



**THE DATASHEET OF
PMEG6010EP,115**





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 | Σ < 900 ppm |

Discrete Semiconductors Selection Guide 2010

Products for general applications

Diodes

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Protection and signal conditioning

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Small-signal transistors

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Standard linear products

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Benefit from interactive features in the online edition of this selection guide: A click on a product type takes you to the corresponding product information page on the NXP website. There you'll find data sheets and other design-support documents. To access the online selection guide, go to www.nxp.com/discrete_selection_guide

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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.

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



Diodes

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Switching diodes

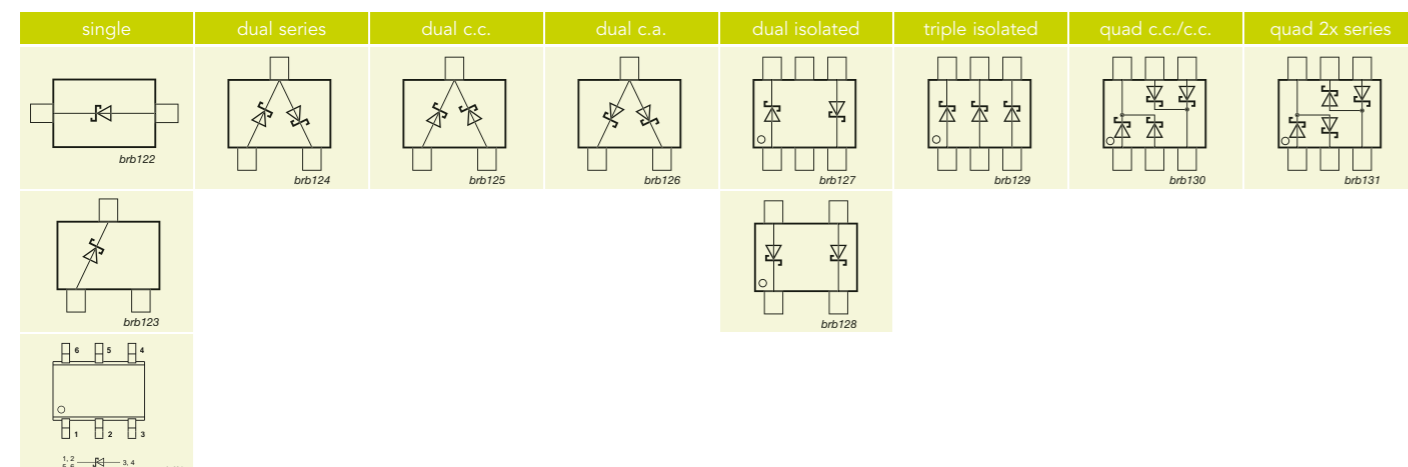
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General purpose Schottky diodes ≤ 250 mA














types in **bold** represent new products

| I _F max (mA) | V _F max (V) | V _F max (mV) | @ I _F (mA) | I _R max (μA) | @ V _R (V) | Package | SOD80C (MiniMelf) | SOD68 (DO-34) | SOT23 | SOT143B | | SOD123F | SOT323 (SC-70) | SOT363 (SC-88) | SOD323F (SC-90) | SOD323 (SC-76) | SOT666 | SOT416 (SC-75) | SOD523 (SC-79) | SOD882/SOT883 (SC-101) | | | | | | |
|-------------------------|------------------------|-------------------------|-----------------------|-------------------------|----------------------|-----------------|---|---|---|---|-----------------|---|---|---|---|---|---|---|---|---|-----------------|-----------------|-----------|-----------------|---------|--|
| | | | | | | |  |  |  |  | |  |  |  |  |  |  |  |  |  | | | | | | |
| | | | | | | | Size (mm) | 3.5 x 1.5 x 1.5 | 3.04 x 1.6 x 0.55 | 2.9 x 1.3 x 1.0 | 2.9 x 1.3 x 1.0 | | 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 0.7 | 1.7 x 1.25 x 0.95 | 1.6 x 1.2 x 0.55 | 1.6 x 0.8 x 0.77 | 1.2 x 0.8 x 0.6 | 1.0 x 0.6 x 0.5 | | | | | |
| | | | | | | | 300 | 500 | 250 | 250 | | 830 | 250 | 300 | 550 | 400 | 300 | 150 | 500 | 250 | | | | | | |
| 70 | 70 | 750 | 10 | 0.1 | 50 | single | | | BAS70 | | | BAS70H | BAS70W | | | 1PS76SB70 | | | 1PS79SB70 | BAS70L | | | | | | |
| | | | | | | dual series | | | BAS70-04 | | | BAS70-04W | | | | | | | | | | | | | | |
| | | | | | | dual c.c. | | | BAS70-05 | | | BAS70-05W | | | | | | | | | | | | | | |
| | | | | | | dual c.a. | | | BAS70-06 | | | BAS70-06W | | | | | | | | | | | | | | |
| | | | | | | dual isolated | | | | BAS70-07 | | | | | | | BAS70-07S | | | | | BAS70-07V | | | | |
| | | | | | | triple isolated | | | | | | | | | | | | | | | | BAS70VV | | | | |
| 120 | 40 | 370 | 1 | 0.5 | 30 | quad 2x series | | | | | | | | | | | | | | | | | | | | |
| | | | | | | single | | | | | | | | | | | | | | RB751V40 | | | RB751S40 | RB751CS40 | | |
| | | | | | | single | | | BAS40 | | BAS40H | BAS40W | | | | | | | | 1PS76SB40 | | | 1PS79SB40 | BAS40L | | |
| | | | | | | dual series | | | BAS40-04 | | | BAS40-04W | | | | | | | | | | | | | | |
| | | | | | | dual c.c. | | | BAS40-05 | | | BAS40-05W | | | | | | | | | | | 1PS75SB45 | | | |
| | | | | | | dual c.a. | | | BAS40-06 | | | BAS40-06W | | | | | | | | | | | | | | |
| 200 | 30 | 300 | 10 | 30 | 10 | dual isolated | | | | BAS40-07 | | | | | | | | | | | | | | | | |
| | | | | | | quad c.c./c.c. | | | | | | | | | | | | | | | | | | | | |
| | | | | | | quad 2x series | | | | | | | | | | | | | | | | | | | | |
| | | | | | | single | | | | | | | | | | | | | | | | | | | | |
| | | 340 | 10 | 2 | 25 | 25 | single | | | BAT754 | | | | | | | | | | | | | | | | |
| | | | | | | | dual series | | | BAT754S | | | | | | | | | | | | | | | | |
| | | | | | | | dual c.c. | | | BAT754C | | | | | | | | | | | | | | | | |
| | | | | | | | dual c.a. | | | BAT754A | | | | | | | | | | | | | | | | |
| | 400 | 10 | 2 | 25 | 25 | triple isolated | | | | | | | | | | | | | | | | 1PS79SB31 | | | | |
| | | | | | | single | BAS85 | BAT85 | BAT54 | | BAT54H | BAT54W | | BAT54J | 1PS76SB10 | | | | | | BAT54T | 1PS79SB10 | BAT54L | | | |
| | | | | | | dual series | | | BAT54S | | | BAT54SW | | | | | | | | | | | | | | |
| | | | | | | dual c.c. | | | BAT54C | | | BAT54CW | | | | | | | | | | | | | BAT54CM | |
| | | | | | | dual c.a. | | | BAT54A | | | BAT54AW | | | | | | | | | | | | | | |
| | | | | | | dual isolated | | | | BAT74 | | | | | | | | | | | | | | | | |
| | | | | | | triple isolated | | | | | | | | | | | | | | | | | | | | |
| | | | | | | quad c.c./c.c. | | | | | | | | | | | | | | | | | | | | |
| 500 | 200 | 30 | 10 | 10 | single | | | | | | | | | | | | | | | | | RB521S30 | | | | |
| | | | | | single | | | | | | | | | | | | | | | | | | | RB520S30 | | |
| | | | | | single | | | | | | | | | | | | | | | | | | | | | |
| | | | | | dual series | | | BAT721 | | | | | | | | | | | | | | | | | | |
| 600 | 200 | 1 | 10 | 10 | single | | | | | | | | | | | | | | | | | | | | | |
| | | | | | dual series | | | BAT721S | | | | | | | | | | | | | | | | | | |
| | | | | | dual c.c. | | | BAT721C | | | | | | | | | | | | | | | | | | |
| | | | | | dual c.a. | | | BAT721A | | | | | | | | | | | | | | | | | | |
| 300 | 10 | 15 | 30 | 30 | single | | | | | | | | | | | | | | | | | | | | | |
| | | | | | dual series | | | | | | | | | | | | | | | | | | | | | |
| | | | | | dual c.c. | | | | | | | | | | | | | | | | | | | | | |
| | | | | | dual c.a. | | | | | | | | | | | | | | | | | | | | | |
| 360 | 10 | 0.5 | 25 | 25 | single | | | | | | | | | | | | | | | | | | | | | |
| | | | | | dual series | | | | | | | | | | | | | | | | | | | | | |
| | | | | | dual c.c. | | | | | | | | | | | | | | | | | | | | | |
| | | | | | dual c.a. | | | | | | | | | | | | | | | | | | | | | |
| 420 | 30 | 0.5 | 25 | 25 | single | | | | | | | | | | | | | | | | | | | | | |
| | | | | | dual series | | | | | | | | | | | | | | | | | | | | | |
| | | | | | dual c.c. | | | | | | | | | | | | | | | | | | | | | |
| | | | | | dual c.a. | | | | | | | | | | | | | | | | | | | | | |
| 50 | 450 | 10 | 5 | 40 | single | | | BAS86 | BAT86 | | | | | | | | | | | | | | | | | |
| | | | | | single | | | | | | | | | | | | | | | | | | | | | |
| 250 | 100 | 950 | 250 | 18 | 75 | single | | | | | | | | | | | | | | | | | | | | |
| | | | | | | single | | | | | | | | | | | | | | | | | | | | |



Medium power low V_F Schottky rectifiers single ≥ 200 mA

types in **bold** represent new products

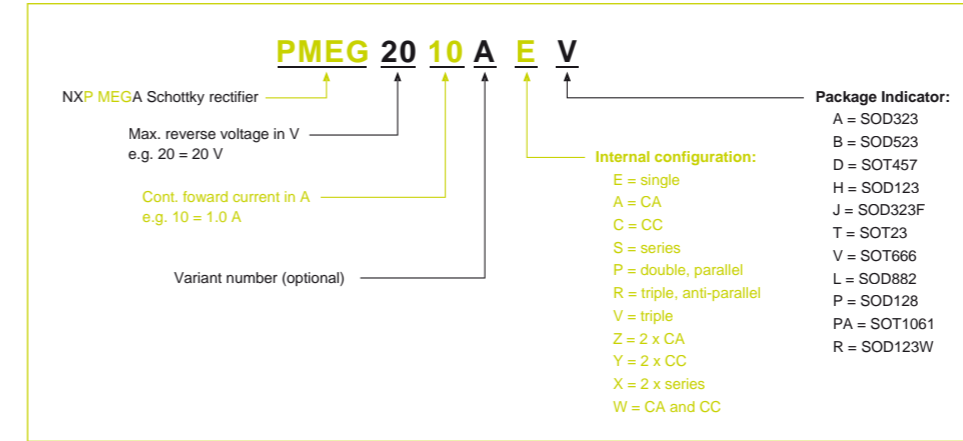
| I_F max (A) | V_R max (V) | V_F max (mV) @ I_F max | I_R max (mA) @ V_R max | Package | SOD128 | SOD87 (Melf) | SOT457 (SC-74) | SOT23 | SOD123W | | SOD123F | SOT1061 | SOT323 (SC-70) | SOD323 (SC-76) | SOD323F (SC-90) | SOT666 | SOD523 (SC-79) | SOD882 | | |
|---------------|---------------|-------------------------------|-------------------------------|------------------------------------|---|---|---|---|---|--|---|---|---|---|---|---|---|---|--|--|
| | | | | |  |  |  |  |  | |  |  |  |  |  |  |  |  | | |
| | | | | Size (mm) | 3.8 x 2.5 x 1.0 | 3.5 x 2.05 x 2.05 | 2.9 x 1.5 x 1.0 | 2.9 x 1.3 x 1.0 | 2.6 x 1.7 x 1.0 | | 2.6 x 1.6 x 1.1 | 2.0 x 2.0 x 0.65 | 2.0 x 1.25 x 0.95 | 1.7 x 1.25 x 0.95 | 1.7 x 1.25 x 0.7 | 1.6 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) @ 1 cm ² | 1050 | 1000 | 540 | 420 | 950 | | 830 | 1000 | 250 | 570 | 830 | 570 | 450 | 250 | | |
| | | | | Optimization | | | | | | | | | | | | | | | | |
| 0.2 | 30 | 480 | 0.04 | low V_F | | | | | | | | | | | | | | | | |
| | 40 | 600 | 0.01 | low I_R | | | | | | | | | | | | | | | | |
| | 60 | 600 | 0.1 | low V_F | | | | | | | | | | | | | | | | |
| 0.5 | 20 | 390 | 0.2 | low V_F | | | | | | | | | | | | | | | | |
| | | 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 | | | | | | | | | | | | | | | | |
| | | 500 | 0.5 | low V_F | | | | | | | | | | | | | | | | |
| 40 | 470 | 0.1 | low V_F | | | | | | | | | | | | | | | | | |
| | 550 | 0.1 | low V_F | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | |
| 1.0 | 20 | 340 | 1 | low V_F | | | | | | | | | | | | | | | | |
| | | 375 | 1.9 | low V_F | | | | | | | | | | | | | | | | |
| | | 430 | 0.2 | low V_F | | | | | | | | | | | | | | | | |
| | | 450 | 0.05 | low I_R | | | | | | | | | | | | | | | | |
| | | 500 | 1.0 | low V_F | | | | | | | | | | | | | | | | |
| | | 550 | 0.2 | low V_F | | | | | | | | | | | | | | | | |
| | 30 | 620 | 1.5 | low V_F | | | | | | | | | | | | | | | | |
| | | 450 | 1.0 | low V_F | | | | | | | | | | | | | | | | |
| | | 360 | 1.5 | low V_F | | | | | | | | | | | | | | | | |
| | | 450 | 0.05 | low I_R | | | | | | | | | | | | | | | | |
| | | 520 | 0.05 | low I_R | | | | | | | | | | | | | | | | |
| | | 550 | 1 | low V_F | | | | | | | | | | | | | | | | |
| | 40 | 560 | 0.15 | low V_F | | | | | | | | | | | | | | | | |
| | | 680 | 0.5 | low V_F | | | | | | | | | | | | | | | | |
| | | 490 | 0.05 | low V_F | | | | | | | | | | | | | | | | |
| | | 600 | 1.0 | low V_F | | | | | | | | | | | | | | | | |
| | | 640 | 0.1 | low V_F | | | | | | | | | | | | | | | | |
| | | 570 | 0.05 | low I_R | | | | | | | | | | | | | | | | |
| 60 | 530 | 0.06 | low V_F | | | | | | | | | | | | | | | | | |
| | 650 | 0.35 | low V_F | | | | | | | | | | | | | | | | | |
| | 660 | 0.05 | low I_R | | | | | | | | | | | | | | | | | |
| 1.5 | 20 | 660 | 0.07 | low I_R | | | | | | | | | | | | | | | | |
| | 30 | 550 | 1.0 | low V_F | | | | | | | | | | | | | | | | |
| 2.0 | 10 | 460 | 3.0 | low V_F | | | | | | | | | | | | | | | | |
| | | 420 | 1.9 | low V_F | | | | | | | | | | | | | | | | |
| | 20 | 525 | 0.2 | low V_F | | | | | | | | | | | | | | | | |
| | | 360 | 3.0 | low V_F | | | | | | | | | | | | | | | | |
| | | 420 | 1.5 | low V_F | | | | | | | | | | | | | | | | |
| | | 450 | 0.1 | low I_R | | | | | | | | | | | | | | | | |
| | | 470 | 2.5 | low V_F | | | | | | | | | | | | | | | | |
| | | 520 | 0.05 | low I_R | | | | | | | | | | | | | | | | |
| | 30 | 620 | 1.0 | low V_F | | | | | | | | | | | | | | | | |
| | | 490 | 0.1 | low V_F | | | | | | | | | | | | | | | | |
| | | 535 | 0.1 | low V_F | | | | | | | | | | | | | | | | |
| | 40 | 530 | 0.15 | low V_F | | | | | | | | | | | | | | | | |
| 575 | | 0.25 | low V_F | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | |
| 3.0 | 10 | 530 | 3.0 | low V_F | | | | | | | | | | | | | | | | |
| | 30 | 360 | 5.0 | low V_F | | | | | | | | | | | | | | | | |
| | | 450 | 0.15 | low I_R | | | | | | | | | | | | | | | | |
| | 40 | 490 | 0.2 | low V_F | | | | | | | | | | | | | | | | |
| | | 540 | 0.1 | low I_R | | | | | | | | | | | | | | | | |
| 5.0 | 30 | 360 | 8.0 | low V_F | | | | | | | | | | | | | | | | |
| | 40 | 490 | 0.3 | low V_F | | | | | | | | | | | | | | | | |

