



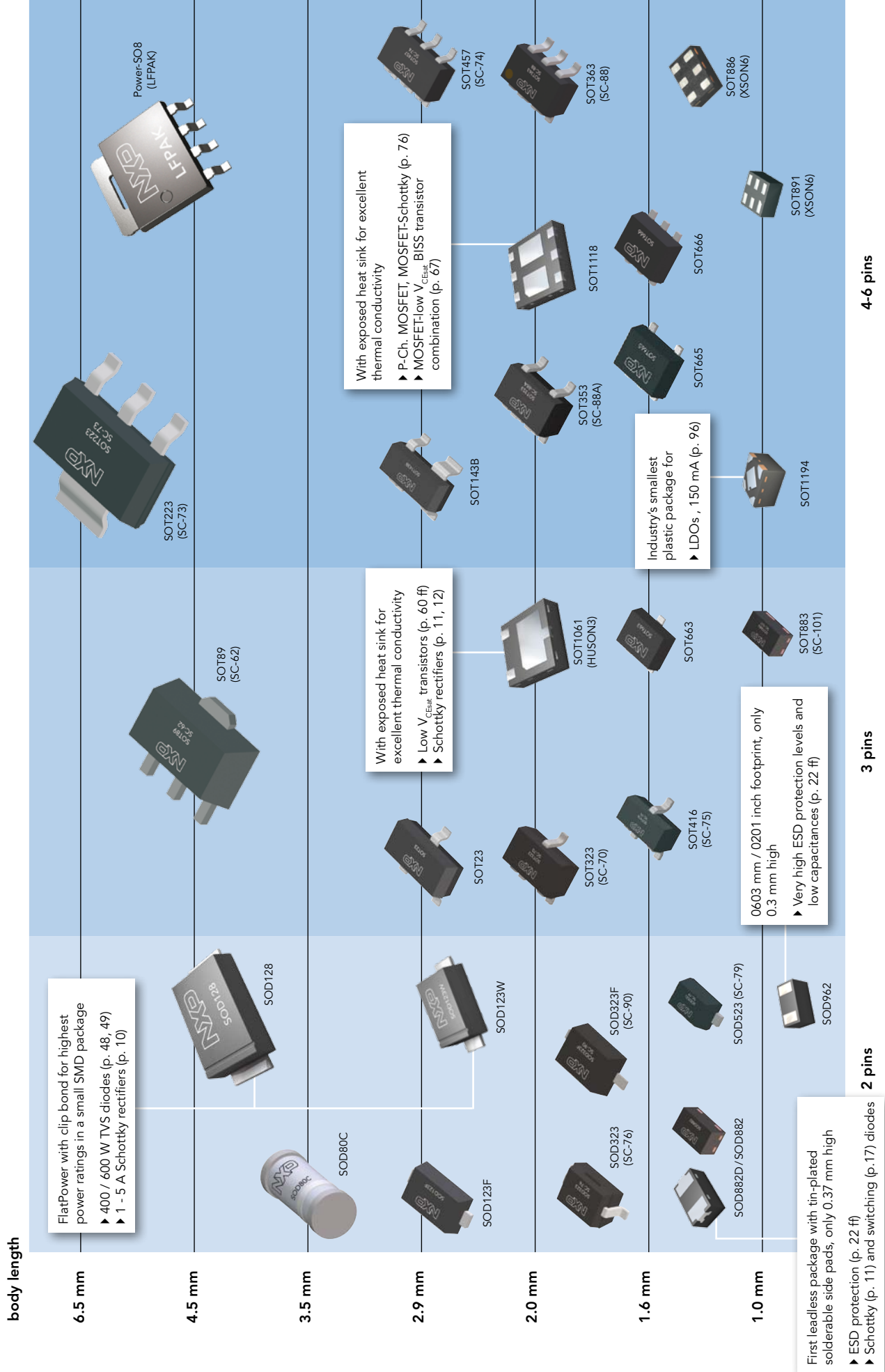
# Discrete Semiconductors Selection Guide 2011

Diodes, protection and signal conditioning devices,  
bipolar transistors, MOSFETs, thyristors



# Discrete Semiconductors packages – portfolio and highlights

## Small SMD packages with 2 - 6 pins



# The first leadless package with solderable side pads

## Solderable (Tin-plated) exposed side pads

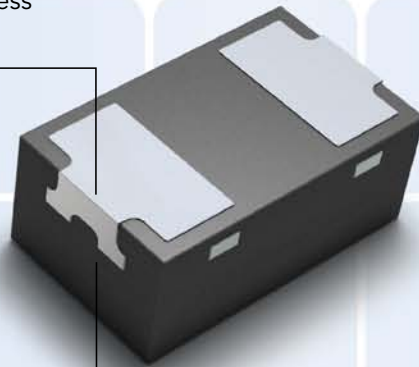
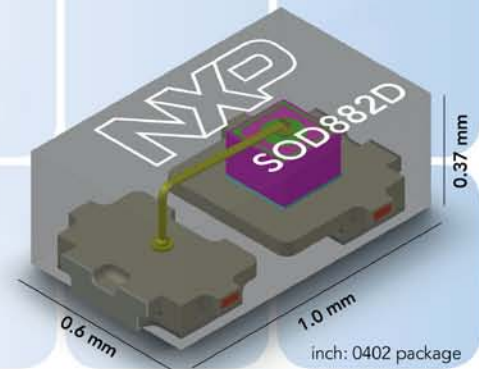
- ▶ Easy visible inspection of solder pads
- ▶ Very high mechanical robustness
- ▶ Post-soldering stability

Full thermal, electrical, mounting and footprint compatibility to leadless 1006 mm packages (inch: 0402)

- ▶ **Height only 0.37 mm**

## Built for a range of functions

- ▶ Protection, Switching and Schottky diodes
- ▶ **Ideal for small and thin devices**



Get ready to improve your ultra-flat PCB design with our SOD882D package.

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# Support tools

Check the NXP Standard Products Portal [www.standardproducts.nxp.com](http://www.standardproducts.nxp.com)

Your first stop for NXP's wide range of diodes, bipolar transistors, MOSFETs, thyristors and ESD protection products. The gateway focuses on:

- Product and application information
- Recently launched products
- News items and related documents
- Design hints, with simple solutions to some of today's common design challenges, incl. energy efficiency, integration, packaging, and protection



Direct links to popular design support tools and items:

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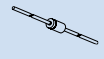


FAQ (Frequently Asked Questions) Discretes

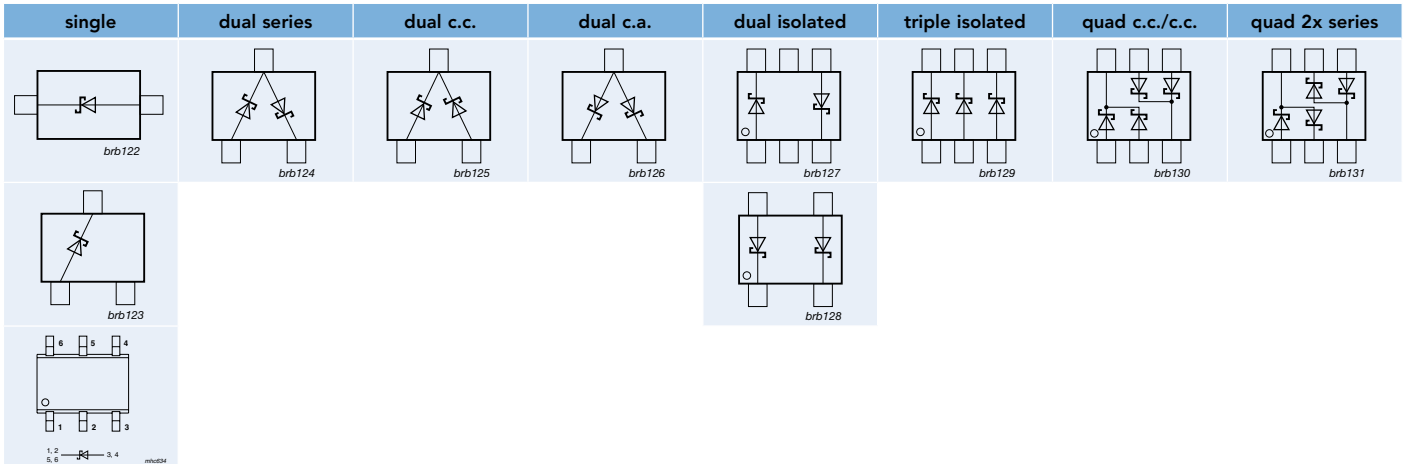
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## General purpose Schottky diodes ≤ 250 mA




















| $I_F$ max (mA) | $V_R$ max (V) | $V_F$ max (mV) | @ $I_F$ (mA) | $I_R$ max (μA) | @ $V_R$ (V) | Package       | SOD80C (MiniMelf)                                                                 | SOD68 (DO-34)                                                                       | SOT23                                                                               | SOT143B                                                                             |                 |  |  |  |  |
|----------------|---------------|----------------|--------------|----------------|-------------|---------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-----------------|--|--|--|--|
|                |               |                |              |                |             |               |  |  |  |  |                 |  |  |  |  |
|                |               |                |              |                |             |               | Size (mm)                                                                         | 3.5 x 1.5 x 1.5                                                                     | 3.04 x 1.6 x 0.55                                                                   | 2.9 x 1.3 x 1.0                                                                     | 2.9 x 1.3 x 1.0 |  |  |  |  |
|                |               |                |              |                |             |               | $P_{tot}$ (mW)                                                                    | 300                                                                                 | 500                                                                                 | 250                                                                                 | 250             |  |  |  |  |
| 70             | 70            | 750            | 10           | 0.1            | 50          | single        |                                                                                   |                                                                                     | BAS70                                                                               |                                                                                     |                 |  |  |  |  |
|                |               |                |              |                |             | dual series   |                                                                                   |                                                                                     | BAS70-04                                                                            |                                                                                     |                 |  |  |  |  |
|                |               |                |              |                |             | dual c.c.     |                                                                                   |                                                                                     | BAS70-05                                                                            |                                                                                     |                 |  |  |  |  |
|                |               |                |              |                |             | dual c.a.     |                                                                                   |                                                                                     | BAS70-06                                                                            |                                                                                     |                 |  |  |  |  |
|                |               |                |              |                |             | dual isolated |                                                                                   |                                                                                     |                                                                                     | BAS70-07                                                                            |                 |  |  |  |  |
| 120            | 40            | 370            | 1            | 0.5            | 30          | single        |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                 |  |  |  |  |
|                |               |                |              |                |             | single        |                                                                                   |                                                                                     | BAS40                                                                               |                                                                                     |                 |  |  |  |  |
|                |               |                |              |                |             | dual series   |                                                                                   |                                                                                     | BAS40-04                                                                            |                                                                                     |                 |  |  |  |  |
|                |               |                |              |                |             | dual c.c.     |                                                                                   |                                                                                     | BAS40-05                                                                            |                                                                                     |                 |  |  |  |  |
|                |               |                |              |                |             | dual c.a.     |                                                                                   |                                                                                     | BAS40-06                                                                            |                                                                                     |                 |  |  |  |  |
|                |               | dual isolated  |              |                |             | BAS40-07      |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                 |  |  |  |  |
|                |               | quad c.c./c.c. |              |                |             |               |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                 |  |  |  |  |
|                |               | quad 2x series |              |                |             |               |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                 |  |  |  |  |
|                |               | 200            | 30           | 300            | 10          | 30            | 10                                                                                | single                                                                              |                                                                                     |                                                                                     |                 |  |  |  |  |
|                |               |                |              |                |             |               |                                                                                   | single                                                                              |                                                                                     |                                                                                     | BAT754          |  |  |  |  |
| dual series    |               |                |              |                |             |               |                                                                                   |                                                                                     | BAT754S                                                                             |                                                                                     |                 |  |  |  |  |
| 340            | 10            |                |              | 2              | 25          | 25            | dual c.c.                                                                         |                                                                                     |                                                                                     | BAT754C                                                                             |                 |  |  |  |  |
|                |               |                |              |                |             |               | dual c.a.                                                                         |                                                                                     |                                                                                     | BAT754A                                                                             |                 |  |  |  |  |
|                |               |                |              |                |             |               | triple isolated                                                                   |                                                                                     |                                                                                     |                                                                                     |                 |  |  |  |  |
| 400            | 10            |                |              | 2              | 25          | 25            | single                                                                            | BAS85                                                                               | BAT85                                                                               | BAT54                                                                               |                 |  |  |  |  |
|                |               |                |              |                |             |               | dual series                                                                       |                                                                                     |                                                                                     | BAT54S                                                                              |                 |  |  |  |  |
|                |               |                |              |                |             |               | dual c.c.                                                                         |                                                                                     |                                                                                     | BAT54C                                                                              |                 |  |  |  |  |
|                |               |                |              |                |             |               | dual c.a.                                                                         |                                                                                     |                                                                                     | BAT54A                                                                              |                 |  |  |  |  |
|                |               |                |              |                |             |               | dual isolated                                                                     |                                                                                     |                                                                                     |                                                                                     | BAT74           |  |  |  |  |
|                |               |                |              |                |             |               | triple isolated                                                                   |                                                                                     |                                                                                     |                                                                                     |                 |  |  |  |  |
| 500            | 200           |                |              | 30             | 10          | 10            | quad c.c./c.c.                                                                    |                                                                                     |                                                                                     |                                                                                     |                 |  |  |  |  |
|                |               |                |              |                |             |               | quad 2x series                                                                    |                                                                                     |                                                                                     |                                                                                     |                 |  |  |  |  |
|                |               |                |              |                |             |               | single                                                                            |                                                                                     |                                                                                     |                                                                                     |                 |  |  |  |  |
| 40             | 50            | 450            | 10           | 5              | 40          | single        |                                                                                   |                                                                                     | BAT721                                                                              |                                                                                     |                 |  |  |  |  |
|                |               |                |              |                |             | single        |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                 |  |  |  |  |
|                |               |                |              |                |             | dual series   |                                                                                   |                                                                                     | BAT721S                                                                             |                                                                                     |                 |  |  |  |  |
|                |               |                |              |                |             | dual c.c.     |                                                                                   |                                                                                     | BAT721C                                                                             |                                                                                     |                 |  |  |  |  |
|                |               |                |              |                |             | dual c.a.     |                                                                                   |                                                                                     | BAT721A                                                                             |                                                                                     |                 |  |  |  |  |
|                |               |                |              |                |             | 360           | 10                                                                                | 0.5                                                                                 | 25                                                                                  | 25                                                                                  | single          |  |  |  |  |
|                |               |                |              |                |             |               |                                                                                   |                                                                                     |                                                                                     |                                                                                     | single          |  |  |  |  |
|                |               |                |              |                |             |               |                                                                                   |                                                                                     |                                                                                     |                                                                                     | dual series     |  |  |  |  |
|                |               |                |              |                |             | 420           | 30                                                                                | 0.5                                                                                 | 25                                                                                  | 25                                                                                  | dual c.c.       |  |  |  |  |
| dual c.a.      |               |                |              |                |             |               |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                 |  |  |  |  |
| single         |               |                |              |                |             |               |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                 |  |  |  |  |
| 250            | 100           | 850            | 250          | 4              | 75          | single        | BAS86                                                                             | BAT86                                                                               |                                                                                     |                                                                                     |                 |  |  |  |  |
|                |               |                |              |                |             | single        |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                 |  |  |  |  |



Medium power low  $V_F$  Schottky rectifiers single  $\geq 200$  mA

| $I_F$ max (A) | $V_R$ max (V) | $V_F$ max (mV)<br>@ $I_F$ max | $I_R$ max (mA)<br>@ $V_R$ max | Package                            | SOD128                                                                            | SOT457<br>(SC-74)                                                                  | SOT23                                                                               | SOD123W                                                                             | SOD123F                                                                             |  |
|---------------|---------------|-------------------------------|-------------------------------|------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--|
|               |               |                               |                               |                                    |  |  |  |  |  |  |
|               |               |                               |                               | Size (mm)                          | 3.8 x 2.5 x 1.0                                                                   | 2.9 x 1.5 x 1.0                                                                    | 2.9 x 1.3 x 1.0                                                                     | 2.6 x 1.7 x 1.0                                                                     | 2.6 x 1.6 x 1.1                                                                     |  |
|               |               |                               |                               | $P_{tot}$ (mW) @ 1 cm <sup>2</sup> | 1050                                                                              | 540                                                                                | 420                                                                                 | 950                                                                                 | 830                                                                                 |  |
| Optimization  |               |                               |                               |                                    |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |  |
| 0.2           | 30            | 480                           | 0.04                          | low $V_F$                          |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |  |
|               | 40            | 600                           | 0.01                          | low $I_R$                          |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |  |
|               | 60            | 600                           | 0.1                           | low $V_F$                          |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |  |
| 0.5           | 20            | 390                           | 0.2                           | low $V_F$                          |                                                                                   |                                                                                    | PMEG2005ET                                                                          |                                                                                     | PMEG2005EH                                                                          |  |
|               |               | 440                           | 1.5                           | low $V_F$                          |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |  |
|               |               | 480                           | 0.01                          | low $I_R$                          |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |  |
|               | 30            | 500                           | 0.03                          | low $I_R$                          |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |  |
|               |               | 430                           | 0.15                          | low $V_F$                          |                                                                                   |                                                                                    | PMEG3005ET                                                                          |                                                                                     | PMEG3005EH                                                                          |  |
|               |               | 500                           | 0.5                           | low $V_F$                          |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |  |
| 40            | 470           | 0.1                           | low $V_F$                     |                                    |                                                                                   | PMEG4005ET                                                                         |                                                                                     | PMEG4005EH                                                                          |                                                                                     |  |
|               | 550           | 0.1                           | low $V_F$                     |                                    |                                                                                   | BAT720                                                                             |                                                                                     |                                                                                     |                                                                                     |  |
| 1.0           | 20            | 340                           | 1                             | low $V_F$                          |                                                                                   |                                                                                    |                                                                                     | PMEG2010ER                                                                          |                                                                                     |  |
|               |               | 375                           | 1.9                           | low $V_F$                          |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |  |
|               |               | 430                           | 0.2                           | low $V_F$                          |                                                                                   |                                                                                    | PMEG2010AET                                                                         |                                                                                     | PMEG2010AEH                                                                         |  |
|               |               | 450                           | 0.05                          | low $I_R$                          |                                                                                   |                                                                                    |                                                                                     | PMEG2010BER                                                                         |                                                                                     |  |
|               |               | 500                           | 0.2                           | low $V_F$                          |                                                                                   |                                                                                    | PMEG2010ET                                                                          |                                                                                     | PMEG2010EH                                                                          |  |
|               |               | 550                           | 0.07                          | low $I_R$                          |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |  |
|               | 30            | 450                           | 1.0                           | low $V_F$                          |                                                                                   |                                                                                    | 1PS74SB23                                                                           |                                                                                     |                                                                                     |  |
|               |               | 360                           | 1.5                           | low $V_F$                          | PMEG3010EP                                                                        |                                                                                    |                                                                                     | PMEG3010ER                                                                          |                                                                                     |  |
|               |               | 450                           | 0.05                          | low $I_R$                          | PMEG3010BEP                                                                       |                                                                                    |                                                                                     | PMEG3010BER                                                                         |                                                                                     |  |
|               |               | 520                           | 0.05                          | low $I_R$                          |                                                                                   |                                                                                    |                                                                                     |                                                                                     | PMEG3010CEH                                                                         |  |
|               |               | 560                           | 0.15                          | low $V_F$                          |                                                                                   |                                                                                    | PMEG3010ET                                                                          |                                                                                     | PMEG3010EH                                                                          |  |
|               |               | 680                           | 0.5                           | low $V_F$                          |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |  |
|               | 40            | 490                           | 0.05                          | low $V_F$                          | PMEG4010EP                                                                        |                                                                                    |                                                                                     | PMEG4010ER                                                                          |                                                                                     |  |
|               |               | 640                           | 0.1                           | low $V_F$                          |                                                                                   |                                                                                    | PMEG4010ET                                                                          |                                                                                     | PMEG4010EH                                                                          |  |
|               |               | 570                           | 0.05                          | low $I_R$                          |                                                                                   |                                                                                    |                                                                                     |                                                                                     | PMEG4010CEH                                                                         |  |
| 60            | 530           | 0.06                          | low $V_F$                     | PMEG6010EP                         |                                                                                   |                                                                                    | PMEG6010ER                                                                          |                                                                                     |                                                                                     |  |
|               | 650           | 0.35                          | low $V_F$                     |                                    |                                                                                   | PMEG6010AED                                                                        |                                                                                     |                                                                                     |                                                                                     |  |
|               | 660           | 0.05                          | low $I_R$                     |                                    |                                                                                   |                                                                                    |                                                                                     | PMEG6010CEH                                                                         |                                                                                     |  |
| 1.5           | 20            | 660                           | 0.07                          | low $I_R$                          |                                                                                   |                                                                                    |                                                                                     | PMEG2015EH                                                                          |                                                                                     |  |
|               | 30            | 550                           | 1.0                           | low $V_F$                          |                                                                                   |                                                                                    |                                                                                     | PMEG3015EH                                                                          |                                                                                     |  |
| 2.0           | 10            | 460                           | 3.0                           | low $V_F$                          |                                                                                   |                                                                                    |                                                                                     |                                                                                     | PMEG1020EH                                                                          |  |
|               |               | 420                           | 1.9                           | low $V_F$                          |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |  |
|               | 20            | 525                           | 0.2                           | low $V_F$                          |                                                                                   |                                                                                    |                                                                                     |                                                                                     | PMEG2020EH                                                                          |  |
|               |               | 360                           | 3.0                           | low $V_F$                          | PMEG3020EP                                                                        |                                                                                    |                                                                                     |                                                                                     |                                                                                     |  |
|               |               | 420                           | 1.5                           | low $V_F$                          | PMEG3020CEP                                                                       |                                                                                    |                                                                                     | PMEG3020ER                                                                          |                                                                                     |  |
|               |               | 450                           | 0.1                           | low $I_R$                          | PMEG3020BEP                                                                       |                                                                                    |                                                                                     |                                                                                     |                                                                                     |  |
|               |               | 470                           | 2.5                           | low $V_F$                          |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |  |
|               |               | 520                           | 0.05                          | low $I_R$                          | PMEG3020DEP                                                                       |                                                                                    |                                                                                     | PMEG3020BER                                                                         |                                                                                     |  |
|               | 30            | 620                           | 1.0                           | low $V_F$                          |                                                                                   |                                                                                    |                                                                                     |                                                                                     | PMEG3020EH                                                                          |  |
|               |               | 490                           | 0.1                           | low $V_F$                          | PMEG4020EP                                                                        |                                                                                    |                                                                                     | PMEG4020ER                                                                          |                                                                                     |  |
|               |               | 535                           | 0.1                           | low $V_F$                          |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |  |
|               |               | 530                           | 0.15                          | low $V_F$                          | PMEG6020EP                                                                        |                                                                                    |                                                                                     | PMEG6020ER                                                                          |                                                                                     |  |
| 60            | 575           | 0.25                          | low $V_F$                     |                                    |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |  |
|               |               |                               |                               |                                    |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |  |
| 3.0           | 10            | 530                           | 3.0                           | low $V_F$                          |                                                                                   |                                                                                    |                                                                                     |                                                                                     | PMEG1030EH                                                                          |  |
|               | 30            | 360                           | 5.0                           | low $V_F$                          | PMEG3030EP                                                                        |                                                                                    |                                                                                     |                                                                                     |                                                                                     |  |
|               |               | 450                           | 0.15                          | low $I_R$                          | PMEG3030BEP                                                                       |                                                                                    |                                                                                     |                                                                                     |                                                                                     |  |
|               | 40            | 490                           | 0.2                           | low $V_F$                          | PMEG4030EP                                                                        |                                                                                    |                                                                                     |                                                                                     |                                                                                     |  |
|               |               | 540                           | 0.1                           | low $I_R$                          |                                                                                   |                                                                                    |                                                                                     | PMEG4030ER                                                                          |                                                                                     |  |
| 60            | 530           | 0.2                           | low $V_F$                     | PMEG6030EP                         |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |  |
| 5.0           | 30            | 360                           | 8.0                           | low $V_F$                          | PMEG3050EP                                                                        |                                                                                    |                                                                                     |                                                                                     |                                                                                     |  |
|               |               | 450                           | 0.25                          | low $I_R$                          | PMEG3050BEP                                                                       |                                                                                    |                                                                                     |                                                                                     |                                                                                     |  |
|               | 40            | 490                           | 0.3                           | low $V_F$                          | PMEG4050EP                                                                        |                                                                                    |                                                                                     |                                                                                     |                                                                                     |  |

Medium power low  $V_F$  Schottky rectifiers dual  $\geq 200$  mAtypes in **bold** represent new products

| $I_F$ max (A) | $V_R$ max (V) | $V_F$ max (mV)<br>@ $I_F$ max | $I_R$ max (mA)<br>@ $V_R$ max | Optimization | Package                                                                                            | SOT223<br>(SC-73)                                                                                | SOT23                                                                               | SOT1061                                                                             | SOT666                                                                              |                    |
|---------------|---------------|-------------------------------|-------------------------------|--------------|----------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--------------------|
|               |               |                               |                               |              |                                                                                                    |                |  |  |  |                    |
|               |               |                               |                               |              |                                                                                                    | Size (mm)                                                                                        | Size (mm)                                                                           | Size (mm)                                                                           | Size (mm)                                                                           |                    |
|               |               |                               |                               |              |                                                                                                    | $P_{tot}$ (mW)                                                                                   | 1500                                                                                | 250                                                                                 | 1000                                                                                | 300                |
| 0.2           | 30            | 480                           | 0.03                          | low $V_F$    | dual isolated<br> |                                                                                                  |                                                                                     |                                                                                     |                                                                                     | PMEG3002TV         |
|               | 60            | 600                           | 0.1                           | low $V_F$    |                   |                                                                                                  |                                                                                     |                                                                                     |                                                                                     | PMEG6002TV         |
| 0.5           | 20            | 390                           | 0.2                           | low $V_F$    | dual c.c.<br>     |                                                                                                  |                                                                                     | PMEG2005CT                                                                          |                                                                                     |                    |
|               | 30            | 430                           | 0.15                          | low $V_F$    |                   |                                                                                                  |                                                                                     | PMEG3005CT                                                                          |                                                                                     |                    |
|               | 40            | 470                           | 0.1                           | low $V_F$    |                   |                                                                                                  |                                                                                     | PMEG4005CT                                                                          |                                                                                     |                    |
| 1.0           | 25            | 450                           | 1.0                           | low $V_F$    | dual series<br>   | BAT120S                                                                                          |                                                                                     |                                                                                     |                                                                                     |                    |
|               |               |                               |                               | low $V_F$    | dual c.c.<br>     | BAT120C                                                                                          |                                                                                     |                                                                                     |                                                                                     |                    |
|               |               |                               |                               | low $V_F$    | dual c.a.<br>    | BAT120A                                                                                          |                                                                                     |                                                                                     |                                                                                     |                    |
|               | 40            | 500                           | 0.05                          | low $V_F$    | dual c.c.<br>   |                                                                                                  |                                                                                     |                                                                                     | <b>PMEG4010CPA</b>                                                                  |                    |
|               |               |                               |                               | low $V_F$    | dual c.c.<br>   |                                                                                                  |                                                                                     |                                                                                     | <b>PMEG6010CPA</b>                                                                  |                    |
|               | 60            | 650                           | 0.35                          | low $V_F$    | dual series<br> | BAT160S                                                                                          |                                                                                     |                                                                                     |                                                                                     |                    |
|               |               |                               |                               | low $V_F$    | dual c.c.<br>   | BAT160C                                                                                          |                                                                                     |                                                                                     |                                                                                     |                    |
|               |               |                               |                               | low $V_F$    | dual c.a.<br>   | BAT160A                                                                                          |                                                                                     |                                                                                     |                                                                                     |                    |
|               | 2.0           | 20                            | 420                           | 1.0          | low $V_F$                                                                                          | dual c.c.<br> |                                                                                     |                                                                                     |                                                                                     | <b>PMEG2020CPA</b> |
| 30            |               | 440                           | 2.0                           | low $V_F$    | dual c.c.<br>   |                                                                                                  |                                                                                     |                                                                                     | <b>PMEG3020CPA</b>                                                                  |                    |

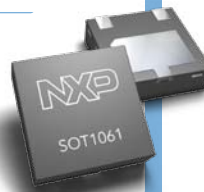
## In the Spotlight

## Medium power single and dual Schottky rectifiers in SOT1061

Small (2 x 2 x 0.65 mm) leadless medium power package SOT1061

Exposed heat sink for excellent thermal and electrical performance ( $P_{tot} > 1$  W)High forward-current capability ( $I_F$  up to 2 A) with low forward voltage dropHigh reverse voltage ( $V_R$  up to 60 V)









































AEC-Q101 qualified





# General purpose Zener diodes

types in **bold** represent new products

| $I_f$ max (mA) | $P_{ZSM}$ (W) | $V_z$ nom (V) | $V_z$ tolerance | Note    | Configuration                                                                                     | Series           | Package                                                                               | Size (mm)          | $P_{tot}$ (mW) |
|----------------|---------------|---------------|-----------------|---------|---------------------------------------------------------------------------------------------------|------------------|---------------------------------------------------------------------------------------|--------------------|----------------|
| 500            | -             | 3.3~24        | C               | Eur     | single           | 1N47xxA series   |    | 4.8 x 2.6 x 0.81   | 1000           |
|                | 60            | 3.6~75        |                 |         |                                                                                                   | BZV85 series     |                                                                                       |                    |                |
| 250            | -             | 2.4~36        | about 2%        | special | single           | NZX series       |    | 4.25 x 1.85 x 0.56 | 400            |
|                | 40            | 2.4~75        | B, C            | Eur     |                                                                                                   | BZX79 series     |                                                                                       |                    |                |
| 400            | 40            | 2.4~75        | C               | Eur     | single           | BZV90 series     |    | 6.5 x 3.5 x 1.65   | 1500           |
| 250            | 40            | 2.4~75        | C               | Eur     | single           | BZV49 series     |    | 4.5 x 2.5 x 1.5    | 1000           |
| 250            | 40            | 2.4~75        | B, C            | Eur     | single           | BZV55 series     |    | 3.5 x 1.5 x 1.5    | 300            |
| 200            | 40            | 2.4~75        | B, C            | Eur     | dual c.a.        | BZB84 series     |    | 2.9 x 1.3 x 1.0    | 250            |
|                |               |               | A, B, C         |         | single           | BZX84 series     |                                                                                       |                    |                |
| 250            | 30            | 5~6.8         | 0.2 V           | Ave     | dual c.a.       | PLVA600A series  |    | 2.9 x 1.3 x 1.0    | 250            |
|                |               |               | 0.2 V           | Ave     | dual c.a.       | PLVA2600A series |                                                                                       |                    |                |
| 250            | -             | 3.0~30        | about 2.5%      | special | single         | NZH series       |  | 2.6 x 1.6 x 1.1    | 830            |
|                | 40            | 2.4~75        | B, C            | Eur     |                                                                                                   | BZT52H series    |                                                                                       |                    |                |
| 200            | 40            | 2.7~24        | B2              | Jap     | dual isolated  | PZUxDB2 series   |  | 2.0 x 1.25 x 0.95  | 300            |
| 200            | 40            | 2.4~15        | C               | Eur     | dual c.a.      | BZB784 series    |  | 2.0 x 1.25 x 0.95  | 350            |
| 200            | 30            | 100           | C               | Eur     | back-to-back   | BZB100A          |  | 1.7 x 1.25 x 0.95  | 300            |
|                | 40            | 2.4~36        | B2              | Jap     | single         | PDZ-B series     |                                                                                       |                    |                |
| 250            | 40            | 2.4~75        | B, C            | Eur     | single         | BZX384 series    |  | 1.7 x 1.25 x 0.95  | 300            |
| 200            | 40            | 2.4~36        | B, B1, B2, B3   | Jap     | single         | PZUxBA series    |                                                                                       |                    |                |
| 200            | 60            | 100           | C               | Eur     | single         | BZX100A          |  | 1.7 x 1.25 x 0.7   | 550            |
| 200            | 40            | 2.4~36        | B, B1, B2, B3   | Jap     | single         | PZUxB series     |                                                                                       |                    |                |
| 250            | 40            | 2.4~75        | B, C            | Eur     | single         | BZX84J series    |                                                                                       |                    |                |
| 200            | 40            | 2.4~15        | C               | Eur     | dual c.a.      | BZB984 series    |  | 1.6 x 1.2 x 0.55   | 350            |
| 200            | 40            | 2.4~75        | B, C            | Eur     | single         | BZX585 series    |  | 1.2 x 0.8 x 0.6    | 300            |
| 200            | 40            | 2.4~75        | B, C            | Eur     | single         | BZX884 series    |  | 1.0 x 0.6 x 0.5    | 250            |
|                |               | 2.4~36        | B, B2           | Jap     |                                                                                                   | PZUxBL series    |                                                                                       |                    |                |
| 250            | 180           | 5.6           | C               | Eur     | single         | <b>TDZ5V6J</b>   |  | 1.7 x 1.25 x 0.7   | 500            |

Notes:

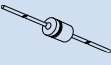
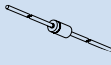






















Jap: B selection: app. 5%  $V_z$  tolerance, B1, B2, B3 selections: app. 2%  $V_z$  tolerance in sequential intervals

Eur: A selection: app. 1%  $V_z$  tolerance, B selection: app. 2%  $V_z$  tolerance, C selection: app. 5%  $V_z$  tolerance; the selections are in overlapping intervals



























Ave: low voltage avalanche regulator diodes

dual c.a.: dual common anode

General purpose switching diodes  $\leq 100V$









| $V_R$ max (V) | $V_F$ max (V) | @ $I_F$ (mA) | $I_R$ max (nA) | @ $V_R$ (V) | $t_{rr}$ max (ns) | Package                                                                             | SOD27 (DO-35)                                                                     | SOD68 (DO-34)                                                                     | SOD80C (MiniMelf)                                                                   | SOT23                                                                               | SOT143B                                                                             | SOD123F                                                                             |                 |  |
|---------------|---------------|--------------|----------------|-------------|-------------------|-------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-----------------|--|
|               |               |              |                |             |                   |                                                                                     |  |  |  |  |  |  |                 |  |
|               |               |              |                |             |                   |                                                                                     | Size (mm)                                                                         | 4.25 x 1.85 x 0.56                                                                | 3.04 x 1.6 x 0.55                                                                   | 3.5 x 1.5 x 1.5                                                                     | 2.9 x 1.3 x 1.0                                                                     | 2.9 x 1.3 x 1.0                                                                     | 2.6 x 1.6 x 1.1 |  |
|               |               |              |                |             |                   |                                                                                     | $P_{tot}$ (mW)                                                                    | 500                                                                               | 500                                                                                 | 500                                                                                 | 250                                                                                 | 250                                                                                 | 830             |  |
| 50            | 1             | 50           | 100            | 50          | 4                 |    |                                                                                   |                                                                                   |                                                                                     | BAL74                                                                               |                                                                                     |                                                                                     |                 |  |
|               |               |              |                |             |                   |    |                                                                                   |                                                                                   |                                                                                     | BAV74                                                                               |                                                                                     |                                                                                     |                 |  |
| 70            | 1             | 50           | 1000           | 70          | 4                 |    |                                                                                   |                                                                                   |                                                                                     | BAL99                                                                               |                                                                                     |                                                                                     |                 |  |
| 75            | 1             | 10           | 25             | 20          | 4                 |    |                                                                                   | 1N4531                                                                            |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                 |  |
|               |               | 50           | 1000           | 75          | 4                 |    |                                                                                   |                                                                                   |                                                                                     |                                                                                     | BAS28                                                                               |                                                                                     |                 |  |
|               |               | 100          | 5000           | 75          | 4                 |   |                                                                                   |                                                                                   | BAS32L                                                                              |                                                                                     |                                                                                     |                                                                                     |                 |  |
| 90            | 1             | 50           | 500            | 80          | 4                 |  |                                                                                   |                                                                                   |                                                                                     | BAW56                                                                               |                                                                                     |                                                                                     |                 |  |
|               |               |              |                |             |                   |  |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                 |  |
|               |               |              |                |             |                   |  |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                 |  |
| 100           | 1             | 10           | 25             | 20          | 4                 |  | 1N4148                                                                            |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                 |  |
|               |               | 50           | 500            | 80          | 4                 |  |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     | BAS16H                                                                              |                 |  |
|               |               |              |                |             |                   |  |                                                                                   |                                                                                   |                                                                                     |                                                                                     | BAS16                                                                               |                                                                                     |                 |  |
|               |               |              |                |             |                   |  |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                 |  |
|               |               |              |                |             |                   |  |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                 |  |
|               |               |              |                |             |                   |  |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     | BAV70           |  |
|               |               |              |                |             |                   |  |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                 |  |
|               |               |              |                |             |                   |  |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     | BAV99           |  |
|               |               |              |                |             |                   |  |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                 |  |

General purpose switching diodes > 100V

| $V_R$ max (V) | $V_F$ max (V) | $I_F$ (mA) | $I_R$ max (mA) | $V_R$ (V) | $t_r$ max (ns) | <br>Package<br>Size (mm)<br>$P_{tot}$ (mW) | SOD27 (DO-35)                                                                     | SOD80C (MiniMelf)                                                                 | SOT457 (SC-74)                                                                    | SOT23                                                                             | SOT143B                                                                           | SOD123F                                                                            | SOT323 (SC-70)                                                                      | SOT363 (SC-88)                                                                      | SOD323 (SC-76)                                                                      | SOD323F (SC-90)                                                                     | SOD523 (SC-79)                                                                      |         |  |  |         |  |  |        |
|---------------|---------------|------------|----------------|-----------|----------------|-----------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|---------|--|--|---------|--|--|--------|
|               |               |            |                |           |                |                                                                                                                             |  |  |  |  |  |  |  |  |  |  |  |         |  |  |         |  |  |        |
| 150           | 1             | 100        | 100            | 150       | 50             |  BAV20                                     |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |         |  |  |         |  |  |        |
| ≥200          | 1             | 100        | 100            | 200       | 50             |  BAV21                                     |                                                                                   | BAV103                                                                            |                                                                                   |                                                                                   |                                                                                   |                                                                                    | BAS21H                                                                              |                                                                                     |                                                                                     | BAS321                                                                              |                                                                                     |         |  |  |         |  |  |        |
|               |               |            |                |           |                |  BAS21                                     |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   | BAS21                                                                              |                                                                                     |                                                                                     |                                                                                     | BAS21W                                                                              |                                                                                     |         |  |  |         |  |  |        |
|               |               |            |                |           |                |  BAV23                                     |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     | BAV23                                                                               |                                                                                     |                                                                                     |         |  |  |         |  |  |        |
|               |               |            |                |           |                |  BAV23A                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     | BAS21AW |  |  |         |  |  |        |
|               |               |            |                |           |                |  BAV23C                                  |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |         |  |  |         |  |  |        |
|               |               |            |                |           |                |  BAV23S                                  |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |         |  |  | BAS21SW |  |  |        |
|               |               |            |                |           |                |  BAS21VD                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |         |  |  |         |  |  |        |
|               |               |            |                |           |                |  BAS21J                                  |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |         |  |  |         |  |  | BAS521 |
| 300           | 1.1           | 100        | 150            | 250       | 50             |  BAS101                                  |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |         |  |  |         |  |  |        |
|               |               |            |                |           |                |  BAS101S                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |         |  |  |         |  |  |        |
|               |               |            |                |           |                |  BAW101                                  |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |         |  |  |         |  |  |        |
|               |               |            |                |           |                |  BAW101S                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |         |  |  |         |  |  |        |
|               |               |            |                |           |                |  BAS101S                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |         |  |  |         |  |  |        |





## Ultrafast recovery power diodes

types in **bold** represent new products

| $V_{RRM}$ (V) | $I_{FAV}$ (A) | $V_F$ (typ) @ 150C (V) | $I_F$ (A) | $t_{rr}$ (typ) @ 25C (ns) | SOD59 (TO220AC)                                                                   | SOD113 (2-pin SOT186A)                                                            | SOT78 (TO220AB)                                                                   | SOT186A (isolated TO220AB)                                                        | SOT223                                                                              | SOT226 (I <sup>2</sup> PAK)                                                         | SOT404 (D <sup>2</sup> PAK)                                                         | SOT428 (DPAK)                                                                       |
|---------------|---------------|------------------------|-----------|---------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|               |               |                        |           |                           |  |  |  |  |  |  |  |  |
| 100           | 8             | 0.8                    | 8         | 20                        | BYW29E-100                                                                        |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|               | 2 x 10        | 0.72                   | 8         | 20                        |                                                                                   |                                                                                   | BYV32E-100                                                                        |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| 150           | 2 x 0.75      | 0.5                    | 0.5       | 10                        |                                                                                   |                                                                                   |                                                                                   |                                                                                   | BYV40E-150                                                                          |                                                                                     |                                                                                     |                                                                                     |
|               | 8             | 0.8                    | 8         | 20                        | BYW29E-150                                                                        |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|               | 2 x 10        | 0.72                   | 8         | 20                        |                                                                                   |                                                                                   | BYV32E-150                                                                        |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| 200           | 2 x 15        | 0.78                   | 15        | 20                        |                                                                                   |                                                                                   | BYV42E-150                                                                        |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|               | 8             | 0.8                    | 8         | 20                        | BYW29E-200                                                                        | BYW29EX-200                                                                       |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     | BYW29ED-200                                                                         |
|               | 2 x 5         | 0.8                    | 5         | 15                        |                                                                                   |                                                                                   | BYQ28E-200                                                                        | BYQ28X-200                                                                        |                                                                                     |                                                                                     |                                                                                     | BYQ28ED-200                                                                         |
|               | 14            | 0.83                   | 14        | 20                        | BYV79E-200                                                                        |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|               | 2 x 8         | 0.84                   | 8         | 20                        |                                                                                   |                                                                                   | BYQ30E-200                                                                        |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|               | 2 x 10        | 0.72                   | 8         | 20                        |                                                                                   |                                                                                   | BYV32E-200                                                                        |                                                                                   |                                                                                     | <b>BYV32G-200</b>                                                                   | BYV32EB-200                                                                         |                                                                                     |
| 300           | 2 x 15        | 0.78                   | 15        | 20                        |                                                                                   |                                                                                   | BYV42E-200                                                                        |                                                                                   |                                                                                     | <b>BYV42G-200</b>                                                                   | BYV42EB-200                                                                         |                                                                                     |
|               | 2 x 5         | 0.95                   | 5         | 50                        |                                                                                   |                                                                                   | BYT28-300                                                                         |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| 400           | 9             | 0.9                    | 8         | 50                        | BYV29-400                                                                         |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|               | 2 x 10        | 0.87                   | 10        | 50                        |                                                                                   |                                                                                   | BYV34-400                                                                         |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| 500           | 9             | 0.9                    | 8         | 50                        | BYV29-500                                                                         | BYV29X-500                                                                        |                                                                                   |                                                                                   |                                                                                     |                                                                                     | BYV29B-500                                                                          |                                                                                     |
|               | 2 x 5         | 0.95                   | 5         | 50                        |                                                                                   |                                                                                   | BYT28-500                                                                         |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|               | 15            | 0.9                    | 15        | 50                        | BYT79-500                                                                         |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|               | 2 x 10        | 0.87                   | 10        | 50                        |                                                                                   |                                                                                   | BYV34-500                                                                         |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| 600           | 2 x 15        | 0.95                   | 15        | 50                        |                                                                                   |                                                                                   | BYV44-500                                                                         |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|               | 5             | 0.97                   | 5         | 50                        |                                                                                   | BYV25X-600                                                                        |                                                                                   |                                                                                   |                                                                                     | BYV25G-600                                                                          |                                                                                     | BYV25D-600                                                                          |
|               | 8             | 1.07                   | 8         | 60                        | BYR29-600                                                                         | BYR29X-600                                                                        |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|               | 9             | 0.97                   | 8         | 50                        | BYV29-600                                                                         | BYV29X-600                                                                        |                                                                                   |                                                                                   |                                                                                     | BYV29G-600                                                                          | BYV29B-600                                                                          |                                                                                     |
|               | 15            | 1                      | 15        | 50                        | BYT79-600                                                                         | BYT79X-600                                                                        |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|               | 2 x 10        | 0.92                   | 10        | 50                        |                                                                                   |                                                                                   | BYV34-600                                                                         | BYV34X-600                                                                        |                                                                                     | BYV34G-600                                                                          |                                                                                     |                                                                                     |
|               | 5             | 1.1                    | 5         | 17.5                      |                                                                                   | <b>BYV25FX-600</b>                                                                | <b>BYV25F-600</b>                                                                 |                                                                                   |                                                                                     |                                                                                     | <b>BYV25FB-600</b>                                                                  | <b>BYV25FD-600</b>                                                                  |
|               | 9             | 1.25                   | 8         | 17.5                      |                                                                                   | BYV29FX-600                                                                       | <b>BYV29F-600</b>                                                                 |                                                                                   |                                                                                     |                                                                                     | <b>BYV29FB-600</b>                                                                  | <b>BYV29FD-600</b>                                                                  |
| 800           | 2 x 10        | 1.3                    | 10        | 20                        |                                                                                   |                                                                                   | BYV410-600                                                                        | BYV410X-600                                                                       |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|               | 8             | 1.07                   | 8         | 60                        | BYR29-800                                                                         | BYR29X-800                                                                        |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |



## Hyperfast power diodes

types in **bold** represent new products

| $V_{RRM}$ (V) | $I_{FAV}$ (A) | $V_F$ (typ) @ 150C (V) | $I_F$ (A) | $t_{rr}$ (typ) @ 25C (ns) | SOD59 (TO220AC)                                                                     | SOD113 (2-pin SOT186A)                                                              | SOT78 (TO220AB)                                                                       | SOT404 (D <sup>2</sup> PAK)                                                           |
|---------------|---------------|------------------------|-----------|---------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
|               |               |                        |           |                           |  |  |  |  |
| 600           | 5             | 1.4                    | 5         | 19                        | BYC5-600                                                                            | BYC5X-600                                                                           |                                                                                       | BYC5B-600                                                                             |
|               | 8             | 1.4                    | 8         | 19                        | BYC8-600                                                                            | BYC8X-600                                                                           |                                                                                       | BYC8B-600                                                                             |
|               | 8             | 1.4                    | 8         | 19                        | <b>BYC8D-600</b>                                                                    | <b>BYC8DX-600</b>                                                                   |                                                                                       |                                                                                       |
|               | 8             | 2                      | 8         | 12.5                      |                                                                                     | BYC58X-600                                                                          |                                                                                       |                                                                                       |
|               | 10            | 1.4                    | 10        | 19                        | BYC10-600                                                                           | BYC10X-600                                                                          |                                                                                       | BYC10B-600                                                                            |
|               | 2 x 5         | 1.4                    | 5         | 19                        |                                                                                     |                                                                                     | BYC10-600CT                                                                           |                                                                                       |
|               | 15            | 1.4                    | 15        | 19                        | BYC15-600                                                                           | BYC15X-600                                                                          |                                                                                       |                                                                                       |
|               | 20            | 1.4                    | 20        | 19                        | BYC20-600                                                                           | BYC20X-600                                                                          |                                                                                       |                                                                                       |

# Standard ESD protection devices

types in **bold** represent new products









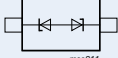






| Number of protected lines |               | $V_{RWM}$ (V) | $C_{line}$ typ (pF) | $C_{line}$ max (pF) | $P_{PP}^{(1)}$ max (W) | ESD rating <sup>(2)</sup> max (kV) | $I_R$ max (μA) @ $V_{RWM}$ | Configuration                                                                     | Type                | Package           | Size (mm)                                                                           |                     |                 |                  |
|---------------------------|---------------|---------------|---------------------|---------------------|------------------------|------------------------------------|----------------------------|-----------------------------------------------------------------------------------|---------------------|-------------------|-------------------------------------------------------------------------------------|---------------------|-----------------|------------------|
| Unidirectional            | Bidirectional |               |                     |                     |                        |                                    |                            |                                                                                   |                     |                   |                                                                                     |                     |                 |                  |
| 1                         | 0             | 3.3           | 207                 | 300                 | 150                    | 30                                 | 2                          |  | PESD3V3S1UL         | SOD882            | 1.0 x 0.6 x 0.5                                                                     |                     |                 |                  |
|                           |               | 5             | 152                 | 200                 | 150                    | 30                                 | 1                          |                                                                                   | PESD5V0S1UL         |                   |                                                                                     |                     |                 |                  |
|                           |               | 12            | 38                  | 75                  | 150                    | 30                                 | 0.05                       |                                                                                   | PESD12VS1UL         |                   |                                                                                     |                     |                 |                  |
|                           |               | 15            | 32                  | 70                  | 150                    | 30                                 | 0.05                       |                                                                                   | PESD15VS1UL         |                   |                                                                                     |                     |                 |                  |
|                           |               | 24            | 23                  | 50                  | 150                    | 23                                 | 0.05                       |                                                                                   | PESD24VS1UL         |                   |                                                                                     |                     |                 |                  |
|                           |               | 5             | 152                 | 200                 | 150                    | 30                                 | 1                          |                                                                                   | <b>PESD5V0S1ULD</b> |                   |                                                                                     |                     |                 |                  |
|                           |               | 12            | 38                  | 75                  | 150                    | 30                                 | 0.05                       |                                                                                   | <b>PESD12VS1ULD</b> |                   |                                                                                     |                     |                 |                  |
|                           |               | 15            | 32                  | 70                  | 150                    | 30                                 | 0.05                       |                                                                                   | <b>PESD15VS1ULD</b> |                   |                                                                                     |                     |                 |                  |
|                           |               | 24            | 23                  | 50                  | 150                    | 23                                 | 0.05                       |                                                                                   | <b>PESD24VS1ULD</b> |                   |                                                                                     |                     |                 |                  |
|                           |               | 3.3           | 207                 | 300                 | 330                    | 30                                 | 2                          |                                                                                   | PESD3V3S1UB         | SOD523 (SC-79)    | 1.2 x 0.8 x 0.6                                                                     |                     |                 |                  |
|                           |               | 5             | 152                 | 200                 | 260                    | 30                                 | 1                          |                                                                                   | PESD5V0S1UB         |                   |                                                                                     |                     |                 |                  |
|                           |               | 12            | 38                  | 75                  | 180                    | 30                                 | 0.05                       |                                                                                   | PESD12VS1UB         |                   |                                                                                     |                     |                 |                  |
|                           |               | 15            | 32                  | 70                  | 160                    | 30                                 | 0.05                       |                                                                                   | PESD15VS1UB         |                   |                                                                                     |                     |                 |                  |
|                           |               | 24            | 23                  | 50                  | 160                    | 23                                 | 0.05                       |                                                                                   | PESD24VS1UB         |                   |                                                                                     |                     |                 |                  |
|                           |               | 5             | 480                 | 530                 | 890                    | 30                                 | 4                          |                                                                                   | PESD5V0S1UA         | SOD323 (SC-76)    | 1.7 x 1.25 x 0.95                                                                   |                     |                 |                  |
|                           |               | 12            | 160                 | 180                 | 600                    | 30                                 | 0.1                        |                                                                                   | PESD12VS1UA         |                   |                                                                                     |                     |                 |                  |
|                           |               | 24            | 23                  | 50                  | 160                    | 23                                 | 0.05                       |                                                                                   | <b>PESD24VS1UA</b>  |                   |                                                                                     |                     |                 |                  |
|                           |               | 5             | 480                 | 530                 | 890                    | 30                                 | 4                          |                                                                                   | PESD5V0S1UJ         | SOD323F (SC-90)   | 1.7 x 1.25 x 0.7                                                                    |                     |                 |                  |
|                           |               | 12            | 160                 | 180                 | 600                    | 30                                 | 0.1                        |                                                                                   | PESD12VS1UJ         |                   |                                                                                     |                     |                 |                  |
|                           |               | 2.5           | 229                 | 300                 | 260                    | 30                                 | 6                          |                                                                                   | PESD5Z2.5           | SOD523 (SC-79)    | 1.2 x 0.8 x 0.6                                                                     |                     |                 |                  |
|                           |               | 3.3           | 172                 | 200                 | 260                    | 30                                 | 0.05                       |                                                                                   | PESD5Z3.3           |                   |                                                                                     |                     |                 |                  |
|                           |               | 5             | 89                  | 150                 | 180                    | 30                                 | 0.05                       |                                                                                   | PESD5Z5.0           |                   |                                                                                     |                     |                 |                  |
|                           |               | 6             | 78                  | 150                 | 180                    | 30                                 | 0.01                       |                                                                                   | PESD5Z6.0           |                   |                                                                                     |                     |                 |                  |
|                           |               | 7             | 69                  | 150                 | 180                    | 30                                 | 0.01                       |                                                                                   | PESD5Z7.0           |                   |                                                                                     |                     |                 |                  |
|                           |               | 12            | 35                  | 75                  | 200                    | 30                                 | 0.01                       |                                                                                   | PESD5Z12            |                   |                                                                                     |                     |                 |                  |
|                           |               | 5             | 68                  | 75                  | 150                    | 30                                 | 1                          |                                                                                   | PESD9X5.0L          |                   |                                                                                     | SOD882              | 1.0 x 0.6 x 0.5 |                  |
|                           |               | 7             | 62                  | 70                  | 150                    | 30                                 | 1                          |                                                                                   | PESD9X7.0L          |                   |                                                                                     |                     |                 |                  |
|                           |               | 0             | 1                   | 5                   | 35                     | 45                                 | 130                        |                                                                                   | 30                  | 0.1               |  | PESD5V0S1BL         | SOD882D         | 1.0 x 0.6 x 0.37 |
|                           |               |               |                     | 5                   | 35                     | 45                                 | 130                        |                                                                                   | 30                  | 0.1               |                                                                                     | <b>PESD5V0S1BLD</b> |                 |                  |
|                           |               |               |                     | 5                   | 35                     | 45                                 | 130                        |                                                                                   | 30                  | 0.1               |                                                                                     | PESD5V0S1BB         | SOD523 (SC-79)  | 1.2 x 0.8 x 0.6  |
| 5                         | 35            |               |                     | 45                  | 130                    | 30                                 | 0.1                        | PESD5V0S1BA                                                                       | SOD323 (SC-76)      | 1.7 x 1.25 x 0.95 |                                                                                     |                     |                 |                  |
| 5.5                       | 35            |               |                     | 45                  | 100                    | 30                                 | 0.1                        | <b>PESD5V0S1BSF</b>                                                               | SOD962              | 0.6 x 0.3 x 0.3   |                                                                                     |                     |                 |                  |

<sup>(1)</sup> 8/20 μs surge pulse acc. to IEC 61000-4-5

<sup>(2)</sup> acc. to IEC 61000-4-2 (contact discharge)

# Low capacitance ESD protection devices

types in **bold** represent new products

| Number of protected lines |               | $V_{RWM}$ (V) | $C_{line}$ typ (pF) | $C_{line}$ max (pF) | $P_{PP}^{(1)}$ max (W) | ESD rating <sup>[2]</sup> max (kV) | $I_R$ max (μA) @ $V_{RWM}$ | Configuration                                                                     | Type                                                                                                    | Package                                                                                                 | Size (mm)                                                                           |
|---------------------------|---------------|---------------|---------------------|---------------------|------------------------|------------------------------------|----------------------------|-----------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Unidirectional            | Bidirectional |               |                     |                     |                        |                                    |                            |                                                                                   |                                                                                                         |                                                                                                         |                                                                                     |
| 1                         | 0             | 3.3           | 34                  | 40                  | 45                     | 30                                 | 0.3                        |  | PESD3V3L1UL                                                                                             | SOD882                                                                                                  | 1.0 x 0.6 x 0.5                                                                     |
|                           |               | 5             | 25                  | 30                  | 42                     | 26                                 | 0.1                        |                                                                                   | PESD5V0L1UL                                                                                             |                      |                                                                                     |
|                           |               | 5             | 25                  | 30                  | 42                     | 26                                 | 0.1                        |                                                                                   | <b>PESD5V0L1ULD</b>                                                                                     | SOD882D<br>          | 1.0 x 0.6 x 0.37                                                                    |
|                           |               | 3.3           | 34                  | 40                  | 45                     | 30                                 | 0.3                        |                                                                                   | PESD3V3L1UB                                                                                             | SOD523 (SC-79)<br>   | 1.2 x 0.8 x 0.6                                                                     |
|                           |               | 5             | 25                  | 30                  | 42                     | 26                                 | 0.1                        |                                                                                   | PESD5V0L1UB                                                                                             |                                                                                                         |                                                                                     |
|                           |               | 3.3           | 34                  | 40                  | 45                     | 30                                 | 0.3                        |                                                                                   | PESD3V3L1UA                                                                                             | SOD323 (SC-76)<br>   | 1.7 x 1.25 x 0.95                                                                   |
|                           |               | 5             | 25                  | 30                  | 42                     | 26                                 | 0.1                        |                                                                                   | PESD5V0L1UA                                                                                             |                                                                                                         |                                                                                     |
|                           |               | 3.3           | 2.6                 | 3.1                 | -                      | 9                                  | 0.1 (@ 3 V)                |                                                                                   | PESD3V3U1UL                                                                                             | SOD882<br>           | 1.0 x 0.6 x 0.5                                                                     |
|                           |               | 5             | 2                   | 2.6                 | -                      | 9                                  | 0.1                        |                                                                                   | PESD5V0U1UL                                                                                             |                                                                                                         |                                                                                     |
|                           |               | 3.3           | 2.6                 | 3.1                 | -                      | 9                                  | 0.1 (@ 3 V)                |                                                                                   | PESD3V3U1UB                                                                                             | SOD523 (SC-79)<br>  | 1.2 x 0.8 x 0.6                                                                     |
|                           |               | 5             | 2                   | 2.6                 | -                      | 9                                  | 0.1                        |                                                                                   | PESD5V0U1UB                                                                                             |                                                                                                         |                                                                                     |
|                           |               | 3.3           | 2.6                 | 3.1                 | -                      | 9                                  | 0.1 (@ 3 V)                |                                                                                   | PESD3V3U1UA                                                                                             | SOD323 (SC-76)<br> | 1.7 x 1.25 x 0.95                                                                   |
|                           |               | 5             | 2                   | 2.6                 | -                      | 9                                  | 0.1                        |                                                                                   | PESD5V0U1UA                                                                                             |                                                                                                         |                                                                                     |
|                           |               | 0             | 1                   | 3.3                 | 101                    | -                                  | 500                        |                                                                                   | 30                                                                                                      | 2                                                                                                       |  |
| 5                         | 75            |               |                     | -                   | 500                    | 30                                 | 1                          | PESD5V0L1BA                                                                       |                                                                                                         |                                                                                                         |                                                                                     |
| 12                        | 19            |               |                     | -                   | 200                    | 30                                 | 0.05                       | PESD12VL1BA                                                                       |                                                                                                         |                                                                                                         |                                                                                     |
| 15                        | 16            |               |                     | -                   | 200                    | 30                                 | 0.05                       | PESD15VL1BA                                                                       |                                                                                                         |                                                                                                         |                                                                                     |
| 24                        | 11            |               |                     | -                   | 200                    | 23                                 | 0.05                       | PESD24VL1BA                                                                       |                                                                                                         |                                                                                                         |                                                                                     |
| 5.5                       | 12            |               |                     | 15.4                | 35                     | 30                                 | 0.1                        | <b>PESD5V0L1BSF</b>                                                               | SOD962<br>         | 0.6 x 0.3 x 0.3                                                                                         |                                                                                     |
| 5                         | 11            |               |                     | 13                  | 45                     | 30                                 | 0.01                       | PESD5V0V1BL                                                                       | SOD882<br>         | 1.0 x 0.6 x 0.5                                                                                         |                                                                                     |
| 5                         | 11            |               |                     | 13                  | 45                     | 30                                 | 0.01                       | <b>PESD5V0V1BLD</b>                                                               | SOD882D<br>        | 1.0 x 0.6 x 0.37                                                                                        |                                                                                     |
| 5                         | 11            |               |                     | 13                  | 45                     | 30                                 | 0.01                       | PESD5V0V1BB                                                                       | SOD523 (SC-79)<br> | 1.2 x 0.8 x 0.6                                                                                         |                                                                                     |
| 5                         | 11            |               |                     | 13                  | 45                     | 30                                 | 0.01                       | PESD5V0V1BA                                                                       | SOD323 (SC-76)<br> | 1.7 x 1.25 x 0.95                                                                                       |                                                                                     |
| 5.5                       | 3.5           |               |                     | 4.5                 | 8                      | 15                                 | 0.1                        | <b>PESD5V0V1BSF</b>                                                               | SOD962<br>         | 0.6 x 0.3 x 0.3                                                                                         |                                                                                     |
| 15                        | 8             |               |                     | 10                  | -                      | 15                                 | 0.1                        | <b>IP4302CX2/A</b>                                                                | CSP2                                                                                                    | 0.7 x 0.52 x 0.40                                                                                       |                                                                                     |

<sup>[1]</sup> 8/20 μs surge pulse acc. to IEC 61000-4-5

<sup>[2]</sup> acc. to IEC 61000-4-2 (contact discharge)

## Low capacitance ESD protection devices

types in **bold** represent new products

| Number of protected lines |               | $V_{RWM}$ (V) | $C_{line}$ typ (pF) | $C_{line}$ max (pF) | $P_{PP}^{(1)}$ max (W) | ESD rating <sup>[2]</sup> max (kV) | $I_r$ max ( $\mu$ A) @ $V_{RWM}$ | Configuration | Type                | Package                    | Size (mm)          |                   |                     |                                  |                    |
|---------------------------|---------------|---------------|---------------------|---------------------|------------------------|------------------------------------|----------------------------------|---------------|---------------------|----------------------------|--------------------|-------------------|---------------------|----------------------------------|--------------------|
| Unidirectional            | Bidirectional |               |                     |                     |                        |                                    |                                  |               |                     |                            |                    |                   |                     |                                  |                    |
| 3                         | 0             | 5.5           | 3                   | 4                   | -                      | 15                                 | 0.1                              | -             | <b>IP4059CX5/LF</b> | CSP5, staggered compressed | 1.34 x 0.96 x 0.65 |                   |                     |                                  |                    |
| 4                         | 3             | 3.3           | 22                  | 28                  | 30                     | 20                                 | 0.3                              |               | PESD3V3L4UF         | SOT886 (XSON6)             |                    | 1.45 x 1.0 x 0.5  |                     |                                  |                    |
|                           |               | 5             | 16                  | 19                  | 30                     | 20                                 | 0.025                            |               | PESD5V0L4UF         |                            |                    |                   |                     |                                  |                    |
|                           |               | 3.3           | 22                  | 28                  | 30                     | 20                                 | 0.3                              |               | PESD3V3L4UW         | SOT665                     |                    | 1.6 x 1.2 x 0.55  |                     |                                  |                    |
|                           |               | 5             | 16                  | 19                  | 30                     | 20                                 | 0.025                            |               | PESD5V0L4UW         |                            |                    |                   |                     |                                  |                    |
|                           |               | 3.3           | 22                  | 28                  | 30                     | 20                                 | 0.3                              |               | PESD3V3L4UG         | SOT353 (SC-88A)            |                    | 2.0 x 1.25 x 0.95 |                     |                                  |                    |
|                           |               | 5             | 16                  | 19                  | 30                     | 20                                 | 0.025                            |               | PESD5V0L4UG         |                            |                    |                   |                     |                                  |                    |
|                           |               | 3.3           | 13                  | 17                  | 25                     | 10                                 | 1                                |               | PESD3V3V4UK         | SOT891 (XSON6)             |                    | 1.0 x 1.0 x 0.5   |                     |                                  |                    |
|                           |               | 5             | 12                  | 15                  | 25                     | 15                                 | 0.3                              |               | PESD5V0V4UK         |                            |                    |                   |                     |                                  |                    |
|                           |               | 9             | 6.5                 | 10                  | 28                     | 8                                  | 0.1                              |               | PESD9V0V4UK         |                            |                    |                   |                     |                                  |                    |
|                           |               | 4             | 3                   | 3.3                 | 15                     | 18                                 | 16                               | 12            | 0.3                 |                            | PESD3V3V4UF        | SOT886 (XSON6)    |                     | 1.45 x 1.0 x 0.5                 |                    |
|                           |               |               |                     | 5                   | 12                     | 15                                 | 16                               | 12            | 0.025               |                            | PESD5V0V4UF        |                   |                     |                                  |                    |
|                           |               |               |                     | 3.3                 | 15                     | 18                                 | 16                               | 12            | 0.3                 |                            | PESD3V3V4UW        | SOT665            |                     | 1.6 x 1.2 x 0.55                 |                    |
|                           |               |               |                     | 5                   | 12                     | 15                                 | 16                               | 12            | 0.025               |                            | PESD5V0V4UW        |                   |                     |                                  |                    |
|                           |               |               |                     | 3.3                 | 15                     | 18                                 | 16                               | 12            | 0.3                 |                            | PESD3V3V4UG        | SOT353 (SC-88A)   |                     | 2.0 x 1.25 x 0.95                |                    |
|                           |               |               |                     | 5                   | 12                     | 15                                 | 16                               | 12            | 0.025               |                            | PESD5V0V4UG        |                   |                     |                                  |                    |
|                           |               |               |                     |                     |                        | 5.5                                | 18                               | 20            | -                   | 15                         | 0.1                | -                 | <b>IP4142CX5/LF</b> | 5 ball CSP, staggered compressed | 1.28 x 0.91 x 0.65 |
|                           |               |               |                     | 0                   | 4                      | 5.5                                | 18                               | 20            | -                   | 15                         | 0.1                |                   | <b>IP4343CX5/LF</b> | 5 ball CSP                       | 1.06 x 0.76 x 0.61 |
|                           |               | 5.5           | 18                  |                     |                        | 20                                 | -                                | 15            | 0.1                 | IP4043CX5/LF               | 5 ball CSP         |                   | 1.12 x 1.12 x 0.65  |                                  |                    |


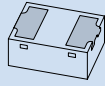
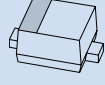


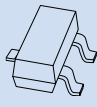

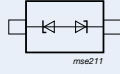


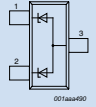
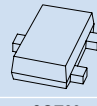
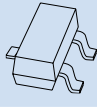

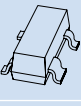

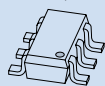

<sup>[1]</sup> 8/20  $\mu$ s surge pulse acc. to IEC 61000-4-5

<sup>[2]</sup> acc. to IEC 61000-4-2 (contact discharge)

# ESD protection for very high-speed interfaces (< 2 pF)

## ESD protection for very high-speed interfaces (< 2 pF)

types in **bold** represent new products

| Number of protected lines |               | V <sub>RWM</sub> (V) | C <sub>lim</sub> typ (pF) | C <sub>lim</sub> max (pF) | ESD rating <sup>(1)</sup> max (kV) | Configuration                                                                       | Type                                                                                | Package                                                                               | Size (mm)                                                                             |                  |
|---------------------------|---------------|----------------------|---------------------------|---------------------------|------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|------------------|
| Unidirectional            | Bidirectional |                      |                           |                           |                                    |                                                                                     |                                                                                     |                                                                                       |                                                                                       |                  |
| 1                         | 0             | 5                    | 1.55                      | 1.75                      | 15                                 |    | PESD5V0X1ULD                                                                        |    | 1.0 x 0.6 x 0.37                                                                      |                  |
|                           |               | 5                    | 0.95                      | 1.15                      | 8                                  |                                                                                     | PESD5V0X1UALD                                                                       |                                                                                       |                                                                                       |                  |
|                           |               | 5                    | 0.95                      | 1.15                      | 8                                  |                                                                                     | PESD5V0X1UB                                                                         |    | 1.2 x 0.8 x 0.6                                                                       |                  |
|                           |               | 5                    | 1.55                      | 1.75                      | 15                                 |                                                                                     | PESD5V0X1UAB                                                                        |                                                                                       |                                                                                       |                  |
|                           |               | 16                   | 0.83                      | 0.98                      | 8                                  | PESD16VX1UL                                                                         |  | 1.0 x 0.6 x 0.5                                                                       |                                                                                       |                  |
|                           |               | 5.5                  | 1                         | 1.5                       | 8                                  |    | PRTR5V0U1T                                                                          |    | 2.9 x 1.3 x 1.0                                                                       |                  |
|                           |               | 80                   | 0.6                       | 0.75                      | 30                                 |                                                                                     | NUP1301                                                                             |   | 2.0 x 1.25 x 0.95                                                                     |                  |
|                           |               | 80                   | 0.6                       | 0.75                      | 30                                 |                                                                                     | <b>NUP1301U</b>                                                                     |                                                                                       |                                                                                       |                  |
| 0                         | 1             | 5.5                  | 0.4                       | 0.55                      | 10                                 |  | PESD5V0F1BL                                                                         |  | 1.0 x 0.6 x 0.5                                                                       |                  |
|                           |               | 16                   | 0.5                       | 0.65                      | 8                                  |                                                                                     | <b>PESD16VF1BL</b>                                                                  |                                                                                       |                                                                                       |                  |
|                           |               | 3.3                  | 1.3                       | 1.6                       | 9                                  |                                                                                     | PESD3V3X1BL                                                                         |                                                                                       |                                                                                       |                  |
|                           |               | 5                    | 0.9                       | 1.3                       | 9                                  |                                                                                     | PESD5V0X1BL                                                                         |                                                                                       |                                                                                       |                  |
|                           |               | 5.5                  | 0.25                      | 0.3                       | 28                                 |                                                                                     | <b>PESD5V0F1BSF</b>                                                                 |  | 0.6 x 0.3 x 0.3                                                                       |                  |
| 2                         | 1             | 5                    | 0.9                       | 1.3                       | 9                                  |  | PESD5V0X1BQ                                                                         |  | 1.6 x 1.2 x 0.55                                                                      |                  |
|                           |               | 5                    | 0.9                       | 1.3                       | 9                                  |                                                                                     | PESD5V0X1BT                                                                         |  | 2.9 x 1.3 x 1.0                                                                       |                  |
|                           | 0             | 1                    | 5.5                       | 1                         | 1.5                                | 8                                                                                   |  | PRTR5V0U2X                                                                            |  | 2.9 x 1.3 x 1.0  |
|                           |               |                      | 5.5                       | 1.8                       | -                                  | 12                                                                                  |                                                                                     | PRTR5V0U2AX                                                                           |                                                                                       |                  |
|                           |               | 0                    | 0                         | 5.5                       | 1                                  | 1.5                                                                                 | 8                                                                                   | PRTR5V0U2K                                                                            |  | 1.0 x 1.0 x 0.5  |
|                           |               |                      |                           | 5.5                       | 1                                  | 1.5                                                                                 | 8                                                                                   | PRTR5V0U2D                                                                            |  | 2.9 x 1.5 x 1.0  |
|                           |               |                      |                           | 5.5                       | 1                                  | 1.5                                                                                 | 8                                                                                   | PRTR5V0U2F                                                                            |  | 1.45 x 1.0 x 0.5 |

<sup>(1)</sup> acc. to IEC 61000-4-2 (contact discharge)



ESD protection for very high-speed interfaces (< 2 pF)

## ESD protection for very high-speed interfaces (< 2 pF)

types in **bold** represent new products

| Number of protected lines |               | $V_{RWM}$ (V) | $C_{limb}$ typ (pF) | $C_{limb}$ max (pF) | ESD rating <sup>(1)</sup> max (kV) | Configuration                                                                       | Type                  | Package                                                                                                   | Size (mm)         |
|---------------------------|---------------|---------------|---------------------|---------------------|------------------------------------|-------------------------------------------------------------------------------------|-----------------------|-----------------------------------------------------------------------------------------------------------|-------------------|
| Unidirectional            | Bidirectional |               |                     |                     |                                    |                                                                                     |                       |                                                                                                           |                   |
| 4                         | 0             | 5.5           | 1                   | -                   | 8                                  |    | PRTR5V0U4D            | SOT457 (SC-74)<br>     | 2.9 x 1.5 x 1.0   |
|                           |               | 5.5           | 1                   | -                   | 8                                  |    | PRTR5V0U4Y            | SOT363 (SC-88)<br>     | 2.0 x 1.25 x 0.95 |
|                           |               | 5.5           | 0.8                 | -                   | 12                                 |    | <b>IP4285CZ9-TBB</b>  | SOT1178 (XSON9)<br>    | 1.0 x 2.1 x 0.5   |
|                           |               | 5.5           | 0.7                 | -                   | 8                                  |    | IP4280CZ10            | SOT552 (TSSOP10)<br>   | 3.0 x 3.0 x 1.1   |
|                           |               | 5.5           | 0.6                 | -                   | 8                                  |                                                                                     | <b>IP4283CZ10-TBA</b> | SOT1165 (XSON10)<br> | 1.0 x 2.5 x 0.5   |
|                           |               | 5.5           | 0.6                 | -                   | 8                                  |                                                                                     | <b>IP4283CZ10-TBR</b> | SOT1176 (XSON10)<br> | 1.0 x 2.5 x 0.5   |
|                           |               | 5.5           | 0.6                 | -                   | 8                                  |  | IP4283CZ10-TT         | SOT552 (TSSOP10)<br> | 3.0 x 3.0 x 1.1   |
|                           |               | 5.5           | 0.5                 | -                   | 8                                  |                                                                                     | <b>IP4284CZ10-TBR</b> | SOT1176 (XSON10)<br> | 1.0 x 2.5 x 0.5   |
|                           |               | 5.5           | 0.5                 | -                   | 8                                  |                                                                                     | <b>IP4284CZ10-TT</b>  | SOT552 (TSSOP10)<br> | 3.0 x 3.0 x 1.1   |
|                           |               | 5.5           | 0.6                 | -                   | 8                                  |  | <b>IP4286CZ6-TBF</b>  | SOT886 (XSON6)<br>   | 1.45 x 1.0 x 0.5  |
|                           |               | 5.5           | 0.6                 | -                   | 8                                  |  | <b>IP4286CZ6-TTY</b>  | SOT363 (SC-88)<br>   | 2.0 x 1.25 x 0.95 |

<sup>(1)</sup> acc. to IEC 61000-4-2 (contact discharge)

## Audio interfaces

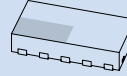

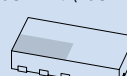

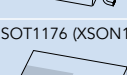




types in **bold** represent new products

| Baseband interface | Number of protected lines | Line small-signal equivalents             |                 | Digital interface clock speed (MHz) | Remark                                                                                                                                          | Type             | Package     | Size (mm)          |
|--------------------|---------------------------|-------------------------------------------|-----------------|-------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|------------------|-------------|--------------------|
|                    |                           | $R_{line}$                                | $C_{line}$ (pF) |                                     |                                                                                                                                                 |                  |             |                    |
| Audio              | 2                         | 0.9 $\Omega$                              | 290             | -                                   | Low-ohmic speaker (< ~8 $\Omega$ )                                                                                                              | IP4047CX6/LF     | 6 ball CSP  | 1.56 x 1.01 x 0.65 |
|                    |                           | 10 $\Omega$                               | 200             | -                                   | Low-ohmic speaker (> ~8 $\Omega$ )                                                                                                              | IP4048CX5/LF     | 5 ball CSP  | 0.91 x 1.28 x 0.65 |
|                    |                           | 68 $\Omega$                               | 110             | -                                   | Single-ended or differential microphone                                                                                                         | IP4049CX5/LF     | 6 ball CSP  | 1.56 x 1.03 x 0.65 |
|                    |                           | 470 $\Omega$                              | 35              | -                                   | Single-ended or differential microphone                                                                                                         | IP4055CX6/LF     |             | 1.16 x 0.76 x 0.65 |
|                    |                           | 470 $\Omega$                              | 20              | -                                   | Single-ended or differential microphone                                                                                                         | IP4355CX6/LF     | 8 ball CSP  | 1.67 x 1.67 x 0.65 |
|                    |                           | 50 $\Omega$ / 2.2 k $\Omega$              | 2000            | -                                   | Single-ended to quasi-differential microphone channel with integrated biasing network                                                           | IP5002CX8/LF     | 6 ball CSP  | 1.60 x 1.15 x 0.65 |
|                    |                           | 0.25 $\Omega$ , 3 nH                      | -               | -                                   | Inductive, low-ohmic differential channel LC filter                                                                                             | <b>IP3047CX6</b> | 5 ball CSP  | 1.51 x 1.15 x 0.65 |
|                    |                           | 0.25 $\Omega$ , 3 nH                      | -               | -                                   | Inductive, low-ohmic differential channel LC filter                                                                                             | <b>IP3048CX5</b> | 20 ball CSP | 1.91 x 2.52 x 0.65 |
|                    | 6                         | 40 $\Omega$ / 1450 $\Omega$ / 10 $\Omega$ | 50 / 20 / 200   | -                                   | Fully integrated audio interface protection for differential microphone and differential speaker, including EMI filtering and pull up resistors | IP4027CX20/LF    | 20 ball CSP | 1.91 x 2.52 x 0.65 |

ESD protection acc. to IEC 61000-4-2 (level 4)

## Video interfaces

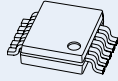
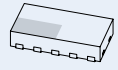
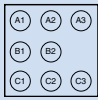
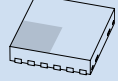
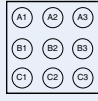

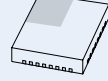
types in **bold** represent new products

| Baseband interface | Number of protected lines | $C_{line}$ (pF) | Remark                                         | Type                  | Package                                                                                                   | Size (mm)         |
|--------------------|---------------------------|-----------------|------------------------------------------------|-----------------------|-----------------------------------------------------------------------------------------------------------|-------------------|
| Display port       | 4                         | 0.6             | ESD protection for ultra high-speed interfaces | IP4283CZ10-TBR        | SOT1176 (XSON10)<br>  | 1.0 x 2.5 x 0.5   |
|                    |                           | 0.6             | ESD protection for ultra high-speed interfaces | IP4283CZ10-TT         | SOT552 (TSSOP10)<br> | 3.0 x 3.0 x 1.1   |
|                    |                           | 0.5             | ESD protection for ultra high-speed interfaces | IP4284CZ10-TBR        | SOT1176 (XSON10)<br> | 1.0 x 2.5 x 0.5   |
|                    |                           | 0.5             | ESD protection for ultra high-speed interfaces | <b>IP4284CZ10-TT</b>  | SOT552 (TSSOP10)<br> | 3.0 x 3.0 x 1.1   |
|                    |                           | 0.5             | ESD protection for ultra high-speed interfaces | <b>IP4292CZ10-TBR</b> | SOT1176 (XSON10)<br> | 1.0 x 2.5 x 0.5   |
|                    |                           | 0.8             | ESD protection for ultra high-speed interfaces | <b>IP4285CZ9-TBB</b>  | SOT1178 (XSON9)<br>  | 1.0 x 2.1 x 0.5   |
|                    |                           | 0.6             | ESD protection for ultra high-speed interfaces | IP4286CZ6-TBF         | SOT886 (XSON6)<br>   | 1.45 x 1.0 x 0.5  |
|                    |                           |                 | ESD protection for ultra high-speed interfaces | IP4286CZ6-TTY         | SOT363 (SC-88)<br>   | 2.0 x 1.25 x 0.95 |
|                    | 11                        | 0.7             | ESD protection for display port                | IP4790CZ38            | SOT510 (TSSOP38)<br> | 9.7 x 4.4 x 1.1   |

ESD protection acc. to IEC 61000-4-2 (level 4)

## Video interfaces

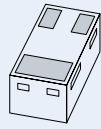
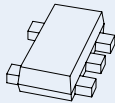
types in **bold** represent new products

| Baseband interface | Number of protected lines | Buffer | Level shifter | C <sub>line</sub> (pF)       | Resistor (Ω)  | Remark                                                                                                  | Type                                            | Package                                                                                                   | Size (mm)                  |
|--------------------|---------------------------|--------|---------------|------------------------------|---------------|---------------------------------------------------------------------------------------------------------|-------------------------------------------------|-----------------------------------------------------------------------------------------------------------|----------------------------|
| HDMI               | 4                         | -      | -             | 0.5                          | -             | ESD protection for ultra high-speed interfaces                                                          | IP4284CZ10-TT                                   | SOT552 (TSSOP10)<br>   | 3.0 x 3.0 x 1.1            |
|                    |                           | -      | -             | 0.5                          | -             | ESD protection for ultra high-speed interfaces                                                          | <b>IP4292CZ10-TBR</b>                           | SOT1176 (XSON10)<br>   | 1.0 x 2.5 x 0.5            |
|                    | 5                         | -      | -             | 10                           | 1.75 k, 100 k | HDMI, DDC, CEC, hot plug ESD protection and biasing                                                     | <b>IP4310CX8/P</b>                              | 8 ball CSP<br>         | 1.16 x 1.16 x 0.61         |
|                    |                           | yes    | yes           | -                            | internal      | Fully integrated solution for HDMI low-speed signals, buffer and level shifter for DDC, CEC, HP         | <b>IP4791CZ12</b>                               | SOT1156<br>            | 2.5 x 2.1 x 0.5            |
|                    | 8                         | -      | -             | 1.3                          | -             | HDMI, TMDS line ESD protection                                                                          | <b>IP4309CX9</b>                                | 9 ball CSP<br>         | 1.16 x 1.16 x 0.61         |
|                    | 12                        | -      | yes           | 0.7                          | -             | ESD protection and level shifting for a complete HDMI port                                              | IP4776CZ38                                      |                                                                                                           |                            |
|                    |                           | yes    | yes           | 0.7                          | -             | ESD protection, DDC buffering, noise reduction and hot plug application for a complete HDMI source port | IP4777CZ38                                      | SOT510 (TSSOP38)<br> | 9.7 x 4.4 x 1.1            |
|                    |                           | yes    | yes           | 0.7                          | -             | ESD protection, DDC buffering, noise reduction and hot plug application for a complete HDMI sink port   | IP4778CZ38                                      |                                                                                                           |                            |
|                    | 13                        | yes    | yes           | 100 Ω differential impedance | internal      | Fully integrated HDMI solution with current limiter, buffer and level shifter for DDC, CEC, HP          | <b>IP4786CZ32</b>                               | SOT617<br>           | 5.0 x 5.0 x 1.0            |
|                    | LVDS                      | 2      | -             | -                            | 30            | 10                                                                                                      | EMI filter with ESD protection for MIPI or MDDI | <b>IP3348CX5</b>                                                                                          | CSP5, staggered compressed |
| 4                  |                           | -      | -             | 30                           | 10            | EMI filter with ESD protection for MIPI or MDDI                                                         | <b>IP3348CX10</b>                               | CSP10, staggered compressed                                                                               | 1.56 x 1.06 x 0.61         |
| 6                  |                           | -      | -             | 30                           | 10            | EMI filter with ESD protection for MIPI or MDDI                                                         | <b>IP3348CX15</b>                               | CSP15, staggered compressed                                                                               | 2.36 x 1.06 x 0.61         |
| 8                  |                           | -      | -             | 30                           | 10            | EMI filter with ESD protection for MIPI or MDDI                                                         | <b>IP3348CX20</b>                               | CSP20, staggered compressed                                                                               | 3.16 x 1.06 x 0.61         |

ESD protection acc. to IEC 61000-4-2 (level 4)

## Multichannel EMI filters, ESD protection for LCD and camera

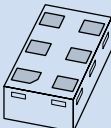
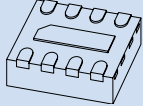
types in **bold** represent new products

| Baseband interface          | Number of protected lines | Line small-signal equivalents |                        |                        | Digital interface clock speed (MHz) | Insertion Loss S <sub>21</sub> ~ -3 dB (MHz) | Type                                                                                  | Package                                                                               | Size (mm)          |
|-----------------------------|---------------------------|-------------------------------|------------------------|------------------------|-------------------------------------|----------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|--------------------|
|                             |                           | R <sub>line</sub> (Ω)         | C <sub>line</sub> (pF) | L <sub>line</sub> (nH) |                                     |                                              |                                                                                       |                                                                                       |                    |
| LCD display, camera, keypad | 1                         | 75                            | 36                     | -                      | ~50                                 | 155                                          | IP4307CX4/LF                                                                          | 4 ball CSP                                                                            | 0.76 x 0.76 x 0.61 |
|                             |                           | 20                            | 40                     | -                      | ~50                                 | 153                                          | <b>PEMI1QFN/CT</b>                                                                    |  | 1.0 x 0.6 x 0.5    |
|                             |                           | 20                            | 36                     | -                      | ~55                                 | 170                                          | <b>PEMI1QFN/CR</b>                                                                    |                                                                                       |                    |
|                             |                           | 20                            | 32                     | -                      | ~60                                 | 185                                          | <b>PEMI1QFN/CP</b>                                                                    |                                                                                       |                    |
|                             |                           | 20                            | 28                     | -                      | ~70                                 | 218                                          | <b>PEMI1QFN/CM</b>                                                                    |                                                                                       |                    |
|                             |                           | 20                            | 23                     | -                      | ~90                                 | 264                                          | <b>PEMI1QFN/CK</b>                                                                    |                                                                                       |                    |
|                             |                           | 20                            | 19                     | -                      | ~105                                | 317                                          | <b>PEMI1QFN/CG</b>                                                                    |                                                                                       |                    |
|                             |                           | 20                            | 15                     | -                      | ~130                                | 397                                          | <b>PEMI1QFN/CE</b>                                                                    |                                                                                       |                    |
|                             |                           | 45                            | 40                     | -                      | ~50                                 | 145                                          | <b>PEMI1QFN/HT</b>                                                                    |                                                                                       |                    |
|                             |                           | 45                            | 36                     | -                      | ~55                                 | 161                                          | <b>PEMI1QFN/HR</b>                                                                    |                                                                                       |                    |
|                             |                           | 45                            | 32                     | -                      | ~60                                 | 175                                          | <b>PEMI1QFN/HP</b>                                                                    |                                                                                       |                    |
|                             |                           | 45                            | 28                     | -                      | ~70                                 | 206                                          | <b>PEMI1QFN/HM</b>                                                                    |                                                                                       |                    |
|                             |                           | 45                            | 23                     | -                      | ~80                                 | 249                                          | <b>PEMI1QFN/HK</b>                                                                    |                                                                                       |                    |
|                             |                           | 45                            | 19                     | -                      | ~100                                | 300                                          | <b>PEMI1QFN/HG</b>                                                                    |                                                                                       |                    |
|                             |                           | 45                            | 15                     | -                      | ~125                                | 376                                          | <b>PEMI1QFN/HE</b>                                                                    |                                                                                       |                    |
|                             |                           | 65                            | 40                     | -                      | ~45                                 | 139                                          | <b>PEMI1QFN/LT</b>                                                                    |                                                                                       |                    |
|                             |                           | 65                            | 36                     | -                      | ~50                                 | 155                                          | <b>PEMI1QFN/LR</b>                                                                    |                                                                                       |                    |
|                             |                           | 65                            | 32                     | -                      | ~55                                 | 168                                          | <b>PEMI1QFN/LP</b>                                                                    |                                                                                       |                    |
|                             |                           | 65                            | 28                     | -                      | ~65                                 | 197                                          | <b>PEMI1QFN/LM</b>                                                                    |                                                                                       |                    |
|                             |                           | 65                            | 23                     | -                      | ~80                                 | 239                                          | <b>PEMI1QFN/LK</b>                                                                    |                                                                                       |                    |
|                             |                           | 65                            | 19                     | -                      | ~95                                 | 288                                          | <b>PEMI1QFN/LG</b>                                                                    |                                                                                       |                    |
|                             |                           | 65                            | 15                     | -                      | ~120                                | 361                                          | <b>PEMI1QFN/LE</b>                                                                    |                                                                                       |                    |
|                             |                           | 100                           | 40                     | -                      | ~45                                 | 131                                          | <b>PEMI1QFN/RT</b>                                                                    |                                                                                       |                    |
|                             |                           | 100                           | 36                     | -                      | ~50                                 | 145                                          | <b>PEMI1QFN/RR</b>                                                                    |                                                                                       |                    |
|                             |                           | 100                           | 32                     | -                      | ~55                                 | 159                                          | <b>PEMI1QFN/RP</b>                                                                    |                                                                                       |                    |
|                             |                           | 100                           | 28                     | -                      | ~60                                 | 187                                          | <b>PEMI1QFN/RM</b>                                                                    |                                                                                       |                    |
|                             |                           | 100                           | 30                     | -                      | ~65                                 | 200                                          | <b>IP4256CZ3-M</b>                                                                    |                                                                                       |                    |
|                             |                           | 100                           | 23                     | -                      | ~75                                 | 227                                          | <b>PEMI1QFN/RK</b>                                                                    |                                                                                       |                    |
|                             |                           | 100                           | 19                     | -                      | ~90                                 | 272                                          | <b>PEMI1QFN/RG</b>                                                                    |                                                                                       |                    |
|                             |                           | 100                           | 15                     | -                      | ~115                                | 343                                          | <b>PEMI1QFN/RE</b>                                                                    |                                                                                       |                    |
|                             | 200                       | 40                            | -                      | ~40                    | 119                                 | <b>PEMI1QFN/WT</b>                           |                                                                                       |                                                                                       |                    |
|                             | 200                       | 36                            | -                      | ~45                    | 132                                 | <b>PEMI1QFN/WR</b>                           |                                                                                       |                                                                                       |                    |
|                             | 200                       | 32                            | -                      | ~50                    | 143                                 | <b>PEMI1QFN/WP</b>                           |                                                                                       |                                                                                       |                    |
|                             | 200                       | 28                            | -                      | ~55                    | 169                                 | <b>PEMI1QFN/WM</b>                           |                                                                                       |                                                                                       |                    |
| 200                         | 23                        | -                             | ~70                    | 205                    | <b>PEMI1QFN/WK</b>                  |                                              |                                                                                       |                                                                                       |                    |
| 200                         | 19                        | -                             | ~80                    | 247                    | <b>PEMI1QFN/WG</b>                  |                                              |                                                                                       |                                                                                       |                    |
| 200                         | 15                        | -                             | ~105                   | 311                    | <b>PEMI1QFN/WE</b>                  |                                              |                                                                                       |                                                                                       |                    |
| 2                           | 10                        | 35                            | 15                     | ~115                   | 350                                 | <b>IP3348CX5</b>                             | 5 ball CSP                                                                            | 0.76 x 1.06 x 0.61                                                                    |                    |
|                             | 18                        | 65                            | 40                     | ~60                    | 175                                 | <b>IP3088CX5</b>                             |                                                                                       | 0.96 x 1.28 x 0.65                                                                    |                    |
|                             | 100                       | 45                            | 35                     | ~50                    | 150                                 | <b>IP3053CX5</b>                             |                                                                                       |                                                                                       |                    |
|                             | 20                        | 40                            | -                      | ~50                    | 153                                 | <b>PEMI2STD/CT</b>                           |  | 1.6 x 1.2 x 0.5                                                                       |                    |
|                             | 20                        | 36                            | -                      | ~55                    | 170                                 | <b>PEMI2STD/CR</b>                           |                                                                                       |                                                                                       |                    |
|                             | 20                        | 32                            | -                      | ~60                    | 185                                 | <b>PEMI2STD/CP</b>                           |                                                                                       |                                                                                       |                    |
| 20                          | 28                        | -                             | ~70                    | 218                    | <b>PEMI2STD/CM</b>                  |                                              |                                                                                       |                                                                                       |                    |

