



# Discrete Semiconductors Selection Guide 2010

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



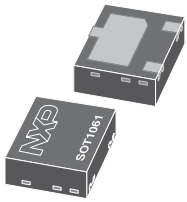
# Introducing new package technology

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	$\Sigma$ < 900 ppm

# Table of Contents

Support tools	6
---------------	---

## Diodes 7

<b>Schottky barrier diodes and rectifiers</b>	<b>8</b>
General purpose Schottky diodes $\leq 250$ mA	8
Medium power low $V_F$ Schottky rectifiers single $\geq 200$ mA	10
Medium power low $V_F$ Schottky rectifiers dual $\geq 200$ mA	12
Nomenclature of low $V_F$ (MEGA) Schottky rectifiers	13
Improved forward characteristics of (MEGA) Schottky rectifiers in new packages	13
Low capacitance Schottky diodes	14
<b>PN rectifiers</b>	<b>15</b>
PN rectifiers in SMA, SMB, SMC	15
<b>Zener diodes</b>	<b>16</b>
General purpose Zener diodes	16
Zener diodes specification	17
<b>Switching diodes</b>	<b>18</b>
General purpose switching diodes $\leq 100$ V	18
General purpose switching diodes $> 100$ V	20
Controlled avalanche switching diodes	21
Low leakage current switching diodes	21

## Protection and signal conditioning 23

<b>Standard ESD protection devices</b>	<b>24</b>
<b>Low capacitance ESD protection devices</b>	<b>26</b>
<b>ESD protection for very high speed interfaces (<math>&lt; 2</math> pF)</b>	<b>29</b>
<b>Application specific ESD and ESD/EMI solutions</b>	<b>32</b>
Audio interfaces	32
Video interfaces	33
Multichannel EMI filter, ESD protection for LCD and camera	36
SD-, SIM-card and MMC	38
Battery and charger protection	38
USB, LVDS, SATA, LAN	39
Automotive LIN/CAN/FlexRay	43
<b>TVS diodes</b>	<b>44</b>
TVS diodes, 24 W / 40 W	44
TVS diodes, 400 W	44
TVS diodes, 600 W	45

## Small-signal transistors 47

<b>General purpose bipolar transistors</b>	<b>48</b>
Single transistors	48
Double transistors	49
Single and double switching transistors	49
Matched pair transistors	50
High voltage transistors	51
Low noise transistors	51
Darlington transistors	51
Medium frequency transistors	52
Schmitt trigger	52
MOSFET driver	53
<b>Resistor-equipped transistors (RETs)</b>	<b>54</b>
RETs 100 mA single	54
RETs 100 mA double	55
RETs 500 mA	55
Low $V_{CEsat}$ (BISS) RETs	55

# 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](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](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](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>

## Samples

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](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?

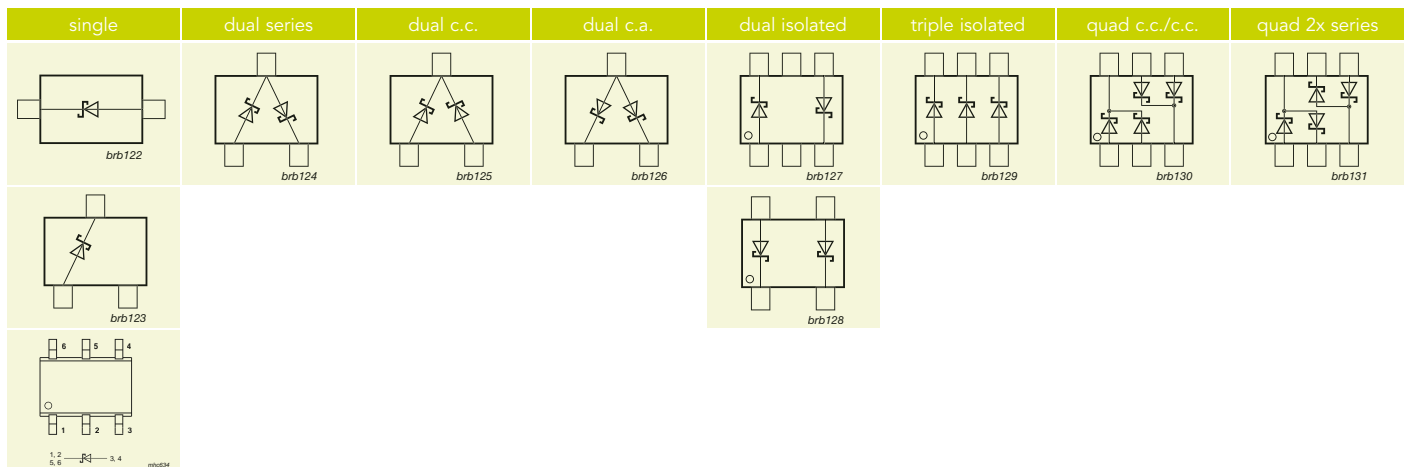
Then download our x-reference offline tool from the NXP website:

<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)	$V_F$ max (V)	$V_{RRM}$ max (mV)	@ $I_F$ (mA)	$I_R$ max ( $\mu$ A)	@ $V_R$ (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
$P_{TOT}$ (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				
120	40	370	1	0.5	30	single				
						dual series			BAS40	
						dual c.c.			BAS40-04	
		500	10	1	30	dual c.a.			BAS40-05	
						dual isolated			BAS40-06	
						quad c.c./c.c.				BAS40-07
quad 2x series										
200	30	300	10	30	10	single				
						single			BAT754	
						dual series			BAT754S	
		340	10	2	25	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									
	500	200	30	10	10	quad c.c./c.c.				
						quad 2x series				
						single				
	40	300	10	15	30	single			BAT721	
						dual series			BAT721S	
						dual c.c.			BAT721C	
360		10	0.5	25	dual c.a.			BAT721A		
					single					
					single					
420		30	0.5	25	dual series					
					dual c.c.					
					dual c.a.					
50	450	10	5	40	single	BAS86	BAT86			
250	100	950	250	18	75	single				






















## Medium power low $V_F$ Schottky rectifiers single $\geq 200$ 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)						
				$P_{tot}$ (mW) @ 1 cm <sup>2</sup>	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	
				Optimization	1050	1000	540	420	950	
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 $I_R$						
	30	500	0.03	low $I_R$						
		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 $I_R$						
	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		
	40	680	0.5	low $V_F$						
		490	0.05	low $V_F$	PMEG4010EP				PMEG4010ER	
600		1.0	low $V_F$		PRLL5819					
640		0.1	low $V_F$				PMEG4010ET			
60	570	0.05	low $I_R$							
	530	0.06	low $V_F$	PMEG6010EP				PMEG6010ER		
	650	0.35	low $V_F$			PMEG6010AED				
1.5	660	0.05	low $I_R$							
	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	
	40	620	1.0	low $V_F$						
		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						
	490	0.3	low $V_F$	PMEG4050EP						

## Medium power low $V_F$ Schottky rectifiers dual $\geq 200$ 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. 			<b>PMEG4010CPA</b>		
	60	650	0.35	low $V_F$	dual c.c. 				<b>PMEG6010CPA</b>	
				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. 			<b>PMEG2020CPA</b>	
30		440	2.0	low $V_F$	dual c.c. 			<b>PMEG3020CPA</b>		

## Low capacitance Schottky diodes




































$I_F$ max (mA)	$V_R$ max (V)	$V_F$ max (mV) @ $I_F$ (mA)	$C_j$ 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			1PS76SB17		1PS79SB17		
					 triple isolated					1PS66SB17		
					 dual series PMBD353 PMBD354 <sup>1)</sup>							
	15	340	1	1	 single 1PS70SB82		1PS70SB82					1PS10SB82
					 triple isolated			1PS88SB82		1PS66SB82		
					 dual series 1PS70SB84			1PS70SB84				
					 dual c.c. 1PS70SB85			1PS70SB85				
					 dual c.a. 1PS70SB86			1PS70SB86				

<sup>1)</sup> 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		4.8 x 2.6 x 0.81	1000
	60	3.6~75				BZV85 series			
250	-	2.4~36	about 2 %	special	single 	NZX series		4.25 x 1.85 x 0.56	400
	40	2.4~75	B, C	Eur		BZX79 series			
400	40	2.4~75	C	Eur	single 	BZV90 series		6.5 x 3.5 x 1.65	1500
250	40	2.4~75	C	Eur	single 	BZV49 series		4.5 x 2.5 x 1.5	1000
250	40	2.4~75	B, C	Eur	single 	BZV55 series		3.5 x 1.5 x 1.5	300
200	40	2.4~75	B, C	Eur	dual c.a. 	BZB84 series		2.9 x 1.3 x 1.0	250
			A, B, C		single 	BZX84 series PLVA600A series			
250	30	5~6.8	0.2 V	Ave	dual c.a. 	PLVA2600A series			
250	-	3.0~30	about 2.5 %	special	single 	<b>NZH series</b>		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		2.0 x 1.25 x 0.95	300
200	40	2.4~15	C	Eur	dual c.a. 	BZB784 series		2.0 x 1.25 x 0.95	350
200	30	100	C	Eur	back-to-back 	BZB100A		1.7 x 1.25 x 0.95	300
	40	2.4~36	B2	Jap	single 	PDZ-B series			
250	40	2.4~75	B, C	Eur	single 	BZX384 series			
200	40	2.4~36	B, B1, B2, B3	Jap	single 	PZUxBA series			
200	60	100	C	Eur	single 	BZX100A		1.7 x 1.25 x 0.7	550
200	40	2.4~36	B, B1, B2, B3	Jap	single 	PZUxB series			
250	40	2.4~75	B, C	Eur	single 	BZX84J series			
200	40	2.4~15	C	Eur	dual c.a. 	BZB984 series		1.6 x 1.2 x 0.55	350
200	40	2.4~75	B, C	Eur	single 	BZX585 series		1.2 x 0.8 x 0.6	300
200	40	2.4~75	B, C	Eur	single 	BZX884 series		1.0 x 0.6 x 0.5	250
		2.4~36	B, B2	Jap		PZUxBL series			

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

























# Switching diodes

## General purpose switching diodes $\leq 100V$

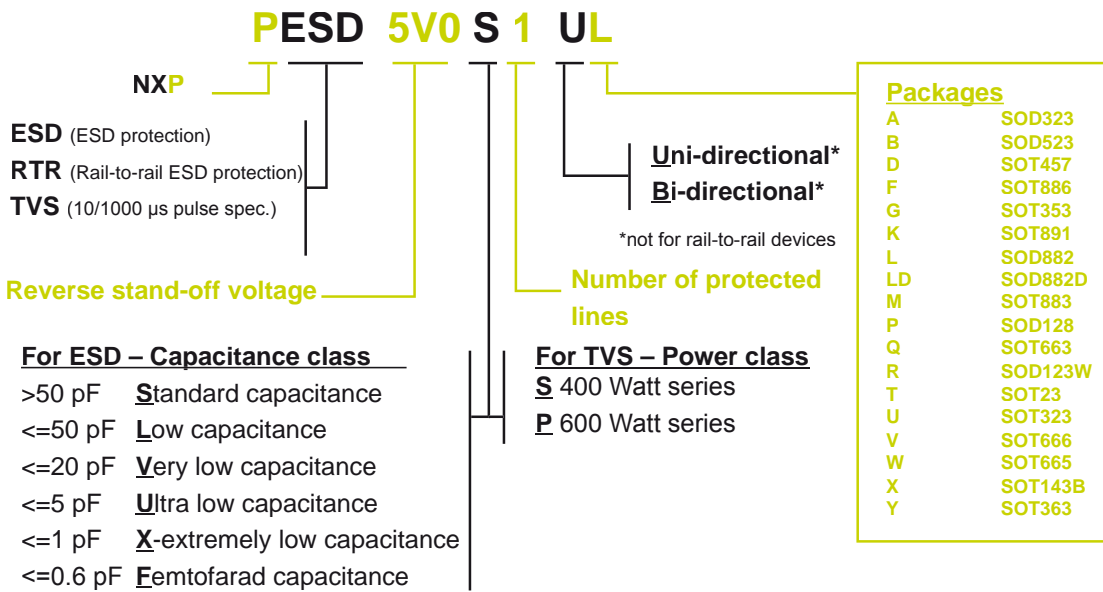
$V_R$ max (V)	$V_F$ max (V)	$I_F$ (mA)	$I_R$ max (mA)	$V_F$ (V)	$t_{tr}$ max (ns)	Package	SOD27 (DO-35)	SOD68 (DO-34)	SOD80C (MiniMelf)	SOT23
						Size (mm)	4.25 x 1.85 x 0.56	3.04 x 1.6 x 0.55	3.5 x 1.5 x 1.5	2.9 x 1.3 x 1.0
						$P_{tot}$ (mW)	500	500	500	250
50	1	50	100	50	4					BAL74
70	1	50	1000	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 > 100V

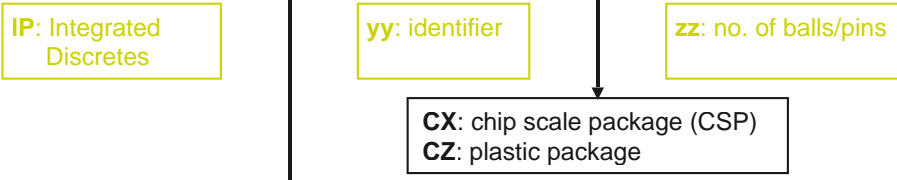
types in **bold** represent new products

$V_R$ max (V)	$V_F$ max (V)	$I_F$ (mA)	$I_R$ max (mA)	$@ V_R$ (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	200	50		BAV21	BAV103					BAS21H			BAS321						
					50						BAS21				<b>BAS21W</b>							
					50								BAS21									
					50								BAS21									
					50								BAS21									
					50								BAS21									
					50								BAS21									
300	1.1	100	150	250	50													BAS21J	BAS521			
					50							BAS101										
					50								BAS101S									
					50									BAS101								
					50													BAS101S				

# Protection and signal conditioning nomenclature















**IP - - - - xx - - - - yy - - - - CX - - - - zz**



xx:	
30:	passive ESD protection/EMI filter with integrated coils in 0.5 mm pitch CSP
32:	passive ESD protection/EMI filter with integrated coils in plastic package
33:	passive ESD protection/EMI filter with integrated coils in 0.4 mm pitch CSP
40, 41:	passive ESD protection/EMI filter in 0.5 mm pitch CSP
42:	passive ESD protection/EMI filter in plastic package
43:	passive ESD protection/EMI filter in 0.4 mm pitch CSP
47:	active device in plastic package with ESD protection/EMI filter
48:	active ESD protection/EMI filter in 0.4 mm pitch CSP
50:	passive ESD protection/EMI filter with high density capacitors in 0.5 mm pitch CSP
53:	passive ESD protection/EMI filter with high density capacitors in 0.4 mm pitch CSP

# Standard ESD protection devices



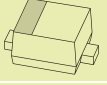


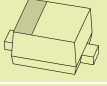

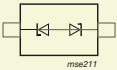

types in **bold** represent new products

Number of protected lines		V <sub>RWM</sub> (V)	C <sub>line</sub> typ (pF)	C <sub>line</sub> max (pF)	P <sub>PP</sub> <sup>(1)</sup> max (W)	ESD rating <sup>(2)</sup> max (kV)	I <sub>R</sub> max (µA) @ V <sub>RWM</sub>	Configuration	Type	Package	Size (mm)
Unidirectional	Bidirectional										
1	0	3.3	207	300	150	30	2		PESD3V3S1UL	SOD882 	1.0 x 0.6 x 0.5
		5	152	200	150	30	1		PESD5V0S1UL		
		12	38	75	150	30	0.05		PESD12VS1UL		
		15	32	70	150	30	0.05		PESD15VS1UL		
		24	23	50	150	23	0.05		PESD24VS1UL		
		5	152	200	150	30	1		<b>PESD5V0S1ULD</b>	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		<b>PESD5V0S1BLD</b>	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

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

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

## Low capacitance ESD protection devices


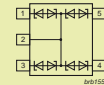
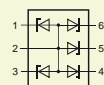
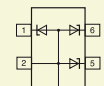
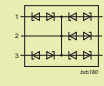
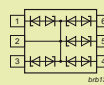

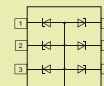
Number of protected lines		$V_{RWM}$ (V)	$C_{line, typ}$ (pF)	$C_{line, max}$ (pF)	$P_{PP}^{(1), max}$ (W)	ESD rating <sup>(2)</sup> max (kV)	$I_R, max$ (μA) @ $V_{RWM}$	Configuration	Type	Package	Size (mm)			
Unidirectional	Bidirectional													
1	0	3.3	34	40	45	30	0.3		PESD3V3L1UL	SOD882	1.0 x 0.6 x 0.5			
		5	25	30	42	26	0.1		PESD5V0L1UL					
		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		1.7 x 1.25 x 0.95
				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				

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

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

# Low capacitance ESD protection devices

types in **bold** represent new products

Number of protected lines		V <sub>RWM</sub> (V)	C <sub>line</sub> typ (pF)	C <sub>line</sub> max (pF)	P <sub>PP</sub> <sup>(1)</sup> max (W)	ESD rating <sup>(2)</sup> max (kV)	I <sub>R</sub> max (μA) @ V <sub>RWM</sub>	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		<b>PESD3V3L5UK</b>	SOT891 (XSON6)	1.0 x 1.0 x 0.5
		5	16		25	20	0.025		<b>PESD5V0L5UK</b>		
		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

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

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

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

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

types in **bold** represent new products

Number of protected lines		V <sub>RWM</sub> (V)	C <sub>line</sub> typ (pF)	C <sub>line</sub> max (pF)	ESD rating <sup>[1]</sup> max (kV)	I <sub>R</sub> max (μA) @ V <sub>RWM</sub>	Configuration	Type	Package	Size (mm)
Unidirectional	Bidirectional									
2	0	5.5	0.7	-	8	-		<b>IP4282CZ6</b>	SOT886 (XSON6) 	1.45 x 1.0 x 0.5
		5.5	1.3	-	15	-		<b>IP4359CX4</b>	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	-		<b>IP4233CZ6</b>	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	-		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	SOT552 (TSSOP10) 	3.0 x 3.0 x 1.1
		5.5	0.6	-	8	-		IP4283CZ10-TT	SOT552 (TSSOP10) 	3.0 x 3.0 x 1.1