Medium power low V_F Schottky rectifiers dual ≥ 200 mA

types in **bold** represent new products

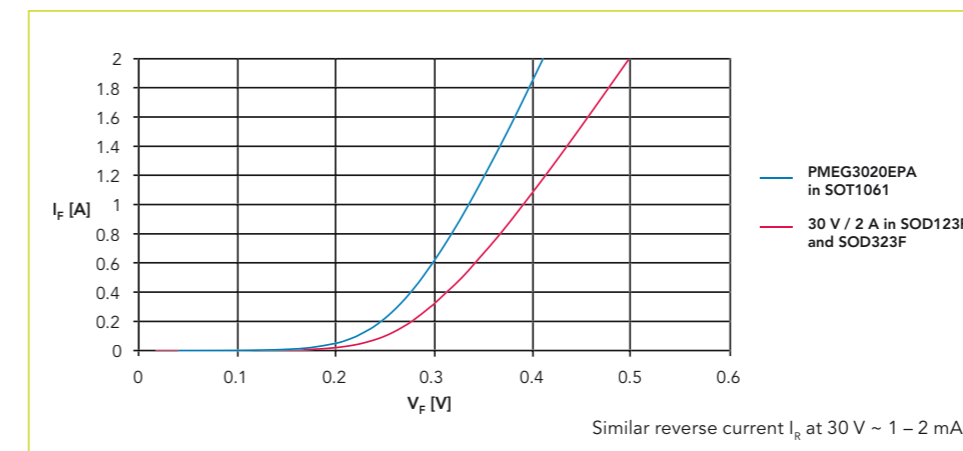
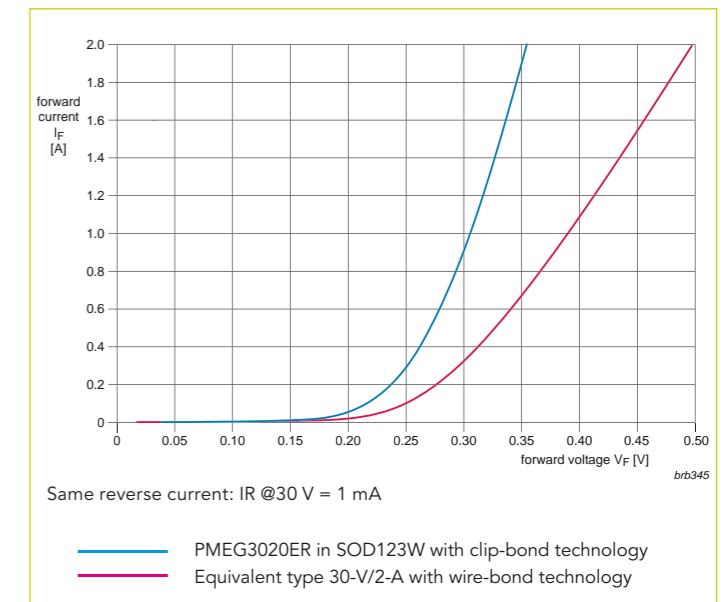
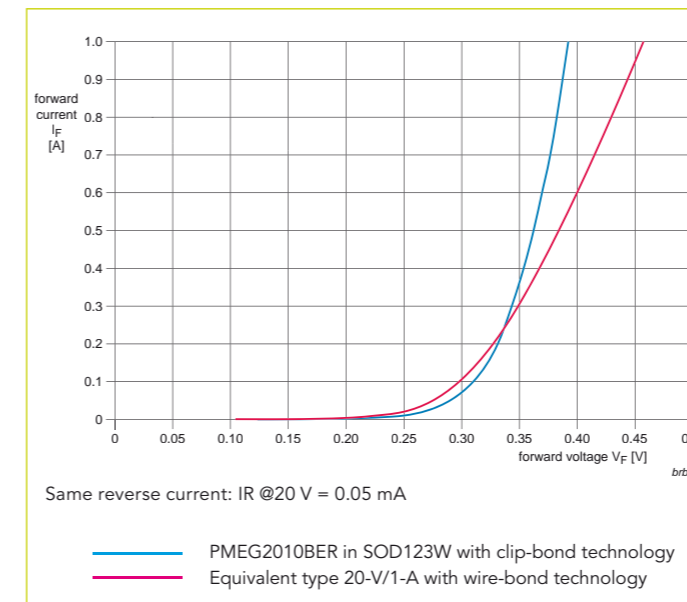
| I_F max (A) | V_R max (V) | V_F max (mV) @ I_F max | I_F max (mA) @ V_R max | Optimization | Package | SOT223 (SC-73) | SOT23 | SOT1061 | SOT666 | |
|---------------|---------------|----------------------------|----------------------------|--------------|---------------|----------------|------------------|-----------------|------------------|------------------|
| | | | | | | Size (mm) | 6.5 x 3.5 x 1.65 | 2.9 x 1.3 x 1.0 | 2.0 x 2.0 x 0.65 | 1.6 x 1.2 x 0.55 |
| | | | | | | P_{tot} (mW) | 1500 | 250 | 1000 | 300 |
| 0.2 | 30 | 480 | 0.03 | low V_F | dual isolated | | | | PMEG3002TV | |
| | 60 | 600 | 0.1 | low V_F | | | | | PMEG6002TV | |
| 0.5 | 20 | 390 | 0.2 | low V_F | dual c.c. | | PMEG2005CT | | | |
| | 30 | 430 | 0.15 | low V_F | | | PMEG3005CT | | | |
| | 40 | 470 | 0.1 | low V_F | | | PMEG4005CT | | | |
| 1.0 | 25 | 450 | 1.0 | low V_F | dual series | BAT120S | | | | |
| | | | | low V_F | dual c.c. | BAT120C | | | | |
| | | | | low V_F | dual c.a. | BAT120A | | | | |
| | 40 | 500 | 0.05 | low V_F | dual c.c. | | | PMEG4010CPA | | |
| | | | | low V_F | dual c.c. | | | PMEG6010CPA | | |
| | 60 | 650 | 0.35 | low V_F | dual series | BAT160S | | | | |
| | | | | low V_F | dual c.c. | BAT160C | | | | |
| | | | | low V_F | dual c.a. | BAT160A | | | | |
| | 2.0 | 20 | 420 | 1.0 | low V_F | dual c.c. | | | PMEG2020CPA | |
| 30 | | 440 | 2.0 | low V_F | dual c.c. | | | PMEG3020CPA | | |

Nomenclature of low V_F (MEGA) Schottky rectifiers










Improved forward characteristics of (MEGA) Schottky rectifiers in new packages

NXP low V_F maximum efficiency general applications (MEGA) Schottky rectifiers in new FlatPower SOD123W and medium power leadless SOT1061 package





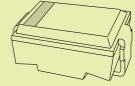
Low capacitance Schottky diodes

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

¹⁾ diodes have matched capacitance

PN rectifiers in SMA, SMB, SMC

types in **bold** represent new products

| Package | SOD131 (SMA) | | | | SOD132 (SMB) | | | SOD133 (SMC) | | | |
|---------------|---|-------------|--------------|--------------|---|-------------|-------------|---|-------------|-------------|------------|
| |  | | | |  | | |  | | | |
| Size (mm) | 4.25 x 2.67 x 2.14 | | | | 4.32 x 3.62 x 2.29 | | | 6.86 x 5.91 x 2.34 | | | |
| t_r (ns) | 30 | 60 | 300 | 2000 | 30 | 300 | 2000 | 30 | 60 | 300 | 2000 |
| V_R max (V) | I_F max (A) | | | | | | | | | | |
| 50 | 1 | ES1A | US1A | RS1A | S1A | | | | | | |
| | 1.5 | | | RS2AA | | RS2A | S2A | | | | |
| | 2 | | | | | ES2A | | | | | |
| | 3 | | | | | | | ES3A | US3A | RS3A | S3A |
| 100 | 1 | ES1B | US1B | RS1B | S1B | | | | | | |
| | 1.5 | | | RS2BA | | RS2B | S2B | | | | |
| | 2 | | | | | ES2B | | | | | |
| | 3 | | | | | | | ES3B | US3B | RS3B | S3B |
| 200 | 1 | ES1D | US1D | RS1D | S1D | | | | | | |
| | 1.5 | | US2DA | RS2DA | S2DA | | RS2D | S2D | | | |
| | 2 | | | | | ES2D | | | | | |
| | 3 | | | | | | | ES3D | US3D | RS3D | S3D |
| 400 | 1 | ES1G | US1G | RS1G | S1G | | | | | | |
| | 1.5 | | US2GA | RS2GA | S2GA | | RS2G | S2G | | | |
| | 2 | | | | | ES2G | | | | | |
| | 3 | | | | | | | ES3G | US3G | RS3G | S3G |
| 600 | 1 | | US1J | RS1J | S1J | | RS2J | S2J | | | |
| | 1.5 | | US2JA | RS2JA | S2JA | | | | | | |
| | 3 | | | | | | | | US3J | RS3J | S3J |
| 800 | 1 | | US1K | RS1K | S1K | | RS2K | S2K | | | |
| | 1.5 | | | RS2KA | S2KA | | | | | | |
| | 3 | | | | | | | | US3K | RS3K | S3K |
| 1000 | 1 | | US1M | RS1M | S1M | | RS2M | S2M | | | |
| | 1.5 | | | RS2MA | S2MA | | | | | | |
| | 3 | | | | | | | | US3M | RS3M | S3M |

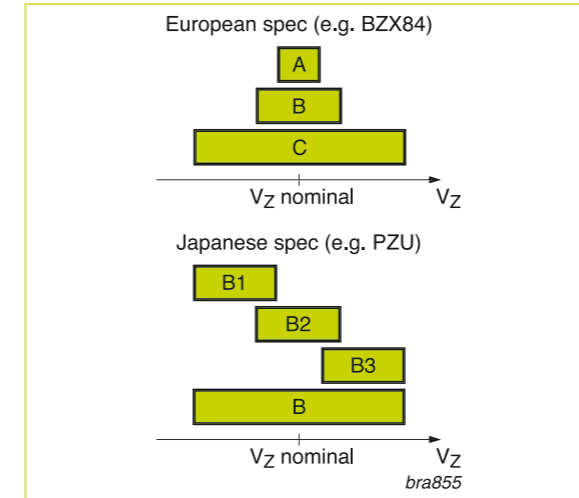
General purpose Zener diodes

types in **bold** represent new products

| I_F max (mA) | P_{ZSM} (W) | V_Z nom (V) | V_Z tolerance | Note | Configuration | Series | Package | Size (mm) | P_{tot} (mW) |
|----------------|---------------|---------------|-----------------|---------|---------------|------------------|-------------------|--------------------|----------------|
| 500 | - | 3.3~24 | C | Eur | single | 1N47xxA series | SOD66 (DO-41) | 4.8 x 2.6 x 0.81 | 1000 |
| | 60 | 3.6~75 | | | | BZV85 series | | | |
| 250 | - | 2.4~36 | about 2 % | special | single | NZX series | SOD27 (DO-35) | 4.25 x 1.85 x 0.56 | 400 |
| | 40 | 2.4~75 | B, C | Eur | | BZX79 series | | | |
| 400 | 40 | 2.4~75 | C | Eur | single | BZV90 series | SOT223 (SC-73) | 6.5 x 3.5 x 1.65 | 1500 |
| 250 | 40 | 2.4~75 | C | Eur | single | BZV49 series | SOT89 (SC-62) | 4.5 x 2.5 x 1.5 | 1000 |
| 250 | 40 | 2.4~75 | B, C | Eur | single | BZV55 series | SOD80C (MiniMelf) | 3.5 x 1.5 x 1.5 | 300 |
| 200 | 40 | 2.4~75 | B, C | Eur | dual c.a. | BZB84 series | SOT23 | 2.9 x 1.3 x 1.0 | 250 |
| | | | A, B, C | | BZX84 series | | | | |
| 250 | 30 | 5~6.8 | 0.2 V | Ave | single | PLVA600A series | SOT23 | 2.9 x 1.3 x 1.0 | 250 |
| | | | 0.2 V | Ave | dual c.a. | PLVA2600A series | | | |
| 250 | - | 3.0~30 | about 2.5 % | special | single | NZH series | SOD123F | 2.6 x 1.6 x 1.1 | 830 |
| | 40 | 2.4~75 | C | Eur | | BZT52H series | | | |
| 200 | 40 | 2.7~24 | B2 | Jap | dual isolated | PZUxDB2 series | SOT353 (SC-88A) | 2.0 x 1.25 x 0.95 | 300 |
| 200 | 40 | 2.4~15 | C | Eur | dual c.a. | BZB784 series | SOT323 (SC-70) | 2.0 x 1.25 x 0.95 | 350 |
| 200 | 30 | 100 | C | Eur | back-to-back | BZB100A | SOD323 (SC-76) | 1.7 x 1.25 x 0.95 | 300 |
| | 40 | 2.4~36 | B2 | Jap | PDZ-B series | | | | |
| 250 | 40 | 2.4~75 | B, C | Eur | single | BZX384 series | SOD323 (SC-76) | 1.7 x 1.25 x 0.95 | 300 |
| 200 | 40 | 2.4~36 | B, B1, B2, B3 | Jap | PZUxBA series | | | | |
| 200 | 60 | 100 | C | Eur | single | BZB100A | SOD323F (SC-90) | 1.7 x 1.25 x 0.7 | 550 |
| 200 | 40 | 2.4~36 | B, B1, B2, B3 | Jap | PZUxB series | | | | |
| 250 | 40 | 2.4~75 | B, C | Eur | single | BZX84J series | SOD323F (SC-90) | 1.7 x 1.25 x 0.7 | 550 |
| 200 | 40 | 2.4~15 | C | Eur | dual c.a. | BZB984 series | SOT663 | 1.6 x 1.2 x 0.55 | 350 |
| 200 | 40 | 2.4~75 | B, C | Eur | single | BZX585 series | SOD523 (SC-79) | 1.2 x 0.8 x 0.6 | 300 |
| 200 | 40 | 2.4~75 | B, C | Eur | single | BZX884 series | SOD882 | 1.0 x 0.6 x 0.5 | 250 |
| | | 2.4~36 | B, B2 | Jap | | PZUxBL series | | | |

Notes:
 Jap: B selection: app. 5 % V_Z tolerance, B1, B2, B3 selections: app. 2 % V_Z tolerance in sequential intervals
 Eur: A selection: app. 1 % V_Z tolerance, B selection: app. 2 % V_Z tolerance, C selection: app. 5 % V_Z tolerance; the selections are in overlapping intervals
 Ave: low voltage avalanche regulator diodes
 dual c.a.: dual common anode

Differences in Zener specification



BZX-series, European spec

| $y =$ | C-series $\pm 5\%$ V_Z (V) | B-series $\pm 2\%$ V_Z (V) | A-series $\pm 1\%$ V_Z (V) |
|------------|------------------------------------|------------------------------------|------------------------------------|
| BZX84-y2V4 | 2.2 - 2.6 | 2.35 - 2.45 | 2.37 - 2.43 |
| BZX84-y2V7 | 2.5 - 2.9 | 2.65 - 2.75 | 2.67 - 2.73 |
| BZX84-y3V0 | 2.8 - 3.2 | 2.94 - 3.06 | 2.97 - 3.03 |
| BZX84-y3V3 | 3.1 - 3.5 | 3.23 - 3.37 | 3.26 - 3.34 |
| BZX84-y3V6 | 3.4 - 3.8 | 3.53 - 3.67 | 3.56 - 3.64 |
| BZX84-y3V9 | 3.7 - 4.1 | 3.82 - 3.98 | 3.86 - 3.94 |
| BZX84-y4V3 | 4 - 4.6 | 4.21 - 4.39 | 4.25 - 4.35 |
| BZX84-y4V7 | 4.4 - 5 | 4.61 - 4.79 | 4.65 - 4.75 |
| BZX84-y5V1 | 4.8 - 5.4 | 5 - 5.2 | 5.04 - 5.16 |
| BZX84-y5V6 | 5.2 - 6 | 5.49 - 5.71 | 5.54 - 5.66 |
| BZX84-y6V2 | 5.8 - 6.6 | 6.08 - 6.32 | 6.13 - 6.27 |
| BZX84-y6V8 | 6.4 - 7.2 | 6.66 - 6.94 | 6.73 - 6.87 |
| BZX84-y7V5 | 7 - 7.9 | 7.35 - 7.65 | 7.42 - 7.58 |
| BZX84-y8V2 | 7.7 - 8.7 | 8.04 - 8.36 | 8.11 - 8.29 |
| BZX84-y9V1 | 8.5 - 9.6 | 8.92 - 9.28 | 9 - 9.2 |
| BZX84-y10 | 9.4 - 10.6 | 9.8 - 10.2 | 9.9 - 10.1 |
| BZX84-y11 | 10.4 - 11.6 | 10.8 - 11.2 | 10.8 - 11.11 |
| BZX84-y12 | 11.4 - 12.7 | 11.8 - 12.2 | 11.88 - 12.12 |
| BZX84-y13 | 12.4 - 14.1 | 12.7 - 13.3 | 12.87 - 13.13 |
| BZX84-y15 | 13.8 - 15.6 | 14.7 - 15.3 | 14.85 - 15.15 |
| BZX84-y16 | 15.3 - 17.1 | 15.7 - 16.3 | - |
| BZX84-y18 | 16.8 - 19.1 | 17.6 - 18.4 | - |
| BZX84-y20 | 18.8 - 21.2 | 19.6 - 20.4 | 19.8 - 20.2 |
| BZX84-y22 | 20.8 - 23.3 | 21.6 - 22.4 | - |
| BZX84-y24 | 22.8 - 25.6 | 23.5 - 24.5 | - |
| BZX84-y27 | 25.1 - 28.9 | 26.5 - 27.5 | 26.73 - 27.27 |
| BZX84-y30 | 28 - 32 | 29.4 - 30.6 | - |
| BZX84-y33 | 31 - 35 | 32.3 - 33.7 | - |
| BZX84-y36 | 34 - 38 | 35.3 - 36.7 | 35.64 - 36.36 |
| BZX84-y39 | 37 - 41 | 38.2 - 39.8 | 38.61 - 39.39 |
| BZX84-y43 | 40 - 46 | 42.1 - 43.9 | 42.57 - 43.43 |
| BZX84-y47 | 44 - 50 | 46.1 - 47.9 | - |
| BZX84-y51 | 48 - 54 | 50 - 52 | 50.49 - 51.51 |
| BZX84-y56 | 52 - 60 | 54.9 - 57.1 | - |
| BZX84-y62 | 58 - 66 | 60.8 - 63.2 | - |
| BZX84-y68 | 64 - 72 | 66.6 - 69.4 | - |
| BZX84-y75 | 70 - 79 | 73.5 - 76.5 | 74.25 - 75.75 |