ESD protection acc. to IEC 61000-4-2 (level 4)

## Multichannel EMI filters, ESD protection for LCD and camera

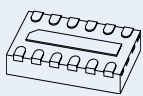
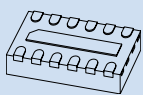
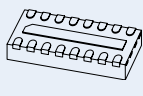
types in **bold** represent new products

| Baseband interface          | Number of protected lines | Line small-signal equivalents |                        |                        | Digital interface clock speed (MHz) | Insertion Loss S21 ~ -3 dB (MHz) | Type                                                                                                         | Package                                                                                               | Size (mm)        |
|-----------------------------|---------------------------|-------------------------------|------------------------|------------------------|-------------------------------------|----------------------------------|--------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|------------------|
|                             |                           | R <sub>line</sub> (Ω)         | C <sub>line</sub> (pF) | L <sub>line</sub> (nH) |                                     |                                  |                                                                                                              |                                                                                                       |                  |
| LCD display, camera, keypad | 2                         | 45                            | 23                     | -                      | ~80                                 | 249                              | PEMI2QFN/HK                                                                                                  | SOT886 (XSON6)<br> | 1.45 x 1.0 x 0.5 |
|                             |                           | 45                            | 19                     | -                      | ~100                                | 300                              | PEMI2QFN/HG                                                                                                  |                                                                                                       |                  |
|                             |                           | 45                            | 15                     | -                      | ~125                                | 376                              | PEMI2QFN/HE                                                                                                  |                                                                                                       |                  |
|                             |                           | 65                            | 40                     | -                      | ~45                                 | 139                              | PEMI2QFN/LT                                                                                                  |                                                                                                       |                  |
|                             |                           | 65                            | 36                     | -                      | ~50                                 | 155                              | PEMI2QFN/LR                                                                                                  |                                                                                                       |                  |
|                             |                           | 65                            | 32                     | -                      | ~55                                 | 168                              | PEMI2QFN/LP                                                                                                  |                                                                                                       |                  |
|                             |                           | 65                            | 28                     | -                      | ~65                                 | 197                              | PEMI2QFN/LM                                                                                                  |                                                                                                       |                  |
|                             |                           | 65                            | 23                     | -                      | ~80                                 | 239                              | PEMI2QFN/LK                                                                                                  |                                                                                                       |                  |
|                             |                           | 65                            | 19                     | -                      | ~95                                 | 288                              | PEMI2QFN/LG                                                                                                  |                                                                                                       |                  |
|                             |                           | 65                            | 15                     | -                      | ~120                                | 361                              | PEMI2QFN/LE                                                                                                  |                                                                                                       |                  |
|                             |                           | 100                           | 40                     | -                      | ~45                                 | 131                              | PEMI2QFN/RT                                                                                                  |                                                                                                       |                  |
|                             |                           | 100                           | 36                     | -                      | ~50                                 | 145                              | PEMI2QFN/RR                                                                                                  |                                                                                                       |                  |
|                             |                           | 100                           | 32                     | -                      | ~55                                 | 159                              | PEMI2QFN/RP                                                                                                  |                                                                                                       |                  |
|                             |                           | 100                           | 30                     | -                      | ~65                                 | 200                              | IP4256CZ6-F                                                                                                  |                                                                                                       |                  |
|                             |                           | 100                           | 28                     | -                      | ~60                                 | 187                              | PEMI2QFN/RM                                                                                                  |                                                                                                       |                  |
|                             |                           | 100                           | 23                     | -                      | ~75                                 | 227                              | PEMI2QFN/RK                                                                                                  |                                                                                                       |                  |
|                             |                           | 100                           | 19                     | -                      | ~90                                 | 272                              | PEMI2QFN/RG                                                                                                  |                                                                                                       |                  |
|                             |                           | 100                           | 15                     | -                      | ~115                                | 343                              | PEMI2QFN/RE                                                                                                  |                                                                                                       |                  |
|                             |                           | 200                           | 40                     | -                      | ~40                                 | 119                              | PEMI2QFN/WT                                                                                                  |                                                                                                       |                  |
|                             |                           | 200                           | 36                     | -                      | ~45                                 | 132                              | PEMI2QFN/WR                                                                                                  |                                                                                                       |                  |
|                             | 200                       | 32                            | -                      | ~50                    | 143                                 | PEMI2QFN/WP                      |                                                                                                              |                                                                                                       |                  |
|                             | 200                       | 28                            | -                      | ~55                    | 169                                 | PEMI2QFN/WM                      |                                                                                                              |                                                                                                       |                  |
|                             | 200                       | 23                            | -                      | ~70                    | 205                                 | PEMI2QFN/WK                      |                                                                                                              |                                                                                                       |                  |
|                             | 200                       | 19                            | -                      | ~80                    | 247                                 | PEMI2QFN/WG                      |                                                                                                              |                                                                                                       |                  |
|                             | 200                       | 15                            | -                      | ~105                   | 311                                 | PEMI2QFN/WE                      |                                                                                                              |                                                                                                       |                  |
|                             | 10                        | 35                            | 15                     | ~115                   | 350                                 | IP3348CX10                       | 10 ball CSP                                                                                                  | 1.56 x 1.06 x 0.61                                                                                    |                  |
|                             | 18                        | 65                            | 40                     | ~60                    | 175                                 | IP3088CX10                       |                                                                                                              | 1.96 x 1.28 x 0.65                                                                                    |                  |
|                             | 100                       | 54                            | -                      | ~30                    | 98                                  | PEMI4CSP/RW                      |                                                                                                              | 1.56 x 1.06 x 0.61                                                                                    |                  |
|                             | 100                       | 45                            | 35                     | ~20                    | 150                                 | IP3053CX10                       |                                                                                                              | 1.96 x 1.28 x 0.65                                                                                    |                  |
|                             | 100                       | 41                            | -                      | ~40                    | 125                                 | PEMI4CSP/RT                      |                                                                                                              | 1.56 x 1.06 x 0.61                                                                                    |                  |
|                             | 20                        | 40                            | -                      | ~50                    | 153                                 | PEMI4QFN/CT                      | SOT1157 (8 pin QFN)<br> | 1.7 x 1.2 x 0.5                                                                                       |                  |
|                             | 20                        | 36                            | -                      | ~55                    | 170                                 | PEMI4QFN/CR                      |                                                                                                              |                                                                                                       |                  |
|                             | 20                        | 32                            | -                      | ~60                    | 185                                 | PEMI4QFN/CP                      |                                                                                                              |                                                                                                       |                  |
|                             | 20                        | 28                            | -                      | ~70                    | 218                                 | PEMI4QFN/CM                      |                                                                                                              |                                                                                                       |                  |
|                             | 20                        | 23                            | -                      | ~90                    | 264                                 | PEMI4QFN/CK                      |                                                                                                              |                                                                                                       |                  |
|                             | 20                        | 19                            | -                      | ~105                   | 317                                 | PEMI4QFN/CG                      |                                                                                                              |                                                                                                       |                  |
| 20                          | 15                        | -                             | ~130                   | 397                    | PEMI4QFN/CE                         |                                  |                                                                                                              |                                                                                                       |                  |
| 45                          | 40                        | -                             | ~50                    | 145                    | PEMI4QFN/HT                         |                                  |                                                                                                              |                                                                                                       |                  |
| 45                          | 36                        | -                             | ~55                    | 161                    | PEMI4QFN/HR                         |                                  |                                                                                                              |                                                                                                       |                  |
| 45                          | 32                        | -                             | ~60                    | 175                    | PEMI4QFN/HP                         |                                  |                                                                                                              |                                                                                                       |                  |
| 45                          | 28                        | -                             | ~70                    | 206                    | PEMI4QFN/HM                         |                                  |                                                                                                              |                                                                                                       |                  |
| 45                          | 23                        | -                             | ~80                    | 249                    | PEMI4QFN/HK                         |                                  |                                                                                                              |                                                                                                       |                  |
| 45                          | 19                        | -                             | ~100                   | 300                    | PEMI4QFN/HG                         |                                  |                                                                                                              |                                                                                                       |                  |

ESD protection acc. to IEC 61000-4-2 (level 4)

## Multichannel EMI filters, ESD protection for LCD and camera




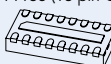
types in **bold** represent new products

| Baseband interface          | Number of protected lines | Line small-signal equivalents |                        |                        | Digital interface clock speed (MHz) | Insertion Loss S21 ~ -3 dB (MHz) | Type                                                                                                          | Package                                                                                                     | Size (mm)          |
|-----------------------------|---------------------------|-------------------------------|------------------------|------------------------|-------------------------------------|----------------------------------|---------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|--------------------|
|                             |                           | R <sub>line</sub> (Ω)         | C <sub>line</sub> (pF) | L <sub>line</sub> (nH) |                                     |                                  |                                                                                                               |                                                                                                             |                    |
| LCD display, camera, keypad | 6                         | 45                            | 36                     | -                      | ~55                                 | 161                              | PEMI6QFN/HR                                                                                                   | SOT1158 (12 pin QFN)<br> | 2.5 x 1.2 x 0.5    |
|                             |                           | 45                            | 32                     | -                      | ~60                                 | 175                              | PEMI6QFN/HP                                                                                                   |                                                                                                             |                    |
|                             |                           | 45                            | 28                     | -                      | ~70                                 | 206                              | PEMI6QFN/HM                                                                                                   |                                                                                                             |                    |
|                             |                           | 45                            | 23                     | -                      | ~80                                 | 249                              | PEMI6QFN/HK                                                                                                   |                                                                                                             |                    |
|                             |                           | 45                            | 19                     | -                      | ~100                                | 300                              | PEMI6QFN/HG                                                                                                   |                                                                                                             |                    |
|                             |                           | 45                            | 15                     | -                      | ~125                                | 376                              | PEMI6QFN/HE                                                                                                   |                                                                                                             |                    |
|                             |                           | 65                            | 40                     | -                      | ~45                                 | 139                              | PEMI6QFN/LT                                                                                                   |                                                                                                             |                    |
|                             |                           | 65                            | 36                     | -                      | ~50                                 | 155                              | PEMI6QFN/LR                                                                                                   |                                                                                                             |                    |
|                             |                           | 65                            | 32                     | -                      | ~55                                 | 168                              | PEMI6QFN/LP                                                                                                   |                                                                                                             |                    |
|                             |                           | 65                            | 28                     | -                      | ~65                                 | 197                              | PEMI6QFN/LM                                                                                                   |                                                                                                             |                    |
|                             |                           | 65                            | 23                     | -                      | ~80                                 | 239                              | PEMI6QFN/LK                                                                                                   |                                                                                                             |                    |
|                             |                           | 65                            | 19                     | -                      | ~95                                 | 288                              | PEMI6QFN/LG                                                                                                   |                                                                                                             |                    |
|                             |                           | 65                            | 15                     | -                      | ~120                                | 361                              | PEMI6QFN/LE                                                                                                   |                                                                                                             |                    |
|                             |                           | 100                           | 40                     | -                      | ~45                                 | 131                              | PEMI6QFN/RT                                                                                                   |                                                                                                             |                    |
|                             |                           | 100                           | 36                     | -                      | ~50                                 | 145                              | PEMI6QFN/RR                                                                                                   |                                                                                                             |                    |
|                             |                           | 100                           | 32                     | -                      | ~55                                 | 159                              | PEMI6QFN/RP                                                                                                   |                                                                                                             |                    |
|                             |                           | 100                           | 28                     | -                      | ~60                                 | 187                              | PEMI6QFN/RM                                                                                                   |                                                                                                             |                    |
|                             |                           | 100                           | 23                     | -                      | ~75                                 | 227                              | PEMI6QFN/RK                                                                                                   |                                                                                                             |                    |
|                             |                           | 100                           | 19                     | -                      | ~90                                 | 272                              | PEMI6QFN/RG                                                                                                   |                                                                                                             |                    |
|                             |                           | 100                           | 15                     | -                      | ~115                                | 343                              | PEMI6QFN/RE                                                                                                   |                                                                                                             |                    |
|                             |                           | 200                           | 40                     | -                      | ~40                                 | 119                              | PEMI6QFN/WT                                                                                                   |                                                                                                             |                    |
|                             |                           | 200                           | 36                     | -                      | ~45                                 | 132                              | PEMI6QFN/WR                                                                                                   |                                                                                                             |                    |
|                             |                           | 200                           | 32                     | -                      | ~50                                 | 143                              | PEMI6QFN/WP                                                                                                   |                                                                                                             |                    |
|                             |                           | 200                           | 28                     | -                      | ~55                                 | 169                              | PEMI6QFN/WM                                                                                                   |                                                                                                             |                    |
|                             | 200                       | 23                            | -                      | ~70                    | 205                                 | PEMI6QFN/WK                      |                                                                                                               |                                                                                                             |                    |
|                             | 200                       | 19                            | -                      | ~80                    | 247                                 | PEMI6QFN/WG                      |                                                                                                               |                                                                                                             |                    |
|                             | 200                       | 15                            | -                      | ~105                   | 311                                 | PEMI6QFN/WE                      |                                                                                                               |                                                                                                             |                    |
|                             | 15                        | 50                            | 18                     | ~50                    | 145                                 | <b>IP3254CZ12-6-TTL</b>          | SOT1167 (12 pin QFN)<br> | 2.5 x 1.35 x 0.5                                                                                            |                    |
|                             | 15                        | 43                            | 12                     | ~60                    | 175                                 | <b>IP3253CZ12-6-TTL</b>          |                                                                                                               |                                                                                                             |                    |
|                             | 40                        | 18                            | -                      | ~100                   | 300                                 | <b>IP4252CZ12-6-TTL</b>          |                                                                                                               |                                                                                                             |                    |
|                             | 100                       | 45                            | -                      | ~40                    | 130                                 | <b>IP4254CZ12-6-TTL</b>          |                                                                                                               |                                                                                                             |                    |
|                             | 100                       | 15                            | -                      | ~110                   | 330                                 | <b>IP4251CZ12-6-TTL</b>          |                                                                                                               |                                                                                                             |                    |
|                             | 200                       | 45                            | -                      | ~35                    | 110                                 | <b>IP4253CZ12-6-TTL</b>          |                                                                                                               |                                                                                                             |                    |
|                             | 7                         | 70                            | 25                     | -                      | ~75                                 | 220                              | IP4337CX18/LF                                                                                                 | 18 ball CSP                                                                                                 | 1.96 x 1.61 x 0.61 |
|                             | 125                       | 25                            | 60                     | ~60                    | 180                                 | IP3337CX18/LF                    | 2.06 x 1.66 x 0.61                                                                                            |                                                                                                             |                    |
|                             | 8                         | 10                            | 35                     | 15                     | ~115                                | 350                              | <b>IP3348CX20</b>                                                                                             | 20 ball CSP                                                                                                 | 3.16 x 1.06 x 0.61 |
| 18                          |                           | 65                            | 40                     | ~60                    | 175                                 | <b>IP3088CX20</b>                | 3.96 x 1.28 x 0.65                                                                                            |                                                                                                             |                    |
| 100                         |                           | 54                            | -                      | ~30                    | 98                                  | PEMI8CSP/RW                      | 3.16 x 1.06 x 0.61                                                                                            |                                                                                                             |                    |
| 100                         |                           | 50                            | -                      | ~40                    | 120                                 | IP4088CX20/LF                    | 3.91 x 1.28 x 0.65                                                                                            |                                                                                                             |                    |
| 100                         |                           | 45                            | 35                     | ~20                    | 150                                 | <b>IP3053CX20</b>                | 3.96 x 1.28 x 0.65                                                                                            |                                                                                                             |                    |
| 100                         |                           | 41                            | -                      | ~40                    | 125                                 | PEMI8CSP/RT                      | 3.16 x 1.06 x 0.61                                                                                            |                                                                                                             |                    |
| 20                          |                           | 40                            | -                      | ~50                    | 153                                 | PEMI8QFN/CT                      | SOT1159 (16 pin QFN)<br> | 3.3 x 1.2 x 0.5                                                                                             |                    |
| 20                          |                           | 36                            | -                      | ~55                    | 170                                 | PEMI8QFN/CR                      |                                                                                                               |                                                                                                             |                    |
| 20                          |                           | 32                            | -                      | ~60                    | 185                                 | PEMI8QFN/CP                      |                                                                                                               |                                                                                                             |                    |
| 20                          |                           | 28                            | -                      | ~70                    | 218                                 | PEMI8QFN/CM                      |                                                                                                               |                                                                                                             |                    |
| 20                          |                           | 23                            | -                      | ~90                    | 264                                 | PEMI8QFN/CK                      |                                                                                                               |                                                                                                             |                    |
| 20                          |                           | 19                            | -                      | ~105                   | 317                                 | PEMI8QFN/CG                      |                                                                                                               |                                                                                                             |                    |
| 20                          | 15                        | -                             | ~130                   | 397                    | PEMI8QFN/CE                         |                                  |                                                                                                               |                                                                                                             |                    |

ESD protection acc. to IEC 61000-4-2 (level 4)

## SD-, SIM-card and MMC

types in **bold** represent new products






| Baseband interface | Number of protected lines | Line small-signal equivalents               |                 | Digital interface clock speed (MHz) | Remark                                                                                                              | Type                                        | Package                                                                                                      | Size (mm)                                                                                             |
|--------------------|---------------------------|---------------------------------------------|-----------------|-------------------------------------|---------------------------------------------------------------------------------------------------------------------|---------------------------------------------|--------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|
|                    |                           | $R_{line}$                                  | $C_{line}$ (pF) |                                     |                                                                                                                     |                                             |                                                                                                              |                                                                                                       |
| SIM card           | 3 + 2                     | 47 $\Omega$ / 100 $\Omega$                  | 10              | ~20                                 | Integrated low capacitance SIM-card passive filter array & USB ESD protection                                       | <b>IP4365CX11</b>                           | 11 ball CSP                                                                                                  | 1.16 x 1.56 x 0.61                                                                                    |
|                    | 3                         | 47 $\Omega$ / 100 $\Omega$                  | 40              | ~12                                 | Integrated SIM-card EMI filter and ESD protection                                                                   | IP4044CX8/LF                                | 8 ball CSP                                                                                                   | 1.46 x 1.49 x 0.65                                                                                    |
|                    |                           | 47 $\Omega$ / 100 $\Omega$                  | 20              | ~20                                 | Integrated SIM-card EMI filter and ESD protection                                                                   | IP4064CX8/LF/P                              |                                                                                                              | 1.41 x 1.41 x 0.65                                                                                    |
|                    |                           | 47 $\Omega$ / 100 $\Omega$                  | 20              | ~20                                 | Smaller size, integrated SIM-card EMI filter and ESD protection                                                     | IP4364CX8/LF/P                              |                                                                                                              | 1.16 x 1.16 x 0.61                                                                                    |
|                    |                           | 47 $\Omega$ / 100 $\Omega$                  | 10              | ~20                                 | Smaller size, low capacitance integrated SIM-card EMI filter and ESD protection                                     | IP4366CX8/P                                 |                                                                                                              |                                                                                                       |
|                    |                           | 47 $\Omega$ / 100 $\Omega$                  | 40              | ~12                                 | Integrated SIM-card EMI filter and ESD protection                                                                   | IP4264CZ8-40-TTL                            | SOT1166 (8 pin QFN)<br>   | 1.7 x 1.35 x 0.5                                                                                      |
|                    |                           | 47 $\Omega$ / 100 $\Omega$                  | 20              | ~20                                 | Integrated SIM-card EMI filter and ESD protection                                                                   | IP4264CZ8-20-TTL                            |                                                                                                              |                                                                                                       |
|                    |                           | 47 $\Omega$ / 100 $\Omega$                  | 10              | ~20                                 | Integrated SIM-card EMI filter and ESD protection                                                                   | <b>IP4264CZ8-10-TTL</b>                     |                                                                                                              |                                                                                                       |
|                    |                           | -                                           | -               | 1                                   | ~240                                                                                                                | Quad channel low capacitance ESD protection | IP4221CZ6-S                                                                                                  | SOT886 (XSON6)<br> |
| SD-card / MMC      | 4                         | 47 $\Omega$ / 13 k $\Omega$ / 56 k $\Omega$ | 25              | ~30                                 | MMC ESD protection, pull-up resistors                                                                               | IP4051CX11/LF                               | 11 ball CSP                                                                                                  | 1.44 x 1.96 x 0.65                                                                                    |
|                    |                           | 50 $\Omega$ / 75 k $\Omega$ / 7 k $\Omega$  | 18              | ~50                                 | High-speed MMC ESD protection, pull-up resistors                                                                    | IP4060CX16/LF                               | 16 ball CSP                                                                                                  | 1.96 x 1.97 x 0.65                                                                                    |
|                    | 6                         | 40 $\Omega$                                 | 12              | >52                                 | (Mini) SD card/trans flash ESD protection, EMI filter                                                               | <b>IP4252CZ12-6-TTL</b>                     | SOT1167 (12 pin QFN)<br>  | 2.5 x 1.35 x 0.5                                                                                      |
|                    | 6 + 2                     | 40 $\Omega$                                 | 12              | >52                                 | (Mini) SD card/trans flash ESD protection, EMI filter                                                               | <b>IP4252CZ16-8-TTL</b>                     | SOT1168 (16 pin QFN)<br> | 3.3 x 1.35 x 0.5                                                                                      |
|                    | 7                         | 40 $\Omega$ / 50 k $\Omega$ / 25 k $\Omega$ | 18              | ~20                                 | (Mini) SD/trans flash card ESD protection, EMI filter, pull-up resistors                                            | IP4052CX20/LF                               | 20 ball CSP                                                                                                  | 2.54 x 1.96 x 0.65                                                                                    |
|                    |                           | -                                           | 5               | ~24                                 | Memory stick PRO ESD protection                                                                                     | IP4067CX9/LF                                | 9 ball CSP                                                                                                   | 1.46 x 1.52 x 0.65                                                                                    |
|                    | 6 (+3)                    | 15 $\Omega$ / 50 k $\Omega$ / 15 k $\Omega$ | 8               | >52                                 | Very low capacitance, low channel resistance (mini) SD card/trans flash ESD protection EMI filter, pull-up resistor | IP4350CX24/LF                               | 24 ball CSP                                                                                                  | 1.95 x 2.11 x 0.61                                                                                    |
|                    |                           | 40 $\Omega$ / 50 k $\Omega$ / 15 k $\Omega$ | 20              | >52                                 | (Mini) SD card/trans flash ESD protection, EMI filter, pull-up resistor                                             | IP4352CX24/LF                               |                                                                                                              | 2.02 x 2.01 x 0.61                                                                                    |
|                    |                           | -                                           | -               | >52                                 | (Mini) SD/SDIO memory card level shifter, can be combined with IP4352CX24/LF                                        | IP4852CX25/LF                               | 25 ball CSP                                                                                                  | 2.01 x 2.01 x 0.61                                                                                    |
|                    |                           | 40 $\Omega$ / 50 k $\Omega$ / 15 k $\Omega$ | -               | >52                                 | (Mini) SD/SDIO memory card level shifter, and voltage regular, incl. ESD and EMI filter                             | IP4853CX24/P                                | 24 ball CSP                                                                                                  |                                                                                                       |

ESD protection acc. to IEC 61000-4-2 (level 4)

Please find more ESD protection diodes for ultra high-speed interfaces on pages 28 - 31

## Battery and charger protection


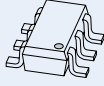

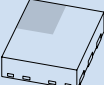
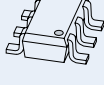



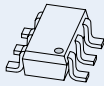
types in **bold** represent new products

| Baseband interface           | Number of protected lines | $C_{line}$ (pF) | Diode voltage    | Remark                               | Type             | Package                                                                                                  | Size (mm)          |                                                                                                          |                   |
|------------------------------|---------------------------|-----------------|------------------|--------------------------------------|------------------|----------------------------------------------------------------------------------------------------------|--------------------|----------------------------------------------------------------------------------------------------------|-------------------|
| Battery & charger protection | 1                         | 180             | Breakdown 16 V   | Power diode                          | IP4085CX4        | 4 ball CSP<br>      | 0.91 x 0.91 x 0.65 |                                                                                                          |                   |
|                              |                           | 450             | Breakdown 7 V    | Power diode                          | IP4385CX4        |                                                                                                          |                    |                                                                                                          |                   |
|                              |                           | 160             | Breakdown 16 V   | Power diode                          | <b>IP4386CX4</b> |                                                                                                          |                    |                                                                                                          |                   |
|                              |                           | 290             | Breakdown 10 V   | Power diode                          | <b>IP4387CX4</b> |                                                                                                          |                    |                                                                                                          |                   |
|                              |                           | 160             | $V_{RWM} = 12$ V | Power diode with 2 A integrated fuse | <b>IP4389CX4</b> | SOD323F (SC-90)<br> | 1.7 x 1.25 x 0.7   |                                                                                                          |                   |
|                              |                           | 160             | $V_{RWM} = 12$ V | Power diode                          | PESD12VS1UJ      |                                                                                                          |                    |                                                                                                          |                   |
|                              |                           | 160             | $V_{RWM} = 12$ V | Power diode                          | PESD12VS1UA      |                                                                                                          |                    | SOD323 (SC-76)<br>  | 1.7 x 1.25 x 0.95 |
|                              |                           | 480             | $V_{RWM} = 5$ V  | Power diode                          | PESD5V0S1UJ      |                                                                                                          |                    | SOD323F (SC-90)<br> | 1.7 x 1.25 x 0.7  |
|                              |                           | 480             | $V_{RWM} = 5$ V  | Power diode                          | PESD5V0S1UA      |                                                                                                          |                    | SOD323 (SC-76)<br>  | 1.7 x 1.25 x 0.95 |

ESD protection acc. to IEC 61000-4-2 (level 4)

## USB, SATA, LAN

types in **bold** represent new products

| Baseband interface          | Number of protected lines | $R_{line}$ | $C_{line}$ (pF) | Remark                                                | Type                                                         | Package                                                                                                  | Size (mm)                                                                                               |                   |
|-----------------------------|---------------------------|------------|-----------------|-------------------------------------------------------|--------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------|-------------------|
| USB2.0<br>(Plastic package) | 2                         | -          | 1               | ESD protection for up to 2 ultra high-speed datalines | PRTR5V0U2K                                                   | SOT891 (XSON6)<br>    | 1.0 x 1.0 x 0.5                                                                                         |                   |
|                             |                           | -          | 1               | ESD protection for up to 2 ultra high-speed datalines | PRTR5V0U2D                                                   | SOT457 (SC-74)<br>    | 2.9 x 1.5 x 1.0                                                                                         |                   |
|                             |                           | -          | 1               | ESD protection for up to 2 ultra high-speed datalines | PRTR5V0U2F                                                   | SOT886 (XSON6)<br>    | 1.45 x 1.0 x 0.5                                                                                        |                   |
|                             | 3 + 1                     | -          | 0.8             | USB protection for USB OTG with 5.5 V Vbat protection | <b>PUSBM5V5X4-TL</b>                                         | SOT1189 (HXSON6)<br> | 1.6 x 1.6 x 0.5                                                                                         |                   |
|                             |                           | -          | 0.8             | USB protection for USB OTG with 12 V Vbat protection  | <b>PUSBM12VX4-TL</b>                                         |                                                                                                          |                                                                                                         |                   |
|                             |                           | -          | 0.8             | USB protection for USB OTG with 15 V Vbat protection  | <b>PUSBM15VX4-TL</b>                                         |                                                                                                          |                                                                                                         |                   |
|                             |                           | -          | 0.8             | USB protection for USB OTG with 27 V Vbat protection  | <b>PUSBM27VX4-TL</b>                                         |                                                                                                          |                                                                                                         |                   |
|                             | 4                         | -          | -               | 1                                                     | Dual ESD protection for USB2.0 high-speed, SD-card, SIM card | IP4220CZ6                                                                                                | SOT457 (SC-74)<br> | 2.9 x 1.5 x 1.0   |
|                             |                           |            | -               | 1                                                     | Dual ESD protection for USB2.0 high-speed, SD-card, SIM card | PRTR5V0U4D                                                                                               |                                                                                                         |                   |
|                             |                           |            | -               | 1                                                     | Dual ESP protection for USB2.0 high-speed, SD-card, SIM card | PRTR5V0U4Y                                                                                               | SOT363 (SC-88)<br> | 2.0 x 1.25 x 0.95 |
|                             |                           | -          | -               | 1                                                     | ESD protection for USB2.0 high-speed, SD-card, SIM card      | IP4221CZ6-S                                                                                              | SOT886 (XSON6)<br> | 1.45 x 1.0 x 0.5  |
|                             |                           |            | -               | 1                                                     | ESD protection for USB2.0 high-speed, SD-card, SIM card      | IP4221CZ6-XS                                                                                             | SOT891 (XSON6)<br> | 1.0 x 1.0 x 0.5   |
|                             |                           |            | 1               | 3                                                     | >15 kV IEC contact ESD protection with pi-filter             | IP4225CZ10                                                                                               | SOT457 (SC-74)<br> | 2.9 x 1.5 x 1.0   |

ESD protection acc. to IEC 61000-4-2 (level 4)



## USB, SATA, LAN

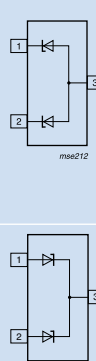
types in **bold** represent new products

| Baseband interface | Number of protected lines | $R_{line}$ | $C_{line}$ (pF) | Remark                                         | Type                  | Package                                                                                                   | Size (mm)         |
|--------------------|---------------------------|------------|-----------------|------------------------------------------------|-----------------------|-----------------------------------------------------------------------------------------------------------|-------------------|
| Display port       | 4                         | -          | 0.6             | ESD protection for ultra high-speed interfaces | IP4286CZ6-TTY         | SOT363 (SC-88)<br>     | 2.0 x 1.25 x 0.95 |
|                    | 11                        | -          | 0.7             | ESD protection                                 | IP4790CZ38            | SOT510 (TSSOP38)<br>   | 9.7 x 4.4 x 1.1   |
| SATA               | 2                         | -          | 0.7             | ESD protection for ultra high-speed interfaces | <b>IP4282CZ6</b>      | SOT886 (XSON6)<br>     | 1.45 x 1.0 x 0.5  |
|                    |                           | -          | 0.6             | ESD protection for ultra high-speed interfaces | IP4286CZ6-TBF         | SOT363 (SC-88)<br>     | 2.0 x 1.25 x 0.95 |
|                    |                           | -          | 0.6             | ESD protection for ultra high-speed interfaces | IP4286CZ6-TTY         |                                                                                                           |                   |
|                    | 4                         | -          | 0.6             | ESD protection for ultra high-speed interfaces | <b>IP4283CZ10-TBR</b> | SOT1176 (XSON10)<br> | 1.0 x 2.5 x 0.5   |
|                    |                           | -          | 0.6             | ESD protection for ultra high-speed interfaces | IP4283CZ10-TT         | SOT552 (TSSOP10)<br> | 3.0 x 3.0 x 1.1   |
|                    |                           | -          | 0.5             | ESD protection for ultra high-speed interfaces | <b>IP4284CZ10-TBR</b> | SOT1176 (XSON10)<br> | 1.0 x 2.5 x 0.5   |
|                    |                           | -          | 0.5             | ESD protection for ultra high-speed interfaces | IP4284CZ10-TT         | SOT552 (TSSOP10)<br> | 3.0 x 3.0 x 1.1   |
|                    |                           | -          | 0.8             | ESD protection for ultra high-speed interfaces | <b>IP4285CZ9-TBB</b>  | SOT1178 (XSON9)<br>  | 1.0 x 2.5 x 0.1   |
|                    |                           | -          | 0.5             | ESD protection for ultra high-speed interfaces | <b>IP4292CZ10-TBR</b> | SOT1176 (XSON10)<br> | 1.0 x 2.5 x 0.5   |

ESD protection acc. to IEC 61000-4-2 (level 4)

TVS diodes

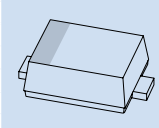
TVS diodes, 24 W/40 W

| Power (W) (10/1000 $\mu$ s waveform) <sup>[1]</sup> | Reverse Voltage |                          |                          |                          |    | $I_R$ (mA) | ESD rating <sup>[2]</sup> max (kV) | $C_{line}$ typ (pF) | $V_{CL}$ max (V) @ $I_{PP}$ | $I_{PP}$ (A) | $I_{RM}$ max ( $\mu$ A) @ $V_{RWM}$                                                | Configuration | Type  | Package         | Size (mm) |
|-----------------------------------------------------|-----------------|--------------------------|--------------------------|--------------------------|----|------------|------------------------------------|---------------------|-----------------------------|--------------|------------------------------------------------------------------------------------|---------------|-------|-----------------|-----------|
|                                                     | $V_{RWM}$ (V)   | $V_{BR}$ min (V) @ $I_R$ | $V_{BR}$ typ (V) @ $I_R$ | $V_{BR}$ max (V) @ $I_R$ |    |            |                                    |                     |                             |              |                                                                                    |               |       |                 |           |
| 24                                                  | 3               | 5.32                     | 5.6                      | 5.88                     | 20 | 30         | 210                                | 8                   | 3                           | 5            |  | MMBZ5V6AL     | SOT23 | 2.9 x 1.3 x 1.0 |           |
|                                                     | 3               | 5.89                     | 6.2                      | 6.51                     | 1  | 30         | 175                                | 8.7                 | 2.76                        | 0.2          |                                                                                    | MMBZ6V2AL     |       |                 |           |
|                                                     | 4.5             | 6.48                     | 6.8                      | 7.14                     | 1  | 30         | 150                                | 9.6                 | 2.5                         | 0.3          |                                                                                    | MMBZ6V8AL     |       |                 |           |
|                                                     | 6               | 8.65                     | 9.1                      | 9.56                     | 1  | 30         | 155                                | 14                  | 1.7                         | 0.1          |                                                                                    | MMBZ9V1AL     |       |                 |           |
|                                                     | 6.5             | 9.5                      | 10                       | 10.5                     | 1  | 30         | 130                                | 14.2                | 1.7                         | 0.02         |                                                                                    | MMBZ10VAL     |       |                 |           |
| 40                                                  | 8.5             | 11.4                     | 12                       | 12.6                     | 1  | 30         | 110                                | 17                  | 2.35                        | 0.005        |                                                                                    | MMBZ12VAL     |       |                 |           |
|                                                     | 12              | 14.25                    | 15                       | 15.75                    | 1  | 30         | 85                                 | 21                  | 1.9                         | 0.005        |                                                                                    | MMBZ15VAL     |       |                 |           |
|                                                     | 14.5            | 17.1                     | 18                       | 18.9                     | 1  | 30         | 70                                 | 25                  | 1.6                         | 0.005        |                                                                                    | MMBZ18VAL     |       |                 |           |
|                                                     | 17              | 19                       | 20                       | 21                       | 1  | 30         | 65                                 | 28                  | 1.4                         | 0.005        |                                                                                    | MMBZ20VAL     |       |                 |           |
|                                                     | 22              | 25.65                    | 27                       | 28.35                    | 1  | 30         | 48                                 | 40                  | 1                           | 0.005        |                                                                                    | MMBZ27VAL     |       |                 |           |
|                                                     | 26              | 31.35                    | 33                       | 34.65                    | 1  | 30         | 45                                 | 46                  | 0.87                        | 0.005        |                                                                                    | MMBZ33VAL     |       |                 |           |
|                                                     | 8.5             | 11.4                     | 12                       | 12.6                     | 1  | 30         | 110                                | 17                  | 2.35                        | 0.005        |                                                                                    | MMBZ12VDL     |       |                 |           |
|                                                     | 12.8            | 14.3                     | 15                       | 15.8                     | 1  | 30         | 85                                 | 21.2                | 1.9                         | 0.005        |                                                                                    | MMBZ15VDL     |       |                 |           |
|                                                     | 14.5            | 17.1                     | 18                       | 18.9                     | 1  | 30         | 70                                 | 25                  | 1.6                         | 0.005        |                                                                                    | MMBZ18VCL     |       |                 |           |
|                                                     | 17              | 19                       | 20                       | 21                       | 1  | 30         | 65                                 | 28                  | 1.4                         | 0.005        |                                                                                    | MMBZ20VCL     |       |                 |           |
|                                                     | 22              | 25.65                    | 27                       | 28.35                    | 1  | 30         | 48                                 | 38                  | 1                           | 0.005        | MMBZ27VCL                                                                          |               |       |                 |           |
|                                                     | 26              | 31.35                    | 33                       | 34.65                    | 1  | 30         | 45                                 | 46                  | 0.87                        | 0.005        | MMBZ33VCL                                                                          |               |       |                 |           |

<sup>[1]</sup> acc. to IEC 61643-321

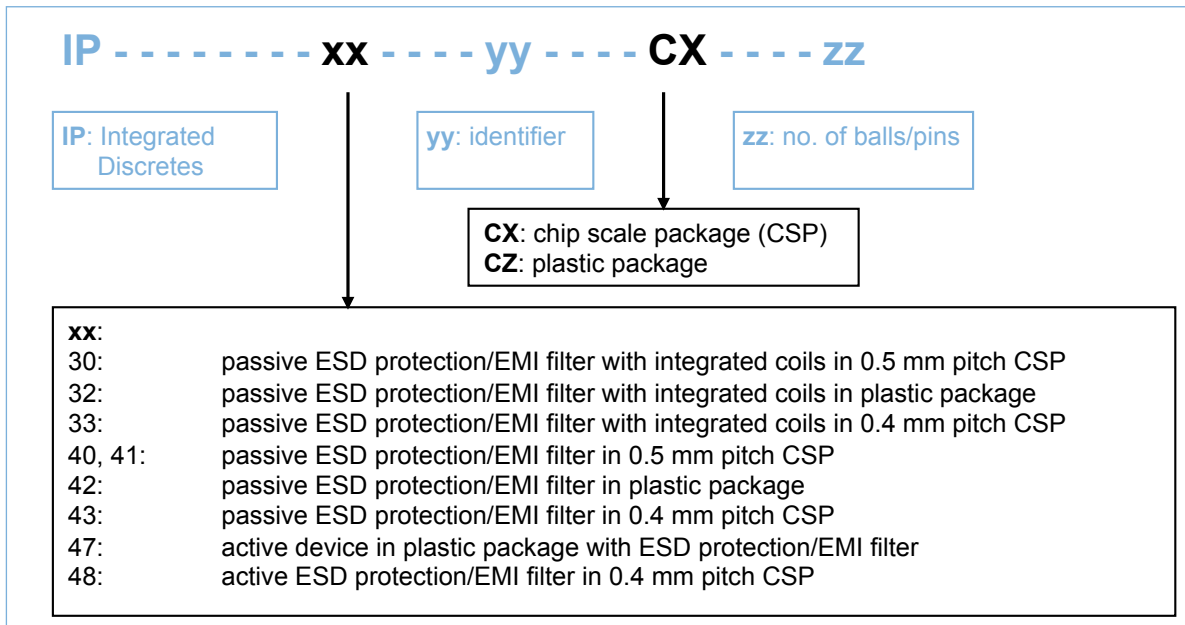
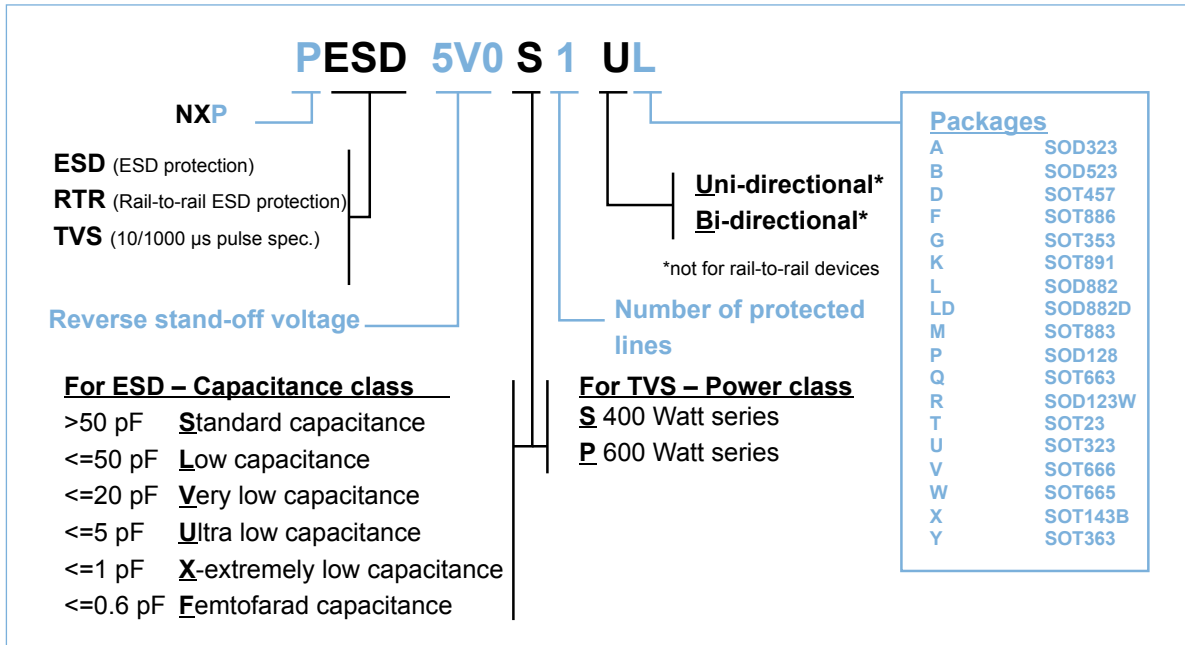
<sup>[2]</sup> acc. to IEC 61000-4-2 (contact discharge)