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




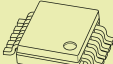



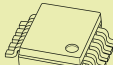


## Audio interfaces

 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 $\Omega$	290	-	Low-ohmic speaker (< ~8 $\Omega$ )	IP4047CX6/LF	6 ball CSP	1.56 x 1.01 x 0.65
		10 $\Omega$	200	-	Low-ohmic speaker (> ~8 $\Omega$ )	IP4048CX5/LF	5 ball CSP	0.91 x 1.28 x 0.65
		15 $\Omega$	5000	-	Low-ohmic speaker (> ~8 $\Omega$ )	IP5311CX5/LF		0.80 x 1.16 x 0.61
		68 $\Omega$	110	-	Single-ended or differential microphone	IP4049CX5/LF	6 ball CSP	0.91 x 1.28 x 0.65
		470 $\Omega$	35	-	Single-ended or differential microphone	IP4055CX6/LF		1.56 x 1.03 x 0.65
		470 $\Omega$	20	-	Single-ended or differential microphone	IP4355CX6/LF	1.16 x 0.76 x 0.65	
		50 $\Omega$ / 2.2 k $\Omega$	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 k $\Omega$	4000	-	Differential microphone filter with integrated biasing network for $\Sigma\Delta$ ADC converters	IP5006CX11/LF	11 ball CSP	1.41 x 1.91 x 0.65
		5 $\Omega$ / 20 $\Omega$ / 1.5 k $\Omega$	550	-	Differential microphone filter with integrated biasing network for $\Sigma\Delta$ including coupling capacitors	IP5020CX16/LF	16 ball CSP	2.01 x 1.91 x 0.65
		0.25 $\Omega$ , 3 nH	-	-	Inductive, low-ohmic differential channel LC filter	<b>IP3047CX6</b>	6 ball CSP	1.60 x 1.15 x 0.65
		0.25 $\Omega$ , 3 nH	-	-	Inductive, low-ohmic differential channel LC filter	<b>IP3048CX5</b>	5 ball CSP	1.51 x 1.15 x 0.65
	2.2 k $\Omega$ / 1 k $\Omega$ / 0.8 k $\Omega$	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 $\Omega$	5000	-	Dual differential speaker	IP5040CX11/LF	11 ball CSP	1.41 x 2.01 x 0.65
	6	15 $\Omega$ / 95 $\Omega$	65 / 33	-	Single-ended microphone and high-ohmic speaker (> ~8 $\Omega$ ) with integrated 2 kohm pull-up resistor	IP4363CX10/LF	10 ball CSP	0.76 x 1.96 x 0.61
		40 $\Omega$ / 1450 $\Omega$ / 10 $\Omega$	50 / 20 / 200	-	Fully integrated audio interface protection for differential microphone and differential speaker, including EMI filtering and pull up resistors	IP4025CX20/LF	20 ball CSP	1.98 x 2.53 x 0.65
40 $\Omega$ / 1450 $\Omega$ / 10 $\Omega$		50 / 20 / 200	-	Fully integrated audio interface protection for differential microphone and differential speaker, including EMI filtering and pull up resistors	IP4027CX20/LF	1.91 x 2.52 x 0.65		
50 $\Omega$ / 10 $\Omega$		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 $\Omega$ / 30 $\Omega$ / 200 $\Omega$	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 <sub>line</sub> (pF)	Resistor (Ω)	Remark	Type	Package	Size (mm)	
HDMI	4	-	-	0.6	-	ESD protection for ultra high speed interfaces	<b>IP4283CZ10-TB</b>	SOT1059 (XSON10U) 	1.0 x 2.5 x 0.5	
		-	-	0.6	-	ESD protection for ultra high speed interfaces	<b>IP4283CZ10-TT</b>	SOT552 (TSSOP10) 	3.0 x 3.0 x 1.1	
		-	-	0.6	-	ESD protection for ultra high speed interfaces	<b>IP4286CZ6-TBF</b>	SOT886 (XSON6) 	1.45 x 1.0 x 0.5	
		-	-	0.6	-	ESD protection for ultra high speed interfaces	<b>IP4286CZ6-TTY</b>	SOT363 (SC-88) 	2.0 x 1.25 x 0.95	
		-	-	0.5	-	ESD protection for ultra high speed interfaces	<b>IP4284CZ10-TB</b>	SOT1059 (XSON10U) 	1.0 x 2.5 x 0.5	
		-	-	0.5	-	ESD protection for ultra high speed interfaces	<b>IP4284CZ10-TT</b>	SOT552 (TSSOP10) 	3.0 x 3.0 x 1.1	
	5	-	-	0.5	-	ESD protection for up to 5 ultra high speed datalines	<b>PESD5V0F5BK</b>	SOT891 (XSON6) 	1.0 x 1.0 x 0.5	
		-	-	10	1.75 k, 100 k	HDMI, DDC, CEC, hotplug ESD protection and biasing	<b>IP4310CX8</b>	8 ball CSP	1.16 x 1.16 x 0.61	
	8	-	-	1.3	-	HDMI, TMDS line ESD protection	<b>IP4309CX9</b>	9 ball CSP	1.16 x 1.16 x 0.61	
	12	-	yes	yes	0.7	-	ESD protection and level shifting for a complete HDMI port	IP4776CZ38		
		-	yes	yes	0.7	-	ESD protection, DDC buffering, noise reduction and Hot Plug application for a complete HDMI source port	IP4777CZ38	SOT510 (TSSOP38) 	9.7 x 4.4 x 1.1
		-	yes	yes	0.7	-	ESD protection, DDC buffering, noise reduction and Hot Plug application for a complete HDMI sink port	IP4778CZ38		



## 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 $\Omega$	36	~40	EMI filter, ESD protection with common ground	IP4307CX4/LF	4 ball CSP	0.76 x 0.76 x 0.61	
		100 $\Omega$	30	~40	EMI filter, ESD protection	IP4256CZ3-M	SOT883 (SC-101) 	1.0 x 0.6 x 0.5	
	2	100 $\Omega$	30	~40	EMI filter, ESD protection	IP4256CZ5-W	SOT665 	1.6 x 1.2 x 0.5	
		100 $\Omega$	30	~40	EMI filter, ESD protection	IP4256CZ6-F	SOT886 (XSON6) 	1.45 x 1.0 x 0.5	
	4	100 $\Omega$	15	~50	EMI filter, ESD protection	IP4251CZ8-4		SOT983 (8 pin QFN)	1.7 x 1.35 x 0.5
		40 $\Omega$	18	~70	EMI filter, ESD protection	IP4252CZ8-4		1.7 x 1.35 x 0.5	
		100 $\Omega$	45	~30	EMI filter, ESD protection	IP4254CZ8-4		1.7 x 1.35 x 0.5	
		200 $\Omega$	45	~30	EMI filter, ESD protection	IP4253CZ8-4		1.7 x 1.35 x 0.5	
		100 $\Omega$	60	~20	EMI filter, ESD protection plus 4x ESD	IP4054CX15/LF		15 ball CSP	2.96 x 1.32 x 0.65
	6	100 $\Omega$	15	~50	EMI filter, ESD protection	IP4251CZ12-6		SOT984 (12 pin QFN)	2.5 x 1.35 x 0.5
		40 $\Omega$	18	~70	EMI filter, ESD protection	IP4252CZ12-6		2.5 x 1.35 x 0.5	
		100 $\Omega$	45	~30	EMI filter, ESD protection	IP4254CZ12-6		2.5 x 1.35 x 0.5	
		200 $\Omega$	45	~30	EMI filter, ESD protection	IP4253CZ12-6		2.5 x 1.35 x 0.5	
		100 $\Omega$	60	~20	EMI filter, ESD protection	IP4053CX15/LF	15 ball CSP	2.96 x 1.32 x 0.65	
		100 $\Omega$	30	~40	EMI filter, ESD protection	IP4153CX15/LF		2.91 x 1.28 x 0.65	
		100 $\Omega$	60	~20	EMI filter, ESD protection	IP4353CX15/LF		2.38 x 1.05 x 0.61	
	7	70 $\Omega$	25	~40	EMI filter, ESD protection, extremely small size	IP4337CX18/LF/E	18 ball CSP	1.96 x 1.61 x 0.61	
		125 $\Omega$	25	~60	60 nH coils RLC filter	<b>IP3337CX18/LF</b>		2.11 x 1.81 x 0.61	
	8	100 $\Omega$	15	~50	EMI filter, ESD protection	IP4251CZ16-8		SOT985 (16 pin QFN)	3.3 x 1.35 x 0.5
		40 $\Omega$	18	~70	EMI filter, ESD protection	IP4252CZ16-8		3.3 x 1.35 x 0.5	
		100 $\Omega$	45	~30	EMI filter, ESD protection	IP4254CZ16-8		3.3 x 1.35 x 0.5	
		200 $\Omega$	45	~20	EMI filter, ESD protection	IP4253CZ16-8		3.3 x 1.35 x 0.5	
		100 $\Omega$	50	~25	EMI filter, ESD protection	IP4088CX20/LF		20 ball CSP	3.91 x 1.28 x 0.65
	10	125 $\Omega$	25	~60	60 nH coils RLC filter	<b>IP3338CX24/LF</b>	24 ball CSP	2.11 x 2.11 x 0.61	
		70 $\Omega$	25	~40	EMI filter, ESD protection, extremely small size	<b>IP4338CX24/LF</b>		1.96 x 2.01 x 0.61	
		200 $\Omega$	50	~20	EMI filter, ESD protection	IP4041CX25/LF		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 $\Omega$ / 100 $\Omega$	10	~20	Integrated low capacitance SIM-card passive filter array & USB ESD protection	<b>IP4365CX11</b>	11 ball CSP	1.16 x 1.56 x 0.61
	3	47 $\Omega$ / 100 $\Omega$	40	~12	Integrated SIM-card EMI filter and ESD protection	IP4044CX8/LF	8 ball CSP	1.46 x 1.49 x 0.65
		47 $\Omega$ / 100 $\Omega$	20	~20	Integrated SIM-card EMI filter and ESD protection	IP4064CX8/LF/S		1.41 x 1.41 x 0.65
		47 $\Omega$ / 100 $\Omega$	20	~20	Smaller size, integrated SIM-card EMI filter and ESD protection	IP4364CX8/LF		1.16 x 1.16 x 0.61
		47 $\Omega$ / 100 $\Omega$	10	~20	Smaller size, low capacitance integrated SIM-card EMI filter and ESD protection	<b>IP4366CX8/LF</b>		1.16 x 1.16 x 0.61
		47 $\Omega$ / 100 $\Omega$	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 $\Omega$ / 100 $\Omega$	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)	
SD-card / MMC	4	47 $\Omega$ / 13 k $\Omega$ / 56 k $\Omega$	25	~30	MMC ESD protection, pull-up resistors	IP4051CX11/LF	11 ball CSP	1.44 x 1.96 x 0.65
		50 $\Omega$ / 75 k $\Omega$ / 7 k $\Omega$	18	~50	High-speed MMC ESD protection, pull-up resistors	IP4060CX16/LF	16 ball CSP	1.96 x 1.97 x 0.65
	7	40 $\Omega$ / 50 k $\Omega$ / 25 k $\Omega$	18	~20	(Mini) SD/trans flash card ESD protection, EMI filter, pull-up resistors	IP4052CX20/LF	20 ball CSP	2.54 x 1.96 x 0.65
		-	5	~24	Memory stick PRO ESD protection	IP4067CX9/LF	9 ball CSP	1.46 x 1.52 x 0.65
	6 (+3)	15 $\Omega$ / 50 k $\Omega$ / 15 k $\Omega$	8	> 52	Very low capacitance, low channel resistance (mini) SD card/trans flash ESD protection EMI filter, pull-up resistor	IP4350CX24/LF	24 ball CSP	1.95 x 2.11 x 0.61
		40 $\Omega$ / 50 k $\Omega$ / 15 k $\Omega$	20	> 52	(Mini) SD card/trans flash ESD protection, EMI filter, pull-up resistor	IP4352CX24/LF		2.02 x 2.01 x 0.61
		-	-	> 52	(Mini) SD/SDIO memory card level shifter, can be combined with IP4352CX24/LF	IP4852CX25/LF	25 ball CSP	2.01 x 2.01 x 0.61
		40 $\Omega$ / 50 k $\Omega$ / 15 k $\Omega$	-	> 52	(Mini) SD/SDIO memory card level shifter, and voltage regular, incl. ESD and EMI filter	<b>IP4853CX24/LF</b>	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	<b>IP4386CX4</b>		0.76 x 0.76 x 0.61	
		290	Breakdown 10 V	Power diode	<b>IP4387CX4</b>		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	SOT457 (SC-74) 	2.9 x 1.5 x 1.0
		-	1	-	ESD protection for USB2.0 high-speed, SD-Card, SIM card	IP4220CZ6		
		-	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	<b>IP4225CZ10</b>	SOT457 (SC-74) 	2.9 x 1.5 x 1.0

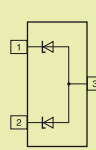
## USB, LVDS, SATA, LAN

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	<b>IP4286CZ6-TTY</b>	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 $\Omega$ termination	IP4263CZ14	SOT108 (SO14) 	8.65 x 3.9 x 1.75
SATA	2	-	0.7	-	ESD protection for ultra high speed interfaces	<b>IP4282CZ6</b>	SOT886 (XSON6) 	1.45 x 1.0 x 0.5
		-	0.6	-	ESD protection for ultra high speed interfaces	<b>IP4286CZ6-TBF</b>		
	-	0.6	-	ESD protection for ultra high speed interfaces	<b>IP4286CZ6-TTY</b>	SOT363 (SC-88) 	2.0 x 1.25 x 0.95	
SATA	4	-	0.6	-	ESD protection for ultra high speed interfaces	<b>IP4283CZ10-TB</b>	SOT1059 (XSON10U) 	1.0 x 2.5 x 0.5
		-	0.6	-	ESD protection for ultra high speed interfaces	<b>IP4283CZ10-TT</b>	SOT552 (TSSOP10) 	3.0 x 3.0 x 1.1
		-	0.5	-	ESD protection for ultra high speed interfaces	<b>IP4284CZ10-TB</b>	SOT1059 (XSON10U) 	1.0 x 2.5 x 0.5
		-	0.5	-	ESD protection for ultra high speed interfaces	<b>IP4284CZ10-TT</b>	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 $\mu$ s waveform) <sup>[1]</sup>	$V_{RWM}$ (V)	$V_{BR}$ min (V) @ $I_R$	$V_{BR}$ typ (V) @ $I_R$	$V_{BR}$ max (V) @ $I_R$	$I_R$ (mA)	ESD rating <sup>[2]</sup> max (kV)	$C_{it}$ typ (pF)	$V_{CL}$ max (V) @ $I_{PP}$	$I_{PP}$ (A)	$I_{RM}$ max ( $\mu$ A) @ $V_{RWM}$	Configuration	Type	Package	Size (mm)
24	3	5.32	5.6	5.88	20	30	210	8	3	5		<b>MMBZ5V6AL</b>	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		<b>MMBZ6V2AL</b>		
	4.5	6.48	6.8	7.14	1	30	150	9.6	2.5	0.3		<b>MMBZ6V8AL</b>		
	6	8.65	9.1	9.56	1	30	155	14	1.7	0.1		<b>MMBZ9V1AL</b>		
	6.5	9.5	10	10.5	1	30	130	14.2	1.7	0.02		<b>MMBZ10VAL</b>		
40	8.5	11.4	12	12.6	1	30	110	17	2.35	0.005		MMBZ12VAL		
	12	14.25	15	15.75	1	30	85	21	1.9	0.005		MMBZ15VAL		
	14.5	17.1	18	18.9	1	30	70	25	1.6	0.005		MMBZ18VAL		
	17	19	20	21	1	30	65	28	1.4	0.005		MMBZ20VAL		
	22	25.65	27	28.35	1	30	48	40	1	0.005		MMBZ27VAL		
	26	31.35	33	34.65	1	30	45	46	0.87	0.005		MMBZ33VAL		
	8.5	11.4	12	12.6	1	30	110	17	2.35	0.005		MMBZ12VDL		
	12.8	14.3	15	15.8	1	30	85	21.2	1.9	0.005		MMBZ15VDL		
	14.5	17.1	18	18.9	1	30	70	25	1.6	0.005		MMBZ18VCL		
	17	19	20	21	1	30	65	28	1.4	0.005		MMBZ20VCL		
	22	25.65	27	28.35	1	30	48	38	1	0.005	MMBZ27VCL			
	26	31.35	33	34.65	1	30	45	46	0.87	0.005	MMBZ33VCL			

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

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

## TVS diodes, 400 W





Power (W) (10/1000 $\mu$ s waveform) <sup>[1]</sup>	$V_{RWM}$ (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 ( $\mu$ A) @ $V_{RWM}$	$I_{RM}$ max ( $\mu$ A) @ $V_{RWM}$	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		

<sup>[1]</sup> 10/1000  $\mu$ s 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 <sub>tot</sub> (mW)						250	200	150	250
Polarity	V <sub>CE0</sub> (V)	I <sub>C</sub> (mA)	h <sub>FE</sub> min	h <sub>FE</sub> max	f <sub>T</sub> 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

							SOT143B	SOT457 (SC-74)	SOT353 (SC-88A)	SOT363 (SC-88)	SOT666		
Package													
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 <sub>tot</sub> (mW)							250	380	300	300	300		
Polarity	V <sub>CEO</sub> (V)	I <sub>C</sub> (mA)	h <sub>FE</sub> min	h <sub>FE</sub> max	h <sub>FE1</sub> / h <sub>FE2</sub>	V <sub>BE1</sub> - V <sub>BE2</sub> (mV)							
NPN	30	100	110	800	0.7 <sup>1)</sup>	n.a.	BCV61/A/B/C <sup>1)</sup>						
	45	100	200	450	0.9 <sup>1)</sup>	2	BCM61B <sup>1)</sup>	BCM847DS		BCM847BS		BCM847BV	
					0.95	2			PMP4501G		PMP4501Y		PMP4501V
					0.98	2			PMP4201G		PMP4201Y		PMP4201V
Configuration													
PNP	30	100	100	800	0.7 <sup>1)</sup>	n.a.	BCV62/A/B/C <sup>1)</sup>						
	45	100	200	450	0.9 <sup>1)</sup>	2	BCM62B <sup>1)</sup>	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													

<sup>1)</sup> I<sub>C1</sub>/I<sub>E2</sub>

### 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

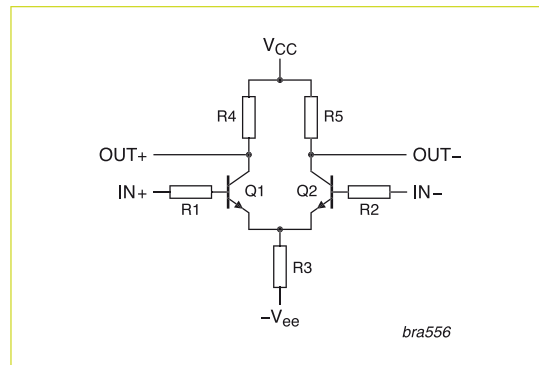
### Key benefits

- ▶ 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

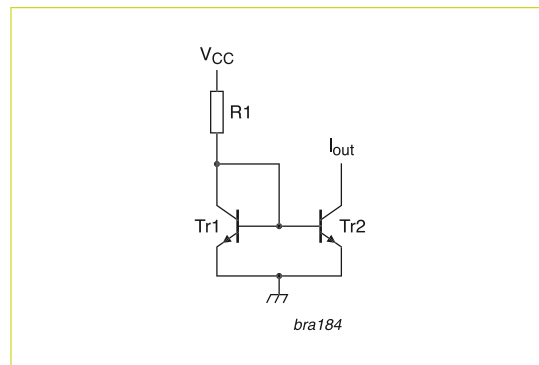
### Key applications

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



### Differential amplifier




### Current mirror



## Medium frequency transistors

						SOT23	SOT323 (SC-70)
Package							
Size (mm)						2.9 x 1.3 x 1.0	2.0 x 1.25 x 0.95
P <sub>tot</sub> (mW)						250	200
Polarity	V <sub>CE0</sub> (V)	I <sub>c</sub> (mA)	h <sub>FE</sub> min	h <sub>FE</sub> max	f <sub>t</sub> typ (MHz)		
NPN	15	100	40	-	500	BF570	
	20	25	40	85	> 275	BFS20	BFS20W
		30	65	225	260	BF519	
	40	25	67	220	380	BF840	
PNP	30	25	25	50	250	BF824	BF824W
	40	25	50	-	> 325	BF550	

## Schmitt trigger

							SOT143B
Package							
Size (mm)							2.9 x 1.3 x 1.0
P <sub>tot</sub> (mW)							250
Polarity	V <sub>CE0</sub> (V) TR1	V <sub>CE0</sub> (V) TR2	I <sub>c</sub> (mA)	h <sub>FE</sub> min	h <sub>FE</sub> max	V <sub>CEsat</sub> typ (mV)	
NPN	30	6	100	110	800	250	BCV63 / B
PNP	30	6	100	220	475	250	BCV64B

### Key features

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

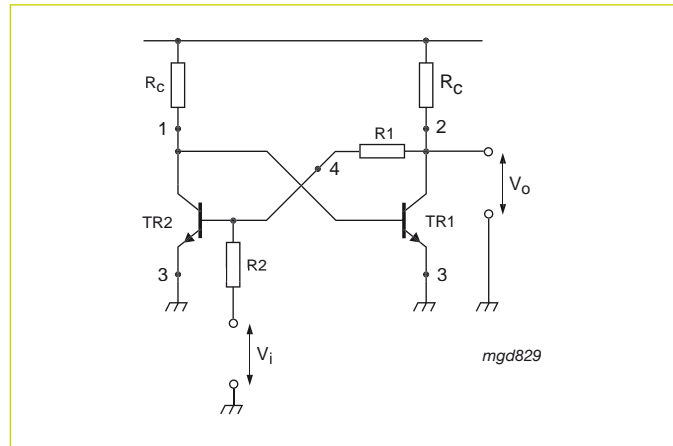
### Key benefits

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

### Key applications



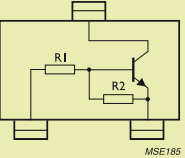
- ▶ General purpose switching and amplification
- ▶ Schmitt trigger applications



