
# Discrete Semiconductors Selection Guide 2010

Diodes, transistors, ESD and signal conditioning devices
Excellence in portfolio and performance

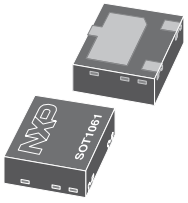
# Introducing new package technology

Portable and increasingly smaller end products fuel the race towards more sophisticated functionality in smaller form factors. To support system designers manage this challenge we as NXP develop products that fulfill requirements regarding space constraints, boosted performance and environmental aspects. Have a look at these five new SMD packages that take discretes to the next level:

## Leadless powerhouse – SOT1061 and SOT1118

**Features**

- Exposed heat sink for excellent thermal and electrical conductivity
- Power dissipation capability ($P_{tot}$) of > 1 W
- Small footprint of 2 x 2 mm and height of 0.65 mm




**Products in SOT1061**
- 1 and 2 A low $V_F$ Schottky rectifiers, *pages 11 and 12*
- Low $V_{CEsat}$ (BISS) transistors, *pages 57, 59, 64 and 65*


**Products in SOT1118**
- Small-signal MOSFET P-channel and FET-KYs, *page 77*

## FlatPower – SOD123W and SOD128

**Features**

- High power ratings due to clip-bonding technology and optimized die design
- 1 mm low profile, footprint of 2.6 x 1.7 (SOD123W) and 3.8 x 2.5 mm (SOD128)
- Pad layout compatible with SMA for easy drop-in replacement
- AEC-Q101 qualified


**Products in SOD123W and SOD128**
- 400 W and 600 W TVS diodes, *pages 44 and 45*
- 1 to 5 A low $V_F$ Schottky rectifiers, *page 10*

## Small, strong, perfectly visible – SOD882D

**Features**

- Exposed leads facilitate visual inspection of solder joints
- More rugged and reliable bond between device and PCB board
- Reduced height down to 0.37 mm and small footprint of 1 x 0.6 mm

**Products in SOD882D**
- Standard ESD protection devices, *page 24*

## Transfer to halogen-free products

Since 2009 all NXP small-signal discrete SMD packages on the market are “Dark Green”, meaning they are fully RoHS compliant (directive 2002/95/EC) and do not contain halogens or antimony exceeding allowed limits:

| Substances | Limit |
|---|---|
| Antimony Oxides | < 900 ppm |
| Chlorinated + Brominated Compounds | ∑ < 900 ppm |

# Table of Contents

# Support tools

To help you achieve the best, most efficient design-ins with our products, we offer a wide variety of support tools, available on the NXP Semiconductors website.

**Application notes**
Comprehensive application information:
http://www.nxp.com/all_appnotes

**Datasheets**
Details on all released products and product families, available for download as pdf files:
http://www.nxp.com/all_datasheets

**Sales literature**
To find the latest sales literature please go here for downloads:
http://www.nxp.com/all_literature

**Sales offices and distributors**
Dedicated and skilled sales and distribution teams provide support on a regional level:
http://www.nxp.com/profile/sales

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You can order samples directly from our online system. Please register here:
http://www.nxp.com/help/samples

**Selection Guide – offline version**
The pdf file of this selection guide can be downloaded here:
http://www.nxp.com/discrete_selection_guide

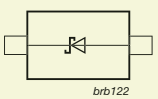
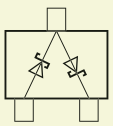
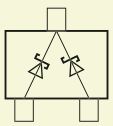
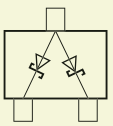
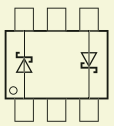
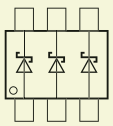
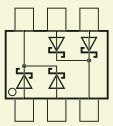
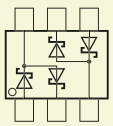
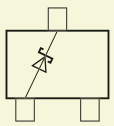
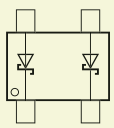
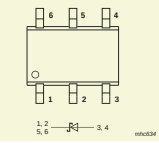
**Spice models**
A selection of our spice models can be found on the internet:
http://www.nxp.com/models

**X-reference tool**
Looking for the most up-to-date information on small-signal discrete, power management, RF and standard logic products? Then download our x-reference offline tool from the NXP website:
http://www.nxp.com/search/advanced

For further design-in support please contact your local sales office.

# 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 | |
| | | | | | | triple isolated | | | | | |
| | | | | | | quad 2x series | | | | | |
| 120 | 40 | 370 | 1 | 0.5 | 30 | single | | | | | |
| | | 500 | 10 | 1 | 30 | 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 | | | | | |
| | | 340 | 10 | 2 | 25 | single | | | BAT754 | | |
| | | | | | | dual series | | | BAT754S | | |
| | | | | | | dual c.c. | | | BAT754C | | |
| | | | | | | dual c.a. | | | BAT754A | | |
| | | | | | | triple isolated | | | | | |
| | | 400 | 10 | 2 | 25 | single | BAS85 | BAT85 | BAT54 | | |
| | | | | | | dual series | | | BAT54S | | |
| | | | | | | dual c.c. | | | BAT54C | | |
| | | | | | | dual c.a. | | | BAT54A | | |
| | | | | | | dual isolated | | | | BAT74 | |
| | | | | | | triple isolated | | | | | |
| | | | | | | quad c.c./c.c. | | | | | |
| | | | | | | quad 2x series | | | | | |
| | | 500 | 200 | 30 | 10 | single | | | | | |
| | | 600 | 200 | 1 | 10 | single | | | | | |
| | 40 | 300 | 10 | 15 | 30 | single | | | BAT721 | | |
| | | | | | | dual series | | | BAT721S | | |
| | | | | | | dual c.c. | | | BAT721C | | |
| | | | | | | dual c.a. | | | BAT721A | | |
| | | 360 | 10 | 0.5 | 25 | single | | | | | |
| | | 420 | 30 | 0.5 | 25 | single | | | | | |
| | | | | | | dual series | | | | | |
| | | | | | | dual c.c. | | | | | |
| | | | | | | dual c.a. | | | | | |
| | 50 | 450 | 10 | 5 | 40 | single | BAS86 | BAT86 | | | |
| 250 | 100 | 950 | 250 | 18 | 75 | single | | | | | |

| single | dual series | dual c.c. | dual c.a. | dual isolated | triple isolated | quad c.c./c.c. | quad 2x series |
|---|---|---|---|---|---|---|---|
|  brb122 |  brb124 |  brb125 |  brb126 |  brb127 |  brb129 |  brb130 |  brb131 |
|  brb123 | | | |  brb128 | | | |
|  | | | | | | | |

# Medium power low $V_F$ Schottky rectifiers single ≥ 200 mA

| $I_F$ max (A) | $V_R$ max (V) | $V_F$ max (mV) @ $I_F$ max | $I_R$ max (mA) @ $V_R$ max | Package | SOD128 | SOD87 (Melf) | SOT457 (SC-74) | SOT23 | SOD123W | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Size (mm) | 3.8 x 2.5 x 1.0 | 3.5 x 2.05 x 2.05 | 2.9 x 1.5 x 1.0 | 2.9 x 1.3 x 1.0 | 2.6 x 1.7 x 1.0 | |
| | | | | $P_{tot}$ (mW) @ 1 cm² | 1050 | 1000 | 540 | 420 | 950 | |
| | | | | 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 | | |
| | | 440 | 1.5 | low $V_F$ | | | | | | |
| | | 480 | 0.01 | low $I_R$ | | | | | | |
| | | 500 | 0.03 | low $I_R$ | | | | | | |
| | 30 | 430 | 0.15 | low $V_F$ | | | | PMEG3005ET | | |
| | | 500 | 0.5 | low $V_F$ | | | | | | |
| | 40 | 470 | 0.1 | low $V_F$ | | | | PMEG4005ET | | |
| | | 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 | | |
| | | 450 | 0.05 | low $I_R$ | | | | | PMEG2010BER | |
| | | | 1.0 | low $V_F$ | | PRLL5817 | | | | |
| | | 500 | 0.2 | low $V_F$ | | | | PMEG2010ET | | |
| | | 550 | 0.07 | low $I_R$ | | | | | | |
| | | 620 | 1.5 | low $V_F$ | | | | | | |
| | 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 $I_R$ | | | | | | |
| | | 550 | 1 | low $V_F$ | | PRLL5818 | | | | |
| | | 560 | 0.15 | low $V_F$ | | | | PMEG3010ET | | |
| | | 680 | 0.5 | low $V_F$ | | | | | | |
| | 40 | 490 | 0.05 | low $V_F$ | PMEG4010EP | | | | PMEG4010ER | |
| | | 600 | 1.0 | low $V_F$ | | PRLL5819 | | | | |
| | | 640 | 0.1 | low $V_F$ | | | | PMEG4010ET | | |
| | | 570 | 0.05 | low $I_R$ | | | | | | |
| | 60 | 530 | 0.06 | low $V_F$ | **PMEG6010EP** | | | | **PMEG6010ER** | |
| | | 650 | 0.35 | low $V_F$ | | | PMEG6010AED | | | |
| | | 660 | 0.05 | low $I_R$ | | | | | | |
| 1.5 | 20 | 660 | 0.07 | low $I_R$ | | | | | | |
| | 30 | 550 | 1.0 | low $V_F$ | | | | | | |
| 2.0 | 10 | 460 | 3.0 | low $V_F$ | | | | | | |
| | 20 | 420 | 1.9 | low $V_F$ | | | | | | |
| | | 525 | 0.2 | low $V_F$ | | | | | | |
| | 30 | 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** | |
| | | 620 | 1.0 | low $V_F$ | | | | | | |
| | 40 | 490 | 0.1 | low $V_F$ | **PMEG4020EP** | | | | **PMEG4020ER** | |
| | | 535 | 0.1 | low $V_F$ | | | | | | |
| | 60 | 530 | 0.15 | low $V_F$ | **PMEG6020EP** | | | | **PMEG6020ER** | |
| | | 575 | 0.25 | low $V_F$ | | | | | | |
| 3.0 | 10 | 530 | 3.0 | low $V_F$ | | | | | | |
| | 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 ≥ 200 mA

types in **bold** represent new products

| $I_F$ max (A) | $V_R$ max (V) | $V_F$ max (mV) @ $I_F$ max | $I_R$ max (mA) @ $V_R$ max | Optimization | Package | SOT223 (SC-73) | SOT23 | SOT1061 | SOT666 |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | Size (mm) | 6.5 x 3.5 x 1.65 | 2.9 x 1.3 x 1.0 | 2.0 x 2.0 x 0.65 | 1.6 x 1.2 x 0.55 |
| | | | | | $P_{tot}$ (mW) | 1500 | 250 | 1000 | 300 |
| 0.2 | 30 | 480 | 0.03 | low $V_F$ | dual isolated | | | | PMEG3002TV |
| | 60 | 600 | 0.1 | low $V_F$ | | | | | PMEG6002TV |
| 0.5 | 20 | 390 | 0.2 | low $V_F$ | dual c.c. | | 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 | BAT120S | | | |
| | | | | low $V_F$ | dual c.c. | BAT120C | | | |
| | | | | low $V_F$ | dual c.a. | BAT120A | | | |
| | 40 | 500 | 0.05 | low $V_F$ | dual c.c. | | | **PMEG4010CPA** | |
| | 60 | 540 | 0.06 | low $V_F$ | dual c.c. | | | **PMEG6010CPA** | |
| | | 650 | 0.35 | low $V_F$ | dual series | BAT160S | | | |
| | | | | low $V_F$ | dual c.c. | BAT160C | | | |
| | | | | low $V_F$ | dual c.a. | BAT160A | | | |
| 2.0 | 20 | 420 | 1.0 | low $V_F$ | dual c.c. | | | **PMEG2020CPA** | |
| | 30 | 440 | 2.0 | low $V_F$ | dual c.c. | | | **PMEG3020CPA** | |

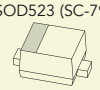
# Low capacitance Schottky diodes

| $I_F$ max (mA) | $V_R$ max (V) | $V_F$ max (mV) @ $I_F$ (mA) | | $C_d$ max (pF) @ $V_R$ = 0 V | Package | SOT23 | SOT323 (SC-70) | SOT363 (SC-88) | SOD323 (SC-76) | SOT666 | SOD523 (SC-79) | SOD882 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Size (mm) | 2.9 x 1.3 x 1.0 | 2.0 x 1.25 x 0.95 | 2.0 x 1.25 x 0.95 | 1.7 x 1.25 x 0.95 | 1.6 x 1.2 x 0.55 | 1.2 x 0.8 x 0.6 | 1.0 x 0.6 x 0.5 |
| | | | | | $P_{tot}$ (mW) | 250 | 250 | 300 | 400 | 300 | 500 | 250 |
| 30 | 4 | 450 | 1 | 1 | single | BAT17 | | | | | | |
| | | | | | single | | | | 1PS76SB17 | | 1PS79SB17 | |
| | | | | | triple isolated | | | | | 1PS66SB17 | | |
| | | | | | dual series | PMBD353<br>PMBD354 [1] | | | | | | |
| | 15 | 340 | 1 | 1 | single | | 1PS70SB82 | | | | | 1PS10SB82 |
| | | | | | triple isolated | | | 1PS88SB82 | | 1PS66SB82 | | |
| | | | | | dual series | | 1PS70SB84 | | | | | |
| | | | | | dual c.c. | | 1PS70SB85 | | | | | |
| | | | | | dual c.a. | | 1PS70SB86 | | | | | |

[1] diodes have matched capacitance

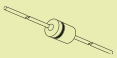
# General purpose Zener diodes

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 | SOD66 (DO-41)  | 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 | SOD27 (DO-35)  | 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 | SOT223 (SC-73)  | 6.5 x 3.5 x 1.65 | 1500 |
| 250 | 40 | 2.4~75 | C | Eur | single  | BZV49 series | SOT89 (SC-62)  | 4.5 x 2.5 x 1.5 | 1000 |
| 250 | 40 | 2.4~75 | B, C | Eur | single  | BZV55 series | SOD80C (MiniMelf)  | 3.5 x 1.5 x 1.5 | 300 |
| 200 | 40 | 2.4~75 | B, C | Eur | dual c.a.  | BZB84 series | SOT23  | 2.9 x 1.3 x 1.0 | 250 |
| | | | A, B, C | | single  | BZX84 series | | | |
| 250 | 30 | 5~6.8 | 0.2 V | Ave | | PLVA600A series | | | |
| | | | 0.2 V | Ave | dual c.a.  | PLVA2600A series | | | |
| 250 | - | 3.0~30 | about 2.5 % | special | single  | **NZH series** | SOD123F  | 2.6 x 1.6 x 1.1 | 830 |
| | 40 | 2.4~75 | C | Eur | | BZT52H series | | | |
| 200 | 40 | 2.7~24 | B2 | Jap | dual isolated  | PZUxDB2 series | SOT353 (SC-88A)  | 2.0 x 1.25 x 0.95 | 300 |
| 200 | 40 | 2.4~15 | C | Eur | dual c.a.  | BZB784 series | SOT323 (SC-70)  | 2.0 x 1.25 x 0.95 | 350 |
| 200 | 30 | 100 | C | Eur | back-to-back  | BZB100A | SOD323 (SC-76)  | 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 | | BZX384 series | | | |
| 200 | 40 | 2.4~36 | B, B1, B2, B3 | Jap | | PZUxBA series | | | |
| 200 | 60 | 100 | C | Eur | single  | BZX100A | SOD323F (SC-90)  | 1.7 x 1.25 x 0.7 | 550 |
| 200 | 40 | 2.4~36 | B, B1, B2, B3 | Jap | | PZUxB series | | | |
| 250 | 40 | 2.4~75 | B, C | Eur | | BZX84J series | | | |
| 200 | 40 | 2.4~15 | C | Eur | dual c.a.  | BZB984 series | SOT663  | 1.6 x 1.2 x 0.55 | 350 |
| 200 | 40 | 2.4~75 | B, C | Eur | single  | BZX585 series | SOD523 (SC-79)  | 1.2 x 0.8 x 0.6 | 300 |
| 200 | 40 | 2.4~75 | B, C | Eur | single  | BZX884 series | SOD882  | 1.0 x 0.6 x 0.5 | 250 |
| | | 2.4~36 | B, B2 | Jap | | PZUxBL series | | | |

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 ≤ 100 V

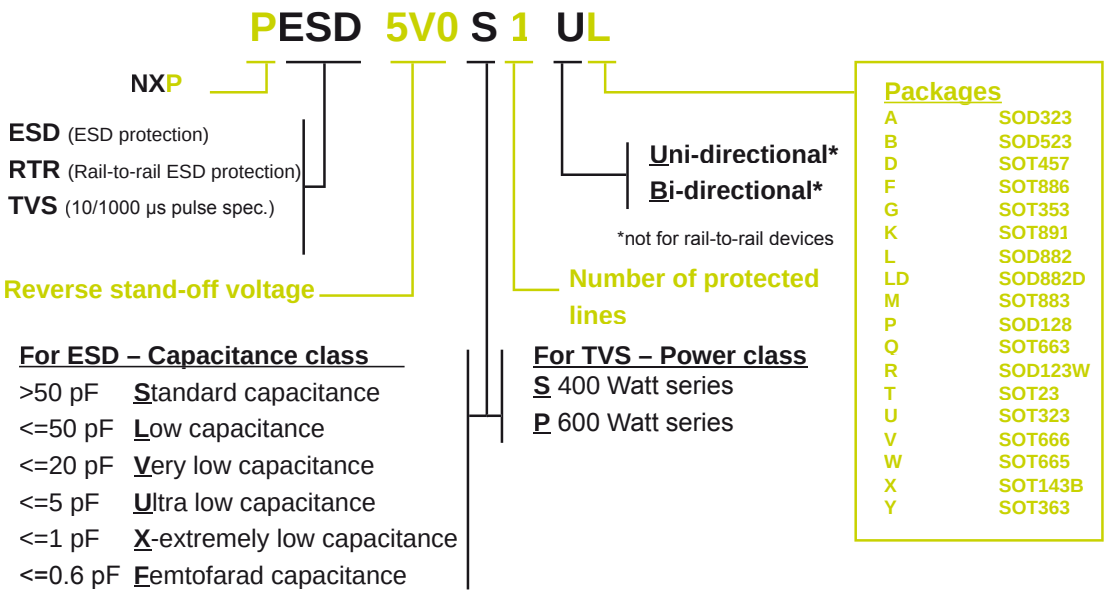
| $V_R$ max (V) | $V_F$ max (V) | @ $I_F$ (mA) | $I_R$ max (nA) | @ $V_R$ (V) | $t_{rr}$ max (ns) | Package | SOD27 (DO-35) | SOD68 (DO-34) | SOD80C (MiniMelf) | SOT23 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | |  |  |  |  | |
| | | | | | | Size (mm) | 4.25 x 1.85 x 0.56 | 3.04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