TVS diodes, 400 W

| Power (W) (10/1000 $\mu$ s waveform) <sup>[1]</sup> | Reverse Voltage          |                          |                          |       |       | $I_R$ (mA) | $V_{CL}$ max (V) @ $I_{PP}$ | $I_{PP}$ (A) | $I_{RM}$ typ ( $\mu$ A) @ $V_{RWM}$ | $I_{RM}$ max ( $\mu$ A) @ $V_{RWM}$ | Type                                                                                  | Package | Size (mm)       |
|-----------------------------------------------------|--------------------------|--------------------------|--------------------------|-------|-------|------------|-----------------------------|--------------|-------------------------------------|-------------------------------------|---------------------------------------------------------------------------------------|---------|-----------------|
| $V_{RWM}$ (V)                                       | $V_{BR}$ min (V) @ $I_R$ | $V_{BR}$ typ (V) @ $I_R$ | $V_{BR}$ max (V) @ $I_R$ |       |       |            |                             |              |                                     |                                     |                                                                                       |         |                 |
| 350                                                 | 3.5                      | 5.20                     | 5.60                     | 6.00  | 10    | 8.0        | 43.8                        | 5            | 600                                 | PTVS3V3S1UR                         |  | SOD123W | 2.6 x 1.7 x 1.0 |
|                                                     | 5.0                      | 6.40                     | 6.70                     | 7.00  | 10    | 9.2        | 43.5                        | 5            | 400                                 | PTVS5V0S1UR                         |                                                                                       |         |                 |
|                                                     | 6.0                      | 6.67                     | 7.02                     | 7.37  | 10    | 10.3       | 38.8                        | 5            | 400                                 | PTVS6V0S1UR                         |                                                                                       |         |                 |
|                                                     | 6.5                      | 7.22                     | 7.60                     | 7.98  | 10    | 11.2       | 35.7                        | 5            | 250                                 | PTVS6V5S1UR                         |                                                                                       |         |                 |
|                                                     | 7.0                      | 7.78                     | 8.20                     | 8.60  | 10    | 12.0       | 33.3                        | 3            | 100                                 | PTVS7V0S1UR                         |                                                                                       |         |                 |
|                                                     | 7.5                      | 8.33                     | 8.77                     | 9.21  | 1     | 12.9       | 31.0                        | 0.2          | 50                                  | PTVS7V5S1UR                         |                                                                                       |         |                 |
|                                                     | 8.0                      | 8.89                     | 9.36                     | 9.83  | 1     | 13.6       | 29.4                        | 0.03         | 25                                  | PTVS8V0S1UR                         |                                                                                       |         |                 |
|                                                     | 8.5                      | 9.44                     | 9.92                     | 10.40 | 1     | 14.4       | 27.8                        | 0.01         | 10                                  | PTVS8V5S1UR                         |                                                                                       |         |                 |
|                                                     | 9.0                      | 10.00                    | 10.55                    | 11.10 | 1     | 15.4       | 26.0                        | 0.005        | 5                                   | PTVS9V0S1UR                         |                                                                                       |         |                 |
|                                                     | 10                       | 11.10                    | 11.70                    | 12.30 | 1     | 17.0       | 23.5                        | 0.005        | 2.5                                 | PTVS10VS1UR                         |                                                                                       |         |                 |
|                                                     | 11                       | 12.20                    | 12.85                    | 13.50 | 1     | 18.2       | 22.0                        | 0.005        | 2.5                                 | PTVS11VS1UR                         |                                                                                       |         |                 |
|                                                     | 12                       | 13.30                    | 14.00                    | 14.70 | 1     | 19.9       | 20.1                        | 0.005        | 2.5                                 | PTVS12VS1UR                         |                                                                                       |         |                 |
|                                                     | 13                       | 14.40                    | 15.15                    | 15.90 | 1     | 21.5       | 18.6                        | 0.001        | 0.1                                 | PTVS13VS1UR                         |                                                                                       |         |                 |
|                                                     | 14                       | 15.60                    | 16.40                    | 17.20 | 1     | 23.2       | 17.2                        | 0.001        | 0.1                                 | PTVS14VS1UR                         |                                                                                       |         |                 |
|                                                     | 15                       | 16.70                    | 17.60                    | 18.50 | 1     | 24.4       | 16.4                        | 0.001        | 0.1                                 | PTVS15VS1UR                         |                                                                                       |         |                 |
|                                                     | 16                       | 17.80                    | 18.75                    | 19.70 | 1     | 26.0       | 15.4                        | 0.001        | 0.1                                 | PTVS16VS1UR                         |                                                                                       |         |                 |
|                                                     | 17                       | 18.90                    | 19.90                    | 20.90 | 1     | 27.6       | 14.5                        | 0.001        | 0.1                                 | PTVS17VS1UR                         |                                                                                       |         |                 |
| 400                                                 | 18                       | 20.00                    | 21.00                    | 22.10 | 1     | 29.2       | 13.7                        | 0.001        | 0.1                                 | PTVS18VS1UR                         |                                                                                       |         |                 |
|                                                     | 20                       | 22.20                    | 23.35                    | 24.50 | 1     | 32.4       | 12.3                        | 0.001        | 0.1                                 | PTVS20VS1UR                         |                                                                                       |         |                 |
|                                                     | 22                       | 24.40                    | 25.60                    | 26.90 | 1     | 35.5       | 11.3                        | 0.001        | 0.1                                 | PTVS22VS1UR                         |                                                                                       |         |                 |
|                                                     | 24                       | 26.70                    | 28.10                    | 29.50 | 1     | 38.9       | 10.3                        | 0.001        | 0.1                                 | PTVS24VS1UR                         |                                                                                       |         |                 |
|                                                     | 26                       | 28.90                    | 30.40                    | 31.90 | 1     | 42.1       | 9.5                         | 0.001        | 0.1                                 | PTVS26VS1UR                         |                                                                                       |         |                 |
|                                                     | 28                       | 31.10                    | 32.80                    | 34.40 | 1     | 45.4       | 8.8                         | 0.001        | 0.1                                 | PTVS28VS1UR                         |                                                                                       |         |                 |
|                                                     | 30                       | 33.30                    | 35.10                    | 36.80 | 1     | 48.4       | 8.3                         | 0.001        | 0.1                                 | PTVS30VS1UR                         |                                                                                       |         |                 |
|                                                     | 33                       | 36.70                    | 38.70                    | 40.60 | 1     | 53.3       | 7.5                         | 0.001        | 0.1                                 | PTVS33VS1UR                         |                                                                                       |         |                 |
|                                                     | 36                       | 40.00                    | 42.10                    | 44.20 | 1     | 58.1       | 6.9                         | 0.001        | 0.1                                 | PTVS36VS1UR                         |                                                                                       |         |                 |
|                                                     | 40                       | 44.40                    | 46.80                    | 49.10 | 1     | 64.5       | 6.2                         | 0.001        | 0.1                                 | PTVS40VS1UR                         |                                                                                       |         |                 |
|                                                     | 43                       | 47.80                    | 50.30                    | 52.80 | 1     | 69.4       | 5.8                         | 0.001        | 0.1                                 | PTVS43VS1UR                         |                                                                                       |         |                 |
|                                                     | 45                       | 50.00                    | 52.65                    | 55.30 | 1     | 72.7       | 5.5                         | 0.001        | 0.1                                 | PTVS45VS1UR                         |                                                                                       |         |                 |
|                                                     | 48                       | 53.30                    | 56.10                    | 58.90 | 1     | 77.4       | 5.2                         | 0.001        | 0.1                                 | PTVS48VS1UR                         |                                                                                       |         |                 |
| 51                                                  | 56.70                    | 59.70                    | 62.70                    | 1     | 82.4  | 4.9        | 0.001                       | 0.1          | PTVS51VS1UR                         |                                     |                                                                                       |         |                 |
| 54                                                  | 60.00                    | 63.15                    | 66.30                    | 1     | 87.1  | 4.6        | 0.001                       | 0.1          | PTVS54VS1UR                         |                                     |                                                                                       |         |                 |
| 58                                                  | 64.40                    | 67.80                    | 71.20                    | 1     | 93.6  | 4.3        | 0.001                       | 0.1          | PTVS58VS1UR                         |                                     |                                                                                       |         |                 |
| 60                                                  | 66.70                    | 70.20                    | 73.70                    | 1     | 96.8  | 4.1        | 0.001                       | 0.1          | PTVS60VS1UR                         |                                     |                                                                                       |         |                 |
| 64                                                  | 71.10                    | 74.85                    | 78.60                    | 1     | 103.0 | 3.9        | 0.001                       | 0.1          | PTVS64VS1UR                         |                                     |                                                                                       |         |                 |

<sup>[1]</sup> 10/1000  $\mu$ s acc. to IEC 61643-321





# Protection and signal conditioning nomenclature



# General purpose bipolar transistors





## Single transistors NPN

types in **bold** represent new products



| Package               |                     |                     |                     |                          | SOT23                                                                             | SOT323 (SC-70)                                                                     | SOT416 (SC-75)                                                                      | SOT883 (SC-101)                                                                     |
|-----------------------|---------------------|---------------------|---------------------|--------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|                       |                     |                     |                     |                          |  |  |  |  |
| Size (mm)             |                     |                     |                     |                          | 2.9 x 1.3 x 1.0                                                                   | 2.0 x 1.25 x 0.95                                                                  | 1.6 x 0.8 x 0.77                                                                    | 1.0 x 0.6 x 0.5                                                                     |
| P <sub>tot</sub> (mW) |                     |                     |                     |                          | 250                                                                               | 200                                                                                | 150                                                                                 | 250                                                                                 |
| V <sub>CEO</sub> (V)  | I <sub>C</sub> (mA) | h <sub>FE</sub> min | h <sub>FE</sub> max | f <sub>T</sub> min (MHz) |                                                                                   |                                                                                    |                                                                                     |                                                                                     |
| 25                    | 100                 | 450                 | 1200                | 100                      |                                                                                   | PMST5089                                                                           |                                                                                     |                                                                                     |
| 30                    | 100                 | 110 - 200           | 450 - 800           | 100                      | BC848B                                                                            | BC848W                                                                             |                                                                                     |                                                                                     |
|                       |                     | 350                 | 900                 | 100                      |                                                                                   | PMST5088                                                                           |                                                                                     |                                                                                     |
| 32                    | 100                 | 110 - 420           | 220 - 800           | 100                      | BCW31 / 32 / 33                                                                   |                                                                                    |                                                                                     |                                                                                     |
|                       |                     | 180 - 380           | 310 - 630           | 250                      | BCW60B / C / D                                                                    |                                                                                    |                                                                                     |                                                                                     |
| 40                    | 100                 | 120 - 270           | 270 - 560           | 100                      |                                                                                   |                                                                                    |                                                                                     | 2PC4617QM / RM                                                                      |
| 45                    | 100                 | 110 - 420           | 220 - 800           | 100                      | BC847 / A / B / C                                                                 | BC847W / AW / BW / CW                                                              | BC847T / AT / BT / CT                                                               | BC847AM / BM / CM                                                                   |
|                       |                     | 120 - 380           | 220 - 630           | 100                      | BCX70G / H / J / K                                                                |                                                                                    |                                                                                     |                                                                                     |
|                       |                     | 110 - 200           | 220 - 450           | 100                      | BCW71 / 72                                                                        |                                                                                    |                                                                                     |                                                                                     |
|                       |                     | 500                 | 1250                | 100                      | PMBT6429                                                                          | PMST6429                                                                           |                                                                                     |                                                                                     |
| 50                    | 100                 | 210 - 290           | 340 - 460           | 100 - 150                | 2PD601ART<br>2PD601ARL<br>2PD601ASL                                               | 2PD601ARW / SW                                                                     |                                                                                     |                                                                                     |
|                       |                     | 250                 | 650                 | 100                      | PMBT6428                                                                          | PMST6428                                                                           |                                                                                     |                                                                                     |
| 60                    | 100                 | 110 - 200           | 220 - 450           | 100                      | BCV71 / 72                                                                        |                                                                                    |                                                                                     |                                                                                     |
| 65                    | 100                 | 110 - 200           | 220 - 450           | 100                      | BC846 / A / B                                                                     | BC846W / AW / BW                                                                   | BC846T / AT / BT                                                                    |                                                                                     |
| 80                    | 100                 | 20                  | 80                  | 60                       | BSS64                                                                             |                                                                                    |                                                                                     |                                                                                     |
| 50                    | 150                 | 120 - 270           | 270 - 560           | 100                      |                                                                                   | 2PC4081Q / R / S                                                                   | 2PC4617Q / R                                                                        |                                                                                     |
|                       | 200                 | 210                 | 340                 | 100                      | <b>2PD601BRL</b>                                                                  |                                                                                    |                                                                                     |                                                                                     |
|                       |                     | 290                 | 460                 | 100                      | <b>2PD601BSL</b>                                                                  |                                                                                    |                                                                                     |                                                                                     |
| 45                    | 500                 | 100 - 250           | 250 - 600           | 100                      | BC817 / -16 / -25 / -40                                                           | BC817W / -16W / -25W / -40W                                                        |                                                                                     |                                                                                     |
|                       |                     | 100                 | 600                 | 100                      | BCX19                                                                             |                                                                                    |                                                                                     |                                                                                     |
| 50                    | 500                 | 85 - 170            | 170 - 340           | 140 - 180                | 2PD602AQL<br>2PD602ARL<br>2PD602ASL                                               | 2PD1820AR / S                                                                      |                                                                                     |                                                                                     |
| 60                    | 500                 | 50                  | -                   | 100                      |                                                                                   | PMSTA05                                                                            |                                                                                     |                                                                                     |

## Single transistors PNP

types in **bold** represent new products






| Package               |                     |                     |                     |                          | SOT23                                                                               | SOT323 (SC-70)                                                                       | SOT416 (SC-75)                                                                        | SOT883 (SC-101)                                                                       |
|-----------------------|---------------------|---------------------|---------------------|--------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
|                       |                     |                     |                     |                          |  |  |  |  |
| Size (mm)             |                     |                     |                     |                          | 2.9 x 1.3 x 1.0                                                                     | 2.0 x 1.25 x 0.95                                                                    | 1.6 x 0.8 x 0.77                                                                      | 1.0 x 0.6 x 0.5                                                                       |
| P <sub>tot</sub> (mW) |                     |                     |                     |                          | 250                                                                                 | 200                                                                                  | 150                                                                                   | 250                                                                                   |
| V <sub>CEO</sub> (V)  | I <sub>C</sub> (mA) | h <sub>FE</sub> min | h <sub>FE</sub> max | f <sub>T</sub> min (MHz) |                                                                                     |                                                                                      |                                                                                       |                                                                                       |
| 80                    | 500                 | 100                 | -                   | 100                      | PMBTA06                                                                             | PMSTA06                                                                              |                                                                                       |                                                                                       |
| 30                    | 100                 | 125 - 220           | 500 - 800           | 100                      | BC858B                                                                              | BC858W                                                                               |                                                                                       |                                                                                       |
|                       |                     | 120 - 215           | 260 - 500           | 100                      | BCW29 / 30                                                                          |                                                                                      |                                                                                       |                                                                                       |
| 32                    | 100                 | 180 - 380           | 310 - 630           | 100                      | BCW61B / C / D                                                                      |                                                                                      |                                                                                       |                                                                                       |
|                       |                     | 120 - 270           | 270 - 560           | 100                      |                                                                                     |                                                                                      |                                                                                       | 2PA1774QM / RM / SM                                                                   |
| 45                    | 100                 | 210 - 290           | 340 - 460           | 70 - 80                  | 2PB709ART<br>2PB709ARL<br>2PB709ASL                                                 | 2PB709ARW / SW                                                                       |                                                                                       |                                                                                       |
|                       |                     | 180 - 380           | 310 - 630           | 100                      | BCX71H / J / K                                                                      |                                                                                      |                                                                                       |                                                                                       |
|                       |                     | 120 - 215           | 260 - 500           | 100                      | BCW69 / 70                                                                          |                                                                                      |                                                                                       |                                                                                       |
|                       |                     | 125 - 420           | 250 - 800           | 100                      | BC857 / A / B / C                                                                   | BC857W / AW / BW / CW                                                                | BC857T / AT / BT / CT                                                                 | BC857AM / BM / CM                                                                     |
| 60                    | 100                 | 120                 | 260                 | 150                      | BCW89                                                                               |                                                                                      |                                                                                       |                                                                                       |
| 65                    | 100                 | 125 - 200           | 250 - 475           | 100                      | BC856 / A / B                                                                       | BC856W / AW / BW                                                                     | BC856T / AT / BT                                                                      |                                                                                       |
| 100                   | 100                 | 30                  | -                   | 50                       | BSS63                                                                               |                                                                                      |                                                                                       |                                                                                       |
| 50                    | 150                 | 120 - 270           | 270 - 560           | 100                      |                                                                                     | 2PA1576Q / R / S                                                                     | 2PA1774Q / R / S                                                                      |                                                                                       |
|                       | 200                 | 210                 | 340                 | 100                      | <b>2PD601BRL</b>                                                                    |                                                                                      |                                                                                       |                                                                                       |
|                       |                     | 290                 | 460                 | 100                      | <b>2PD601BSL</b>                                                                    |                                                                                      |                                                                                       |                                                                                       |
| 25                    | 500                 | 100                 | 600                 | 80                       | BCX18                                                                               |                                                                                      |                                                                                       |                                                                                       |
| 45                    | 500                 | 100 - 250           | 250 - 600           | 80                       | BC807 / -16 / -25 / -40                                                             | BC807W / -16W / -25W / -40W                                                          |                                                                                       |                                                                                       |
|                       |                     | 100                 | 600                 | 80                       | BCX17                                                                               |                                                                                      |                                                                                       |                                                                                       |
| 50                    | 500                 | 85 - 170            | 170 - 340           | 100 - 140                | 2PB710ARL<br>2PB710ASL                                                              | 2PB1219AQ / R / S                                                                    |                                                                                       |                                                                                       |
| 60                    | 500                 | 100                 | -                   | 50                       |                                                                                     | PMSTA55                                                                              |                                                                                       |                                                                                       |
| 80                    | 500                 | 100                 | -                   | 50                       | PMBTA56                                                                             | PMSTA56                                                                              |                                                                                       |                                                                                       |

## Medium power general purpose transistors

| Package               |                      |                     |                     |                     |                                       | SOT223 (SC-73)                                                                      | SOT89 (SC-62)                                                                       |
|-----------------------|----------------------|---------------------|---------------------|---------------------|---------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|                       |                      |                     |                     |                     |                                       |  |  |
| Size (mm)             |                      |                     |                     |                     |                                       | 6.5 x 3.5 x 1.65                                                                    | 4.5 x 2.5 x 1.5                                                                     |
| P <sub>tot</sub> (mW) |                      |                     |                     |                     |                                       | 1700                                                                                | 1300                                                                                |
| Polarity              | V <sub>CEO</sub> (V) | I <sub>C</sub> (mA) | h <sub>FE</sub> min | h <sub>FE</sub> max | f <sub>T</sub> min (MHz)              |                                                                                     |                                                                                     |
| NPN                   | 20                   | 1000                | 85 - 160            | 375                 | 40                                    | BCP68 / -25                                                                         | BC868 / -25                                                                         |
|                       | 45                   | 1000                | 63 - 100            | 160 - 250           | 100                                   | BCP54 / -10 / -16                                                                   | BCX54 / -10 / -16                                                                   |
|                       | 60                   | 1000                | 63 - 100            | 160 - 250           | 100                                   | BCP55 / -10 / -16                                                                   | BCX55 / -10 / -16                                                                   |
|                       |                      |                     | 100                 | 300                 | 100                                   | BSP41                                                                               | BSR41                                                                               |
|                       | 80                   | 1000                | 63 - 100            | 160 - 250           | 100                                   | BCP56 / -10 / -16                                                                   | BCX56 / -10 / -16                                                                   |
| 40 - 100              |                      |                     | 120 - 300           | 100                 | BSP43                                 | BSR42 / 43                                                                          |                                                                                     |
| PNP                   | 20                   | 1000                | 85 - 160            | 250 - 375           | 40                                    | BCP69 / -16 / -25                                                                   | BC869 / -16 / -25                                                                   |
|                       | 45                   | 1000                | 63 - 100            | 160 - 250           | 115 <sup>1)</sup> - 145 <sup>1)</sup> | BCP51 / -10 / -16                                                                   | BCX51 / -10 / -16                                                                   |
|                       | 60                   | 1000                | 63 - 100            | 160 - 250           | 100                                   | BCP52 / -10 / -16                                                                   | BCX52 / -10 / -16                                                                   |
|                       |                      |                     | 40 - 100            | 120 - 300           | 100                                   | BSP31                                                                               | BSR30 / 31                                                                          |
|                       | 80                   | 1000                | 63 - 100            | 160 - 250           | 115 <sup>1)</sup> - 145 <sup>1)</sup> | BCP53 / -10 / -16                                                                   | BCX53 / -10 / -16                                                                   |
|                       |                      |                     | 40 - 100            | 120 - 300           | 100                                   | BSP32 / 33                                                                          | BSR33                                                                               |



<sup>1)</sup> typical value

## High voltage transistors




| Package               |                      |                     |                     |                     |                          | SOT223 (SC-73)                                                                    | SOT89 (SC-62)                                                                      | SOT457 (SC-74)                                                                      | SOT23                                                                               | SOT323 (SC-70)                                                                      |
|-----------------------|----------------------|---------------------|---------------------|---------------------|--------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|                       |                      |                     |                     |                     |                          |  |  |  |  |  |
| Size (mm)             |                      |                     |                     |                     |                          | 6.5 x 3.5 x 1.65                                                                  | 4.5 x 2.5 x 1.5                                                                    | 2.9 x 1.5 x 1.0                                                                     | 2.9 x 1.3 x 1.0                                                                     | 2.0 x 1.25 x 0.95                                                                   |
| P <sub>tot</sub> (mW) |                      |                     |                     |                     |                          | 1700                                                                              | 1300                                                                               | 600                                                                                 | 250                                                                                 | 200                                                                                 |
| Polarity              | V <sub>CEO</sub> (V) | I <sub>C</sub> (mA) | h <sub>FE</sub> min | h <sub>FE</sub> max | f <sub>T</sub> min (MHz) |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |
| NPN                   | 80                   | 100                 | 20                  | -                   | 60                       |                                                                                   |                                                                                    |                                                                                     | BSS64                                                                               |                                                                                     |
|                       | 140                  | 100                 | 60                  | 250                 | 100                      |                                                                                   |                                                                                    |                                                                                     | PMBT5550                                                                            | PMST5550                                                                            |
|                       | 160                  | 300                 | 80                  | 250                 | 100                      |                                                                                   |                                                                                    |                                                                                     | PMBT5551/BSR19A                                                                     | PMST5551                                                                            |
|                       | 250                  | 100                 | 50                  | -                   | 60                       | BF722                                                                             | BF622                                                                              |                                                                                     | BF822                                                                               |                                                                                     |
|                       |                      |                     | 50                  | -                   | 60                       | BF720                                                                             | BF620                                                                              |                                                                                     | BF820                                                                               | BF820W                                                                              |
|                       | 300                  | 100                 | 40                  | -                   | 50                       | PZTA42                                                                            | PXTA42                                                                             |                                                                                     | PMBTA42                                                                             | PMSTA42                                                                             |
|                       |                      |                     | 40                  | -                   | 70                       | BSP19                                                                             | BST39                                                                              |                                                                                     |                                                                                     |                                                                                     |
| 400                   | 300                  | 50                  | 200                 | 20                  | PZTA44                   |                                                                                   |                                                                                    | PMBTA44                                                                             |                                                                                     |                                                                                     |
| PNP                   | 100                  | 100                 | 30                  | -                   | 50                       |                                                                                   |                                                                                    |                                                                                     | BSS63                                                                               |                                                                                     |
|                       | 250                  | 100                 | 50                  | -                   | 60                       | BF723                                                                             |                                                                                    |                                                                                     |                                                                                     |                                                                                     |
|                       |                      |                     | 50                  | -                   | 60                       |                                                                                   | BF623                                                                              |                                                                                     | BF823                                                                               |                                                                                     |
|                       | 300                  | 100                 | 50                  | -                   | 60                       |                                                                                   | BF621                                                                              |                                                                                     | BF821                                                                               |                                                                                     |
| 40                    |                      |                     | -                   | 50                  | PZTA92                   | PXTA92                                                                            |                                                                                    | PMBTA92                                                                             | PMSTA92                                                                             |                                                                                     |
| 2 x NPN               | 300                  | 100                 | 40                  | -                   | 50                       |                                                                                   |                                                                                    |                                                                                     | PMBTA42DS                                                                           |                                                                                     |

For high voltage transistors with increased performance please refer to our high voltage low V<sub>CEsat</sub> (BISS) transistor portfolio on page 66.


## Low noise transistors

| Package               |                      |                     |             |                     |                     |                          | SOT23                                                                                 | SOT323 (SC-70)                                                                        |
|-----------------------|----------------------|---------------------|-------------|---------------------|---------------------|--------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
|                       |                      |                     |             |                     |                     |                          |  |  |
| Size (mm)             |                      |                     |             |                     |                     |                          | 2.9 x 1.3 x 1.0                                                                       | 2.0 x 1.25 x 0.95                                                                     |
| P <sub>tot</sub> (mW) |                      |                     |             |                     |                     |                          | 250                                                                                   | 200                                                                                   |
| Polarity              | V <sub>CEO</sub> (V) | I <sub>C</sub> (mA) | NF max (dB) | h <sub>FE</sub> min | h <sub>FE</sub> max | f <sub>T</sub> min (MHz) |                                                                                       |                                                                                       |
| NPN                   | 30                   | 100                 | 4           | 200                 | 450                 | 100                      | BC849B                                                                                | BC849BW                                                                               |
|                       |                      |                     |             | 420                 | 800                 | 100                      | BC849C                                                                                | BC849CW                                                                               |
|                       | 45                   | 100                 | 4           | 200                 | 450                 | 100                      | BC850B                                                                                | BC850BW                                                                               |
|                       |                      |                     |             | 420                 | 800                 | 100                      | BC850C                                                                                | BC850CW                                                                               |
| PNP                   | 30                   | 100                 | 4           | 220                 | 475                 | 100                      | BC859B                                                                                | BC859BW                                                                               |
|                       |                      |                     |             | 420                 | 800                 | 100                      | BC859C                                                                                | BC859CW                                                                               |
|                       | 45                   | 100                 | 4           | 220                 | 475                 | 100                      | BC860B                                                                                | BC860BW                                                                               |
|                       |                      |                     |             | 420                 | 800                 | 100                      | BC860C                                                                                | BC860CW                                                                               |

## Darlington transistors

| Package               |                      |                     |                     |                          | SOT223 (SC-73)                                                                    | SOT89 (SC-62)                                                                       | SOT23                                                                               |       |       |
|-----------------------|----------------------|---------------------|---------------------|--------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------|-------|
|                       |                      |                     |                     |                          |  |  |  |       |       |
| Size (mm)             |                      |                     |                     |                          | 6.5 x 3.5 x 1.65                                                                  | 4.5 x 2.5 x 1.5                                                                     | 2.9 x 1.3 x 1.0                                                                     |       |       |
| P <sub>tot</sub> (mW) |                      |                     |                     |                          | 1700                                                                              | 1300                                                                                | 250                                                                                 |       |       |
| Polarity              | V <sub>CEO</sub> (V) | I <sub>C</sub> (mA) | h <sub>FE</sub> min | f <sub>T</sub> min (MHz) |                                                                                   |                                                                                     |                                                                                     |       |       |
| NPN                   | 30                   | 500                 | 10000               | 125                      |                                                                                   |                                                                                     | PMBTA13                                                                             |       |       |
|                       |                      |                     | 20000               | 125                      | PZTA14                                                                            | PXTA14                                                                              | PMBTA14                                                                             |       |       |
|                       | 45                   | 1000                | 10000               | 2000                     | 200                                                                               |                                                                                     |                                                                                     | BCV29 |       |
|                       |                      |                     |                     | 2000                     | 200                                                                               | BSP50                                                                               | BST50                                                                               |       |       |
|                       |                      |                     |                     | 2000                     | 200                                                                               |                                                                                     |                                                                                     | BCV49 | BCV47 |
|                       |                      |                     |                     | 2000                     | 200                                                                               |                                                                                     |                                                                                     |       |       |
| 60                    | 1000                 | 1000                | 2000                | 200                      | BSP51                                                                             | BST51                                                                               |                                                                                     |       |       |
|                       |                      |                     | 2000                | 200                      | BSP52                                                                             | BST52                                                                               |                                                                                     |       |       |
| PNP                   | 30                   | 500                 | 20000               | 125                      |                                                                                   |                                                                                     | PMBTA64                                                                             |       |       |
|                       |                      |                     | 20000               | 125                      |                                                                                   |                                                                                     | BCV28                                                                               | BCV26 |       |
|                       | 45                   | 1000                | 10000               | 2000                     | 200                                                                               | BSP60                                                                               | BST60                                                                               |       |       |
|                       |                      |                     |                     | 2000                     | 200                                                                               |                                                                                     |                                                                                     | BCV48 | BCV46 |
|                       |                      |                     |                     | 2000                     | 200                                                                               |                                                                                     |                                                                                     |       |       |
|                       |                      |                     |                     | 2000                     | 200                                                                               | BSP61                                                                               | BST61                                                                               |       |       |
| 60                    | 1000                 | 1000                | 2000                | 200                      |                                                                                   |                                                                                     |                                                                                     |       |       |
|                       |                      |                     | 2000                | 200                      | BSP62                                                                             | BST62                                                                               |                                                                                     |       |       |

## Schmitt trigger

| Package               |                          |                          |                     |                     |                     |                             | SOT143B                                                                              |
|-----------------------|--------------------------|--------------------------|---------------------|---------------------|---------------------|-----------------------------|--------------------------------------------------------------------------------------|
|                       |                          |                          |                     |                     |                     |                             |  |
| Size (mm)             |                          |                          |                     |                     |                     |                             | 2.9 x 1.3 x 1.0                                                                      |
| P <sub>tot</sub> (mW) |                          |                          |                     |                     |                     |                             | 250                                                                                  |
| Polarity              | V <sub>CEO</sub> (V) TR1 | V <sub>CEO</sub> (V) TR2 | I <sub>C</sub> (mA) | h <sub>FE</sub> min | h <sub>FE</sub> max | V <sub>CEsat</sub> typ (mV) |                                                                                      |
| NPN                   | 30                       | 6                        | 100                 | 110                 | 800                 | 250                         | BCV63 / B                                                                            |
| PNP                   | 30                       | 6                        | 100                 | 220                 | 475                 | 250                         | BCV64B                                                                               |

### Key features

- ▶ Low current (max. 100 mA)
- ▶ Low voltage (max. 30 and 6 V)

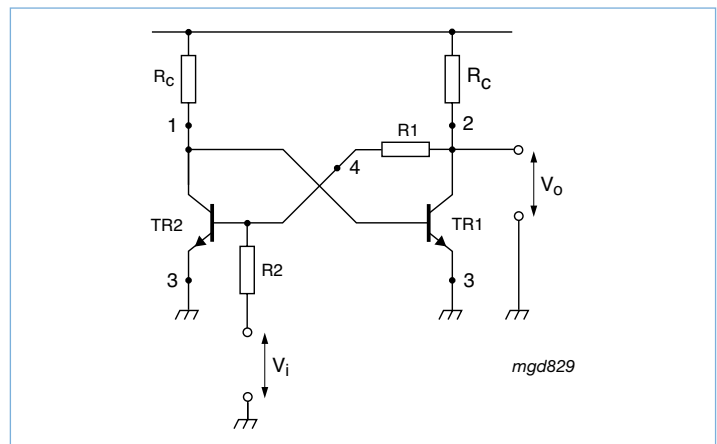
### Key benefits

- ▶ Reduced component count and pick-and-place costs
- ▶ Smaller designs

### Key applications



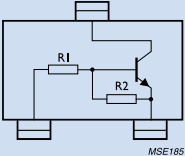
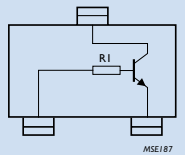
- ▶ General purpose switching and amplification
- ▶ Schmitt trigger applications



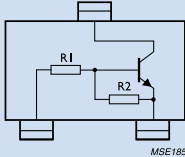
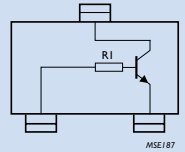
### Schmitt trigger






# Resistor-equipped transistors (RETs)

## RETs 100 mA single

| Package               |                     |                                                                                    |           |           | SOT23                                                                              |           | SOT323 (SC-70)                                                                      |           |           |
|-----------------------|---------------------|------------------------------------------------------------------------------------|-----------|-----------|------------------------------------------------------------------------------------|-----------|-------------------------------------------------------------------------------------|-----------|-----------|
|                       |                     |                                                                                    |           |           |  |           |  |           |           |
| Size (mm)             |                     |                                                                                    |           |           | 2.9 x 1.3 x 1.0                                                                    |           | 2.0 x 1.25 x 0.95                                                                   |           |           |
| P <sub>tot</sub> (mW) |                     |                                                                                    |           |           | 250                                                                                |           | 200                                                                                 |           |           |
| V <sub>CEO</sub> (V)  | I <sub>c</sub> (mA) | Configuration                                                                      | R1 (kΩ)   | R2 (kΩ)   | NPN                                                                                | PNP       | NPN                                                                                 | PNP       |           |
| 50                    | 100                 |   | 1         | 1         |                                                                                    |           | PDTA113ET                                                                           |           | PDTA113EU |
|                       |                     |                                                                                    | 2.2       | 2.2       | PDTC123ET                                                                          | PDTA123ET | PDTC123EU                                                                           | PDTA123EU |           |
|                       |                     |                                                                                    | 4.7       | 4.7       | PDTC143ET                                                                          | PDTA143ET | PDTC143EU                                                                           | PDTA143EU |           |
|                       |                     |                                                                                    | 10        | 10        | PDTC114ET                                                                          | PDTA114ET | PDTC114EU                                                                           | PDTA114EU |           |
|                       |                     |                                                                                    | 22        | 22        | PDTC124ET                                                                          | PDTA124ET | PDTC124EU                                                                           | PDTA124EU |           |
|                       |                     |                                                                                    | 47        | 47        | PDTC144ET                                                                          | PDTA144ET | PDTC144EU                                                                           | PDTA144EU |           |
|                       |                     |                                                                                    | 100       | 100       | PDTC115ET                                                                          | PDTA115ET | PDTC115EU                                                                           | PDTA115EU |           |
|                       |                     |                                                                                    | 1         | 10        |                                                                                    | PDTA113ZT |                                                                                     | PDTA113ZU |           |
|                       |                     |                                                                                    | 2.2       | 10        | PDTC123YT                                                                          | PDTA123YT | PDTC123YU                                                                           | PDTA123YU |           |
|                       |                     |                                                                                    | 2.2       | 47        | PDTC123JT                                                                          | PDTA123JT | PDTC123JU                                                                           | PDTA123JU |           |
|                       |                     | 4.7                                                                                | 10        | PDTC143XT | PDTA143XT                                                                          | PDTC143XU | PDTA143XU                                                                           |           |           |
|                       |                     | 4.7                                                                                | 47        | PDTC143ZT | PDTA143ZT                                                                          | PDTC143ZU | PDTA143ZU                                                                           |           |           |
|                       |                     | 10                                                                                 | 47        | PDTC114YT | PDTA114YT                                                                          | PDTC114YU | PDTA114YU                                                                           |           |           |
|                       |                     | 22                                                                                 | 47        | PDTC124XT | PDTA124XT                                                                          | PDTC124XU | PDTA124XU                                                                           |           |           |
|                       |                     | 47                                                                                 | 10        | PDTC144VT | PDTA144VT                                                                          | PDTC144VU | PDTA144VU                                                                           |           |           |
|                       |                     | 47                                                                                 | 22        | PDTC144WT | PDTA144WT                                                                          | PDTC144WU | PDTA144WU                                                                           |           |           |
|                       |                     | 2.2                                                                                | -         | PDTC123TT | PDTA123TT                                                                          | PDTC123TU | PDTA123TU                                                                           |           |           |
|                       |                     | 4.7                                                                                | -         | PDTC143TT | PDTA143TT                                                                          | PDTC143TU | PDTA143TU                                                                           |           |           |
|                       |                     | 10                                                                                 | -         | PDTC114TT | PDTA114TT                                                                          | PDTC114TU | PDTA114TU                                                                           |           |           |
|                       |                     | 22                                                                                 | -         | PDTC124TT | PDTA124TT                                                                          | PDTC124TU | PDTA124TU                                                                           |           |           |
| 47                    | -                   | PDTC144TT                                                                          | PDTA144TT | PDTC144TU | PDTA144TU                                                                          |           |                                                                                     |           |           |
| 100                   | -                   | PDTC115TT                                                                          | PDTA115TT | PDTC115TU | PDTA115TU                                                                          |           |                                                                                     |           |           |
|                       |                     |  | 2.2       | -         | PDTC123TE                                                                          | PDTA123TE | PDTC123TE                                                                           | PDTA123TE |           |
|                       |                     |                                                                                    | 4.7       | -         | PDTC143TE                                                                          | PDTA143TE | PDTC143TE                                                                           | PDTA143TE |           |
|                       |                     |                                                                                    | 10        | -         | PDTC114TE                                                                          | PDTA114TE | PDTC114TE                                                                           | PDTA114TE |           |
|                       |                     |                                                                                    | 22        | -         | PDTC124TE                                                                          | PDTA124TE | PDTC124TE                                                                           | PDTA124TE |           |
|                       |                     |                                                                                    | 47        | -         | PDTC144TE                                                                          | PDTA144TE | PDTC144TE                                                                           | PDTA144TE |           |
|                       |                     |                                                                                    | 100       | -         | PDTC115TE                                                                          | PDTA115TE | PDTC115TE                                                                           | PDTA115TE |           |




| Package               |                     |                                                                                     |           |           | SOT416 (SC-75)                                                                       |           | SOT883 (SC-101)                                                                       |           |           |
|-----------------------|---------------------|-------------------------------------------------------------------------------------|-----------|-----------|--------------------------------------------------------------------------------------|-----------|---------------------------------------------------------------------------------------|-----------|-----------|
|                       |                     |                                                                                     |           |           |  |           |  |           |           |
| Size (mm)             |                     |                                                                                     |           |           | 1.6 x 0.8 x 0.77                                                                     |           | 1.0 x 0.6 x 0.5                                                                       |           |           |
| P <sub>tot</sub> (mW) |                     |                                                                                     |           |           | 150                                                                                  |           | 250                                                                                   |           |           |
| V <sub>CEO</sub> (V)  | I <sub>c</sub> (mA) | Configuration                                                                       | R1 (kΩ)   | R2 (kΩ)   | NPN                                                                                  | PNP       | NPN                                                                                   | PNP       |           |
| 50                    | 100                 |  | 1         | 1         |                                                                                      |           | PDTA113EE                                                                             |           | PDTA113EM |
|                       |                     |                                                                                     | 2.2       | 2.2       | PDTC123EE                                                                            | PDTA123EE | PDTC123EM                                                                             | PDTA123EM |           |
|                       |                     |                                                                                     | 4.7       | 4.7       | PDTC143EE                                                                            | PDTA143EE | PDTC143EM                                                                             | PDTA143EM |           |
|                       |                     |                                                                                     | 10        | 10        | PDTC114EE                                                                            | PDTA114EE | PDTC114EM                                                                             | PDTA114EM |           |
|                       |                     |                                                                                     | 22        | 22        | PDTC124EE                                                                            | PDTA124EE | PDTC124EM                                                                             | PDTA124EM |           |
|                       |                     |                                                                                     | 47        | 47        | PDTC144EE                                                                            | PDTA144EE | PDTC144EM                                                                             | PDTA144EM |           |
|                       |                     |                                                                                     | 100       | 100       | PDTC115EE                                                                            | PDTA115EE | PDTC115EM                                                                             | PDTA115EM |           |
|                       |                     |                                                                                     | 1         | 10        |                                                                                      | PDTA113ZE |                                                                                       | PDTA113ZM |           |
|                       |                     |                                                                                     | 2.2       | 10        | PDTC123YE                                                                            | PDTA123YE | PDTC123YM                                                                             | PDTA123YM |           |
|                       |                     |                                                                                     | 2.2       | 47        | PDTC123JE                                                                            | PDTA123JE | PDTC123JM                                                                             | PDTA123JM |           |
|                       |                     | 4.7                                                                                 | 10        | PDTC143XE | PDTA143XE                                                                            | PDTC143XM | PDTA143XM                                                                             |           |           |
|                       |                     | 4.7                                                                                 | 47        | PDTC143ZE | PDTA143ZE                                                                            | PDTC143ZM | PDTA143ZM                                                                             |           |           |
|                       |                     | 10                                                                                  | 47        | PDTC114YE | PDTA114YE                                                                            | PDTC114YM | PDTA114YM                                                                             |           |           |
|                       |                     | 22                                                                                  | 47        | PDTC124XE | PDTA124XE                                                                            | PDTC124XM | PDTA124XM                                                                             |           |           |
|                       |                     | 47                                                                                  | 10        | PDTC144VE | PDTA144VE                                                                            | PDTC144VM | PDTA144VM                                                                             |           |           |
|                       |                     | 47                                                                                  | 22        | PDTC144WE | PDTA144WE                                                                            | PDTC144WM | PDTA144WM                                                                             |           |           |
|                       |                     | 2.2                                                                                 | -         | PDTC123TE | PDTA123TE                                                                            | PDTC123TM | PDTA123TM                                                                             |           |           |
|                       |                     | 4.7                                                                                 | -         | PDTC143TE | PDTA143TE                                                                            | PDTC143TM | PDTA143TM                                                                             |           |           |
|                       |                     | 10                                                                                  | -         | PDTC114TE | PDTA114TE                                                                            | PDTC114TM | PDTA114TM                                                                             |           |           |
|                       |                     | 22                                                                                  | -         | PDTC124TE | PDTA124TE                                                                            | PDTC124TM | PDTA124TM                                                                             |           |           |
| 47                    | -                   | PDTC144TE                                                                           | PDTA144TE | PDTC144TM | PDTA144TM                                                                            |           |                                                                                       |           |           |
| 100                   | -                   | PDTC115TE                                                                           | PDTA115TE | PDTC115TM | PDTA115TM                                                                            |           |                                                                                       |           |           |
|                       |                     |  | 2.2       | -         | PDTC123TE                                                                            | PDTA123TE | PDTC123TE                                                                             | PDTA123TE |           |
|                       |                     |                                                                                     | 4.7       | -         | PDTC143TE                                                                            | PDTA143TE | PDTC143TE                                                                             | PDTA143TE |           |
|                       |                     |                                                                                     | 10        | -         | PDTC114TE                                                                            | PDTA114TE | PDTC114TE                                                                             | PDTA114TE |           |
|                       |                     |                                                                                     | 22        | -         | PDTC124TE                                                                            | PDTA124TE | PDTC124TE                                                                             | PDTA124TE |           |
|                       |                     |                                                                                     | 47        | -         | PDTC144TE                                                                            | PDTA144TE | PDTC144TE                                                                             | PDTA144TE |           |
|                       |                     |                                                                                     | 100       | -         | PDTC115TE                                                                            | PDTA115TE | PDTC115TE                                                                             | PDTA115TE |           |