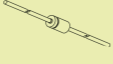



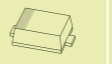






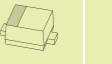




















PZU-series in SOD323F, Japanese spec

| $y =$ | B-series $\pm 5\%$ V_Z (V) | B1-series $\pm 2\%$ V_Z (V) | B2-series $\pm 2\%$ V_Z (V) | B3-series $\pm 2\%$ V_Z (V) |
|---------|------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|
| PZU2.4y | 2.3 - 2.6 | - | - | - |
| PZU2.7y | 2.5 - 2.9 | 2.5 - 2.75 | 2.65 - 2.9 | - |
| PZU3.0y | 2.8 - 3.2 | 2.8 - 3.05 | 2.95 - 3.2 | - |
| PZU3.3y | 3.1 - 3.5 | 3.1 - 3.35 | 3.25 - 3.5 | - |
| PZU3.6y | 3.4 - 3.8 | 3.4 - 3.65 | 3.55 - 3.8 | - |
| PZU3.9y | 3.7 - 4.1 | 3.7 - 3.97 | 3.87 - 4.1 | - |
| PZU4.3y | 4.01 - 4.48 | 4.01 - 4.21 | 4.15 - 4.34 | 4.28 - 4.48 |
| PZU4.7y | 4.42 - 4.9 | 4.42 - 4.61 | 4.55 - 4.75 | 4.69 - 4.9 |
| PZU5.1y | 4.84 - 5.37 | 4.84 - 5.04 | 4.98 - 5.2 | 5.14 - 5.37 |
| PZU5.6y | 5.31 - 5.92 | 5.31 - 5.55 | 5.49 - 5.73 | 5.67 - 5.92 |
| PZU6.2y | 5.86 - 6.53 | 5.86 - 6.12 | 6.06 - 6.33 | 6.26 - 6.53 |
| PZU6.8y | 6.47 - 7.14 | 6.47 - 6.73 | 6.65 - 6.93 | 6.86 - 7.14 |
| PZU7.5y | 7.06 - 7.84 | 7.06 - 7.36 | 7.28 - 7.6 | 7.52 - 7.84 |
| PZU8.2y | 7.76 - 8.64 | 7.76 - 8.1 | 8.02 - 8.36 | 8.28 - 8.64 |
| PZU9.1y | 8.56 - 9.55 | 8.56 - 8.93 | 8.85 - 9.23 | 9.15 - 9.55 |
| PZU10y | 9.45 - 10.55 | 9.45 - 9.87 | 9.77 - 10.21 | 10.11 - 10.55 |
| PZU11y | 10.44 - 11.56 | 10.44 - 10.88 | 10.76 - 11.22 | 11.14 - 11.56 |
| PZU12y | 11.42 - 12.6 | 11.42 - 11.9 | 11.74 - 12.24 | 12.08 - 12.6 |
| PZU13y | 12.47 - 13.96 | 12.47 - 13.03 | 12.91 - 13.49 | 13.37 - 13.96 |
| PZU14y | - | - | 13.7 - 14.3 | - |
| PZU15y | 13.84 - 15.52 | 13.84 - 14.46 | 14.34 - 14.98 | 14.85 - 15.52 |
| PZU16y | 15.37 - 17.09 | 15.37 - 16.01 | 15.85 - 16.51 | 16.35 - 17.09 |
| PZU18y | 16.94 - 19.03 | 16.94 - 17.7 | 17.56 - 18.35 | 18.21 - 19.03 |
| PZU20y | 18.86 - 21.08 | 18.86 - 19.7 | 19.52 - 20.39 | 20.21 - 21.08 |
| PZU22y | 20.88 - 23.17 | 20.88 - 21.77 | 21.54 - 22.47 | 22.23 - 23.17 |
| PZU24y | 22.93 - 25.57 | 22.93 - 23.96 | 23.72 - 24.78 | 24.54 - 25.57 |
| PZU27y | 25.1 - 28.9 | - | - | - |
| PZU30y | 28 - 32 | - | - | - |
| PZU33y | 31 - 35 | - | - | - |
| PZU36y | 34 - 38 | - | - | - |

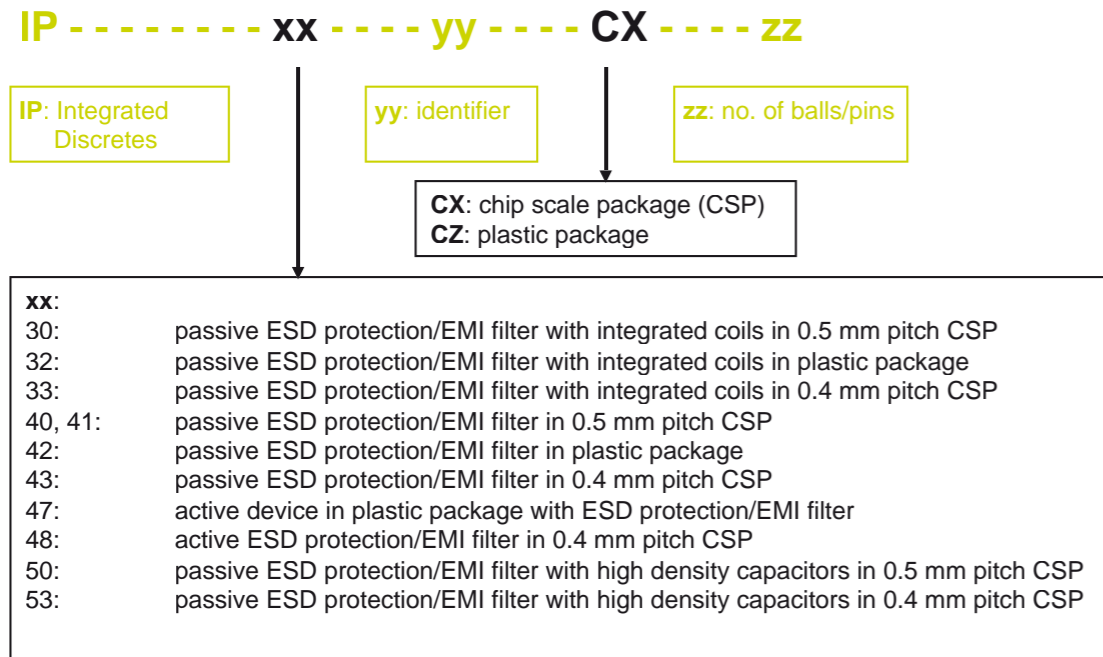
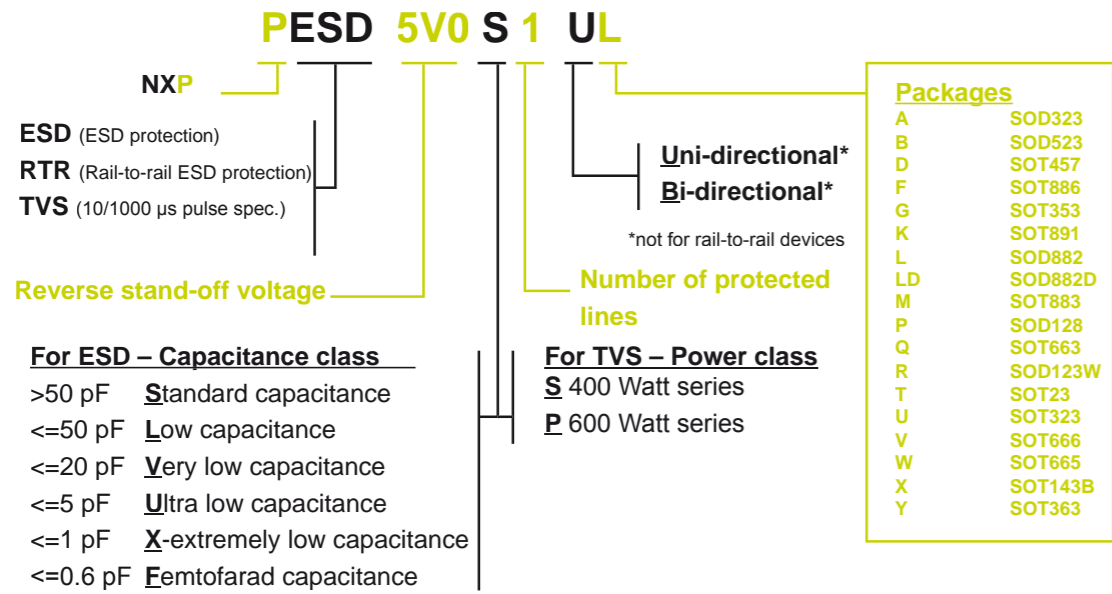
NZX-series in SOD27

| | V_Z (V) | | V_Z (V) | V_Z (V) | |
|---------|-----------|---------|---------------|-----------|---------------|
| NZX2V4A | 2.3 - 2.5 | NZX6V2D | 6.1 - 6.4 | NZX14B | 13.5 - 14 |
| NZX2V4B | 2.4 - 2.6 | NZX6V2E | 6.3 - 6.6 | NZX14C | 13.8 - 14.3 |
| NZX2V7A | 2.5 - 2.7 | NZX6V8A | 6.4 - 6.7 | NZX15A | 14.1 - 14.7 |
| NZX2V7B | 2.6 - 2.8 | NZX6V8B | 6.6 - 6.9 | NZX15B | 14.5 - 15.1 |
| NZX2V7C | 2.7 - 2.9 | NZX6V8C | 6.7 - 7 | NZX15C | 14.9 - 15.5 |
| NZX3V0A | 2.8 - 3 | NZX6V8D | 6.9 - 7.2 | NZX15X | 14.35 - 15.09 |
| NZX3V0B | 2.9 - 3.1 | NZX7V5A | 7 - 7.3 | NZX16A | 15.3 - 15.9 |
| NZX3V0C | 3 - 3.2 | NZX7V5B | 7.2 - 7.6 | NZX16B | 15.7 - 16.5 |
| NZX3V3A | 3.1 - 3.3 | NZX7V5C | 7.3 - 7.7 | NZX16C | 16.3 - 17.1 |
| NZX3V3B | 3.2 - 3.4 | NZX7V5D | 7.5 - 7.9 | NZX18A | 16.9 - 17.7 |
| NZX3V3C | 3.3 - 3.5 | NZX7V5X | 7.07 - 7.45 | NZX18B | 17.5 - 18.3 |
| NZX3V6A | 3.4 - 3.6 | NZX8V2A | 7.7 - 8.1 | NZX18C | 18.1 - 19 |
| NZX3V6B | 3.5 - 3.7 | NZX8V2B | 7.9 - 8.3 | NZX20A | 18.8 - 19.7 |
| NZX3V6C | 3.6 - 3.8 | NZX8V2C | 8.1 - 8.5 | NZX20B | 19.5 - 20.4 |
| NZX3V9A | 3.7 - 3.9 | NZX8V2D | 8.3 - 8.7 | NZX20C | 20.2 - 21.2 |
| NZX3V9B | 3.8 - 4 | NZX9V1A | 8.5 - 8.9 | NZX22A | 20.9 - 21.9 |
| NZX3V9C | 3.9 - 4.1 | NZX9V1B | 8.7 - 9.1 | NZX22B | 21.6 - 22.6 |
| NZX4V3A | 4 - 4.2 | NZX9V1C | 8.9 - 9.3 | NZX22C | 22.3 - 23.3 |
| NZX4V3B | 4.1 - 4.3 | NZX9V1D | 9.1 - 9.5 | NZX24A | 22.9 - 24 |
| NZX4V3C | 4.2 - 4.4 | NZX9V1E | 9.3 - 9.7 | NZX24B | 23.6 - 24.7 |
| NZX4V3D | 4.3 - 4.5 | NZX10A | 9.5 - 9.9 | NZX24C | 24.3 - 25.5 |
| NZX4V7A | 4.4 - 4.6 | NZX10B | 9.7 - 10.1 | NZX24X | 22.61 - 23.77 |
| NZX4V7B | 4.5 - 4.7 | NZX10C | 9.9 - 10.3 | NZX27A | 25.2 - 26.6 |
| NZX4V7C | 4.6 - 4.8 | NZX10D | 10.2 - 10.6 | NZX27B | 26.2 - 27.6 |
| NZX4V7D | 4.7 - 4.9 | NZX11A | 10.4 - 10.8 | NZX27C | 27.2 - 28.6 |
| NZX5V1A | 4.8 - 5 | NZX11B | 10.7 - 11.1 | NZX27X | 26.99 - 28.39 |
| NZX5V1B | 4.9 - 5.1 | NZX11C | 10.9 - 11.3 | NZX30A | 28.2 - 29.6 |
| NZX5V1C | 5 - 5.2 | NZX11D | 11.1 - 11.6 | NZX30B | 29.2 - 30.6 |
| NZX5V1D | 5.1 - 5.3 | NZX12A | 11.4 - 11.9 | NZX30C | 30.2 - 31.6 |
| NZX5V6A | 5.2 - 5.5 | NZX12B | 11.6 - 12.1 | NZX30X | 29.02 - 30.51 |
| NZX5V6B | 5.3 - 5.6 | NZX12C | 11.9 - 12.4 | NZX33A | 31.2 - 32.6 |
| NZX5V6C | 5.4 - 5.7 | NZX12D | 12.2 - 12.7 | NZX33B | 32.2 - 33.6 |
| NZX5V6D | 5.5 - 5.8 | NZX12X | 11.44 - 12.03 | NZX33C | 33.2 - 34.5 |
| NZX5V6E | 5.6 - 5.9 | NZX13A | 12.4 - 12.9 | NZX36A | 34.2 - 35.7 |
| NZX6V2A | 5.7 - 6 | NZX13B | 12.6 - 13.1 | NZX36B | 35.3 - 36.8 |
| NZX6V2B | 5.8 - 6.1 | NZX13C | 12.9 - 13.4 | NZX36C | 36.4 - 38 |
| NZX6V2C | 6 - 6.3 | NZX14A | 13.2 - 13.7 | NZX36X | 35.36 - 37.19 |

General purpose switching diodes ≤ 100V

| V _r max (V) | V _f max (V) | I _f (mA) | I _r max (mA) | @ V _r (V) | t _r max (ns) | Package | SOD27 (DO-35) | SOD68 (DO-34) | SOD80C (MiniMelf) | SOT23 | SOT143B | SOD123F | SOT323 (SC-70) | SOT363 (SC-88) | SOD323 (SC-76) | SOD323F (SC-90) | SOT666 | SOT416 (SC-75) | SOD523 (SC-79) | SOD882 | SOT883 (SC-101) | | | | |
|---|------------------------|---|-------------------------|----------------------|-------------------------|---|--|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---------|--------|--------|--|
| | | | | | | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | | | |
| | | | | | | | 4.25 x 1.85 x 0.56 | 3.04 x 1.6 x 0.55 | 3.5 x 1.5 x 1.5 | 2.9 x 1.3 x 1.0 | 2.9 x 1.3 x 1.0 | 2.6 x 1.6 x 1.1 | 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 | 1.6 x 1.2 x 0.55 | 1.6 x 0.8 x 0.77 | 1.2 x 0.8 x 0.6 | 1.0 x 0.6 x 0.5 | 1.0 x 0.6 x 0.5 | | | | |
| | | | | | | 500 | 500 | 500 | 250 | 250 | 830 | 200 | 300 | 400 | 550 | 180 | 170 | 500 | 250 | 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 |  | | | | BAS28 | | | | | | | | | | | | | | | |
| | | 100 | 5000 | 75 | 4 |  | | | BAS32L | | | | | | | | | | | | | | | | |
| 90 | 1 | 50 | 500 | 80 | 4 |  | | | | BAW56 | | | BAW56W | | | | | | | BAW56T | | | BAW56M | | |
| | | | | | |  | | | | | | | | | | | BAW56S | | | | | | | | |
| | | | | | |  | | | | | | | | | | | | BAW756S | | | | | | | |
| 100 | 1 | 10 | 25 | 20 | 4 |  | 1N4148 | | | | | | | | | | | | | | | | | | |
| | | | | | |  | | | | | | | | BAS16H | | | BAS316 | BAS16J | | | | | | | |
| | |  | | | | | | | | BAS16 | | | BAS16W | | | | | | | BAS16T | | | | | |
| | |  | | | | | | | | | | | | | | | | | | | BAS516 | BAS16L | | | |
| | |  | | | | | | | | | | | | BAS16VY | | | | | | | | | | | |
| | |  | | | | | | | | | | | | | | | | | | | | BAS16VW | | | |
| | |  | | | | | | | | | BAV70 | | | | BAV70W | | | | | | | BAV70T | | BAV70M | |
| | |  | | | | | | | | | | | | | BAV70S | | | | | | | | | | |
|  | | | | | | | | | BAV99 | | | | BAV99W | | | | | | | | | | | | |
|  | | | | | | | | | | | | | BAV99S | | | | | | | | | | | | |

Protection and signal conditioning nomenclature



Protection and signal conditioning

| | |
|--|----|
| Standard ESD protection devices | 24 |
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| TVS diodes, 600 W | 45 |

Standard ESD protection devices

types in **bold** represent new products

| Number of protected lines | | V _{RWM} (V) | C _{line} typ (pF) | C _{line} max (pF) | P _{PP} ^[1] max (W) | ESD rating ^[2] max (kV) | I _R max (μA) @ V _{RWM} | Configuration | Type | Package | Size (mm) | | |
|---------------------------|---------------|----------------------|----------------------------|----------------------------|--|------------------------------------|--|---------------|---------------------|---------------------|------------------|-----------------|-------------------|
| Unidirectional | Bidirectional | | | | | | | | | | | | |
| 1 | 0 | 3.3 | 207 | 300 | 150 | 30 | 2 | | PESD3V3S1UL | SOD882 | 1.0 x 0.6 x 0.5 | | |
| | | 5 | 152 | 200 | 150 | 30 | 1 | | PESD5V0S1UL | | | | |
| | | 12 | 38 | 75 | 150 | 30 | 0.05 | | PESD12VS1UL | | | | |
| | | 15 | 32 | 70 | 150 | 30 | 0.05 | | PESD15VS1UL | | | | |
| | | 24 | 23 | 50 | 150 | 23 | 0.05 | | PESD24VS1UL | | | | |
| | | 5 | 152 | 200 | 150 | 30 | 1 | | PESD5V0S1ULD | | | SOD882D | 1.0 x 0.6 x 0.37 |
| | | 3.3 | 207 | 300 | 330 | 30 | 2 | | | PESD3V3S1UB | SOD523 (SC-79) | 1.2 x 0.8 x 0.6 | |
| | | 5 | 152 | 200 | 260 | 30 | 1 | | | PESD5V0S1UB | | | |
| | | 12 | 38 | 75 | 180 | 30 | 0.05 | | | PESD12VS1UB | | | |
| | | 15 | 32 | 70 | 160 | 30 | 0.05 | | | PESD15VS1UB | | | |
| | | 24 | 23 | 50 | 160 | 23 | 0.05 | | | PESD24VS1UB | | | |
| | | 5 | 480 | 530 | 890 | 30 | 4 | | | PESD5V0S1UA | | | SOD323 (SC-76) |
| | | 12 | 160 | 180 | 600 | 30 | 0.1 | PESD12VS1UA | | SOD323F (SC-90) | 1.7 x 1.25 x 0.7 | | |
| | | 5 | 480 | 530 | 890 | 30 | 4 | PESD5V0S1UJ | | | | | |
| | | 12 | 160 | 180 | 600 | 30 | 0.1 | PESD12VS1UJ | | SOD523 (SC-79) | 1.2 x 0.8 x 0.6 | | |
| | | 2.5 | 229 | 300 | 260 | 30 | 6 | PESD5Z2.5 | | | | | |
| | | 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 |
| | | | | 5 | 35 | 45 | 130 | 30 | 0.1 | PESD5V0S1BLD | SOD882D | | 1.0 x 0.6 x 0.37 |
| | | | | 5 | 35 | 45 | 130 | 30 | 0.1 | PESD5V0S1BB | SOD523 (SC-79) | | 1.2 x 0.8 x 0.6 |
| | | | | 5 | 35 | 45 | 130 | 30 | 0.1 | PESD5V0S1BA | SOD323 (SC-76) | | 1.7 x 1.25 x 0.95 |