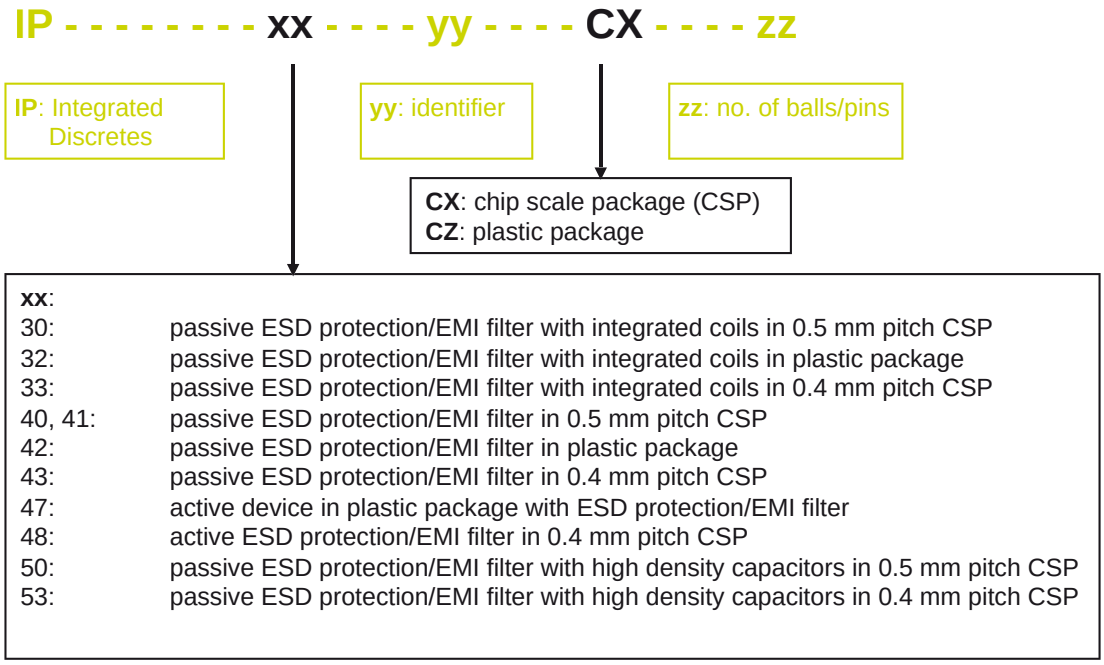
# General purpose switching diodes > 100 V

types in **bold** represent new products

| $V_R$ max (V) | $V_F$ max (V) | @ $I_F$ (mA) | $I_R$ max (nA) | @ $V_R$ (V) | $t_{rr}$ max (ns) | Package | SOD27 (DO-35) | SOD80C (MiniMelf) | SOT457 (SC-74) | SOT23 | SOT143B | SOD123F | SOT323 (SC-70) | SOT363 (SC-88) | SOD323 (SC-76) | SOD323F (SC-90) | SOD523 (SC-79) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Size (mm) | 4.25 x 1.85 x 0.56 | 3.5 x 1.5 x 1.5 | 2.9 x 1.5 x 1.0 | 2.9 x 1.3 x 1.0 | 2.9 x 1.3 x 1.0 | 2.6 x 1.6 x 1.1 | 2.0 x 1.25 x 0.95 | 2.0 x 1.25 x 0.95 | 1.7 x 1.25 x 0.95 | 1.7 x 1.25 x 0.7 | 1.2 x 0.8 x 0.6 |
| | | | | | | $P_{tot}$ (mW) | 500 | 300 | 500 | 250 | 250 | 830 | 350 | 300 | 400 | 550 | 500 |
| 150 | 1 | 100 | 100 | 150 | 50 |  | BAV20 | | | | | | | | | | |
| ≥200 | 1 | 100 | 100 | 150 | 50 |  | BAV21 | BAV103 | | | | BAS21H | | | BAS321 | | |
| | | | | 200 | |  | | | | BAS21 | | | **BAS21W** | | | | |
| | | | | | |  | | | | | BAV23 | | | | | | |
| | | | | | |  | | | | BAV23A | | | **BAS21AW** | | | | |
| | | | | | |  | | | | BAV23C | | | | | | | |
| | | | | | |  | | | | BAV23S | | | **BAS21SW** | | | | |
| | | | | | |  | | | BAS21VD | | | | | | | | |
| 300 | 1.1 | 100 | 150 | 250 | 50 |  | | | | | | | | | | BAS21J | BAS521 |
| | | | | | |  | | | | BAS101 | | | | | | | |
| | | | | | |  | | | | BAS101S | | | | | | | |
| | | | | | |  | | | | | BAW101 | | | | | | |
| | | | | | |  | | | | | | | | BAW101S | | | |

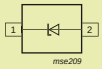
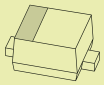
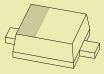
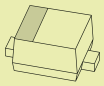
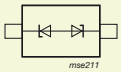
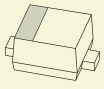
# Protection and signal conditioning nomenclature



# Standard ESD protection devices

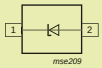
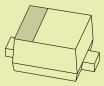
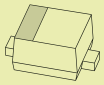
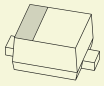
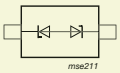
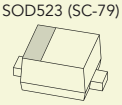
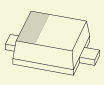
types in **bold** represent new products

| Number of protected lines | | $V_{RWM}$ (V) | $C_{line}$ typ (pF) | $C_{line}$ max (pF) | $P_{PP}$ [1] max (W) | ESD rating [2] 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 | | **PESD5V0S1ULD** | SOD882D  | 1.0 x 0.6 x 0.37 |
| | | 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 | | |
| | | 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 | | |
| 0 | 1 | 5 | 35 | 45 | 130 | 30 | 0.1 |  | PESD5V0S1BL | SOD882  | 1.0 x 0.6 x 0.5 |
| | | 5 | 35 | 45 | 130 | 30 | 0.1 | | **PESD5V0S1BLD** | SOD882D  | 1.0 x 0.6 x 0.37 |
| | | 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 |

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

[2] acc. to IEC 61000-4-2 (contact discharge)

# Low capacitance ESD protection devices

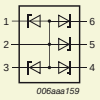
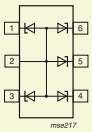
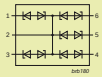
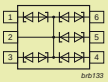
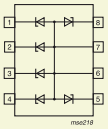
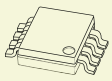
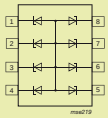
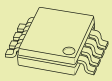
| Number of protected lines | | $V_{RWM}$ (V) | $C_{line}$ typ (pF) | $C_{line}$ max (pF) | $P_{PP}$ [1] max (W) | ESD rating [2] max (kV) | $I_R$ max (µA) @ $V_{RWM}$ | Configuration | Type | Package | Size (mm) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Unidirectional | Bidirectional | | | | | | | | | | |
| 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 | | |
| | | 3.3 | 34 | 40 | 45 | 30 | 0.3 | | PESD3V3L1UB | SOD523 (SC-79)  | 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)  | 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  | 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)  | 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)  | 1.7 x 1.25 x 0.95 |
| | | 5 | 2 | 2.6 | - | 9 | 0.1 | | PESD5V0U1UA | | |
| 0 | 1 | 3.3 | 101 | - | 500 | 30 | 2 | | PESD3V3L1BA | | |
| | | 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 | 11 | 13 | 45 | 30 | 0.01 | | PESD5V0V1BL | SOD882  | 1.0 x 0.6 x 0.5 |
| | | 5 | 11 | 13 | 45 | 30 | 0.01 | | PESD5V0V1BB | SOD523 (SC-79)  | 1.2 x 0.8 x 0.6 |
| | | 5 | 11 | 13 | 45 | 30 | 0.01 |  | PESD5V0V1BA | SOD323 (SC-76)  | 1.7 x 1.25 x 0.95 |
| | | 5 | 2.9 | 3.5 | - | 10 | 0.1 | | PESD5V0U1BL | SOD882  | 1.0 x 0.6 x 0.5 |
| | | 5 | 2.9 | 3.5 | - | 10 | 0.1 | | PESD5V0U1BB | SOD523 (SC-79)  | 1.2 x 0.8 x 0.6 |
| | | 5 | 2.9 | 3.5 | - | 10 | 0.1 | | PESD5V0U1BA | SOD323 (SC-76)  | 1.7 x 1.25 x 0.95 |

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

[2] acc. to IEC 61000-4-2 (contact discharge)

# Low capacitance ESD protection devices

types in **bold** represent new products

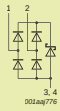
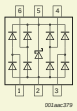
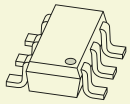
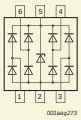
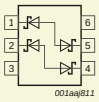
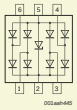
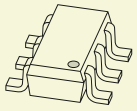
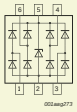
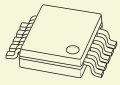
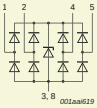
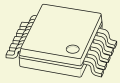
| Number of protected lines | | $V_{RWM}$ (V) | $C_{line}$ typ (pF) | $C_{line}$ max (pF) | $P_{PP}$ [1] max (W) | ESD rating [2] max (kV) | $I_R$ max (µA) @ $V_{RWM}$ | Configuration | Type | Package | Size (mm) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Unidirectional | Bidirectional | | | | | | | | | | |
| 0 | 4 | 5 | 2.9 | 3.5 | - | 10 | 0.1 |  | PESD5V0U4BF | SOT886 (XSON6)  | 1.45 x 1.0 x 0.5 |
| | | 5 | 2.9 | 3.5 | - | 10 | 0.1 |  | PESD5V0U4BW | SOT665  | 1.6 x 1.2 x 0.55 |
| 5 | 4 | 3.3 | 22 | | 25 | 20 | 1 |  | **PESD3V3L5UK** | SOT891 (XSON6)  | 1.0 x 1.0 x 0.5 |
| | | 5 | 16 | | 25 | 20 | 0.025 | | **PESD5V0L5UK** | | |
| | | 3.3 | 22 | 28 | 25 | 20 | 0.3 | | PESD3V3L5UF | SOT886 (XSON6)  | 1.45 x 1.0 x 0.5 |
| | | 5 | 16 | 19 | 25 | 20 | 0.025 | | PESD5V0L5UF | | |
| | | 3.3 | 22 | 28 | 25 | 20 | 0.3 |  | PESD3V3L5UV | SOT666  | 1.6 x 1.2 x 0.55 |
| | | 5 | 16 | 19 | 25 | 20 | 0.025 | | PESD5V0L5UV | | |
| | | 3.3 | 22 | 28 | 25 | 20 | 0.3 | | PESD3V3L5UY | SOT363 (SC-88)  | 2.0 x 1.25 x 0.95 |
| | | 5 | 16 | 19 | 25 | 20 | 0.025 | | PESD5V0L5UY | | |
| 0 | 5 | 5 | 2.9 | 3.5 | - | 10 | 0.1 |  | PESD5V0U5BF | SOT886 (XSON6)  | 1.45 x 1.0 x 0.5 |
| | | 5 | 2.9 | 3.5 | - | 10 | 0.1 |  | PESD5V0U5BV | SOT666  | 1.6 x 1.2 x 0.55 |
| 6 | 5 | 5 | 16 | 19 | 35 | 20 | 0.025 |  | PESD5V0L6UAS | SOT505 (TSSOP8)  | 3.0 x 3.0 x 1.1 |
| | | 5 | 16 | 19 | 35 | 20 | 0.025 | | PESD5V0L6US | SOT96 (SO8)  | 4.9 x 3.9 x 1.75 |
| 0 | 7 | 5 | 8 | 10 | 35 | 10 | 0.025 |  | PESD5V0L7BAS | SOT505 (TSSOP8)  | 3.0 x 3.0 x 1.1 |
| | | 5 | 8 | 10 | 35 | 10 | 0.025 | | PESD5V0L7BS | SOT96 (SO8)  | 4.9 x 3.9 x 1.75 |

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

[2] acc. to IEC 61000-4-2 (contact discharge)

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

types in **bold** represent new products

| Number of protected lines | | $V_{RWM}$ (V) | $C_{line}$ typ (pF) | $C_{line}$ max (pF) | ESD rating [2] max (kV) | $I_R$ max (µA) @ $V_{RWM}$ | Configuration | Type | Package | Size (mm) |
|---|---|---|---|---|---|---|---|---|---|---|
| Unidirectional | Bidirectional | | | | | | | | | |
| 2 | 0 | 5.5 | 0.7 | - | 8 | - |  | **IP4282CZ6** | SOT886 (XSON6)  | 1.45 x 1.0 x 0.5 |
| | | 5.5 | 1.3 | - | 15 | - |  | **IP4359CX4** | CSP  | 0.76 x 0.76 x 0.61 |
| 4 | 0 | 5.5 | 1 | - | 8 | - |  | IP4220CZ6 | SOT457 (SC-74)  | 2.9 x 1.5 x 1.0 |
| | | 5.5 | 1 | - | 8 | - |  | IP4221CZ6-S | SOT886 (XSON6)  | 1.45 x 1.0 x 0.5 |
| | | 5.5 | 1 | - | 8 | - |  | IP4221CZ6-XS | SOT891 (XSON6)  | 1.0 x 1.0 x 0.5 |
| | | 5.5 | 1 | - | 8 | - |  | **IP4233CZ6** | SOT363 (SC-88)  | 2.0 x 1.25 x 0.95 |
| | | 5.5 | 1 | - | 8 | - |  | PRTR5V0U4AD | SOT457 (SC-74)  | 2.9 x 1.5 x 1.0 |
| | | 5.5 | 1 | - | 8 | - |  | PRTR5V0U4D | | |
| | | 5.5 | 1 | - | 8 | - | | PRTR5V0U4Y | SOT363 (SC-88)  | 2.0 x 1.25 x 0.95 |
| | | 5.5 | 0.7 | - | 8 | - |  | IP4280CZ10 | SOT552 (TSSOP10)  | 3.0 x 3.0 x 1.1 |
| | | 5.5 | 0.7 | - | 8 | - |  | IP4281CZ10 | SOT1059 (XSON10U)  | 1.0 x 2.5 x 0.5 |
| | | 5.5 | 0.6 | - | 8 | - | | IP4283CZ10-TB | | |
| | | 5.5 | 0.6 | - | 8 | - | | IP4283CZ10-TT | SOT552 (TSSOP10)  | 3.0 x 3.0 x 1.1 |

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

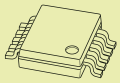
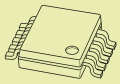
# Audio interfaces

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 Ω | 290 | - | Low-ohmic speaker (< ~8 Ω) | IP4047CX6/LF | 6 ball CSP | 1.56 x 1.01 x 0.65 |
| | | 10 Ω | 200 | - | Low-ohmic speaker (> ~8 Ω) | IP4048CX5/LF | 5 ball CSP | 0.91 x 1.28 x 0.65 |
| | | 15 Ω | 5000 | - | Low-ohmic speaker (> ~8 Ω) | IP5311CX5/LF | | 0.80 x 1.16 x 0.61 |
| | | 68 Ω | 110 | - | Single-ended or differential microphone | IP4049CX5/LF | | 0.91 x 1.28 x 0.65 |
| | | 470 Ω | 35 | - | Single-ended or differential microphone | IP4055CX6/LF | 6 ball CSP | 1.56 x 1.03 x 0.65 |
| | | 470 Ω | 20 | - | Single-ended or differential microphone | IP4355CX6/LF | | 1.16 x 0.76 x 0.65 |
| | | 50 Ω / 2.2 kΩ | 2000 | - | Single-ended to quasi-differential microphone channel with integrated biasing network | IP5002CX8/LF | 8 ball CSP | 1.67 x 1.67 x 0.65 |
| | | 2.25 kΩ | 4000 | - | Differential microphone filter with integrated biasing network for ∑Δ ADC converters | IP5006CX11/LF | 11 ball CSP | 1.41 x 1.91 x 0.65 |
| | | 5 Ω / 20 Ω / 1.5 kΩ | 550 | - | Differential microphone filter with integrated biasing network for ∑Δ including coupling capacitors | IP5020CX16/LF | 16 ball CSP | 2.01 x 1.91 x 0.65 |
| | | 0.25 Ω, 3 nH | - | - | Inductive, low-ohmic differntial channel LC filter | **IP3047CX6** | 6 ball CSP | 1.60 x 1.15 x 0.65 |
| | | 0.25 Ω, 3 nH | - | - | Inductive, low-ohmic differntial channel LC filter | **IP3048CX5** | 5 ball CSP | 1.51 x 1.15 x 0.65 |
| | | 2.2 kΩ / 1 kΩ / 0.8 kΩ | 0.8 nF / 1.6 nF | - | Differential microphone biasing ESD protection / EMI filtering | IP5306CX8 | 8 ball CSP | 1.19 x 1.19 x 0.61 |
| | 4 | 10 Ω | 5000 | - | Dual differential speaker | IP5040CX11/LF | 11 ball CSP | 1.41 x 2.01 x 0.65 |
| | 6 | 15 Ω / 95 Ω | 65 / 33 | - | Single-ended microphone and high-ohmic speaker (> ~8 Ω) with integrated 2 kohm pull-up resistor | IP4363CX10/LF | 10 ball CSP | 0.76 x 1.96 x 0.61 |
| | | 40 Ω / 1450 Ω / 10 Ω | 50 / 20 / 200 | - | Fully integrated audio interface protection for differential microphone and differential speaker, including EMI filtering and pull up resistors | IP4025CX20/LF | 20 ball CSP | 1.98 x 2.53 x 0.65 |
| | | 40 Ω / 1450 Ω / 10 Ω | 50 / 20 / 200 | - | Fully integrated audio interface protection for differential microphone and differential speaker, including EMI filtering and pull up resistors | IP4027CX20/LF | | 1.91 x 2.52 x 0.65 |
| | | 50 Ω / 10 Ω | 50 / 100 / 1000 | - | Fully integrated audio interface protection for differential microphone and differential speaker, including EMI filtering and pull up resistors | IP4125CX20/LF | | 2.00 x 2.66 x 0.65 |
| | 8 | 0.8 Ω / 30 Ω / 200 Ω | 20 / 50 / 150 | ~20 | Fully integrated audio interface protection including EMI filtering for microphone and speaker, and additional 4-channel EMI filter | IP4110CX20/LF | | 1.91 x 2.47 x 0.65 |

# Video interfaces

types in **bold** represent new products

| Baseband interface | Number of protected lines | Buffer | Level shifter | $C_{line}$ (pF) | Resistor (Ω) | Remark | Type | Package | Size (mm) |
|---|---|---|---|---|---|---|---|---|---|
| HDMI | 4 | - | - | 0.6 | - | ESD protection for ultra high speed interfaces | **IP4283CZ10-TB** | SOT1059 (XSON10U)  | 1.0 x 2.5 x 0.5 |
| | | - | - | 0.6 | - | ESD protection for ultra high speed interfaces | **IP4283CZ10-TT** | SOT552 (TSSOP10)  | 3.0 x 3.0 x 1.1 |
| | | - | - | 0.6 | - | ESD protection for ultra high speed interfaces | **IP4286CZ6-TBF** | SOT886 (XSON6)  | 1.45 x 1.0 x 0.5 |
| | | | | | | | **IP4286CZ6-TTY** | SOT363 SC-88)  | 2.0 x 1.25 x 0.95 |
| | | - | - | 0.5 | - | ESD protection for ultra high speed interfaces | **IP4284CZ10-TB** | SOT1059 (XSON10U)  | 1.0 x 2.5 x 0.5 |
| | | - | - | 0.5 | - | ESD protection for ultra high speed interfaces | **IP4284CZ10-TT** | SOT552 (TSSOP10)  | 3.0 x 3.0 x 1.1 |
| | 5 | - | - | 0.5 | - | ESD protection for up to 5 ultra high speed datalines | **PESD5V0F5BK** | SOT891 (XSON6)  | 1.0 x 1.0 x 0.5 |
| | | - | - | 10 | 1.75 k, 100 k | HDMI, DDC, CEC, hotplug ESD protection and biasing | **IP4310CX8** | 8 ball CSP | 1.16 x 1.16 x 0.61 |
| | 8 | - | - | 1.3 | - | HDMI, TMDS line ESD protection | **IP4309CX9** | 9 ball CSP | 1.16 x 1.16 x 0.61 |
| | 12 | - | yes | 0.7 | - | ESD protection and level shifting for a complete HDMI port | IP4776CZ38 | SOT510 (TSSOP38)  | 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 source port | IP4777CZ38 | | |
| | | yes | yes | 0.7 | - | ESD protection, DDC buffering, noise reduction and Hot Plug application for a complete HDMI sink port | IP4778CZ38 | | |