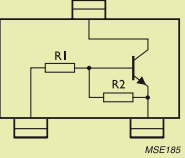
### Schmitt trigger






# Resistor-equipped transistors (RETs)

## RETs 100 mA single




Package					SOT23		SOT323 (SC-70)		
									
Size (mm)					2.9 x 1.3 x 1.0		2.0 x 1.25 x 0.95		
P <sub>tot</sub> (mW)					250		200		
V <sub>CE0</sub> (V)	I <sub>C</sub> (mA)	Configuration	R1 (kΩ)	R2 (kΩ)	NPN	PNP	NPN	PNP	
50	100		1	1			PDTA113ET		PDTA113EU
			2.2	2.2	PDTC123ET	PDTA123ET	PDTC123EU	PDTA123EU	
			4.7	4.7	PDTC143ET	PDTA143ET	PDTC143EU	PDTA143EU	
			10	10	PDTC114ET	PDTA114ET	PDTC114EU	PDTA114EU	
			22	22	PDTC124ET	PDTA124ET	PDTC124EU	PDTA124EU	
			47	47	PDTC144ET	PDTA144ET	PDTC144EU	PDTA144EU	
			100	100	PDTC115ET	PDTA115ET	PDTC115EU	PDTA115EU	
			1	10			PDTA113ZT		PDTA113ZU
			2.2	10	PDTC123YT	PDTA123YT	PDTC123YU	PDTA123YU	
			2.2	47	PDTC123JT	PDTA123JT	PDTC123JU	PDTA123JU	
		4.7	10	PDTC143XT	PDTA143XT	PDTC143XU	PDTA143XU		
		4.7	47	PDTC143ZT	PDTA143ZT	PDTC143ZU	PDTA143ZU		
		10	47	PDTC114YT	PDTA114YT	PDTC114YU	PDTA114YU		
		22	47	PDTC124XT	PDTA124XT	PDTC124XU	PDTA124XU		
		47	10	PDTC144VT	PDTA144VT	PDTC144VU	PDTA144VU		
		47	22	PDTC144WT	PDTA144WT	PDTC144WU	PDTA144WU		
		2.2	-	PDTC123TT	PDTA123TT	PDTC123TU	PDTA123TU		
		4.7	-	PDTC143TT	PDTA143TT	PDTC143TU	PDTA143TU		
		10	-	PDTC114TT	PDTA114TT	PDTC114TU	PDTA114TU		
		22	-	PDTC124TT	PDTA124TT	PDTC124TU	PDTA124TU		
47	-	PDTC144TT	PDTA144TT	PDTC144TU	PDTA144TU				
100	-	PDTC115TT	PDTA115TT	PDTC115TU	PDTA115TU				

Package					SOT416 (SC-75)		SOT883 (SC-101)		
									
Size (mm)					1.6 x 0.8 x 0.77		1.0 x 0.6 x 0.5		
P <sub>tot</sub> (mW)					150		250		
V <sub>CE0</sub> (V)	I <sub>C</sub> (mA)	Configuration	R1 (kΩ)	R2 (kΩ)	NPN	PNP	NPN	PNP	
50	100		1	1			PDTA113EE		PDTA113EM
			2.2	2.2	PDTC123EE	PDTA123EE	PDTC123EM	PDTA123EM	
			4.7	4.7	PDTC143EE	PDTA143EE	PDTC143EM	PDTA143EM	
			10	10	PDTC114EE	PDTA114EE	PDTC114EM	PDTA114EM	
			22	22	PDTC124EE	PDTA124EE	PDTC124EM	PDTA124EM	
			47	47	PDTC144EE	PDTA144EE	PDTC144EM	PDTA144EM	
			100	100	PDTC115EE	PDTA115EE	PDTC115EM	PDTA115EM	
			1	10			PDTA113ZE		PDTA113ZM
			2.2	10	PDTC123YE	PDTA123YE	PDTC123YM	PDTA123YM	
			2.2	47	PDTC123JE	PDTA123JE	PDTC123JM	PDTA123JM	
		4.7	10	PDTC143XE	PDTA143XE	PDTC143XM	PDTA143XM		
		4.7	47	PDTC143ZE	PDTA143ZE	PDTC143ZM	PDTA143ZM		
		10	47	PDTC114YE	PDTA114YE	PDTC114YM	PDTA114YM		
		22	47	PDTC124XE	PDTA124XE	PDTC124XM	PDTA124XM		
		47	10	PDTC144VE	PDTA144VE	PDTC144VM	PDTA144VM		
		47	22	PDTC144WE	PDTA144WE	PDTC144WM	PDTA144WM		
		2.2	-	PDTC123TE	PDTA123TE	PDTC123TM	PDTA123TM		
		4.7	-	PDTC143TE	PDTA143TE	PDTC143TM	PDTA143TM		
		10	-	PDTC114TE	PDTA114TE	PDTC114TM	PDTA114TM		
		22	-	PDTC124TE	PDTA124TE	PDTC124TM	PDTA124TM		
47	-	PDTC144TE	PDTA144TE	PDTC144TM	PDTA144TM				
100	-	PDTC115TE	PDTA115TE	PDTC115TM	PDTA115TM				

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 <sub>tot</sub> (mW)												1700	1650	750		
V <sub>CEO</sub> (V)	I <sub>c</sub> (A)	I <sub>CE</sub> (A)	h <sub>FE</sub> min/typ	@ I <sub>c</sub> (A)	@ V <sub>CE</sub> (V)	R <sub>CEsat</sub> typ (mΩ); I <sub>c</sub> /I <sub>B</sub> = 10	V <sub>CEsat</sub> typ (mV); I <sub>c</sub> = 0.5 A; I <sub>B</sub> = 0.05 A	V <sub>CEsat</sub> max (mV)	@ I <sub>c</sub> (A)	@ I <sub>B</sub> (A)						
12	5.3	10.6	300/530	0.5	2	27 <sup>1)</sup>	18	200	5.3	0.265			PBSS301NX			
	5.8	11.6	300/530	0.5	2	29 <sup>1)</sup>	18	235	5.8	0.29			PBSS301NZ			
	6.0	7.0	280/440	0.5	2	33 <sup>1)</sup>	20	275	6	0.3						
15	0.5	1.0	200/325	0.01	2	360	-	250	0.5	0.05						
			200/425	0.01	2	300	200	250	0.5	0.05						
20	1.0	3.0	350/470	0.1	2	220	110 <sup>2)</sup>	250	1	0.05						
	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 <sup>1)</sup>	20	200	5.3	0.265				PBSS302NX		
	5.8	10.2	300/570	0.5	2	30 <sup>1)</sup>	20	250	5.8	0.29				PBSS302NZ		
	7.0	7.0	280/440	0.5	2	33 <sup>1)</sup>	20	275	6	0.3						
30	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		
	1.0	3.0	300/450	0.5	2	240	120 <sup>2)</sup>	270	1	0.05						
	2.0	3.0	300/450	0.5	2	120	70	320	2	0.2						
	2.6	5.0	300/500	0.5	2	76	80	320	3	0.3						
	3.0	5.0	300/490	0.5	2	80	45	300	3	0.3				PBSS4330X		
	3.5	6.0	300/500	0.5	2	50	70	300	4	0.4					PBSS4032ND <sup>3)</sup>	
	4.7	10.0	300/500	0.5	2	45	57	250	4	0.4					PBSS4032NX <sup>3)</sup>	
	5.1	10.2	300/480	0.5	2	30 <sup>1)</sup>	20	220	5.1	0.255					PBSS303NX	
	5.4	10.0	300/500	0.5	2	45	57	340	5.4	0.27					PBSS4032NZ <sup>3)</sup>	
40	5.5	11.0	300/480	0.5	2	31 <sup>1)</sup>	20	240	5.5	0.275				PBSS303NZ		
	6.0	7.0	280/450	0.5	2	35 <sup>1)</sup>	21	275	6	0.3						
	0.5	1.0	200/550	0.01	2	380	200 <sup>2)</sup>	250	0.5	0.05						
			200/350	0.01	2	380	190	250	0.5	0.05						
	1.0	3.0	300/-	0.5	5	150	70	440	2	0.2						
			300/440	0.5	5	240	130	500	1	0.1						
			300/510	0.5	5	230	120	500	1	0.1						
			300/420	0.5	5	150	130	500	1	0.1						
			300/400	0.5	5	150	70	400	2	0.2						
			350/470	0.1	2	120	70	320	2	0.2						
2.0	3.0	300/450	0.5	2	120	70	320	2	0.2							
		300/520	0.5	2	55	35	300	4	0.4							
4.0	10.0	300/500	0.5	2	40	21	355	5	0.5					PBSS302ND		
		300/500	0.5	2	42	25	355	5	0.5					PBSS4540Z		
50	2.0	5.0	300/495	0.5	2	100	60	260	2	0.2						
			300/-	0.5	2	160	90 <sup>2)</sup>	320	2	0.2					PBSS4540X	
	3.0	5.0	200/280	0.5	2	110	65	290	2	0.2					PBSS4250X	
			300/460	0.5	2	75	50	370	3	0.3					PBSS4350X	
			200/280	0.5	2	110	60 <sup>1)</sup>	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 <sup>1)</sup>	25	245	4.7	0.235					PBSS304NX	
	5.2	10.4	300/520	0.5	2	39 <sup>1)</sup>	25	280	5.2	0.26					PBSS304NZ	
	6.0	7.0	280/440	0.5	2	34 <sup>1)</sup>	22	290	6	0.3						
80	4.0	10.0	250/400	0.5	2	43 <sup>1)</sup>	25	230	4	0.2					PBSS4480X	
			300/470	0.5	2	37 <sup>1)</sup>	25	240	4.6	0.23					PBSS305NX	
			300/470	0.5	2	38 <sup>1)</sup>	25	270	5.1	0.255					PBSS305NZ	
100	1.0	3.0	270/425	0.5	2	40 <sup>1)</sup>	25	320	5.6	0.28						
			150/400	0.25	10	160	80	200	1	0.1						
			150/300	0.25	10	165	70	200	1	0.1						
			150/290	0.25	10	160	75	200	1	0.1						PBSS8110D
			150/290	0.25	10	165	73	200	1	0.1						PBSS8110X
	150/290	0.25	10	160	73	200	1	0.1						PBSS8110Z		
	3.0	4.0	170/275	0.5	2	72	45	360	4	0.4					PBSS305ND	
	4.5	9.0	200/330	0.5	2	38 <sup>1)</sup>	27	245	4.5	0.225					PBSS306NX	
5.1	10.2	200/330	0.5	2	43 <sup>1)</sup>	27	300	5.1	0.255					PBSS306NZ		
5.2	6.0	180/285	0.5	2	48 <sup>1)</sup>	30	340	5.2	0.26							





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

Package											SOT223 (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 <sub>tot</sub> (mW)											1700	1650	750		
V <sub>CEO</sub> (V)	I <sub>C</sub> (A)	I <sub>CM</sub> (A)	h <sub>FE</sub> min/typ	@ I <sub>C</sub> (V)	@ V <sub>CE</sub> (V)	R <sub>CEsat</sub> typ (mΩ); I <sub>C</sub> /I <sub>B</sub> = 10	V <sub>CEsat</sub> typ (mV); I <sub>C</sub> = 0.5 A; I <sub>B</sub> = 0.05 A	V <sub>CEsat</sub> max (mV)	@ I <sub>C</sub> (A)	@ I <sub>B</sub> (A)					
12	5.3	10.6	250/400	0.5	2	28 <sup>1)</sup>	20	210	5.3	0.265					
	5.7	11.4	250/400	0.5	2	30 <sup>1)</sup>	20	245	5.7	0.285	PBSS301PZ	PBSS301PX			
	6.0	7.0	220/335	0.5	2	33 <sup>1)</sup>	20	300	6	0.3					
15	0.5	1.0	200/260	0.01	2	300	150	250	0.5	0.05					
			200/325	0.01	2	300	150	250	0.5	0.05					
20	1.0	2.0	300/450	0.1	2	250	125 <sup>2)</sup>	250	1	0.05					
	2.0	4.0	220/440	0.1	2	140	75	390	2	0.2					
		3.0	225/-	0.5	2	115	80 <sup>2)</sup>	225	2	0.2					
	3.0	5.0	220/420	0.5	2	75	50	210	2	0.2					
		200/-	0.5	2	85	80 <sup>2)</sup>	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 <sup>1)</sup>	25	230	5.1	0.255		PBSS302PX			
5.5	11.0	250/370	0.5	2	34 <sup>1)</sup>	25	265	5.5	0.275	PBSS302PZ					
6.0	7.0	230/345	0.5	2	39 <sup>1)</sup>	25	350	6	0.3						
6.2	15.0	250/400	0.5	2	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 <sup>3)</sup>	
	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 <sup>3)</sup>		
	4.4	10.0	200/350	0.5	2	58	70	400	4	0.2	PBSS4032PZ <sup>3)</sup>				
	5.1	10.2	250/400	0.5	2	32 <sup>1)</sup>	25	230	5.1	0.255			PBSS303PX		
	5.3	10.6	250/400	0.5	2	35 <sup>1)</sup>	25	265	5.3	0.265	PBSS303PZ				
6.0	7.0	200/335	0.5	2	39 <sup>1)</sup>	25	350	6	0.3						
40	0.5	1.0	200/380	0.01	2	440	220	350	0.5	0.05					
	1.0	2.0	200/380	0.01	2	440	230	350	0.5	0.05					
			300/-	0.1	5	200	120	310	1	0.1					
			300/520	0.1	5	230	130	500	1	0.1					
	1.0	2.0	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 <sup>2)</sup>	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						
	10.0	250/370	0.5	2	45	33	375	5	0.5			PBSS5540X	PBSS302PD		
5.0	10.0	250/350	0.5	2	55	40 <sup>1)</sup>	160	2	0.2	PBSS5540Z					
50	2.0	3.0	200/-	0.5	2	150	90 <sup>2)</sup>	300	2	0.1					
		5.0	200/360	0.5	2	90	55	270	2	0.2					
		200/-	0.5	2	160	90 <sup>2)</sup>	320	2	0.2			PBSS5250X			
	3.0	5.0	200/300	0.5	2	120	70	300	2	0.2				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					
	4.2	8.4	200/295	0.5	2	53 <sup>1)</sup>	35	310	4.2	0.21			PBSS303PD		
	4.5	9.0	200/295	0.5	2	59 <sup>1)</sup>	35	375	4.5	0.225	PBSS304PZ			PBSS304PX	
			170/260	0.5	2	35 <sup>1)</sup>	55	450	5	0.25					
5.0	15.0	200/300	0.5	2	40	30	300	5	0.5						
5.7	15.0	200/300	0.5	2	29	22	285	6	0.3	PBSS4041PZ			PBSS4041PX		
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 <sup>1)</sup>	40	420	4	0.2					
		10.0	200/300	0.5	2	50	35	380	5	0.5			PBSS5480X		
	4.5	8.0	200/280	0.5	2	43	36	240	4	0.4			PBSS305PX		
		9.0	200/280	0.5	2	69 <sup>1)</sup>	36	450	4.5	0.225	PBSS305PZ				
100	1.0	3.0	150/-	0.25	5	170	93	320	1	0.1					
			150/350	0.5	5	170	95	320	1	0.1					
			150/350	0.5	5	170	100	320	1	0.1				PBSS9110D	
			150/350	0.5	5	170	90	320	1	0.1			PBSS9110X		
			150/-	0.5	5	170	90	320	1	0.1	PBSS9110Z				
	2.0	3.0	175/275	0.5	2	88	65	250	2	0.2				PBSS305PD	
	2.7	4.0	180/295	0.5	2	110 <sup>1)</sup>	45	450	2.7	0.135					
3.7	7.4	200/300	0.5	2	52	45	300	4	0.4			PBSS306PX			
4.1	8.2	200/300	0.5	5	57	45	325	4.1	0.41	PBSS306PZ					

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

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

types in **bold** represent new products

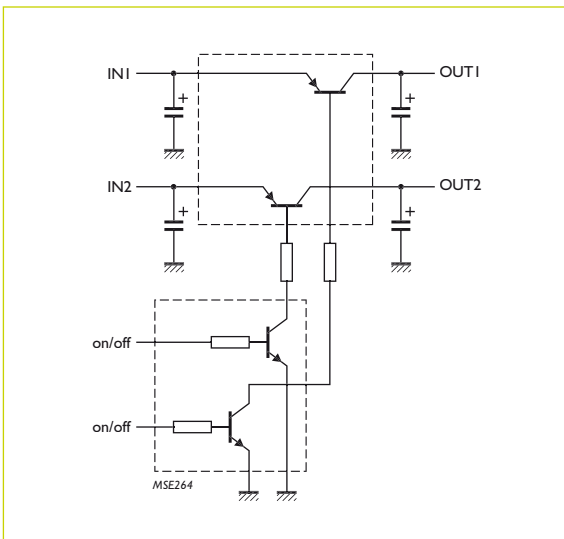
Package										SOT96 (SO8)	SOT457 (SC-74)	SOT363 (SC-88)	SOT666
													
Size (mm)										4.9 x 3.9 x 1.75	2.9 x 1.5 x 1.0	2.0 x 1.25 x 0.95	1.6 x 1.2 x 0.55
$P_{tot}$ (mW)										2000 <sup>2)</sup>	750	430	500
$V_{CE0}$ (V)	$I_c$ (A)	Polarity	$h_{FE}$ min	@ $I_c$ (A)	@ $V_{CE}$ (V)	$V_{CEsat, typ}$ (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 <sup>1)</sup>	250	0.5	0.05				PBSS2515VS
		2 x PNP	200	0.01	2	170 <sup>1)</sup>	250	0.5	0.05				PBSS3515VS
		NPN/PNP	200	0.01	2	170 <sup>1)</sup>	250	0.5	0.05				PBSS2515VPN
		NPN/PNP	200	0.01	2	170 <sup>1)</sup>	250	0.5	0.05			PBSS2515YPN	
20	7.5	NPN/NPN	300	0.5	2	15	150	4	0.2	<b>PBSS4021SN</b>			
	6.3	PNP/PNP	250	0.5	2	24	225	4	0.2	<b>PBSS4021SP</b>			
	7.5 / 6.3	NPN/PNP	300/250	0.5	2	15/24	150/225	4	0.2	<b>PBSS4021SPN</b>			
30	5.7	NPN/NPN	300	0.5	2	57	250	4	0.4	<b>PBSS4032SN</b> <sup>3)</sup>			
	4.8	PNP/PNP	200	0.5	2	70	390	4	0.4	<b>PBSS4032SP</b> <sup>3)</sup>			
	5.7 / 4.8	NPN/PNP	300/200	0.5	2	57/70	250/390	4	0.4	<b>PBSS4032SPN</b> <sup>3)</sup>			
40	1.0	NPN/PNP	300/250	0.5	5	130/150	500	1	0.1		PBSS4140DPN		
	2.0	NPN/PNP	300/250	0.5	5	80/100	400/530	2	0.2		PBSS4240DPN		
50	2.7	2 x NPN	300	0.5	2	50	340	2.7	0.27	PBSS4350SS			
		2 x PNP	200	0.5	2	60	370	2.7	0.27	PBSS5350SS			
		NPN/PNP	300/200	0.5	2	50/60	340/370	2.7	0.27	PBSS4350SPN			
60	1.0	2 x NPN	200	0.5	5	115	250	1	0.1		PBSS4160DS		
		2 x PNP	150	0.5	5	120	330	1	0.1		PBSS5160DS		
		NPN/PNP	200/150	0.5	5	115/120	250/330	1	0.1		PBSS4160DPN		
	6.7	NPN/NPN	300	0.5	2	20	190	4	0.2	<b>PBSS4041SN</b>			
	5.9	PNP/PNP	200	0.5	2	35	330	4	0.2	<b>PBSS4041SP</b>			
	6.7 / 5.9	NPN/PNP	300/200	0.5	2	20/35	190/330	4	0.2	<b>PBSS4041SPN</b>			