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

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

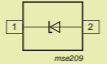






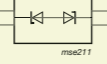







Standard ESD protection devices

| Number of protected lines | | V _{RWM} (V) | C _{line} typ (pF) | C _{line} max (pF) | P _{PP} ^[1] max (W) | ESD rating ^[2] max (kV) | I _R max (μA) @ V _{RWM} | Configuration | Type | Package | Size (mm) | | |
|---------------------------|---------------|----------------------|----------------------------|----------------------------|--|------------------------------------|--|---------------|----------------|-------------------|------------------|------------------|------------------|
| Unidirectional | Bidirectional | | | | | | | | | | | | |
| 2 | 1 | 3.3 | 200 | 275 | 150 | 23 | 3 | | PESD3V3S2UQ | SOT663 | 1.6 x 1.2 x 0.55 | | |
| | | 5 | 150 | 215 | 150 | 30 | 0.3 | | PESD5V0S2UQ | | | | |
| | | 12 | 38 | 100 | 150 | 30 | 0.03 | | PESD12VS2UQ | | | | |
| | | 15 | 32 | 70 | 150 | 30 | 0.05 | | PESD15VS2UQ | | | | |
| | | 24 | 23 | 50 | 150 | 23 | 0.05 | | PESD24VS2UQ | | | | |
| | | 3.3 | 207 | 300 | 330 | 30 | 2 | | PESD3V3S2UT | | | SOT23 | 2.9 x 1.3 x 1.0 |
| | | 5.2 | 152 | 200 | 260 | 30 | 1 | | PESD5V2S2UT | | | | |
| | | 12 | 38 | 75 | 180 | 30 | 1 | | PESD12VS2UT | | | | |
| | | 15 | 32 | 70 | 160 | 30 | 1 | | PESD15VS2UT | | | | |
| | | 24 | 23 | 50 | 160 | 23 | 1 | | PESD24VS2UT | | | | |
| | | 36 | 17 | 35 | 160 | 30 | 1 (@ 30 V) | | PESD36VS2UT | | | | |
| | | 3.3 | 207 | 300 | 330 | 30 | 2 | | | PESD3V3S2UAT | SOT886 (XSON6) | 1.45 x 1.0 x 0.5 | |
| | | 5 | 152 | 200 | 260 | 30 | 1 | PESD5V0S2UAT | | | | | |
| | | 12 | 38 | 75 | 180 | 30 | 0.05 | PESD12VS2UAT | | | | | |
| | | 15 | 32 | 70 | 160 | 30 | 0.05 | PESD15VS2UAT | | | | | |
| | | 24 | 23 | 50 | 160 | 23 | 0.05 | PESD24VS2UAT | | | | | |
| | | 3.3 | 110 | 300 | 110 | 30 | 1 (@ 3 V) | PESD3V3S4UF | | SOT665 | | | 1.6 x 1.2 x 0.55 |
| | | 5 | 85 | 220 | 110 | 30 | 0.1 (@ 4.3 V) | PESD5V0S4UF | | | | | |
| | | 4 | 3 | 3 | 107 | 125 | - | 8 | | 1 | | | |
| | | | | 4 | 90 | 105 | - | 8 | 0.5 | BZA962A | | | |
| 4.3 | 78 | | | 90 | - | 8 | 0.1 | BZA968A | | | | | |
| 3 | 200 | | | 240 | - | 8 | 2 | BZA856A | | | | | |
| 3 | 107 | | | 125 | - | 8 | 1 | BZA856AL | | | | | |
| 4 | 165 | | | 200 | - | 8 | 0.7 | BZA862A | | | | | |
| 4 | 90 | | | 105 | - | 8 | 0.5 | BZA862AL | SOT457 (SC-74) | 2.9 x 1.5 x 1.0 | | | |
| 4.3 | 145 | | | 180 | - | 8 | 0.2 | BZA868A | | | | | |
| 4.3 | 78 | | | 90 | - | 8 | 0.1 | BZA868AL | | | | | |
| 15 | 37 | | | 50 | - | 8 | 0.1 | BZA820A | | | | | |
| 3 | 200 | | | 240 | - | 8 | 2 | BZA456A | | | | | |
| 4 | 165 | | | 200 | - | 15 | 0.7 | BZA462A | | | | | |
| 14 | 37 | | | 48 | - | 8 | 0.075 | BZA418A | SOT163 (SO20) | 12.8 x 7.5 x 2.65 | | | |
| 15 | 37 | | | 48 | - | 8 | 0.1 | BZA420A | | | | | |
| 3.3 | 215 | | | 300 | 200 | 30 | 0.8 | PESD3V3S4UD | | | | | |
| 5 | 165 | | | 220 | 200 | 30 | 0.2 | PESD5V0S4UD | | | | | |
| 12 | 73 | | | 100 | 200 | 30 | 0.015 | PESD12VS4UD | | | | | |
| 15 | 60 | | | 90 | 200 | 30 | 0.015 | PESD15VS4UD | | | | | |
| 24 | 40 | | | 70 | 200 | 23 | 0.015 | PESD24VS4UD | | | | | |
| 3.3 | 215 | | | 300 | 200 | 30 | 0.8 | PESD3V3S5UD | | | | | |
| 5 | 165 | 220 | 200 | 30 | 0.2 | PESD5V0S5UD | | | | | | | |
| 12 | 73 | 100 | 200 | 30 | 0.015 | PESD12VS5UD | | | | | | | |
| 15 | 60 | 90 | 200 | 30 | 0.015 | PESD15VS5UD | | | | | | | |
| 24 | 45 | 70 | 200 | 23 | 0.015 | PESD24VS5UD | | | | | | | |
| 0 | 4 | 5 | 45 | 75 | - | 15 | 0.1 | BZA408B | | | | | |
| 18 | 17 | 5.2 | 100 | 120 | - | 8 | 2 | BZA100 | | | | | |

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

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

Low capacitance ESD protection devices

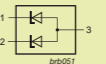


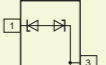


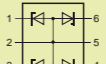


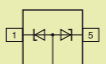


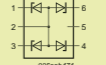

| Number of protected lines | | V _{RMV} (V) | C _{line} typ (pF) | C _{line} max (pF) | P _{IP} ⁽¹⁾ max (W) | ESD rating ⁽²⁾ max (kV) | I _R max (μA) @ V _{RMV} | Configuration | Type | Package | Size (mm) | | | |
|---------------------------|---------------|----------------------|----------------------------|----------------------------|--|------------------------------------|--|---|---|---|---|-------------|---|-------------------|
| 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 | SOD882  | 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 | | | | |

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

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

Low capacitance ESD protection devices

types in **bold** represent new products

| Number of protected lines | | V _{RMV} (V) | C _{line} typ (pF) | C _{line} max (pF) | P _{IP} ⁽¹⁾ max (W) | ESD rating ⁽²⁾ max (kV) | I _R max (μA) @ V _{RMV} | Configuration | Type | Package | Size (mm) | | | |
|---------------------------|---------------|----------------------|----------------------------|----------------------------|--|------------------------------------|--|---|--|---|---|-------------|---|------------------|
| Unidirectional | Bidirectional | | | | | | | | | | | | | |
| 2 | 1 | 3.3 | 22 | 28 | 30 | 15 | 0.3 |  | PESD3V3L2UM | SOT883 (SC-101)  | 1.0 x 0.6 x 0.5 | | | |
| | | 5 | 16 | 19 | 30 | 15 | 0.025 | | PESD5V0L2UM | | | | | |
| | | 5 | 38 | 46 | 70 | 30 | 0.09 (@ 4 V) | | PESD5V0L2UU | SOT323 (SC-70)  | 2.0 x 1.25 x 0.95 | | | |
| | | 6 | 34 | 40 | 60 | 30 | 0.018 (@ 4.3 V) | | PESD6V0L2UU | | | | | |
| 0 | 2 | 3.3 | 101 | - | 350 | 30 | 2 |  | PESD3V3L2BT | SOT23  | 2.9 x 1.3 x 1.0 | | | |
| | | 5 | 75 | - | 350 | 30 | 1 | | PESD5V0L2BT | | | | | |
| | | 12 | 19 | - | 200 | 30 | 0.05 | | PESD12VL2BT | | | | | |
| | | 15 | 16 | - | 200 | 30 | 0.05 | | PESD15VL2BT | | | | | |
| | | 24 | 11 | - | 200 | 23 | 0.05 | | PESD24VL2BT | | | | | |
| | | 5 | 35 | 45 | 130 | 30 | 0.1 | | PESD5V0S2BT | | | | | |
| | | 5 | 2.9 | 3.5 | - | 10 | 0.1 | | PESD5V0U2BT | | | | | |
| | | 5 | 2.9 | 3.5 | - | 10 | 0.1 | | PESD5V0U2BM | SOT883 (SC-101)  | 1.0 x 0.6 x 0.5 | | | |
| | | 4 | 3 | 3.3 | 22 | 28 | 30 | | 20 | 0.3 |  | PESD3V3L4UF | SOT886 (XSON6)  | 1.45 x 1.0 x 0.5 |
| | | | | 5 | 16 | 19 | 30 | | 20 | 0.025 | | PESD5V0L4UF | | |
| 3.3 | 22 | | | 28 | 30 | 20 | 0.3 | PESD3V3L4UW | SOT665  | 1.6 x 1.2 x 0.55 | | | | |
| 5 | 16 | | | 19 | 30 | 20 | 0.025 | PESD5V0L4UW | | | | | | |
| 3.3 | 22 | | | 28 | 30 | 20 | 0.3 | PESD3V3L4UG | SOT353 (SC-88A)  | 2.0 x 1.25 x 0.95 | | | | |
| 5 | 16 | | | 19 | 30 | 20 | 0.025 | PESD5V0L4UG | | | | | | |
| 3.3 | 13 | | | 17 | 14 | 10 | 1 | PESD3V3V4UK | SOT891 (XSON6)  | 1.0 x 1.0 x 0.5 | | | | |
| 5 | 12 | | | 15 | 20 | 15 | 0.5 | PESD5V0V4UK | | | | | | |
| 9 | 6.5 | | | 10 | 25 | 8 | 0.5 | PESD9V0V4UK | | | | | | |
| 3.3 | 15 | | | 18 | 16 | 12 | 0.3 | PESD3V3V4UF | SOT886 (XSON6)  | 1.45 x 1.0 x 0.5 | | | | |
| 5 | 12 | | | 15 | 16 | 12 | 0.025 | PESD5V0V4UF | | | | | | |
| 3.3 | 15 | | | 18 | 16 | 12 | 0.3 | PESD3V3V4UW | SOT665  | 1.6 x 1.2 x 0.55 | | | | |
| 5 | 12 | | | 15 | 16 | 12 | 0.025 | PESD5V0V4UW | | | | | | |
| 3.3 | 15 | | | 18 | 16 | 12 | 0.3 | PESD3V3V4UG | SOT353 (SC-88A)  | 2.0 x 1.25 x 0.95 | | | | |
| 5 | 12 | 15 | 16 | 12 | 0.025 | PESD5V0V4UG | | | | | | | | |

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

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

Low capacitance ESD protection devices

types in **bold** represent new products

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

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

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

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

types in **bold** represent new products

| Number of protected lines | | V_{RWM} (V) | C_{in} typ (pF) | C_{in} max (pF) | ESD rating ^[2] max (kV) | I_R max (μA) @ V_{RWM} | Configuration | Type | Package | Size (mm) |
|---------------------------|---------------|---------------|-------------------|-------------------|------------------------------------|----------------------------|----------------|---------------------|--------------------|------------------|
| Unidirectional | Bidirectional | | | | | | | | | |
| 1 | 0 | 5 | 0.9 | 1 | 8 | 0.2 | | PESD5V0X1UB | SOD523 (SC-79) | 1.2 x 0.8 x 0.6 |
| | | 5 | 1.8 | 2 | 15 | 0.2 | | PESD5V0X1UAB | SOD882 | |
| | | 16 | 0.83 | 0.95 | 8 | 0.1 | | PESD16VX1UL | SOT23 | 1.0 x 0.6 x 0.5 |
| 0 | 1 | 5.5 | 1 | 1.5 | 8 | 0.1 (@ 3 V) | | PRTR5V0U1T | SOT23 | 2.9 x 1.3 x 1.0 |
| | | 5.5 | 1 | 1.5 | 8 | 0.1 (@ 3 V) | | PESD5V0F1BL | SOD882 | 1.0 x 0.6 x 0.5 |
| 0 | 1 | 16 | 0.5 | 0.65 | 8 | 0.1 | | PESD16VX1UL | SOD882 | |
| | | 3.3 | 1.3 | 1.6 | 9 | 0.1 | | PESD3V3X1BL | | |
| | | 5 | 0.9 | 1.3 | 9 | 0.1 | | PESD5V0X1BL | | |
| 1 | 1 | 5 | 0.9 | 1.3 | 9 | 0.1 | | PESD5V0X1BQ | SOT663 | 1.6 x 1.2 x 0.55 |
| | | 5 | 0.9 | 1.3 | 9 | 0.1 | | PESD5V0X1BT | SOT23 | 2.9 x 1.3 x 1.0 |
| | | 80 | 0.6 | 0.75 | 30 | 0.1 | NUP1301 | SOT143B | | |
| | | 5.5 | 1 | 1.5 | 8 | 0.1 (@ 3 V) | PRTR5V0U2X | SOT891 (XSON6) | 1.0 x 1.0 x 0.5 | |
| | | 5.5 | 1.8 | | 12 | 0.1 (@ 3 V) | PRTR5V0U2AX | | | |
| | | 2 | 0 | 5.5 | 1 | 1.5 | 8 | 0.1 (@ 3 V) | | PRTR5V0U2D |
| 5.5 | 1 | | | 1.5 | 8 | 0.1 (@ 3 V) | PRTR5V0U2F | SOT886 (XSON6) | | 1.45 x 1.0 x 0.5 |
| 5.5 | 2 | | | - | 15 | - | | IP4234CZ6 | SOT457 (SC-74) | 2.9 x 1.5 x 1.0 |
| 5.5 | 1.5 | | | - | 8 | - | | IP3219CZ6 | SOT1082-1 (VSON6U) | 2.3 x 3.5 x 0.85 |

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

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

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

types in **bold** represent new products

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

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

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

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

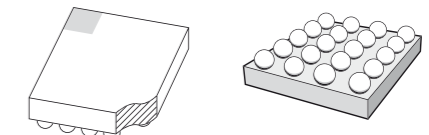
types in **bold** represent new products

| Number of protected lines | | V_{RWM} (V) | C_{line} typ (pF) | C_{line} max (pF) | ESD rating ^[1] max (kV) | I_R max (μA) @ V_{RWM} | Configuration | Type | Package | Size (mm) |
|---------------------------|---------------|---------------|---------------------|---------------------|------------------------------------|----------------------------|---------------|----------------------|-------------------|--------------------|
| Unidirectional | Bidirectional | | | | | | | | | |
| 4 | 0 | 5.5 | 0.6 | - | 8 | - | | IP4286CZ6-TBF | SOT886 (XSON6) | 1.45 x 1.0 x 0.5 |
| | | 5.5 | 0.6 | - | 8 | - | | IP4286CZ6-TTY | SOT363 (SC-88) | 2.0 x 1.25 x 0.95 |
| | | 5.5 | 0.5 | - | 8 | - | | IP4284CZ10-TB | SOT1059 (XSON10U) | 1 x 2.5 x 0.5 |
| 5 | 0 | 5.5 | 0.5 | - | 8 | - | | IP4284CZ10-TT | SOT552 (TSSOP10) | 3.0 x 3.0 x 1.1 |
| | | 5.5 | 1.3 | - | 15 | - | | IP4358CX6 | CSP | 0.76 x 1.16 x 0.61 |
| 8 | 0 | 5.5 | 10 | - | 15 | - | | IP4310CX8 | CSP | 1.16 x 1.16 x 0.61 |
| | | 5.5 | 0.5 | 0.65 | 8 | 0.2 | | PESD5V0F5BK | SOT891 (XSON6) | 1.0 x 1.0 x 0.5 |
| 11 | 0 | 5.5 | 1.3 | - | 15 | - | | IP4309CX9 | CSP | 1.16 x 1.16 x 0.61 |
| | | 5.5 | 1 | - | 8 | - | | PRTR5V0U8S | SOT552 (TSSOP10) | 3.0 x 3.0 x 1.1 |
| 11 | 0 | 5.5 | 0.7 | - | 8 | - | | IP4790CZ38 | SOT510 (TSSOP38) | 9.7 x 4.4 x 1.1 |

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

NXP Wafer-Level Chip Scale Package (WL-CSP)

- ▶ Smallest possible solution for ESD and EMI circuits, saving maximum of space
- ▶ Lowest parasitic inductance to GND contact, ensures best performance
- ▶ High mechanical robustness