# Multichannel EMI filter, 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) | Remark | Type | Package | Size (mm) |
|---|---|---|---|---|---|---|---|---|
| | | $R_{line}$ | $C_{line}$ (pF) | | | | | |
| LCD display, camera, keypad | 1 | 75 Ω | 36 | ~40 | EMI filter, ESD protection with common ground | IP4307CX4/LF | 4 ball CSP | 0.76 x 0.76 x 0.61 |
| | | 100 Ω | 30 | ~40 | EMI filter, ESD protection | IP4256CZ3-M | SOT883 (SC-101)  | 1.0 x 0.6 x 0.5 |
| | 2 | 100 Ω | 30 | ~40 | EMI filter, ESD protection | IP4256CZ5-W | SOT665  | 1.6 x 1.2 x 0.5 |
| | | 100 Ω | 30 | ~40 | EMI filter, ESD protection | IP4256CZ6-F | SOT886 (XSON6)  | 1.45 x 1.0 x 0.5 |
| | 4 | 100 Ω | 15 | ~50 | EMI filter, ESD protection | IP4251CZ8-4 | SOT983 (8 pin QFN)  | 1.7 x 1.35 x 0.5 |
| | | 40 Ω | 18 | ~70 | EMI filter, ESD protection | IP4252CZ8-4 | | 1.7 x 1.35 x 0.5 |
| | | 100 Ω | 45 | ~30 | EMI filter, ESD protection | IP4254CZ8-4 | | 1.7 x 1.35 x 0.5 |
| | | 200 Ω | 45 | ~30 | EMI filter, ESD protection | IP4253CZ8-4 | | 1.7 x 1.35 x 0.5 |
| | | 100 Ω | 60 | ~20 | EMI filter, ESD protection plus 4x ESD | IP4054CX15/LF | 15 ball CSP | 2.96 x 1.32 x 0.65 |
| | 6 | 100 Ω | 15 | ~50 | EMI filter, ESD protection | IP4251CZ12-6 | SOT984 (12 pin QFN)  | 2.5 x 1.35 x 0.5 |
| | | 40 Ω | 18 | ~70 | EMI filter, ESD protection | IP4252CZ12-6 | | 2.5 x 1.35 x 0.5 |
| | | 100 Ω | 45 | ~30 | EMI filter, ESD protection | IP4254CZ12-6 | | 2.5 x 1.35 x 0.5 |
| | | 200 Ω | 45 | ~30 | EMI filter, ESD protection | IP4253CZ12-6 | | 2.5 x 1.35 x 0.5 |
| | | 100 Ω | 60 | ~20 | EMI filter, ESD protection | IP4053CX15/LF | 15 ball CSP | 2.96 x 1.32 x 0.65 |
| | | 100 Ω | 30 | ~40 | EMI filter, ESD protection | IP4153CX15/LF | | 2.91 x 1.28 x 0.65 |
| | | 100 Ω | 60 | ~20 | EMI filter, ESD protection | IP4353CX15/LF | | 2.38 x 1.05 x 0.61 |
| | 7 | 70 Ω | 25 | ~40 | EMI filter, ESD protection, extremely small size | IP4337CX18/LF/E | 18 ball CSP | 1.96 x 1.61 x 0.61 |
| | | 125 Ω | 25 | ~60 | 60 nH coils RLC filter | **IP3337CX18/LF** | | 2.11 x 1.81 x 0.61 |
| | 8 | 100 Ω | 15 | ~50 | EMI filter, ESD protection | IP4251CZ16-8 | SOT985 (16 pin QFN)  | 3.3 x 1.35 x 0.5 |
| | | 40 Ω | 18 | ~70 | EMI filter, ESD protection | IP4252CZ16-8 | | 3.3 x 1.35 x 0.5 |
| | | 100 Ω | 45 | ~30 | EMI filter, ESD protection | IP4254CZ16-8 | | 3.3 x 1.35 x 0.5 |
| | | 200 Ω | 45 | ~20 | EMI filter, ESD protection | IP4253CZ16-8 | | 3.3 x 1.35 x 0.5 |
| | | 100 Ω | 50 | ~25 | EMI filter, ESD protection | IP4088CX20/LF | 20 ball CSP | 3.91 x 1.28 x 0.65 |
| | 10 | 125 Ω | 25 | ~60 | 60 nH coils RLC filter | **IP3338CX24/LF** | 24 ball CSP | 2.11 x 2.11 x 0.61 |
| | | 70 Ω | 25 | ~40 | EMI filter, ESD protection, extremely small size | **IP4338CX24/LF** | | 1.96 x 2.01 x 0.61 |
| | | 200 Ω | 50 | ~20 | EMI filter, ESD protection | IP4041CX25/LF | 25 ball CSP | 2.41 x 2.41 x 0.65 |
| | 4 | - | 25 | ~175 | LC low-pass filter | IP3253CZ8 | SOT983 (8 pin QFN)  | 1.7 x 1.35 x 0.5 |
| | 6 | - | 25 | ~175 | LC low-pass filter | IP3253CZ12 | SOT984 (12 pin QFN)  | 2.5 x 1.35 x 0.5 |
| | 8 | - | 25 | ~175 | LC low-pass filter | IP3253CZ16 | SOT985 (16 pin QFN)  | 3.3 x 1.35 x 0.5 |
| | 4 | - | 25 | ~175 | LC low-pass filter | IP3254CZ8 | SOT983 (8 pin QFN)  | 1.7 x 1.35 x 0.5 |
| | 6 | - | 25 | ~175 | LC low-pass filter | IP3254CZ12 | SOT984 (12 pin QFN)  | 2.5 x 1.35 x 0.5 |
| | 8 | - | 25 | ~175 | LC low-pass filter | IP3254CZ16 | SOT985 (16 pin QFN)  | 3.3 x 1.35 x 0.5 |

# 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 Ω / 100 Ω | 10 | ~20 | Integrated low capacitance SIM-card passive filter array & USB ESD protection | **IP4365CX11** | 11 ball CSP | 1.16 x 1.56 x 0.61 |
| | 3 | 47 Ω / 100 Ω | 40 | ~12 | Integrated SIM-card EMI filter and ESD protection | IP4044CX8/LF | 8 ball CSP | 1.46 x 1.49 x 0.65 |
| | | 47 Ω / 100 Ω | 20 | ~20 | Integrated SIM-card EMI filter and ESD protection | IP4064CX8/LF/S | | 1.41 x 1.41 x 0.65 |
| | | 47 Ω / 100 Ω | 20 | ~20 | Smaller size, integrated SIM-card EMI filter and ESD protection | IP4364CX8/LF | | 1.16 x 1.16 x 0.61 |
| | | 47 Ω / 100 Ω | 10 | ~20 | Smaller size, low capacitance integrated SIM-card EMI filter and ESD protection | **IP4366CX8/LF** | | 1.16 x 1.16 x 0.61 |
| | | 47 Ω / 100 Ω | 40 | ~12 | Integrated SIM-card EMI filter and ESD protection | IP4264CZ8-40 | SOT983 (8 pin QFN)  | 1.7 x 1.35 x 0.5 |
| | | 47 Ω / 100 Ω | 20 | ~20 | Integrated SIM-card EMI filter and ESD protection | IP4264CZ8-20 | | 1.7 x 1.35 x 0.5 |
| | | - | 1 | ~240 | Quad channel low capacitance ESD protection | IP4221CZ6-S | SOT886 (XSON6)  | 1.45 x 1.0 x 0.5 |
| SD-card / MMC | 4 | 47 Ω / 13 k Ω / 56 kΩ | 25 | ~30 | MMC ESD protection, pull-up resistors | IP4051CX11/LF | 11 ball CSP | 1.44 x 1.96 x 0.65 |
| | | 50 Ω / 75 kΩ / 7 kΩ | 18 | ~50 | High-speed MMC ESD protection, pull-up resistors | IP4060CX16/LF | 16 ball CSP | 1.96 x 1.97 x 0.65 |
| | 7 | 40 Ω / 50 kΩ / 25 kΩ | 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 Ω / 50 kΩ / 15 kΩ | 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 Ω / 50 kΩ / 15 kΩ | 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 Ω / 50 kΩ / 15 kΩ | - | > 52 | (Mini) SD/SDIO memory card level shifter, and voltage regular, incl. ESD and EMI filter | **IP4853CX24/LF** | 24 ball CSP | 2.01 x 2.01 x 0.61 |

For ultra high speed single line ESD protection please refer to pages 29 - 31

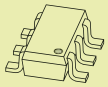
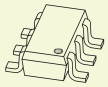
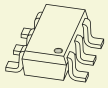
# Battery and charger protection

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 | 0.91 x 0.91 x 0.65 |
| | | 450 | Breakdown 7 V | Power diode | IP4385CX4 | | 0.76 x 0.76 x 0.61 |
| | | 160 | Breakdown 16 V | Power diode | **IP4386CX4** | | 0.76 x 0.76 x 0.61 |
| | | 290 | Breakdown 10 V | Power diode | **IP4387CX4** | | 0.76 x 0.76 x 0.61 |
| | | 160 | $V_{RWM}$ = 12 V | Power diode | PESD12VS1UJ | SOD323F (SC-90)  | 1.7 x 1.25 x 0.7 |
| | | 160 | $V_{RWM}$ = 12 V | Power diode | PESD12VS1UA | SOD323 (SC-76)  | 1.7 x 1.25 x 0.95 |
| | | 480 | $V_{RWM}$ = 5 V | Power diode | PESD5V0S1UJ | SOD323F (SC-90)  | 1.7 x 1.25 x 0.7 |
| | | 480 | $V_{RWM}$ = 5 V | Power diode | PESD5V0S1UA | SOD323 (SC-76)  | 1.7 x 1.25 x 0.95 |

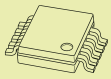
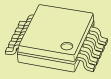
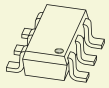
# USB, LVDS, SATA, LAN

types in **bold** represent new products

| Baseband interface | Number of protected lines | $R_{line}$ | $C_{line}$ (pF) | Digital interface clock speed (MHz) | Remark | Type | Package | Size (mm) |
|---|---|---|---|---|---|---|---|---|
| USB2.0 (Plastic package) | 2 | - | 1 | - | ESD protection for up to 2 ultra high speed datalines | PRTR5V0U2K | SOT891 (XSON6)  | 1.0 x 1.0 x 0.5 |
| | | - | 1 | - | ESD protection for up to 2 ultra high speed datalines | PRTR5V0U2D | SOT457 (SC-74)  | 2.9 x 1.5 x 1.0 |
| | | - | 1 | - | ESD protection for up to 2 ultra high speed datalines | PRTR5V0U2F | SOT886 (XSON6)  | 1.45 x 1.0 x 0.5 |
| | 4 | - | 1 | - | ESD protection for USB2.0 high- speed, SD-Card, SIM card | IP4221CZ6-S | | |
| | | - | 1 | - | ESD protection for USB2.0 high- speed, SD-Card, SIM card | IP4220CZ6 | SOT457 (SC-74)  | 2.9 x 1.5 x 1.0 |
| | | - | 1 | - | Dual USB2.0, ESD protection | IP4220CZ6 | | |
| | | - | 1 | - | ESD protection, as IP4220CZ6 but different bonding | PRTR5V0U4AD | | |
| | | - | 1 | - | ESD protection, as IP4220CZ6 but different package | PRTR5V0U4Y | SOT363 (SC-88)  | 2.0 x 1.25 x 0.95 |
| | | - | 1 | - | ESD protection for USB2.0 high-speed, SD-Card, SIM card | IP4221CZ6-S | SOT886 (XSON6)  | 1.45 x 1.0 x 0.5 |
| | | - | 1 | - | ESD protection for USB2.0 high-speed, SD-Card, SIM card | IP4221CZ6-XS | SOT891 (XSON6)  | 1.0 x 1.0 x 0.5 |
| | | 1 | 3 | - | >15 kV IEC contact ESD protection with pi-filter | **IP4225CZ10** | SOT457 (SC-74)  | 2.9 x 1.5 x 1.0 |

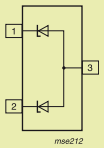
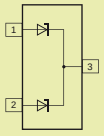
# USB, LVDS, SATA, LAN

types in **bold** represent new products

| Baseband interface | Number of protected lines | $R_{line}$ | $C_{line}$ (pF) | Digital interface clock speed (MHz) | Remark | Type | Package | Size (mm) |
|---|---|---|---|---|---|---|---|---|
| Display port | 4 | - | 0.6 | - | ESD protection for ultra high speed interfaces | **IP4286CZ6-TTY** | SOT363 (SC-88)  | 2.0 x 1.25 x 0.95 |
| | 11 | - | 0.7 | - | ESD protection | IP4790CZ38 | SOT510 (TSSOP38)  | 9.7 x 4.4 x 1.1 |
| LVDS | 10 | - | 5 | - | 100 Ω termination | IP4263CZ14 | SOT108 (SO14)  | 8.65 x 3.9 x 1.75 |
| SATA | 2 | - | 0.7 | - | ESD protection for ultra high speed interfaces | **IP4282CZ6** | SOT886 (XSON6)  | 1.45 x 1.0 x 0.5 |
| | | - | 0.6 | - | ESD protection for ultra high speed interfaces | **IP4286CZ6-TBF** | | |
| | | | | | | **IP4286CZ6-TTY** | SOT363 (SC-88)  | 2.0 x 1.25 x 0.95 |
| | 4 | - | 0.6 | - | ESD protection for ultra high speed interfaces | **IP4283CZ10-TB** | SOT1059 (XSON10U)  | 1.0 x 2.5 x 0.5 |
| | | - | 0.6 | - | ESD protection for ultra high speed interfaces | **IP4283CZ10-TT** | SOT552 (TSSOP10)  | 3.0 x 3.0 x 1.1 |
| | | - | 0.5 | - | ESD protection for ultra high speed interfaces | **IP4284CZ10-TB** | SOT1059 (XSON10U)  | 1.0 x 2.5 x 0.5 |
| | | - | 0.5 | - | ESD protection for ultra high speed interfaces | **IP4284CZ10-TT** | SOT552 (TSSOP10)  | 3.0 x 3.0 x 1.1 |
| IEEE1394 | 4 | 55 | 5 | - | ESD protection and termination for IEEE1394 | IP4224CZ6 | SOT457 (SC-74)  | 2.9 x 1.5 x 1.0 |

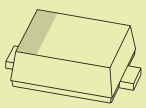
# TVS diodes, 24 W / 40 W

types in **bold** represent new products

| Power (W) (10/1000 µs waveform) [1] | $V_{RWM}$ (V) | $V_{BR}$ min (V) @ $I_R$ | $V_{BR}$ typ (V) @ $I_R$ | $V_{BR}$ max (V) @ $I_R$ | $I_R$ (mA) | ESD rating [2] max (kV) | $C_{line}$ typ (pF) | $V_{CL}$ max (V) @ $I_{PP}$ | $I_{PP}$ (A) | $I_{RM}$ max (µA) @ $V_{RWM}$ | Configuration | Type | Package | Size (mm) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 24 | 3 | 5.32 | 5.6 | 5.88 | 20 | 30 | 210 | 8 | 3 | 5 |  mse212 | **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 |  bra004 | 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 | | |

[1] acc. to IEC 61643-321 [2] acc. to IEC 61000-4-2 (contact discharge)

# TVS diodes, 400 W

| Power (W) (10/1000 µs waveform) [1] | $V_{RWM}$ (V) | $V_{BR}$ min (V) @ $I_R$ | $V_{BR}$ typ (V) @ $I_R$ | $V_{BR}$ max (V) @ $I_R$ | $I_R$ (mA) | $V_{CL}$ max (V) @ $I_{PP}$ | $I_{PP}$ (A) | $I_{RM}$ max (µA) @ $V_{RWM}$ | $I_{RM}$ max (µA) @ $V_{RWM}$ | Type | Package | Size (mm) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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 |
| 400 | 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 | | |
| | 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 | | |

[1] 10/1000 µs acc. to IEC 61643-321

# Single transistors

| 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 |
| $P_{tot}$ (mW) | | | | | | 250 | 200 | 150 | 250 |
| Polarity | $V_{CEO}$ (V) | $I_C$ (mA) | $h_{FE}$ min | $h_{FE}$ max | $f_t$ min (MHz) | | | | |
| NPN | 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 2PD601ARL 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 | |
| | 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 2PD602ARL 2PD602ASL | 2PD1820AR / S | | |
| | 60 | 500 | 50 | - | 100 | | PMSTA05 | | |
| | 80 | 500 | 100 | - | 100 | PMBTA06 | PMSTA06 | | |
| PNP | 30 | 100 | 125 - 220 | 500 - 800 | 100 | BC858B | BC858W | | |
| | 32 | 100 | 120 - 215 | 260 - 500 | 100 | BCW29 / 30 | | | |
| | | | 180 - 380 | 310 - 630 | 100 | BCW61B / C / D | | | |
| | 40 | 100 | 120 - 270 | 270 - 560 | 100 | | | | 2PA1774QM / RM / SM |
| | 45 | 100 | 210 - 290 | 340 - 460 | 70 - 80 | 2PB709ART 2PB709ARL 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 | |
| | 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 2PB710ASL | 2PB1219AQ / R / S | | |
| | 60 | 500 | 100 | - | 50 | | PMSTA55 | | |
| | 80 | 500 | 100 | - | 50 | PMBTA56 | PMSTA56 | | |

# Matched pair transistors

| Package | | | | | | | SOT143B | SOT457 (SC-74) | SOT353 (SC-88A) | SOT363 (SC-88) | | SOT666 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | |  |  |  |  | |  | |
| Size (mm) | | | | | | | 2.9 x 1.3 x 1.0 | 2.9 x 1.5 x 1.0 | 2.0 x 1.25 x 0.95 | 2.0 x 1.25 x 0.95 | | 1.6 x 1.2 x 0.55 | |
| $P_{tot}$ (mW) | | | | | | | 250 | 380 | 300 | 300 | | 300 | |
| Polarity | $V_{CEO}$ (V) | $I_C$ (mA) | $h_{FE}$ min | $h_{FE}$ max | $h_{FE1}$/$h_{FE2}$ | $V_{BE1}$ - $V_{BE2}$ (mV) | | | | | | | |
| NPN | 30 | 100 | 110 | 800 | 0.7 [1] | n.a. | BCV61/A/B/C [1] | | | | | | |
| | 45 | 100 | 200 | 450 | 0.9 [1] | 2 | BCM61B [1] | BCM847DS | | BCM847BS | | BCM847BV | |
| | | | | | 0.95 | 2 | | | PMP4501G | | PMP4501Y | | PMP4501V |
| | | | | | 0.98 | 2 | | | PMP4201G | | PMP4201Y | | PMP4201V |
| | Configuration | | | | | |  |  |  |  |  |  |  |
| PNP | 30 | 100 | 100 | 800 | 0.7 [1] | n.a. | BCV62/A/B/C [1] | | | | | | |
| | 45 | 100 | 200 | 450 | 0.9 [1] | 2 | BCM62B [1] | BCM857DS | | BCM857BS | | BCM857BV | |
| | | | | | 0.95 | 2 | | | PMP5501G | | PMP5501Y | | PMP5501V |
| | | | | | 0.98 | 2 | | | PMP5201G | | PMP5201Y | | PMP5201V |
| | 65 | 100 | 200 | 450 | 0.9 | 2 | | BCM856DS | | BCM856BS | | | |
| | Configuration | | | | | |  |  |  |  |  |  |  |

[1] $I_{C1}/I_{E2}$

## Key features

- Current gain matching to 10 %, 5 % or 2 %
- Base-emitter voltage matching to 2 mV
- Choice of standard double transistor pinout or application-optimized pinout
- Common-emitter configuration for 5-pin type
- Range of small, very small and ultra small packages

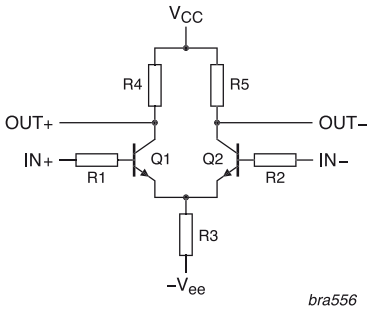
## Key benefits

- Improved performance of current mirror and differential amplifier circuits
- Drop-in replacement for standard double transistors (BCM series)
- Simplified board layout (PMP series)
- Eliminates the need for costly additional trimming

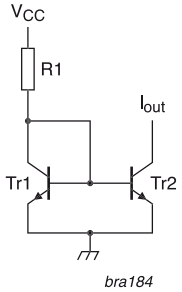
## Key applications

- Current mirrors
- Differential and instrumentation amplifiers
- Logarithmic amplifiers
- Comparators