<sup>1)</sup>  $I_c/I_b=20$

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

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

### 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 <sub>tot</sub> (mW)				1700	1300	250	
Polarity	V <sub>CESM</sub> <sup>1)</sup>	V <sub>CEO</sub> (V)	I <sub>C</sub> (A)				
NPN	-	150	1	PBHV8115Z		PBHV8115T	
			2	<b>PBHV8215Z</b>			
	500	400	0.5	PBHV8540Z		PBHV8540T	
			1	<b>PBHV8140Z</b>			
			500	0.15			<b>PMBTA45</b>
			0.4	<b>PBHV8550Z</b>			
PNP	-	150	1	PBHV9115Z	<b>PBHV9115X</b>	PBHV9115T	
			2	<b>PBHV9215Z</b>			
	500	400	0.25	PBHV9040Z		PBHV9040T	
			0.5	<b>PBHV9540Z</b>			
			500	0.15			<b>PBHV9050T</b>
				0.25	<b>PBHV9050Z</b>		

<sup>1)</sup> 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 <sub>tot</sub> (mW)							500	250
Transistor			Schottky rectifier			Configuration		
V <sub>CEO</sub> max (V)	I <sub>C</sub> max (A)	V <sub>CEsat</sub> max (mV)	I <sub>F</sub> max (A)	V <sub>R</sub> max (V)	V <sub>F</sub> max (mV)			
15	0.5	250	0.5	20	390			PMEM1505NG
40	1.0	210	1	20	550		PMEM4010ND	
	2.0	400	1	40	640		PMEM4020ND	
							PMEM4020AND	
15	0.5	250	0.5	20	390			PMEM1505PG
40	1.0	410	1	20	550		PMEM4010PD	
	2.0	530	1	40	640		PMEM4020PD	
							PMEM4020APD	

### Key features

- ▶ Combination of low V<sub>F</sub> (MEGA) Schottky rectifier and low V<sub>CEsat</sub> (BISS) transistor in one package
- ▶ High forward current capability
- ▶ Low power dissipation

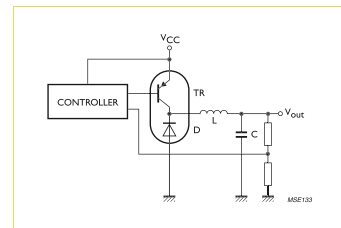
### Key benefits

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

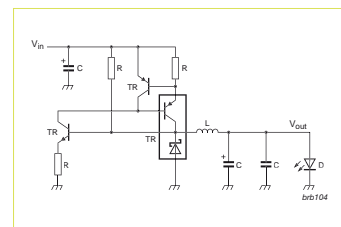
### Key applications

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

### Step-down DC/DC converter







### Power LED 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 <sub>tot</sub> (mW)												1700	1650	750	1400
Polarity	V <sub>CEO</sub> (V)	I <sub>C</sub> (A)	I <sub>CM</sub> (A)	h <sub>FE</sub> min/typ	@ I <sub>C</sub> (A)	@ V <sub>CE</sub> (V)	R <sub>CEsat</sub> typ (mΩ); I <sub>C</sub> /I <sub>B</sub> = 10	V <sub>CEsat</sub> typ (mV); I <sub>C</sub> = 0.5A; I <sub>B</sub> = 0.05A	V <sub>CEsat</sub> max (mV)	@ I <sub>C</sub> (A)	@ I <sub>B</sub> (A)				
NPN	12	5.3	10.6	300/530	0.5	2	27 <sup>1)</sup>	18	200	5.3	0.265		PBSS301NX		
		5.8	11.6	300/530	0.5	2	29 <sup>1)</sup>	18	235	5.8	0.29	PBSS301NZ			
		6.0	7.0	280/440	0.5	2	33 <sup>1)</sup>	20	275	6	0.3				<b>PBSS4612PA</b>
	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 <sup>1)</sup>	20	200	5.3	0.265		PBSS302NX		
		5.8	10.2	300/570	0.5	2	30 <sup>1)</sup>	20	250	5.8	0.29	PBSS302NZ			
		6.0	7.0	280/440	0.5	2	33 <sup>1)</sup>	20	275	6	0.3				<b>PBSS4620PA</b>
		7.0	15.0	300/550	0.5	2	19	12	210	7	0.35		<b>PBSS4021NX</b>		
		8.0	20.0	300/550	0.5	2	14	9	170	8	0.4	<b>PBSS4021NZ</b>			
	30	3.0	5.0	300/490	0.5	2	80	45	300	3	0.3		PBSS4330X		<b>PBSS4330PA</b>
		3.5	6.0	300/500	0.5	2	50	70	300	4	0.4			<b>PBSS4032ND</b> <sup>3)</sup>	
		4.7	10.0	300/500	0.5	2	45	57	250	4	0.4		<b>PBSS4032NX</b> <sup>3)</sup>		
		5.1	10.2	300/480	0.5	2	30 <sup>1)</sup>	20	220	5.1	0.255		PBSS303NX		
		5.4	10.0	300/500	0.5	2	45	57	340	5.4	0.27	<b>PBSS4032NZ</b> <sup>3)</sup>			
		5.5	11.0	300/480	0.5	2	31 <sup>1)</sup>	20	240	5.5	0.275	PBSS303NZ			
	40	6.0	7.0	280/450	0.5	2	35	21	275	6	0.3				<b>PBSS4630PA</b>
		4.0	15.0	300/520	0.5	2	55	35	300	4	0.4			PBSS302ND	
		5.0	10.0	300/500	0.5	2	40	21	355	5	0.5	PBSS4540Z	PBSS4540X		
	50	2.0	5.0	300/495	0.5	2	100	60	260	2	0.2				
				300/-	0.5	2	160	90 <sup>2)</sup>	320	2	0.2			PBSS4250X	
				200/280	0.5	2	110	65	290	2	0.2				PBSS4350D
		3.0	5.0	300/460	0.5	2	75	50	370	3	0.3		PBSS4350X		
				200/280	0.5	2	110	60 <sup>1)</sup>	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 <sup>1)</sup>	25	245	4.7	0.235		PBSS304NX		
		5.2	10.4	300/520	0.5	2	39 <sup>1)</sup>	25	280	5.2	0.26	PBSS304NZ			
		6.0	7.0	280/440	0.5	2	34 <sup>1)</sup>	22	290	6	0.3				<b>PBSS4560PA</b>
		6.2	15.0	300/500	0.5	2	25	17	230	6	0.3		<b>PBSS4041NX</b>		
	80	7.0	15.0	300/500	0.5	2	17.5	13	195	7	0.35	<b>PBSS4041NZ</b>			
		3.0	6.0	240/360	0.5	2	67	40	255	3	0.3			PBSS304ND	
		4.0	10.0	250/400	0.5	2	43 <sup>1)</sup>	25	230	4	0.2		PBSS4480X		
		4.6	9.2	300/470	0.5	2	37 <sup>1)</sup>	25	240	4.6	0.23		PBSS305NX		
		5.1	10.2	300/470	0.5	2	38 <sup>1)</sup>	25	270	5.1	0.255	PBSS305NZ			
	100	5.6	7.0	270/425	0.5	2	40 <sup>1)</sup>	25	320	5.6	0.28				<b>PBSS4580PA</b>
		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 <sup>1)</sup>	27	245	4.5	0.225		PBSS306NX		
		5.1	10.2	200/330	0.5	2	43 <sup>1)</sup>	27	300	5.1	0.255	PBSS306NZ			
5.2	6.0	180/285	0.5	2	48 <sup>1)</sup>	30	340	5.2	0.26				<b>PBSS8510PA</b>		

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


<sup>2)</sup> V<sub>CEsat</sub> (max)

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



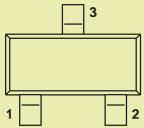
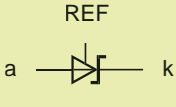
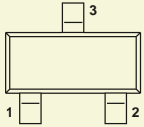
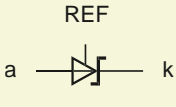
## Adjustable shunt voltage regulator IC

types in **bold** represent new products

Package				SOT23		
						
Size (mm)				2.9 x 1.3 x 1.0		
P <sub>tot</sub> (mW)				580		
Pinning configuration				normal pinning <sup>1)</sup>	mirrored pinning <sup>1)</sup>	
V <sub>KA</sub> (V)	I <sub>K</sub> (mA)	V <sub>ref</sub>	T <sub>amb</sub> (°C)			
20	80	1.24 V	1.5%	0 to 70	<b>TLVH431CDBZR</b>	
				-40 to 85	<b>TLVH431IDBZR</b>	
				-40 to 125	<b>TLVH431QDBZR</b>	<b>TLVH431MQDBZR</b>
			1%	0 to 70	<b>TLVH431ACDBZR</b>	
				-40 to 85	<b>TLVH431AIDBZR</b>	
				-40 to 125	<b>TLVH431AQDBZR</b>	<b>TLVH431AMQDBZR</b>
			0.5%	0 to 70	<b>TLVH431BCDBZR</b>	
				-40 to 85	<b>TLVH431BIDBZR</b>	
				-40 to 125	<b>TLVH431BQDBZR</b>	<b>TLVH431BMQDBZR</b>
36	100	2.495 V	2%	0 to 70	TL431CDBZR	
				-40 to 85	TL431IDBZR	
				-40 to 125	TL431QDBZR	
					<b>TL431SDT <sup>1)</sup></b>	<b>TL431MSDT <sup>1)</sup></b>
			1%	0 to 70	TL431ACDBZR	
				-40 to 85	TL431AIDBZR	
				-40 to 125	TL431AQDBZR	
			0.5%	-40 to 125	<b>TL431ASDT <sup>1)</sup></b>	<b>TL431ASDT <sup>1)</sup></b>
					TL431BCDBZR	
				-40 to 85	TL431BIDBZR	
				-40 to 125	TL431BQDBZR	
					<b>TL431BSDT <sup>1)</sup></b>	<b>TL431BMSDT <sup>1)</sup></b>


<sup>1)</sup> 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

### Constant current source

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

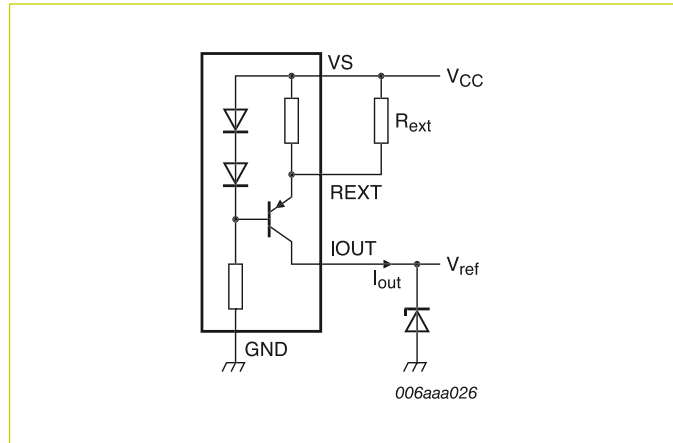
#### Key benefits

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

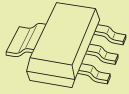
#### Key applications

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

#### Voltage reference



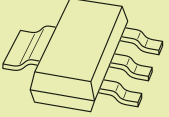
Small-signal MOSFETs single (N-channel) < 50V

Package													SOT223 (SC-73)		
															
Size (mm)													6.5 x 3.5 x 1.65		
P <sub>tot</sub> (mW)													1700		
V <sub>DS</sub> (V)	V <sub>GS</sub> (V)	I <sub>D</sub> (A)	V <sub>GS(th) min</sub> (V)	V <sub>GS(th) max</sub> (V)	t <sub>on</sub> typ (ns)	t <sub>off</sub> typ (ns)	Q <sub>G</sub> typ (nC)	ESD protection	R <sub>DSon</sub> typ (mΩ) @ V <sub>gs</sub> =						
									10 V	4.5 V	2.5 V	1.8 V			
12	8	5.7	0.4	-	23	67	10.1	-	-	28	-	39			
20	8	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	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	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 <sup>2)</sup>	-	600 <sup>2)</sup>			
0.8			0.45	1	11.5	22.5	0.89	-	-	400	-	580			
12		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		15	5.4	1	2	12	27	13.8	-	32	40	-	-		
20		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 <sup>2)</sup>	190 <sup>2)</sup>	-	-				

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

<sup>2)</sup> max values

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

Package													SOT223 (SC-73)	
														
Size (mm)													6.5 x 3.5 x 1.65	
P <sub>tot</sub> (mW)													1700	
V <sub>DS</sub> (V)	V <sub>GS</sub> (V)	I <sub>D</sub> (A)	V <sub>GS(th) min</sub> (V)	V <sub>GS(th) max</sub> (V)	t <sub>on</sub> typ (ns)	t <sub>off</sub> typ (ns)	Q <sub>G</sub> typ (nC)	ESD protection	R <sub>DSon</sub> typ (mΩ) @ V <sub>gs</sub> =					
									10 V	4.5 V	2.5 V	1.8 V		
50	20	0.1	0.4	1.8	2	5	-	-	2800	3800 <sup>3)</sup>	-	-		
55	8	0.3	0.4	1.3	4	11	1	-	-	2300	2400	3100		
	10	0.335	0.4	1.3	4	11	1	-	-	2300	2400	3100		
	13	4.9	1	2	-	-	-	-	2KV	-	30	-	-	PHT11N06LT
		3.5	1	2	-	-	-	-	2KV	-	65	-	-	PHT8N06LT
2.5		1	2	-	-	-	-	2KV	-	120	-	-	PHT6N06LT	
60	15	2.5	2	4	-	-	-	2KV	120	-	-	-	PHT6N06T	
		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 <sup>2)</sup>	3000 <sup>2)</sup>	-	-		
		0.3	1	2.5	tbd	tbd	tbd	2KV	1600 <sup>2)</sup>	3000 <sup>2)</sup>	-	-		
		0.57	1	-	6	7.2	-	-	780	1100	-	-		
	30	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	-	-	-		
		0.385	1	2.5	2.5	11	0.69	-	780	1200	-	-		
100	20	0.475	1	2.5	2.5	11	0.69	-	780	1200	-	-		
		0.3	1	2.5	2.5	11	-	-	2800	3800	-	-		
		16	3.5	1	2	14	73	-	-	-	200	-	-	PHT4NQ10LT
		0.19	1	-	3	12	-	-	-	5000	-	-	BSP110	
		0.52	1	-	3	12	-	-	-	5000	-	-		
		0.85	2	4	19	13	4.6	-	400	-	-	-		
	0.15	1	2.8	3	12	-	-	3500	-	-	-			
30	3.5	2	4	21	31	7.4	-	200	-	-	-	PHT4NQ10T		
	3	2	4	-	-	-	-	57	-	-	-	PHT6NQ10T		
200	20	1.9	2	4	10.5	12.5	7	-	213	-	-	-		
		0.55	0.4	2	10	45	-	-	1700	-	3000	-	BSP122	
		0.4	0.8	2.8	6	49	-	-	1600	-	-	-		
220	20	7.3	2	4	20.8	24.3	13.2	-	250	-	-			
240	20	0.375	0.8	2	6	47	-	-	2800	7500 <sup>2)</sup>	-	-	BSP89	
250	20	0.35	0.8	2	6	47	-	-	2800	-	-	-	BSP126	
300	20	0.35	0.8	2	6	46	-	-	3700	-	4800	-	BSP130	

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

<sup>2)</sup> max values

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

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

Package													
Size (mm)													
P <sub>tot</sub> (mW)													
V <sub>DS</sub> (V)	V <sub>GS</sub> (V)	I <sub>D</sub> (A)	V <sub>GS(th)</sub> min(V)	V <sub>GS(th)</sub> max(V)	t <sub>on</sub> typ (ns)	t <sub>off</sub> typ (ns)	Q <sub>G</sub> typ (nC)	ESD protection	R <sub>DSon</sub> typ (mΩ) @ V <sub>gs</sub> =				
									10 V	4.5 V	2.5 V	1.8 V	
20	8	0.87	0.45	1	14.5	23.5	-	-	-	280	-	460	
	12	0.86	0.5	1.5	16	17	0.72	-	-	290	460	-	
30	8	0.71	0.45	1	11.5	22.5	0.89	-	-	400	-	580	
	12	0.74	0.5	1.5	17	19.5	0.65	-	-	370	550	-	
	15	0.125	0.8	1.5	17	22	0.35	-	-	1800	2900	-	
60	20	0.3	1	2.5	tbd	tbd	tbd	-	2000 <sup>2)</sup>	3000 <sup>2)</sup>	-	-	
		0.3	1	2.5	tbd	tbd	tbd	2KV	1600 <sup>2)</sup>	3000 <sup>2)</sup>	-	-	
		0.49	1	-	6	7.2	1.05	-	780	1100	-	-	


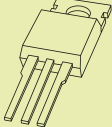
### Small-signal MOSFETs single (P-channel)

Package													
Size (mm)													
P <sub>tot</sub> (mW)													
V <sub>DS</sub> (V)	V <sub>GS</sub> (V)	I <sub>D</sub> (A)	V <sub>GS(th)</sub> min(V)	V <sub>GS(th)</sub> max(V)	t <sub>on</sub> typ (ns)	t <sub>off</sub> typ (ns)	Q <sub>G</sub> typ (nC)	ESD protection	R <sub>DSon</sub> typ (mΩ) @ V <sub>gs</sub> =				
									10 V	4.5 V	2.5 V	1.8 V	
12	8	1.52	0.4	-	6.5	65	-	-	-	80	-	140	
		0.75	0.4	-	6.5	65	-	-	-	180	-	420	
20	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 <sup>2)</sup>	-	-	-	

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

Package													
Size (mm)													
P <sub>tot</sub> (mW)													
Configuration	V <sub>DS</sub> (V)	V <sub>GS</sub> (V)	I <sub>D</sub> (A)	V <sub>GS(th)</sub> min(V)	V <sub>GS(th)</sub> max(V)	t <sub>on</sub> typ (ns)	t <sub>off</sub> typ (ns)	Q <sub>G</sub> typ (nC)	ESD protection	I <sub>F</sub> (A)	V <sub>R</sub> (V)	V <sub>F</sub> 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	


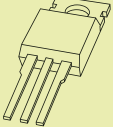
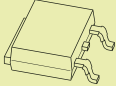
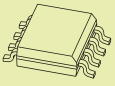
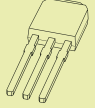
Power MOSFETs single (N-channel)

V <sub>DS</sub> (max) (V)	R <sub>DSon</sub> (max) (mΩ) @ V <sub>gs</sub> = 10 V	R <sub>DSon</sub> (max) (mΩ) @ V <sub>gs</sub> = 4.5 V	I <sub>D</sub> (max) (A) @ 25 °C	Power-SO8 (LFPAK)	TO-220AB (SOT78)	D2PAK (SOT404)	DDPAK (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	<b>PSMN1R2-25YL</b>				
	1.5	2.2	100	<b>PSMN1R5-25YL</b>				
	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					




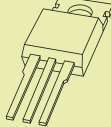
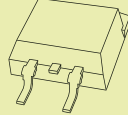
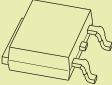
Power MOSFETs single (N-channel)

types in **bold** represent new products

$V_{DS}$ (max) (V)	$R_{DSon}$ (max) (mΩ) @ $V_{gs} = 10\text{ V}$	$R_{DSon}$ (max) (mΩ) @ $V_{gs} = 4.5\text{ V}$	$I_D$ (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	<b>PSMN1R3-30YL</b>					
	1.7	2.1	100		<b>PSMN1R6-30PL</b>				
	1.7	2.6	100	<b>PSMN1R7-30YL</b>					
	1.8	-	-		<b>PSMN1R8-30PL</b>				
	2	3.2	100	<b>PSMN2R0-30YL</b>					
	2.1	2.8	100		<b>PSMN2R0-30PL</b>				
	2.4	3.9	100	<b>PSMN2R5-30YL</b>					
	2.7	-	-		<b>PSMN2R7-30PL</b>				
	2.8	-	75		PSMN003-30P				
	3	4.8	100	<b>PSMN3R0-30YL</b>					
	3.2	-	100	PH3230S					
	3.3	4.5	100	PH3330L					
	3.4	-	-		<b>PSMN3R4-30PL</b>				
	3.5	5.6	100	<b>PSMN3R5-30YL</b>					
	3.8	-	98	PH3830L					
	4	6.5	99	<b>PSMN4R0-30YL</b>					
	4.3	6.2	100		<b>PSMN4R3-30PL</b>				
	4.3	-	95.9	PH4330L					
	4.4	-	30.4					PHK31NQ03LT	
	4.8	-	84	PH4830L					
	5	8	84	<b>PSMN5R0-30YL</b>					
	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	<b>PSMN6R0-30YL</b>					
	6.5	-	23.7						PHK28NQ03LT
	7	11.3	65	<b>PSMN7R0-30YL</b>					
	7.9	11	68	PH7030L					
8	13.8	55	<b>PSMN9R0-30YL</b>						
8.2	-	67	PH8230E						
8.9	-	20.3						PHK18NQ03LT	
9	12.5	63	PH9030L						
9.9	-	63	PH9930L						