Protection and signal conditioning

Audio interfaces

types in **bold** represent new products

| Baseband interface | Number of protected lines | Line small-signal equivalents | | Digital interface clock speed (MHz) | Remark | Type | Package | Size (mm) |
|----------------------|---------------------------|-------------------------------|------------------------|---|---|------------------|--------------------|--------------------|
| | | R _{line} | C _{line} (pF) | | | | | |
| Audio | 2 | 0.9 Ω | 290 | - | Low-ohmic speaker (< ~8 Ω) | IP4047CX6/LF | 6 ball CSP | 1.56 x 1.01 x 0.65 |
| | | 10 Ω | 200 | - | Low-ohmic speaker (> ~8 Ω) | IP4048CX5/LF | 6 ball CSP | 0.91 x 1.28 x 0.65 |
| | | 15 Ω | 5000 | - | Low-ohmic speaker (> ~8 Ω) | IP5311CX5/LF | | 5 ball CSP |
| | | 68 Ω | 110 | - | Single-ended or differential microphone | IP4049CX5/LF | 6 ball CSP | 0.91 x 1.28 x 0.65 |
| | | 470 Ω | 35 | - | Single-ended or differential microphone | IP4055CX6/LF | | 1.56 x 1.03 x 0.65 |
| | | 470 Ω | 20 | - | Single-ended or differential microphone | IP4355CX6/LF | 8 ball CSP | 1.16 x 0.76 x 0.65 |
| | | 50 Ω / 2.2 kΩ | 2000 | - | Single-ended to quasi-differential microphone channel with integrated biasing network | IP5002CX8/LF | | 1.67 x 1.67 x 0.65 |
| | | 2.25 kΩ | 4000 | - | Differential microphone filter with integrated biasing network for ΣΔ ADC converters | IP5006CX11/LF | 11 ball CSP | 1.41 x 1.91 x 0.65 |
| | | 5 Ω / 20 Ω / 1.5 kΩ | 550 | - | Differential microphone filter with integrated biasing network for ΣΔ including coupling capacitors | IP5020CX16/LF | 16 ball CSP | 2.01 x 1.91 x 0.65 |
| | | 0.25 Ω, 3 nH | - | - | Inductive, low-ohmic differential channel LC filter | IP3047CX6 | 6 ball CSP | 1.60 x 1.15 x 0.65 |
| | 0.25 Ω, 3 nH | - | - | Inductive, low-ohmic differential channel LC filter | IP3048CX5 | 5 ball CSP | 1.51 x 1.15 x 0.65 | |
| | 2.2 kΩ / 1 kΩ / 0.8 kΩ | 0.8 nF / 1.6 nF | - | Differential microphone biasing ESD protection / EMI filtering | IP5306CX8 | 8 ball CSP | 1.19 x 1.19 x 0.61 | |
| | 4 | 10 Ω | 5000 | - | Dual differential speaker | IP5040CX11/LF | 11 ball CSP | 1.41 x 2.01 x 0.65 |
| | 6 | 15 Ω / 95 Ω | 65 / 33 | - | Single-ended microphone and high-ohmic speaker (> ~8 Ω) with integrated 2 kohm pull-up resistor | IP4363CX10/LF | 10 ball CSP | 0.76 x 1.96 x 0.61 |
| 40 Ω / 1450 Ω / 10 Ω | | 50 / 20 / 200 | - | Fully integrated audio interface protection for differential microphone and differential speaker, including EMI filtering and pull up resistors | IP4025CX20/LF | 20 ball CSP | 1.98 x 2.53 x 0.65 | |
| 40 Ω / 1450 Ω / 10 Ω | | 50 / 20 / 200 | - | Fully integrated audio interface protection for differential microphone and differential speaker, including EMI filtering and pull up resistors | IP4027CX20/LF | | 1.91 x 2.52 x 0.65 | |
| 50 Ω / 10 Ω | | 50 / 100 / 1000 | - | Fully integrated audio interface protection for differential microphone and differential speaker, including EMI filtering and pull up resistors | IP4125CX20/LF | | 2.00 x 2.66 x 0.65 | |
| 8 | 0.8 Ω / 30 Ω / 200 Ω | 20 / 50 / 150 | ~20 | Fully integrated audio interface protection including EMI filtering for microphone and speaker, and additional 4-channel EMI filter | IP4110CX20/LF | | 1.91 x 2.47 x 0.65 | |

Video interfaces


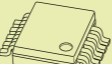



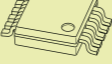

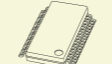
types in **bold** represent new products

| Baseband interface | Number of protected lines | Buffer | Level shifter | C _{line} (pF) | Resistor (Ω) | Remark | Type | Package | Size (mm) | |
|--------------------|---------------------------|--------|---------------|------------------------|--------------|--|--|-------------------|-------------------|-------------------|
| Display port | 4 | - | - | 0.6 | - | ESD protection for ultra high speed interfaces | IP4283CZ10-TB | SOT1059 (XSON10U) | 1.0 x 2.5 x 0.5 | |
| | | - | - | 0.6 | - | ESD protection for ultra high speed interfaces | IP4283CZ10-TT | SOT552 (TSSOP10) | 3.0 x 3.0 x 1.1 | |
| | | - | - | 0.5 | - | ESD protection for ultra high speed interfaces | IP4284CZ10-TB | SOT1059 (XSON10U) | 1.0 x 2.5 x 0.5 | |
| | | - | - | 0.5 | - | ESD protection for ultra high speed interfaces | IP4284CZ10-TT | SOT552 (TSSOP10) | 3.0 x 3.0 x 1.1 | |
| | 11 | - | - | 0.6 | - | ESD protection for ultra high speed interfaces | IP4286CZ6-TBF | SOT886 (XSON6) | 1.45 x 1.0 x 0.5 | |
| | | - | - | 0.6 | - | ESD protection for ultra high speed interfaces | IP4286CZ6-TTY | SOT363 (SC-88) | 2.0 x 1.25 x 0.95 | |
| | LVDS | 10 | - | - | 5 | 100 | 100 Ω termination | IP4263CZ14 | SOT108 (SO14) | 8.65 x 3.9 x 1.75 |
| | | 2 | - | - | 0.7 | - | ESD protection for ultra high speed interfaces | IP4282CZ6 | SOT886 (XSON6) | 1.45 x 1.0 x 0.5 |
| | HDMI | 4 | - | - | 0.7 | - | ESD protection for ultra high speed interfaces | IP4280CZ10 | SOT552 (TSSOP10) | 3.0 x 3.0 x 1.1 |
| | | | - | - | 0.7 | - | ESD protection for ultra high speed interfaces | IP4281CZ10 | SOT1059 (XSON10U) | 1.0 x 2.5 x 0.5 |

Protection and signal conditioning







Video interfaces

types in **bold** represent new products

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

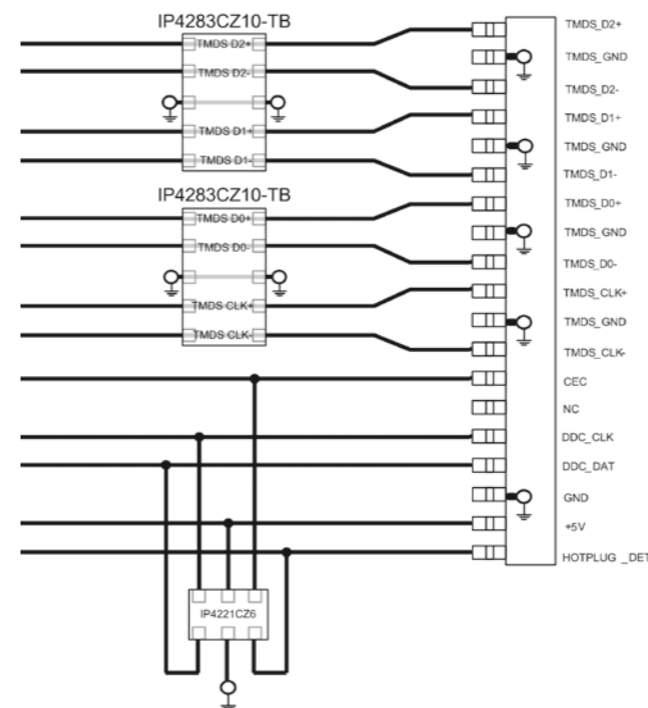
Video interfaces

types in **bold** represent new products

| Baseband interface | Number of protected lines | Buffer | Level shifter | C _{line} (pF) | Resistor (Ω) | Remark | Type | Package | Size (mm) |
|--------------------|---------------------------|--------|---------------|------------------------|--------------|---|-------------------|---|------------------|
| VGA | 7 | yes | yes | 5 | 55 | H&V sync buffer, DDC level shifter | IP4770CZ16 | SOT519 (SSOP16)  | 4.9 x 3.9 x 1.73 |
| | | yes | yes | 5 | 65 | H&V sync buffer, DDC level shifter | IP4771CZ16 | SOT519 (SSOP16)  | 4.9 x 3.9 x 1.73 |
| | | yes | yes | 5 | 10 | H&V sync buffer, DDC level shifter | IP4772CZ16 | SOT519 (SSOP16)  | 4.9 x 3.9 x 1.73 |
| | | yes | no | 4 | 10 | VGA receivers and transmitters, H&V sync buffer | IP4773CZ14 | SOT337 (SSOP14)  | 6.2 x 5.3 x 2.0 |
| | | yes | no | 4 | 10 | VGA receivers and transmitters, H sync buffer | IP4774CZ14 | SOT337 (SSOP14)  | 6.2 x 5.3 x 2.0 |
| | | no | yes | 4 | 1.3 - 2.4 | VGA receivers and transmitters, DDC level shifter | IP4769CZ14 | SOT402-1 (TSSOP14)  | 5.0 x 4.4 x 1.1 |




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

HDMI ESD protection using IP4283CZ10-TB and IP4221CZ6-S



Multichannel EMI filter, ESD protection for LCD and camera

types in **bold** represent new products

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

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) | | | | | |
| Generic ESD protection | 1 | - | 10 | ~40 | 1x back-to-back diode with one common ground, extremely small size | IP4302CX2/LF | 2 ball CSP | 0.49 x 0.67 x 0.38 |
| | 2 | - | 10 | ~40 | 2x back-to-back diode with one common ground, extremely small size | IP4303CX4/LF | 4 ball CSP | 0.76 x 0.76 x 0.61 |
| | | - | 0.6 | - | 16 V ultra low capacitance ESD protection in 4 mm pitch | IP4361CX4/LF | | 0.76 x 0.76 x 0.61 |
| | 4 | - | 30 | ~30 | 4x single diode with one common ground | IP4042CX5/LF | 5 ball CSP | 0.91 x 1.28 x 0.65 |
| | | - | 14 | ~40 | 4x single diode with one common ground | IP4142CX5/LF | | 0.91 x 1.28 x 0.65 |
| | | - | 15 | Breakdown: min. 5.5 V | Quad diode array with ESD protection | IP4332CX5/LF | | 0.76 x 1.06 x 0.61 |
| | | - | 30 | Breakdown: min. 5.5 V | Quad diode array with ESD protection | IP4342CX5/LF | | 0.76 x 1.06 x 0.61 |
| | | - | 16 | ~40 | 4x back-to-back diode with one common ground | IP4043CX5/LF | | 1.12 x 1.12 x 0.65 |
| | | - | 16 | ~40 | 4x back-to-back diode with one common ground, extremely small size | IP4343CX5/LF | | 0.93 x 0.93 x 0.61 |
| | Special diode | 1 | - | 65 | Breakdown: min. 20 V Forward: 0.25 - 0.5 V | Schottky power diode in WLCSP | IP4306CX2/LF | 2 ball CSP |
| 2 | | - | 19 | Breakdown: min. 15 V Forward: 0.25 - 0.45 V | 1x back-to-back diode with integrated dual Schottky diode array incl. ESD protection | IP4305CX4/LF | 4 ball CSP | 0.96 x 0.96 x 0.61 |

Protection and signal conditioning

SD-, SIM-card and MMC





types in **bold** represent new products

| Baseband interface | Number of protected lines | Line small-signal equivalents | | Digital interface clock speed (MHz) | Remark | Type | Package | Size (mm) |
|--------------------|---------------------------|---|-----------------|-------------------------------------|---|----------------------|---|---|
| | | R_{line} | C_{line} (pF) | | | | | |
| SIM card | 3 + 2 | 47 Ω / 100 Ω | 10 | ~20 | Integrated low capacitance SIM-card passive filter array & USB ESD protection | IP4365CX11 | 11 ball CSP | 1.16 x 1.56 x 0.61 |
| | 3 | 47 Ω / 100 Ω | 40 | ~12 | Integrated SIM-card EMI filter and ESD protection | IP4044CX8/LF | 8 ball CSP | 1.46 x 1.49 x 0.65 |
| | | 47 Ω / 100 Ω | 20 | ~20 | Integrated SIM-card EMI filter and ESD protection | IP4064CX8/LF/S | | 1.41 x 1.41 x 0.65 |
| | | 47 Ω / 100 Ω | 20 | ~20 | Smaller size, integrated SIM-card EMI filter and ESD protection | IP4364CX8/LF | | 1.16 x 1.16 x 0.61 |
| | | 47 Ω / 100 Ω | 10 | ~20 | Smaller size, low capacitance integrated SIM-card EMI filter and ESD protection | IP4366CX8/LF | | 1.16 x 1.16 x 0.61 |
| | | 47 Ω / 100 Ω | 40 | ~12 | Integrated SIM-card EMI filter and ESD protection | IP4264CZ8-40 | SOT983 (8 pin QFN) | 1.7 x 1.35 x 0.5 |
| | | 47 Ω / 100 Ω | 20 | ~20 | Integrated SIM-card EMI filter and ESD protection | IP4264CZ8-20 |  | 1.7 x 1.35 x 0.5 |
| | | - | 1 | ~240 | Quad channel low capacitance ESD protection | IP4221CZ6-S | SOT886 (XSON6) |  |
| SD-card / MMC | 4 | 47 Ω / 13 k Ω / 56 k Ω | 25 | ~30 | MMC ESD protection, pull-up resistors | IP4051CX11/LF | 11 ball CSP | 1.44 x 1.96 x 0.65 |
| | | 50 Ω / 75 k Ω / 7 k Ω | 18 | ~50 | High-speed MMC ESD protection, pull-up resistors | IP4060CX16/LF | 16 ball CSP | 1.96 x 1.97 x 0.65 |
| | 7 | 40 Ω / 50 k Ω / 25 k Ω | 18 | ~20 | (Mini) SD/trans flash card ESD protection, EMI filter, pull-up resistors | IP4052CX20/LF | 20 ball CSP | 2.54 x 1.96 x 0.65 |
| | | - | 5 | ~24 | Memory stick PRO ESD protection | IP4067CX9/LF | 9 ball CSP | 1.46 x 1.52 x 0.65 |
| | 6 (+3) | 15 Ω / 50 k Ω / 15 k Ω | 8 | > 52 | Very low capacitance, low channel resistance (mini) SD card/trans flash ESD protection EMI filter, pull-up resistor | IP4350CX24/LF | 24 ball CSP | 1.95 x 2.11 x 0.61 |
| | | 40 Ω / 50 k Ω / 15 k Ω | 20 | > 52 | (Mini) SD card/trans flash ESD protection, EMI filter, pull-up resistor | IP4352CX24/LF | | 2.02 x 2.01 x 0.61 |
| | | - | - | > 52 | (Mini) SD/SDIO memory card level shifter, can be combined with IP4352CX24/LF | IP4852CX25/LF | 25 ball CSP | 2.01 x 2.01 x 0.61 |
| | | 40 Ω / 50 k Ω / 15 k Ω | - | > 52 | (Mini) SD/SDIO memory card level shifter, and voltage regular, incl. ESD and EMI filter | IP4853CX24/LF | 24 ball CSP | 2.01 x 2.01 x 0.61 |

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





Battery and charger protection

types in **bold** represent new products

| Baseband interface | Number of protected lines | C_{line} (pF) | Diode voltage | Remark | Type | Package | Size (mm) | |
|------------------------------|---------------------------|-----------------|------------------|-------------|------------------|-----------------|---|-------------------|
| Battery & charger protection | 1 | 180 | Breakdown 16 V | Power diode | IP4085CX4 | 4 ball CSP | 0.91 x 0.91 x 0.65 | |
| | | 450 | Breakdown 7 V | Power diode | IP4385CX4 | | 0.76 x 0.76 x 0.61 | |
| | | 160 | Breakdown 16 V | Power diode | IP4386CX4 | | 0.76 x 0.76 x 0.61 | |
| | | 290 | Breakdown 10 V | Power diode | IP4387CX4 | | 0.76 x 0.76 x 0.61 | |
| | | 160 | $V_{RWM} = 12 V$ | Power diode | PESD12VS1UJ | SOD323F (SC-90) |  | 1.7 x 1.25 x 0.7 |
| | | 160 | $V_{RWM} = 12 V$ | Power diode | PESD12VS1UA | SOD323 (SC-76) |  | 1.7 x 1.25 x 0.95 |
| | | 480 | $V_{RWM} = 5 V$ | Power diode | PESD5V0S1UJ | SOD323F (SC-90) |  | 1.7 x 1.25 x 0.7 |
| | | 480 | $V_{RWM} = 5 V$ | Power diode | PESD5V0S1UA | SOD323 (SC-76) |  | 1.7 x 1.25 x 0.95 |