## Differential amplifier




## Current mirror



# Medium frequency transistors

| Package | | | | | | SOT23 | SOT323 (SC-70) |
|---|---|---|---|---|---|---|---|
| | | | | | |  |  |
| Size (mm) | | | | | | 2.9 x 1.3 x 1.0 | 2.0 x 1.25 x 0.95 |
| $P_{tot}$ (mW) | | | | | | 250 | 200 |
| Polarity | $V_{CEO}$ (V) | $I_C$ (mA) | $h_{FE}$ min | $h_{FE}$ max | $f_T$ typ (MHz) | | |
| NPN | 15 | 100 | 40 | - | 500 | BF570 | |
| | 20 | 25 | 40 | 85 | > 275 | BFS20 | BFS20W |
| | | 30 | 65 | 225 | 260 | BFS19 | |
| | 40 | 25 | 67 | 220 | 380 | BF840 | |
| PNP | 30 | 25 | 25 | 50 | 250 | BF824 | BF824W |
| | 40 | 25 | 50 | - | > 325 | BF550 | |

# Schmitt trigger

| Package | | | | | | | SOT143B |
|---|---|---|---|---|---|---|---|
| | | | | | | |  |
| Size (mm) | | | | | | | 2.9 x 1.3 x 1.0 |
| $P_{tot}$ (mW) | | | | | | | 250 |
| Polarity | $V_{CEO}$ (V) TR1 | $V_{CEO}$ (V) TR2 | $I_C$ (mA) | $h_{FE}$ min | $h_{FE}$ max | $V_{CEsat}$ 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)

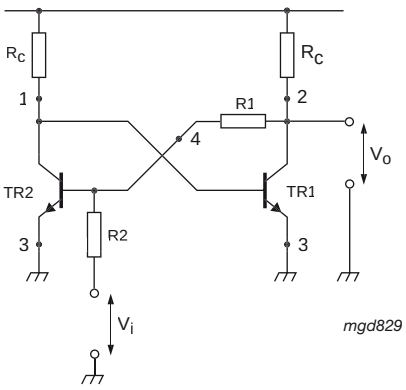
## Key benefits

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

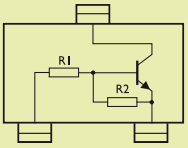
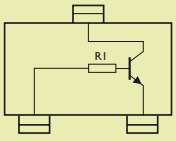
## Key applications

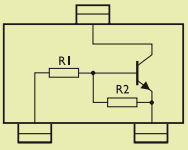
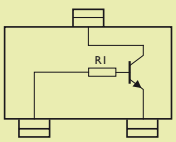
- General purpose switching and amplification
- Schmitt trigger applications

## Schmitt trigger



# 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 | |
| $P_{tot}$ (mW) | | | | | 250 | | 200 | |
| $V_{CEO}$ (V) | $I_C$ (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 |

| 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 | |
| $P_{tot}$ (mW) | | | | | 150 | | 250 | |
| $V_{CEO}$ (V) | $I_C$ (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 |

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

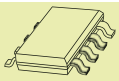
| Package | | | | | | | | | | | SOT223 (SC-73) | SOT89 (SC-62) | SOT457 (SC-74) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | |  |  |  | |
| Size (mm) | | | | | | | | | | | 6.5 x 3.5 x 1.65 | 4.5 x 2.5 x 1.5 | 2.9 x 1.5 x 1.0 | |
| $P_{tot}$ (mW) | | | | | | | | | | | 1700 | 1650 | 750 | |
| $V_{CEO}$ (V) | $I_C$ (A) | $I_{CM}$ (A) | $h_{FE}$ min/typ | @ $I_C$ (A) | @ $V_{CE}$ (V) | $R_{CEsat}$ typ (mΩ); $I_C/I_B$ = 10 | $V_{CEsat}$ typ (mV); $I_C$ = 0.5 A; $I_B$ = 0.05 A | $V_{CEsat}$ max (mV) | @ $I_C$ (A) | @ $I_B$ (A) | | | | |
| 12 | 5.3 | 10.6 | 300/530 | 0.5 | 2 | 27 [1] | 18 | 200 | 5.3 | 0.265 | | PBSS301NX | | |
| | 5.8 | 11.6 | 300/530 | 0.5 | 2 | 29 [1] | 18 | 235 | 5.8 | 0.29 | PBSS301NZ | | | |
| | 6.0 | 7.0 | 280/440 | 0.5 | 2 | 33 [1] | 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 [2] | 250 | 1 | 0.05 | | | | |
| | 2.0 | 4.0 | 220/410 | 0.5 | 2 | 140 | 70 | 350 | 2 | 0.2 | | | | |
| | | 5.0 | 220/330 | 0.1 | 2 | 80 | 45 | 310 | 3 | 0.3 | | | | |
| | 3.0 | 5.0 | 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 [1] | 20 | 200 | 5.3 | 0.265 | | PBSS302NX | | |
| | 5.8 | 10.2 | 300/570 | 0.5 | 2 | 30 [1] | 20 | 250 | 5.8 | 0.29 | PBSS302NZ | | | |
| | 6.0 | 7.0 | 280/440 | 0.5 | 2 | 33 [1] | 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 [2] | 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 | | |
| | 3.5 | 6.0 | 300/500 | 0.5 | 2 | 50 | 70 | 300 | 4 | 0.4 | | | **PBSS4032ND** [3] | |
| | 4.7 | 10.0 | 300/500 | 0.5 | 2 | 45 | 57 | 250 | 4 | 0.4 | | **PBSS4032NX** [3] | | |
| | 5.1 | 10.2 | 300/480 | 0.5 | 2 | 30 [1] | 20 | 220 | 5.1 | 0.255 | | PBSS303NX | | |
| | 5.4 | 10.0 | 300/500 | 0.5 | 2 | 45 | 57 | 340 | 5.4 | 0.27 | **PBSS4032NZ** [3] | | | |
| | 5.5 | 11.0 | 300/480 | 0.5 | 2 | 31 [1] | 20 | 240 | 5.5 | 0.275 | PBSS303NZ | | | |
| | 6.0 | 7.0 | 280/450 | 0.5 | 2 | 35 [1] | 21 | 275 | 6 | 0.3 | | | | |
| 40 | 0.5 | 1.0 | 200/550 | 0.01 | 2 | 380 | 200 [2] | 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 | | | | |
| | | 2.0 | 300/440 | 0.5 | 5 | 240 | 130 | 500 | 1 | 0.1 | | | | |
| | | | 300/510 | 0.5 | 5 | 230 | 120 | 500 | 1 | 0.1 | | | | |
| | | | 300/420 | 0.5 | 5 | 150 | 130 | 500 | 1 | 0.1 | | | | |
| | 2.0 | 3.0 | 300/400 | 0.5 | 5 | 150 | 70 | 400 | 2 | 0.2 | | | | |
| | | | 350/470 | 0.1 | 2 | 120 | 70 | 320 | 2 | 0.2 | | | | |
| | | | 300/450 | 0.5 | 2 | 120 | 70 | 320 | 2 | 0.2 | | | | |
| | 4.0 | 15.0 | 300/520 | 0.5 | 2 | 55 | 35 | 300 | 4 | 0.4 | | | PBSS302ND | |
| | | 10.0 | 300/500 | 0.5 | 2 | 40 | 21 | 355 | 5 | 0.5 | | PBSS4540X | | |
| | 5.0 | 10.0 | 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 [2] | 320 | 2 | 0.2 | | PBSS4250X | | |
| | 3.0 | 5.0 | 200/280 | 0.5 | 2 | 110 | 65 | 290 | 2 | 0.2 | | | PBSS4350D | |
| | | | 300/460 | 0.5 | 2 | 75 | 50 | 370 | 3 | 0.3 | | PBSS4350X | | |
| | | | 200/280 | 0.5 | 2 | 110 | 60 [1] | 290 | 2 | 0.2 | PBSS4350Z | | | |
| 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 | | | | |
| | | | 200/350 | 0.5 | 5 | 200 | 110 | 250 | 1 | 0.1 | | | | |
| | 3.0 | 6.0 | 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 [1] | 25 | 245 | 4.7 | 0.235 | | PBSS304NX | | |
| | 5.2 | 10.4 | 300/520 | 0.5 | 2 | 39 [1] | 25 | 280 | 5.2 | 0.26 | PBSS304NZ | | | |
| | 6.0 | 7.0 | 280/440 | 0.5 | 2 | 34 [1] | 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 [1] | 25 | 230 | 4 | 0.2 | | PBSS4480X | | |
| | 4.6 | 9.2 | 300/470 | 0.5 | 2 | 37 [1] | 25 | 240 | 4.6 | 0.23 | | PBSS305NX | | |
| | 5.1 | 10.2 | 300/470 | 0.5 | 2 | 38 [1] | 25 | 270 | 5.1 | 0.255 | PBSS305NZ | | | |
| | 5.6 | 7.0 | 270/425 | 0.5 | 2 | 40 [1] | 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 [1] | 27 | 245 | 4.5 | 0.225 | | PBSS306NX | | |
| | 5.1 | 10.2 | 200/330 | 0.5 | 2 | 43 [1] | 27 | 300 | 5.1 | 0.255 | PBSS306NZ | | | |
| | 5.2 | 6.0 | 180/285 | 0.5 | 2 | 48 [1] | 30 | 340 | 5.2 | 0.26 | | | | |

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

| Package | | | | | | | | | | | SOT223 (SC-73) | SOT89 (SC-62) | SOT457 (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 |
| $P_{tot}$ (mW) | | | | | | | | | | | 1700 | 1650 | 750 |
| $V_{CEO}$ (V) | $I_C$ (A) | $I_{CM}$ (A) | $h_{FE}$ min/typ | @ $I_C$ (V) | @ $V_{CE}$ (V) | $R_{CEsat}$ typ (mΩ); $I_C/I_B$ = 10 | $V_{CEsat}$ typ (mV); $I_C$ = 0.5 A; $I_B$ = 0.05 A | $V_{CEsat}$ max (mV) | @ $I_C$ (A) | @ $I_B$ (A) | | | |
| 12 | 5.3 | 10.6 | 250/400 | 0.5 | 2 | 28 [1] | 20 | 210 | 5.3 | 0.265 | | PBSS301PX | |
| | 5.7 | 11.4 | 250/400 | 0.5 | 2 | 30 [1] | 20 | 245 | 5.7 | 0.285 | PBSS301PZ | | |
| | 6.0 | 7.0 | 220/335 | 0.5 | 2 | 33 [1] | 20 | 300 | 6 | 0.3 | | | |
| 15 | 0.5 | 1.0 | 200/260 | 0.01 | 2 | 300 | 150 | 250 | 0.5 | 0.05 | | | |
| | | | 200/325 | 0.01 | 2 | 300 | 150 | 250 | 0.5 | 0.05 | | | |
| 20 | 1.0 | 2.0 | 300/450 | 0.1 | 2 | 250 | 125 [2] | 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 [2] | 225 | 2 | 0.2 | | | |
| | | 5.0 | 220/420 | 0.5 | 2 | 75 | 50 | 210 | 2 | 0.2 | | | |
| | 3.0 | 5.0 | 200/ - | 0.5 | 2 | 85 | 80 [2] | 400 | 3 | 0.3 | | | PBSS5320D |
| | | | 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 [1] | 25 | 230 | 5.1 | 0.255 | | PBSS302PX | |
| | 5.5 | 11.0 | 250/370 | 0.5 | 2 | 34 [1] | 25 | 265 | 5.5 | 0.275 | PBSS302PZ | | |
| | 6.0 | 7.0 | 230/345 | 0.5 | 2 | 39 [1] | 25 | 350 | 6 | 0.3 | | | |
| | 6.2 | 15.0 | 250/400 | 0.5 | 2 | 25 | 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** [3] |
| | 3.0 | 5.0 | 200/380 | 0.5 | 2 | 80 | 50 | 320 | 3 | 0.3 | | PBSS5330X | |
| | 4.2 | 10.0 | 200/350 | 0.5 | 2 | 58 | 70 | 345 | 4 | 0.4 | | **PBSS4032PX** [3] | |
| | 4.4 | 10.0 | 200/350 | 0.5 | 2 | 58 | 70 | 400 | 4 | 0.2 | **PBSS4032PZ** [3] | | |
| | 5.1 | 10.2 | 250/400 | 0.5 | 2 | 32 [1] | 25 | 230 | 5.1 | 0.255 | | PBSS303PX | |
| | 5.3 | 10.6 | 250/400 | 0.5 | 2 | 35 [1] | 25 | 265 | 5.3 | 0.265 | PBSS303PZ | | |
| | 6.0 | 7.0 | 200/335 | 0.5 | 2 | 39 [1] | 25 | 350 | 6 | 0.3 | | | |
| 40 | 0.5 | 1.0 | 200/380 | 0.01 | 2 | 440 | 220 | 350 | 0.5 | 0.05 | | | |
| | | | 200/380 | 0.01 | 2 | 440 | 230 | 350 | 0.5 | 0.05 | | | |
| | 1.0 | 2.0 | 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 | | | |
| | | | 300/510 | 0.1 | 5 | 230 | 130 | 500 | 1 | 0.1 | | | |
| | 1.8 | 3.0 | 300/450 | 0.1 | 5 | 185 | 100 | 530 | 2 | 0.2 | | | |
| | 2.0 | 3.0 | 300/ - | 0.1 | 2 | 200 | 110 [2] | 350 | 2 | 0.2 | | | |
| | | | 300/450 | 0.1 | 2 | 150 | 70 | 350 | 2 | 0.2 | | | |
| | 4.0 | 15.0 | 200/310 | 0.5 | 2 | 55 | 46 | 300 | 4 | 0.4 | | | PBSS302PD |
| | | 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 [1] | 160 | 2 | 0.2 | PBSS5540Z | | |
| 50 | 2.0 | 3.0 | 200/ - | 0.5 | 2 | 150 | 90 [2] | 300 | 2 | 0.1 | | | |
| | | 5.0 | 200/360 | 0.5 | 2 | 90 | 55 | 270 | 2 | 0.2 | | | |
| | | | 200/ - | 0.5 | 2 | 160 | 90 [2] | 320 | 2 | 0.2 | | PBSS5250X | |
| | 3.0 | 5.0 | 200/300 | 0.5 | 2 | 120 | 70 | 300 | 2 | 0.2 | | | PBSS5350D |
| | | | 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 | | | |
| | | | 150/250 | 0.5 | 5 | 255 | 135 | 340 | 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 [1] | 35 | 310 | 4.2 | 0.21 | | PBSS304PX | |
| | 4.5 | 9.0 | 200/295 | 0.5 | 2 | 59 [1] | 35 | 375 | 4.5 | 0.225 | PBSS304PZ | | |
| | 5.0 | 6.0 | 170/260 | 0.5 | 2 | 35 [1] | 55 | 450 | 5 | 0.25 | | | |
| | | 15.0 | 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 | 5.0 | 180/265 | 0.5 | 2 | 65 [1] | 40 | 420 | 4 | 0.2 | | | |
| | | 10.0 | 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 [1] | 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 [1] | 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 | | |

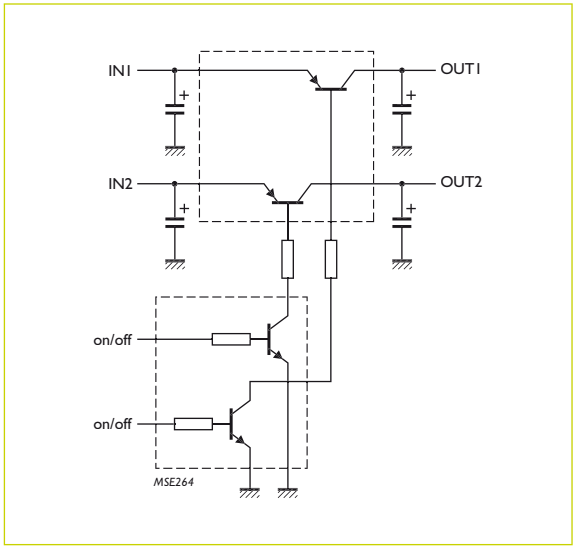
# Low $V_{CEsat}$ (BISS) transistors double

types in **bold** represent new products

| 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 |
| $P_{tot}$ (mW) | | | | | | | | | | 2000 [2] | 750 | 430 | 500 |
| $V_{CEO}$ (V) | $I_C$ (A) | Polarity | $h_{FE}$ min | @ $I_C$ (A) | @ $V_{CE}$ (V) | $V_{CEsat}$ typ (mV); $I_C$ = 0.5 A; $I_B$ = 0.05 A | $V_{CEsat}$ max (mV) | @ $I_C$ (A) | @ $I_B$ (A) | | | | |
| 15 | 0.5 | 2 x NPN | 200 | 0.01 | 2 | 170 [1] | 250 | 0.5 | 0.05 | | | | PBSS2515VS |
| | | 2 x PNP | 200 | 0.01 | 2 | 170 [1] | 250 | 0.5 | 0.05 | | | | PBSS3515VS |
| | | NPN/PNP | 200 | 0.01 | 2 | 170 [1] | 250 | 0.5 | 0.05 | | | | PBSS2515VPN |
| | | NPN/PNP | 200 | 0.01 | 2 | 170 [1] | 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** [3] | | | |
| | 4.8 | PNP/PNP | 200 | 0.5 | 2 | 70 | 390 | 4 | 0.4 | **PBSS4032SP** [3] | | | |
| | 5.7 / 4.8 | NPN/PNP | 300/200 | 0.5 | 2 | 57/70 | 250/390 | 4 | 0.4 | **PBSS4032SPN** [3] | | | |
| 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** | | | |

[1] $I_c/I_b$=20
[2] Device mounted on a ceramic PCB, Al2O3, standard footprint.
[3] Optimized for high speed switching

## Dual load switch using double RETs and double BISS transistors



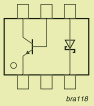
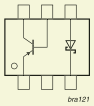
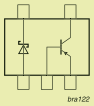
# High voltage low $V_{CEsat}$ (BISS) transistors

types in **bold** represent new products

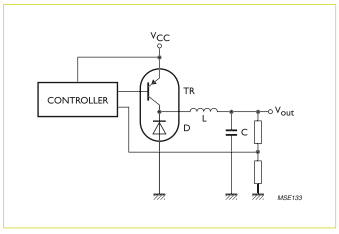
| Package | | | | SOT223 (SC-73) | SOT89 (SC-62) | SOT23 |
|---|---|---|---|---|---|---|
| | | | |  |  |  |
| Size (mm) | | | | 6.5 x 3.5 x 1.65 | 4.5 x 2.5 x 1.5 | 2.9 x 1.3 x 1.0 |
| $P_{tot}$ (mW) | | | | 1700 | 1300 | 250 |
| Polarity | $V_{CESM}$ [1] | $V_{CEO}$ (V) | $I_C$ (A) | | | |
| NPN | - | 150 | 1 | PBHV8115Z | | PBHV8115T |
| | | | 2 | **PBHV8215Z** | | |
| | 500 | 400 | 0.5 | PBHV8540Z | | PBHV8540T |
| | | | 1 | **PBHV8140Z** | | |
| | | 500 | 0.15 | | | **PMBTA45** |
| | | | 0.4 | **PBHV8550Z** | | |
| PNP | - | 150 | 1 | PBHV9115Z | **PBHV9115X** | PBHV9115T |
| | | | 2 | **PBHV9215Z** | | |
| | 500 | 400 | 0.25 | PBHV9040Z | | PBHV9040T |
| | | | 0.5 | **PBHV9540Z** | | |
| | | 500 | 0.15 | | | **PBHV9050T** |
| | | | 0.25 | **PBHV9050Z** | | |

[1] Collector-emitter peak voltage

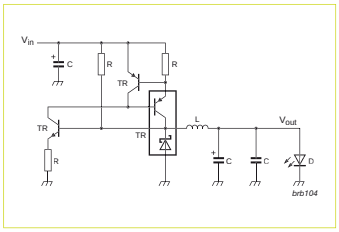
# Low $V_{CEsat}$ modules – Schottky diode / (BISS) transistor

| Package | | | | | | | SOT457 (SC-74) | SOT353 (SC-88A) |
|---|---|---|---|---|---|---|---|---|
| | | | | | | |  |  |
| Size (mm) | | | | | | | 2.9 x 1.5 x 1.0 | 2.0 x 1.25 x 0.95 |
| $P_{tot}$ (mW) | | | | | | | 500 | 250 |
| Transistor | | | Schottky rectifier | | | Configuration | | |
| $V_{CEO}$ max (V) | $I_C$ max (A) | $V_{CEsat}$ max (mV) | $I_F$ max (A) | $V_R$ max (V) | $V_F$ max (mV) | | | |
| 15 | 0.5 | 250 | 0.5 | 20 | 390 |  | | PMEM1505NG |
| 40 | 1.0 | 210 | 1 | 20 | 550 |  | PMEM4010ND | |
| | 2.0 | 400 | 1 | 20 | 550 | | PMEM4020ND | |
| | | | | 40 | 640 | | PMEM4020AND | |
| 15 | 0.5 | 250 | 0.5 | 20 | 390 |  | | PMEM1505PG |
| 40 | 1.0 | 410 | 1 | 20 | 550 |  | PMEM4010PD | |
| | 2.0 | 530 | 1 | 20 | 550 | | PMEM4020PD | |
| | | | | 40 | 640 | | PMEM4020APD | |