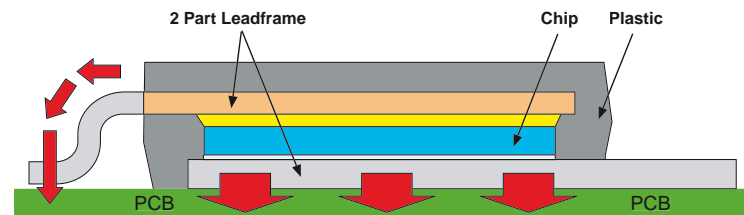
## Power MOSFETs single (N-channel)

types in **bold** represent new products


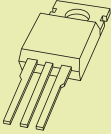
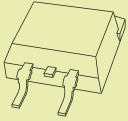
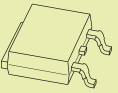
$V_{DS}$ (max) (V)	$R_{DSon}$ (max) (m $\Omega$ ) @ $V_{gs} = 10$ V	$R_{DSon}$ (max) (m $\Omega$ ) @ $V_{gs} = 4.5$ V	$I_D$ (max) (A) @ 25 °C	Power-SO8 (LFAK)	TO-220AB (SOT78)	D2PAK (SOT404)	DDPAK (SOT428)
							
				3.95 x 4.9 x 1.1	15.6 x 10 x 4.4	11 x 10 x 4.3	6 x 6.6 x 2.3
60	3.6	-	75			PSMN004-60B	
	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		<b>PSMN4R4-80PS</b>		
	4.7	-	100		<b>PSMN5R0-80PS</b>		
	6.4	-	-	<b>PSMN6R0-80YS</b>			
	6.5	-	-		<b>PSMN6R5-80PS</b>		
	8.5	-	82	<b>PSMN8R2-80YS</b>			
	8.7	-	-		<b>PSMN8R7-80PS</b>		
	11	-	-	<b>PSMN011-80YS</b>			
	11	-	74		<b>PSMN012-80PS</b>		
	12.9	-	60	<b>PSMN013-80YS</b>			
	17.0	-	-		<b>PSMN017-80PS</b>		
	19.5	-	-	<b>PSMN018-80YS</b>			
	27.5	-	34	<b>PSMN026-80YS</b>			
	46	-	-	<b>PSMN045-80YS</b>			
46	-	22		<b>PSMN050-80PS</b>			

### Power-SO8 (LFAK) Design

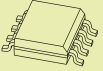
- ▶ Low Thermal resistance
- ▶ Low Electrical resistance
- ▶ Low Inductance



Power MOSFETs single (N-channel)

$V_{DS}$ (max) (V)	$R_{DSon}$ (max) (m $\Omega$ ) @ $V_{gs} = 10$ V	$R_{DSon}$ (max) (m $\Omega$ ) @ $V_{gs} = 4.5$ 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) (m $\Omega$ ) @ $V_{gs} = 10$ V	$R_{DSon}$ (max) (m $\Omega$ ) @ $V_{gs} = 4.5$ 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 PMK35EP



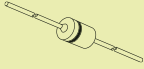
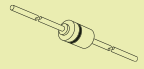
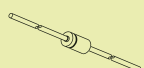
















## Package cross reference

types in **bold** represent new products

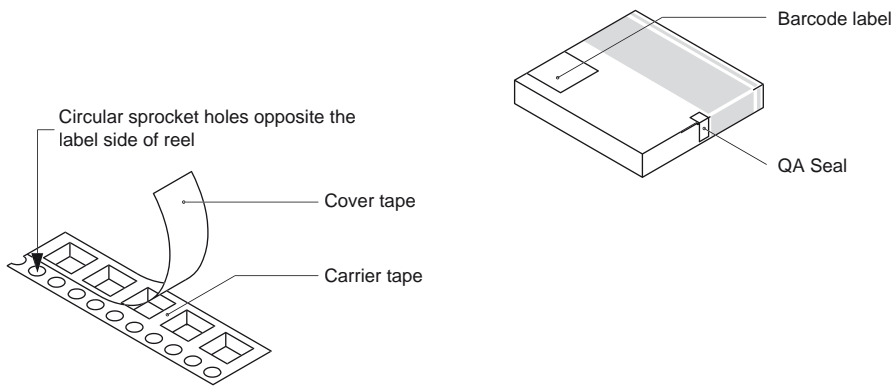
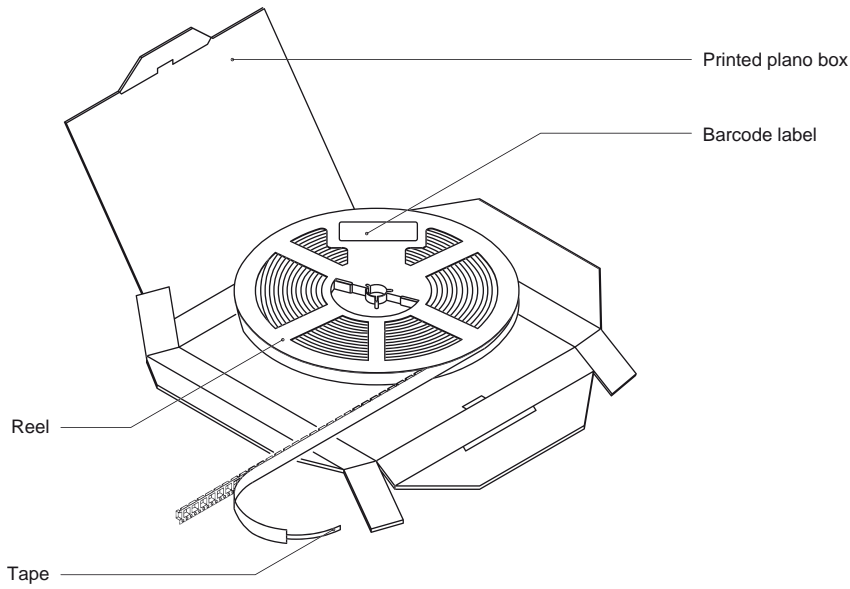
NXP	Industry standard names	Size (l x w x h)	Pins/leads	P <sub>tot</sub> (mW)	Package	Competitor synonyms							
						Rohm	Toshiba	ON Semi	Renesas	Infineon	Diodes Inc	KEC	Vishay
SOD27	DO-35	4.25 x 1.85 x 0.56	2	500		GSD			DO-35		DO-35		DO-204AH
SOD66	DO-41	4.8 x 2.6 x 0.81	2	1300		GSR	DO-41				DO-41		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-D1123	SMF	
SOD123W	-	2.6 x 1.7 x 1.0	2	900			S-Flat	SOD-123-FL			Power-D1123		
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-D1323		
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		
<b>SOD882D</b>	-	1.0 x 0.6 x 0.37	2	250						TSLP-2-7	DFN1006H4-2		
<b>SOD131 SMA</b>	DO-214AC	4.25 x 2.67 x 2.14	2	900		PMDS (SOD-106)		SMA Case 403D-02			SMA	SMA	
<b>SOD132 SMB</b>	DO-214AA	4.32 x 3.62 x 2.29	2	1000				SMB Case 403A-03			SMB		
<b>SOD133 SMC</b>	DO-214AB	6.86 x 5.91 x 2.34	2	1200				SMC Case 403-03			SMC		
<b>SOT1061</b>	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

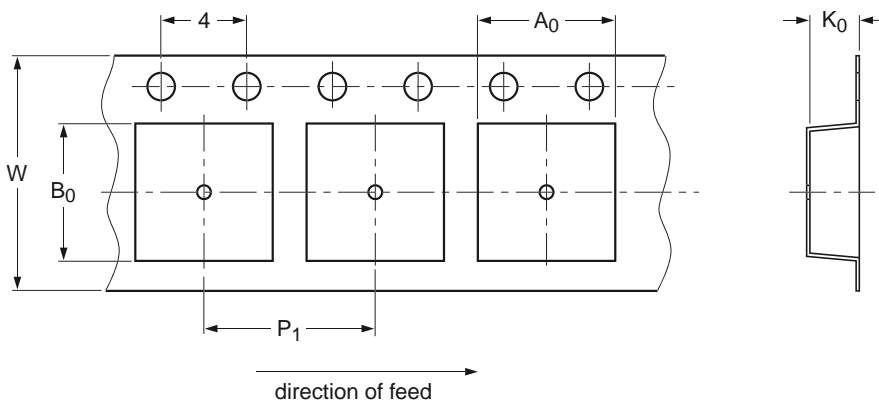
types in **bold** represent new products

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
<b>SOD882D</b>	2 mm pitch, 8 mm tape and reel	180 x 8 mm		-	-	-	-	-	-	-315
<b>SOT1061</b>	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

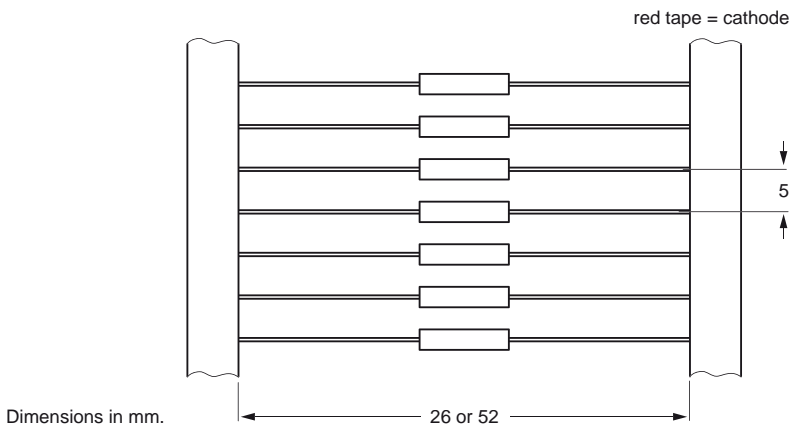
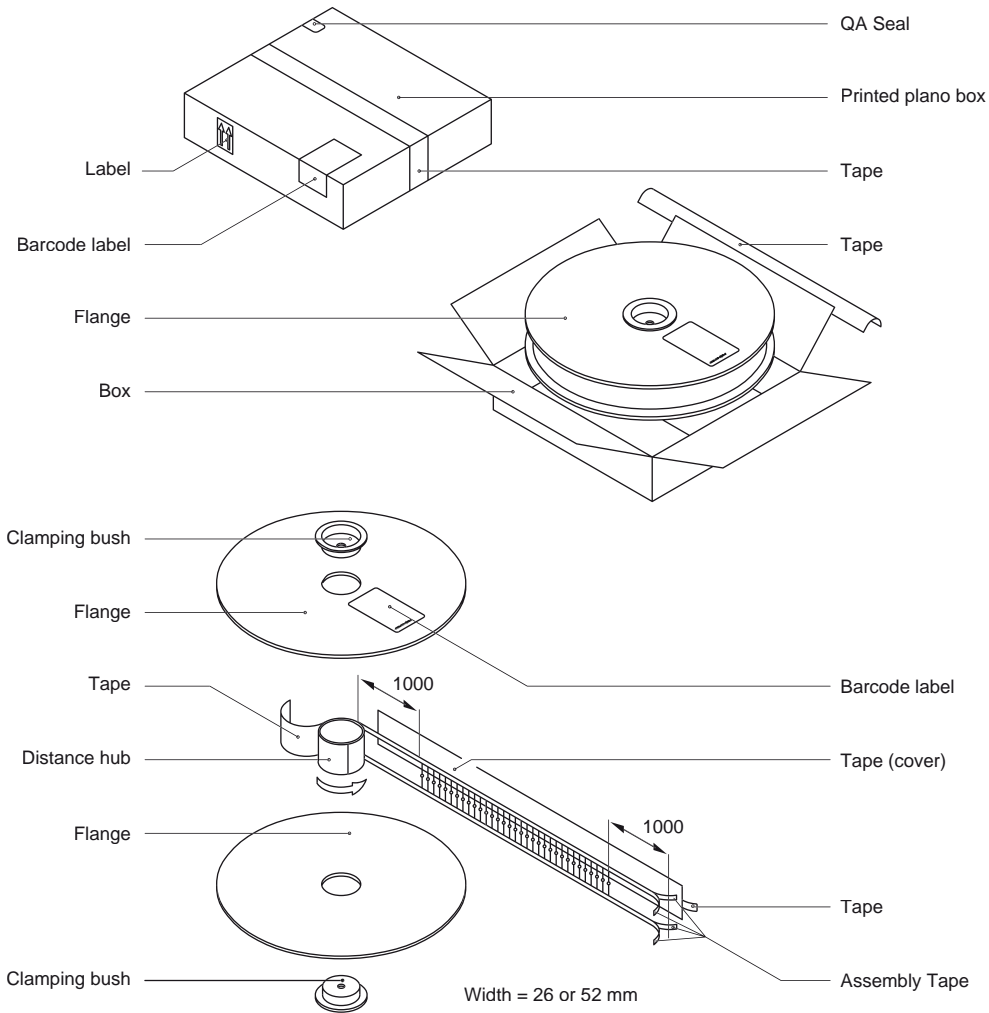


$P_1$  = pitch (see table packing methods)

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

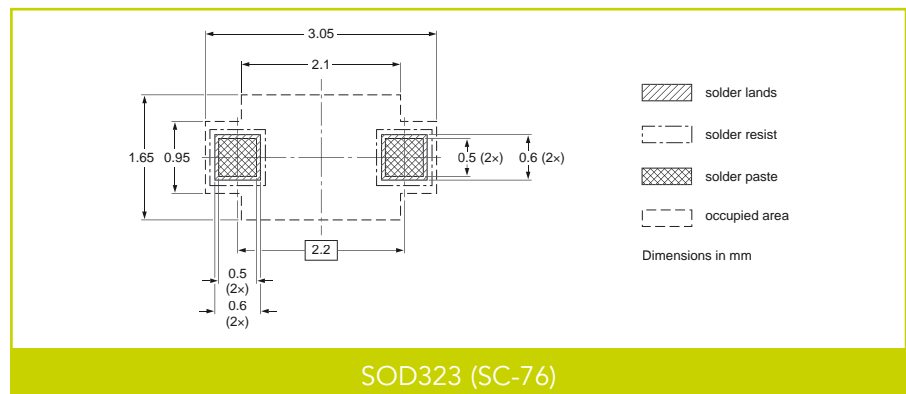
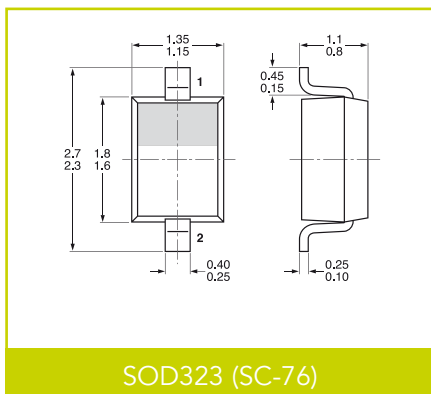
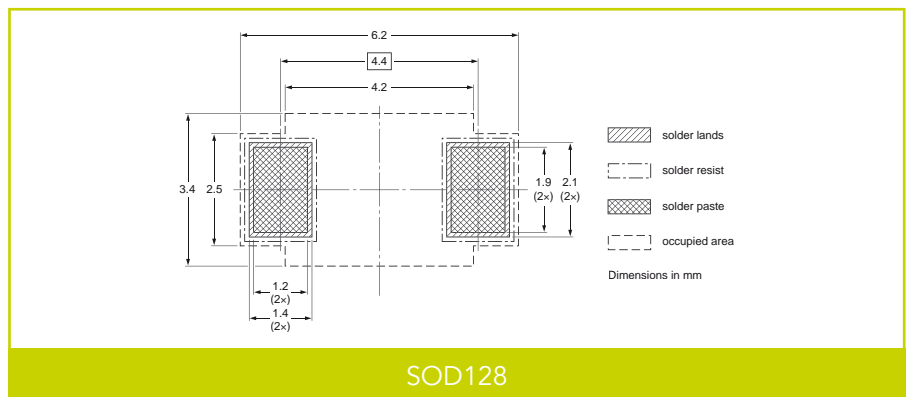
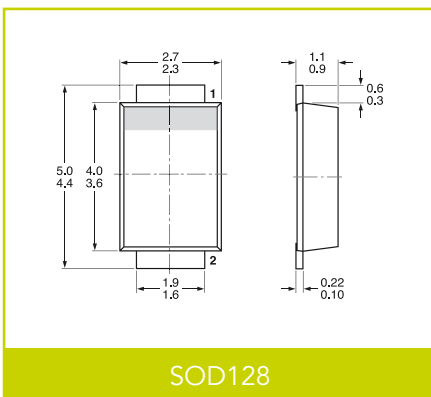
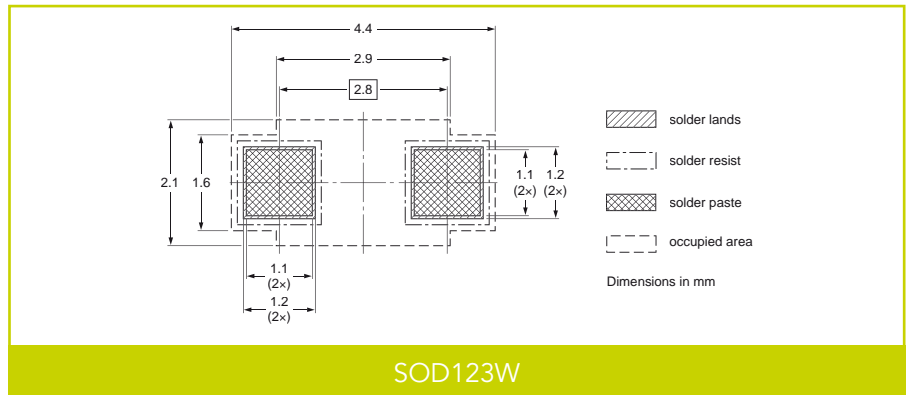
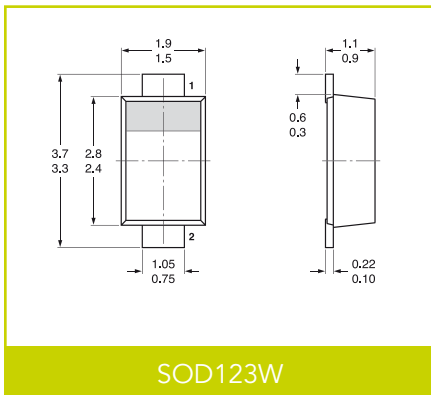
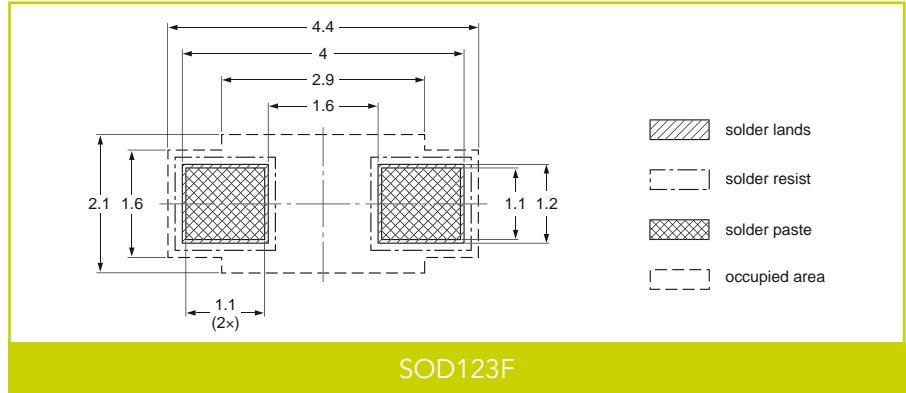
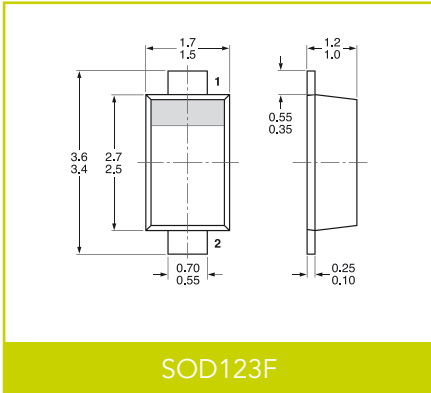
Compartment width ( $A_0$ ), length ( $B_0$ ) and depth ( $K_0$ ) depending on package