Low  $V_{CEsat}$  (BISS) transistors single NPN

| Package                 |                       |                        |                            |                         |                          |                                                                           |                                                                                       |                                   |                         |                         | SOT223<br>(SC-73)                                                                   | SOT89<br>(SC-62)                                                                    | SOT457<br>(SC-74)                                                                   |                          |
|-------------------------|-----------------------|------------------------|----------------------------|-------------------------|--------------------------|---------------------------------------------------------------------------|---------------------------------------------------------------------------------------|-----------------------------------|-------------------------|-------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--------------------------|
|                         |                       |                        |                            |                         |                          |                                                                           |                                                                                       |                                   |                         |                         |  |  |  |                          |
| Size (mm)               |                       |                        |                            |                         |                          |                                                                           |                                                                                       |                                   |                         |                         | 6.5 x 3.5 x 1.65                                                                    | 4.5 x 2.5 x 1.5                                                                     | 2.9 x 1.5 x 1.0                                                                     |                          |
| P <sub>tot</sub> (mW)   |                       |                        |                            |                         |                          |                                                                           |                                                                                       |                                   |                         |                         | 1700                                                                                | 1650                                                                                | 750                                                                                 |                          |
| V <sub>CEO</sub><br>(V) | I <sub>C</sub><br>(A) | I <sub>CM</sub><br>(A) | h <sub>FE</sub><br>min/typ | @ I <sub>C</sub><br>(A) | @ V <sub>CE</sub><br>(V) | R <sub>CEsat</sub> typ<br>(mΩ);<br>I <sub>C</sub> /I <sub>B</sub> =<br>10 | V <sub>CEsat</sub> typ<br>(mV);<br>I <sub>C</sub> = 0.5 A;<br>I <sub>B</sub> = 0.05 A | V <sub>CEsat</sub><br>max<br>(mV) | @ I <sub>C</sub><br>(A) | @ I <sub>B</sub><br>(A) |                                                                                     |                                                                                     |                                                                                     |                          |
| 12                      | 5.3                   | 10.6                   | 300/530                    | 0.5                     | 2                        | 27 <sup>1)</sup>                                                          | 18                                                                                    | 200                               | 5.3                     | 0.265                   |                                                                                     |                                                                                     | PBSS301NX                                                                           |                          |
|                         | 5.8                   | 11.6                   | 300/530                    | 0.5                     | 2                        | 29 <sup>1)</sup>                                                          | 18                                                                                    | 235                               | 5.8                     | 0.29                    | PBSS301NZ                                                                           |                                                                                     |                                                                                     |                          |
|                         | 6.0                   | 7.0                    | 280/440                    | 0.5                     | 2                        | 33 <sup>1)</sup>                                                          | 20                                                                                    | 275                               | 6                       | 0.3                     |                                                                                     |                                                                                     |                                                                                     |                          |
| 15                      | 0.5                   | 1.0                    | 200/325                    | 0.01                    | 2                        | 360                                                                       | -                                                                                     | 250                               | 0.5                     | 0.05                    |                                                                                     |                                                                                     |                                                                                     |                          |
|                         |                       |                        | 200/425                    | 0.01                    | 2                        | 300                                                                       | 200                                                                                   | 250                               | 0.5                     | 0.05                    |                                                                                     |                                                                                     |                                                                                     |                          |
| 20                      | 1.0                   | 3.0                    | 350/470                    | 0.1                     | 2                        | 220                                                                       | 110 <sup>2)</sup>                                                                     | 250                               | 1                       | 0.05                    |                                                                                     |                                                                                     |                                                                                     |                          |
|                         |                       |                        | 220/410                    | 0.5                     | 2                        | 140                                                                       | 70                                                                                    | 350                               | 2                       | 0.2                     |                                                                                     |                                                                                     |                                                                                     |                          |
|                         | 2.0                   | 5.0                    | 220/330                    | 0.1                     | 2                        | 80                                                                        | 45                                                                                    | 310                               | 3                       | 0.3                     |                                                                                     |                                                                                     |                                                                                     |                          |
|                         |                       |                        | 220/390                    | 0.5                     | 2                        | 85                                                                        | 40                                                                                    | 310                               | 3                       | 0.3                     |                                                                                     |                                                                                     | PBSS4320X                                                                           |                          |
|                         | 4.0                   | 15.0                   | 300/450                    | 0.5                     | 2                        | 50                                                                        | 30                                                                                    | 280                               | 4                       | 0.4                     |                                                                                     |                                                                                     | PBSS301ND                                                                           |                          |
|                         | 4.3                   | 8.0                    | 300/550                    | 0.5                     | 2                        | 36                                                                        | 21                                                                                    | 220                               | 4                       | 0.2                     |                                                                                     |                                                                                     |                                                                                     |                          |
|                         | 5.0                   | 10.0                   | 300/450                    | 0.5                     | 2                        | 32                                                                        | 35                                                                                    | 220                               | 5                       | 0.5                     |                                                                                     |                                                                                     | PBSS4520X                                                                           |                          |
|                         | 5.3                   | 10.6                   | 300/570                    | 0.5                     | 2                        | 27 <sup>1)</sup>                                                          | 20                                                                                    | 200                               | 5.3                     | 0.265                   |                                                                                     |                                                                                     | PBSS302NX                                                                           |                          |
|                         | 5.8                   | 10.2                   | 300/570                    | 0.5                     | 2                        | 30 <sup>1)</sup>                                                          | 20                                                                                    | 250                               | 5.8                     | 0.29                    | PBSS302NZ                                                                           |                                                                                     |                                                                                     |                          |
|                         | 6.0                   | 7.0                    | 280/440                    | 0.5                     | 2                        | 33 <sup>1)</sup>                                                          | 20                                                                                    | 275                               | 6                       | 0.3                     |                                                                                     |                                                                                     |                                                                                     |                          |
| 7.0                     | 15.0                  | 300/550                | 0.5                        | 2                       | 19                       | 12                                                                        | 210                                                                                   | 7                                 | 0.35                    |                         |                                                                                     | PBSS4021NX                                                                          |                                                                                     |                          |
| 8.0                     | 20.0                  | 300/550                | 0.5                        | 2                       | 14                       | 9                                                                         | 170                                                                                   | 8                                 | 0.4                     | PBSS4021NZ              |                                                                                     |                                                                                     |                                                                                     |                          |
| 30                      | 1.0                   | 3.0                    | 300/450                    | 0.5                     | 2                        | 240                                                                       | 120 <sup>2)</sup>                                                                     | 270                               | 1                       | 0.05                    |                                                                                     |                                                                                     |                                                                                     |                          |
|                         | 2.0                   | 3.0                    | 300/450                    | 0.5                     | 2                        | 120                                                                       | 70                                                                                    | 320                               | 2                       | 0.2                     |                                                                                     |                                                                                     |                                                                                     |                          |
|                         | 2.6                   | 5.0                    | 300/500                    | 0.5                     | 2                        | 76                                                                        | 80                                                                                    | 320                               | 3                       | 0.3                     |                                                                                     |                                                                                     |                                                                                     |                          |
|                         | 3.0                   | 5.0                    | 300/490                    | 0.5                     | 2                        | 80                                                                        | 45                                                                                    | 300                               | 3                       | 0.3                     |                                                                                     |                                                                                     | PBSS4330X                                                                           |                          |
|                         | 3.0                   | 5.0                    | 300/465                    | 0.5                     | 2                        | 75                                                                        | 40                                                                                    | 300                               | 3                       | 0.3                     |                                                                                     |                                                                                     |                                                                                     |                          |
|                         | 3.5                   | 6.0                    | 300/500                    | 0.5                     | 2                        | 50                                                                        | 70                                                                                    | 300                               | 4                       | 0.4                     |                                                                                     |                                                                                     |                                                                                     | PBSS4032ND <sup>3)</sup> |
|                         | 4.7                   | 10.0                   | 300/500                    | 0.5                     | 2                        | 45                                                                        | 57                                                                                    | 250                               | 4                       | 0.4                     |                                                                                     |                                                                                     | PBSS4032NX <sup>3)</sup>                                                            |                          |
|                         | 5.1                   | 10.2                   | 300/480                    | 0.5                     | 2                        | 30 <sup>1)</sup>                                                          | 20                                                                                    | 220                               | 5.1                     | 0.255                   |                                                                                     |                                                                                     | PBSS303NX                                                                           |                          |
|                         | 5.4                   | 10.0                   | 300/500                    | 0.5                     | 2                        | 45                                                                        | 57                                                                                    | 340                               | 4.9                     | 0.27                    | PBSS4032NZ <sup>3)</sup>                                                            |                                                                                     |                                                                                     |                          |
| 5.5                     | 11.0                  | 300/480                | 0.5                        | 2                       | 31 <sup>1)</sup>         | 20                                                                        | 240                                                                                   | 5.5                               | 0.275                   | PBSS303NZ               |                                                                                     |                                                                                     |                                                                                     |                          |
| 6.0                     | 7.0                   | 280/450                | 0.5                        | 2                       | 35 <sup>1)</sup>         | 21                                                                        | 275                                                                                   | 6                                 | 0.3                     |                         |                                                                                     |                                                                                     |                                                                                     |                          |
| 40                      | 0.5                   | 1.0                    | 200/550                    | 0.01                    | 2                        | 380                                                                       | 200 <sup>2)</sup>                                                                     | 250                               | 0.5                     | 0.05                    |                                                                                     |                                                                                     |                                                                                     |                          |
|                         |                       |                        | 200/350                    | 0.01                    | 2                        | 380                                                                       | 190                                                                                   | 250                               | 0.5                     | 0.05                    |                                                                                     |                                                                                     |                                                                                     |                          |
|                         | 1.0                   | 3.0                    | 300/-                      | 0.5                     | 5                        | 150                                                                       | 70                                                                                    | 440                               | 2                       | 0.2                     |                                                                                     |                                                                                     |                                                                                     |                          |
|                         |                       |                        | 300/440                    | 0.5                     | 5                        | 240                                                                       | 130                                                                                   | 500                               | 1                       | 0.1                     |                                                                                     |                                                                                     |                                                                                     |                          |
|                         | 2.0                   | 3.0                    | 300/510                    | 0.5                     | 5                        | 230                                                                       | 120                                                                                   | 500                               | 1                       | 0.1                     |                                                                                     |                                                                                     |                                                                                     |                          |
|                         |                       |                        | 300/420                    | 0.5                     | 5                        | 150                                                                       | 130                                                                                   | 500                               | 1                       | 0.1                     |                                                                                     |                                                                                     |                                                                                     |                          |
|                         | 3.0                   | 3.0                    | 300/400                    | 0.5                     | 5                        | 150                                                                       | 70                                                                                    | 400                               | 2                       | 0.2                     |                                                                                     |                                                                                     |                                                                                     |                          |
|                         |                       |                        | 350/470                    | 0.1                     | 2                        | 120                                                                       | 70                                                                                    | 320                               | 2                       | 0.2                     |                                                                                     |                                                                                     |                                                                                     |                          |
| 4.0                     | 15.0                  | 300/450                | 0.5                        | 2                       | 120                      | 70                                                                        | 320                                                                                   | 2                                 | 0.2                     |                         |                                                                                     |                                                                                     |                                                                                     |                          |
|                         |                       | 300/520                | 0.5                        | 2                       | 55                       | 35                                                                        | 300                                                                                   | 4                                 | 0.4                     |                         |                                                                                     |                                                                                     | PBSS302ND                                                                           |                          |
| 5.0                     | 10.0                  | 300/500                | 0.5                        | 2                       | 40                       | 21                                                                        | 355                                                                                   | 5                                 | 0.5                     |                         |                                                                                     |                                                                                     | PBSS4540X                                                                           |                          |
|                         |                       | 300/500                | 0.5                        | 2                       | 42                       | 25                                                                        | 355                                                                                   | 5                                 | 0.5                     | PBSS4540Z               |                                                                                     |                                                                                     |                                                                                     |                          |
| 50                      | 2.0                   | 5.0                    | 300/495                    | 0.5                     | 2                        | 100                                                                       | 60                                                                                    | 260                               | 2                       | 0.2                     |                                                                                     |                                                                                     |                                                                                     |                          |
|                         |                       |                        | 300/-                      | 0.5                     | 2                        | 160                                                                       | 90 <sup>2)</sup>                                                                      | 320                               | 2                       | 0.2                     |                                                                                     |                                                                                     | PBSS4250X                                                                           |                          |
|                         | 3.0                   | 5.0                    | 200/280                    | 0.5                     | 2                        | 110                                                                       | 65                                                                                    | 290                               | 2                       | 0.2                     |                                                                                     |                                                                                     |                                                                                     | PBSS4350D                |
| 60                      | 1.0                   | 2.0                    | 200/400                    | 0.5                     | 5                        | 200                                                                       | 110                                                                                   | 250                               | 1                       | 0.1                     |                                                                                     |                                                                                     |                                                                                     |                          |
|                         |                       |                        | 200/420                    | 0.5                     | 5                        | 230                                                                       | 120                                                                                   | 280                               | 1                       | 0.1                     |                                                                                     |                                                                                     |                                                                                     |                          |
|                         | 3.0                   | 6.0                    | 200/350                    | 0.5                     | 5                        | 200                                                                       | 110                                                                                   | 250                               | 1                       | 0.1                     |                                                                                     |                                                                                     |                                                                                     |                          |
|                         |                       |                        | 345/570                    | 0.5                     | 2                        | 65                                                                        | 40                                                                                    | 260                               | 3                       | 0.3                     |                                                                                     |                                                                                     |                                                                                     | PBSS303ND                |
|                         | 3.8                   | 8.0                    | 300/500                    | 0.5                     | 2                        | 46                                                                        | 29                                                                                    | 200                               | 3                       | 0.3                     |                                                                                     |                                                                                     |                                                                                     |                          |
|                         | 4.7                   | 9.4                    | 300/520                    | 0.5                     | 2                        | 37 <sup>1)</sup>                                                          | 25                                                                                    | 245                               | 4.7                     | 0.235                   |                                                                                     |                                                                                     | PBSS304NX                                                                           |                          |
|                         | 5.2                   | 10.4                   | 300/520                    | 0.5                     | 2                        | 39 <sup>1)</sup>                                                          | 25                                                                                    | 280                               | 5.2                     | 0.26                    | PBSS304NZ                                                                           |                                                                                     |                                                                                     |                          |
|                         | 6.0                   | 7.0                    | 280/440                    | 0.5                     | 2                        | 34 <sup>1)</sup>                                                          | 22                                                                                    | 290                               | 6                       | 0.3                     |                                                                                     |                                                                                     |                                                                                     |                          |
|                         | 6.2                   | 15.0                   | 300/500                    | 0.5                     | 2                        | 25                                                                        | 17                                                                                    | 230                               | 6                       | 0.3                     |                                                                                     |                                                                                     | PBSS4041NX                                                                          |                          |
|                         | 7.0                   | 15.0                   | 300/500                    | 0.5                     | 2                        | 17.5                                                                      | 13                                                                                    | 195                               | 7                       | 0.35                    | PBSS4041NZ                                                                          |                                                                                     |                                                                                     |                          |
| 80                      | 3.0                   | 6.0                    | 240/360                    | 0.5                     | 2                        | 67                                                                        | 40                                                                                    | 255                               | 3                       | 0.3                     |                                                                                     |                                                                                     |                                                                                     | PBSS304ND                |
|                         | 4.0                   | 10.0                   | 250/400                    | 0.5                     | 2                        | 43 <sup>1)</sup>                                                          | 25                                                                                    | 230                               | 4                       | 0.2                     |                                                                                     |                                                                                     | PBSS4480X                                                                           |                          |
|                         | 4.6                   | 9.2                    | 300/470                    | 0.5                     | 2                        | 37 <sup>1)</sup>                                                          | 25                                                                                    | 240                               | 4.6                     | 0.23                    |                                                                                     |                                                                                     | PBSS305NX                                                                           |                          |
|                         | 5.1                   | 10.2                   | 300/470                    | 0.5                     | 2                        | 38 <sup>1)</sup>                                                          | 25                                                                                    | 270                               | 5.1                     | 0.255                   | PBSS305NZ                                                                           |                                                                                     |                                                                                     |                          |
|                         | 5.6                   | 7.0                    | 270/425                    | 0.5                     | 2                        | 40 <sup>1)</sup>                                                          | 25                                                                                    | 320                               | 5.6                     | 0.28                    |                                                                                     |                                                                                     |                                                                                     |                          |
| 100                     | 1.0                   | 3.0                    | 150/400                    | 0.25                    | 10                       | 160                                                                       | 80                                                                                    | 200                               | 1                       | 0.1                     |                                                                                     |                                                                                     |                                                                                     |                          |
|                         |                       |                        | 150/300                    | 0.25                    | 10                       | 165                                                                       | 70                                                                                    | 200                               | 1                       | 0.1                     |                                                                                     |                                                                                     |                                                                                     |                          |
|                         |                       |                        | 150/290                    | 0.25                    | 10                       | 160                                                                       | 75                                                                                    | 200                               | 1                       | 0.1                     |                                                                                     |                                                                                     |                                                                                     | PBSS8110D                |
|                         |                       |                        | 150/290                    | 0.25                    | 10                       | 165                                                                       | 73                                                                                    | 200                               | 1                       | 0.1                     |                                                                                     |                                                                                     | PBSS8110X                                                                           |                          |
|                         |                       |                        | 150/290                    | 0.25                    | 10                       | 160                                                                       | 73                                                                                    | 200                               | 1                       | 0.1                     | PBSS8110Z                                                                           |                                                                                     |                                                                                     |                          |
|                         | 3.0                   | 4.0                    | 170/275                    | 0.5                     | 2                        | 72                                                                        | 45                                                                                    | 360                               | 4                       | 0.4                     |                                                                                     |                                                                                     |                                                                                     | PBSS305ND                |
|                         | 4.5                   | 9.0                    | 200/330                    | 0.5                     | 2                        | 38 <sup>1)</sup>                                                          | 27                                                                                    | 245                               | 4.5                     | 0.225                   |                                                                                     |                                                                                     | PBSS306NX                                                                           |                          |
| 5.1                     | 10.2                  | 200/330                | 0.5                        | 2                       | 43 <sup>1)</sup>         | 27                                                                        | 300                                                                                   | 5.1                               | 0.255                   | PBSS306NZ               |                                                                                     |                                                                                     |                                                                                     |                          |
| 5.2                     | 6.0                   | 180/285                | 0.5                        | 2                       | 48 <sup>1)</sup>         | 30                                                                        | 340                                                                                   | 5.2                               | 0.26                    |                         |                                                                                     |                                                                                     |                                                                                     |                          |



Low  $V_{CEsat}$  (BISS) transistors single PNP

| Package                 |                       |                        |                            |                         |                          |                                                                        |                                                                                       |                                   |                         |                         | SOT223<br>(SC-73)                                                                   | SOT89<br>(SC-62)                                                                    | SOT457<br>(SC-74)                                                                   |                          |           |
|-------------------------|-----------------------|------------------------|----------------------------|-------------------------|--------------------------|------------------------------------------------------------------------|---------------------------------------------------------------------------------------|-----------------------------------|-------------------------|-------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--------------------------|-----------|
|                         |                       |                        |                            |                         |                          |                                                                        |                                                                                       |                                   |                         |                         |  |  |  |                          |           |
| Size (mm)               |                       |                        |                            |                         |                          |                                                                        |                                                                                       |                                   |                         |                         | 6.5 x 3.5 x 1.65                                                                    | 4.5 x 2.5 x 1.5                                                                     | 2.9 x 1.5 x 1.0                                                                     |                          |           |
| P <sub>tot</sub> (mW)   |                       |                        |                            |                         |                          |                                                                        |                                                                                       |                                   |                         |                         | 1700                                                                                | 1650                                                                                | 750                                                                                 |                          |           |
| V <sub>CEO</sub><br>(V) | I <sub>C</sub><br>(A) | I <sub>CM</sub><br>(A) | h <sub>FE</sub><br>min/typ | @ I <sub>C</sub><br>(V) | @ V <sub>CE</sub><br>(V) | R <sub>CEsat</sub> typ<br>(mΩ);<br>I <sub>C</sub> /I <sub>B</sub> = 10 | V <sub>CEsat</sub> typ<br>(mV);<br>I <sub>C</sub> = 0.5 A;<br>I <sub>B</sub> = 0.05 A | V <sub>CEsat</sub><br>max<br>(mV) | @ I <sub>C</sub><br>(A) | @ I <sub>B</sub><br>(A) |                                                                                     |                                                                                     |                                                                                     |                          |           |
| 12                      | 5.3                   | 10.6                   | 250/400                    | 0.5                     | 2                        | 28 <sup>1)</sup>                                                       | 20                                                                                    | 210                               | 5.3                     | 0.265                   |                                                                                     |                                                                                     | PBSS301PX                                                                           |                          |           |
|                         | 5.7                   | 11.4                   | 250/400                    | 0.5                     | 2                        | 30 <sup>1)</sup>                                                       | 20                                                                                    | 245                               | 5.7                     | 0.285                   | PBSS301PZ                                                                           |                                                                                     |                                                                                     |                          |           |
|                         | 6.0                   | 7.0                    | 220/335                    | 0.5                     | 2                        | 33 <sup>1)</sup>                                                       | 20                                                                                    | 300                               | 6                       | 0.3                     |                                                                                     |                                                                                     |                                                                                     |                          |           |
| 15                      | 0.5                   | 1.0                    | 200/260                    | 0.01                    | 2                        | 300                                                                    | 150                                                                                   | 250                               | 0.5                     | 0.05                    |                                                                                     |                                                                                     |                                                                                     |                          |           |
|                         | 0.5                   | 1.0                    | 200/325                    | 0.01                    | 2                        | 300                                                                    | 150                                                                                   | 250                               | 0.5                     | 0.05                    |                                                                                     |                                                                                     |                                                                                     |                          |           |
| 20                      | 1.0                   | 2.0                    | 300/450                    | 0.1                     | 2                        | 250                                                                    | 125 <sup>2)</sup>                                                                     | 250                               | 1                       | 0.05                    |                                                                                     |                                                                                     |                                                                                     |                          |           |
|                         | 2.0                   | 4.0                    | 220/440                    | 0.1                     | 2                        | 140                                                                    | 75                                                                                    | 390                               | 2                       | 0.2                     |                                                                                     |                                                                                     |                                                                                     |                          |           |
|                         |                       | 3.0                    | 225/-                      | 0.5                     | 2                        | 115                                                                    | 80 <sup>2)</sup>                                                                      | 225                               | 2                       | 0.2                     |                                                                                     |                                                                                     |                                                                                     |                          |           |
|                         | 3.0                   | 5.0                    | 220/420                    | 0.5                     | 2                        | 75                                                                     | 50                                                                                    | 210                               | 2                       | 0.2                     |                                                                                     |                                                                                     |                                                                                     |                          |           |
|                         |                       | 5.0                    | 200/-                      | 0.5                     | 2                        | 85                                                                     | 80 <sup>2)</sup>                                                                      | 400                               | 3                       | 0.3                     |                                                                                     |                                                                                     |                                                                                     | PBSS5320D                |           |
|                         | 3.0                   | 5.0                    | 220/450                    | 0.5                     | 2                        | 90                                                                     | 50                                                                                    | 300                               | 3                       | 0.3                     |                                                                                     |                                                                                     |                                                                                     | PBSS5320X                |           |
|                         | 3.5                   | 8.0                    | 250/400                    | 0.5                     | 2                        | 55                                                                     | 35                                                                                    | 375                               | 4                       | 0.2                     |                                                                                     |                                                                                     |                                                                                     |                          |           |
|                         | 4.0                   | 15.0                   | 250/400                    | 0.5                     | 2                        | 50                                                                     | 35                                                                                    | 280                               | 4                       | 0.4                     |                                                                                     |                                                                                     |                                                                                     | PBSS301PD                |           |
|                         | 5.0                   | 10.0                   | 300/430                    | 0.5                     | 2                        | 34                                                                     | 45                                                                                    | 270                               | 5                       | 0.5                     |                                                                                     |                                                                                     |                                                                                     | PBSS5520X                |           |
|                         | 5.1                   | 10.2                   | 250/370                    | 0.5                     | 2                        | 32 <sup>1)</sup>                                                       | 25                                                                                    | 230                               | 5.1                     | 0.255                   |                                                                                     |                                                                                     |                                                                                     | PBSS302PX                |           |
|                         | 5.5                   | 11.0                   | 250/370                    | 0.5                     | 2                        | 34 <sup>1)</sup>                                                       | 25                                                                                    | 265                               | 5.5                     | 0.275                   | PBSS302PZ                                                                           |                                                                                     |                                                                                     |                          |           |
|                         | 6.0                   | 7.0                    | 230/345                    | 0.5                     | 2                        | 39 <sup>1)</sup>                                                       | 25                                                                                    | 350                               | 6                       | 0.3                     |                                                                                     |                                                                                     |                                                                                     |                          |           |
| 6.2                     | 15.0                  | 250/400                | 0.5                        | 2                       | 23                       | 18                                                                     | 240                                                                                   | 6                                 | 0.3                     |                         |                                                                                     |                                                                                     | PBSS4021PX                                                                          |                          |           |
| 6.6                     | 20.0                  | 250/400                | 0.5                        | 2                       | 22                       | 16                                                                     | 240                                                                                   | 7                                 | 0.35                    | PBSS4021PZ              |                                                                                     |                                                                                     |                                                                                     |                          |           |
| 30                      | 1.0                   | 3.0                    | 260/350                    | 0.5                     | 2                        | 220                                                                    | 110                                                                                   | 225                               | 1                       | 0.05                    |                                                                                     |                                                                                     |                                                                                     |                          |           |
|                         | 2.0                   | 3.0                    | 300/450                    | 0.1                     | 2                        | 160                                                                    | 70                                                                                    | 350                               | 2                       | 0.2                     |                                                                                     |                                                                                     |                                                                                     |                          |           |
|                         | 2.4                   | 5.0                    | 200/320                    | 0.5                     | 2                        | 110                                                                    | 95                                                                                    | 330                               | 2                       | 0.2                     |                                                                                     |                                                                                     |                                                                                     |                          |           |
|                         | 2.7                   | 5.0                    | 200/350                    | 0.5                     | 2                        | 88                                                                     | 87                                                                                    | 395                               | 3                       | 0.3                     |                                                                                     |                                                                                     |                                                                                     | PBSS4032PD <sup>3)</sup> |           |
|                         | 3.0                   | 5.0                    | 200/380                    | 0.5                     | 2                        | 80                                                                     | 50                                                                                    | 320                               | 3                       | 0.3                     |                                                                                     |                                                                                     |                                                                                     | PBSS5330X                |           |
|                         | 3.0                   | 5.0                    | 200/320                    | 0.5                     | 2                        | 75                                                                     | 45                                                                                    | 320                               | 3                       | 0.3                     |                                                                                     |                                                                                     |                                                                                     |                          |           |
|                         | 4.2                   | 10.0                   | 200/350                    | 0.5                     | 2                        | 58                                                                     | 70                                                                                    | 345                               | 4                       | 0.4                     |                                                                                     |                                                                                     |                                                                                     | PBSS4032PX <sup>3)</sup> |           |
|                         | 4.4                   | 10.0                   | 200/350                    | 0.5                     | 2                        | 58                                                                     | 70                                                                                    | 400                               | 4                       | 0.2                     |                                                                                     |                                                                                     |                                                                                     |                          |           |
|                         | 5.1                   | 10.2                   | 250/400                    | 0.5                     | 2                        | 32 <sup>1)</sup>                                                       | 25                                                                                    | 230                               | 5.1                     | 0.255                   | PBSS4032PZ <sup>3)</sup>                                                            |                                                                                     |                                                                                     |                          | PBSS303PX |
|                         | 5.3                   | 10.6                   | 250/400                    | 0.5                     | 2                        | 35 <sup>1)</sup>                                                       | 25                                                                                    | 265                               | 5.3                     | 0.265                   | PBSS303PZ                                                                           |                                                                                     |                                                                                     |                          |           |
|                         | 6.0                   | 7.0                    | 200/335                    | 0.5                     | 2                        | 39 <sup>1)</sup>                                                       | 25                                                                                    | 350                               | 6                       | 0.3                     |                                                                                     |                                                                                     |                                                                                     |                          |           |
| 40                      | 0.5                   | 1.0                    | 200/380                    | 0.01                    | 2                        | 440                                                                    | 220                                                                                   | 350                               | 0.5                     | 0.05                    |                                                                                     |                                                                                     |                                                                                     |                          |           |
|                         | 1.0                   | 2.0                    | 200/380                    | 0.01                    | 2                        | 440                                                                    | 230                                                                                   | 350                               | 0.5                     | 0.05                    |                                                                                     |                                                                                     |                                                                                     |                          |           |
|                         |                       |                        | 300/-                      | 0.1                     | 5                        | 200                                                                    | 120                                                                                   | 310                               | 1                       | 0.1                     |                                                                                     |                                                                                     |                                                                                     |                          |           |
|                         |                       |                        | 300/520                    | 0.1                     | 5                        | 230                                                                    | 130                                                                                   | 500                               | 1                       | 0.1                     |                                                                                     |                                                                                     |                                                                                     |                          |           |
|                         |                       |                        | 300/800                    | 0.1                     | 5                        | 250                                                                    | 130                                                                                   | 500                               | 1                       | 0.1                     |                                                                                     |                                                                                     |                                                                                     |                          |           |
|                         | 1.0                   | 2.0                    | 300/510                    | 0.1                     | 5                        | 230                                                                    | 130                                                                                   | 500                               | 1                       | 0.1                     |                                                                                     |                                                                                     |                                                                                     |                          |           |
|                         |                       |                        | 300/450                    | 0.1                     | 5                        | 185                                                                    | 100                                                                                   | 530                               | 2                       | 0.2                     |                                                                                     |                                                                                     |                                                                                     |                          |           |
|                         | 2.0                   | 3.0                    | 300/-                      | 0.1                     | 2                        | 200                                                                    | 110 <sup>2)</sup>                                                                     | 350                               | 2                       | 0.2                     |                                                                                     |                                                                                     |                                                                                     |                          |           |
|                         | 2.0                   | 3.0                    | 300/450                    | 0.1                     | 2                        | 150                                                                    | 70                                                                                    | 350                               | 2                       | 0.2                     |                                                                                     |                                                                                     |                                                                                     |                          |           |
|                         |                       |                        | 200/310                    | 0.5                     | 2                        | 55                                                                     | 46                                                                                    | 300                               | 4                       | 0.4                     |                                                                                     |                                                                                     |                                                                                     |                          | PBSS302PD |
|                         | 4.0                   | 10.0                   | 250/370                    | 0.5                     | 2                        | 45                                                                     | 33                                                                                    | 375                               | 5                       | 0.5                     |                                                                                     |                                                                                     |                                                                                     | PBSS5540X                |           |
| 5.0                     | 10.0                  | 250/350                | 0.5                        | 2                       | 55                       | 40 <sup>1)</sup>                                                       | 160                                                                                   | 2                                 | 0.2                     |                         |                                                                                     |                                                                                     | PBSS5540Z                                                                           |                          |           |
| 50                      | 3.0                   | 200/-                  | 0.5                        | 2                       | 150                      | 90 <sup>2)</sup>                                                       | 300                                                                                   | 2                                 | 0.1                     |                         |                                                                                     |                                                                                     |                                                                                     |                          |           |
|                         | 2.0                   | 5.0                    | 200/360                    | 0.5                     | 2                        | 90                                                                     | 55                                                                                    | 270                               | 2                       | 0.2                     |                                                                                     |                                                                                     |                                                                                     |                          |           |
|                         |                       |                        | 200/-                      | 0.5                     | 2                        | 160                                                                    | 90 <sup>2)</sup>                                                                      | 320                               | 2                       | 0.2                     |                                                                                     |                                                                                     |                                                                                     | PBSS5250X                |           |
|                         | 3.0                   | 5.0                    | 200/300                    | 0.5                     | 2                        | 120                                                                    | 70                                                                                    | 300                               | 2                       | 0.2                     |                                                                                     |                                                                                     |                                                                                     |                          |           |
|                         |                       |                        | 200/375                    | 0.5                     | 2                        | 120                                                                    | 70                                                                                    | 390                               | 3                       | 0.3                     |                                                                                     |                                                                                     |                                                                                     | PBSS5350X                |           |
| 200/300                 | 0.5                   | 2                      | 120                        | 70                      | 300                      | 2                                                                      | 0.2                                                                                   |                                   |                         |                         |                                                                                     | PBSS5350Z                                                                           |                                                                                     |                          |           |
| 60                      | 1.0                   | 2.0                    | 150/250                    | 0.5                     | 5                        | 220                                                                    | 120                                                                                   | 330                               | 1                       | 0.1                     |                                                                                     |                                                                                     |                                                                                     |                          |           |
|                         | 1.0                   | 2.0                    | 150/250                    | 0.5                     | 5                        | 220                                                                    | 120                                                                                   | 330                               | 1                       | 0.1                     |                                                                                     |                                                                                     |                                                                                     |                          |           |
|                         |                       |                        | 150/250                    | 0.5                     | 5                        | 220                                                                    | 120                                                                                   | 330                               | 1                       | 0.1                     |                                                                                     |                                                                                     |                                                                                     |                          |           |
|                         | 2.7                   | 8.0                    | 200/300                    | 0.5                     | 2                        | 80                                                                     | 49                                                                                    | 360                               | 3                       | 0.3                     |                                                                                     |                                                                                     |                                                                                     |                          |           |
|                         | 3.0                   | 6.0                    | 180/265                    | 0.5                     | 2                        | 70                                                                     | 55                                                                                    | 290                               | 3                       | 0.3                     |                                                                                     |                                                                                     |                                                                                     | PBSS303PD                |           |
|                         | 4.2                   | 8.4                    | 200/295                    | 0.5                     | 2                        | 53 <sup>1)</sup>                                                       | 35                                                                                    | 310                               | 4.2                     | 0.21                    |                                                                                     |                                                                                     |                                                                                     | PBSS304PX                |           |
|                         | 4.5                   | 9.0                    | 200/295                    | 0.5                     | 2                        | 59 <sup>1)</sup>                                                       | 35                                                                                    | 375                               | 4.5                     | 0.225                   | PBSS304PZ                                                                           |                                                                                     |                                                                                     |                          |           |
|                         | 5.0                   | 15.0                   | 170/260                    | 0.5                     | 2                        | 35 <sup>1)</sup>                                                       | 35                                                                                    | 450                               | 5                       | 0.25                    |                                                                                     |                                                                                     |                                                                                     |                          |           |
| 200/300                 |                       |                        | 0.5                        | 2                       | 40                       | 30                                                                     | 300                                                                                   | 5                                 | 0.5                     |                         |                                                                                     |                                                                                     |                                                                                     | PBSS4041PX               |           |
| 5.7                     | 15.0                  | 200/300                | 0.5                        | 2                       | 29                       | 22                                                                     | 285                                                                                   | 6                                 | 0.3                     | PBSS4041PZ              |                                                                                     |                                                                                     |                                                                                     |                          |           |
| 80                      | 3.0                   | 5.0                    | 155/225                    | 0.5                     | 2                        | 71                                                                     | 55                                                                                    | 290                               | 3                       | 0.3                     |                                                                                     |                                                                                     |                                                                                     | PBSS304PD                |           |
|                         | 4.0                   | 10.0                   | 180/265                    | 0.5                     | 2                        | 65 <sup>1)</sup>                                                       | 40                                                                                    | 420                               | 4                       | 0.2                     |                                                                                     |                                                                                     |                                                                                     |                          |           |
|                         |                       |                        | 200/300                    | 0.5                     | 2                        | 50                                                                     | 35                                                                                    | 380                               | 5                       | 0.5                     |                                                                                     |                                                                                     |                                                                                     | PBSS5480X                |           |
|                         | 8.0                   | 200/280                | 0.5                        | 2                       | 43                       | 36                                                                     | 240                                                                                   | 4                                 | 0.4                     |                         |                                                                                     |                                                                                     | PBSS305PX                                                                           |                          |           |
| 4.5                     | 9.0                   | 200/280                | 0.5                        | 2                       | 69 <sup>1)</sup>         | 36                                                                     | 450                                                                                   | 4.5                               | 0.225                   | PBSS305PZ               |                                                                                     |                                                                                     |                                                                                     |                          |           |
| 100                     | 1.0                   | 3.0                    | 150/-                      | 0.25                    | 5                        | 170                                                                    | 93                                                                                    | 320                               | 1                       | 0.1                     |                                                                                     |                                                                                     |                                                                                     |                          |           |
|                         |                       |                        | 150/350                    | 0.5                     | 5                        | 170                                                                    | 95                                                                                    | 320                               | 1                       | 0.1                     |                                                                                     |                                                                                     |                                                                                     |                          |           |
|                         |                       |                        | 150/350                    | 0.5                     | 5                        | 170                                                                    | 100                                                                                   | 320                               | 1                       | 0.1                     |                                                                                     |                                                                                     |                                                                                     | PBSS9110D                |           |
|                         |                       |                        | 150/350                    | 0.5                     | 5                        | 170                                                                    | 90                                                                                    | 320                               | 1                       | 0.1                     |                                                                                     |                                                                                     |                                                                                     | PBSS9110X                |           |
|                         |                       |                        | 150/-                      | 0.5                     | 5                        | 170                                                                    | 90                                                                                    | 320                               | 1                       | 0.1                     |                                                                                     |                                                                                     |                                                                                     | PBSS9110Z                |           |
|                         | 2.0                   | 3.0                    | 175/275                    | 0.5                     | 2                        | 88                                                                     | 65                                                                                    | 250                               | 2                       | 0.2                     |                                                                                     |                                                                                     |                                                                                     | PBSS305PD                |           |
|                         | 2.7                   | 4.0                    | 180/295                    | 0.5                     | 2                        | 110 <sup>1)</sup>                                                      | 45                                                                                    | 450                               | 2.7                     | 0.135                   |                                                                                     |                                                                                     |                                                                                     |                          |           |
|                         | 3.7                   | 7.4                    | 200/300                    | 0.5                     | 2                        | 52                                                                     | 45                                                                                    | 300                               | 4                       | 0.4                     |                                                                                     |                                                                                     |                                                                                     | PBSS306PX                |           |
| 4.1                     | 8.2                   | 200/300                | 0.5                        | 5                       | 57                       | 45                                                                     | 325                                                                                   | 4.1                               | 0.41                    | PBSS306PZ               |                                                                                     |                                                                                     |                                                                                     |                          |           |

In the Spotlight

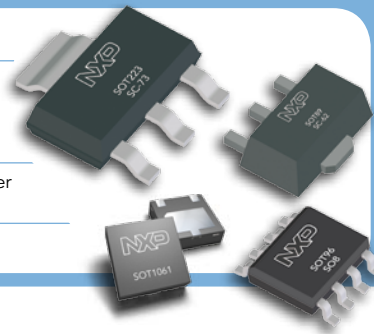
**New low  $V_{CEsat}$  (BISS) transistors**

Industry's first combination of reduced switching times (down to 125 ns) with minimized saturation voltage (below 50 mV)

Voltage range from 12 V to 100 V

Flexible package options, from standard SMD to brand new medium power leadless package SOT1061 (2 x 2 x 0.65 mm)

Benchmark for reduced on-state-resistance



**Low  $V_{CEsat}$  (BISS) double transistors**

| Package               |                    |          |                     |                      |                       |                                                                                    |                             |                      |                      | SOT96 (SO8)               | SOT457 (SC-74)  | SOT363 (SC-88)    | SOT666           |
|-----------------------|--------------------|----------|---------------------|----------------------|-----------------------|------------------------------------------------------------------------------------|-----------------------------|----------------------|----------------------|---------------------------|-----------------|-------------------|------------------|
|                       |                    |          |                     |                      |                       |                                                                                    |                             |                      |                      |                           |                 |                   |                  |
| Size (mm)             |                    |          |                     |                      |                       |                                                                                    |                             |                      |                      | 4.9 x 3.9 x 1.75          | 2.9 x 1.5 x 1.0 | 2.0 x 1.25 x 0.95 | 1.6 x 1.2 x 0.55 |
| P <sub>tot</sub> (mW) |                    |          |                     |                      |                       |                                                                                    |                             |                      |                      | 2000 <sup>2)</sup>        | 750             | 430               | 500              |
| V <sub>CEO</sub> (V)  | I <sub>C</sub> (A) | Polarity | h <sub>FE min</sub> | @ I <sub>C</sub> (A) | @ V <sub>CE</sub> (V) | V <sub>CEsat typ</sub> (mV);<br>I <sub>C</sub> = 0.5 A;<br>I <sub>B</sub> = 0.05 A | V <sub>CEsat max</sub> (mV) | @ I <sub>C</sub> (A) | @ I <sub>B</sub> (A) |                           |                 |                   |                  |
| 15                    | 0.5                | 2 x NPN  | 200                 | 0.01                 | 2                     | 170 <sup>1)</sup>                                                                  | 250                         | 0.5                  | 0.05                 |                           |                 |                   | PBSS2515VS       |
|                       |                    | 2 x PNP  | 200                 | 0.01                 | 2                     | 170 <sup>1)</sup>                                                                  | 250                         | 0.5                  | 0.05                 |                           |                 |                   | PBSS3515VS       |
|                       |                    | NPN/PNP  | 200                 | 0.01                 | 2                     | 170 <sup>1)</sup>                                                                  | 250                         | 0.5                  | 0.05                 |                           |                 |                   | PBSS2515VPN      |
|                       |                    | NPN/PNP  | 200                 | 0.01                 | 2                     | 170 <sup>1)</sup>                                                                  | 250                         | 0.5                  | 0.05                 |                           |                 | PBSS2515YPN       |                  |
| 20                    | 7.5                | NPN/NPN  | 300                 | 0.5                  | 2                     | 15                                                                                 | 150                         | 4                    | 0.2                  | PBSS4021SN                |                 |                   |                  |
|                       | 6.3                | PNP/PNP  | 250                 | 0.5                  | 2                     | 24                                                                                 | 225                         | 4                    | 0.2                  | PBSS4021SP                |                 |                   |                  |
|                       | 7.5 / 6.3          | NPN/PNP  | 300/250             | 0.5                  | 2                     | 15/24                                                                              | 150/225                     | 4                    | 0.2                  | PBSS4021SPN               |                 |                   |                  |
| 30                    | 5.7                | NPN/NPN  | 300                 | 0.5                  | 2                     | 57                                                                                 | 250                         | 4                    | 0.4                  | PBSS4032SN <sup>3)</sup>  |                 |                   |                  |
|                       | 4.8                | PNP/PNP  | 200                 | 0.5                  | 2                     | 70                                                                                 | 390                         | 4                    | 0.4                  | PBSS4032SP <sup>3)</sup>  |                 |                   |                  |
|                       | 5.7 / 4.8          | NPN/PNP  | 300/200             | 0.5                  | 2                     | 57/70                                                                              | 250/390                     | 4                    | 0.4                  | PBSS4032SPN <sup>3)</sup> |                 |                   |                  |
| 40                    | 1.0                | NPN/PNP  | 300/250             | 0.5                  | 5                     | 130/150                                                                            | 500                         | 1                    | 0.1                  |                           | PBSS4140DPN     |                   |                  |
|                       | 2.0                | NPN/PNP  | 300/250             | 0.5                  | 5                     | 80/100                                                                             | 400/530                     | 2                    | 0.2                  |                           | PBSS4240DPN     |                   |                  |
| 50                    | 2.7                | 2 x NPN  | 300                 | 0.5                  | 2                     | 50                                                                                 | 340                         | 2.7                  | 0.27                 | PBSS4350SS                |                 |                   |                  |
|                       |                    | 2 x PNP  | 200                 | 0.5                  | 2                     | 60                                                                                 | 370                         | 2.7                  | 0.27                 | PBSS5350SS                |                 |                   |                  |
|                       |                    | NPN/PNP  | 300/200             | 0.5                  | 2                     | 50/60                                                                              | 340/370                     | 2.7                  | 0.27                 | PBSS4350SPN               |                 |                   |                  |
| 60                    | 1.0                | 2 x NPN  | 200                 | 0.5                  | 5                     | 115                                                                                | 250                         | 1                    | 0.1                  |                           | PBSS4160DS      |                   |                  |
|                       |                    | 2 x PNP  | 150                 | 0.5                  | 5                     | 120                                                                                | 330                         | 1                    | 0.1                  |                           | PBSS5160DS      |                   |                  |
|                       |                    | NPN/PNP  | 200/150             | 0.5                  | 5                     | 115/120                                                                            | 250/330                     | 1                    | 0.1                  |                           | PBSS4160DPN     |                   |                  |
|                       | 6.7                | NPN/NPN  | 300                 | 0.5                  | 2                     | 20                                                                                 | 190                         | 4                    | 0.2                  | PBSS4041SN                |                 |                   |                  |
|                       | 5.9                | PNP/PNP  | 200                 | 0.5                  | 2                     | 35                                                                                 | 330                         | 4                    | 0.2                  | PBSS4041SP                |                 |                   |                  |
|                       | 6.7 / 5.9          | NPN/PNP  | 300/200             | 0.5                  | 2                     | 20/35                                                                              | 190/330                     | 4                    | 0.2                  | PBSS4041SPN               |                 |                   |                  |

<sup>1)</sup> I<sub>C</sub>/I<sub>B</sub>=20

<sup>2)</sup> Device mounted on a ceramic PCB, Al<sub>2</sub>O<sub>3</sub>, standard footprint.