## Step-down DC/DC converter




## Power LED driver




## Key features

- Combination of low $V_F$ (MEGA) Schottky rectifier and low $V_{CEsat}$ (BISS) transistor in one package
- High forward current capability
- Low power dissipation

## Key benefits

- Reduced component count
- Space savings of up to 32 %
- Higher efficiency
- Higher power density
- Cost reduction potential
- Simplified circuit design

## Key applications

- DC/DC conversion
- Inductive load driver
- Push-pull driver

# Medium power low $V_{CEsat}$ (BISS) transistors NPN

types in **bold** represent new products

| Package | | | | | | | | | | | | SOT223 (SC-73) | SOT89 (SC-62) | SOT457 (SC-74) | SOT1061 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | |  |  |  |  |
| 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 | 2.0 x 2.0 x 0.65 |
| $P_{tot}$ (mW) | | | | | | | | | | | | 1700 | 1650 | 750 | 1400 |
| Polarity | $V_{CEO}$ (V) | $I_C$ (A) | $I_{CM}$ (A) | $h_{FE}$ min/typ | @ $I_C$ (A) | @ $V_{CE}$ (V) | $R_{CEsat}$ typ (mΩ); $I_C/I_B$ = 10 | $V_{CEsat}$ typ (mV); $I_C$ = 0.5A; $I_B$ = 0.05A | $V_{CEsat}$ max (mV) | @ $I_C$ (A) | @ $I_B$ (A) | | | | |
| NPN | 12 | 5.3 | 10.6 | 300/530 | 0.5 | 2 | 27 [1] | 18 | 200 | 5.3 | 0.265 | | PBSS301NX | | |
| | | 5.8 | 11.6 | 300/530 | 0.5 | 2 | 29 [1] | 18 | 235 | 5.8 | 0.29 | PBSS301NZ | | | |
| | | 6.0 | 7.0 | 280/440 | 0.5 | 2 | 33 [1] | 20 | 275 | 6 | 0.3 | | | | **PBSS4612PA** |
| | 20 | 3.0 | 5.0 | 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 | |
| | | 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 [1] | 20 | 200 | 5.3 | 0.265 | | PBSS302NX | | |
| | | 5.8 | 10.2 | 300/570 | 0.5 | 2 | 30 [1] | 20 | 250 | 5.8 | 0.29 | PBSS302NZ | | | |
| | | 6.0 | 7.0 | 280/440 | 0.5 | 2 | 33 [1] | 20 | 275 | 6 | 0.3 | | | | **PBSS4620PA** |
| | | 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 | 3.0 | 5.0 | 300/490 | 0.5 | 2 | 80 | 45 | 300 | 3 | 0.3 | | PBSS4330X | | **PBSS4330PA** |
| | | 3.5 | 6.0 | 300/500 | 0.5 | 2 | 50 | 70 | 300 | 4 | 0.4 | | | **PBSS4032ND** [3] | |
| | | 4.7 | 10.0 | 300/500 | 0.5 | 2 | 45 | 57 | 250 | 4 | 0.4 | | **PBSS4032NX** [3] | | |
| | | 5.1 | 10.2 | 300/480 | 0.5 | 2 | 30 [1] | 20 | 220 | 5.1 | 0.255 | | PBSS303NX | | |
| | | 5.4 | 10.0 | 300/500 | 0.5 | 2 | 45 | 57 | 340 | 5.4 | 0.27 | **PBSS4032NZ** [3] | | | |
| | | 5.5 | 11.0 | 300/480 | 0.5 | 2 | 31 [1] | 20 | 240 | 5.5 | 0.275 | PBSS303NZ | | | |
| | | 6.0 | 7.0 | 280/450 | 0.5 | 2 | 35 | 21 | 275 | 6 | 0.3 | | | | **PBSS4630PA** |
| | 40 | 4.0 | 15.0 | 300/520 | 0.5 | 2 | 55 | 35 | 300 | 4 | 0.4 | | | PBSS302ND | |
| | | | 10.0 | 300/500 | 0.5 | 2 | 40 | 21 | 355 | 5 | 0.5 | | PBSS4540X | | |
| | | 5.0 | 10.0 | 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 [2] | 320 | 2 | 0.2 | | PBSS4250X | | |
| | | 3.0 | 5.0 | 200/280 | 0.5 | 2 | 110 | 65 | 290 | 2 | 0.2 | | | PBSS4350D | |
| | | | | 300/460 | 0.5 | 2 | 75 | 50 | 370 | 3 | 0.3 | | PBSS4350X | | |
| | | | | 200/280 | 0.5 | 2 | 110 | 60 [1] | 290 | 2 | 0.2 | PBSS4350Z | | | |
| | 60 | 3.0 | 6.0 | 345/570 | 0.5 | 2 | 65 | 40 | 260 | 3 | 0.3 | | | PBSS303ND | |
| | | 4.7 | 9.4 | 300/520 | 0.5 | 2 | 37 [1] | 25 | 245 | 4.7 | 0.235 | | PBSS304NX | | |
| | | 5.2 | 10.4 | 300/520 | 0.5 | 2 | 39 [1] | 25 | 280 | 5.2 | 0.26 | PBSS304NZ | | | |
| | | 6.0 | 7.0 | 280/440 | 0.5 | 2 | 34 [1] | 22 | 290 | 6 | 0.3 | | | | **PBSS4560PA** |
| | | 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 [1] | 25 | 230 | 4 | 0.2 | | PBSS4480X | | |
| | | 4.6 | 9.2 | 300/470 | 0.5 | 2 | 37 [1] | 25 | 240 | 4.6 | 0.23 | | PBSS305NX | | |
| | | 5.1 | 10.2 | 300/470 | 0.5 | 2 | 38 [1] | 25 | 270 | 5.1 | 0.255 | PBSS305NZ | | | |
| | | 5.6 | 7.0 | 270/425 | 0.5 | 2 | 40 [1] | 25 | 320 | 5.6 | 0.28 | | | | **PBSS4580PA** |
| | 100 | 1.0 | 3.0 | 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 [1] | 27 | 245 | 4.5 | 0.225 | | PBSS306NX | | |
| | | 5.1 | 10.2 | 200/330 | 0.5 | 2 | 43 [1] | 27 | 300 | 5.1 | 0.255 | PBSS306NZ | | | |
| | | 5.2 | 6.0 | 180/285 | 0.5 | 2 | 48 [1] | 30 | 340 | 5.2 | 0.26 | | | | **PBSS8510PA** |

[1] $I_C/I_B$ = 20
[2] $V_{CEsat}$ (max)
[3] optimized for high speed switching

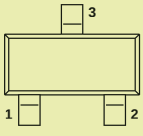
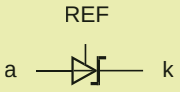
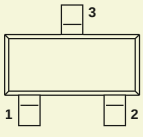
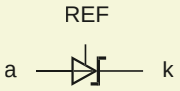
# Adjustable shunt voltage regulator IC

types in **bold** represent new products

| Package | | | | | SOT23 | |
|---|---|---|---|---|---|---|
| | | | | |  | |
| Size (mm) | | | | | 2.9 x 1.3 x 1.0 | |
| $P_{tot}$ (mW) | | | | | 580 | |
| Pinning configuration | | | | | normal pinning *) | mirrored pinning *) |
| $V_{KA}$ (V) | $I_K$ (mA) | $V_{ref}$ | | $T_{amb}$ (°C) | | |
| 20 | 80 | 1.24 V | 1.5% | 0 to 70 | **TLVH431CDBZR** | |
| | | | | -40 to 85 | **TLVH431IDBZR** | |
| | | | | -40 to 125 | **TLVH431QDBZR** | **TLVH431MQDBZR** |
| | | | 1% | 0 to 70 | **TLVH431ACDBZR** | |
| | | | | -40 to 85 | **TLVH431AIDBZR** | |
| | | | | -40 to 125 | **TLVH431AQDBZR** | **TLVH431AMQDBZR** |
| | | | 0.5% | 0 to 70 | **TLVH431BCDBZR** | |
| | | | | -40 to 85 | **TLVH431BIDBZR** | |
| | | | | -40 to 125 | **TLVH431BQDBZR** | **TLVH431BMQDBZR** |
| 36 | 100 | 2.495 V | 2% | 0 to 70 | TL431CDBZR | |
| | | | | -40 to 85 | TL431IDBZR | |
| | | | | -40 to 125 | TL431QDBZR | |
| | | | | | TL431SDT [1)] | TL431MSDT [1)] |
| | | | 1% | 0 to 70 | TL431ACDBZR | |
| | | | | -40 to 85 | TL431AIDBZR | |
| | | | | -40 to 125 | TL431AQDBZR | |
| | | | | | TL431ASDT [1)] | TL431AMSDT [1)] |
| | | | 0.5% | 0 to 70 | TL431BCDBZR | |
| | | | | -40 to 85 | TL431BIDBZR | |
| | | | | -40 to 125 | TL431BQDBZR | |
| | | | | | **TL431BSDT** [1)] | **TL431BMSDT** [1)] |

[1)] optimized for use with dedicated capacitive load

# *Normal pinning vs. mirrored pinning

| | Pin | Symbol | Description | Simplified outline | Grafic symbol |
|---|---|---|---|---|---|
| normal pinning | 1 | k | cathode |  |  |
| | 2 | REF | reference | | |
| | 3 | a | anode | | |
| mirrored pinning | 1 | REF | reference |  |  |
| | 2 | k | cathode | | |
| | 3 | a | anode | | |

# Constant current source

| Package | SOT353 (SC-88A) | | | | | | |
|---|---|---|---|---|---|---|---|
| |  | | | | | | |
| Size (mm) | 2.0 x 1.25 x 0.95 | | | | | | |
| $P_{tot}$ (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 | $V_S$ max (V) | $I_S$ max (mA) | $I_{out}$ typ (µA) | $I_{out}$ min (mA) | $I_{out}$ max (mA) | $\Delta I_{out}/I_{out}$ typ (%) | $\Delta I_{out}/(I_{out} * \Delta T_{amb})_{typ}$ (%/K) |
| Condition | | @ $V_S$ = 12 V; $I_{out}$ = 15 µA; $V_{out}$ = 1 V to 10 V | @ $V_S$ = 12 V; $V_{out}$ = 1 V to 10 V; $R_{ext}$ = open | | | @ $V_S$ = 12 V; $V_{out}$ = 1 V to 10 V | @ $V_S$ = 12 V; $V_{out}$ = 1 V; $T_{amb}$ = -55 °C to 150 °C |
| Value | 75> | 2.2 | 15 | 0.015 | 50 | 0.5 | 0.15 |

## Key features

- Single-chip constant current source
- Output current set by an external resistor
- Very small footprint package

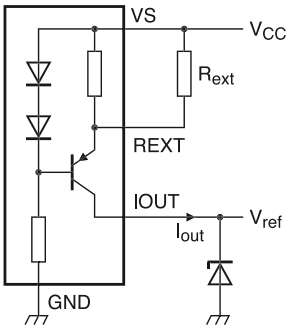
## Key benefits

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

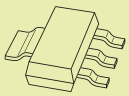
## Key applications

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

## Voltage reference

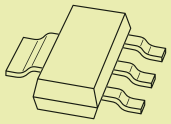


# Small-signal MOSFETs single (N-channel) < 50 V

| Package | | | | | | | | | SOT223 (SC-73) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |  | | | | |
| Size (mm) | | | | | | | | | 6.5 x 3.5 x 1.65 | | | | |
| $P_{tot}$ (mW) | | | | | | | | | 1700 | | | | |
| $V_{DS}$ (V) | $V_{GS}$ (V) | $I_D$ (A) | $V_{GS}$(th) min(V) | $V_{GS}$(th) max(V) | $t_{on}$ typ (ns) | $t_{off}$ typ (ns) | $Q_G$ typ (nC) | ESD protection | $R_{DSon}$ typ (mΩ) @ $V_{gs}$ = | | | | |
| | | | | | | | | | 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 | 6.3 | 2 | 4 | 23 | 71 | 10.6 | - | - | 23 | - | 37 | |
| | | 5.7 | 0.4 | - | 23 | 71 | 10.6 | - | - | 27 | - | 39 | |
| | | 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 | |
| | | 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 | |
| | 12 | 5.9 | 0.5 | 1.5 | 25 | 37 | 5.8 | - | - | 31 | 44 | - | |
| | | 2.15 | 0.5 | 1.5 | 16 | 17 | 0.72 | - | - | 270 | 440 | - | |
| | | 1 | 0.5 | 1.5 | 16 | 17 | 0.72 | - | - | 290 | 460 | - | |
| | 15 | 5.7 | 1 | 2 | 24 | 35 | 13.1 | - | 28 | 34 | - | - | |
| | | 4.1 | 1 | 2 | 24 | 35 | 13.1 | - | 55 | 70 | - | - | |
| 30 | 8 | 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 | |
| | | 0.85 | 0.4 | - | 6 | 27 | - | - | - | 400 [2] | - | 600 [2] | |
| | | 0.8 | 0.45 | 1 | 11.5 | 22.5 | 0.89 | - | - | 400 | - | 580 | |
| | 12 | 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 | 1.5 | 16 | 19.5 | 0.65 | - | - | 370 | 550 | - | |
| | 15 | 5.4 | 1 | 2 | 12 | 27 | 13.8 | - | 32 | 40 | - | - | |
| | 20 | 10 | 1 | 2.8 | 18 | 44 | 24 | - | 20 | 30 | - | - | BSP030 |
| | | 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 | - | - | |
| | | 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 | - | - | BSP100 |
| | | 1.7 | 1.5 | - | 11.5 | 31 | 4.6 | - | 117 [2] | 190 [2] | - | - | |

[1] enhanced thermal capability
[2] max values

# Small-signal MOSFETs single (N-channel) ≥ 50 V

| Package | | | | | | | | | SOT223 (SC-73) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |  | | | | |
| Size (mm) | | | | | | | | | 6.5 x 3.5 x 1.65 | | | | |
| $P_{tot}$ (mW) | | | | | | | | | 1700 | | | | |
| $V_{DS}$ (V) | $V_{GS}$ (V) | $I_D$ (A) | $V_{GS}$(th) min(V) | $V_{GS}$(th) max(V) | $t_{on}$ typ (ns) | $t_{off}$ typ (ns) | $Q_G$ typ (nC) | ESD protection | $R_{DSon}$ typ (mΩ) @ $V_{gs}$ = | | | | |
| | | | | | | | | | 10 V | 4.5 V | 2.5 V | 1.8 V | |
| 50 | 20 | 0.1 | 0.4 | 1.8 | 2 | 5 | - | - | 2800 | 3800 [3] | - | - | |
| 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 | 4.9 | 1 | 2 | - | - | - | 2KV | - | 30 | - | - | PHT11N06LT |
| | | 3.5 | 1 | 2 | - | - | - | 2KV | - | 65 | - | - | PHT8N06LT |
| | | 2.5 | 1 | 2 | - | - | - | 2KV | - | 120 | - | - | PHT6N06LT |
| | | 2.5 | 2 | 4 | - | - | - | 2KV | 120 | - | - | - | PHT6N06T |
| 60 | 15 | 0.26 | 1 | 3.3 | 3 | 9 | - | 1KV | 2800 | 3800 | - | - | |
| | | 0.34 | 1 | - | 3 | 9 | - | 1KV | 2800 | 3800 | - | - | |
| | | 0.3 | 1 | - | 3 | 9 | - | yes | 2800 | 3800 | - | - | |
| | | 0.3 | 1 | 2.5 | 16 | 60 | 1.09 | 3KV | 1100 | 1300 | - | - | |
| | | 0.3 | 1 | 2.5 | tbd | tbd | tbd | - | 2000 [2] | 3000 [2] | - | - | |
| | | 0.3 | 1 | 2.5 | tbd | tbd | tbd | 2KV | 1600 [2] | 3000 [2] | - | - | |
| | | 0.57 | 1 | - | 6 | 7.2 | - | - | 780 | 1100 | - | - | |
| | | 0.55 | 1 | 3 | 6 | 7.2 | 1.05 | - | 780 | 1100 | - | - | |
| | | 1.22 | 1 | 3 | 6 | 7.2 | 1.05 | - | 760 | 1100 | - | - | |
| | | 0.25 | 0.8 | 3 | - | - | - | - | 2500 | - | - | - | |
| | 30 | 0.385 | 1 | 2.5 | 2.5 | 11 | 0.69 | - | 780 | 1200 | - | - | |
| | | 0.475 | 1 | 2.5 | 2.5 | 11 | 0.69 | - | 780 | 1200 | - | - | |
| | | 0.3 | 1 | 2.5 | 2.5 | 11 | - | - | 2800 | 3800 | - | - | |
| 100 | 16 | 3.5 | 1 | 2 | 14 | 73 | - | - | - | 200 | - | - | PHT4NQ10LT |
| | 20 | 0.19 | 1 | - | 3 | 12 | - | - | - | 5000 | - | - | |
| | | 0.52 | 1 | - | 3 | 12 | - | - | - | 5000 | - | - | BSP110 |
| | | 0.85 | 2 | 4 | 19 | 13 | 4.6 | - | 400 | - | - | - | |
| | | 0.15 | 1 | 2.8 | 3 | 12 | - | - | 3500 | - | - | - | |
| | | 3.5 | 2 | 4 | 21 | 31 | 7.4 | - | 200 | - | - | - | PHT4NQ10T |
| | | 3 | 2 | 4 | - | - | - | - | 57 | - | - | - | PHT6NQ10T |
| | 30 | 1.9 | 2 | 4 | 10.5 | 12.5 | 7 | - | 213 | - | - | - | |
| 200 | 20 | 0.55 | 0.4 | 2 | 10 | 45 | - | - | 1700 | - | 3000 | - | BSP122 |
| | | 0.4 | 0.8 | 2.8 | 6 | 49 | - | - | 1600 | - | - | - | |
| | | 8.8 | 2 | 4 | 18 | 26 | 13.3 | - | 250 | - | - | - | |
| 220 | 20 | 7.3 | 2 | 4 | 20.8 | 24.3 | 13.2 | - | 320 | - | - | - | |
| 240 | 20 | 0.375 | 0.8 | 2 | 6 | 47 | - | - | 2800 | 7500 [2] | - | - | BSP89 |
| 250 | 20 | 0.35 | 0.8 | 2 | 6 | 47 | - | - | 2800 | - | - | - | BSP126 |
| 300 | 20 | 0.35 | 0.8 | 2 | 6 | 46 | - | - | 3700 | - | 4800 | - | BSP130 |

[1] enhanced thermal capability
[2] max values
[3] @ $V_{gs}$ = 5 V

# Small-signal MOSFETs dual (N-channel)

| Package | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Size (mm) | | | | | | | | | | | | |
| $P_{tot}$ (mW) | | | | | | | | | | | | |
| $V_{DS}$ (V) | $V_{GS}$ (V) | $I_D$ (A) | $V_{GS}$(th) min(V) | $V_{GS}$(th) max(V) | $t_{on}$ typ (ns) | $t_{off}$ typ (ns) | $Q_G$ typ (nC) | ESD protection | $R_{DSon}$ typ (mΩ) @ $V_{gs}$ = | | | |
| | | | | | | | | | 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 | 0.3 | 1 | 2.5 | tbd | tbd | tbd | - | 2000 [2] | 3000 [2] | - | - |
| | | 0.3 | 1 | 2.5 | tbd | tbd | tbd | 2KV | 1600 [2] | 3000 [2] | - | - |
| | | 0.49 | 1 | - | 6 | 7.2 | 1.05 | - | 780 | 1100 | - | - |