USB, LVDS, SATA, LAN









types in **bold** represent new products

| Baseband interface | Number of protected lines | R_{line} | C_{line} (pF) | Digital interface clock speed (MHz) | Remark | Type | Package | Size (mm) | |
|--------------------------|---------------------------|--|--|---|--|---|---|---|------------------|
| USB (CSP package) | 2 | 33 Ω / 1.3 k Ω | 30 | >6 | Fully integrated USB low / fullspeed interface with EMI filter, ESD protection, pull-up resistors and impedance matching | IP4056CX8 | 8 ball CSP | 1.27 x 1.83 x 0.65 | |
| | | 33 Ω / 1.3 k Ω / 10 k Ω | 30 | >6 | Fully integrated USB low / fullspeed interface with EMI filter, ESD protection, pull-up resistors and impedance matching | IP4057CX10 | 10 ball CSP | 1.56 x 1.91 x 0.65 | |
| | | 33 Ω / 1.3 k Ω / 17 k Ω / 15 k Ω | 27 | >6 | Fully integrated USB low / fullspeed interface with EMI filter, ESD protection, pull-up resistors and impedance matching | IP4065CX11 | 11 ball CSP | 1.47 x 1.97 x 0.65 | |
| | | 33 Ω / 1.5 k Ω | 35 | >6 | Fully integrated USB low / fullspeed interface with EMI filter, ESD protection, pull-up resistors and impedance matching | IP4058CX8 | 8 ball CSP | 0.91 x 1.91 x 0.65 | |
| | | 17 Ω / 1.5 k Ω | 35 | >6 | Fully integrated USB low / fullspeed interface with EMI filter, ESD protection, pull-up resistors and impedance matching | IP4158CX8 | | | |
| | | 33 Ω | 35 | >6 | Fully integrated USB low / fullspeed interface with EMI filter, ESD protection and impedance matching | IP4078CX6 | 6 ball CSP | 0.91 x 1.41 x 0.65 | |
| | - | 1.3 | ~1 GHz | USB2.0 high-speed ESD protection | IP4359CX4 | 4 ball CSP | 0.76 x 0.76 x 0.61 | | |
| | 3+2 | 47 Ω / 100 Ω | 10 | ~20/6 | Integrated low capacitance SIM-Card & USB passive filter array with ESD protection | IP4365CX11 | 11 ball CSP | 1.16 x 1.56 x 0.61 | |
| | 4 | - | 3 | >240 | USB2.0 high-speed ESD protection | IP4059CX5 | 5 ball CSP | 0.96 x 1.34 x 0.65 | |
| | | - | 1.3 | ~1 GHz | USB2.0 high-speed ESD protection | IP4358CX6 | 6 ball CSP | 0.76 x 1.16 x 0.41 | |
| USB2.0 (Plastic package) | 2 | - | 1.5 | - | 2-channel common mode filter with integrated ESD protection | IP3219CZ6 | SOT1082-1 (VSON6U) |  | 2.3 x 3.5 x 0.85 |
| | | 0.5 | 2 | - | >15 kV IEC contact ESD protection with pi-filter | IP4234CZ6 | SOT457 (SC-74) |  | 2.9 x 1.5 x 1.0 |
| | - | 1.0 | - | ESD protection for up to 2 ultra high speed datalines | PRTR5V0U2X | SOT143B |  | 2.9 x 1.3 x 1.0 | |
| | - | 1.8 | - | ESD protection for up to 2 ultra high speed datalines with 12 kV ESD robustness | PRTR5V0U2AX | | | | |
| - | 0.7 | - | ESD protection for ultra high speed interfaces | IP4282CZ6 | SOT886 (XSON6) |  | 1.45 x 1.0 x 0.5 | | |

Protection and signal conditioning











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 |  | 1.0 x 1.0 x 0.5 |
| | | - | 1 | - | ESD protection for up to 2 ultra high speed datalines | PRTR5V0U2D |  | 2.9 x 1.5 x 1.0 |
| | | - | 1 | - | ESD protection for up to 2 ultra high speed datalines | PRTR5V0U2F |  | 1.45 x 1.0 x 0.5 |
| | 4 | - | 1 | - | ESD protection for USB2.0 high- speed, SD-Card, SIM card | IP4221CZ6-S |  | 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 |  | 2.0 x 1.25 x 0.95 |
| | | - | 1 | - | ESD protection for USB2.0 high-speed, SD-Card, SIM card | IP4221CZ6-S |  | 1.45 x 1.0 x 0.5 |
| | | - | 1 | - | ESD protection for USB2.0 high-speed, SD-Card, SIM card | IP4221CZ6-XS |  | 1.0 x 1.0 x 0.5 |
| | 1 | 3 | - | >15 kV IEC contact ESD protection with pi-filter | IP4225CZ10 |  | 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) |
|--------------------------------|---------------------------|------------|-----------------|-------------------------------------|---|----------------------|---|------------------|
| USB3.0 SuperSpeed USB / USB2.0 | 4 | - | 0.6 | - | ESD protection for ultra high speed interfaces | IP4283CZ10-TB |  | 1.0 x 2.5 x 0.5 |
| | | - | 0.6 | - | ESD protection for ultra high speed interfaces | IP4283CZ10-TT |  | 3.0 x 3.0 x 1.1 |
| | | - | 0.5 | - | ESD protection for ultra high speed interfaces | IP4284CZ10-TB |  | 1.0 x 2.5 x 0.5 |
| | | - | 0.5 | - | ESD protection for ultra high speed interfaces | IP4284CZ10-TT |  | 3.0 x 3.0 x 1.1 |
| | 5 | - | 0.5 | - | ESD protection for up to 5 ultra high speed datalines | PESD5V0F5BK |  | 1.0 x 1.0 x 0.5 |
| Display port | 4 | 0.6 | 0.6 | - | ESD protection for ultra high speed interfaces | IP4283CZ10-TB |  | 1.0 x 2.5 x 0.5 |
| | | - | 0.6 | - | ESD protection for ultra high speed interfaces | IP4283CZ10-TT |  | 3.0 x 3.0 x 1.1 |
| | | - | 0.5 | - | ESD protection for ultra high speed interfaces | IP4284CZ10-TB |  | 1.0 x 2.5 x 0.5 |
| | | - | 0.5 | - | ESD protection for ultra high speed interfaces | IP4284CZ10-TT |  | 3.0 x 3.0 x 1.1 |
| | | - | 0.6 | - | ESD protection for high speed interfaces | IP4286CZ6-TBF |  | 1.45 x 1.0 x 0.5 |

Protection and signal conditioning




USB, LVDS, SATA, LAN

types in **bold** represent new products

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

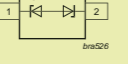

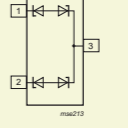

USB, LVDS, SATA, LAN

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) |
|--------------------|---------------------------|------------|-----------------|--|---|---|---|-----------------|
| LAN | 1 | - | 0.6 | - | Ethernet ESD protection $V_{RWM}=3.3$ V | PESD3V3U1UT |  | 2.9 x 1.3 x 1.0 |
| | | - | 0.6 | - | Ethernet ESD protection $V_{RWM}=5.0$ V | PESD5V0U1UT | | |
| | | - | 0.6 | - | Ethernet ESD protection $V_{RWM}=12$ V | PESD12VU1UT | | |
| | | - | 0.6 | - | Ethernet ESD protection $V_{RWM}=15$ V | PESD15VU1UT | | |
| | - | 0.6 | - | Ethernet ESD protection $V_{RWM}=24$ V | PESD24VU1UT | | | |
| 4 | - | 1 | - | Ethernet ESD protection | IP4220CZ6 | SOT457 (SC-74)  | 2.9 x 1.5 x 1.0 | |
| | - | 1 | - | Ethernet line surge ESD protection | IP4233CZ6 | SOT363 (SC-88)  | 2.0 x 1.25 x 0.95 | |

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

Automotive LIN/CAN/FlexRay

| Number of protected lines bidirectional | V_{RWM} (V) | C_{line} typ (pF) | C_{line} max (pF) | $P_{PP}^{(1)}$ max (W) | ESD rating ⁽²⁾ max (kV) | I_T max [μ A] @ V_{RWM} | Configuration | Type | Package | Size (mm) |
|---|------------------------------|---------------------|---------------------|------------------------|------------------------------------|----------------------------------|---|-----------|---|-------------------|
| 1 | 15 (diode 1) 24 (diode 2) | 13 | 17 | 160 | 23 | 0.05 |  | PESD1LIN | SOD323 (SC-76)  | 1.7 x 1.25 x 0.95 |
| 2 | 24 | 11 | 17 | 200 | 23 | 0.05 |  | PESD1CAN |  | 2.9 x 1.3 x 1.0 |
| | | 25 | 30 | 230 | 30 | 0.01 | | PESD2CAN | | 2.9 x 1.3 x 1.0 |
| | | 11 | 17 | 200 | 23 | 0.05 | | PESD1FLEX | | 2.9 x 1.3 x 1.0 |

⁽¹⁾ 8/20 μ s surge pulse acc. to IEC 61000-4-5

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

TVS diodes, 24 W / 40 W

types in **bold** represent new products

| Power (W) (10/1000 μ s waveform) ^[1] | V_{max} (V) | $V_{\text{BR min}}$ (V) @ I_{R} | $V_{\text{BR typ}}$ (V) @ I_{R} | $V_{\text{BR max}}$ (V) @ I_{R} | I_{R} (mA) | ESD rating ^[2] max (kV) | $C_{\text{int typ}}$ (pF) | $V_{\text{CL max}}$ (V) @ I_{PP} | I_{PP} (A) | $I_{\text{RM max}}$ (μ A) @ V_{RWM} | Configuration | Type | Package | Size (mm) | | | | | |
|---|----------------------|--|--|--|---------------------|------------------------------------|---------------------------|---|---------------------|---|---------------|------------------|------------------|-----------------|-------|-----------------|------------------|--------|-----------------|
| 24 | 3 | 5.32 | 5.6 | 5.88 | 20 | 30 | 210 | 8 | 3 | 5 | | MMBZ5V6AL | SOT23 | 2.9 x 1.3 x 1.0 | | | | | |
| | 3 | 5.89 | 6.2 | 6.51 | 1 | 30 | 175 | 8.7 | 2.76 | 0.2 | | MMBZ6V2AL | | | | | | | |
| | 4.5 | 6.48 | 6.8 | 7.14 | 1 | 30 | 150 | 9.6 | 2.5 | 0.3 | | MMBZ6V8AL | | | | | | | |
| | 6 | 8.65 | 9.1 | 9.56 | 1 | 30 | 155 | 14 | 1.7 | 0.1 | | MMBZ9V1AL | | | | | | | |
| | 6.5 | 9.5 | 10 | 10.5 | 1 | 30 | 130 | 14.2 | 1.7 | 0.02 | | MMBZ10VAL | | | | | | | |
| 40 | 8.5 | 11.4 | 12 | 12.6 | 1 | 30 | 110 | 17 | 2.35 | 0.005 | | MMBZ12VAL | | | SOT23 | 2.9 x 1.3 x 1.0 | | | |
| | 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 | SOD128 | 2.6 x 1.7 x 1.0 |
| | 12.8 | 14.3 | 15 | 15.8 | 1 | 30 | 85 | 21.2 | 1.9 | 0.005 | | | | | | | MMBZ15VDL | | |
| | 14.5 | 17.1 | 18 | 18.9 | 1 | 30 | 70 | 25 | 1.6 | 0.005 | | | | | | | MMBZ18VCL | | |
| | 17 | 19 | 20 | 21 | 1 | 30 | 65 | 28 | 1.4 | 0.005 | | | | | | | MMBZ20VCL | | |
| | 22 | 25.65 | 27 | 28.35 | 1 | 30 | 48 | 38 | 1 | 0.005 | | | MMBZ27VCL | | | | | | |
| | 26 | 31.35 | 33 | 34.65 | 1 | 30 | 45 | 46 | 0.87 | 0.005 | | | MMBZ33VCL | | | | | | |

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

TVS diodes, 400 W

| Power (W) (10/1000 μ s waveform) ^[1] | V_{max} (V) | $V_{\text{BR min}}$ (V) @ I_{R} | $V_{\text{BR typ}}$ (V) @ I_{R} | $V_{\text{BR max}}$ (V) @ I_{R} | I_{R} (mA) | $V_{\text{CL max}}$ (V) @ I_{PP} | I_{PP} (A) | $I_{\text{RM max}}$ (μ A) @ V_{RWM} | $I_{\text{RM max}}$ (μ 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 | | | |

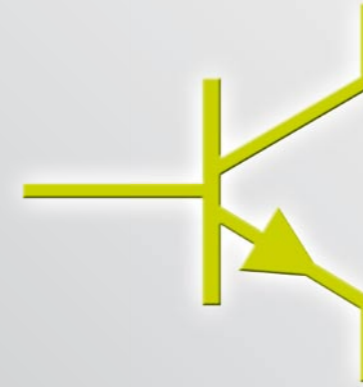
^[1] 10/1000 μ s acc. to IEC 61643-321

TVS diodes, 600 W

types in **bold** represent new products

| Power (W) (10/1000 μ s waveform) ^[1] | V_{max} (V) | $V_{\text{BR min}}$ (V) @ I_{R} | $V_{\text{BR typ}}$ (V) @ I_{R} | $V_{\text{BR max}}$ (V) @ I_{R} | I_{R} (mA) | $V_{\text{CL max}}$ (V) @ I_{PP} | I_{PP} (A) | $I_{\text{RM max}}$ (μ A) @ V_{RWM} | $I_{\text{RM max}}$ (μ A) @ V_{RWM} | Type | Package | Size (mm) |
|---|----------------------|--|--|--|---------------------|---|---------------------|---|---|--------------------|---------|-----------------|
| 600 | 3.5 | 5.20 | 5.60 | 6.00 | 10 | 8 | 75 | 5 | 600 | PTVS3V3P1UP | SOD128 | 3.8 x 2.6 x 1.0 |
| | 5 | 6.40 | 6.70 | 7.00 | 10 | 9.2 | 65.2 | 5 | 400 | PTVS5V0P1UP | | |
| | 6 | 6.67 | 7.02 | 7.37 | 10 | 10.3 | 58.3 | 5 | 400 | PTVS6V0P1UP | | |
| | 6.5 | 7.22 | 7.60 | 7.98 | 10 | 11.2 | 53.6 | 5 | 250 | PTVS6V5P1UP | | |
| | 7 | 7.78 | 8.20 | 8.60 | 10 | 12 | 50 | 3 | 100 | PTVS7V0P1UP | | |
| | 7.5 | 8.33 | 8.77 | 9.21 | 1 | 12.9 | 46.5 | 0.2 | 50 | PTVS7V5P1UP | | |
| | 8 | 8.89 | 9.36 | 9.83 | 1 | 13.6 | 44.1 | 0.03 | 25 | PTVS8V0P1UP | | |
| | 8.5 | 9.44 | 9.92 | 10.40 | 1 | 14.4 | 41.7 | 0.01 | 10 | PTVS8V5P1UP | | |
| | 9 | 10.00 | 10.55 | 11.10 | 1 | 15.4 | 39 | 0.005 | 5 | PTVS9V0P1UP | | |
| | 10 | 11.10 | 11.70 | 12.30 | 1 | 17 | 35.3 | 0.005 | 2.5 | PTVS10VP1UP | | |
| | 11 | 12.20 | 12.85 | 13.50 | 1 | 18.2 | 33 | 0.005 | 2.5 | PTVS11VP1UP | | |
| | 12 | 13.30 | 14.00 | 14.70 | 1 | 19.9 | 30.2 | 0.005 | 2.5 | PTVS12VP1UP | | |
| | 13 | 14.40 | 15.15 | 15.90 | 1 | 21.5 | 27.9 | 0.001 | 0.1 | PTVS13VP1UP | | |
| | 14 | 15.60 | 16.40 | 17.20 | 1 | 23.2 | 25.9 | 0.001 | 0.1 | PTVS14VP1UP | | |
| | 15 | 16.70 | 17.60 | 18.50 | 1 | 24.4 | 24.6 | 0.001 | 0.1 | PTVS15VP1UP | | |
| | 16 | 17.80 | 18.75 | 19.70 | 1 | 26 | 23.1 | 0.001 | 0.1 | PTVS16VP1UP | | |
| | 17 | 18.90 | 19.90 | 20.90 | 1 | 27.6 | 21.7 | 0.001 | 0.1 | PTVS17VP1UP | | |
| | 18 | 20.00 | 21.00 | 22.10 | 1 | 29.2 | 20.5 | 0.001 | 0.1 | PTVS18VP1UP | | |
| | 20 | 22.20 | 23.35 | 24.50 | 1 | 32.4 | 18.5 | 0.001 | 0.1 | PTVS20VP1UP | | |
| | 22 | 24.40 | 25.60 | 26.90 | 1 | 35.5 | 16.9 | 0.001 | 0.1 | PTVS22VP1UP | | |
| | 24 | 26.70 | 28.10 | 29.50 | 1 | 38.9 | 15.4 | 0.001 | 0.1 | PTVS24VP1UP | | |
| | 26 | 28.90 | 30.40 | 31.90 | 1 | 42.1 | 14.2 | 0.001 | 0.1 | PTVS26VP1UP | | |
| | 28 | 31.10 | 32.80 | 34.40 | 1 | 45.4 | 13.2 | 0.001 | 0.1 | PTVS28VP1UP | | |
| | 30 | 33.30 | 35.10 | 36.80 | 1 | 48.4 | 12.4 | 0.001 | 0.1 | PTVS30VP1UP | | |
| | 33 | 36.70 | 38.70 | 40.60 | 1 | 53.3 | 11.3 | 0.001 | 0.1 | PTVS33VP1UP | | |
| | 36 | 40.00 | 42.10 | 44.20 | 1 | 58.1 | 10.3 | 0.001 | 0.1 | PTVS36VP1UP | | |
| | 40 | 44.40 | 46.80 | 49.10 | 1 | 64.5 | 9.3 | 0.001 | 0.1 | PTVS40VP1UP | | |
| | 43 | 47.80 | 50.30 | 52.80 | 1 | 69.4 | 8.6 | 0.001 | 0.1 | PTVS43VP1UP | | |
| | 45 | 50.00 | 52.65 | 55.30 | 1 | 72.7 | 8.3 | 0.001 | 0.1 | PTVS45VP1UP | | |
| | 48 | 53.30 | 56.10 | 58.90 | 1 | 77.4 | 7.8 | 0.001 | 0.1 | PTVS48VP1UP | | |
| | 51 | 56.70 | 59.70 | 62.70 | 1 | 82.4 | 7.3 | 0.001 | 0.1 | PTVS51VP1UP | | |
| | 54 | 60.00 | 63.15 | 66.30 | 1 | 87.1 | 6.9 | 0.001 | 0.1 | PTVS54VP1UP | | |
| | 58 | 64.40 | 67.80 | 71.20 | 1 | 93.6 | 6.4 | 0.001 | 0.1 | PTVS58VP1UP | | |
| | 60 | 66.70 | 70.20 | 73.70 | 1 | 96.8 | 6.2 | 0.001 | 0.1 | PTVS60VP1UP | | |
| 64 | 71.10 | 74.85 | 78.60 | 1 | 103 | 5.8 | 0.001 | 0.1 | PTVS64VP1UP | | | |

^[1] 10/1000 μ s acc. to IEC 61643-321



Small-signal transistors

General purpose bipolar transistors

48

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| Single and double switching transistors | 49 |
| Matched pair transistors | 50 |
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| Darlington transistors | 51 |
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Resistor-equipped transistors (RETs)