# Reel pack axial tape for glass diodes



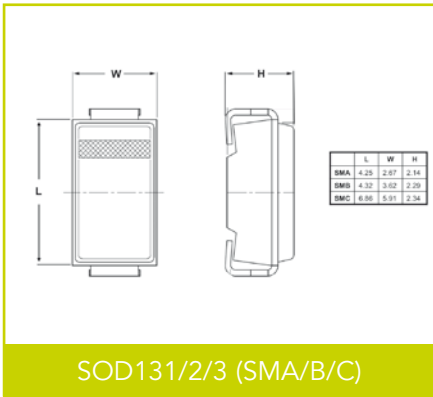


## 2-Pin SMD Packages

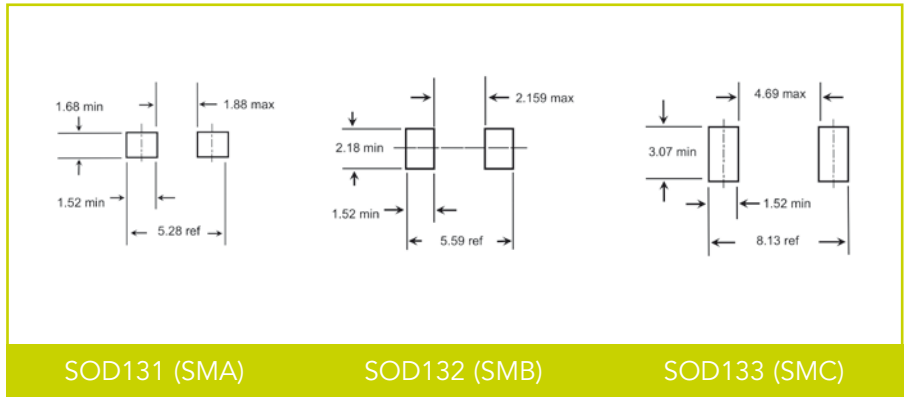


Dimensions in mm

# Minimized outline drawings and reflow soldering footprint



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

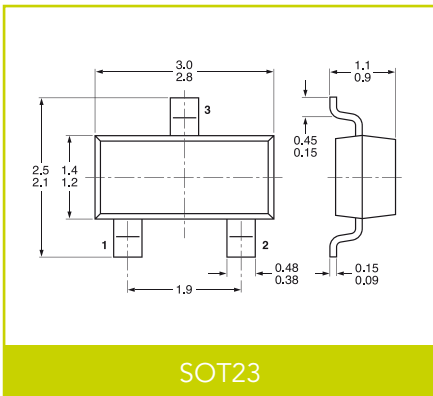


SOD131 (SMA)

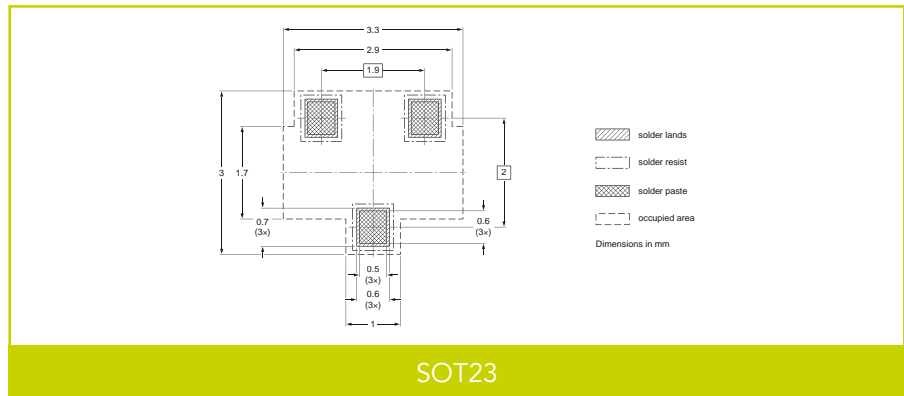
SOD132 (SMB)

SOD133 (SMC)

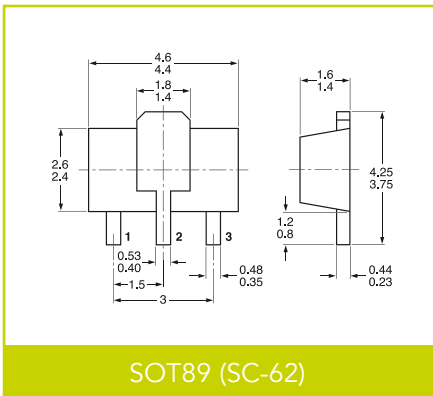
## 3-Pin SMD Packages



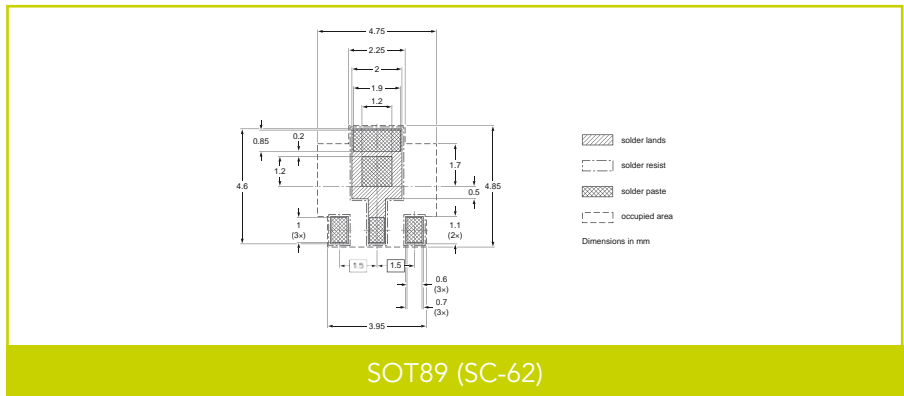
SOT23



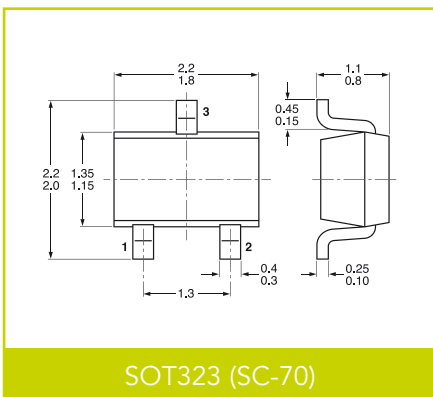
SOT23



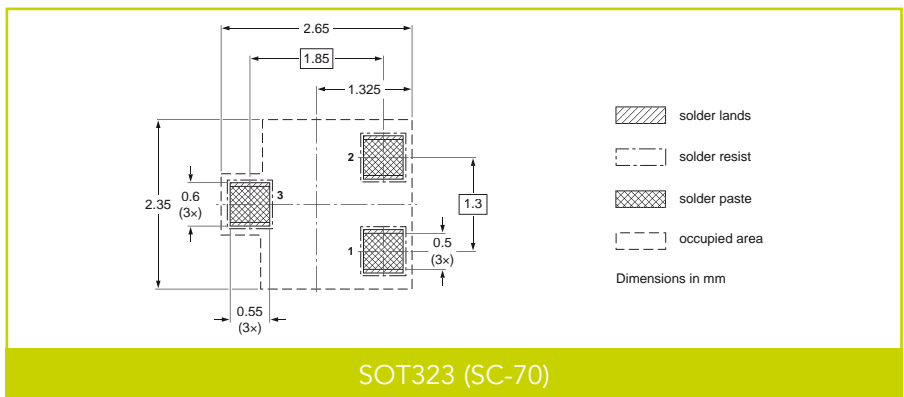
SOT89 (SC-62)



SOT89 (SC-62)



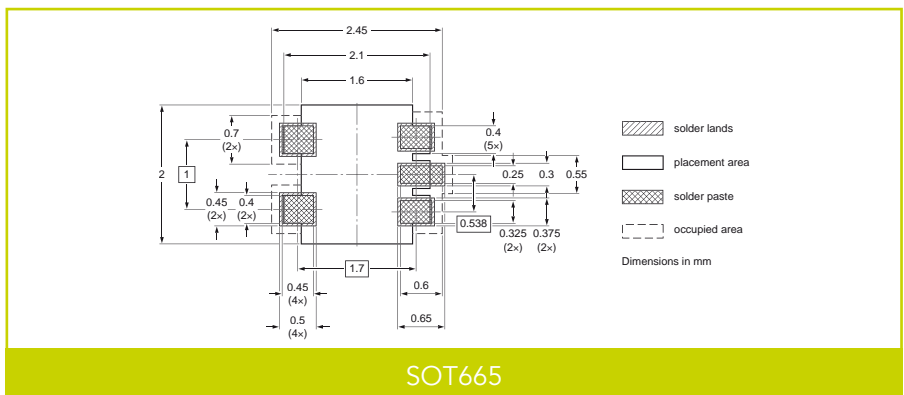
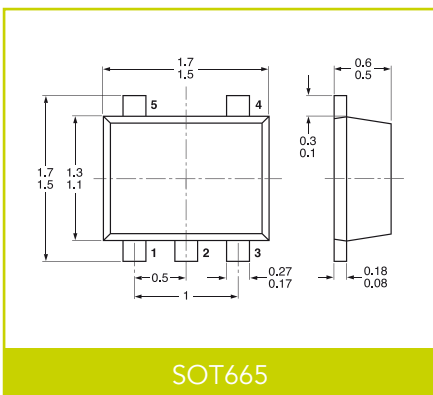
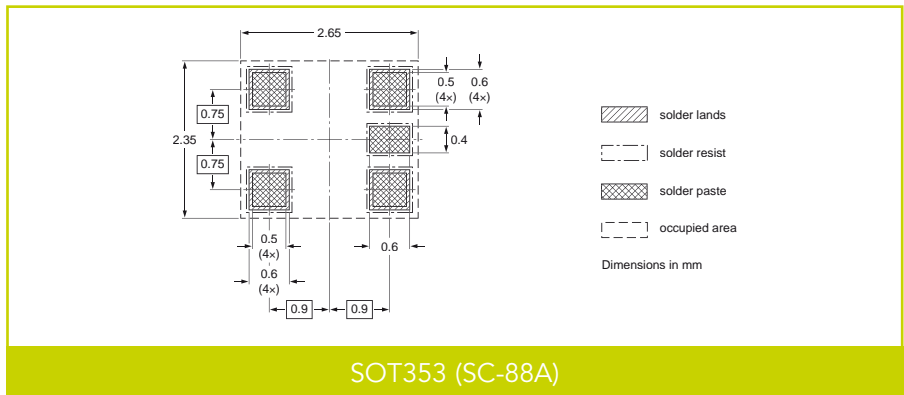
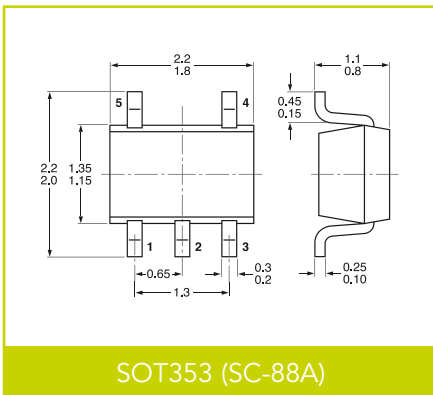
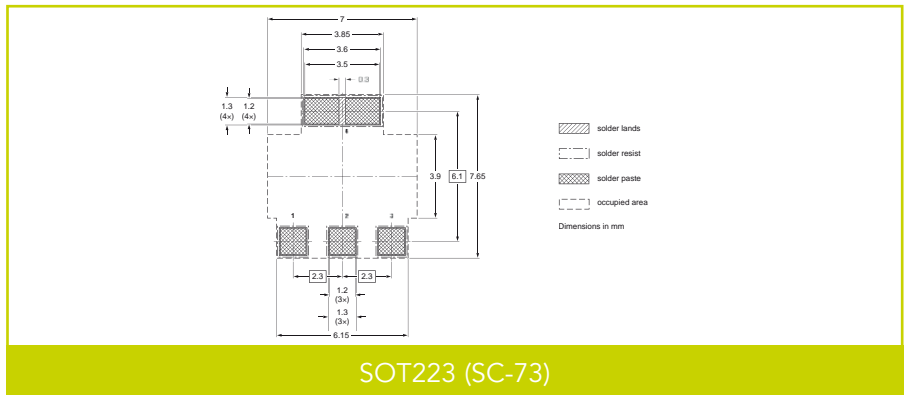
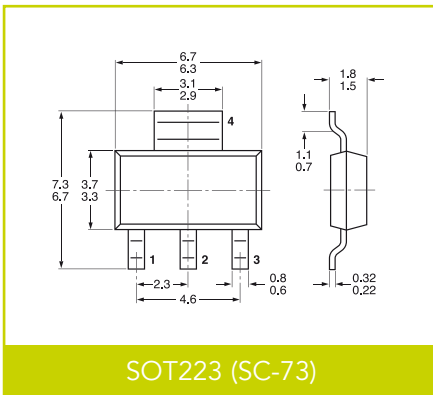
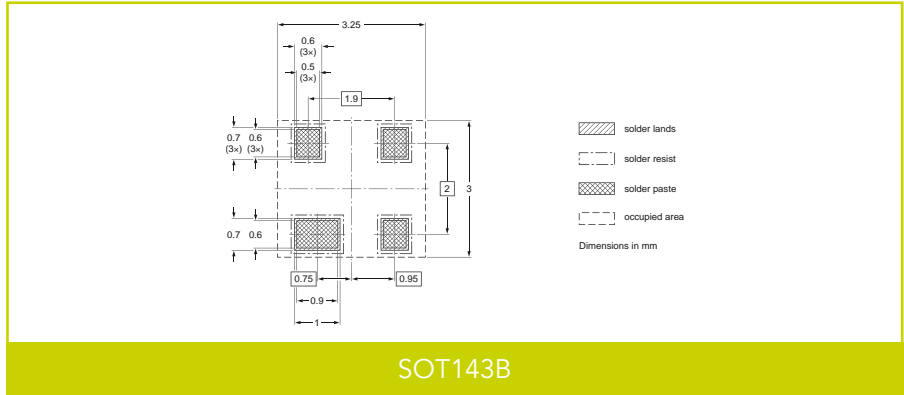
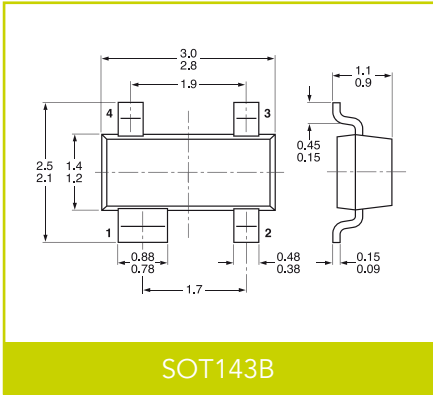
SOT323 (SC-70)



SOT323 (SC-70)

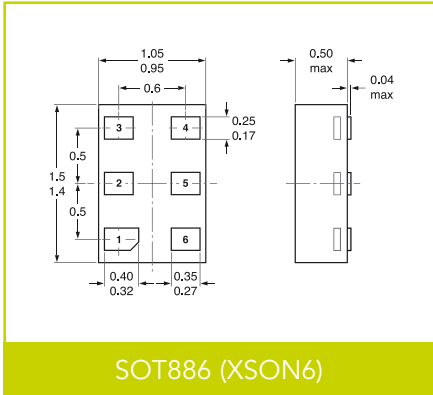
Dimensions in mm

## 4-/5-Pin SMD Packages

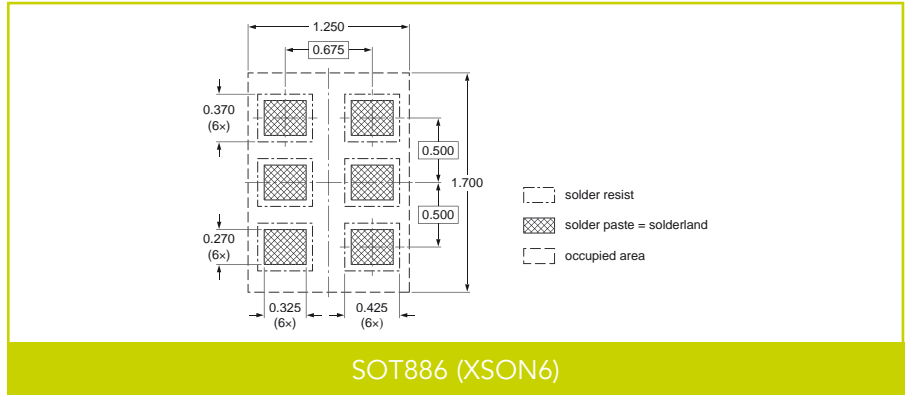


Dimensions in mm

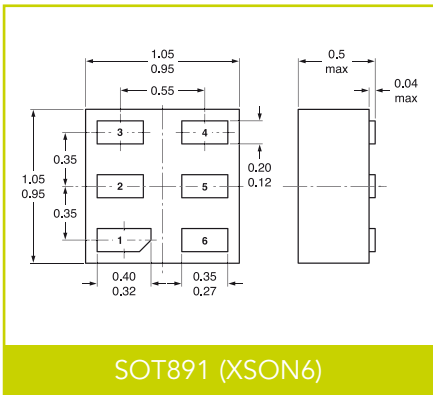
# Minimized outline drawings and reflow soldering footprint



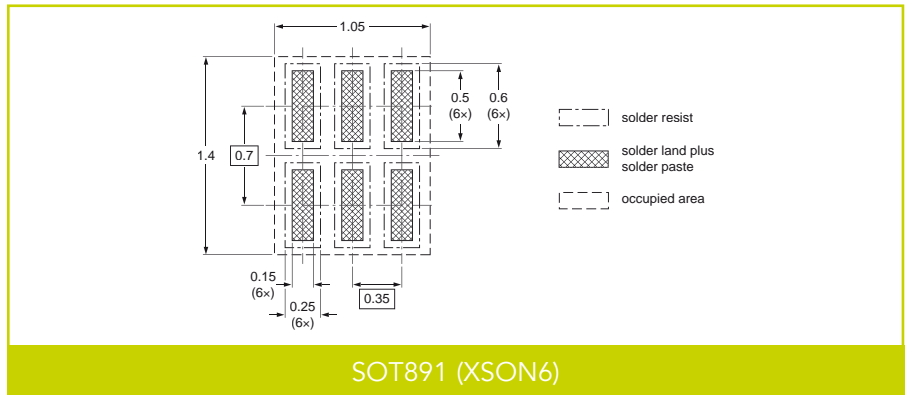
SOT886 (XSON6)



SOT886 (XSON6)

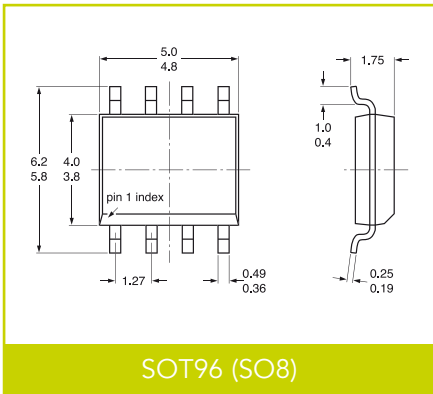


SOT891 (XSON6)

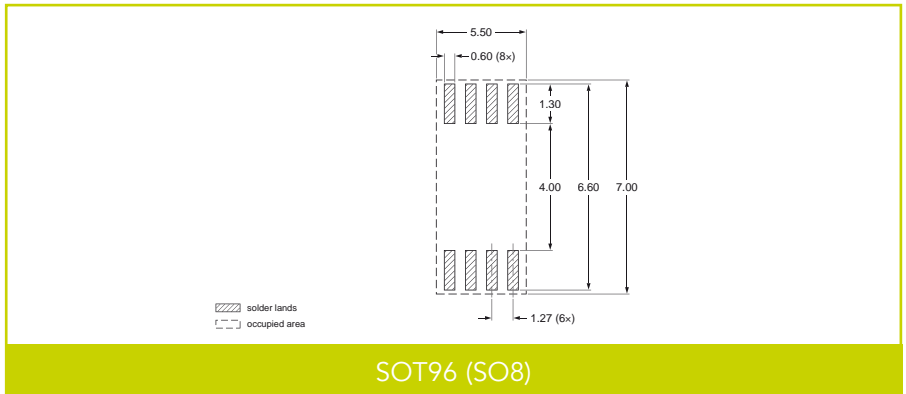


SOT891 (XSON6)