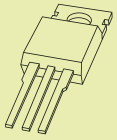
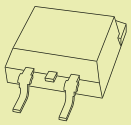
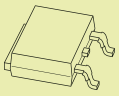
# Small-signal MOSFETs single (P-channel)

| Package | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Size (mm) | | | | | | | | | | | | |
| $P_{tot}$ (mW) | | | | | | | | | | | | |
| $V_{DS}$ (V) | $V_{GS}$ (V) | $I_D$ (A) | $V_{GS}$(th) min(V) | $V_{GS}$(th) max(V) | $t_{on}$ typ (ns) | $t_{off}$ typ (ns) | $Q_G$ typ (nC) | ESD protection | $R_{DSon}$ typ (mΩ) @ $V_{gs}$ = | | | |
| | | | | | | | | | 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 | 12 | 4.8 | 0.55 | 0.95 | 16 | 117 | 10 | - | - | 48 | 65 | - |
| | | 3.9 | 0.55 | 0.95 | 28 | 101 | 7.6 | - | - | 65 | 90 | - |
| 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 | 0.13 | 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 [2] | - | - | - |

# Small-signal MOSFET dual (P-channel) and FET-KYs

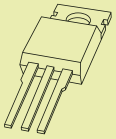
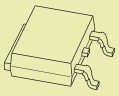
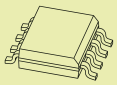
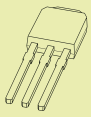
| Package | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Size (mm) | | | | | | | | | | | | |
| $P_{tot}$ (mW) | | | | | | | | | | | | |
| Configuration | $V_{DS}$ (V) | $V_{GS}$ (V) | $I_D$ (A) | $V_{GS}$(th) min(V) | $V_{GS}$(th) max(V) | $t_{on}$ typ (ns) | $t_{off}$ typ (ns) | $Q_G$ typ (nC) | ESD protection | $I_F$ (A) | $V_R$ (V) | $V_F$ typ. (mA) |
| dual | 20 | 8 | 3.3 | 0.5 | 1.5 | tbd | tbd | tbd | 800 V | - | - | - |
| single + schottky | 20 | 8 | 3.3 | 0.5 | 1.5 | tbd | tbd | tbd | 800 V | 2 | 30 | 455 |
| | | | 3.3 | 0.5 | 1.5 | tbd | tbd | tbd | 800 V | 2.2 | 30 | 325 |

# Power MOSFETs single (N-channel)

| $V_{DS}$ (max) (V) | $R_{DSon}$ (max) (mΩ) @ $V_{gs}$ = 10 V | $R_{DSon}$ (max) (mΩ) @ $V_{gs}$ = 4.5 V | $I_D$ (max) (A) @ 25 °C | Power-SO8 (LFPAK) | TO-220AB (SOT78) | D2PAK (SOT404) | DPAK (SOT428) | |
|---|---|---|---|---|---|---|---|---|
| | | | |  |  |  |  | |
| | | | | 3.95 x 4.9 x 1.1 | 15.6 x 10 x 4.4 | 11 x 10 x 4.3 | 6 x 6.6 x 2.3 | |
| 20 | 2.65 | 3.7 | 100 | PH3120L | | | | |
| | - | 2.7 | 100 | PH2520U | | | | |
| | - | 5 | 32 | | | | | |
| | - | 16 @ 5 V | 44.7 | | | | PHD38N02LT | |
| | - | 20 @ 5 V | 10.9 | | | | | |
| 25 | 1.2 | 1.85 | 100 | **PSMN1R2-25YL** | | | | |
| | 1.5 | 2.2 | 100 | **PSMN1R5-25YL** | | | | |
| | 2.5 | 3.9 | 100 | PH2525L | | | | |
| | 2.8 | 4.1 | 100 | PH2625L | | | | |
| | 4 | - | 99 | PH4025L | | | | |
| | 4.95 | - | 75 | | | | PHD96NQ03LT | |
| | 5.5 | 8.2 | 81.7 | PH5525L | | | | |
| | 5.8 | - | 75 | | | | PSMN005-25D | |
| | 6 | - | 75 | | | | PHD108NQ03LT | |
| | 6.3 | 9.5 | 78.7 | PH6325L | | | | |
| | 6.3 | 10.6 | 75 | | | | PHD97NQ03LT | |
| | 6.6 | - | 75 | | | | | |
| | 9 | 13 | 66 | PH9025L | | | | |
| | 9 | - | 66.4 | | | | PHD78NQ03LT | |
| | 9 | - | 61 | | PHP78NQ03LT | | | |
| | 9.5 | - | 75 | | | | PHD77NQ03T | |
| | 10.5 | - | 66 | | | PHB66NQ03LT | PHD66NQ03LT | |
| | - | 3 | 100 | PH2925U | | | | |

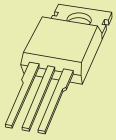
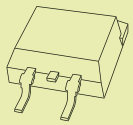
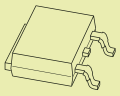
# Power MOSFETs single (N-channel)

types in **bold** represent new products

| $V_{DS}$ (max) (V) | $R_{DSon}$ (max) (mΩ) @ $V_{gs}$ = 10 V | $R_{DSon}$ (max) (mΩ) @ $V_{gs}$ = 4.5 V | $I_D$ (max) (A) @ 25 °C | Power-SO8 (LFPAK) | TO-220AB (SOT78) | DPAK (SOT428) | SO8 (SOT96-1) | IPAK (SOT533) |
|---|---|---|---|---|---|---|---|---|
| | | | |  |  |  |  |  |
| | | | | 3.95 x 4.9 x 1.1 | 15.6 x 10 x 4.4 | 6 x 6.6 x 2.3 | 4.9 x 3.9 x 1.75 | 6 x 6.6 x 2.3 |
| 30 | 1.3 | 1.95 | 100 | **PSMN1R3-30YL** | | | | |
| | 1.7 | 2.1 | 100 | | **PSMN1R6-30PL** | | | |
| | 1.7 | 2.6 | 100 | **PSMN1R7-30YL** | | | | |
| | 1.8 | - | - | | **PSMN1R8-30PL** | | | |
| | 2 | 3.2 | 100 | **PSMN2R0-30YL** | | | | |
| | 2.1 | 2.8 | 100 | | **PSMN2R0-30PL** | | | |
| | 2.4 | 3.9 | 100 | **PSMN2R5-30YL** | | | | |
| | 2.7 | - | - | | **PSMN2R7-30PL** | | | |
| | 2.8 | - | 75 | | PSMN003-30P | | | |
| | 3 | 4.8 | 100 | **PSMN3R0-30YL** | | | | |
| | 3.2 | - | 100 | PH3230S | | | | |
| | 3.3 | 4.5 | 100 | PH3330L | | | | |
| | 3.4 | - | - | | **PSMN3R4-30PL** | | | |
| | 3.5 | 5.6 | 100 | **PSMN3R5-30YL** | | | | |
| | 3.8 | - | 98 | PH3830L | | | | |
| | 4 | 6.5 | 99 | **PSMN4R0-30YL** | | | | |
| | 4.3 | 6.2 | 100 | | **PSMN4R3-30PL** | | | |
| | 4.3 | - | 95.9 | PH4330L | | | | |
| | 4.4 | - | 30.4 | | | | PHK31NQ03LT | |
| | 4.8 | - | 84 | PH4830L | | | | |
| | 5 | 8 | 84 | **PSMN5R0-30YL** | | | | |
| | 5.5 | - | 20 @ 80 °C | | | | PSMN005-30K | |
| | 5.5 | - | 75 | | PHP101NQ03LT | PHD101NQ03LT | | PHU101NQ03LT |
| | 5.7 | - | 80 | PH5330E | | | | |
| | 5.9 | - | 76.7 | PH8030L | | | | |
| | 6 | 9.7 | 76.7 | PH6030L | | | | |
| | 6 | 9.7 | 73 | **PSMN6R0-30YL** | | | | |
| | 6.5 | - | 23.7 | | | | PHK28NQ03LT | |
| | 7 | 11.3 | 65 | **PSMN7R0-30YL** | | | | |
| | 7.9 | 11 | 68 | PH7030L | | | | |
| | 8 | 13.8 | 55 | **PSMN9R0-30YL** | | | | |
| | 8.2 | - | 67 | PH8230E | | | | |
| | 8.9 | - | 20.3 | | | | PHK18NQ03LT | |
| | 9 | 12.5 | 63 | PH9030L | | | | |
| | 9.9 | - | 63 | PH9930L | | | | |

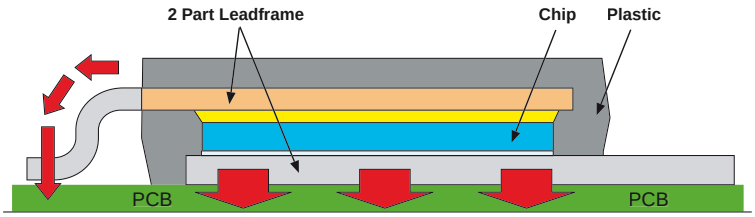
# Power MOSFETs single (N-channel)

types in **bold** represent new products

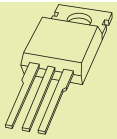
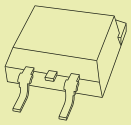
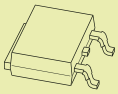
| $V_{DS}$ (max) (V) | $R_{DSon}$ (max) (mΩ) @ $V_{gs}$ = 10 V | $R_{DSon}$ (max) (mΩ) @ $V_{gs}$ = 4.5 V | $I_D$ (max) (A) @ 25 °C | Power-SO8 (LFPAK) | TO-220AB (SOT78) | D2PAK (SOT404) | DPAK (SOT428) |
|---|---|---|---|---|---|---|---|
| | | | |  |  |  |  |
| | | | | 3.95 x 4.9 x 1.1 | 15.6 x 10 x 4.4 | 11 x 10 x 4.3 | 6 x 6.6 x 2.3 |
| 60 | 3.6 | - | 75 | | | PSMN004-60B | |
| | 22 | - | 52 | | PHP52N06T | | |
| | 150 | - | 10.3 | | PHP3055E | | PHD3055E |
| | - | 43 | 34 | | PHP32N06LT | PHB32N06LT | |
| 75 | 5 | - | 75 | | PHP165NQ08T | | |
| | 5 | - | 75 | | PSMN005-75P | PSMN005-75B | |
| | 5.6 | - | 75 | | PHP160NQ08T | PHB160NQ08T | |
| | 8.5 | - | 75 | | PSMN008-75P | PSMN008-75B | |
| | 9 | - | 75 | | PHP110NQ08T | PHB110NQ08T | |
| | 13 | - | 75 | | PHP75NQ08T | | |
| | 16 | - | 73 | | PHP79NQ08LT | | |
| | 16.5 | - | 45.8 | PH1875L | | | |
| | 28 | 34 | 30 | PH3075L | | | |
| | 50 @ 11 V | - | 27 | | PHP29N08T | PHB29N08T | |
| 80 | 4.1 | - | 100 | | **PSMN4R4-80PS** | | |
| | 4.7 | - | 100 | | **PSMN5R0-80PS** | | |
| | 6.4 | - | - | **PSMN6R0-80YS** | | | |
| | 6.5 | - | - | | **PSMN6R5-80PS** | | |
| | 8.5 | - | 82 | **PSMN8R2-80YS** | | | |
| | 8.7 | - | - | | **PSMN8R7-80PS** | | |
| | 11 | - | - | **PSMN011-80YS** | | | |
| | 11 | - | 74 | | **PSMN012-80PS** | | |
| | 12.9 | - | 60 | **PSMN013-80YS** | | | |
| | 17.0 | - | - | | **PSMN017-80PS** | | |
| | 19.5 | - | - | **PSMN018-80YS** | | | |
| | 27.5 | - | 34 | **PSMN026-80YS** | | | |
| | 46 | - | - | **PSMN045-80YS** | | | |
| | 46 | - | 22 | | **PSMN050-80PS** | | |

## Power-SO8 (LFPAK) Design

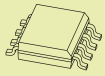
- Low Thermal resistance
- Low Electrical resistance
- Low Inductance



# Power MOSFETs single (N-channel)

| $V_{DS}$ (max) (V) | $R_{DSon}$ (max) (mΩ) @ $V_{gs}$ = 10 V | $R_{DSon}$ (max) (mΩ) @ $V_{gs}$ = 4.5 V | $I_D$ (max) (A) @ 25 °C | Power-SO8 (LFPAK) | TO-220AB (SOT78) | D2PAK (SOT404) | DPAK (SOT428) | |
|---|---|---|---|---|---|---|---|---|
| | | | |  |  |  |  | |
| | | | | 3.95 x 4.9 x 1.1 | 15.6 x 10 x 4.4 | 11 x 10 x 4.3 | 6 x 6.6 x 2.3 | |
| 150 | 30 | - | 55.5 | | PSMN030-150P | PSMN030-150B | | |
| | 35 | - | 50 | | PSMN035-150P | PSMN035-150B | | |
| | 42 | - | 45.1 | | | PHB45NQ15T | | |
| | 59 | - | 43 | PSMN059-150Y | | | | |
| | 63 | - | 29 | | PHP30NQ15T | | PSMN063-150D | |
| | 65 | - | 28.5 | | PHP28NQ15T | | | |
| | 75 | - | 5 | | | | | |
| | 85 | - | 3.5 @ 80 °C | | | | | |
| 200 | 57 | - | 39 | | PSMN057-200P | PSMN057-200B | | |
| | 70 | - | 35 | | PSMN070-200P | PSMN070-200B | | |
| | 77 | - | 32.7 | | PHP33NQ20T | PHB33NQ20T | | |
| | 102 | - | 21.5 | PSMN102-200Y | | | | |
| | 130 | - | 20 | | PHP20NQ20T | PHB20NQ20T | PSMN130-200D | |
| | 165 | - | 2.9 @ 80 °C | | | | | |
| | 294 | - | 8.8 | | | | | |
| | 400 | - | 8.7 | | PHP9NQ20T | | PHD9NQ20T | |
| 220 | 386 | - | 7.3 | | | | | |

# Power MOSFETs single (P-channel)

| $V_{DS}$ (max) (V) | $R_{DSon}$ (max) (mΩ) @ $V_{gs}$ = 10 V | $R_{DSon}$ (max) (mΩ) @ $V_{gs}$ = 4.5 V | $I_D$ (max) (A) @ 25 °C | SO8 (SOT96-1) |
|---|---|---|---|---|
| | | | |  |
| | | | | 4.9 x 3.9 x 1.75 |
| -16 | - | 120 | -4.66 | PHK04P02T |
| -20 | - | 50 | -7.9 | PMK50XP |
| -30 | 19 | - | -14.9 | PMK30EP<br>PMK35EP |

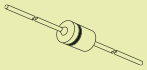
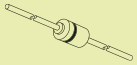
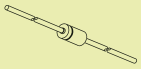
# Package cross reference

types in **bold** represent new products

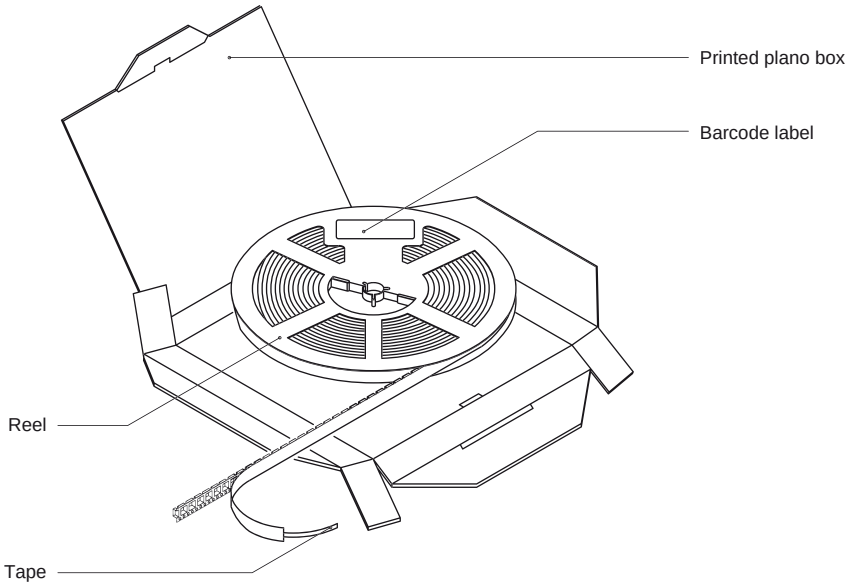
| NXP | Industry standard names | Size (l x w x h) | Pins / leads | $P_{tot}$ (mW) | Package | Competitor synonyms | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Rohm | Toshiba | ON Semi | Renesas | Infineon | Diodes Inc | KEC | Vishay |
| SOD27 | DO-35 | 4.25 x 1.85 x 0.56 | 2 | 500 |  | GSD | | | DO-35 | | DO-35 | | DO-204AH |
| SOD66 | DO-41 | 4.8 x 2.6 x 0.81 | 2 | 1300 |  | GSR | DO-41 | | | | DO-41 | | DO-204AL |
| SOD68 | DO-34 | 3.04 x 1.6 x 0.55 | 2 | 500 |  | MSD | | | | | | | |
| SOD80C | MiniMelf | 3.5 x 1.5 x 1.5 | 2 | 300 |  | LLDS | | | LLD | | MiniMELF | | MiniMELF |
| SOD87 | Melf | 3.5 x 2.05 x 2.05 | 2 | 1000 |  | | | | | | | | |
| SOD123F | - | 2.6 x 1.6 x 1.1 | 2 | 830 |  | PMDU | S-Flat | SOD-123-FL | | | Power-DI123 | SMF | |
| SOD123W | - | 2.6 x 1.7 x 1.0 | 2 | 900 |  | | S-Flat | SOD-123-FL | | | Power-DI123 | | |
| SOD128 | - | 3.8 x 2.6 x 1.0 | 2 | 1000 |  | PMDT | M-Flat | | | | | | |
| SOD323 | SC-76 | 1.7 x 1.25 x 0.95 | 2 | 400 |  | | USC | SOD-323 | URP | SOD323 | SOD-323 | USC | SOD323 |
| SOD323F | SC-90 | 1.7 x 1.25 x 0.7 | 2 | 830 |  | UMD2 | US-Flat | | | | Power-DI323 | | |
| SOD523 | SC-79 | 1.2 x 0.8 x 0.6 | 2 | 500 |  | EMD2 | ESC/TESC | SOD-523 | UFP | SC79 | | ESC | SOD523 |
| SOD882 | - | 1.0 x 0.6 x 0.5 | 2 | 250 |  | | CTS2 | | | TSLP-2 | DFN1006-2 | | |
| **SOD882D** | - | 1.0 x 0.6 x 0.37 | 2 | 250 |  | | | | | TSLP-2-7 | DFN1006H4-2 | | |
| **SOD131 SMA** | DO-214AC | 4.25 x 2.67 x 2.14 | 2 | 900 |  | PMDS (SOD-106) | | SMA Case 403D-02 | | | SMA | SMA | |
| **SOD132 SMB** | DO-214AA | 4.32 x 3.62 x 2.29 | 2 | 1000 |  | | | SMB Case 403A-03 | | | SMB | | |
| **SOD133 SMC** | DO-214AB | 6.86 x 5.91 x 2.34 | 2 | 1200 |  | | | SMC Case 403-03 | | | SMC | | |
| **SOT1061** | HUSON3 | 2.0 x 2.0 x 0.65 | 3 | 1300 |  | | | WDFN3 | | | DFN2020-3 | | PowerPAK SC706L |
| SOT23 | - | 2.9 x 1.3 x 1.0 | 3 | 250 |  | SSD3/SST3 | | SOT-23 | | SOT23 | SOT-23 | SOT-23 | SOT23 |
| SOT323 | SC-70 | 2.0 x 1.25 x 0.95 | 3 | 200 |  | UMD3/ UMT3 | USM | SC-70 | CMAK/ CMPAK | SOT323 | SOT-323 | USM | SC-70 3 leads |
| SOT416 | SC-75 | 1.6 x 0.8 x 0.77 | 3 | 150 |  | EMD3/ EMT3 | SSM | SC-75 | SMPAK | SC75 | | | SC-75A |
| SOT663 | - | 1.6 x 1.2 x 0.55 | 3 | 300 |  | | | | | | | | |
| SOT883 | SC-101 | 1.0 x 0.6 x 0.5 | 3 | 250 |  | | SS CSP2 | | | TSLP-3-1 | DFN1006-3 | | |
| SOT89 | SC-62 | 4.5 x 2.5 x 1.5 | 3 | 1300 |  | MPT3 | PW-Mini | SOT-89 | UPAK (SOT89) | SOT89 | | SOT-89 | |
| SOT143B | - | 2.9 x 1.3 x 1.0 | 4 | 250 |  | | CP4 | | MPAK-4R | SOT143 | SOT-143 | | |
| SOT223 | SC-73 | 6.5 x 3.5 x 1.65 | 4 | 1700 |  | | | SOT-223 | | SOT223 | SOT-223 | SOT-223 | SOT223 |