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| RETs 100 mA double | 55 |
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| Low V_{CEsat} (BISS) RETs | 55 |

Low V_{CEsat} (BISS) transistors

56

| | |
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| Low V_{CEsat} (BISS) transistors single NPN | 56 |
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| Advantages of low V_{CEsat} (BISS) technology | 63 |

Medium power transistors

64

| | |
|---|----|
| Medium power low V_{CEsat} (BISS) transistors NPN | 64 |
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| Medium power general purpose transistors | 65 |

Single transistors

| Package | | | | | | SOT23 | SOT323 (SC-70) | SOT416 (SC-75) | SOT883 (SC-101) | |
|-----------------------|----------------------|---------------------|---------------------|---------------------|--------------------------|-------------------------------------|-----------------------------|-----------------------|-------------------|---------------------|
| Size (mm) | | | | | | 2.9 x 1.3 x 1.0 | 2.0 x 1.25 x 0.95 | 1.6 x 0.8 x 0.77 | 1.0 x 0.6 x 0.5 | |
| P _{tot} (mW) | | | | | | 250 | 200 | 150 | 250 | |
| Polarity | V _{CEO} (V) | I _C (mA) | h _{FE} min | h _{FE} max | f _r 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 | | | | |
| | 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 | | | |
| | 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 | | | | |
| 45 | | 100 | 125 - 420 | 250 - 800 | 100 | BC857 / A / B / C | BC857W / AW / BW / CW | BC857T / AT / BT / CT | BC857AM / BM / CM | |
| | | | 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 | | | |

Double transistors

types in **bold** represent new products

| Package | | | | | | SOT457 (SC-74) | SOT363 (SC-88) | SOT666 |
|-----------------------|----------------------|---------------------|---------------------|---------------------|--------------------------|-----------------|-------------------|------------------|
| Size (mm) | | | | | | 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) | | | | | | 600 | 300 | 300 |
| Polarity | V _{CEO} (V) | I _C (mA) | h _{FE} min | h _{FE} max | f _r min (MHz) | | | |
| NPN | 40 | 100 | 120 | 450 | 100 | | PUMX1 | PEMX1 |
| | 45 | 100 | 200 | 450 | 100 | BC847DS | BC847BS | BC847BV |
| | 65 | 100 | 110 | - | 100 | | BC846S | |
| | | | 200 | 450 | 100 | BC846DS | BC846BS | |
| | 50 | 150 | 120 | 560 | 100 | | PUMX2 | |
| PNP | 45 | 500 | 160 | 400 | 80 | BC817DS | | |
| | 40 | 100 | 120 | 450 | 100 | PIMT1 | PUMT1 | PEMT1 |
| | 45 | 100 | 200 | 450 | 100 | | BC857BS | BC857BV |
| NPN/PNP | 65 | 100 | 110 | - | 100 | | BC856S | |
| | 45 | 500 | 200 | 450 | 100 | | BC856BS | |
| | | | 160 | 400 | 80 | BC807DS | | |
| 40 | 100 | 120 | 450 | 100 | | PUMZ1 | PEMZ1 | |
| 45 | 100 | 200 | 450 | 100 | | | BC847BPN | BC847BPN |
| 50 | 100 | 120 | 560 | 100 | | PIMZ2 | PUMZ2 | |
| 65 | 100 | 200 | 450 | 100 | | | BC846BPN | |
| 12 | 500 | 200 | - | 250/100 | | | | PEMZ7 |
| 45 | 500 | 160 | 400 | 100/80 | | BC817DPN | | |

Small-signal transistors

Single and double switching transistors

| Package | | | | | | | SOT223 (SC-73) | SOT89 (SC-62) | SOT23 | SOT323 (SC-70) | SOT363 (SC-88) | SOT666 | SOT883 (SC-101) | |
|-----------------------|----------------------|---------------------|---------------------|---------------------|--------------------------|-----------------------|------------------|-----------------|-----------------|-------------------|-------------------|------------------|-----------------|-----------|
| 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 | 2.0 x 1.25 x 0.95 | 2.0 x 1.25 x 0.95 | 1.6 x 1.2 x 0.55 | 1.0 x 0.6 x 0.5 | |
| P _{tot} (mW) | | | | | | | 1700 | 1300 | 250 | 200 | 300 | 300 | 250 | |
| Configuration | | | | | | | single | single | single | single | double | double | single | |
| Polarity | V _{CEO} (V) | I _C (mA) | h _{FE} min | h _{FE} max | f _r min (MHz) | t _{off} (ns) | | | | | | | | |
| NPN | 12 | 100 | 40 | 120 | 400 | 20 | | | BSV52 | | | | | |
| | 40 | 100 | 100 | 300 | 180 | 20 | | | | PMBS3904 | PMSS3904 | | | |
| | | | | | 300 | 250 | | PXT2222A | | | | | | |
| | 15 | 200 | 40 | 120 | 500 | 20 | | | PMBT2369 | PMST2369 | | | | |
| | 40 | 200 | 100 | 300 | 300 | 250 | | | MMBT3904 | | | | | |
| | 30 | 600 | 100 | 300 | 250 | 250 | | | | PMBT3904 | PMST3904 | PMBT3904YS | PMBT3904VS | PMBT3904M |
| | | | | | 250 | 250 | | | | PMBT2222 | PMST2222 | | | |
| | 40 | 600 | 100 | 300 | 250 | 250 | PZT4401 | PXT4401 | PMBT4401 | PMST4401 | | | | |
| | 40 | 600 | 100 | 300 | 300 | 250 | | | | MMBT2222A | | | | |
| | | | | | 300 | 250 | | PZT2222A | | PMBT2222A | PMST2222A | | | |
| | 40 | 800 | 100 | 300 | 300 | 250 | | | BSR14 | | | | | |
| | 40 | 100 | 100 | 300 | 150 | 700 | | | PMBS3906 | PMSS3906 | | | | |
| | PNP | 40 | 200 | 100 | 300 | 250 | 300 | | | MMBT3906 | | | | |
| | | 40 | 600 | 100 | 300 | 350 | 300 | | | PMBT3906 | PMST3906 | PMBT3906YS | PMBT3906VS | PMBT3906M |
| | | | | | | 365 | 300 | | PZT4403 | PXT4403 | PMBT4403 | PMST4403 | | |
| 60 | | 600 | 100 | 300 | 300 | 200 | | | PMBT2907 | | | | | |
| | | | | | 365 | 200 | | | | | PMST2907A | | | |
| 40 | | 600 | 100 | 300 | 200 | 365 | | | PZT2907A | PXT2907A | PMBT2907A | | | |
| 40 | 200 | 100 | 300 | 300/250 | 250/300 | | | | | PMBT3946YPN | PMBT3946VPN | | | |

Matched pair transistors

| Package | | SOT143B | SOT457 (SC-74) | SOT353 (SC-88A) | SOT363 (SC-88) | SOT666 |
|-----------------------|----------------------|---------------------|---------------------|---------------------|------------------------------------|--|
| Size (mm) | | 2.9 x 1.3 x 1.0 | 2.9 x 1.5 x 1.0 | 2.0 x 1.25 x 0.95 | 2.0 x 1.25 x 0.95 | 1.6 x 1.2 x 0.55 |
| P _{tot} (mW) | | 250 | 380 | 300 | 300 | 300 |
| Polarity | V _{CE0} (V) | I _C (mA) | h _{FE} min | h _{FE} max | h _{FE1} /h _{FE2} | V _{BE1} - V _{BE2} (mV) |
| NPN | 30 | 100 | 110 | 800 | 0.7 ¹⁾ | n.a. |
| | 45 | 100 | 200 | 450 | 0.9 ¹⁾ | 2 |
| | | | | | 0.95 | 2 |
| | | | | | 0.98 | 2 |
| Configuration | | | | | | |
| PNP | 30 | 100 | 100 | 800 | 0.7 ¹⁾ | n.a. |
| | 45 | 100 | 200 | 450 | 0.9 ¹⁾ | 2 |
| | | | | | 0.95 | 2 |
| | | | | | 0.98 | 2 |
| Configuration | | | | | | |

¹⁾ I_{C1}/I_{E2}

Key features

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

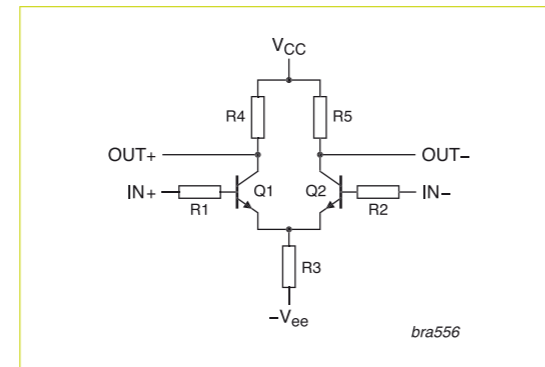
Key benefits

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

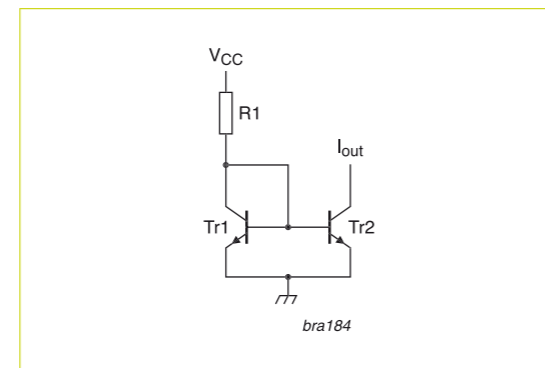
Key applications

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

Differential amplifier



Current mirror



High voltage transistors

| Package | | SOT223 (SC-73) | SOT89 (SC-62) | SOT457 (SC-74) | SOT23 | SOT323 (SC-70) | | | |
|-----------------------|----------------------|---------------------|---------------------|---------------------|--------------------------|-------------------|--------|---------|---------|
| Size (mm) | | 6.5 x 3.5 x 1.65 | 4.5 x 2.5 x 1.5 | 2.9 x 1.5 x 1.0 | 2.9 x 1.3 x 1.0 | 2.0 x 1.25 x 0.95 | | | |
| P _{tot} (mW) | | 1700 | 1300 | 600 | 250 | 200 | | | |
| Polarity | V _{CE0} (V) | I _C (mA) | h _{FE} min | h _{FE} max | f _T min (MHz) | | | | |
| NPN | 80 | 100 | 20 | - | 60 | BSS64 | | | |
| | 140 | 100 | 60 | 250 | 100 | PMBT5550 | | | |
| | 160 | 300 | 80 | 250 | 100 | PMBT5551/BSR19A | | | |
| | 250 | 100 | 50 | - | 60 | BF722 | BF622 | | |
| | | | | | | BF822 | BF820 | | |
| | 300 | 100 | 40 | - | 60 | PZTA42 | PXTA42 | | |
| | 350 | 100 | 40 | - | 70 | BSP19 | BST39 | | |
| 400 | 300 | 50 | 200 | 20 | PZTA44 | PMBTA44 | | | |
| PNP | 100 | 100 | 30 | - | 50 | BSS63 | | | |
| | 250 | 100 | 50 | - | 60 | BF723 | | | |
| | | | 50 | - | 60 | | BF623 | BF823 | |
| | 300 | 100 | 50 | - | 60 | | BF621 | BF821 | |
| 2 x NPN | 300 | 100 | 40 | - | 50 | PZTA92 | PXTA92 | PMBTA92 | PMSTA92 |

For high voltage transistors with increased performance please refer to our high voltage low V_{CEsat} (BISS) transistor portfolio on pages 56 - 64.

Low noise transistors

| Package | | SOT23 | SOT323 (SC-70) | | | |
|-----------------------|----------------------|---------------------|-------------------|---------------------|---------------------|--------------------------|
| Size (mm) | | 2.9 x 1.3 x 1.0 | 2.0 x 1.25 x 0.95 | | | |
| P _{tot} (mW) | | 250 | 200 | | | |
| Polarity | V _{CE0} (V) | I _C (mA) | NF max (dB) | h _{FE} min | h _{FE} max | f _T min (MHz) |
| NPN | 30 | 100 | 4 | 200 | 450 | 100 |
| | 45 | 100 | 4 | 420 | 800 | 100 |
| PNP | 30 | 100 | 4 | 200 | 450 | 100 |
| | | | | 420 | 800 | 100 |
| | 45 | 100 | 4 | 220 | 475 | 100 |
| | | | | 420 | 475 | 100 |

Darlington transistors

| Package | | SOT223 (SC-73) | SOT89 (SC-62) | SOT23 |
|-----------------------|----------------------|---------------------|---------------------|--------------------------|
| Size (mm) | | 6.5 x 3.5 x 1.65 | 4.5 x 2.5 x 1.5 | 2.9 x 1.3 x 1.0 |
| P _{tot} (mW) | | 1700 | 1300 | 250 |
| Polarity | V _{CE0} (V) | I _C (mA) | h _{FE} min | f _T typ (MHz) |
| NPN | 30 | 500 | 10000 | 125 |
| | | | 20000 | 125 |
| | 45 | 1000 | 2000 | 200 |
| | | | 500 | 10000 |
| | 60 | 1000 | 2000 | 200 |
| | | | 1000 | 2000 |
| PNP | 30 | 500 | 20000 | 125 |
| | | | 20000 | 125 |
| | 45 | 1000 | 2000 | 200 |
| | | | 500 | 10000 |
| 60 | 1000 | 2000 | 200 | |
| | | 1000 | 2000 | 200 |

Medium frequency transistors

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

Schmitt trigger

| Package | | SOT143B | | | | |
|-----------------------|--------------------------|--------------------------|---------------------|---------------------|---------------------|-----------------------------|
| Size (mm) | | 2.9 x 1.3 x 1.0 | | | | |
| P _{tot} (mW) | | 250 | | | | |
| Polarity | V _{CE0} (V) TR1 | V _{CE0} (V) TR2 | I _C (mA) | h _{FE} min | h _{FE} max | V _{CEsat} typ (mV) |
| NPN | 30 | 6 | 100 | 110 | 800 | 250 |
| PNP | 30 | 6 | 100 | 220 | 475 | 250 |

Key features

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

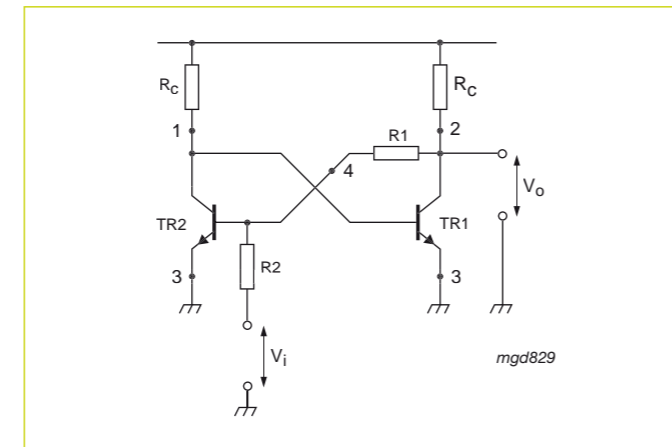
Key benefits

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

Key applications

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

Schmitt trigger



MOSFET driver

| Package | | SOT457 (SC-74) | | | | |
|--|--------------------|---------------------|--------------|----------|-----------------|--|
| Size (mm) | | 2.9 x 1.5 x 1.0 | | | | |
| P _{tot} (mW) | | 400 | 400 | 580 | | |
| Configuration | | | | | | |
| Contains | I _C (A) | I _{CM} (A) | R1 = R2 (kΩ) | | | |
| General purpose transistors | 0.1 | 0.2 | PMD9050D | PMD9010D | BCV65 (SOT143B) | |
| | | | | 2.2 | PMD9001D | |
| | | | | 4.7 | PMD9002D | |
| | | | | 10 | PMD9003D | |
| Switching transistors - reduced storage time | 0.6 | 1.0 | - | | PMD2001D | |
| Low V _{CEsat} (BISS) transistors - Low V _{CEsat} , high h _{FE} and I _C | 1.0 | 2.0 | - | | PMD3001D | |

Key features

- ▶ Three different configurations
- ▶ Types available with standard, switching and low V_{CEsat} (BISS) transistors
- ▶ Small footprint packages

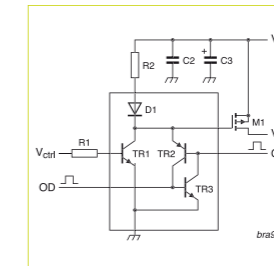
Key benefits

- ▶ Reduced component count
- ▶ Smaller end products

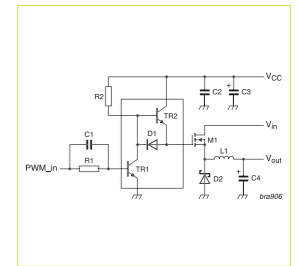
Key applications

- ▶ MOSFET driver
- ▶ Bipolar power transistor driver
- ▶ Push-pull driver



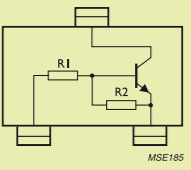
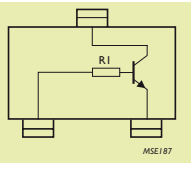
MOSFET driver with hardware output disable function



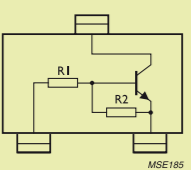
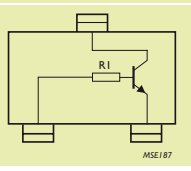


High-side MOSFET driver with level shifter function






RETs 100 mA single

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

| Package | | SOT416 (SC-75) | | SOT883 (SC-101) | | | | |
|-----------------------|---------------------|---|---------|--|-----------|-----------|-----------|-----------|
| | |  | |  | | | | |
| Size (mm) | | 1.6 x 0.8 x 0.77 | | 1.0 x 0.6 x 0.5 | | | | |
| P _{tot} (mW) | | 150 | | 250 | | | | |
| V _{CE0} (V) | I _c (mA) | Configuration | R1 (kΩ) | R2 (kΩ) | 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 |