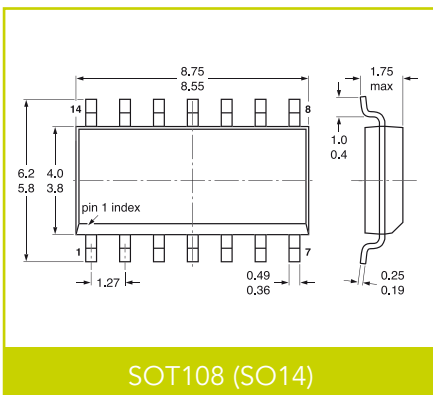
## Multi-Pin SMD Packages



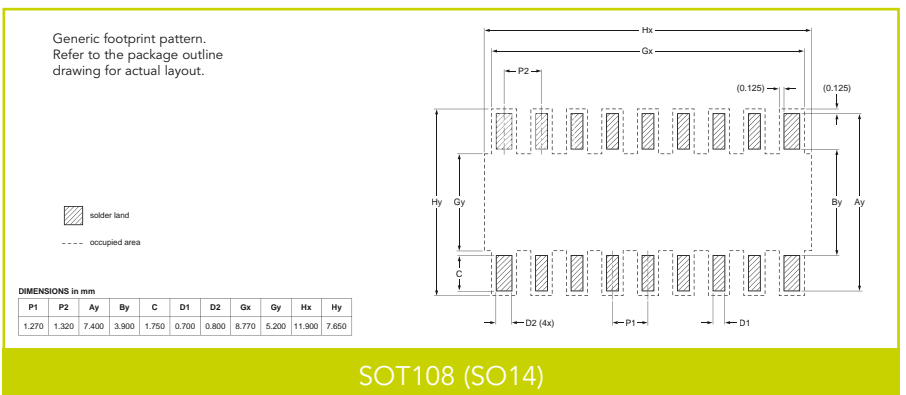
SOT96 (SO8)



SOT96 (SO8)



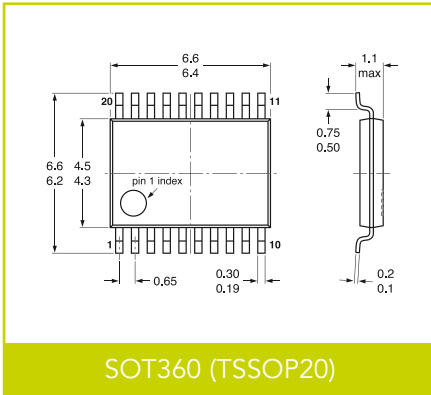
SOT108 (SO14)



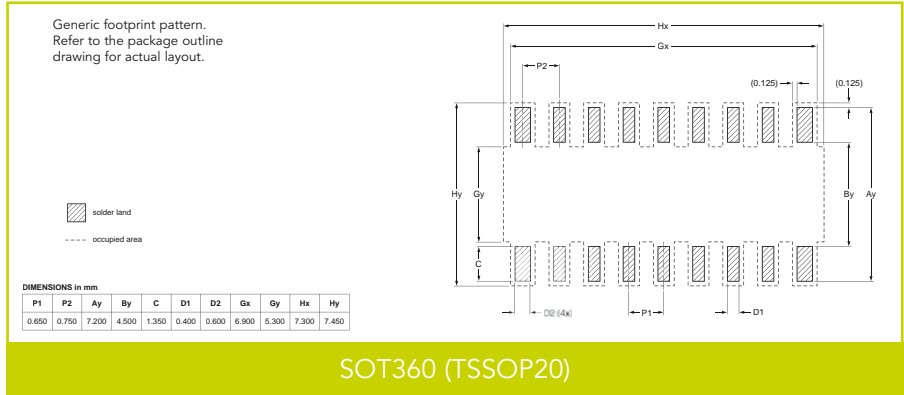
SOT108 (SO14)

Dimensions in mm

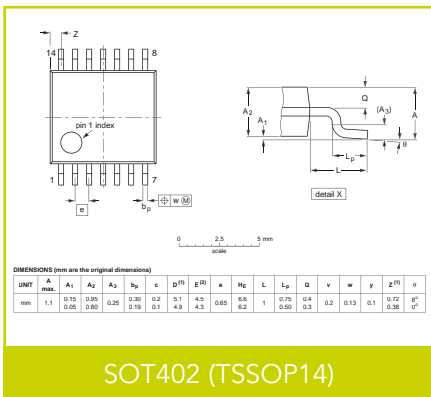
# Minimized outline drawings and reflow soldering footprint



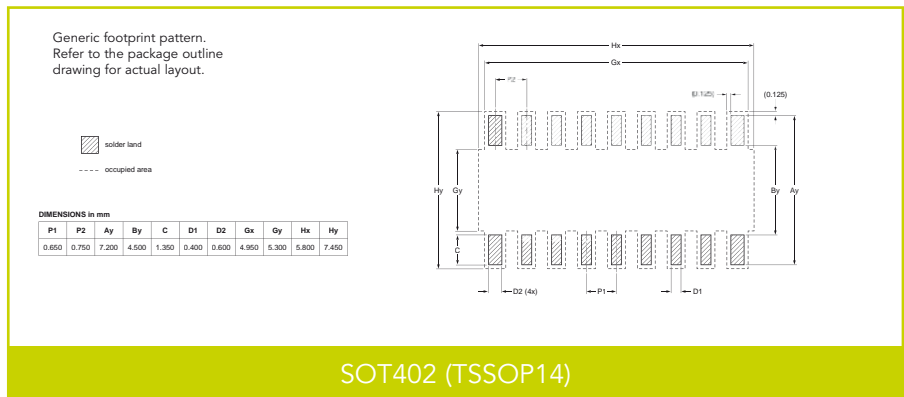
SOT360 (TSSOP20)



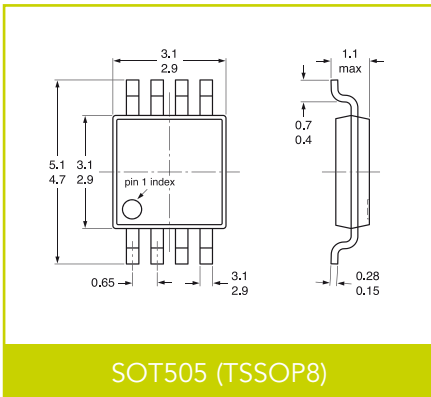
SOT360 (TSSOP20)



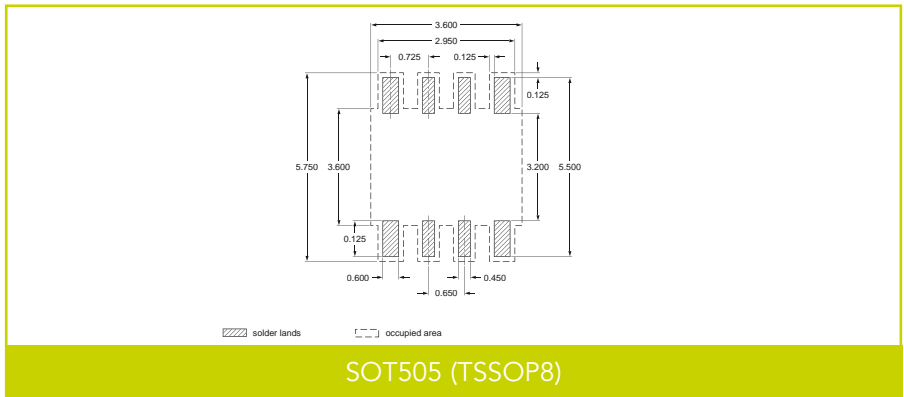
SOT402 (TSSOP14)



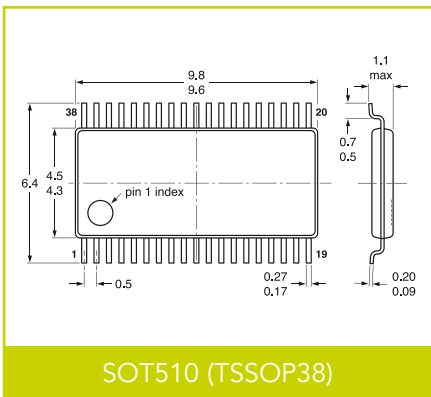
SOT402 (TSSOP14)



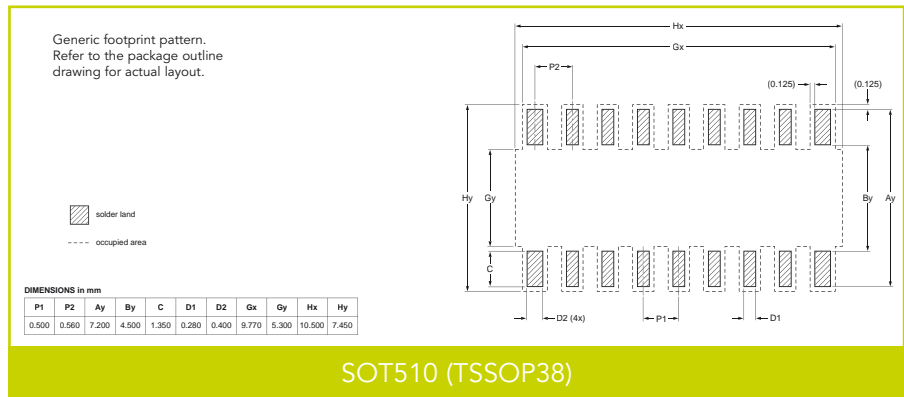
SOT505 (TSSOP8)



SOT505 (TSSOP8)



SOT510 (TSSOP38)



SOT510 (TSSOP38)

Dimensions in mm



# Index

Type Number	Page Number	Type Number	Page Number	Type Number	Page Number	Type Number	Page Number	Type Number	Page Number
1N4148	18	2PD601ARW / SW	48	BAS70-06	8	BAV103	20	BC850CW	51
1N4531	18	2PD601ASL	48	BAS70-06W	9	BAV170	21	BC856 / A / B	48
1N47xxA series	16	2PD602AQL	48	BAS70-07	8	BAV199	21	BC856BS	49
1PS10SB82	14	2PD602ARL	48	BAS70-07S	9	BAV199W	21	BC856S	49
1PS66SB17	14	2PD602ASL	48	BAS70-07V	9	BAV20	20	BC856T / AT / BT	48
1PS66SB82	14	BAL74	18	BAS70H	9	BAV21	20	BC856W / AW / BW	48
1PS70SB20	11	BAL99	18	BAS70L	9	BAV23	20	BC857 / A / B / C	48
1PS70SB82	14	BAS101	20	BAS70VV	9	BAV23A	20	BC857AM / BM / CM	48
1PS70SB84	14	BAS101S	20	BAS70W	9	BAV23C	20	BC857BS	49
1PS70SB85	14	BAS116	21	BAS70XY	9	BAV23S	20	BC857BV	49
1PS70SB86	14	BAS116H	21	BAS716	21	BAV70	18	BC857T / AT / BT / CT	48
1PS74SB23	10	BAS116T	21	BAS85	8	BAV70M	19	BC857W / AW / BW / CW	48
1PS75SB45	9	BAS16	18	BAS86	8	BAV70S	19	BC858B	48
1PS76SB10	9	BAS16H	19	BAT120A	12	BAV70T	19	BC858W	48
1PS76SB17	14	BAS16J	19	BAT120C	12	BAV70W	19	BC859B	51
1PS76SB21	9	BAS16L	19	BAT120S	12	BAV756S	19	BC859BW	51
1PS76SB40	9	BAS16T	19	BAT160A	12	BAV99	18	BC859C	51
1PS76SB70	9	BAS16VV	19	BAT160C	12	BAV99S	19	BC859CW	51
1PS79SB10	9	BAS16VY	19	BAT160S	12	BAV99W	19	BC860B	51
1PS79SB17	14	BAS16W	19	BAT17	14	BAW101	20	BC860BW	51
1PS79SB30	9	BAS21	20	BAT46WH	9	BAW101S	20	BC860C	51
1PS79SB31	9	BAS21AW	20	BAT46WJ	9	BAW156	21	BC860CW	51
1PS79SB40	9	BAS21H	20	BAT54	8	BAW56	18	BC868 / -25	65
1PS79SB70	9	BAS21J	20	BAT54A	8	BAW56M	19	BC869 / -16 / -25	65
1PS88SB48	9	BAS21SW	20	BAT54AW	9	BAW56S	19	BCM61B	50
1PS88SB82	14	BAS21VD	20	BAT54C	8	BAW56T	19	BCM62B	50
2N7002	77	BAS21W	20	BAT54CM	9	BAW56W	19	BCM847BS	50
2N7002BK	77	BAS28	19	BAT54CV	9	BC807 / -16 / -25 / -40	48	BCM847BV	50
2N7002BKM	77	BAS29	21	BAT54CW	9	BC807DS	49	BCM847DS	50
2N7002BKS	79	BAS31	21	BAT54H	9	BC807W / -16W / -25W / -40W	48	BCM856BS	50
2N7002BKT	77	BAS316	19	BAT54J	9	BC817 / -16 / -25 / -40	48	BCM856DS	50
2N7002BKV	79	BAS321	20	BAT54L	9	BC817DPN	49	BCM857BS	50
2N7002BKW	77	BAS32L	18	BAT54S	8	BC817DS	49	BCM857BV	50
2N7002CK	77	BAS35	21	BAT54SW	9	BC817W / -16W / -25W / -40W	48	BCM857DS	50
2N7002E	77	BAS40	8	BAT54T	9	BC846 / A / B	48	BCP51 / -10 / -16	65
2N7002F	77	BAS40-04	8	BAT54VV	9	BC846BPN	49	BCP52 / -10 / -16	65
2N7002K	77	BAS40-04W	9	BAT54W	9	BC846BS	49	BCP53 / -10 / -16	65
2N7002P	77	BAS40-05	8	BAT54XY	9	BC846DS	49	BCP54 / -10 / -16	65
2N7002PM	77	BAS40-05V	9	BAT720	10	BC846S	49	BCP55 / -10 / -16	65
2N7002PS	79	BAS40-05W	9	BAT721	8	BC846T / AT / BT	48	BCP56 / -10 / -16	65
2N7002PT	77	BAS40-06	8	BAT721A	8	BC846W / AW / BW	48	BCP68 / -25	65
2N7002PV	79	BAS40-06W	9	BAT721C	8	BC847 / A / B / C	48	BCP69 / -16 / -25	65
2N7002PW	77	BAS40-07	8	BAT721S	8	BC847AM / BM / CM	48	BCV26	51
2PA1576Q / R / S	48	BAS40-07V	9	BAT74	8	BC847BPN	49	BCV27	51
2PA1774Q / R / S	48	BAS40H	9	BAT74S	9	BC847BS	49	BCV28	51
2PA1774QM / RM / SM	48	BAS40L	9	BAT74V	9	BC847BV	49	BCV29	51
2PB1219AQ / R / S	48	BAS40W	9	BAT754	8	BC847BVN	49	BCV46	51
2PB709ARL	48	BAS40XY	9	BAT754A	8	BC847DS	49	BCV47	51
2PB709ART	48	BAS416	21	BAT754C	8	BC847T / AT / BT / CT	48	BCV48	51
2PB709ARW / SW	48	BAS45A	21	BAT754L	9	BC847W / AW / BW / CW	48	BCV49	51
2PB709ASL	48	BAS45AL	21	BAT754S	8	BC848B	48	BCV61/A/B/C	50
2PB710ARL	48	BAS516	19	BAT760	11	BC848W	48	BCV62/A/B/C	50
2PB710ASL	48	BAS521	20	BAT85	8	BC849B	51	BCV63 / B	52
2PC4081Q / R / S	48	BAS56	21	BAT854AW	9	BC849BW	51	BCV64B	52
2PC4617Q / R	48	BAS70	8	BAT854CW	9	BC849C	51	BCV65 (SOT143B)	53
2PC4617QM / RM	48	BAS70-04	8	BAT854SW	9	BC849CW	51	BCV71 / 72	48
2PD1820AR / S	48	BAS70-04W	9	BAT854W	9	BC850B	51	BCW29 / 30	48
2PD601ARL	48	BAS70-05	8	BAT86	8	BC850BW	51	BCW31 / 32 / 33	48
2PD601ART	48	BAS70-05W	9	BAT960	11	BC850C	51	BCW60B / C / D	48