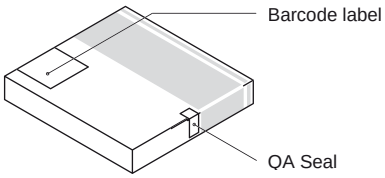
# Packing methods

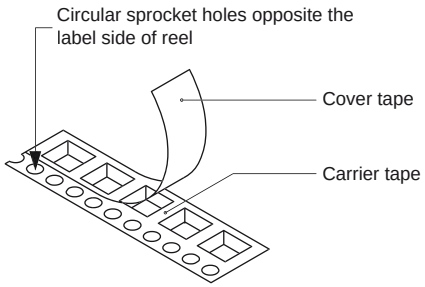
types in **bold** represent new products

| Package | Packing method and tape dimension | Reel dimension (d x w) | Package | Packing quantity | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 2000 | 2500 | 3000 | 4000 | 5000 | 8000 | 10000 |
| SOD27 | 26 mm tape ammo pack, axial | |  | - | - | - | - | -143 | - | - |
| | 52 mm tape ammo pack, axial | | | - | - | - | - | - | - | -133 |
| | 52 mm reel pack, axial | | | - | - | - | - | - | - | -113 |
| SOD66 | 52 mm tape ammo pack, axial | |  | - | - | - | - | - | - | -133 |
| | 52 mm reel pack, axial | | | - | - | - | - | - | - | -113 |
| SOD68 | 26 mm tape ammo pack, axial | |  | - | - | - | - | -143 | - | - |
| | 52 mm reel pack, axial | | | - | - | - | - | - | - | -113 |
| | 52 mm tape ammo pack, axial | | | - | - | - | - | - | - | -133 |
| SOD80C | 4 mm pitch, 8 mm tape and reel | 180 x 8 mm |  | - | -115 | - | - | - | - | - |
| | 4 mm pitch, 8 mm tape and reel | 330 x 8 mm | | - | - | - | - | - | - | -135 |
| SOD87 | 4 mm pitch, 8 mm tape and reel | 180 x 8 mm |  | -115 | - | - | - | - | - | - |
| | 4 mm pitch, 8 mm tape and reel | 330 x 8 mm | | - | - | - | - | - | -135 | - |
| SOD123F | 4 mm pitch, 8 mm tape and reel | 180 x 8 mm |  | - | - | -115 | - | - | - | - |
| SOD123W | 4 mm pitch, 8 mm tape and reel | 180 x 8 mm |  | - | - | -115 | - | - | - | - |
| SOD128 | 4 mm pitch, 12 mm tape and reel | 180 x 12 mm |  | - | - | -115 | - | - | - | - |
| SOD323 | 4 mm pitch, 8 mm tape and reel | 180 x 8 mm |  | - | - | -115 | - | - | - | - |
| | 4 mm pitch, 8 mm tape and reel | 286 x 8 mm | | - | - | - | - | - | - | -135 |
| SOD323F | 4 mm pitch, 8 mm tape and reel | 180 x 8 mm |  | - | - | -115 | - | - | - | - |
| SOD523 | 2 mm pitch, 8 mm tape and reel | 180 x 8 mm |  | - | - | - | - | - | -315 | - |
| | 4 mm pitch, 8 mm tape and reel | 180 x 8 mm | | - | - | -115 | - | - | - | - |
| | 4 mm pitch, 8 mm tape and reel | 286 x 8 mm | | - | - | - | - | - | - | -135 |
| SOD882 | 2 mm pitch, 8 mm tape and reel | 180 x 8 mm |  | - | - | - | - | - | - | -315 |
| **SOD882D** | 2 mm pitch, 8 mm tape and reel | 180 x 8 mm |  | - | - | - | - | - | - | -315 |
| **SOT1061** | 4 mm pitch, 8 mm tape and reel | 180 x 8 mm |  | - | - | -115 | - | - | - | - |
| SOT23 | 4 mm pitch, 8 mm tape and reel | 180 x 8 mm |  | - | - | -215 | - | - | - | - |
| | 4 mm pitch, 8 mm tape and reel | 286 x 8 mm | | - | - | - | - | - | - | -235 |
| SOT323 | 4 mm pitch, 8 mm tape and reel | 180 x 8 mm |  | - | - | -115 | - | - | - | - |
| | 4 mm pitch, 8 mm tape and reel | 286 x 8 mm | | - | - | | - | - | - | -135 |
| SOT416 | 4 mm pitch, 8 mm tape and reel | 180 x 8 mm |  | - | - | -115 | - | - | - | - |
| | 4 mm pitch, 8 mm tape and reel | 286 x 8 mm | | - | - | - | - | - | - | -135 |
| SOT663 | 4 mm pitch, 8 mm tape and reel | 180 x 8 mm |  | - | - | - | -115 | - | - | - |
| SOT883 | 2 mm pitch, 8 mm tape and reel | 180 x 8 mm |  | - | - | - | - | - | - | -315 |

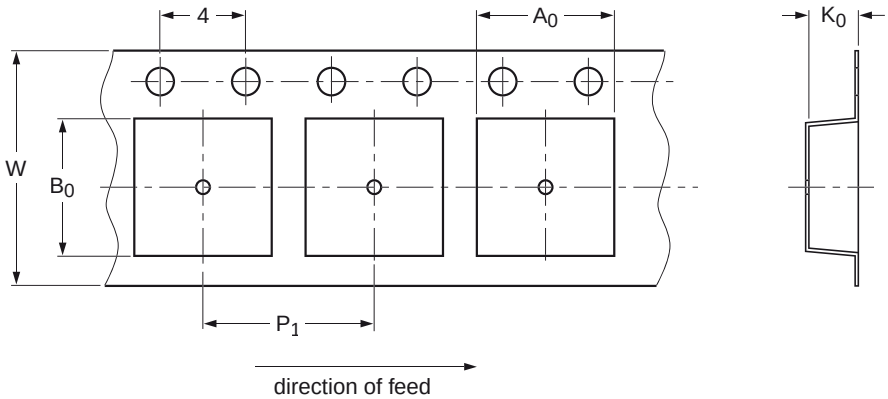
# Tape and reel pack for SMD packages



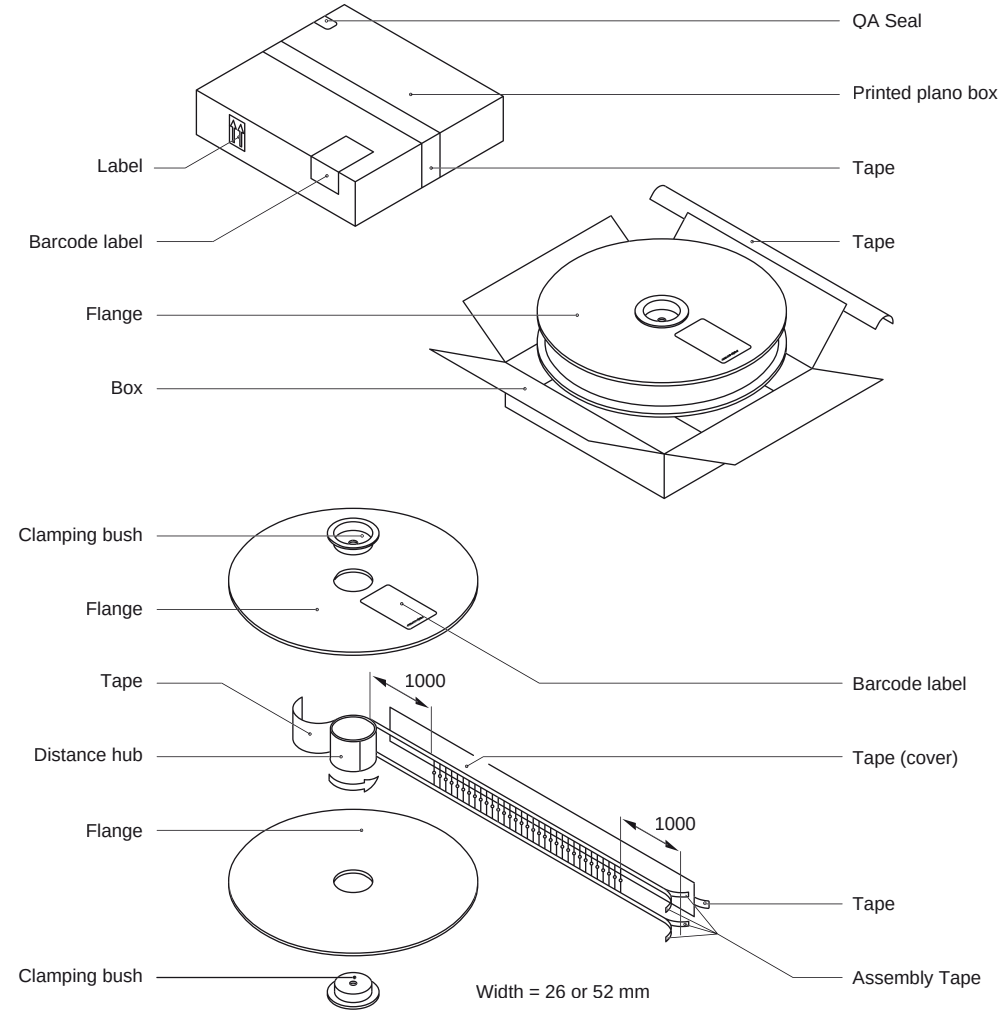

# Carrier tape - tape and reel

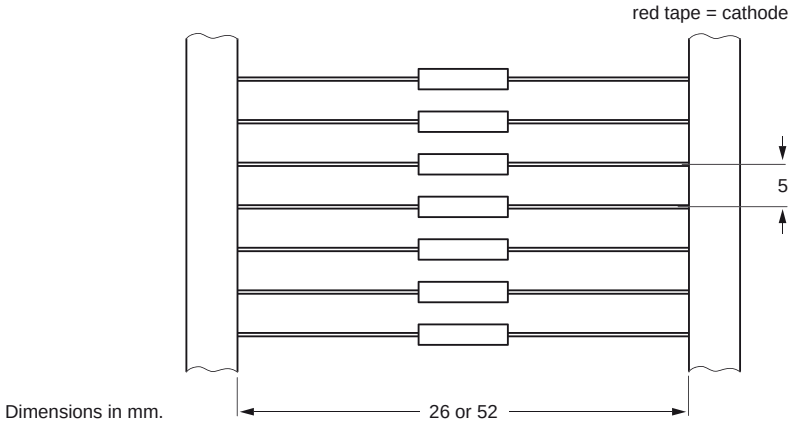



P1 = pitch (see table packing methods)
W = tape width (see table packing methods)

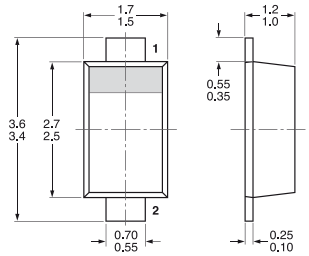
Compartment width ($A_0$), length ($B_0$) and depth ($K_0$) depending on package

# Reel pack axial tape for glass diodes

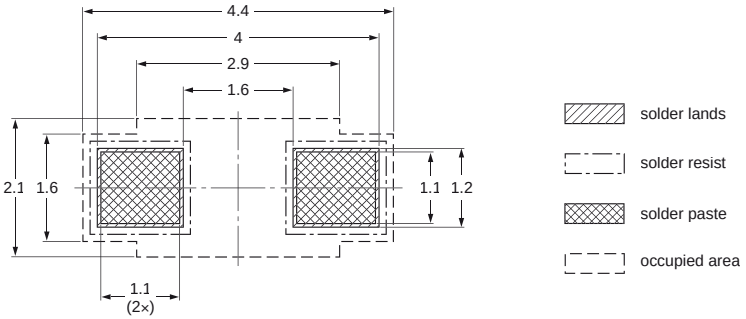


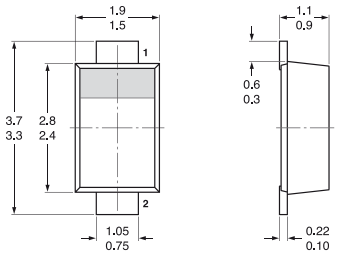
# 2-Pin SMD Packages



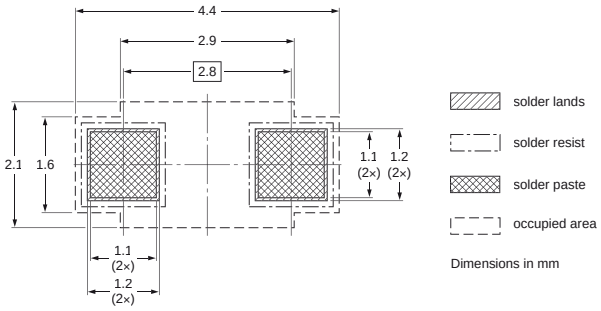

SOD123F



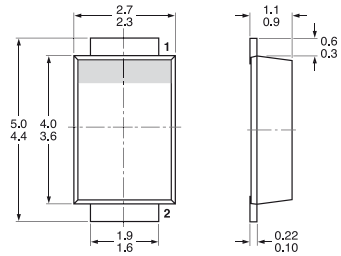

SOD123F



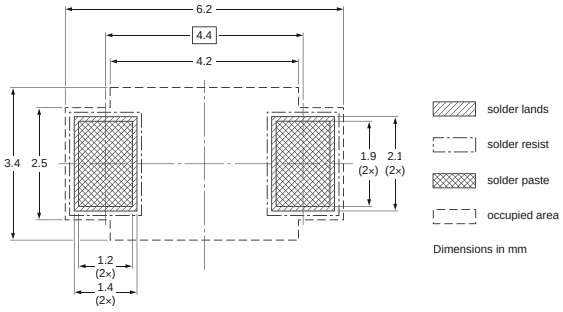

SOD123W



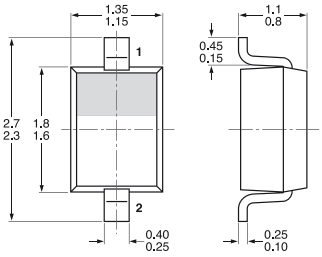

SOD123W



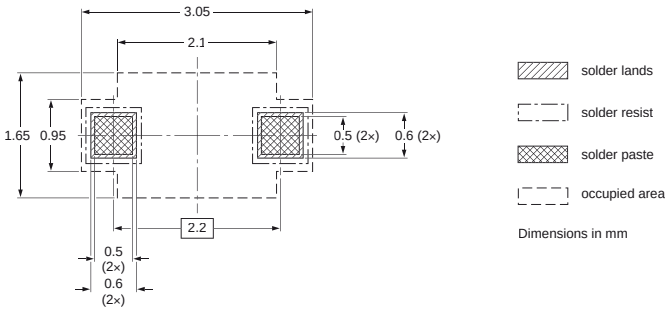

SOD128




SOD128



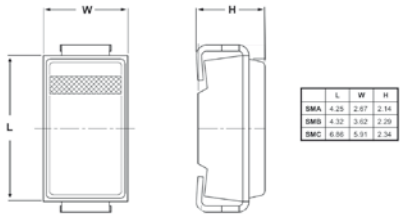

SOD323 (SC-76)



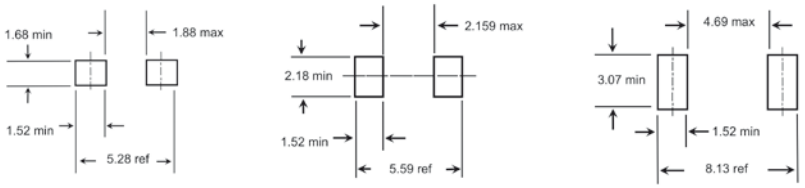

SOD323 (SC-76)

Dimensions in mm

# Minimized outline drawings and reflow soldering footprint

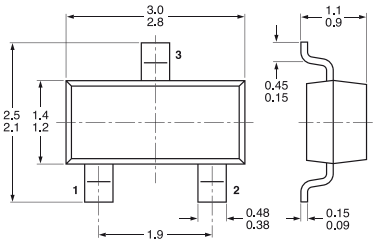



SOD131/2/3 (SMA/B/C)

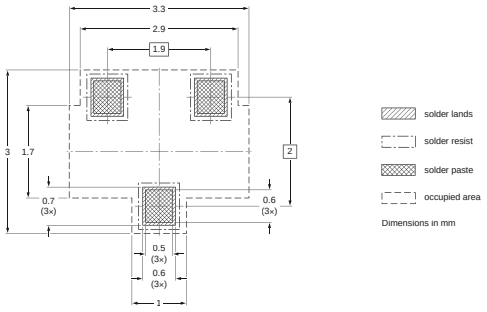



SOD131 (SMA) SOD132 (SMB) SOD133 (SMC)

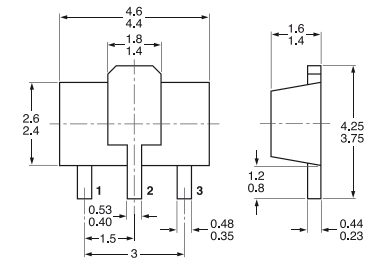
## 3-Pin SMD Packages



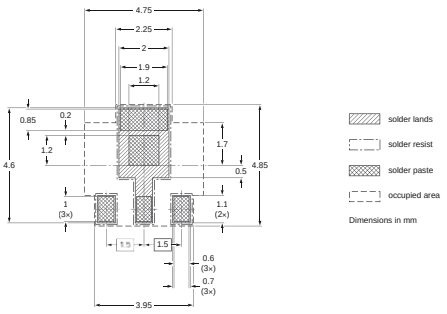

SOT23



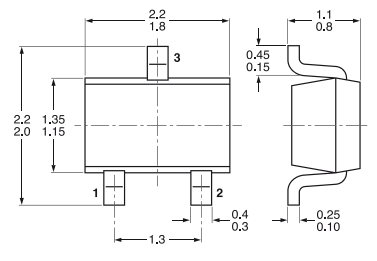

SOT23



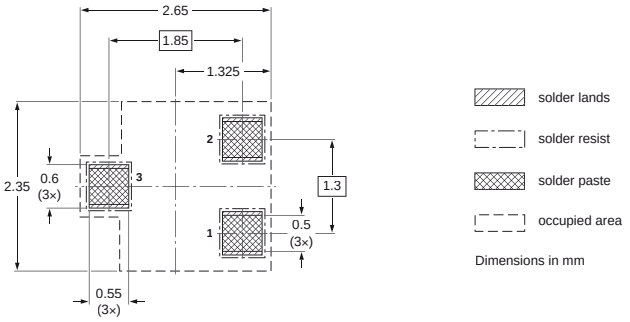

SOT89 (SC-62)




SOT89 (SC-62)



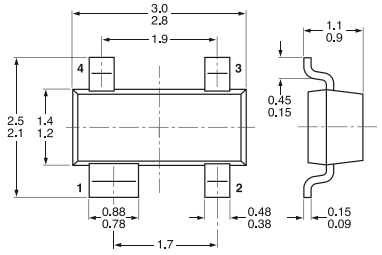

SOT323 (SC-70)



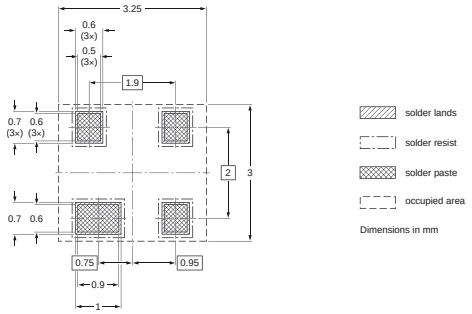

SOT323 (SC-70)