<sup>3)</sup> Optimized for high speed switching

## Low $V_{CEsat}$ (BISS) transistors

## High voltage low $V_{CEsat}$ (BISS) transistors

types in **bold** represent new products

| Package               |                 |               |           | SOT223 (SC-73)   | SOT89 (SC-62)   | SOT23            |
|-----------------------|-----------------|---------------|-----------|------------------|-----------------|------------------|
| Size (mm)             |                 |               |           | 6.5 x 3.5 x 1.65 | 4.5 x 2.5 x 1.5 | 2.9 x 1.3 x 1.0  |
| P <sub>tot</sub> (mW) |                 |               |           | 1700             | 1300            | 250              |
| Polarity              | $V_{CESM}^{1)}$ | $V_{CEO}$ (V) | $I_c$ (A) |                  |                 |                  |
| NPN                   | -               | 150           | 1         | PBHV8115Z        |                 | PBHV8115T        |
|                       |                 |               | 2         | PBHV8215Z        |                 |                  |
|                       | 500             | 180           | 1         |                  |                 | <b>PBHV8118T</b> |
|                       |                 | 400           | 0.5       | PBHV8540Z        |                 | PBHV8540T        |
|                       |                 | 500           | 1         | PBHV8140Z        |                 |                  |
| PNP                   | -               | 150           | 1         | PBHV9115Z        | PBHV9115X       | PMBTA45          |
|                       |                 |               | 2         | PBHV9215Z        |                 | PBHV9115T        |
|                       | 500             | 400           | 0.25      | PBHV9040Z        |                 | PBHV9040T        |
|                       |                 |               | 0.5       | PBHV9540Z        |                 |                  |
|                       |                 | 500           | 0.15      |                  |                 | PBHV9050T        |
|                       |                 |               | 0.25      | PBHV9050Z        |                 |                  |

<sup>1)</sup> Collector-emitter peak voltage

In the Spotlight


### High voltage low $V_{CEsat}$ (BISS) transistors in SOT223 & SOT23

Voltage  $V_{CEO}$  up to 500 V

Current  $I_c$  up to 1 A (continuous), 2 A (peak)

$V_{CEsat}$  down to 33 mV at  $I_B = 20$  mA

AEC-Q101 qualified








## Low $V_{CEsat}$ (BISS) RETs

| Package               |            |         |         |         | SOT23           |           |
|-----------------------|------------|---------|---------|---------|-----------------|-----------|
| Size (mm)             |            |         |         |         | 2.9 x 1.3 x 1.0 |           |
| P <sub>tot</sub> (mW) |            |         |         |         | 250             |           |
| $V_{CEO}$ (V)         | $I_c$ (mA) |         | R1 (kΩ) | R2 (kΩ) | NPN             | PNP       |
| 40                    | 600        | R1 = R2 | 1       | 1       | PBRN113ET       | PBRP113ET |
|                       |            |         | 2.2     | 2.2     | PBRN123ET       | PBRP123ET |
|                       |            | R1 ≠ R2 | 1       | 10      | PBRN113ZT       | PBRP113ZT |
|                       |            |         | 2.2     | 10      | PBRN123YT       | PBRP123YT |

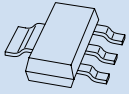
## High voltage bipolar transistors for lighting, SMPS and industrial applications

types in **bold** represent new products

| $V_{CESM}$ (V) | $I_{C(DC)}$ (max) (A) | 25 °C ind. $t_f$ (typ) (ns) | @ $I_C$ (A) | $h_{FE}$ (typ) | @ $I_C$ (A) | SOT54 (TO92)                                                                      | SOT78 (TO220AB)                                                                    | SOT186A (isolated TO220AB)                                                          | SOT404 (D <sup>2</sup> PAK)                                                         | SOT428 (DPAK)                                                                       |
|----------------|-----------------------|-----------------------------|-------------|----------------|-------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|                |                       |                             |             |                |             |  |  |  |  |  |
| 700            | 1                     | 80                          | 1           | 7.5            | 0.8         | BUJ100LR                                                                          |                                                                                    |                                                                                     |                                                                                     |                                                                                     |
|                | 1                     | 80                          | 1           | 7.5            | 0.8         | PHE13003A                                                                         |                                                                                    |                                                                                     |                                                                                     |                                                                                     |
|                | 1                     | 50                          | 1           | 14             | 0.75        | BUJ100                                                                            |                                                                                    |                                                                                     |                                                                                     |                                                                                     |
|                | 1.5                   | 100                         | 0.5         | 9              | 1           | PHE13003C                                                                         |                                                                                    |                                                                                     |                                                                                     |                                                                                     |
|                | 1.5                   | 100                         | 0.5         | 9              | 1           | PHD13003C <sup>1)</sup>                                                           |                                                                                    |                                                                                     |                                                                                     |                                                                                     |
|                | 4                     | 30                          | 2           | 12.5           | 3           |                                                                                   | BUJ103A                                                                            | BUJ103AX                                                                            |                                                                                     | BUJ103AD                                                                            |
|                | 4                     | 30                          | 2           | 12.5           | 3           |                                                                                   |                                                                                    |                                                                                     |                                                                                     | BUJD103AD <sup>1)</sup>                                                             |
|                | 4                     | 100                         | 2           | 17             | 2           |                                                                                   | PHE13005                                                                           | PHE13005X                                                                           |                                                                                     |                                                                                     |
|                | 4                     | 100                         | 2           | 17             | 2           |                                                                                   | PHD13005 <sup>1)</sup>                                                             |                                                                                     |                                                                                     |                                                                                     |
|                | 8                     | 20                          | 5           | 11             | 4           |                                                                                   | BUJ105A                                                                            |                                                                                     | BUJ105AB                                                                            | BUJ105AD                                                                            |
|                | 8                     | 20                          | 5           | 11             | 4           |                                                                                   |                                                                                    |                                                                                     |                                                                                     | BUJD105AD <sup>1)</sup>                                                             |
|                | 8                     | 40                          | 5           | 9              | 5           |                                                                                   | PHE13007                                                                           |                                                                                     |                                                                                     |                                                                                     |
|                | 10                    | 20                          | 5           | 11             | 6           |                                                                                   | BUJ106A                                                                            |                                                                                     |                                                                                     |                                                                                     |
|                | 12                    | 100                         | 5           | 6 min - 30 max | 8           |                                                                                   | PHE13009                                                                           |                                                                                     |                                                                                     |                                                                                     |
| 850            | 4                     | 30                          | 2           | 12.5           | 3           |                                                                                   | <b>BUJD203A<sup>1)</sup></b>                                                       | <b>BUJD203AX<sup>1)</sup></b>                                                       |                                                                                     | <b>BUJD203AD<sup>1)</sup></b>                                                       |
| 1000           | 5                     | 145                         | 2.5         | 12             | 3           |                                                                                   | BUJ303A                                                                            | <b>BUJ303AX</b>                                                                     |                                                                                     | <b>BUJ303AD</b>                                                                     |
| 1050           | 4                     | 520                         | 2           | 41             | 0.8         |                                                                                   | <b>BUJ302A</b>                                                                     | <b>BUJ302AX</b>                                                                     |                                                                                     | <b>BUJ302AD</b>                                                                     |
|                | 5                     | 200                         | 2.5         | 10.5           | 3           |                                                                                   | BUJ303B                                                                            |                                                                                     |                                                                                     |                                                                                     |
| 1200           | 6                     | 170                         | 2.5         | 15.5           | 3           |                                                                                   | BUJ403A                                                                            |                                                                                     |                                                                                     |                                                                                     |

<sup>1)</sup> Integrated freewheeling diode

Small-signal MOSFETs single (N-channel) < 50V

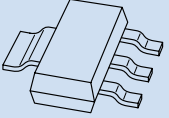
| Package               |                     |                    |                             |                             |                          |                           |                         |                     |                                                  |                   |       |                   | SOT223 (SC-73)                                                                      |  |
|-----------------------|---------------------|--------------------|-----------------------------|-----------------------------|--------------------------|---------------------------|-------------------------|---------------------|--------------------------------------------------|-------------------|-------|-------------------|-------------------------------------------------------------------------------------|--|
|                       |                     |                    |                             |                             |                          |                           |                         |                     |                                                  |                   |       |                   |  |  |
|                       |                     |                    |                             |                             |                          |                           |                         |                     |                                                  |                   |       |                   |                                                                                     |  |
| Size (mm)             |                     |                    |                             |                             |                          |                           |                         |                     |                                                  |                   |       |                   | 6.5 x 3.5 x 1.65                                                                    |  |
| P <sub>tot</sub> (mW) |                     |                    |                             |                             |                          |                           |                         |                     |                                                  |                   |       |                   | 1700                                                                                |  |
| V <sub>DS</sub> (V)   | V <sub>GS</sub> (V) | I <sub>D</sub> (A) | V <sub>GS(th) min</sub> (V) | V <sub>GS(th) max</sub> (V) | t <sub>on</sub> typ (ns) | t <sub>off</sub> typ (ns) | Q <sub>G</sub> typ (nC) | ESD protection (kV) | R <sub>DS(on)</sub> typ (mΩ) @ V <sub>GS</sub> = |                   |       |                   |                                                                                     |  |
|                       |                     |                    |                             |                             |                          |                           |                         |                     | 10 V                                             | 4.5 V             | 2.5 V | 1.8 V             |                                                                                     |  |
| 12                    | 8                   | 5.7                | 0.4                         | -                           | 23                       | 67                        | 10.1                    | -                   | -                                                | 28                | -     | 39                |                                                                                     |  |
| 20                    | 8                   | tbd                | tbd                         | tbd                         | tbd                      | tbd                       | tbd                     | -                   | -                                                | 16                | tbd   | tbd               |                                                                                     |  |
|                       |                     | 6.3                | 2                           | 4                           | 23                       | 71                        | 10.6                    | -                   | -                                                | 23                | -     | 37                |                                                                                     |  |
|                       |                     | 5.7                | 0.4                         | -                           | 23                       | 71                        | 10.6                    | -                   | -                                                | 27                | -     | 39                |                                                                                     |  |
|                       |                     | tbd                | tbd                         | tbd                         | tbd                      | tbd                       | tbd                     | tbd                 | -                                                | -                 | 28    | tbd               | tbd                                                                                 |  |
|                       |                     | 5.7                | 0.45                        | -                           | 20                       | 66                        | 7.4                     | -                   | -                                                | 30                | -     | 44                |                                                                                     |  |
|                       |                     | 3.76               | 0.65                        | -                           | 35                       | 84                        | 5.4                     | -                   | -                                                | 56                | 77    | -                 |                                                                                     |  |
|                       |                     | 2.5                | 0.65                        | -                           | 35                       | 84                        | 5.4                     | -                   | -                                                | 56                | 77    | -                 |                                                                                     |  |
|                       |                     | 1.05               | 0.4                         | -                           | 6.5                      | 65                        | -                       | -                   | -                                                | 140               | -     | 240               |                                                                                     |  |
|                       | 12                  | 2.28               | 0.45                        | 0.95                        | 14.5                     | 23.5                      | 0.89                    | -                   | -                                                | 250               | -     | 420               |                                                                                     |  |
|                       |                     | 1                  | 0.45                        | 1                           | 14.5                     | 23.5                      | 0.89                    | -                   | -                                                | 280               | -     | 460               |                                                                                     |  |
|                       |                     | tbd                | tbd                         | tbd                         | tbd                      | tbd                       | tbd                     | tbd                 | -                                                | -                 | 30    | tbd               | -                                                                                   |  |
|                       |                     | 5.9                | 0.5                         | 1.5                         | 25                       | 37                        | 5.8                     | -                   | -                                                | 31                | 44    | -                 |                                                                                     |  |
|                       | 15                  | 2.15               | 0.5                         | 1.5                         | 16                       | 17                        | 0.72                    | -                   | -                                                | 270               | 440   | -                 |                                                                                     |  |
|                       |                     | 1                  | 0.5                         | 1.5                         | 16                       | 17                        | 0.72                    | -                   | -                                                | 290               | 460   | -                 |                                                                                     |  |
|                       | 30                  | 8                  | 5.7                         | 1                           | 2                        | 24                        | 35                      | 13.1                | -                                                | 28                | 34    | -                 | -                                                                                   |  |
|                       |                     |                    | 4.1                         | 1                           | 2                        | 24                        | 35                      | 13.1                | -                                                | 55                | 70    | -                 | -                                                                                   |  |
|                       |                     |                    | 4.9                         | 0.45                        | -                        | 22                        | 60                      | 9.9                 | -                                                | -                 | 38    | -                 | 54                                                                                  |  |
|                       |                     |                    | 4.9                         | 0.45                        | -                        | 18                        | 50                      | 9.3                 | -                                                | -                 | 40    | -                 | 55                                                                                  |  |
| 1.78                  |                     |                    | 0.45                        | 0.95                        | 11.5                     | 22.5                      | 0.89                    | -                   | -                                                | 390               | -     | 550               |                                                                                     |  |
| 12                    |                     | 0.85               | 0.4                         | -                           | 6                        | 27                        | -                       | -                   | -                                                | 400 <sup>2)</sup> | -     | 600 <sup>2)</sup> |                                                                                     |  |
|                       |                     | 0.8                | 0.45                        | 1                           | 11.5                     | 22.5                      | 0.89                    | -                   | -                                                | 400               | -     | 580               |                                                                                     |  |
|                       |                     | tbd                | tbd                         | tbd                         | tbd                      | tbd                       | tbd                     | tbd                 | -                                                | -                 | 20    | tbd               | -                                                                                   |  |
|                       |                     | tbd                | tbd                         | tbd                         | tbd                      | tbd                       | tbd                     | tbd                 | -                                                | -                 | 250   | tbd               | -                                                                                   |  |
|                       |                     | 1.87               | 0.5                         | 1.5                         | 16                       | 19.5                      | 0.65                    | -                   | -                                                | 350               | 520   | -                 |                                                                                     |  |
|                       |                     | 0.87               | 0.35                        | -                           | 16                       | 19.5                      | -                       | -                   | -                                                | 370               | 550   | -                 |                                                                                     |  |
|                       |                     | 0.9                | 0.5                         | -                           | 16                       | 19.5                      | 0.65                    | -                   | -                                                | 370               | 550   | -                 |                                                                                     |  |
| 20                    | 15                  | 5.4                | 1                           | 2                           | 12                       | 27                        | 13.8                    | -                   | 32                                               | 40                | -     | -                 |                                                                                     |  |
|                       | tbd                 | tbd                | tbd                         | tbd                         | tbd                      | tbd                       | tbd                     | -                   | tbd                                              | 15                | tbd   | -                 |                                                                                     |  |
|                       | tbd                 | tbd                | tbd                         | tbd                         | tbd                      | tbd                       | tbd                     | -                   | tbd                                              | 18                | tbd   | -                 |                                                                                     |  |
|                       | 10                  | 1                  | 2.8                         | 18                          | 44                       | 24                        | -                       | 20                  | 30                                               | -                 | -     | BSP030            |                                                                                     |  |
|                       | tbd                 | tbd                | tbd                         | tbd                         | tbd                      | tbd                       | tbd                     | -                   | tbd                                              | 31                | tbd   | -                 |                                                                                     |  |
|                       | tbd                 | tbd                | tbd                         | tbd                         | tbd                      | tbd                       | tbd                     | -                   | tbd                                              | 35                | tbd   | -                 |                                                                                     |  |
|                       | 5.4                 | 1                  | 2                           | 33                          | 44                       | 6.1                       | -                       | 31                  | 38                                               | -                 | -     |                   |                                                                                     |  |
|                       | 5.2                 | 1                  | 2                           | 33                          | 44                       | 6.1                       | -                       | 32                  | 42                                               | -                 | -     |                   |                                                                                     |  |
|                       | 5.4                 | 1                  | 2                           | 12                          | 21.5                     | 9.4                       | -                       | 35                  | 45                                               | -                 | -     |                   |                                                                                     |  |
|                       | 4.6                 | 1                  | 2                           | 8.4                         | 17.8                     | 8.8                       | -                       | 40                  | 49                                               | -                 | -     |                   |                                                                                     |  |
| BSP100                | 4.7                 | 1                  | 2                           | 12                          | 23.5                     | 9.4                       | -                       | 47                  | 60                                               | -                 | -     |                   |                                                                                     |  |
|                       | 1.9                 | 1                  | 2                           | 11                          | 41                       | 6.4                       | -                       | 77                  | 102                                              | -                 | -     |                   |                                                                                     |  |
|                       | 2.5                 | 1.5                | -                           | 12                          | 23.5                     | 4.6                       | -                       | 74                  | 117                                              | -                 | -     |                   |                                                                                     |  |
|                       | 6                   | 1                  | 2.8                         | 14                          | 36                       | -                         | -                       | 80                  | 120                                              | -                 | -     |                   |                                                                                     |  |
|                       |                     | 1.7                | 1.5                         | -                           | 11.5                     | 31                        | 4.6                     | -                   | 117 <sup>2)</sup>                                | 190 <sup>2)</sup> | -     | -                 |                                                                                     |  |

<sup>1)</sup> Enhanced thermal capability

<sup>2)</sup> Max values

\* Products to be released in 2011. For new product information, please check <http://standardproducts.nxp.com/mosfets>

Small-signal MOSFETs single (N-channel)  $\geq 50V$

| Package               |                     |                    |                             |                             |                          |                           |                         |                     |                                                |                    |        |           | SOT223 (SC-73)                                                                      |
|-----------------------|---------------------|--------------------|-----------------------------|-----------------------------|--------------------------|---------------------------|-------------------------|---------------------|------------------------------------------------|--------------------|--------|-----------|-------------------------------------------------------------------------------------|
|                       |                     |                    |                             |                             |                          |                           |                         |                     |                                                |                    |        |           |  |
|                       |                     |                    |                             |                             |                          |                           |                         |                     |                                                |                    |        |           |                                                                                     |
| Size (mm)             |                     |                    |                             |                             |                          |                           |                         |                     |                                                |                    |        |           | 6.5 x 3.5 x 1.65                                                                    |
| P <sub>tot</sub> (mW) |                     |                    |                             |                             |                          |                           |                         |                     |                                                |                    |        |           | 1700                                                                                |
| V <sub>DS</sub> (V)   | V <sub>GS</sub> (V) | I <sub>D</sub> (A) | V <sub>GS(th) min</sub> (V) | V <sub>GS(th) max</sub> (V) | t <sub>on typ</sub> (ns) | t <sub>off typ</sub> (ns) | Q <sub>G typ</sub> (nC) | ESD protection (kV) | R <sub>DSon typ</sub> (mΩ) @ V <sub>GS</sub> = |                    |        |           |                                                                                     |
|                       |                     |                    |                             |                             |                          |                           |                         |                     | 10 V                                           | 4.5 V              | 2.5 V  | 1.8 V     |                                                                                     |
| 50                    | 20                  | 0.1                | 0.4                         | 1.8                         | 2                        | 5                         | -                       | -                   | 2800                                           | 3800 <sup>3)</sup> | -      | -         |                                                                                     |
| 55                    | 8                   | 0.3                | 0.4                         | 1.3                         | 4                        | 11                        | 1                       | -                   | -                                              | 2300               | 2400   | 3100      |                                                                                     |
|                       | 10                  | 0.335              | 0.4                         | 1.3                         | 4                        | 11                        | 1                       | -                   | -                                              | 2300               | 2400   | 3100      |                                                                                     |
|                       | 13                  | 2.5                | 2                           | 4                           | -                        | -                         | -                       | 2                   | 120                                            | -                  | -      | -         | PHT6N06T                                                                            |
| 3.5                   |                     | 1                  | 2                           | -                           | -                        | -                         | 2                       | -                   | 65                                             | -                  | -      | PHT8N06LT |                                                                                     |
| 2.5                   |                     | 1                  | 2                           | -                           | -                        | -                         | 2                       | -                   | 120                                            | -                  | -      | PHT6N06LT |                                                                                     |
| 60                    | 15                  | 0.26               | 1                           | 3.3                         | 3                        | 9                         | -                       | 1                   | 2800                                           | 3800               | -      | -         |                                                                                     |
|                       | 20                  | 0.25               | 0.8                         | 3                           | -                        | -                         | -                       | -                   | 2500                                           | -                  | -      | -         |                                                                                     |
|                       |                     | 0.36               | 0.9                         | 1.5                         | 5                        | 13                        | 0.72                    | -                   | 900                                            | 1000               | -      | -         |                                                                                     |
|                       |                     | 1.22               | 1                           | 3                           | 6                        | 7.2                       | 1.05                    | -                   | 760                                            | 1100               | -      | -         |                                                                                     |
|                       |                     | 0.57               | 1                           | -                           | 6                        | 7.2                       | -                       | -                   | 780                                            | 1100               | -      | -         |                                                                                     |
|                       |                     | 0.55               | 1                           | 3                           | 6                        | 7.2                       | 1.05                    | -                   | 780                                            | 1100               | -      | -         |                                                                                     |
|                       |                     | 0.3                | 1                           | 2.5                         | 7                        | 15                        | 0.6                     | -                   | 1000                                           | 1300               | -      | -         |                                                                                     |
|                       |                     | 0.3                | 1                           | 2.5                         | 11                       | 19                        | 0.5                     | 2                   | 1000                                           | 1300               | -      | -         |                                                                                     |
|                       | 0.3                 | 1                  | 2.5                         | 16                          | 60                       | 1.09                      | 3                       | 1100                | 1300                                           | -                  | -      |           |                                                                                     |
|                       | 30                  | 0.34               | 1                           | -                           | 3                        | 9                         | -                       | 1                   | 2800                                           | 3800               | -      | -         |                                                                                     |
| 0.385                 |                     | 1                  | 2.5                         | 2.5                         | 11                       | 0.69                      | -                       | 780                 | 1200                                           | -                  | -      |           |                                                                                     |
| 0.475                 |                     | 1                  | 2.5                         | 2.5                         | 11                       | 0.69                      | -                       | 780                 | 1200                                           | -                  | -      |           |                                                                                     |
| 100                   | 0.3                 | 1                  | 2.5                         | 2.5                         | 11                       | -                         | -                       | 2800                | 3800                                           | -                  | -      |           |                                                                                     |
|                       | 16                  | 3.5                | 1                           | 2                           | 14                       | 73                        | -                       | -                   | -                                              | 200                | -      | -         | PHT4NQ10LT                                                                          |
|                       | 20                  | 3                  | 2                           | 4                           | -                        | -                         | -                       | -                   | 57                                             | -                  | -      | -         | PHT6NQ10T                                                                           |
|                       |                     | 3.5                | 2                           | 4                           | 21                       | 31                        | 7.4                     | -                   | 200                                            | -                  | -      | -         | PHT4NQ10T                                                                           |
|                       |                     | 0.85               | 2                           | 4                           | 19                       | 13                        | 4.6                     | -                   | 400                                            | -                  | -      | -         |                                                                                     |
|                       |                     | 0.15               | 1                           | 2.8                         | 3                        | 12                        | -                       | -                   | 3500                                           | -                  | -      | -         |                                                                                     |
|                       |                     | 0.19               | 1                           | -                           | 3                        | 12                        | -                       | -                   | -                                              | 5000               | -      | -         |                                                                                     |
| 0.52                  | 1                   | -                  | 3                           | 12                          | -                        | -                         | -                       | 5000                | -                                              | -                  | BSP110 |           |                                                                                     |
| 30                    | 1.9                 | 2                  | 4                           | 10.5                        | 12.5                     | 7                         | -                       | 213                 | -                                              | -                  | -      |           |                                                                                     |
| 200                   | 0.4                 | 0.8                | 2.8                         | 6                           | 49                       | -                         | -                       | 1600                | -                                              | -                  | -      |           |                                                                                     |
|                       | 0.55                | 0.4                | 2                           | 10                          | 45                       | -                         | -                       | 1700                | -                                              | 3000               | -      | BSP122    |                                                                                     |
| 240                   | 20                  | 0.375              | 0.8                         | 2                           | 6                        | 47                        | -                       | -                   | 2800                                           | 7500 <sup>3)</sup> | -      | -         | BSP89                                                                               |
| 250                   | 20                  | 0.35               | 0.8                         | 2                           | 6                        | 47                        | -                       | -                   | 2800                                           | -                  | -      | -         | BSP126                                                                              |
| 300                   | 20                  | 0.35               | 0.8                         | 2                           | 6                        | 46                        | -                       | -                   | 3700                                           | -                  | 4800   | -         | BSP130                                                                              |

<sup>1)</sup> Enhanced thermal capability

<sup>2)</sup> Max values

<sup>3)</sup> @ V<sub>gs</sub> = 5 V

## Small-signal MOSFETs dual (N-channel)

| Package               |                     |                    |                             |                             |                          |                           |                         |                     |                                                  |       |       |       |   |
|-----------------------|---------------------|--------------------|-----------------------------|-----------------------------|--------------------------|---------------------------|-------------------------|---------------------|--------------------------------------------------|-------|-------|-------|---|
| Size (mm)             |                     |                    |                             |                             |                          |                           |                         |                     |                                                  |       |       |       |   |
| P <sub>tot</sub> (mW) |                     |                    |                             |                             |                          |                           |                         |                     |                                                  |       |       |       |   |
| V <sub>DS</sub> (V)   | V <sub>GS</sub> (V) | I <sub>D</sub> (A) | V <sub>GS(th)</sub> min (V) | V <sub>GS(th)</sub> max (V) | t <sub>on</sub> typ (ns) | t <sub>off</sub> typ (ns) | Q <sub>G</sub> typ (nC) | ESD protection (kV) | R <sub>DS(on)</sub> typ (mΩ) @ V <sub>GS</sub> = |       |       |       |   |
|                       |                     |                    |                             |                             |                          |                           |                         |                     | 10 V                                             | 4.5 V | 2.5 V | 1.8 V |   |
| 20                    | 8                   | 0.87               | 0.45                        | 1                           | 14.5                     | 23.5                      | -                       | -                   | -                                                | 280   | -     | 460   | - |
|                       | 12                  | 0.86               | 0.5                         | 1.5                         | 16                       | 17                        | 0.72                    | -                   | -                                                | 290   | 460   | -     | - |
| 30                    | 8                   | 0.71               | 0.45                        | 1                           | 11.5                     | 22.5                      | 0.89                    | -                   | -                                                | 400   | -     | 580   | - |
|                       | 12                  | 0.74               | 0.5                         | 1.5                         | 17                       | 19.5                      | 0.65                    | -                   | -                                                | 370   | 550   | -     | - |
|                       | 15                  | 0.125              | 0.8                         | 1.5                         | 17                       | 22                        | 0.35                    | -                   | -                                                | 1800  | 2900  | -     | - |
| 60                    | 20                  | 0.49               | 1                           | -                           | 6                        | 7.2                       | 1.05                    | -                   | -                                                | 780   | 1100  | -     | - |
|                       |                     | 0.36               | 0.9                         | 1.5                         | 5                        | 13                        | 0.72                    | -                   | -                                                | 900   | 1000  | -     | - |
|                       |                     | 0.3                | 1                           | 2.5                         | 7                        | 15                        | 0.6                     | -                   | -                                                | 1000  | 1300  | -     | - |
|                       |                     | 0.3                | 1                           | 2.5                         | 11                       | 19                        | 0.5                     | 2                   | -                                                | 1000  | 1300  | -     | - |

## Small-signal MOSFETs single (P-channel)

| Package               |                     |                    |                             |                             |                          |                           |                         |                     |                                                  |       |       |       |     |
|-----------------------|---------------------|--------------------|-----------------------------|-----------------------------|--------------------------|---------------------------|-------------------------|---------------------|--------------------------------------------------|-------|-------|-------|-----|
| Size (mm)             |                     |                    |                             |                             |                          |                           |                         |                     |                                                  |       |       |       |     |
| P <sub>tot</sub> (mW) |                     |                    |                             |                             |                          |                           |                         |                     |                                                  |       |       |       |     |
| V <sub>DS</sub> (V)   | V <sub>GS</sub> (V) | I <sub>D</sub> (A) | V <sub>GS(th)</sub> min (V) | V <sub>GS(th)</sub> max (V) | t <sub>on</sub> typ (ns) | t <sub>off</sub> typ (ns) | Q <sub>G</sub> typ (nC) | ESD protection (kV) | R <sub>DS(on)</sub> typ (mΩ) @ V <sub>GS</sub> = |       |       |       |     |
|                       |                     |                    |                             |                             |                          |                           |                         |                     | 10 V                                             | 4.5 V | 2.5 V | 1.8 V |     |
| 12                    | 8                   | 1.52               | 0.4                         | -                           | 6.5                      | 65                        | -                       | -                   | -                                                | 80    | -     | 140   | -   |
|                       |                     | 0.75               | 0.4                         | -                           | 6.5                      | 65                        | -                       | -                   | -                                                | 180   | -     | 420   | -   |
| 20                    | 8                   | tbd                | tbd                         | tbd                         | tbd                      | tbd                       | tbd                     | -                   | -                                                | -     | 21    | tbd   | tbd |
|                       |                     | tbd                | tbd                         | tbd                         | tbd                      | tbd                       | tbd                     | -                   | -                                                | -     | 27    | tbd   | tbd |
|                       |                     | 2                  | 0.5                         | 1.1                         | 7                        | 50                        | 6                       | -                   | -                                                | -     | 100   | -     | -   |
|                       |                     | 4.8                | 0.55                        | 0.95                        | 16                       | 117                       | 10                      | -                   | -                                                | -     | 48    | 65    | -   |
|                       | 12                  | 3.5                | 0.75                        | 1.25                        | 24                       | 84                        | 8.5                     | -                   | -                                                | -     | 48    | 71    | -   |
|                       |                     | 3.9                | 0.55                        | 0.95                        | 28                       | 101                       | 7.6                     | -                   | -                                                | -     | 65    | 90    | -   |
|                       |                     | 3.5                | 0.75                        | 1.25                        | tbd                      | tbd                       | tbd                     | -                   | -                                                | -     | 85    | tbd   | tbd |
|                       |                     | 3.5                | 0.75                        | 1.25                        | tbd                      | tbd                       | tbd                     | -                   | -                                                | -     | 170   | tbd   | tbd |
| 30                    | 8                   | 0.47               | 0.4                         | -                           | 6.5                      | 65                        | -                       | -                   | -                                                | 660   | -     | 1100  |     |
|                       | 20                  | 3                  | 1                           | 2.8                         | 20                       | 50                        | -                       | -                   | 220                                              | 330   | -     | -     |     |
|                       |                     | 0.52               | 1                           | -                           | 6.5                      | 65                        | -                       | -                   | 630                                              | 890   | -     | -     |     |
| 50                    | 20                  | 0.2                | tbd                         | tbd                         | tbd                      | tbd                       | tbd                     | 1                   | 5300                                             | 6000  | -     | -     |     |
|                       |                     | 0.13               | 0.8                         | 2                           | 3                        | 7                         | -                       | -                   | 6000                                             | -     | -     | -     |     |
| 60                    | 20                  | 0.3                | 1                           | -                           | 6.5                      | 65                        | -                       | -                   | 2100                                             | 2700  | -     | -     |     |
| 200                   | 20                  | 0.225              | 0.8                         | 2.8                         | 5                        | 20                        | -                       | -                   | 10000                                            | -     | -     | -     |     |
| 240                   | 20                  | 0.2                | 0.8                         | 2.8                         | 5                        | 20                        | -                       | -                   | 10000                                            | -     | -     | -     |     |
| 250                   | 20                  | 0.225              | 0.8                         | 2.8                         | 5                        | 10                        | -                       | -                   | 10000                                            | -     | -     | -     |     |
| 300                   | 20                  | 0.21               | 1.95                        | 2.8                         | 5                        | 15                        | -                       | -                   | 17000 <sup>2)</sup>                              | -     | -     | -     |     |


<sup>1)</sup> Enhanced thermal capability

<sup>2)</sup> Max values

\* Products to be released in 2011. For new product information, please check <http://standardproducts.nxp.com/mosfets>




## Small-signal MOSFET – Schottky combination

types in **bold** represent new products

| Package               |                     |                     |                    |                             |                             |                          |                           |                         |                     |                    |                    |                          |                                                | SOT1118                                                                             |       |                    |
|-----------------------|---------------------|---------------------|--------------------|-----------------------------|-----------------------------|--------------------------|---------------------------|-------------------------|---------------------|--------------------|--------------------|--------------------------|------------------------------------------------|-------------------------------------------------------------------------------------|-------|--------------------|
|                       |                     |                     |                    |                             |                             |                          |                           |                         |                     |                    |                    |                          |                                                |  |       |                    |
| Size (mm)             |                     |                     |                    |                             |                             |                          |                           |                         |                     |                    |                    |                          |                                                | 2.0 x 2.0 x 0.65                                                                    |       |                    |
| P <sub>tot</sub> (mW) |                     |                     |                    |                             |                             |                          |                           |                         |                     |                    |                    |                          |                                                | 1250                                                                                |       |                    |
| Configuration         | V <sub>DS</sub> (V) | V <sub>GS</sub> (V) | I <sub>D</sub> (A) | V <sub>GS(th) min</sub> (V) | V <sub>GS(th) max</sub> (V) | t <sub>on</sub> typ (ns) | t <sub>off</sub> typ (ns) | Q <sub>G</sub> typ (nC) | ESD protection (kV) | I <sub>F</sub> (A) | V <sub>R</sub> (V) | V <sub>F</sub> typ. (mA) | R <sub>DSon</sub> typ (mΩ) @ V <sub>GS</sub> = |                                                                                     |       |                    |
|                       |                     |                     |                    |                             |                             |                          |                           |                         |                     |                    |                    |                          | 4.5 V                                          | 2.5 V                                                                               | 1.8 V |                    |
| single + schottky     | 20                  | 8                   | 3.3                | 0.5                         | 1.5                         | 15                       | 92                        | 4.5                     | 1                   | 2                  | 30                 | 455                      | 58                                             | 72                                                                                  | 100   | <b>PMFPB6545UP</b> |
|                       |                     |                     | 3.3                | 0.5                         | 1.5                         | 15                       | 92                        | 4.5                     | 1                   | 2.2                | 30                 | 325                      | 58                                             | 72                                                                                  | 100   | <b>PMFPB6532UP</b> |

## Small-signal MOSFETs dual (P-channel)

types in **bold** represent new products


| Package               |                     |                    |                             |                             |                          |                           |                         |                     |                                                | SOT363 (SC-88)                                                                      | SOT666 (SC-88)                                                                      | SOT1118                                                                             |           |           |                  |
|-----------------------|---------------------|--------------------|-----------------------------|-----------------------------|--------------------------|---------------------------|-------------------------|---------------------|------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-----------|-----------|------------------|
|                       |                     |                    |                             |                             |                          |                           |                         |                     |                                                |  |  |  |           |           |                  |
| Size (mm)             |                     |                    |                             |                             |                          |                           |                         |                     |                                                | 2.0 x 1.25 x 0.95                                                                   | 1.6 x 1.2 x 0.55                                                                    | 2.0 x 2.0 x 0.65                                                                    |           |           |                  |
| P <sub>tot</sub> (mW) |                     |                    |                             |                             |                          |                           |                         |                     |                                                | 300                                                                                 | 300                                                                                 | 1250                                                                                |           |           |                  |
| V <sub>DS</sub> (V)   | V <sub>GS</sub> (V) | I <sub>D</sub> (A) | V <sub>GS(th) min</sub> (V) | V <sub>GS(th) max</sub> (V) | t <sub>on</sub> typ (ns) | t <sub>off</sub> typ (ns) | Q <sub>G</sub> typ (nC) | ESD protection (kV) | R <sub>DSon</sub> typ (mΩ) @ V <sub>GS</sub> = |                                                                                     |                                                                                     |                                                                                     |           |           |                  |
|                       |                     |                    |                             |                             |                          |                           |                         |                     | 10 V                                           | 4.5 V                                                                               | 2.5 V                                                                               | 1.8 V                                                                               |           |           |                  |
| 20                    | 8                   | 3.3                | 0.5                         | 1.5                         | 15                       | 92                        | 4.5                     | 1                   | -                                              | 58                                                                                  | 72                                                                                  | 100                                                                                 |           |           | <b>PMDPB65UP</b> |
| 50                    | 20                  | 0.2                | tbd                         | tbd                         | tbd                      | tbd                       | tbd                     | 1                   | 5300                                           | 6000                                                                                | -                                                                                   | -                                                                                   | BSS84AKS* | BSS84AKV* |                  |

\* Products to be released in 2011. For new product information, please check <http://standardproducts.nxp.com/mosfets>

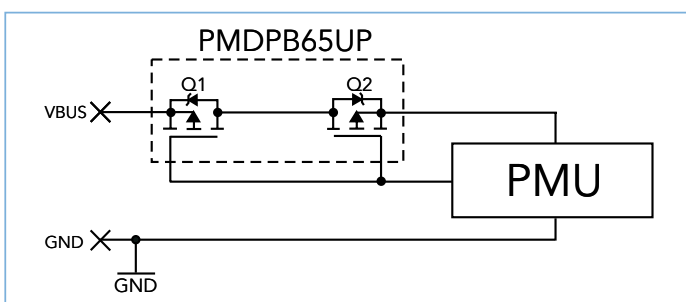
**In the Spotlight**

**Dual P-channel ESD protected MOSFET in small 0.65 mm flat, 2 x 2 mm leadless package (PMDPB65UP)**

- ESD protected MOSFET of >1 kV HBM
- Very low R<sub>DSon</sub> of <70 mΩ at V<sub>GS</sub> = 4.5 V
- 1.8 V R<sub>DSon</sub> rating for operation at low voltage gate drive levels
- Best-in-class thermal performance due to extra heatsink
- Smallest 2 x 2 mm leadless package dual P-channel; 0.65 mm package height



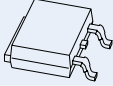
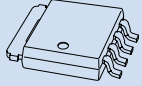

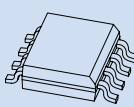
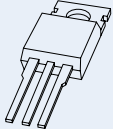
### USB OTG Vbus protection





## 30V N-channel MOSFETs

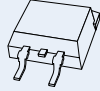
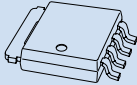

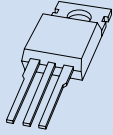
types in **bold** represent new products

| Package               | Typenumber                                                                          | $V_{DS}$ [max] (V)   | $R_{Dson}$ [max] @<br>$V_{GS} = 10\text{ V}$ (m $\Omega$ ) | $R_{Dson}$ [max] @<br>$V_{GS} = 4.5\text{ V}$ (m $\Omega$ ) | $I_D$ [max] (A) | $Q_{g(tot)}$ [typ] (nC) |      |
|-----------------------|-------------------------------------------------------------------------------------|----------------------|------------------------------------------------------------|-------------------------------------------------------------|-----------------|-------------------------|------|
| DPAK<br>(SOT428)      |    | PHD71NQ03LT          | 30                                                         | 10                                                          | -               | 75                      | 13.2 |
|                       |                                                                                     | PHD36N03LT           | 30                                                         | 17                                                          | 22              | 43.4                    | 18.5 |
| Power-SO8<br>(LFAK)   |    | <b>PSMN1R0-30YLC</b> | 30                                                         | 1.15                                                        | 1.4             | 100                     | 50   |
|                       |                                                                                     | <b>PSMN1R3-30YL</b>  | 30                                                         | 1.3                                                         | 1.95            | 100                     | 46.6 |
|                       |                                                                                     | <b>PSMN1R5-30YL</b>  | 30                                                         | 1.5                                                         | 1.9             | 100                     | 36.2 |
|                       |                                                                                     | <b>PSMN1R7-30YL</b>  | 30                                                         | 1.7                                                         | 2.1             | 100                     | 36.2 |
|                       |                                                                                     | <b>PSMN2R0-30YL</b>  | 30                                                         | 2                                                           | 2.63            | 100                     | 30   |
|                       |                                                                                     | <b>PSMN2R5-30YL</b>  | 30                                                         | 2.4                                                         | 3.16            | 100                     | 27   |
|                       |                                                                                     | <b>PSMN3R0-30YL</b>  | 30                                                         | 3                                                           | 4.04            | 100                     | 21   |
|                       |                                                                                     | <b>PSMN3R5-30YL</b>  | 30                                                         | 3.5                                                         | 4.61            | 100                     | 19   |
|                       |                                                                                     | <b>PSMN4R0-30YL</b>  | 30                                                         | 4                                                           | 5.25            | 100                     | 17.6 |
|                       |                                                                                     | <b>PSMN4R5-30YLC</b> | 30                                                         | 4.8                                                         | 6.1             | 84                      | 9.6  |
|                       |                                                                                     | <b>PSMN5R0-30YL</b>  | 30                                                         | 5                                                           | 6.7             | 91                      | 14.1 |
|                       |                                                                                     | <b>PSMN6R0-30YL</b>  | 30                                                         | 6                                                           | 7.87            | 79                      | 11   |
|                       |                                                                                     | <b>PSMN7R0-30YL</b>  | 30                                                         | 7                                                           | 9.1             | 76                      | 10   |
|                       |                                                                                     | <b>PSMN9R0-30YL</b>  | 30                                                         | 8                                                           | 11.03           | 61                      | 8.7  |
| QFN3333<br>(SOT873-1) |  | <b>PSMN3R5-30LL</b>  | 30                                                         | 3.6                                                         | 5.6             | 40                      | 18   |
|                       |                                                                                     | <b>PSMN3R8-30LL</b>  | 30                                                         | 3.7                                                         | 5.8             | 40                      | 38   |
|                       |                                                                                     | <b>PSMN5R8-30LL</b>  | 30                                                         | 5.8                                                         | 8               | 40                      | 24   |
|                       |                                                                                     | <b>PSMN9R0-30LL</b>  | 30                                                         | 9                                                           | 13              | 21                      | 20.6 |
|                       |                                                                                     | <b>PSMN013-30LL</b>  | 30                                                         | 13                                                          | 19              | 21                      | 12.2 |
|                       |                                                                                     | <b>PSMN017-30LL</b>  | 30                                                         | 17                                                          | 25              | 15                      | 10   |
| SO8<br>(SOT96-1)      |  | PHK12NQ03LT          | 30                                                         | -                                                           | 14              | 11.8                    | -    |
|                       |                                                                                     | <b>PSMN3R2-30KL</b>  | 30                                                         | 3.5                                                         | 3.8             | 30                      | 70.3 |
|                       |                                                                                     | PHK31NQ03LT          | 30                                                         | 4.4                                                         | -               | 30.4                    | -    |
|                       |                                                                                     | <b>PSMN005-30K</b>   | 30                                                         | 5.5                                                         | 8               | -                       | 34   |
|                       |                                                                                     | PHK28NQ03LT          | 30                                                         | 6.5                                                         | 7.7             | 23.7                    | 30.3 |
|                       |                                                                                     | PHK18NQ03LT          | 30                                                         | 8.9                                                         | -               | 20.3                    | -    |
|                       |                                                                                     | SI4410DY             | 30                                                         | 13.5                                                        | 20              | 10                      | 21.5 |
|                       |                                                                                     | PHK13N03LT           | 30                                                         | 20                                                          | 26              | 13.8                    | 10.7 |
|                       |                                                                                     | PHKD13N03LT          | 30                                                         | 20                                                          | 26              | 10.4                    | 10.7 |
|                       |                                                                                     | PHN203               | 30                                                         | 30                                                          | 55              | 6.3                     | 14.6 |
|                       |                                                                                     | PHN210T              | 30                                                         | 100                                                         | 200             | 3.4                     | -    |
| TO-220AB<br>(SOT78)   |  | <b>PSMN1R6-30PL</b>  | 30                                                         | 1.7                                                         | 2.1             | 100                     | 101  |
|                       |                                                                                     | <b>PSMN1R8-30PL</b>  | 30                                                         | 1.8                                                         | 2.3             | 100                     | 83   |
|                       |                                                                                     | <b>PSMN2R0-30PL</b>  | 30                                                         | 2.1                                                         | 2.8             | 100                     | 55   |
|                       |                                                                                     | <b>PSMN2R7-30PL</b>  | 30                                                         | 2.7                                                         | 3.6             | 100                     | 32   |
|                       |                                                                                     | <b>PSMN3R4-30PL</b>  | 30                                                         | 3.4                                                         | 4.1             | 100                     | 31   |
|                       |                                                                                     | <b>PSMN4R3-30PL</b>  | 30                                                         | 4.3                                                         | 6.2             | 100                     | 19   |
|                       |                                                                                     | PHP36N03LT           | 30                                                         | 17                                                          | 22              | 43.4                    | 18.5 |
|                       |                                                                                     | <b>PSMN022-30PL</b>  | 30                                                         | 22                                                          | 34              | 30                      | 4.4  |

For the most up to date product information, please visit <http://standardproducts.nxp.com/mosfets>