# Index

Type Number	Page Number	Type Number	Page Number	Type Number	Page Number	Type Number	Page Number	Type Number	Page Number
MMBT3904	49	NZX13C	17	NZX4V3D	17	PBLS2001D	61	PBSS302PX	58
MMBT3906	49	NZX14A	17	NZX4V7A	17	PBLS2001S	61	PBSS302PZ	58
MMBZ10VAL	44	NZX14B	17	NZX4V7B	17	PBLS2002D	61	PBSS303ND	56
MMBZ12VAL	44	NZX14C	17	NZX4V7C	17	PBLS2002S	61	PBSS303NX	56
MMBZ12VDL	44	NZX15A	17	NZX4V7D	17	PBLS2003D	61	PBSS303NZ	56
MMBZ15VAL	44	NZX15B	17	NZX5V1A	17	PBLS2003S	61	PBSS303PD	58
MMBZ15VDL	44	NZX15C	17	NZX5V1B	17	PBLS2004D	61	PBSS303PX	58
MMBZ18VAL	44	NZX15X	17	NZX5V1C	17	PBLS2021D	61	PBSS303PZ	58
MMBZ18VCL	44	NZX16A	17	NZX5V1D	17	PBLS2022D	61	PBSS304ND	56
MMBZ20VAL	44	NZX16B	17	NZX5V6A	17	PBLS2023D	61	PBSS304NX	56
MMBZ20VCL	44	NZX16C	17	NZX5V6B	17	PBLS2024D	61	PBSS304NZ	56
MMBZ27VAL	44	NZX18A	17	NZX5V6C	17	PBLS4001D	61	PBSS304PD	58
MMBZ27VCL	44	NZX18B	17	NZX5V6D	17	PBLS4001V	61	PBSS304PX	58
MMBZ33VAL	44	NZX18C	17	NZX5V6E	17	PBLS4001Y	61	PBSS304PZ	58
MMBZ33VCL	44	NZX20A	17	NZX6V2A	17	PBLS4002D	61	PBSS305ND	56
MMBZ5V6AL	44	NZX20B	17	NZX6V2B	17	PBLS4002V	61	PBSS305NX	56
MMBZ6V2AL	44	NZX20C	17	NZX6V2C	17	PBLS4002Y	61	PBSS305NZ	56
MMBZ6V8AL	44	NZX22A	17	NZX6V2D	17	PBLS4003D	61	PBSS305PD	58
MMBZ9V1AL	44	NZX22B	17	NZX6V2E	17	PBLS4003V	61	PBSS305PX	58
NUP1301	29	NZX22C	17	NZX6V8A	17	PBLS4003Y	61	PBSS305PZ	58
NX1117C120Z	69	NZX24A	17	NZX6V8B	17	PBLS4004D	61	PBSS306NX	56
NX1117C12Z	69	NZX24B	17	NZX6V8C	17	PBLS4004V	61	PBSS306NZ	56
NX1117C15Z	69	NZX24C	17	NZX6V8D	17	PBLS4004Y	61	PBSS306PX	58
NX1117C18Z	69	NZX24X	17	NZX7V5A	17	PBLS4005D	61	PBSS306PZ	58
NX1117C19Z	69	NZX27A	17	NZX7V5B	17	PBLS4005V	61	PBSS3515E	59
NX1117C20Z	69	NZX27B	17	NZX7V5C	17	PBLS4005Y	61	PBSS3515M	59
NX1117C25Z	69	NZX27C	17	NZX7V5D	17	PBLS6001D	61	PBSS3515VS	60
NX1117C285Z	69	NZX27X	17	NZX7V5X	17	PBLS6002D	61	PBSS3540E	59
NX1117C33Z	69	NZX2V4A	17	NZX8V2A	17	PBLS6003D	61	PBSS3540M	59
NX1117C50Z	69	NZX2V4B	17	NZX8V2B	17	PBLS6004D	61	PBSS4021NT	57
NX1117CADJZ	69	NZX2V7A	17	NZX8V2C	17	PBLS6005D	61	PBSS4021NX	56
NX1117I120Z	69	NZX2V7B	17	NZX8V2D	17	PBLS6021D	61	PBSS4021NZ	56
NX1117I12Z	69	NZX2V7C	17	NZX9V1A	17	PBLS6022D	61	PBSS4021PT	59
NX1117I15Z	69	NZX30A	17	NZX9V1B	17	PBLS6023D	61	PBSS4021PX	58
NX1117I18Z	69	NZX30B	17	NZX9V1C	17	PBLS6024D	61	PBSS4021PZ	58
NX1117I19Z	69	NZX30C	17	NZX9V1D	17	PBRN113ET	55	PBSS4021SN	60
NX1117I20Z	69	NZX30X	17	NZX9V1E	17	PBRN113ZT	55	PBSS4021SP	60
NX1117I25Z	69	NZX33A	17	PBHV8115T	62	PBRN123ET	55	PBSS4021SPN	60
NX1117I285Z	69	NZX33B	17	PBHV8115Z	62	PBRN123YT	55	PBSS4032ND	56
NX1117I33Z	69	NZX33C	17	PBHV8140Z	62	PBRP113ET	55	PBSS4032NT	57
NX1117I50Z	69	NZX36A	17	PBHV8215Z	62	PBRP113ZT	55	PBSS4032NX	56
NX1117IADJZ	69	NZX36B	17	PBHV8540T	62	PBRP123ET	55	PBSS4032NZ	56
NZH series	16	NZX36C	17	PBHV8540Z	62	PBRP123YT	55	PBSS4032PD	58
NZX series	16	NZX36X	17	PBHV8550Z	62	PBSS2515E	57	PBSS4032PD	65
NZX10A	17	NZX3V0A	17	PBHV9040T	62	PBSS2515M	57	PBSS4032PT	59
NZX10B	17	NZX3V0B	17	PBHV9040Z	62	PBSS2515VPN	60	PBSS4032PX	58
NZX10C	17	NZX3V0C	17	PBHV9050T	62	PBSS2515VS	60	PBSS4032PZ	58
NZX10D	17	NZX3V3A	17	PBHV9050Z	62	PBSS2540E	57	PBSS4032PZ	65
NZX11A	17	NZX3V3B	17	PBHV9115T	62	PBSS2540M	57	PBSS4032SN	60
NZX11B	17	NZX3V3C	17	PBHV9115X	62	PBSS301ND	56	PBSS4032SP	60
NZX11C	17	NZX3V6A	17	PBHV9115Z	62	PBSS301NX	56	PBSS4032SPN	60
NZX11D	17	NZX3V6B	17	PBHV9215Z	62	PBSS301NZ	56	PBSS4041NT	57
NZX12A	17	NZX3V6C	17	PBLS1501Y	61	PBSS301PD	58	PBSS4041NX	56
NZX12B	17	NZX3V9A	17	PBLS1502V	61	PBSS301PX	58	PBSS4041NZ	56
NZX12C	17	NZX3V9B	17	PBLS1502Y	61	PBSS301PZ	58	PBSS4041PT	59
NZX12D	17	NZX3V9C	17	PBLS1503V	61	PBSS302ND	56	PBSS4041PX	58
NZX12X	17	NZX4V3A	17	PBLS1503Y	61	PBSS302NX	56	PBSS4041PZ	58
NZX13A	17	NZX4V3B	17	PBLS1504V	61	PBSS302NZ	56	PBSS4041SN	60
NZX13B	17	NZX4V3C	17	PBLS1504Y	61	PBSS302PD	58	PBSS4041SP	60



Type Number	Page Number	Type Number	Page Number	Type Number	Page Number	Type Number	Page Number	Type Number	Page Number
PEMD48	55	PESD24V5SUD	25	PESD5V0S1UB	24	PH4830L	82	PHKD3NQ10T	85
PEMD6	55	PESD24VU1UT	43	PESD5V0S1UJ	24	PH4840S	83	PHKD6NQ2LT	81
PEMD9	55	PESD2CAN	43	PESD5V0S1UL	24	PH5330E	82	PHN203	83
PEMH1	55	PESD36VS2UT	25	PESD5V0S1ULD	24	PH5525L	80	PHN210	83
PEMH10	55	PESD3V3L1BA	26	PESD5V0S2BT	27	PH6030L	82	PHN210T	83
PEMH11	55	PESD3V3L1UA	26	PESD5V0S2UAT	25	PH6325L	80	PHP101NQ03LT	82
PEMH13	55	PESD3V3L1UB	26	PESD5V0S2UQ	25	PH7030L	82	PHP101NQ04T	83
PEMH14	55	PESD3V3L1UL	26	PESD5V0S4UD	25	PH8030L	82	PHP110NQ06LT	83
PEMH15	55	PESD3V3L2BT	27	PESD5V0S4UF	25	PH8230E	82	PHP110NQ08T	84
PEMH16	55	PESD3V3L2UM	27	PESD5V0S5UD	25	PH9025L	80	PHP119NQ06T	83
PEMH17	55	PESD3V3L4UF	27	PESD5V0U1BA	26	PH9030L	82	PHP143NQ04T	83
PEMH18	55	PESD3V3L4UG	27	PESD5V0U1BB	26	PH955L	83	PHP160NQ08T	84
PEMH19	55	PESD3V3L4UW	27	PESD5V0U1BL	26	PH9930L	82	PHP165NQ08T	84
PEMH2	55	PESD3V3L5UF	28	PESD5V0U1UA	26	PHB101NQ04T	83	PHP176NQ04T	83
PEMH20	55	PESD3V3L5UK	28	PESD5V0U1UB	26	PHB110NQ06LT	83	PHP18NQ10T	85
PEMH24	55	PESD3V3L5UV	28	PESD5V0U1UL	26	PHB110NQ08T	84	PHP18NQ11T	85
PEMH30	55	PESD3V3L5UY	28	PESD5V0U1UT	43	PHB119NQ06T	83	PHP191NQ06LT	83
PEMH4	55	PESD3V3S1UB	24	PESD5V0U2BM	27	PHB160NQ08T	84	PHP20N06T	83
PEMH7	55	PESD3V3S1UL	24	PESD5V0U2BT	27	PHB18NQ10T	85	PHP20NQ20T	86
PEMH9	55	PESD3V3S2UAT	25	PESD5V0U4BF	28	PHB191NQ06LT	83	PHP21N06LT	83
PEMT1	49	PESD3V3S2UQ	25	PESD5V0U4BW	28	PHB20N06T	83	PHP21N06T	83
PEMX1	49	PESD3V3S2UT	25	PESD5V0U5BF	28	PHB20NQ20T	86	PHP225	87
PEMZ1	49	PESD3V3S4UD	25	PESD5V0U5BV	28	PHB21N06LT	83	PHP23NQ11T	85
PEMZ7	49	PESD3V3S4UF	25	PESD5V0V1BA	26	PHB27NQ10T	85	PHP27NQ11T	85
PESD12VL1BA	26	PESD3V3S5UD	25	PESD5V0V1BB	26	PHB29N08T	84	PHP28NQ15T	86
PESD12VL2BT	27	PESD3V3U1UA	26	PESD5V0V1BL	26	PHB32N06LT	84	PHP29N08T	84
PESD12VS1UA	24	PESD3V3U1UB	26	PESD5V0V4UF	27	PHB33NQ20T	86	PHP3055E	84
PESD12VS1UB	24	PESD3V3U1UL	26	PESD5V0V4UG	27	PHB45NQ10T	85	PHP30NQ15T	86
PESD12VS1UJ	24	PESD3V3U1UT	43	PESD5V0V4UK	27	PHB45NQ15T	86	PHP32N06LT	84
PESD12VS1UL	24	PESD3V3V4UF	27	PESD5V0V4UW	27	PHB47NQ10T	85	PHP33NQ20T	86
PESD12VS2UAT	25	PESD3V3V4UG	27	PESD5V0X1BL	29	PHB66NQ03LT	80	PHP34NQ11T	85
PESD12VS2UQ	25	PESD3V3V4UK	27	PESD5V0X1BQ	29	PHC21025	87	PHP36N03LT	83
PESD12VS2UT	25	PESD3V3V4UW	27	PESD5V0X1BT	29	PHC2300	87	PHP45NQ10T	85
PESD12VS4UD	25	PESD3V3X1BL	29	PESD5V0X1UAB	29	PHD101NQ03LT	82	PHP45NQ10TA	85
PESD12VS5UD	25	PESD5V0F1BL	29	PESD5V0X1UB	29	PHD108NQ03LT	80	PHP45NQ11T	85
PESD12VU1UT	43	PESD5V0F5BK	31	PESD5V2S2UT	25	PHD18NQ10T	85	PHP52N06T	84
PESD15VL1BA	26	PESD5V0L1BA	26	PESD5Z12	24	PHD20N06T	83	PHP54N06T	83
PESD15VL2BT	27	PESD5V0L1UA	26	PESD5Z2.5	24	PHD21N06LT	83	PHP75NQ08T	84
PESD15VS1UB	24	PESD5V0L1UB	26	PESD5Z3.3	24	PHD3055E	84	PHP78NQ03LT	80
PESD15VS1UL	24	PESD5V0L1UL	26	PESD5Z5.0	24	PHD34NQ10T	85	PHP79NQ08LT	84
PESD15VS2UAT	25	PESD5V0L2BT	27	PESD5Z6.0	24	PHD36N03LT	83	PHP9NQ20T	86
PESD15VS2UQ	25	PESD5V0L2UM	27	PESD5Z7.0	24	PHD38N02LT	80	PHT11N06LT	76
PESD15VS2UT	25	PESD5V0L2UU	27	PESD6V0L2UU	27	PHD63NQ03LT	83	PHT4NQ10LT	76
PESD15VS4UD	25	PESD5V0L4UF	27	PESD9V0V4UK	27	PHD66NQ03LT	80	PHT4NQ10T	76
PESD15VS5UD	25	PESD5V0L4UG	27	PH1875L	84	PHD71NQ03LT	83	PHT6N06LT	76
PESD15VU1UT	43	PESD5V0L4UW	27	PH1955L	83	PHD77NQ03T	80	PHT6N06T	76
PESD16VF1BL	29	PESD5V0L5UF	28	PH20100S	85	PHD78NQ03LT	80	PHT6NQ10T	76
PESD16VX1UL	29	PESD5V0L5UK	28	PH2520U	80	PHD96NQ03LT	80	PHT8N06LT	76
PESD1CAN	43	PESD5V0L5UV	28	PH2525L	80	PHD97NQ03LT	80	PHU101NQ03LT	82
PESD1FLEX	43	PESD5V0L5UY	28	PH2625L	80	PHD99NQ20T	86	PHU77NQ03T	81
PESD1LIN	43	PESD5V0L6UAS	28	PH2925U	80	PHK04P02T	86	PHU78NQ03LT	81
PESD24VL1BA	26	PESD5V0L6US	28	PH3075L	84	PHK12NQ03LT	83	PHU97NQ03LT	81
PESD24VL2BT	27	PESD5V0L7BAS	28	PH3120L	80	PHK12NQ10T	85	PIMC31	55
PESD24VS1UB	24	PESD5V0L7BS	28	PH3230S	82	PHK13N03LT	83	PIMD2	55
PESD24VS1UL	24	PESD5V0S1BA	24	PH3330L	82	PHK18NQ03LT	82	PIMD3	55
PESD24VS2UAT	25	PESD5V0S1BB	24	PH3830L	82	PHK28NQ03LT	82	PIMH9	55
PESD24VS2UQ	25	PESD5V0S1BL	24	PH3855L	83	PHK31NQ03LT	82	PIMN31	55
PESD24VS2UT	25	PESD5V0S1BLD	24	PH4025L	80	PHK5NQ15T	87	PIMT1	49
PESD24VS4UD	25	PESD5V0S1UA	24	PH4330L	82	PHKD13N03LT	83	PIMZ2	49

# Index

Type Number	Page Number	Type Number	Page Number	Type Number	Page Number	Type Number	Page Number	Type Number	Page Number
PSMN025-100D	85	PTVS12VP1UP	45	PTVS7VSS1UR	44	PUMT1	49	PZU9.1y	17
PSMN026-80YS	84	PTVS12VS1UR	44	PTVS8VOP1UP	45	PUMX1	49	PZUxB series	16
PSMN030-150B	86	PTVS13VP1UP	45	PTVS8VOS1UR	44	PUMX2	49	PZUxBA series	16
PSMN030-150P	86	PTVS13VS1UR	44	PTVS8V5P1UP	45	PUMZ1	49	PZUxBL series	16
PSMN035-150B	86	PTVS14VP1UP	45	PTVS8V5S1UR	44	PUMZ2	49	PZUxDB2 series	16
PSMN035-150P	86	PTVS14VS1UR	44	PTVS9VOP1UP	45	PVR100AD-B12V	69	RB520S30	9
PSMN038-100K	85	PTVS15VP1UP	45	PTVS9VOS1UR	44	PVR100AD-B2V5	69	RB521S30	9
PSMN045-80YS	84	PTVS15VS1UR	44	PUMB1	55	PVR100AD-B3V0	69	RB751CS40	9
PSMN050-80PS	84	PTVS16VP1UP	45	PUMB10	55	PVR100AD-B3V3	69	RB751S40	9
PSMN057-200B	86	PTVS16VS1UR	44	PUMB11	55	PVR100AD-B5V0	69	RB751V40	9
PSMN057-200P	86	PTVS17VP1UP	45	PUMB13	55	PVR100AZ-B12V	69	RS1A	15
PSMN059-150Y	86	PTVS17VS1UR	44	PUMB14	55	PVR100AZ-B2V5	69	RS1B	15
PSMN063-150D	86	PTVS18VP1UP	45	PUMB15	55	PVR100AZ-B3V0	69	RS1D	15
PSMN070-200B	86	PTVS18VS1UR	44	PUMB16	55	PVR100AZ-B3V3	69	RS1G	15
PSMN070-200P	86	PTVS20VP1UP	45	PUMB17	55	PVR100AZ-B5V0	69	RS1J	15
PSMN085-150K	87	PTVS20VS1UR	44	PUMB18	55	PXT2222A	49	RS1K	15
PSMN102-200Y	86	PTVS22VP1UP	45	PUMB19	55	PXT2907A	49	RS1M	15
PSMN130-200D	86	PTVS22VS1UR	44	PUMB2	55	PXT4401	49	RS2A	15
PSMN165-200K	87	PTVS24VP1UP	45	PUMB20	55	PXT4403	49	RS2AA	15
PSMN1R2-25YL	80	PTVS24VS1UR	44	PUMB24	55	PXTA14	51	RS2B	15
PSMN1R3-30YL	82	PTVS26VP1UP	45	PUMB3	55	PXTA42	51	RS2BA	15
PSMN1R5-25YL	80	PTVS26VS1UR	44	PUMB30	55	PXTA92	51	RS2D	15
PSMN1R6-30PL	82	PTVS28VP1UP	45	PUMB4	55	PZT2222A	49	RS2DA	15
PSMN1R7-30YL	82	PTVS28VS1UR	44	PUMB9	55	PZT2907A	49	RS2G	15
PSMN1R8-30PL	82	PTVS30VP1UP	45	PUMD10	55	PZT4401	49	RS2GA	15
PSMN2R0-30PL	82	PTVS30VS1UR	44	PUMD12	55	PZT4403	49	RS2J	15
PSMN2R0-30YL	82	PTVS33VP1UP	45	PUMD13	55	PZTA14	51	RS2JA	15
PSMN2R0-40YS	83	PTVS33VS1UR	44	PUMD14	55	PZTA42	51	RS2K	15
PSMN2R2-40PS	83	PTVS36VP1UP	45	PUMD15	55	PZTA44	51	RS2KA	15
PSMN2R5-30YL	82	PTVS36VS1UR	44	PUMD16	55	PZTA92	51	RS2M	15
PSMN2R6-40YS	83	PTVS3V3P1UP	45	PUMD17	55	PZU10y	17	RS2MA	15
PSMN2R7-30PL	82	PTVS3V3S1UR	44	PUMD18	55	PZU11y	17	RS3A	15
PSMN2R8-40PS	83	PTVS40VP1UP	45	PUMD19	55	PZU12y	17	RS3B	15
PSMN3R0-30YL	82	PTVS40VS1UR	44	PUMD2	55	PZU13y	17	RS3D	15
PSMN3R3-40YS	83	PTVS43VP1UP	45	PUMD20	55	PZU14y	17	RS3G	15
PSMN3R4-30PL	82	PTVS43VS1UR	44	PUMD24	55	PZU15y	17	RS3J	15
PSMN3R5-30YL	82	PTVS45VP1UP	45	PUMD3	55	PZU16y	17	RS3K	15
PSMN4R0-30YL	82	PTVS45VS1UR	44	PUMD30	55	PZU18y	17	RS3M	15
PSMN4R0-40YS	83	PTVS48VP1UP	45	PUMD4	55	PZU2.4y	17	S1A	15
PSMN4R3-30PL	82	PTVS48VS1UR	44	PUMD48	55	PZU2.7y	17	S1B	15
PSMN4R4-80PS	84	PTVS51VP1UP	45	PUMD6	55	PZU20y	17	S1D	15
PSMN4R5-40PS	83	PTVS51VS1UR	44	PUMD9	55	PZU22y	17	S1G	15
PSMN5R0-30YL	82	PTVS54VP1UP	45	PUMH1	55	PZU24y	17	S1J	15
PSMN5R0-80PS	84	PTVS54VS1UR	44	PUMH10	55	PZU27y	17	S1K	15
PSMN5R8-40YS	83	PTVS58VP1UP	45	PUMH11	55	PZU3.0y	17	S1M	15
PSMN6R0-30YL	82	PTVS58VS1UR	44	PUMH13	55	PZU3.3y	17	S2A	15
PSMN6R0-80YS	84	PTVS5V0P1UP	45	PUMH14	55	PZU3.6y	17	S2B	15
PSMN6R5-80PS	84	PTVS5V0S1UR	44	PUMH15	55	PZU3.9y	17	S2D	15
PSMN7R0-30YL	82	PTVS60VP1UP	45	PUMH16	55	PZU30y	17	S2DA	15
PSMN8R0-40PS	83	PTVS60VS1UR	44	PUMH17	55	PZU33y	17	S2G	15
PSMN8R2-80YS	84	PTVS64VP1UP	45	PUMH18	55	PZU36y	17	S2GA	15
PSMN8R3-40YS	83	PTVS64VS1UR	44	PUMH19	55	PZU4.3y	17	S2J	15
PSMN8R7-80PS	84	PTVS6V0P1UP	45	PUMH2	55	PZU4.7y	17	S2JA	15
PSMN9R0-30YL	82	PTVS6V0S1UR	44	PUMH20	55	PZU5.1y	17	S2K	15
PSSI2021SAY	70	PTVS6V5P1UP	45	PUMH24	55	PZU5.6y	17	S2KA	15
PTVS10VP1UP	45	PTVS6V5S1UR	44	PUMH30	55	PZU6.2y	17	S2M	15
PTVS10VS1UR	44	PTVS7V0P1UP	45	PUMH4	55	PZU6.8y	17	S2MA	15
PTVS11VP1UP	45	PTVS7V0S1UR	44	PUMH7	55	PZU7.5y	17	S3A	15
PTVS11VS1UR	44	PTVS7V5P1UP	45	PUMH9	55	PZU8.2y	17	S3B	15





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[ESD5V5U5ULCE6327HTSA1](#) [ESD1P0RFWH6327XTSA1](#) [SMF05CT2G](#) [MAX3203EETTT](#) [NUP4102XV6T1G](#) [D5V0L4B5TS-7](#)  
[NUP4060AXV6T1G](#) [SZMMBZ15VDLT1G](#) [SZMMBZ15VALT1G](#) [SRDA3.3-4BTG](#) [SPT01-335DEE](#) [SMS24CT1G](#) [SMF15CT1G](#)  
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[SZSMF12CT1G](#) [SP6001-06UTG-1](#)