Dimensions in mm

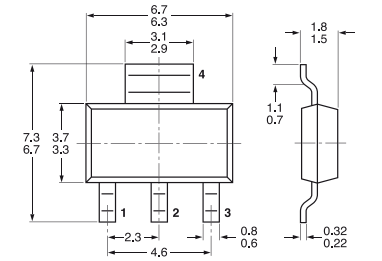
# 4-/5-Pin SMD Packages



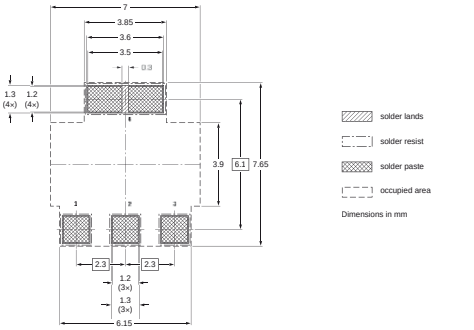

SOT143B



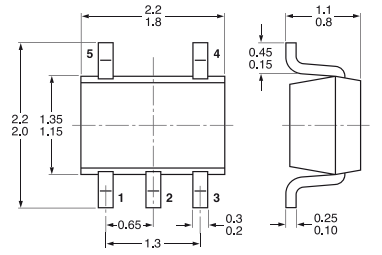

SOT143B



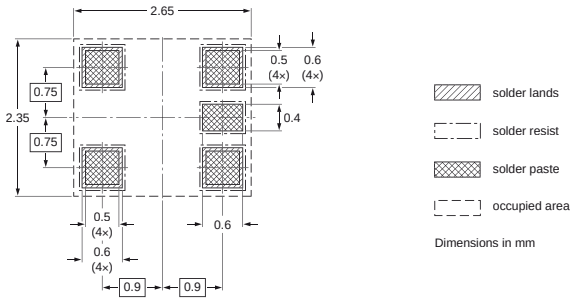

SOT223 (SC-73)



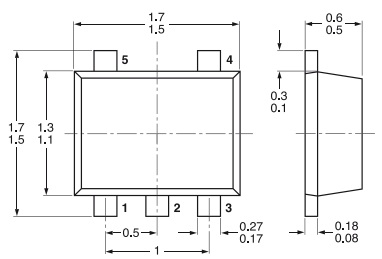

SOT223 (SC-73)



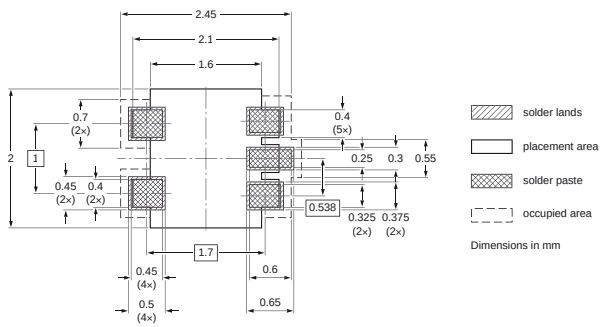

SOT353 (SC-88A)




SOT353 (SC-88A)

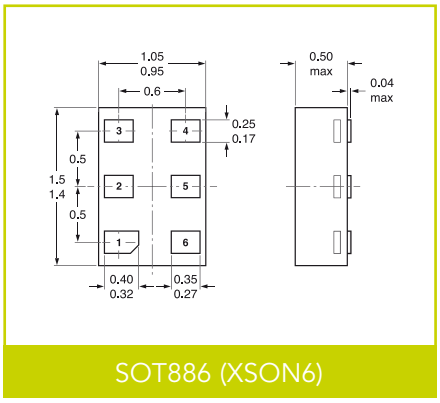



SOT665

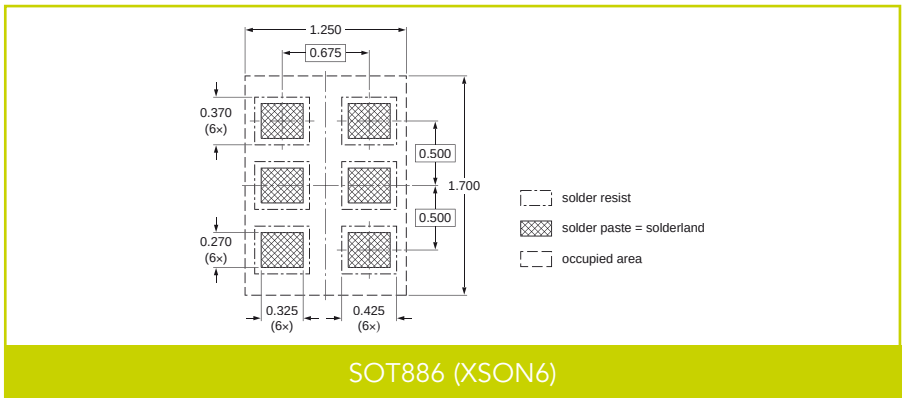



SOT665

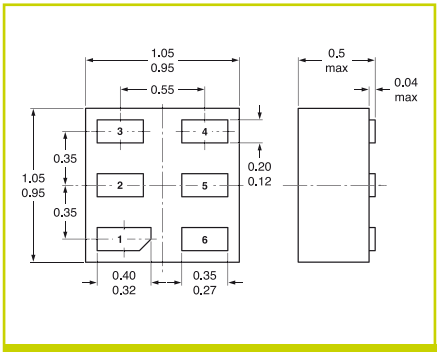
Dimensions in mm



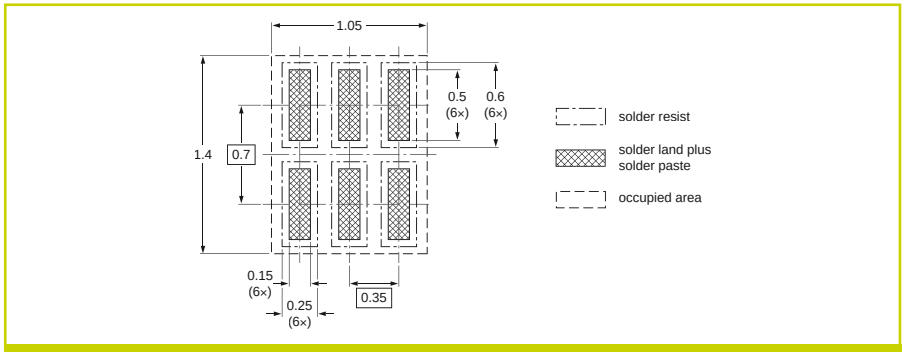

SOT886 (XSON6)




SOT886 (XSON6)

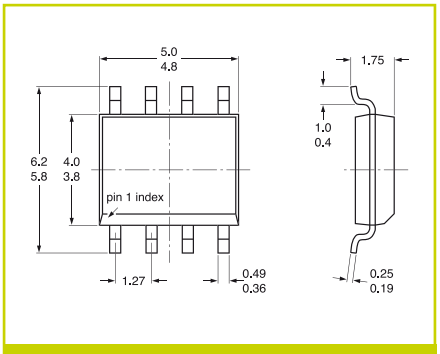



SOT891 (XSON6)

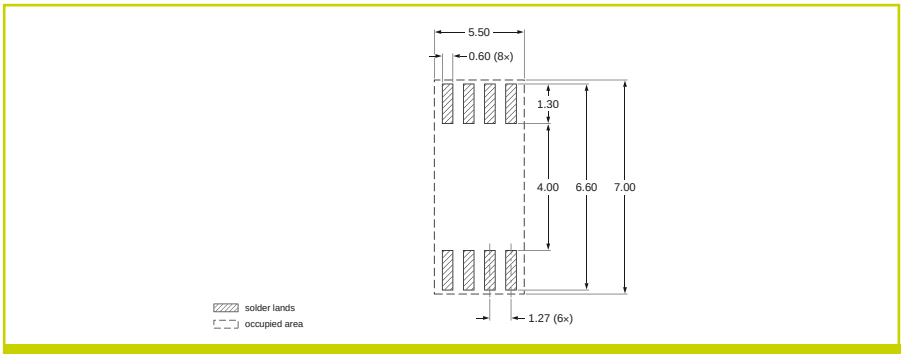



SOT891 (XSON6)

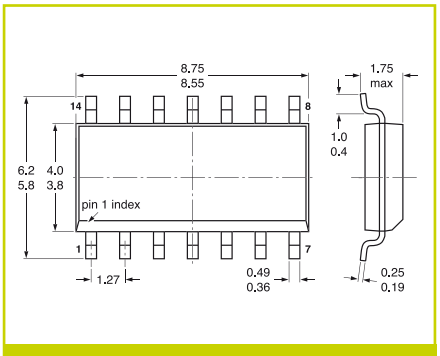
## Multi-Pin SMD Packages



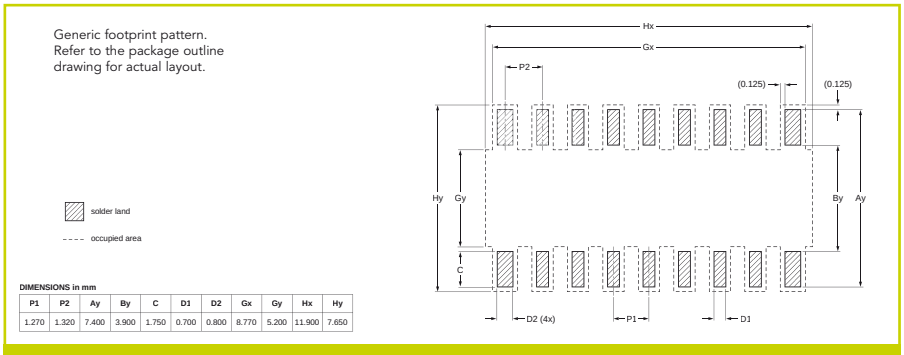

SOT96 (SO8)




SOT96 (SO8)



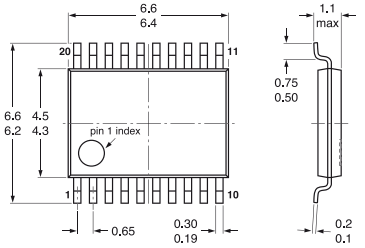

SOT108 (SO14)




SOT108 (SO14)

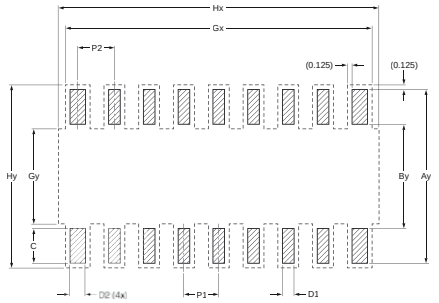
Dimensions in mm

# Minimized outline drawings and reflow soldering footprint




SOT360 (TSSOP20)

Generic footprint pattern.
Refer to the package outline drawing for actual layout.



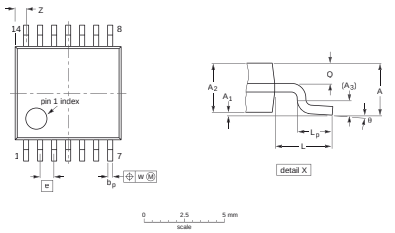

solder land

occupied area

DIMENSIONS in mm

| P1 | P2 | Ay | By | C | D1 | D2 | Gx | Gy | Hx | Hy |
|---|---|---|---|---|---|---|---|---|---|---|
| 0.650 | 0.750 | 7.200 | 4.500 | 1.350 | 0.400 | 0.600 | 6.900 | 5.300 | 7.300 | 7.450 |

SOT360 (TSSOP20)

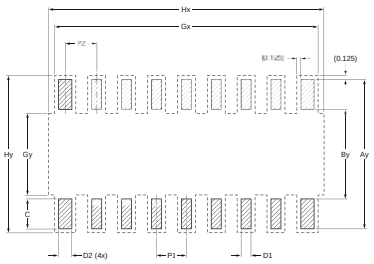



DIMENSIONS (mm are the original dimensions)

| UNIT | A max. | A1 | A2 | A3 | bp | c | D(1) | E(2) | e | HE | L | Lp | Q | v | w | y | Z(1) | θ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| mm | 1.1 | 0.15<br>0.05 | 0.95<br>0.80 | 0.25 | 0.30<br>0.19 | 0.2<br>0.1 | 5.1<br>4.9 | 4.5<br>4.3 | 0.65 | 6.6<br>6.2 | 1 | 0.75<br>0.50 | 0.4<br>0.3 | 0.2 | 0.13 | 0.1 | 0.72<br>0.38 | 8°<br>0° |

SOT402 (TSSOP14)

Generic footprint pattern.
Refer to the package outline drawing for actual layout.



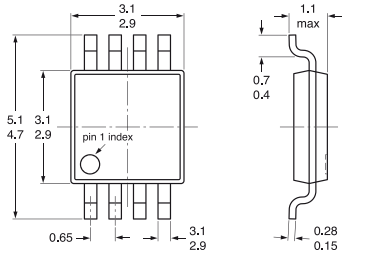

solder land

occupied area

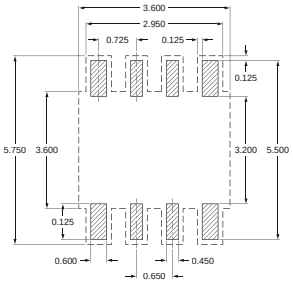
DIMENSIONS in mm

| P1 | P2 | Ay | By | C | D1 | D2 | Gx | Gy | Hx | Hy |
|---|---|---|---|---|---|---|---|---|---|---|
| 0.650 | 0.750 | 7.200 | 4.500 | 1.350 | 0.400 | 0.600 | 4.950 | 5.300 | 5.800 | 7.450 |

SOT402 (TSSOP14)



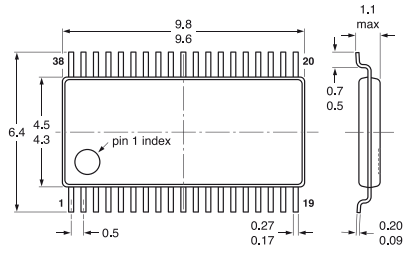

SOT505 (TSSOP8)




solder lands

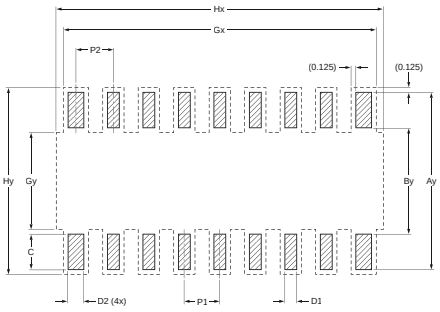
occupied area

SOT505 (TSSOP8)




SOT510 (TSSOP38)

Generic footprint pattern.
Refer to the package outline drawing for actual layout.




solder land

occupied area

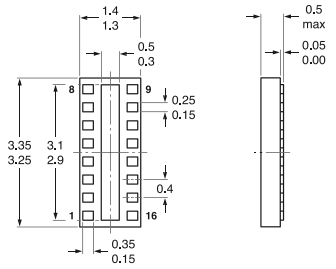
DIMENSIONS in mm

| P1 | P2 | Ay | By | C | D1 | D2 | Gx | Gy | Hx | Hy |
|---|---|---|---|---|---|---|---|---|---|---|
| 0.500 | 0.560 | 7.200 | 4.500 | 1.350 | 0.280 | 0.400 | 9.770 | 5.300 | 10.500 | 7.450 |

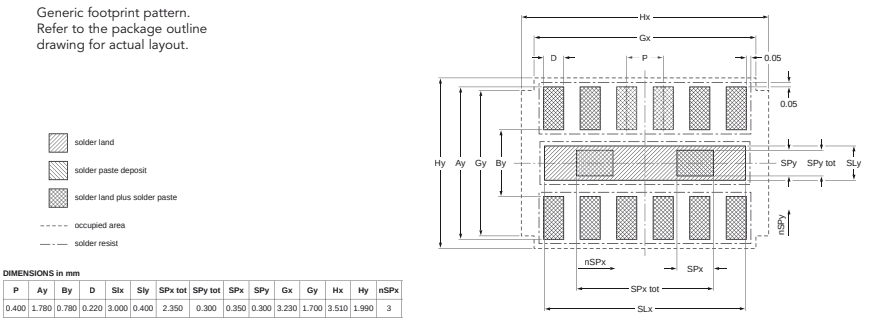
SOT510 (TSSOP38)

Dimensions in mm

# Minimized outline drawings and reflow soldering footprint



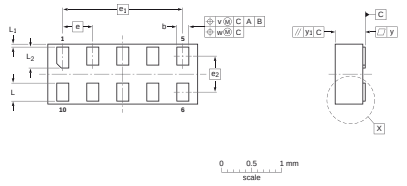

SOT985 (HXSON16)




DIMENSIONS in mm

| P | Ay | By | D | Slx | Sly | SPx tot | SPy tot | SPx | SPy | Gx | Gy | Hx | Hy | nSPx |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.400 | 1.780 | 0.780 | 0.220 | 3.000 | 0.400 | 2.350 | 0.300 | 0.350 | 0.300 | 3.230 | 1.700 | 3.510 | 1.990 | 3 |

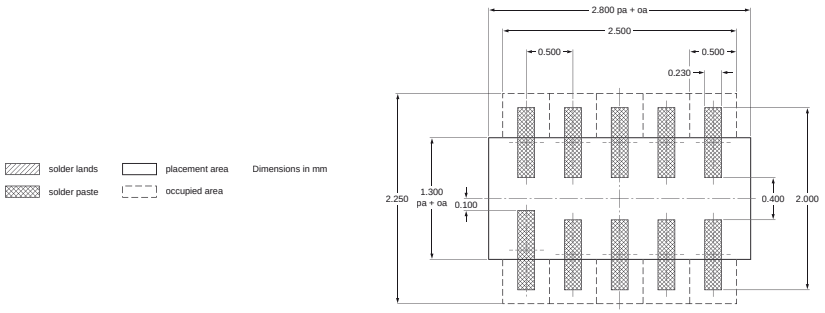
SOT985 (HXSON16)




DIMENSIONS (mm are the original dimensions)

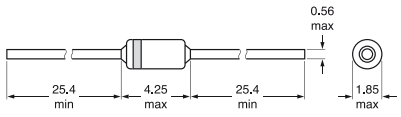
| UNIT | A max | $A_1$ | b | D | E | e | $e_1$ | $e_2$ | L | $L_1$ | $L_2$ | v | w | y | $y_1$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| mm | 0.5 | 0.05<br>0.00 | 0.25<br>0.15 | 2.6<br>2.4 | 1.1<br>0.9 | 0.5 | 2 | 0.6 | 0.4<br>0.2 | 0.15<br>0.00 | 0.45<br>0.25 | 0.1 | 0.05 | 0.05 | 0.1 |

SOT1059 (XSON10U)

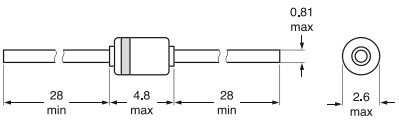



SOT1059 (XSON10U)

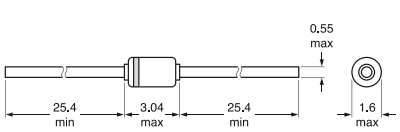
## Glass diodes



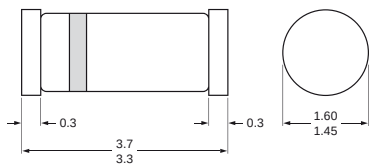

SOD27 (DO-35)



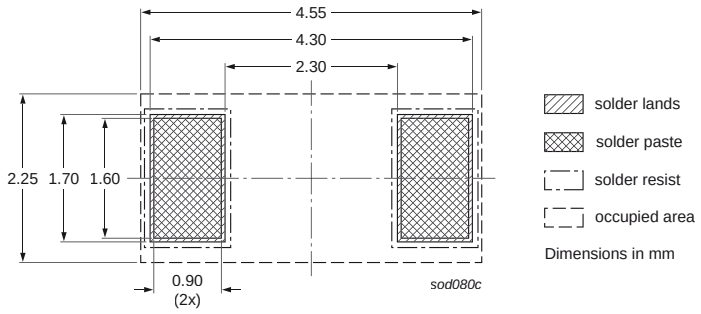

SOD66 (DO-41)




SOD68 (DO-34)




SOD80C




SOD80C

Dimensions in mm

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