## 60V - 80V N-channel MOSFETs

types in **bold** represent new products

| Package                        | Typenumber                                                                          | $V_{DS}$ [max] (V)  | $R_{DS(on)}$ [max] @ $V_{GS} = 10$ V (m $\Omega$ ) | $I_D$ [max] (A) | $Q_{g(tot)}$ [typ] (nC) |       |
|--------------------------------|-------------------------------------------------------------------------------------|---------------------|----------------------------------------------------|-----------------|-------------------------|-------|
| D <sup>2</sup> PAK<br>(SOT404) |    | PSMN004-60B         | 60                                                 | 3.6             | 75                      | 168   |
|                                |                                                                                     | PHB32N06LT          | 60                                                 | 37              | 34                      | 17    |
|                                |                                                                                     | PHB29N08T           | 75                                                 | -               | 27                      | 19    |
|                                |                                                                                     | PSMN005-75B         | 75                                                 | 5               | 75                      | 165   |
|                                |                                                                                     | PSMN008-75B         | 75                                                 | 8.5             | 75                      | 122.8 |
|                                |                                                                                     | PHB110NQ08T         | 75                                                 | 9               | 75                      | 113.1 |
| Power-SO8<br>(LFPAK)           |    | <b>PSMN5R5-60YS</b> | 60                                                 | 5.2             | 100                     | 56    |
|                                |                                                                                     | <b>PSMN7R0-60YS</b> | 60                                                 | 6.4             | 89                      | 45    |
|                                |                                                                                     | <b>PSMN8R5-60YS</b> | 60                                                 | 8               | 76                      | 39    |
|                                |                                                                                     | <b>PSMN012-60YS</b> | 60                                                 | 11.1            | 59                      | 28.4  |
|                                |                                                                                     | <b>PSMN017-60YS</b> | 60                                                 | 15.7            | 44                      | 20    |
|                                |                                                                                     | <b>PSMN030-60YS</b> | 60                                                 | 24.7            | 29                      | 13    |
|                                |                                                                                     | <b>PSMN8R2-80YS</b> | 80                                                 | 8.5             | 82                      | 55    |
|                                |                                                                                     | <b>PSMN011-80YS</b> | 80                                                 | 11              | 67                      | 45    |
|                                |                                                                                     | <b>PSMN013-80YS</b> | 80                                                 | 12.9            | 60                      | 37    |
|                                |                                                                                     | <b>PSMN018-80YS</b> | 80                                                 | 18              | 45                      | 26    |
|                                |                                                                                     | <b>PSMN026-80YS</b> | 80                                                 | 27.5            | 34                      | 20    |
| QFN3333<br>(SOT873-1)          |  | <b>PSMN014-60LS</b> | 60                                                 | 14              | 40                      | 19.6  |
|                                |                                                                                     | <b>PSMN023-80LS</b> | 80                                                 | 23              | 34                      | 21    |
| TO-220AB<br>(SOT78)            |  | <b>PSMN3R0-60PS</b> | 60                                                 | 3               | 100                     | 130   |
|                                |                                                                                     | <b>PSMN4R6-60PS</b> | 60                                                 | 4.6             | 100                     | 70.8  |
|                                |                                                                                     | <b>PSMN7R6-60PS</b> | 60                                                 | 7.8             | 92                      | 38.7  |
|                                |                                                                                     | <b>PSMN015-60PS</b> | 60                                                 | 14.8            | 50                      | 20.9  |
|                                |                                                                                     | PHP29N08T           | 75                                                 | -               | 27                      | 19    |
|                                |                                                                                     | PSMN008-75P         | 75                                                 | 8.5             | 75                      | 122.8 |
|                                |                                                                                     | PHP79NQ08LT         | 75                                                 | 16              | 73                      | 30    |
|                                |                                                                                     | <b>PSMN4R4-80PS</b> | 80                                                 | 4.1             | 100                     | 112   |
|                                |                                                                                     | <b>PSMN5R0-80PS</b> | 80                                                 | 4.7             | 100                     | 87    |
|                                |                                                                                     | <b>PSMN6R5-80PS</b> | 80                                                 | 6.9             | 100                     | 71    |
|                                |                                                                                     | <b>PSMN8R7-80PS</b> | 80                                                 | 8.7             | 90                      | 52    |
|                                |                                                                                     | <b>PSMN012-80PS</b> | 80                                                 | 11              | 74                      | 36    |
|                                |                                                                                     | <b>PSMN017-80PS</b> | 80                                                 | 17              | 50                      | 26    |
|                                |                                                                                     | <b>PSMN050-80PS</b> | 80                                                 | 46              | 22                      | 9     |

For the most up to date product information, please visit <http://standardproducts.nxp.com/mosfets>

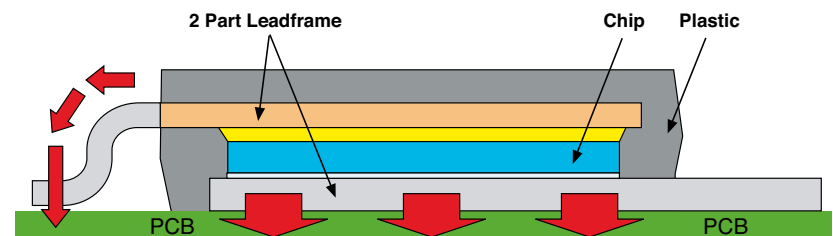
## 150V - 300V N-channel MOSFETs

| Package                     | Typenumber   | $V_{DS}$ [max] (V) | $R_{DS(on)}$ [max] @ $V_{GS} = 10$ V (m $\Omega$ ) | $I_D$ [max] (A) | $Q_{g(total)}$ [typ] (nC) |
|-----------------------------|--------------|--------------------|----------------------------------------------------|-----------------|---------------------------|
| D <sup>2</sup> PAK (SOT404) | PSMN030-150B | 150                | 30                                                 | 55.5            | -                         |
|                             | PSMN035-150B | 150                | 35                                                 | 50              | 79                        |
|                             | PHB45NQ15T   | 150                | 42                                                 | 45.1            | 32                        |
|                             | PSMN057-200B | 200                | 57                                                 | 39              | -                         |
|                             | PSMN070-200B | 200                | 70                                                 | 35              | -                         |
|                             | PHB33NQ20T   | 200                | 77                                                 | 32.7            | 32.2                      |
|                             | PHB20NQ20T   | 200                | 130                                                | 20              | -                         |
| DPAK (SOT428)               | PSMN063-150D | 150                | 63                                                 | 29              | 55                        |
|                             | PSMN130-200D | 200                | 130                                                | 20              | -                         |
|                             | PHD9NQ20T    | 200                | 400                                                | 8.7             | -                         |
| Power-SO8 (LFAK)            | PSMN059-150Y | 150                | 59                                                 | 43              | -                         |
|                             | PSMN102-200Y | 200                | 102                                                | 21.5            | -                         |
| QFN3333 (SOT873-1)          | PML260SN     | 200                | 294                                                | 8.8             | 13.3                      |
|                             | PML340SN     | 220                | 386                                                | 7.3             | 13.2                      |
| SO8 (SOT96-1)               | PHK5NQ15T    | 150                | 75                                                 | 5               | 29                        |
|                             | PSMN085-150K | 150                | 85                                                 | -               | 40                        |
|                             | PSMN165-200K | 200                | 165                                                | -               | 40                        |
| TO-220AB (SOT78)            | PSMN030-150P | 150                | 30                                                 | 55.5            | -                         |
|                             | PSMN035-150P | 150                | 35                                                 | 50              | 79                        |
|                             | PHP30NQ15T   | 150                | 63                                                 | 29              | 55                        |
|                             | PHP28NQ15T   | 150                | 65                                                 | 28.5            | 24                        |
|                             | PSMN057-200P | 200                | 57                                                 | 39              | -                         |
|                             | PSMN070-200P | 200                | 70                                                 | 35              | -                         |
|                             | PHP33NQ20T   | 200                | 77                                                 | 32.7            | 32.2                      |
|                             | PHP20NQ20T   | 200                | 130                                                | 20              | -                         |
|                             | PHP9NQ20T    | 200                | 400                                                | 8.7             | -                         |

For the most up to date product information, please visit <http://standardproducts.nxp.com/mosfets>

### Power-SO8 (LFAK) Design

- ▶ Low Thermal resistance
- ▶ Low Electrical resistance
- ▶ Low Inductance













# 4-Quadrant Triacs

## 4-Quadrant Triacs

types in **bold** represent new products








| $I_{T(RMS)}$ (A) | $V_{DRM}$ (V) | $I_{GT}$ (max) (mA) | SOT54 (TO92)                                                                      | SOT78 (TO220AB)                                                                   | SOT78D (internally insulated TO220AB)                                             | SOT82                                                                             | SOT186A (isolated TO220AB)                                                         | SOT223                                                                              | SOT404 (D <sup>2</sup> PAK)                                                         | SOT428 (DPAK)                                                                       |
|------------------|---------------|---------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|                  |               |                     |  |  |  |  |  |  |  |  |
| 0.6              | 400           | 5/5/5/7             | MAC97A6                                                                           |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |
|                  | 600           | 5/5/5/7             | MAC97A8                                                                           |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |
|                  | 400 / 600     | 5/5/5/7             | BT1306-D                                                                          |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |
| 0.8              | 400 / 600     | 5/5/5/7             | BT1308-D                                                                          |                                                                                   |                                                                                   |                                                                                   |                                                                                    | BT1308W-D                                                                           |                                                                                     |                                                                                     |
|                  | 600           | 5/5/5/7             | Z00607MA                                                                          |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |
| 1                | 600           | 3/3/3/7             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    | BT131W                                                                              |                                                                                     |                                                                                     |
|                  | 600 / 800     | 3/3/3/7             | BT131                                                                             |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |
|                  | 600 / 800     | 5/5/5/7             | BT131-D                                                                           |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |
|                  | 600 / 800     | 10/10/10/10         | BT131-E                                                                           |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |
|                  | 600 / 800     | 3/3/3/5             | Z0103MA/NA                                                                        |                                                                                   |                                                                                   |                                                                                   |                                                                                    | Z0103MN/NN                                                                          |                                                                                     |                                                                                     |
|                  | 600 / 800     | 5/5/5/7             | Z0107MA/NA                                                                        |                                                                                   |                                                                                   |                                                                                   |                                                                                    | Z0107MN/NN                                                                          |                                                                                     |                                                                                     |
|                  | 600 / 800     | 10/10/10/10         | Z0109MA/NA                                                                        |                                                                                   |                                                                                   |                                                                                   |                                                                                    | Z0109MN/NN                                                                          |                                                                                     |                                                                                     |
|                  | 600 / 800     | 3/3/3/5             | <b>Z0103MA0/NA0**</b>                                                             |                                                                                   |                                                                                   |                                                                                   |                                                                                    | <b>Z0103MN0/NN0**</b>                                                               |                                                                                     |                                                                                     |
|                  | 600 / 800     | 5/5/5/7             | <b>Z0107MA0/NA0**</b>                                                             |                                                                                   |                                                                                   |                                                                                   |                                                                                    | <b>Z0107MN0/NN0**</b>                                                               |                                                                                     |                                                                                     |
|                  | 600 / 800     | 10/10/10/10         | <b>Z0109MA0/NA0**</b>                                                             |                                                                                   |                                                                                   |                                                                                   |                                                                                    | <b>Z0109MN0/NN0**</b>                                                               |                                                                                     |                                                                                     |
| 600              | 5/5/5/10      | BT132-D*            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |
| 4                | 600           | D/E/-/G             |                                                                                   |                                                                                   |                                                                                   | BT134                                                                             |                                                                                    |                                                                                     |                                                                                     |                                                                                     |
|                  | 800           | E/-                 |                                                                                   |                                                                                   |                                                                                   | BT134                                                                             |                                                                                    |                                                                                     |                                                                                     |                                                                                     |
|                  | 600           | D/-                 |                                                                                   | BT136                                                                             |                                                                                   |                                                                                   | BT136X                                                                             |                                                                                     |                                                                                     | BT136S                                                                              |
|                  | 600           | F                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   | BT136X                                                                             |                                                                                     |                                                                                     | BT136S                                                                              |
|                  | 600 / 800     | E                   |                                                                                   | BT136                                                                             |                                                                                   |                                                                                   | BT136X                                                                             |                                                                                     | BT136B                                                                              | BT136S                                                                              |
|                  | 800           | F                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     | BT136S                                                                              |
|                  | 800           | -                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   | BT136X                                                                             |                                                                                     |                                                                                     | BT136S                                                                              |
| 6                | 600           | F/-/G               |                                                                                   |                                                                                   |                                                                                   |                                                                                   | BT236X                                                                             |                                                                                     |                                                                                     |                                                                                     |
|                  | 800           | -/G                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   | BT236X                                                                             |                                                                                     |                                                                                     |                                                                                     |
| 8                | 600           | D/-/G               |                                                                                   | BT137                                                                             |                                                                                   |                                                                                   | BT137X                                                                             |                                                                                     |                                                                                     | BT137S                                                                              |
|                  | 600           | E                   |                                                                                   | BT137                                                                             |                                                                                   |                                                                                   | BT137X                                                                             |                                                                                     | BT137B                                                                              | BT137S                                                                              |
|                  | 600           | F                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   | BT137X                                                                             |                                                                                     | BT137B                                                                              | BT137S                                                                              |
|                  | 800           | E                   |                                                                                   | BT137                                                                             |                                                                                   |                                                                                   | BT137X                                                                             |                                                                                     |                                                                                     | BT137S                                                                              |
|                  | 800           | F                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     | BT137B                                                                              | BT137S                                                                              |
|                  | 800           | -                   |                                                                                   | BT137                                                                             |                                                                                   |                                                                                   | BT137X                                                                             |                                                                                     | BT137B                                                                              |                                                                                     |
|                  | 800           | G                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     | BT137B                                                                              | BT137S                                                                              |
| 12               | 600           | D                   |                                                                                   | BT138                                                                             |                                                                                   |                                                                                   | BT138X                                                                             |                                                                                     |                                                                                     |                                                                                     |
|                  | 600           | -/G                 |                                                                                   | BT138                                                                             |                                                                                   |                                                                                   | BT138X                                                                             |                                                                                     | BT138B                                                                              |                                                                                     |
|                  | 600           | F                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   | BT138X                                                                             |                                                                                     | BT138B                                                                              |                                                                                     |
|                  | 600 / 800     | E                   |                                                                                   | BT138                                                                             | BT138Y                                                                            |                                                                                   | BT138X                                                                             |                                                                                     | BT138B                                                                              |                                                                                     |
|                  | 800           | F                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   | BT138X                                                                             |                                                                                     |                                                                                     |                                                                                     |
|                  | 800           | -                   |                                                                                   | BT138                                                                             |                                                                                   |                                                                                   | BT138X                                                                             |                                                                                     |                                                                                     |                                                                                     |
|                  | 800           | G                   |                                                                                   | BT138                                                                             |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |

\* Large chip / high  $I_{TSM}$

\*\* Enhanced immunity to false triggering

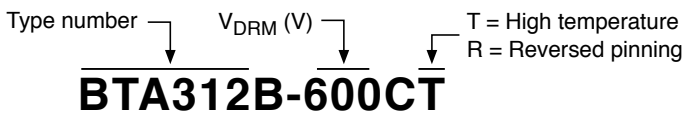
## 3-Quadrant Triacs

types in **bold** represent new products

| $I_{T(RMS)}$<br>(A) | $V_{DRM}$<br>(V) | $I_{GT}$ (max)<br>(mA) | SOT54<br>(TO92)                                                                   | SOT78<br>(TO220AB)                                                                | SOT78D<br>(internally<br>insulated<br>TO220AB)                                    | SOT186A<br>(isolated<br>TO220AB)                                                  | SOT223                                                                              | SOT404<br>(D <sup>2</sup> PAK)                                                      | SOT428<br>(DPAK)                                                                    |
|---------------------|------------------|------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|                     |                  |                        |  |  |  |  |  |  |  |
| 0.8                 | 600 / 800        | D/E                    | BTA2008                                                                           |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| 1                   | 600 / 800        | B/E/ER                 | BTA201                                                                            |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |
|                     | 600 / 800        | E                      |                                                                                   |                                                                                   |                                                                                   |                                                                                   | BTA201W                                                                             |                                                                                     |                                                                                     |
| 2                   | 600 / 800        | D/E                    |                                                                                   |                                                                                   |                                                                                   | BTA202X                                                                           |                                                                                     |                                                                                     |                                                                                     |
| 4                   | 600              | B/C/D/E/F              |                                                                                   | BTA204                                                                            |                                                                                   | BTA204X                                                                           |                                                                                     |                                                                                     | BTA204S                                                                             |
|                     | 800              | B/C/E                  |                                                                                   | BTA204                                                                            |                                                                                   | BTA204X                                                                           |                                                                                     |                                                                                     | BTA204S                                                                             |
|                     | 1000             | C                      |                                                                                   |                                                                                   |                                                                                   | <b>BTA204X</b>                                                                    |                                                                                     |                                                                                     | <b>BTA204S</b>                                                                      |
| 8                   | 600              | B/D/E/F                |                                                                                   | BTA208                                                                            |                                                                                   | BTA208X                                                                           |                                                                                     |                                                                                     | BTA208S                                                                             |
|                     | 800              | B/E                    |                                                                                   | BTA208                                                                            |                                                                                   | BTA208X                                                                           |                                                                                     |                                                                                     | BTA208S                                                                             |
|                     | 800              | F                      |                                                                                   | <b>BTA208</b>                                                                     |                                                                                   | BTA208X                                                                           |                                                                                     |                                                                                     | <b>BTA208S</b>                                                                      |
|                     | 1000             | B                      |                                                                                   |                                                                                   |                                                                                   | BTA208X                                                                           |                                                                                     |                                                                                     |                                                                                     |
|                     | 1000             | C                      |                                                                                   |                                                                                   |                                                                                   | BTA208X                                                                           |                                                                                     | BTA208B                                                                             |                                                                                     |
|                     | 1000             | 5 min - 35 max         |                                                                                   |                                                                                   |                                                                                   | BTA208X-1000C0                                                                    |                                                                                     |                                                                                     |                                                                                     |
| 12                  | 600              | D                      |                                                                                   | BTA312                                                                            |                                                                                   | BTA312X                                                                           |                                                                                     | BTA312B                                                                             |                                                                                     |
|                     | 600              | CT                     |                                                                                   | BTA312                                                                            |                                                                                   |                                                                                   |                                                                                     | BTA312B                                                                             |                                                                                     |
|                     | 600 / 800        | B/C/E                  |                                                                                   | BTA312                                                                            |                                                                                   | BTA312X                                                                           |                                                                                     | BTA312B                                                                             |                                                                                     |
|                     | 600 / 800        | C                      |                                                                                   |                                                                                   | BTA312Y                                                                           |                                                                                   |                                                                                     |                                                                                     |                                                                                     |
|                     | 800              | ET                     |                                                                                   | BTA312                                                                            |                                                                                   |                                                                                   |                                                                                     | BTA312B                                                                             |                                                                                     |
|                     | 600 / 800        | B/C                    |                                                                                   |                                                                                   |                                                                                   | BTA412Y                                                                           |                                                                                     |                                                                                     |                                                                                     |
| 16                  | 600              | BT/D                   |                                                                                   | BTA316                                                                            |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |
|                     | 600 / 800        | B/C/E                  |                                                                                   | BTA316                                                                            |                                                                                   | BTA316X                                                                           |                                                                                     | BTA316B                                                                             |                                                                                     |
|                     | 600 / 800        | ET                     |                                                                                   | <b>BTA316</b>                                                                     |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |
|                     | 800              | 10 min - 50 max        |                                                                                   |                                                                                   |                                                                                   | <b>BTA316X-800B0</b>                                                              |                                                                                     |                                                                                     |                                                                                     |
|                     | 600 / 800        | B/C                    |                                                                                   |                                                                                   | BTA416Y                                                                           |                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| 25                  | 600              | BT                     |                                                                                   | BTA225                                                                            |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |
|                     | 600 / 800        | B                      |                                                                                   | BTA225                                                                            |                                                                                   |                                                                                   |                                                                                     | BTA225B                                                                             |                                                                                     |

\* Large chip / high  $I_{TSM}$   
T: high  $T_{max}$  150 °C

### 3-Quadrant Triacs part numbering



- Package identifier**
- = TO220AB (SOT78)
  - B** = D<sup>2</sup>PAK (SOT404)
  - S** = DPAK (SOT428)
  - W** = SOT223
  - X** = SOT186A (isolated TO220AB)
  - Y** = SOT78D (internally insulated TO220)
  - BTA2008, BTA201 use TO92 (SOT54) package
- Gate sensitivity  $I_{GTmax}$**
- D** = 5, 5, 5 mA
  - E** = 10, 10, 10 mA
  - F** = 25, 25, 25 mA
  - C** = 35, 35, 35 mA
  - C0** =  $I_{GT}$  5-35 mA
  - B** = 50, 50, 50 mA
- MSD849





## Adjustable shunt voltage regulator TL431

types in **bold** represent new products

| Package               |                     |                               |                                | SOT23                         |                                |  |
|-----------------------|---------------------|-------------------------------|--------------------------------|-------------------------------|--------------------------------|--|
| Size (mm)             |                     |                               |                                | 2.9 x 1.3 x 1.0               |                                |  |
| P <sub>tot</sub> (mW) |                     |                               |                                | 580                           |                                |  |
| Pinning configuration |                     |                               |                                | Normal pinning*               | Mirrored pinning*              |  |
| V <sub>KA</sub> (V)   | I <sub>K</sub> (mA) | V <sub>ref</sub>              | T <sub>amb</sub> (°C)          |                               |                                |  |
| 36                    | 100                 | 2.495                         | 2%                             | 0 to 70                       | TL431CDBZR <sup>1)</sup>       |  |
|                       |                     |                               |                                | -40 to 85                     | TL431IDBZR <sup>1)</sup>       |  |
|                       |                     |                               |                                | -40 to 125                    | TL431QDBZR <sup>1)</sup>       |  |
|                       |                     |                               | -40 to 125                     | <b>TL431FDT<sup>2)</sup></b>  | <b>TL431MFDT<sup>2)</sup></b>  |  |
|                       |                     |                               | -40 to 125                     | TL431SDT <sup>3)</sup>        | TL431MSDT <sup>3)</sup>        |  |
|                       |                     |                               | -40 to 125                     | TL431ASDT <sup>3)</sup>       | TL431MSDT <sup>3)</sup>        |  |
|                       |                     | 1%                            | 0 to 70                        | TL431ACDBZR <sup>1)</sup>     |                                |  |
|                       |                     |                               | -40 to 85                      | TL431AIDBZR <sup>1)</sup>     |                                |  |
|                       |                     |                               | -40 to 125                     | TL431AQDBZR <sup>1)</sup>     |                                |  |
|                       |                     |                               | -40 to 125                     | <b>TL431AFDT<sup>2)</sup></b> | <b>TL431AMFDT<sup>2)</sup></b> |  |
|                       |                     |                               | -40 to 125                     | TL431ASDT <sup>3)</sup>       | TL431MSDT <sup>3)</sup>        |  |
|                       |                     |                               | -40 to 125                     | TL431ASDT <sup>3)</sup>       | TL431MSDT <sup>3)</sup>        |  |
| 0.5%                  | 0 to 70             | TL431BCDBZR <sup>1)</sup>     |                                |                               |                                |  |
|                       | -40 to 85           | TL431BIDBZR <sup>1)</sup>     |                                |                               |                                |  |
|                       | -40 to 125          | TL431BQDBZR <sup>1)</sup>     |                                |                               |                                |  |
|                       | -40 to 125          | <b>TL431BFDT<sup>2)</sup></b> | <b>TL431BMFDT<sup>2)</sup></b> |                               |                                |  |
|                       | -40 to 125          | TL431BSDT <sup>3)</sup>       | TL431MSDT <sup>3)</sup>        |                               |                                |  |
|                       | -40 to 125          | TL431BSDT <sup>3)</sup>       | TL431MSDT <sup>3)</sup>        |                               |                                |  |

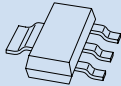
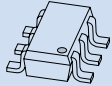


<sup>1)</sup> Offers enhanced stability area and very low load capacity requirement<sup>2)</sup> Offers higher ElectroMagnetic Interference (EMI) ruggedness, e.g. for Switch Mode Power Supply<sup>3)</sup> Is designed for standard requirements and linear applications

## \* Normal pinning vs. mirrored pinning for TL431

|                  | Pin | Symbol | Description | Simplified outline                                                                   | Grafic symbol   |
|------------------|-----|--------|-------------|--------------------------------------------------------------------------------------|-----------------|
| Normal pinning   | 1   | k      | cathode     |  | REF<br>a — >— k |
|                  | 2   | REF    | reference   |                                                                                      |                 |
|                  | 3   | a      | anode       |                                                                                      |                 |
| Mirrored pinning | 1   | REF    | reference   |  | REF<br>a — >— k |
|                  | 2   | k      | cathode     |                                                                                      |                 |
|                  | 3   | a      | anode       |                                                                                      |                 |



## Discrete voltage regulator

|                       |                                                                        |                      |                    |                                                  | SOT223 (SC-73)                                                                     | SOT457 (SC-74)                                                                      |
|-----------------------|------------------------------------------------------------------------|----------------------|--------------------|--------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Package               |                                                                        |                      |                    |                                                  |  |  |
| Size (mm)             |                                                                        |                      |                    |                                                  | 6.5 x 3.5 x 1.65                                                                   | 2.9 x 1.5 x 1.0                                                                     |
| P <sub>tot</sub> (mW) |                                                                        |                      |                    |                                                  | 1300                                                                               | 380                                                                                 |
| Zener diode           |                                                                        | Transistor           |                    |                                                  |  |  |
| V <sub>out</sub> (V)  | V <sub>Z</sub> min - V <sub>Z</sub> max (V)<br>@ I <sub>Z</sub> = 5 mA | V <sub>CEO</sub> (V) | I <sub>C</sub> (A) | h <sub>FE</sub> min<br>@ I <sub>C</sub> = 100 mA |                                                                                    |                                                                                     |
| 2.5                   | 3.23 - 3.37                                                            | 45                   | 0.1                | 160                                              | PVR100AZ-B2V5                                                                      | PVR100AD-B2V5                                                                       |
| 3.0                   | 3.53 - 3.67                                                            | 45                   | 0.1                | 160                                              | PVR100AZ-B3V0                                                                      | PVR100AD-B3V0                                                                       |
| 3.3                   | 3.82 - 3.98                                                            | 45                   | 0.1                | 160                                              | PVR100AZ-B3V3                                                                      | PVR100AD-B3V3                                                                       |
| 5.0                   | 5.49 - 5.71                                                            | 45                   | 0.1                | 160                                              | PVR100AZ-B5V0                                                                      | PVR100AD-B5V0                                                                       |
| 12.3                  | 12.7 - 13.3                                                            | 45                   | 0.1                | 160                                              | PVR100AZ-B12V                                                                      | PVR100AD-B12V                                                                       |

### Key features

- ▶ A bipolar transistor and an integrated Zener diode, internally connected to build a voltage regulator
- ▶ Output voltage options V<sub>out</sub>: 2.5 V, 3 V, 3.3 V, 5 V and 12 V

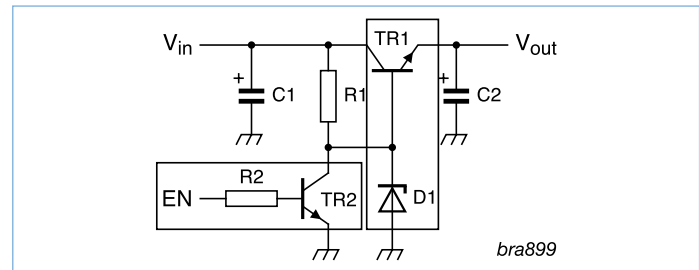
### Key benefits

- ▶ Component count reduction
- ▶ Board space reduction
- ▶ Improved reliability


### Key applications

- ▶ Linear voltage regulation

Discrete voltage regulator. PVR-series already include TR1 and D1, internally connected to build a voltage regulator. A resistor-equipped transistor (RET) adds an output enable function.



## Constant current source

| SOT353 (SC-88A)       |                                                                                     |                                                                                         |                                                                                        |                                   |                                   |                                                            |                                                                                            |
|-----------------------|-------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|-----------------------------------|-----------------------------------|------------------------------------------------------------|--------------------------------------------------------------------------------------------|
| Package               |  |                                                                                         |                                                                                        |                                   |                                   |                                                            |                                                                                            |
| Size (mm)             | 2.0 x 1.25 x 0.95                                                                   |                                                                                         |                                                                                        |                                   |                                   |                                                            |                                                                                            |
| P <sub>tot</sub> (mW) | 335                                                                                 |                                                                                         |                                                                                        |                                   |                                   |                                                            |                                                                                            |
| Type                  | PSSI2021SAY                                                                         |                                                                                         |                                                                                        |                                   |                                   |                                                            |                                                                                            |
| Description           | maximum supply voltage                                                              | maximum supply current                                                                  | typical stabilized output current                                                      | minimum stabilized output current | maximum stabilized output current | typical load stability of stabilized output current        | typical output current change over ambient temperature                                     |
| Parameter             | V <sub>S</sub> max (V)                                                              | I <sub>S</sub> max (mA)                                                                 | I <sub>out</sub> typ (µA)                                                              | I <sub>out</sub> min (mA)         | I <sub>out</sub> max (mA)         | ΔI <sub>out</sub> /I <sub>out</sub> typ (%)                | ΔI <sub>out</sub> /I <sub>out</sub> (ΔT <sub>amb</sub> ) <sup>typ</sup> (%/K)              |
| Condition             |                                                                                     | @ V <sub>S</sub> = 12 V;<br>I <sub>out</sub> = 15 µA;<br>V <sub>out</sub> = 1 V to 10 V | @ V <sub>S</sub> = 12 V;<br>V <sub>out</sub> = 1 V to 10 V;<br>R <sub>ext</sub> = open |                                   |                                   | @ V <sub>S</sub> = 12 V;<br>V <sub>out</sub> = 1 V to 10 V | @ V <sub>S</sub> = 12 V;<br>V <sub>out</sub> = 1 V;<br>T <sub>amb</sub> = -55 °C to 150 °C |
| Value                 | 75                                                                                  | 2.2                                                                                     | 15                                                                                     | 0.015                             | 50                                | 0.5                                                        | 0.15                                                                                       |

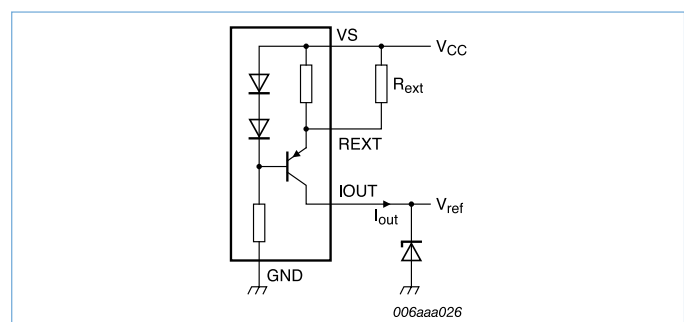
### Key features and benefits

- ▶ Single-chip constant current source with reduced component count
- ▶ Output current set by an external resistor
- ▶ Very small footprint package for smaller designs

### Key applications


- ▶ Constant current LED driver
- ▶ Generic constant current source
- ▶ Active bias control for audio amplifiers

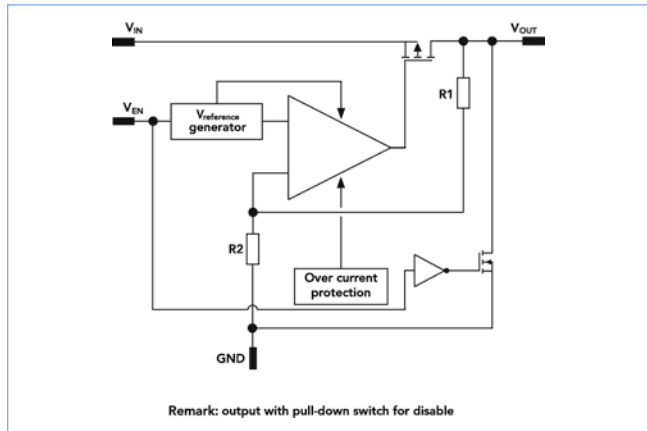
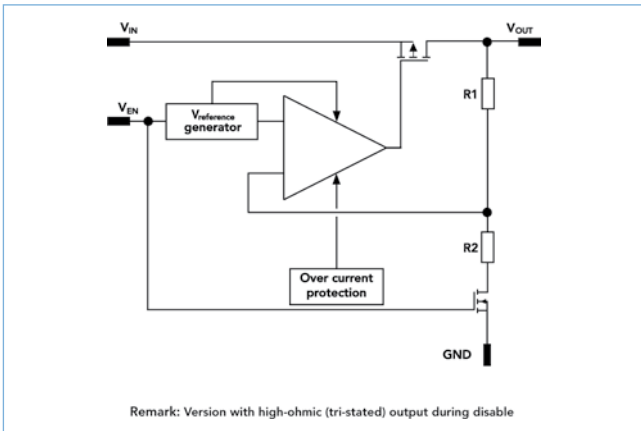
### Voltage reference



# LD6805 Ultra low-dropout voltage regulators – 150 mA

types in **bold** represent new products

| Package               |                           |                        |                                     |                          |                 |                    | SOT1194                                                                             |                                    |
|-----------------------|---------------------------|------------------------|-------------------------------------|--------------------------|-----------------|--------------------|-------------------------------------------------------------------------------------|------------------------------------|
|                       |                           |                        |                                     |                          |                 |                    |  |                                    |
| Size (mm)             |                           |                        |                                     |                          |                 |                    | 1.0 x 1.0 x 0.55                                                                    |                                    |
| P <sub>tot</sub> @ °C |                           |                        |                                     |                          |                 |                    | 400                                                                                 |                                    |
| V <sub>in</sub> (V)   | I <sub>out</sub> typ (mA) | Quiescent current (µA) | V <sub>out</sub> drop @ 150 mA (mV) | output noise µVrms (typ) | PSRR @ 1 kHz dB | Output voltage (V) | V <sub>OUT,nom</sub>                                                                |                                    |
|                       |                           |                        |                                     |                          |                 |                    | LD6805K/vvH High ohmic output stage                                                 | LD6805K/vvP Pull down output stage |
| 2.3 - 5.5             | 150                       | 35                     | 250                                 | 50                       | 75              | 1.2                | <b>LD6805K/12H</b>                                                                  | <b>LD6805K/12P</b>                 |
|                       |                           |                        |                                     |                          |                 | 1.4                | <b>LD6805K/14H</b>                                                                  | <b>LD6805K/14P</b>                 |
|                       |                           |                        |                                     |                          |                 | 1.6                | <b>LD6805K/16H</b>                                                                  | <b>LD6805K/16P</b>                 |
|                       |                           |                        |                                     |                          |                 | 1.7                | <b>LD6805K/17H</b>                                                                  | <b>LD6805K/17P</b>                 |
|                       |                           |                        |                                     |                          |                 | 1.8                | <b>LD6805K/18H</b>                                                                  | <b>LD6805K/18P</b>                 |
|                       |                           |                        |                                     |                          |                 | 2.2                | <b>LD6805K/22H</b>                                                                  | <b>LD6805K/22P</b>                 |
|                       |                           |                        |                                     |                          |                 | 2.3                | <b>LD6805K/23H</b>                                                                  | <b>LD6805K/23P</b>                 |
|                       |                           |                        |                                     |                          |                 | 2.5                | <b>LD6805K/25H</b>                                                                  | <b>LD6805K/25P</b>                 |
|                       |                           |                        |                                     |                          |                 | 2.8                | <b>LD6805K/28H</b>                                                                  | <b>LD6805K/28P</b>                 |
|                       |                           |                        |                                     |                          |                 | 2.9                | <b>LD6805K/29H</b>                                                                  | <b>LD6805K/29P</b>                 |
|                       |                           |                        |                                     |                          |                 | 3.0                | <b>LD6805K/30H</b>                                                                  | <b>LD6805K/30P</b>                 |
|                       |                           |                        |                                     |                          |                 | 3.3                | <b>LD6805K/33H</b>                                                                  | <b>LD6805K/33P</b>                 |
|                       |                           |                        |                                     |                          |                 | 3.6                | <b>LD6805K/36H</b>                                                                  | <b>LD6805K/36P</b>                 |



### Key features

- ▶ High power supply ripple rejection (PSRR)
- ▶ Ultra low-dropout voltage and low noise
- ▶ Very small package size

### Key benefits





























- ▶ No additional noise bypass capacitor needed
- ▶ Very low-dropout voltage for extended battery usage
- ▶ Lower power dissipation

### Key applications






















- ▶ Mobile phone handsets, cordless telephones, personal digital devices (applications requiring component miniaturization)



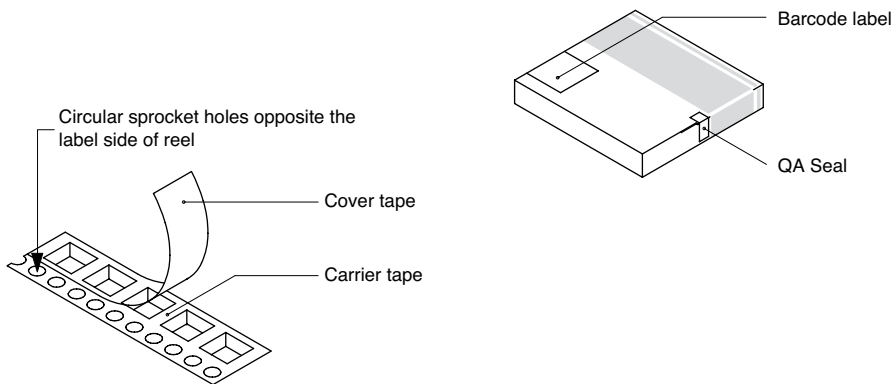
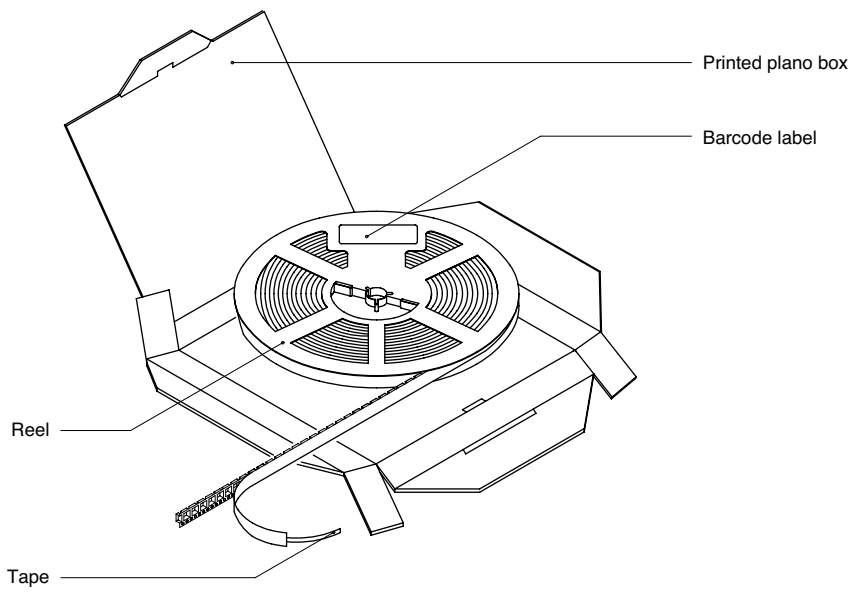
## Package cross reference

| Pins / leads | NXP     | Industry standard names | Size (l x w x h) (mm) | P <sub>tot</sub> (mW) | Package                                                                             | Competitor synonyms |          |            |              |          |             |         |                 |           |
|--------------|---------|-------------------------|-----------------------|-----------------------|-------------------------------------------------------------------------------------|---------------------|----------|------------|--------------|----------|-------------|---------|-----------------|-----------|
|              |         |                         |                       |                       |                                                                                     | Rohm                | Toshiba  | ON Semi    | Renesas      | Infineon | Diodes Inc  | KEC     | Vishay          | Semtech   |
| 2            | SOD27   | DO-35                   | 4.25 x 1.85 x 0.56    | 500                   |    | GSD                 |          |            | DO-35        |          | DO-35       |         | DO-204AH        |           |
|              | SOD66   | DO-41                   | 4.8 x 2.6 x 0.81      | 1300                  |    | GSR                 | DO-41    |            |              |          | DO-41       |         | DO-204AL        |           |
|              | SOD68   | DO-34                   | 3.04 x 1.6 x 0.55     | 500                   |    | MSD                 |          |            |              |          |             |         |                 |           |
|              | SOD80C  | MiniMelf                | 3.5 x 1.5 x 1.5       | 300                   |    | LLDS                |          |            | LLD          |          | MiniMELF    |         | MiniMELF        |           |
|              | SOD123F | -                       | 2.6 x 1.6 x 1.1       | 830                   |    | PMDU                | S-Flat   | SOD-123-FL |              |          | PowerDI123  | SMF     |                 |           |
|              | SOD123W | -                       | 2.6 x 1.7 x 1.0       | 900                   |    |                     | S-Flat   | SOD-123-FL |              |          | PowerDI123  |         |                 |           |
|              | SOD128  | -                       | 3.8 x 2.5 x 1.0       | 1000                  |    | PMDT                | M-Flat   |            |              |          |             |         |                 |           |
|              | SOD323  | SC-76                   | 1.7 x 1.25 x 0.95     | 400                   |    |                     | USC      | SOD-323    | URP          | SOD323   | SOD-323     | USC     | SOD323          |           |
|              | SOD323F | SC-90                   | 1.7 x 1.25 x 0.7      | 830                   |    | UMD2                | US-Flat  |            |              |          | PowerDI323  |         |                 |           |
|              | SOD523  | SC-79                   | 1.2 x 0.8 x 0.6       | 500                   |    | EMD2                | ESC/TESC | SOD-523    | UFP          | SC79     |             | ESC     | SOD523          |           |
|              | SOD882  | -                       | 1.0 x 0.6 x 0.5       | 250                   |    |                     | CTS2     |            |              | TSLP-2   | DFN1006-2   |         |                 |           |
|              | SOD882D | -                       | 1.0 x 0.6 x 0.37      | 250                   |   |                     |          |            |              | TSLP-2-7 | DFN1006H4-2 |         |                 |           |
| 3            | SOT1061 | HUSON3                  | 2.0 x 2.0 x 0.65      | 1300                  |  |                     |          | WDFN3      |              |          | DFN2020-3   |         | PowerPAK SC706L |           |
|              | SOT23   | -                       | 2.9 x 1.3 x 1.0       | 250                   |  | SSD3/SST3           |          | SOT-23     |              | SOT23    | SOT-23      | SOT-23  | SOT23           |           |
|              | SOT323  | SC-70                   | 2.0 x 1.25 x 0.95     | 200                   |  | UMD3/UMT3           | USM      | SC-70      | CMAK/CM-PAK  | SOT323   | SOT-323     | USM     | SC-70 3 leads   |           |
|              | SOT416  | SC-75                   | 1.6 x 0.8 x 0.77      | 150                   |  | EMD3/EMT3           | SSM      | SC-75      | SMPAK        | SC75     |             |         | SC-75A          |           |
|              | SOT883  | SC-101                  | 1.0 x 0.6 x 0.5       | 250                   |  |                     | SS CSP2  |            |              | TSLP-3-1 | DFN1006-3   |         |                 |           |
|              | SOT89   | SC-62                   | 4.5 x 2.5 x 1.5       | 1300                  |  | MPT3                | PW-Mini  | SOT-89     | UPAK (SOT89) | SOT89    |             | SOT-89  |                 |           |
| 4            | SOT143B | -                       | 2.9 x 1.3 x 1.0       | 250                   |  |                     | CP4      |            | MPAK-4R      | SOT143   | SOT-143     |         |                 |           |
|              | SOT223  | SC-73                   | 6.5 x 3.5 x 1.65      | 1700                  |  |                     |          | SOT-223    |              | SOT223   | SOT-223     | SOT-223 | SOT223          |           |
| 5            | SOT353  | SC-88A                  | 2.0 x 1.25 x 0.95     | 300                   |  | UMD5/UMT5           | USV      | SC-88A     | CMPAK-5(T)   |          |             | USV     | SOT353          |           |
|              | SOT665  | -                       | 1.6 x 1.2 x 0.55      | 300                   |  | EMD5/EMT5           | ESV      | SOT-553    | VSON-5       |          |             | TESV    |                 |           |
| 6            | SOT363  | SC-88                   | 2.0 x 1.25 x 0.95     | 300                   |  | UMD6/UMT6           | US6      | SC-88      | CMPAK-6      | SOT363   | SOT-363     | US6     | SOT363          |           |
|              | SOT457  | SC-74                   | 2.9 x 1.5 x 1.0       | 750                   |  | SMD6/SMT6           | SM6      | SC-74      | TSOP-6       | SC74     |             | TSOP6   | TSOP-6          |           |
|              | SOT666  | -                       | 1.6 x 1.2 x 0.55      | 300                   |  | EMD6/EMT6           | ES6      | SOT-563    | SMFPAK-6     | SOT666   | SOT563      | TES6    | SC89-6lead      |           |
|              | SOT1118 | -                       | 2.0 x 2.0 x 0.65      | 1300                  |  |                     |          | 6 Lead DFN |              |          | DFN2020B-6  |         |                 |           |
|              | SOT886  | XSON6                   | 1.45 x 1.0 x 0.5      | 250                   |  |                     |          |            |              |          |             |         |                 | SLP1510N6 |
|              | SOT891  | XSON6                   | 1.0 x 1.0 x 0.5       | -                     |  |                     |          | CS6        |              |          |             |         |                 |           |

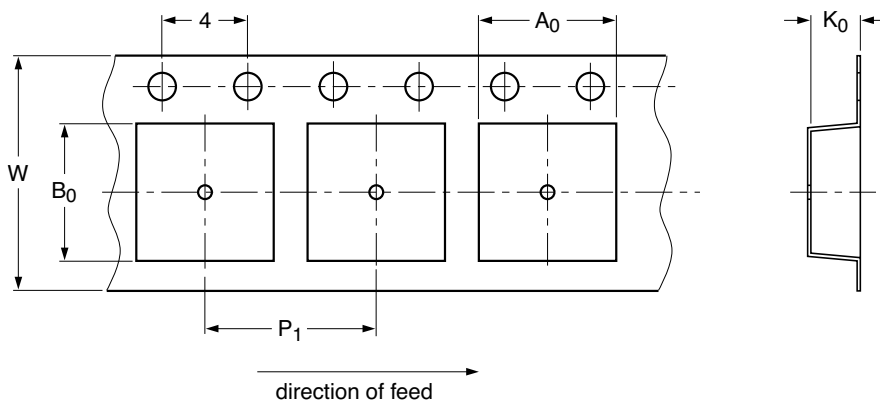
## Packing methods SMD

| Pins / leads | Package                        | Packing method and tape dimension | Reel dimension (d x w) (mm) | Taping                                                                              | Package                                                                             | Packing quantity and ordering code (12 NC ending) |      |      |      |      |      |      |       |      |
|--------------|--------------------------------|-----------------------------------|-----------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|---------------------------------------------------|------|------|------|------|------|------|-------|------|
|              |                                |                                   |                             |                                                                                     |                                                                                     | 800                                               | 1000 | 2500 | 3000 | 4000 | 8000 | 9000 | 10000 |      |
| 2            | SOD80C                         | 4 mm pitch, 8 mm tape and reel    | 180 x 8                     | -                                                                                   |    | -                                                 | -    | -115 | -    | -    | -    | -    | -     |      |
|              |                                | 4 mm pitch, 8 mm tape and reel    | 330 x 8                     | -                                                                                   |                                                                                     | -                                                 | -    | -    | -    | -    | -    | -    | -135  |      |
|              | SOD123F                        | 4 mm pitch, 8 mm tape and reel    | 180 x 8                     | -                                                                                   |    | -                                                 | -    | -    | -115 | -    | -    | -    | -     |      |
|              | SOD123W                        | 4 mm pitch, 8 mm tape and reel    | 180 x 8                     | -                                                                                   |    | -                                                 | -    | -    | -115 | -    | -    | -    | -     |      |
|              | SOD128                         | 4 mm pitch, 12 mm tape and reel   | 180 x 12                    | -                                                                                   |    | -                                                 | -    | -    | -115 | -    | -    | -    | -     |      |
|              | SOD323                         | 4 mm pitch, 8 mm tape and reel    | 180 x 8                     | -                                                                                   |    | -                                                 | -    | -    | -115 | -    | -    | -    | -     |      |
|              |                                | 4 mm pitch, 8 mm tape and reel    | 286 x 8                     | -                                                                                   |                                                                                     | -                                                 | -    | -    | -    | -    | -    | -    | -135  |      |
|              | SOD323F                        | 4 mm pitch, 8 mm tape and reel    | 180 x 8                     | -                                                                                   |    | -                                                 | -    | -    | -115 | -    | -    | -    | -     |      |
|              | SOD523                         | 2 mm pitch, 8 mm tape and reel    | 180 x 8                     | -                                                                                   |    | -                                                 | -    | -    | -    | -    | -    | -315 | -     | -    |
|              |                                | 4 mm pitch, 8 mm tape and reel    | 180 x 8                     | -                                                                                   |                                                                                     | -                                                 | -    | -    | -115 | -    | -    | -    | -     |      |
|              |                                | 4 mm pitch, 8 mm tape and reel    | 286 x 8                     | -                                                                                   |                                                                                     | -                                                 | -    | -    | -    | -    | -    | -    | -     | -135 |
|              | SOD882                         | 2 mm pitch, 8 mm tape and reel    | 180 x 8                     | -                                                                                   |    | -                                                 | -    | -    | -    | -    | -    | -    | -315  |      |
|              | SOD882D                        | 2 mm pitch, 8 mm tape and reel    | 180 x 8                     | -                                                                                   |    | -                                                 | -    | -    | -    | -    | -    | -    | -315  |      |
|              | SOD962                         | 2 mm pitch, 8 mm tape and reel    | 180 x 8                     | -                                                                                   |   | -                                                 | -    | -    | -    | -    | -    | -    | -315  | -    |
| 3            | SOT23                          | 4 mm pitch, 8 mm tape and reel    | 180 x 8                     | -                                                                                   |  | -                                                 | -    | -    | -215 | -    | -    | -    | -     |      |
|              |                                | 4 mm pitch, 8 mm tape and reel    | 286 x 8                     | -                                                                                   |                                                                                     | -                                                 | -    | -    | -    | -    | -    | -    | -     | -235 |
|              | SOT89                          | 8 mm pitch, 12 mm tape and reel   | 180 x 12                    | T1                                                                                  |  | -                                                 | -115 | -    | -    | -    | -    | -    | -     | -    |
|              |                                | 8 mm pitch, 12 mm tape and reel   | 330 x 12                    | T1                                                                                  |                                                                                     | -                                                 | -    | -    | -    | -    | -135 | -    | -     | -    |
|              |                                | 8 mm pitch, 12 mm tape and reel   | 180 x 12                    | T3                                                                                  |                                                                                     | -                                                 | -146 | -    | -    | -    | -    | -    | -     | -    |
|              |                                | 8 mm pitch, 12 mm tape and reel   | 180 x 12                    | T4                                                                                  |                                                                                     | -                                                 | -147 | -    | -    | -    | -    | -    | -     | -    |
|              | SOT323                         | 4 mm pitch, 8 mm tape and reel    | 180 x 8                     | -                                                                                   |  | -                                                 | -    | -    | -115 | -    | -    | -    | -     |      |
|              |                                | 4 mm pitch, 8 mm tape and reel    | 286 x 8                     | -                                                                                   |                                                                                     | -                                                 | -    | -    | -    | -    | -    | -    | -     | -135 |
|              | SOT404                         | 16 mm pitch, 24 mm tape and reel  | 330 x 24                    | -                                                                                   |  | -118                                              | -    | -    | -    | -    | -    | -    | -     |      |
|              | SOT416                         | 4 mm pitch, 8 mm tape and reel    | 180 x 8                     | -                                                                                   |  | -                                                 | -    | -    | -115 | -    | -    | -    | -     |      |
|              |                                | 4 mm pitch, 8 mm tape and reel    | 286 x 8                     | -                                                                                   |                                                                                     | -                                                 | -    | -    | -    | -    | -    | -    | -     | -135 |
|              | SOT428                         | 8 mm pitch, 16 mm tape and reel   | 330 x 16                    | -                                                                                   |  | -                                                 | -    | -118 | -    | -    | -    | -    | -     |      |
|              | SOT663                         | 4 mm pitch, 8 mm tape and reel    | 180 x 8                     | -                                                                                   |  | -                                                 | -    | -    | -    | -115 | -    | -    | -     |      |
|              | SOT883                         | 2 mm pitch, 8 mm tape and reel    | 180 x 8                     | -                                                                                   |  | -                                                 | -    | -    | -    | -    | -    | -    | -315  |      |
| SOT1061      | 4 mm pitch, 8 mm tape and reel | 180 x 8                           | -                           |  | -                                                                                   | -                                                 | -    | -115 | -    | -    | -    | -    |       |      |
| 4            | SOT143B                        | 4 mm pitch, 8 mm tape and reel    | 180 x 8                     | -                                                                                   |  | -                                                 | -    | -    | -215 | -    | -    | -    | -     |      |
|              |                                | 4 mm pitch, 8 mm tape and reel    | 286 x 8                     | -                                                                                   |                                                                                     | -                                                 | -    | -    | -    | -    | -    | -    | -     | -235 |
|              | SOT223                         | 8 mm pitch, 12 mm tape and reel   | 180 x 12                    | -                                                                                   |  | -                                                 | -115 | -    | -    | -    | -    | -    | -     |      |
|              |                                | 8 mm pitch, 12 mm tape and reel   | 330 x 12                    | -                                                                                   |                                                                                     | -                                                 | -    | -    | -    | -135 | -    | -    | -     |      |

## Tape and reel pack for SMD packages



## Carrier tape - tape and reel

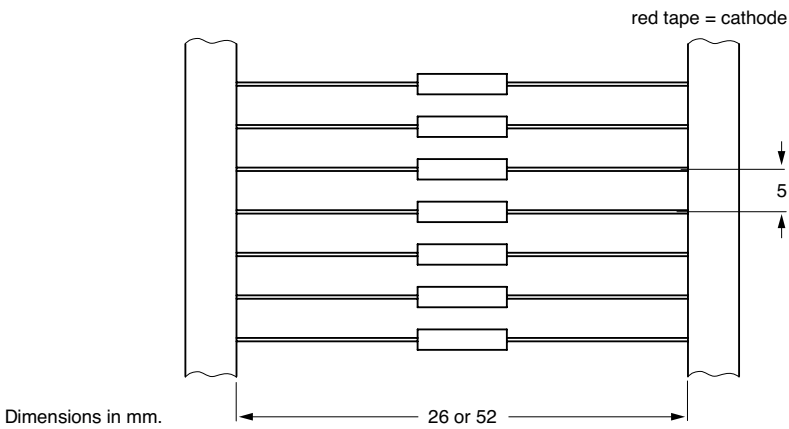
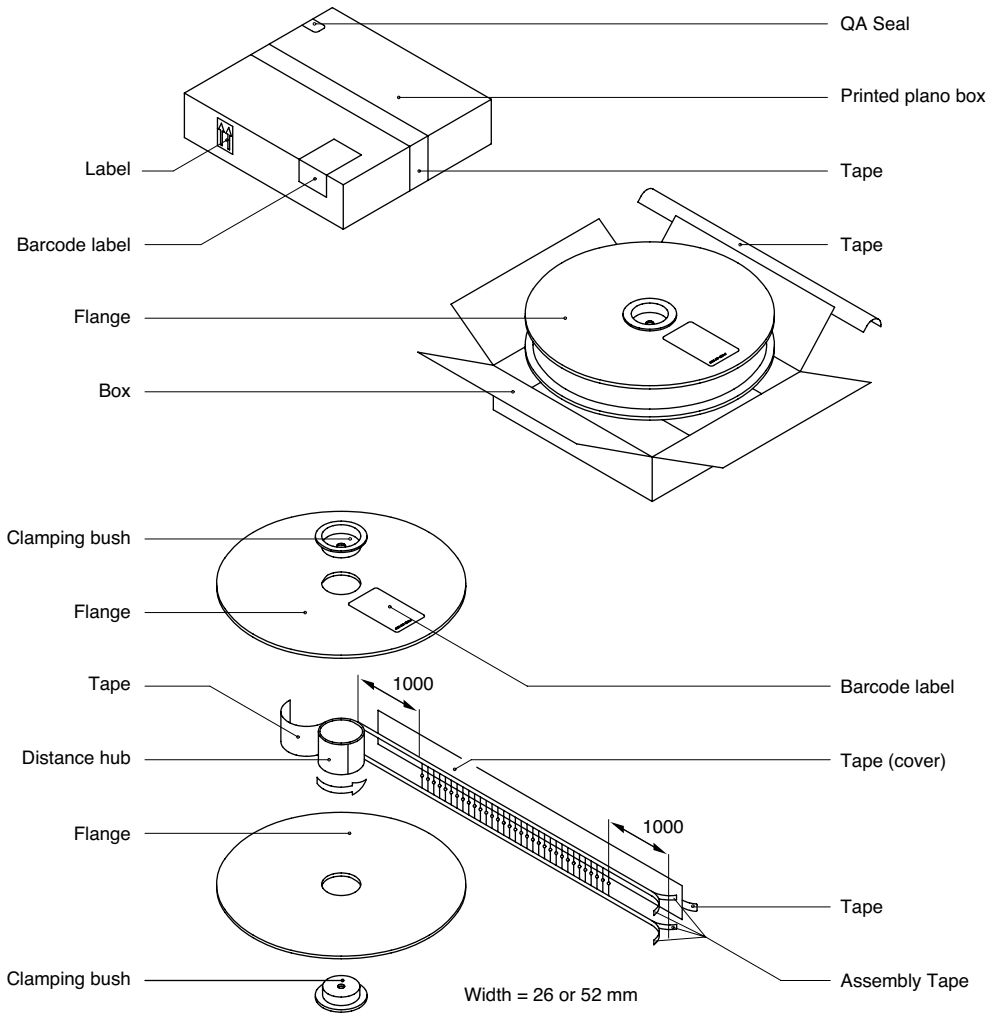


$P_1$  = pitch (see table packing methods)

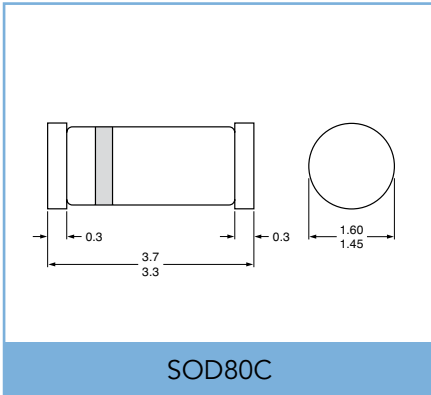
$W$  = tape width (see table packing methods)

Compartment width ( $A_0$ ), length ( $B_0$ ) and depth ( $K_0$ ) depending on package

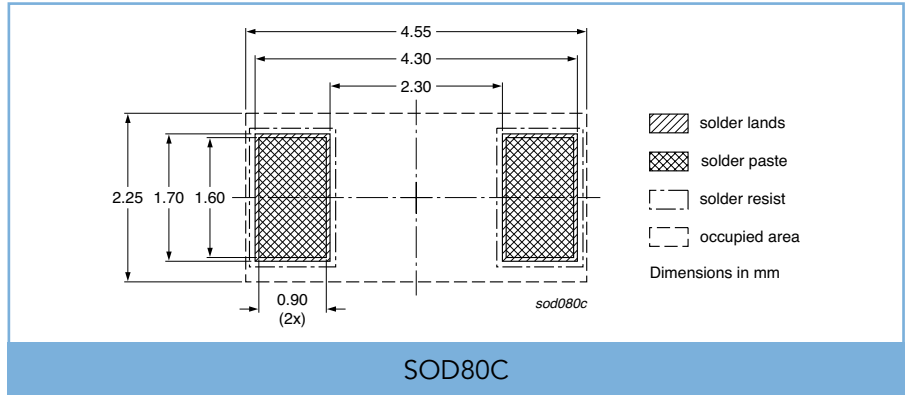
# Reel pack axial tape for glass diodes



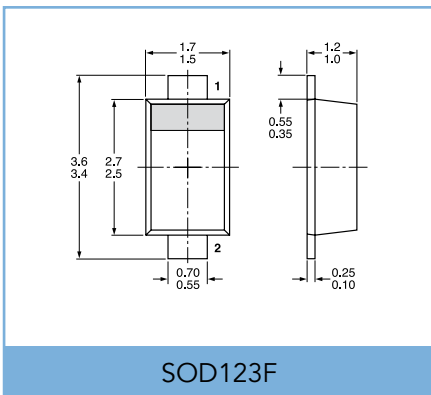
## 2-Pin SMD Packages



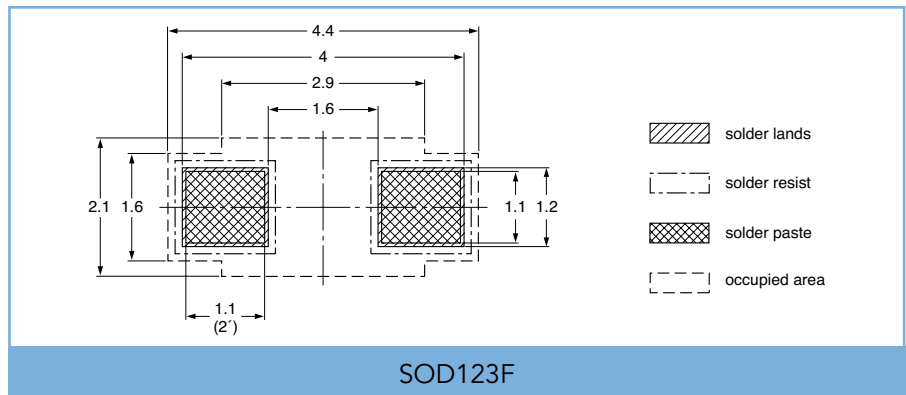
SOD80C



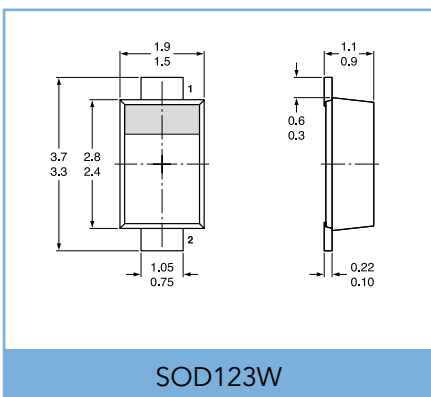
SOD80C



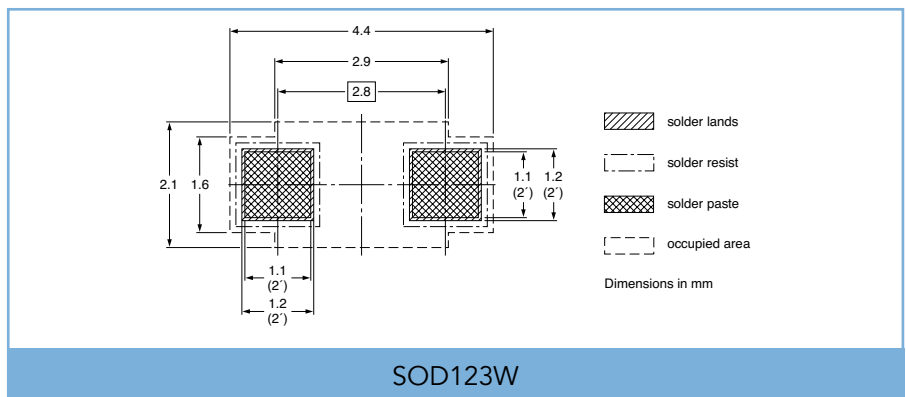
SOD123F



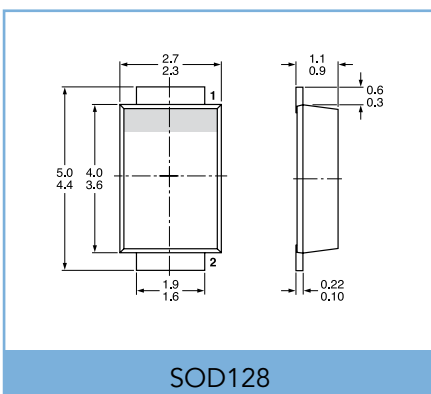
SOD123F



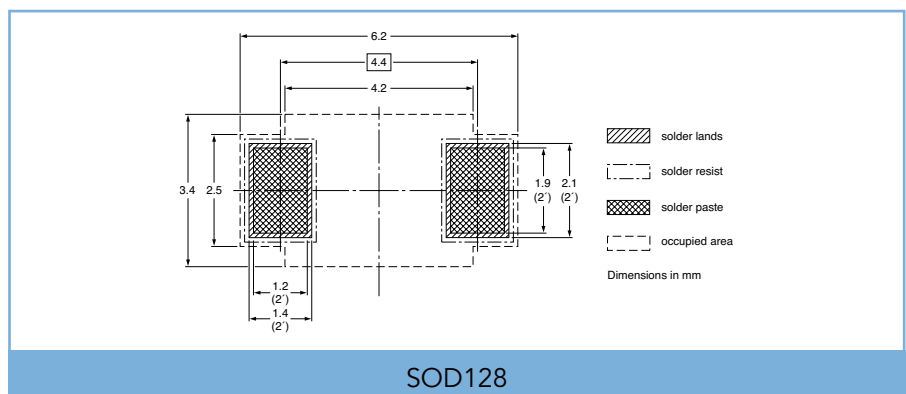
SOD123W



SOD123W



SOD128



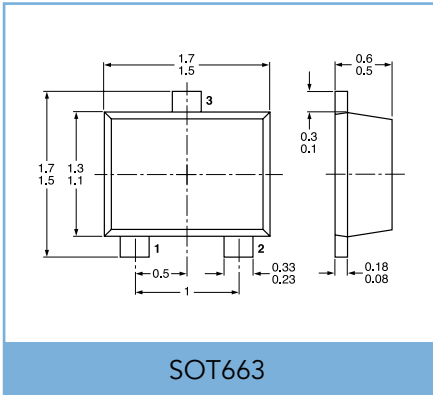
SOD128

Dimensions in mm

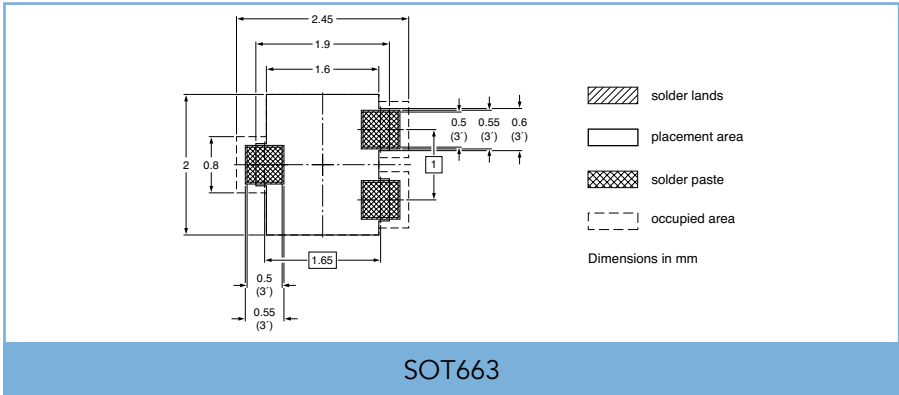




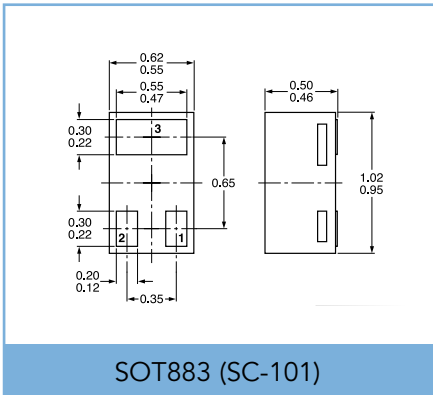
# Minimized outline drawings and reflow soldering footprint



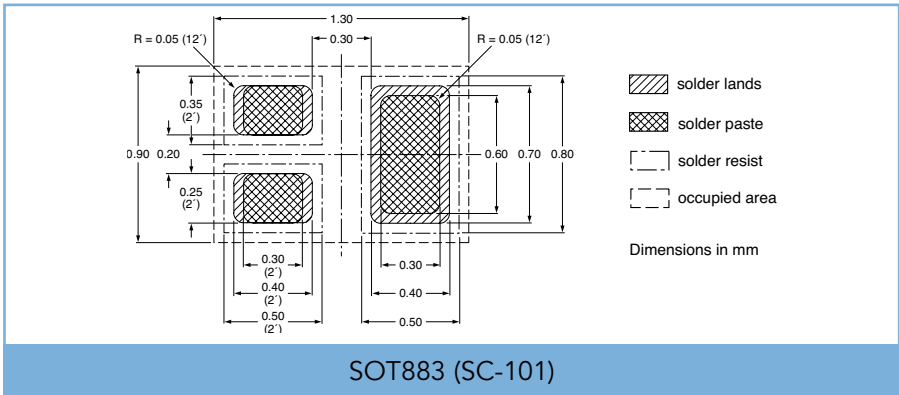
SOT663



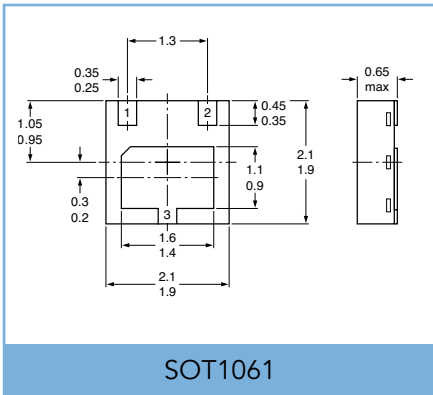
SOT663



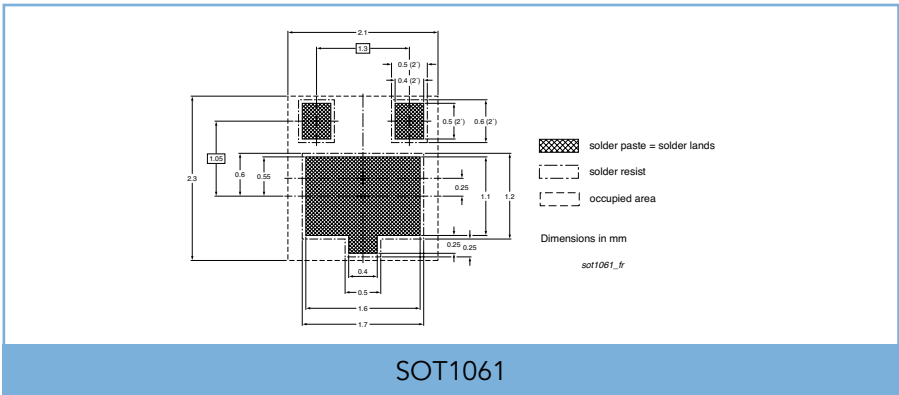
SOT883 (SC-101)



SOT883 (SC-101)

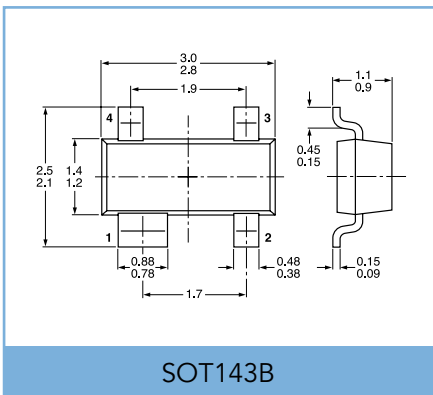


SOT1061

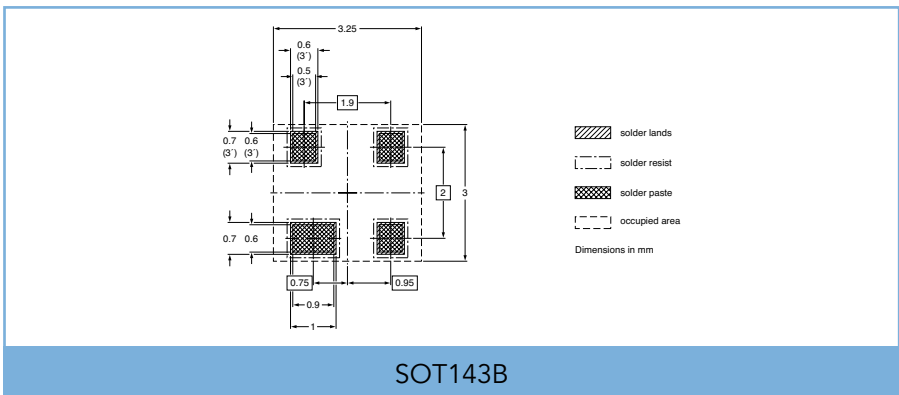


SOT1061

## 4-/5-Pin SMD Packages



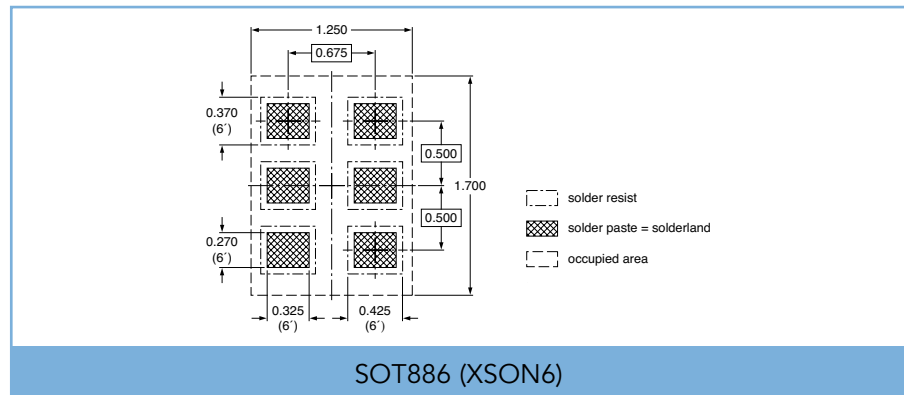
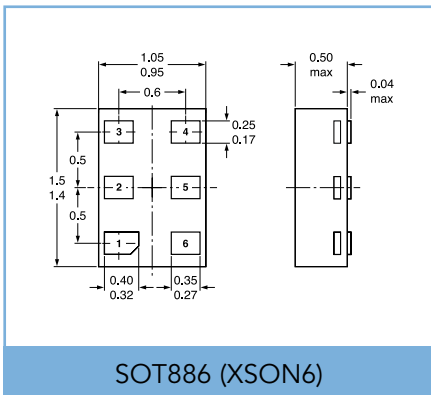
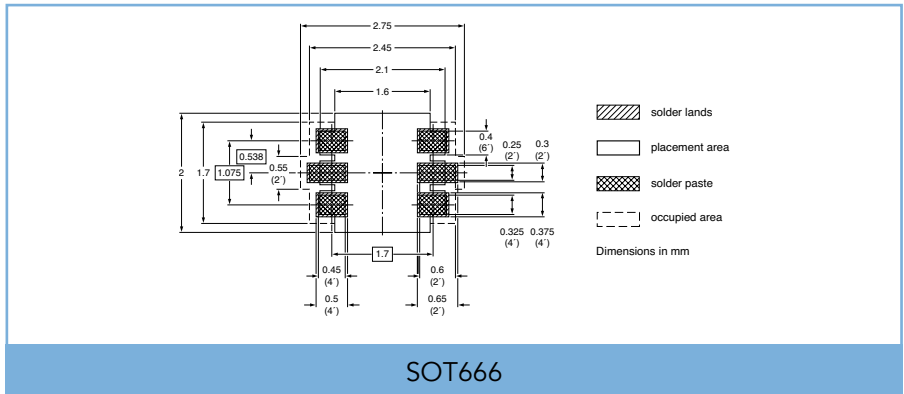
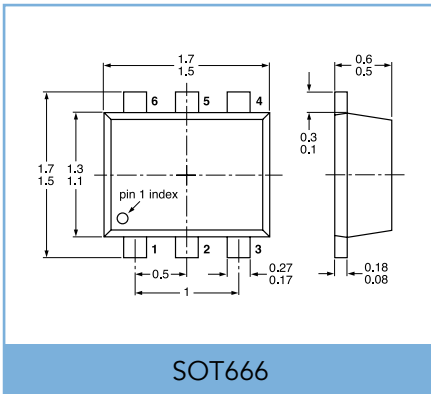
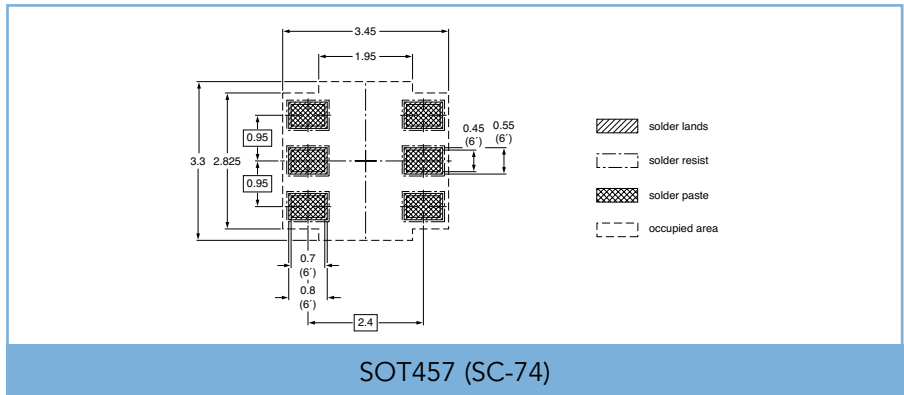
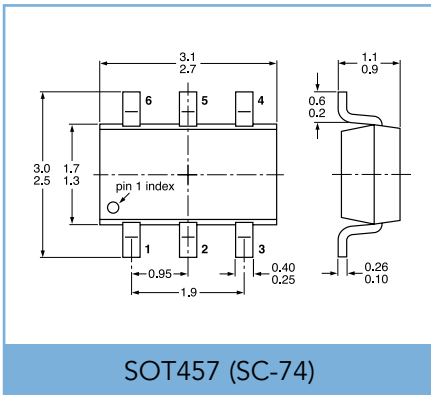
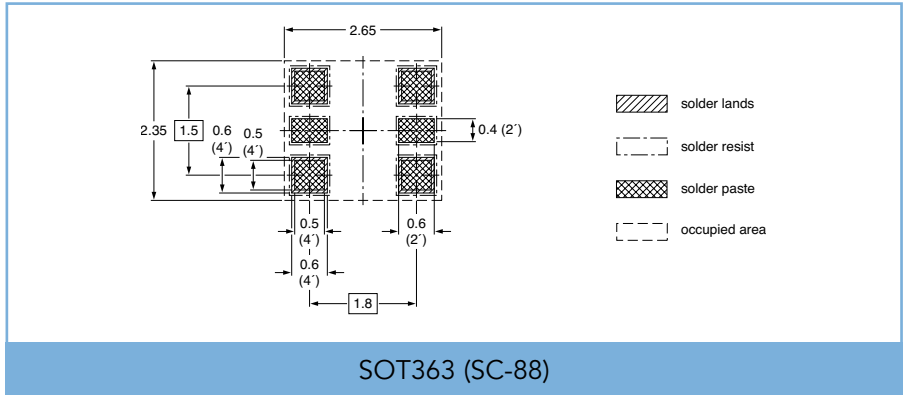
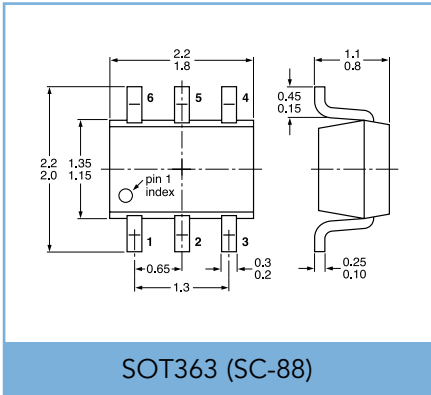
SOT143B



SOT143B

Dimensions in mm

## 6-Pin SMD Packages



Dimensions in mm





**DIMENSIONS (mm are the original dimensions)**

| UNIT | A   | b    | b <sub>1</sub> | c    | D   | d   | E   | e    | e <sub>1</sub> | L    | L <sub>1</sub> <sup>(1)</sup> max. |
|------|-----|------|----------------|------|-----|-----|-----|------|----------------|------|------------------------------------|
| mm   | 5.2 | 0.48 | 0.66           | 0.45 | 4.8 | 1.7 | 4.2 | 2.54 | 1.27           | 14.5 | 12.7                               |
|      | 5.0 | 0.40 | 0.55           | 0.38 | 4.4 | 1.4 | 3.6 |      |                |      | 2.5                                |

**Note**  
1. Terminal dimensions within this zone are uncontrolled to allow for flow of plastic and terminal irregularities.

**SOT54**

**DIMENSIONS (mm are the original dimensions)**

| UNIT | A   | A <sub>1</sub> | b   | b <sub>1</sub> <sup>(2)</sup> | b <sub>2</sub> <sup>(2)</sup> | c   | D    | D <sub>1</sub> | E    | e    | L    | L <sub>1</sub> <sup>(1)</sup> | L <sub>2</sub> <sup>(1)</sup> max. | p   | q   | Q   |
|------|-----|----------------|-----|-------------------------------|-------------------------------|-----|------|----------------|------|------|------|-------------------------------|------------------------------------|-----|-----|-----|
| mm   | 4.7 | 1.40           | 0.9 | 1.6                           | 1.3                           | 0.7 | 16.0 | 6.6            | 10.3 | 2.54 | 15.0 | 3.30                          | 3.0                                | 3.8 | 3.0 | 2.6 |
|      | 4.1 | 1.25           | 0.6 | 1.0                           | 1.0                           | 0.4 | 15.2 | 5.9            | 9.7  |      | 12.8 | 2.79                          | 3.0                                | 3.5 | 2.7 | 2.2 |

**Notes**  
1. Lead shoulder designs may vary.  
2. Dimension includes excess dambar.

**SOT78**

**DIMENSIONS (mm are the original dimensions)**

| UNIT | A   | A <sub>1</sub> | b   | b <sub>1</sub> | b <sub>2</sub> | c   | D    | D <sub>1</sub> ref. | E    | e    | L    | L <sub>1</sub> ref. | p   | Q   | q   | w   |
|------|-----|----------------|-----|----------------|----------------|-----|------|---------------------|------|------|------|---------------------|-----|-----|-----|-----|
| mm   | 4.7 | 1.40           | 0.9 | 1.4            | 1.72           | 0.6 | 16.0 | 6.5                 | 10.3 | 2.54 | 14.0 | 3.0                 | 3.7 | 2.6 | 3.0 | 2.6 |
|      | 4.3 | 1.25           | 0.6 | 1.1            | 1.32           | 0.4 | 15.2 |                     | 9.7  |      | 12.8 |                     | 3.5 | 2.2 | 2.7 | 0.2 |

**SOT78D**

**DIMENSIONS (mm are the original dimensions)**

| UNIT | A   | b    | c    | D    | E   | e    | e <sub>1</sub> | L    | L <sub>1</sub> <sup>(1)</sup> max. | P   | Q   | q   | w     |
|------|-----|------|------|------|-----|------|----------------|------|------------------------------------|-----|-----|-----|-------|
| mm   | 2.8 | 0.88 | 0.58 | 11.1 | 7.8 | 2.29 | 4.58           | 16.5 | 2.54                               | 3.1 | 1.5 | 3.9 | 0.254 |
|      | 2.3 | 0.65 | 0.47 | 10.5 | 7.2 |      |                | 15.3 |                                    | 2.5 | 0.9 | 3.5 |       |

**Note**  
1. Terminal dimensions within this zone are uncontrolled to allow for body and terminal irregularities.

**SOT82**

| Type Number         | Page Number | Type Number | Page Number | Type Number | Page Number | Type Number                 | Page Number | Type Number           | Page Number |
|---------------------|-------------|-------------|-------------|-------------|-------------|-----------------------------|-------------|-----------------------|-------------|
| 1N4148              | 16          | 2PD601BSL   | 52          | BAS70-05    | 8           | BAT960                      | 11          | BC850C                | 54          |
| 1N4531              | 16          | 2PD602AQL   | 52          | BAS70-05W   | 9           | BAV103                      | 18          | BC850CW               | 54          |
| 1N47xxA series      | 14          | 2PD602ARL   | 52          | BAS70-06    | 8           | BAV170                      | 19          | BC856 / A / B         | 52          |
| 1PS66SB17           | 9           | 2PD602ASL   | 52          | BAS70-06W   | 9           | BAV199                      | 19          | BC856BS               | 53          |
| 1PS66SB82           | 9           | ACT102H     | 89          | BAS70-07    | 8           | BAV199W                     | 19          | BC856S                | 53          |
| 1PS70SB20           | 11          | ACT108      | 89          | BAS70-07S   | 9           | BAV20                       | 18          | BC856T / AT / BT      | 52          |
| 1PS70SB82           | 9           | ACT108W     | 89          | BAS70-07V   | 9           | BAV21                       | 18          | BC856W / AW / BW      | 52          |
| 1PS70SB84           | 9           | BAL74       | 16          | BAS70H      | 9           | BAV23                       | 18          | BC857 / A / B / C     | 52          |
| 1PS70SB85           | 9           | BAL99       | 16          | BAS70L      | 9           | BAV23A                      | 18          | BC857AM / BM / CM     | 52          |
| 1PS70SB86           | 9           | BAS101      | 18          | BAS70VV     | 9           | BAV23C                      | 18          | BC857BS               | 53          |
| 1PS74SB23           | 10          | BAS101S     | 18          | BAS70W      | 9           | BAV23S                      | 18          | BC857BV               | 53          |
| 1PS75SB45           | 9           | BAS116      | 19          | BAS70XY     | 9           | BAV70                       | 16          | BC857T / AT / BT / CT | 52          |
| 1PS76SB10           | 9           | BAS116H     | 19          | BAS716      | 19          | BAV70M                      | 17          | BC857W / AW / BW / CW | 52          |
| 1PS76SB17           | 9           | BAS116T     | 19          | BAS85       | 8           | BAV70S                      | 17          | BC858B                | 52          |
| 1PS76SB21           | 9           | BAS16       | 16          | BAS86       | 8           | BAV70T                      | 17          | BC858W                | 52          |
| 1PS76SB40           | 9           | BAS16H      | 16          | BAT120A     | 12          | BAV70W                      | 17          | BC859B                | 54          |
| 1PS76SB70           | 9           | BAS16J      | 17          | BAT120C     | 12          | BAV74                       | 16          | BC859BW               | 54          |
| 1PS79SB10           | 9           | BAS16L      | 17          | BAT120S     | 12          | BAV756S                     | 17          | BC859C                | 54          |
| 1PS79SB17           | 9           | BAS16LD     | 17          | BAT160A     | 12          | BAV99                       | 16          | BC859CW               | 54          |
| 1PS79SB30           | 9           | BAS16T      | 17          | BAT160C     | 12          | BAV99S                      | 17          | BC860B                | 54          |
| 1PS79SB31           | 9           | BAS16VV     | 17          | BAT160S     | 12          | BAV99W                      | 17          | BC860BW               | 54          |
| 1PS79SB40           | 9           | BAS16VY     | 17          | BAT17       | 9           | BAW101                      | 18          | BC860C                | 54          |
| 1PS79SB70           | 9           | BAS16W      | 17          | BAT46WH     | 9           | BAW101S                     | 18          | BC860CW               | 54          |
| 1PS88SB48           | 9           | BAS21       | 18          | BAT46WJ     | 9           | BAW156                      | 19          | BC868 / -25           | 54          |
| 1PS88SB82           | 9           | BAS21AW     | 18          | BAT54       | 8           | BAW56                       | 16          | BC869 / -16 / -25     | 54          |
| 2N7002              | 73          | BAS21H      | 18          | BAT54A      | 8           | BAW56M                      | 17          | BCM61B                | 55          |
| 2N7002BK            | 73          | BAS21J      | 18          | BAT54AW     | 9           | BAW56S                      | 17          | BCM62B                | 55          |
| 2N7002BKM           | 73          | BAS21SW     | 18          | BAT54C      | 8           | BAW56T                      | 17          | BCM847BS              | 55          |
| 2N7002BKBS          | 75          | BAS21VD     | 18          | BAT54CM     | 9           | BAW56W                      | 17          | BCM847BV              | 55          |
| 2N7002BKT           | 73          | BAS21W      | 18          | BAT54CV     | 9           | BC807 / -16 / -25 / -40     | 52          | BCM847DS              | 55          |
| 2N7002BKV           | 75          | BAS28       | 16          | BAT54CW     | 9           | BC807DS                     | 53          | BCM856BS              | 55          |
| 2N7002BKW           | 73          | BAS29       | 19          | BAT54H      | 9           | BC807W / -16W / -25W / -40W | 52          | BCM856DS              | 55          |
| 2N7002CK            | 73          | BAS31       | 19          | BAT54J      | 9           | BC817 / -16 / -25 / -40     | 52          | BCM857BS              | 55          |
| 2N7002E             | 73          | BAS316      | 17          | BAT54L      | 9           | BC817DPN                    | 53          | BCM857BV              | 55          |
| 2N7002F             | 73          | BAS321      | 18          | BAT54S      | 8           | BC817DS                     | 53          | BCM857DS              | 55          |
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Date of release: January 2011

Document order number: 9397 750 17022

Printed in the Netherlands

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