RETs 100 mA double

| Package | | SOT457 (SC-74) | | SOT363 (SC-88) | | | SOT666 | | | | | | | | |
|-----------------------|---------------------|---|---------|---|---------|---------|---|---------|---------|---------|---------|---------|--------|--------|--|
| | |  | |  | | |  | | | | | | | | |
| Size (mm) | | 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) | | 600 | | 300 | | | 300 | | | | | | | | |
| V _{CE0} (V) | I _c (mA) | Configuration | R1 (kΩ) | R2 (kΩ) | NPN/NPN | NPN/PNP | NPN/NPN | NPN/PNP | PNP/PNP | NPN/NPN | NPN/PNP | PNP/PNP | | | |
| 50 | 100 | R1 = R2 | 2.2 | 2.2 | | | PUMH20 | PUMD20 | PUMB20 | PEMH20 | PEMD20 | PEMB20 | | | |
| | | | 4.7 | 4.7 | | | PUMH15 | PUMD15 | PUMB15 | PEMH15 | PEMD15 | PEMB15 | | | |
| | | | 10 | 10 | | | PUMH11 | PUMD3 | PUMB11 | PEMH11 | PEMD3 | PEMB11 | | | |
| | | | 22 | 22 | | | PUMH1 | PUMD2 | PUMB1 | PEMH1 | PEMD2 | PEMB1 | | | |
| | | | 47 | 47 | | | PUMH2 | PUMD12 | PUMB2 | PEMH2 | PEMD12 | PEMB2 | | | |
| | | | 100 | 100 | | | PUMH24 | PUMD24 | PUMB24 | PEMH24 | PEMD24 | PEMB24 | | | |
| | | | 2.2 | 47 | | | PUMH10 | PUMD10 | PUMB10 | PEMH10 | PEMD10 | PEMB10 | | | |
| | | | 4.7 | 10 | | | PUMH18 | PUMD18 | PUMB18 | PEMH18 | PEMD18 | PEMB18 | | | |
| | | | 4.7 | 47 | | | PUMH13 | PUMD13 | PUMB13 | PEMH13 | PEMD13 | PEMB13 | | | |
| | | | 10 | 47 | PIMH9 | | PUMH9 | PUMD9 | PUMB9 | PEMH9 | PEMD9 | PEMB9 | | | |
| | | | 22 | 47 | | | PUMH16 | PUMD16 | PUMB16 | PEMH16 | PEMD16 | PEMB16 | | | |
| | | | 47 | 22 | | | PUMH17 | PUMD17 | PUMB17 | PEMH17 | PEMD17 | PEMB17 | | | |
| | | | 47/2.2 | 47/47 | | | | | PUMD48 | | | PEMD48 | | | |
| | | | R1 ≠ R2 | 2.2 | - | | | | PUMH30 | PUMD30 | PUMB30 | PEMH30 | PEMD30 | PEMB30 | |
| | | 4.7 | | - | | | | PUMH7 | PUMD6 | PUMB3 | PEMH7 | PEMD6 | PEMB3 | | |
| | | 10 | | - | | | | PUMH4 | PUMD4 | PUMB4 | PEMH4 | PEMD4 | PEMB4 | | |
| | | 22 | | - | | | | PUMH19 | PUMD19 | PUMB19 | PEMH19 | PEMD19 | PEMB19 | | |
| | | 47 | | - | | | | PUMH14 | PUMD14 | PUMB14 | PEMH14 | PEMD14 | PEMB14 | | |
| | | Only R1 | | 2.2 | - | | | | | | | | | | |
| | | | | 4.7 | - | | | | | | | | | | |
| | | | | 10 | - | | | | | | | | | | |
| | | | | 22 | - | | | | | | | | | | |
| | | | | 47 | - | | | | | | | | | | |
| | | | | | - | | | | | | | | | | |
| | | | | | - | | | | | | | | | | |
| | | | | | - | | | | | | | | | | |
| | | | | | - | | | | | | | | | | |
| | | | | - | | | | | | | | | | | |


Small-signal transistors

RETs 500 mA

types in bold represent new products

| Package | | SOT457 (SC-74) | | SOT23 | | | | | |
|-----------------------|---------------------|---|---------|---|---------|---------------|-----------|-----------|-----------|
| | |  | |  | | | | | |
| Size (mm) | | 2.9 x 1.5 x 1.0 | | 2.9 x 1.3 x 1.0 | | | | | |
| P _{tot} (mW) | | 600 | | 250 | | | | | |
| V _{CE0} (V) | I _c (mA) | Configuration | R1 (kΩ) | R2 (kΩ) | NPN/NPN | NPN/PNP | NPN | PNP | |
| 50 | 500 | R1 = R2 | 1.0 | 1.0 | | | PDTD113ET | PDTB113ET | |
| | | | 2.2 | 2.2 | | | PDTD123ET | PDTB123ET | |
| | | | 1.0 | 10 | PIMN31 | PIMC31 | PDTD113ZT | PDTB113ZT | |
| | | R1 ≠ R2 | 2.2 | 10 | | | | PDTD123YT | PDTB123YT |
| | | | 2.2 | - | | | | PDTD123TT | PDTB123TT |
| | | | Only R1 | 2.2 | - | | | | |

Low V_{CEsat} (BISS) RETs

| Package | | SOT23 | | | | |
|-----------------------|----------------------|---|---------|---------|-----|-----------|
| | |  | | | | |
| Size (mm) | | 2.9 x 1.3 x 1.0 | | | | |
| P _{tot} (mW) | | 250 | | | | |
| Polarity | V _{CE0} (V) | I _c (mA) | R1 (kΩ) | R2 (kΩ) | | |
| NPN | 40 | 600 | R1 = R2 | 1 | 1 | PBRN113ET |
| | | | | 2.2 | 2.2 | PBRN123ET |
| | | | | 1 | 10 | PBRN113ZT |
| | | | R1 ≠ R2 | 2.2 | 10 | PBRN123YT |
| | | | | 1 | 1 | PBRP113ET |
| | | | | 2.2 | 2.2 | PBRP123ET |
| PNP | 40 | 600 | R1 = R2 | 1 | 10 | PBRP113ZT |
| | | | | 2.2 | 10 | PBRP123YT |
| | | | | 1 | 10 | PBRP113ET |
| | | | R1 ≠ R2 | 2.2 | 10 | PBRP123YT |

Low V_{CEsat} (BISS) transistors single NPN

types in **bold** represent new products











| Package | | | | | | | | | | | SOT223 (SC-73) | SOT89 (SC-62) | SOT457 (SC-74) | | SOT23 | SOT1061 | SOT323 (SC-70) | SOT363 (SC-88) | SOT416 (SC-75) | SOT666 | SOT883 (SC-101) | | |
|----------------|-----------|--------------|------------------|-------------|------------------|---|---|----------------------|-------------|-------------|------------------|-----------------|-----------------|--|-----------------|-------------------|-------------------|-------------------|------------------|------------------|-----------------|-----------|-----------|
| | | | | | | | | | | | | | | | | | | | | | | | |
| Size (mm) | | | | | | | | | | | 6.5 x 3.5 x 1.65 | 4.5 x 2.5 x 1.5 | 2.9 x 1.5 x 1.0 | | 2.9 x 1.3 x 1.0 | 2.0 x 2.0 x 0.65 | 2.0 x 1.25 x 0.95 | 2.0 x 1.25 x 0.95 | 1.6 x 0.8 x 0.77 | 1.6 x 1.2 x 0.55 | 1.0 x 0.6 x 0.5 | | |
| P_{tot} (mW) | | | | | | | | | | | 1700 | 1650 | 750 | | 480 | 1400 | 350 | 430 | 250 | 500 | 250 | | |
| V_{CE0} (V) | I_C (A) | I_{CW} (A) | h_{FE} min/typ | @ I_C (A) | @ V_{CE} (V) | R_{CEsat} typ (m Ω); $I_C/I_B = 10$ | V_{CEsat} typ (mV); $I_C = 0.5$ A; $I_B = 0.05$ A | V_{CEsat} max (mV) | @ I_C (A) | @ I_B (A) | | | | | | | | | | | | | |
| 12 | 5.3 | 10.6 | 300/530 | 0.5 | 2 | 27 ¹⁾ | 18 | 200 | 5.3 | 0.265 | PBSS301NZ | PBSS301NX | | | | | | | | | | | |
| | 5.8 | 11.6 | 300/530 | 0.5 | 2 | 29 ¹⁾ | 18 | 235 | 5.8 | 0.29 | | | | | | | | | | | | | |
| | 6.0 | 7.0 | 280/440 | 0.5 | 2 | 33 ¹⁾ | 20 | 275 | 6 | 0.3 | | | | | | PBSS4612PA | | | | | | | |
| 15 | 0.5 | 1.0 | 200/325 | 0.01 | 2 | 360 | - | 250 | 0.5 | 0.05 | | | | | | | | | | | PBSS2515M | | |
| | | | 200/425 | 0.01 | 2 | 300 | 200 | 250 | 0.5 | 0.05 | | | | | | | | | | | | | |
| 20 | 1.0 | 3.0 | 350/470 | 0.1 | 2 | 220 | 110 ²⁾ | 250 | 1 | 0.05 | | | | | | | | | | | PBSS2515E | | |
| | 2.0 | 4.0 | 220/410 | 0.5 | 2 | 140 | 70 | 350 | 2 | 0.2 | | | | | | | | | | | | PBSS4220V | |
| | | 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 | | | | | | | | | | | | | |
| | 4.0 | 15.0 | 300/450 | 0.5 | 2 | 50 | 30 | 280 | 4 | 0.4 | | | | | | | | | | | | | |
| | 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 | | | | | | | | | | | | | |
| | 5.3 | 10.6 | 300/570 | 0.5 | 2 | 27 ¹⁾ | 20 | 200 | 5.3 | 0.265 | | | | | | | | | | | | | |
| | 5.8 | 10.2 | 300/570 | 0.5 | 2 | 30 ¹⁾ | 20 | 250 | 5.8 | 0.29 | | | | | | | | | | | | | |
| | 6.0 | 7.0 | 280/440 | 0.5 | 2 | 33 ¹⁾ | 20 | 275 | 6 | 0.3 | | | | | | | | | | | | | |
| 30 | 7.0 | 15.0 | 300/550 | 0.5 | 2 | 19 | 12 | 210 | 7 | 0.35 | | | | | | | | | | | | | |
| | 8.0 | 20.0 | 300/550 | 0.5 | 2 | 14 | 9 | 170 | 8 | 0.4 | | | | | | | | | | | | | |
| | 1.0 | 3.0 | 300/450 | 0.5 | 2 | 240 | 120 ²⁾ | 270 | 1 | 0.05 | | | | | | | | | | | | | |
| | 2.0 | 3.0 | 300/450 | 0.5 | 2 | 120 | 70 | 320 | 2 | 0.2 | | | | | | | | | | | | | |
| | 2.6 | 5.0 | 300/500 | 0.5 | 2 | 76 | 80 | 320 | 3 | 0.3 | | | | | | | | | | | | | |
| | 3.0 | 5.0 | 300/490 | 0.5 | 2 | 80 | 45 | 300 | 3 | 0.3 | | | | | | | | | | | | | |
| | 3.5 | 6.0 | 300/500 | 0.5 | 2 | 50 | 70 | 300 | 4 | 0.4 | | | | | | | | | | | | | |
| | 4.7 | 10.0 | 300/500 | 0.5 | 2 | 45 | 57 | 250 | 4 | 0.4 | | | | | | | | | | | | | |
| | 5.1 | 10.2 | 300/480 | 0.5 | 2 | 30 ¹⁾ | 20 | 220 | 5.1 | 0.255 | | | | | | | | | | | | | |
| | 5.4 | 10.0 | 300/500 | 0.5 | 2 | 45 | 57 | 340 | 5.4 | 0.27 | | | | | | | | | | | | | |
| 40 | 5.5 | 11.0 | 300/480 | 0.5 | 2 | 31 ¹⁾ | 20 | 240 | 5.5 | 0.275 | | | | | | | | | | | | | |
| | 6.0 | 7.0 | 280/450 | 0.5 | 2 | 35 ¹⁾ | 21 | 275 | 6 | 0.3 | | | | | | | | | | | | | |
| | 0.5 | 1.0 | 200/550 | 0.01 | 2 | 380 | 200 ²⁾ | 250 | 0.5 | 0.05 | | | | | | | | | | | | PBSS2540M | |
| | | | 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 | | | | | | | | | | | | | PBSS2540E |
| | | 2.0 | 300/440 | 0.5 | 5 | 240 | 130 | 500 | 1 | 0.1 | | | | | | | | | | | | | PBSS4140V |
| | 2.0 | 3.0 | 300/510 | 0.5 | 5 | 230 | 120 | 500 | 1 | 0.1 | | | | | | | | | | | | | |
| | | 3.0 | 300/420 | 0.5 | 5 | 150 | 130 | 500 | 1 | 0.1 | | | | | | | | | | | | | |
| | | 3.0 | 300/400 | 0.5 | 5 | 150 | 70 | 400 | 2 | 0.2 | | | | | | | | | | | | | |
| | | 3.0 | 350/470 | 0.1 | 2 | 120 | 70 | 320 | 2 | 0.2 | | | | | | | | | | | | | |
| 4.0 | 15.0 | 300/520 | 0.5 | 2 | 55 | 35 | 300 | 4 | 0.4 | | | | | | | | | | | | | | |
| | 10.0 | 300/500 | 0.5 | 2 | 40 | 21 | 355 | 5 | 0.5 | | | | | | | | | | | | | | |
| | 10.0 | 300/500 | 0.5 | 2 | 42 | 25 | 355 | 5 | 0.5 | | | | | | | | | | | | | | |
| 50 | 2.0 | 5.0 | 300/495 | 0.5 | 2 | 100 | 60 | 260 | 2 | 0.2 | | | | | | | | | | | | | |
| | | | 300/- | 0.5 | 2 | 160 | 90 ²⁾ | 320 | 2 | 0.2 | | | | | | | | | | | | | |
| | 2.0 | 280/280 | 0.5 | 2 | 110 | 65 | 290 | 2 | 0.2 | | | | | | | | | | | | | | |
| | 3.0 | 5.0 | 300/460 | 0.5 | 2 | 75 | 50 | 370 | 3 | 0.3 | | | | | | | | | | | | | |
| 60 | 2.0 | 5.0 | 200/280 | 0.5 | 2 | 110 | 60 ¹⁾ | 290 | 2 | 0.2 | | | | | | | | | | | | | |
| | 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 | | | | | | | | | | | | | |
| | 3.8 | 8.0 | 300/500 | 0.5 | 2 | 46 | 29 | 200 | 3 | 0.3 | | | | | | | | | | | | | |
| | 4.7 | 9.4 | 300/520 | 0.5 | 2 | 37 ¹⁾ | 25 | 245 | 4.7 | 0.235 | | | | | | | | | | | | | |
| | 5.2 | 10.4 | 300/520 | 0.5 | 2 | 39 ¹⁾ | 25 | 280 | 5.2 | 0.26 | | | | | | | | | | | | | |
| | 6.0 | 7.0 | 280/440 | 0.5 | 2 | 34 ¹⁾ | 22 | 290 | 6 | 0.3 | | | | | | | | | | | | | |
| | 6.2 | 15.0 | 300/500 | 0.5 | 2 | 25 | 17 | 230 | 6 | 0.3 | | | | | | | | | | | | | |
| 80 | 7.0 | 15.0 | 300/500 | 0.5 | 2 | 17.5 | 13 | 195 | 7 | 0.35 | | | | | | | | | | | | | |
| | 3.0 | 6.0 | 240/360 | 0.5 | 2 | 67 | 40 | 255 | 3 | 0.3 | | | | | | | | | | | | | |
| | 4.0 | 10.0 | 250/400 | 0.5 | 2 | 43 ¹⁾ | 25 | 230 | 4 | 0.2 | | | | | | | | | | | | | |
| | 4.6 | 9.2 | 300/470 | 0.5 | 2 | 37 ¹⁾ | 25 | 240 | 4.6 | 0.23 | | | | | | | | | | | | | |
| | 5.1 | 10.2 | 300/470 | 0.5 | 2 | 38 ¹⁾ | 25 | 270 | 5.1 | 0.255 | | | | | | | | | | | | | |
| 100 | 5.6 | 7.0 | 270/425 | 0.5 | 2 | 40 ¹⁾ | 25 | 320 | 5.6 | 0.28 | | | | | | | | | | | | | |
| | 1.0 | 3.0 | 150/400 | 0.25 | 10 | 160 | 80 | 200 | 1 | 0.1 | | | | | | | | | | | | | |
| | | | 150/300 | 0.25 | 10 | 165 | 70 | 200 | 1 | 0.1 | | | | | | | | | | | | | |
| | | | 150/290 | 0.25 | 10 | 160 | 75 | 200 | 1 | 0.1 | | | | | | | | | | | | | |
| | | | 150/290 | 0.25 | 10 | 165 | 73 | 200 | 1 | 0.1 | | | | | | | | | | | | | |
| | | | 150/290 | 0.25 | 10 | 160 | 73 | 200 | 1 | 0.1 | | | | | | | | | | | | | |
| | 3.0 | 4.0 | 170/275 | 0.5 | 2 | 72 | 45 | 360 | 4 | 0.4 | | | | | | | | | | | | | |
| 4.5 | 9.0 | 200/330 | 0.5 | 2 | 38 ¹⁾ | 27 | 245 | 4.5 | 0.225 | | | | | | | | | | | | | | |
| 5.1 | 10.2 | 200/330 | 0.5 | 2 | 43 ¹⁾ | 27 | 300 | 5.1 | 0.255 | | | | | | | | | | | | | | |
| 5.2 | 6.0 | 180/285 | 0.5 | 2 | 48 ¹⁾ | 30 | 340 | 5.2 | 0.26 | | | | | | | | | | | | | | |

Small-signal transistors

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

Low V_{CEsat} (BISS) transistors single PNP

types in **bold** represent new products

| Package | | | | | | | | | | | | SOT223 (SC-73) | SOT89 (SC-62) | SOT457 (SC-74) | | SOT23 | SOT1061 | SOT323 (SC-70) | SOT363 (SC-88) | SOT416 (SC-75) | SOT666 | SOT883 (SC-101) |
|---|--------------------|---------------------|-------------------------|----------------------|-----------------------|--|--|-----------------------------|----------------------|----------------------|-----------|---|---|-------------------|---|---|---|---|---|---|---|-----------------|
|  | | | | | | | | | | | |  |  | |  |  |  |  |  |  |  | |
| Size (mm) | | | | | | | | | | | | 6.5 x 3.5 x 1.65 | 4.5 x 2.5 x 1.5 | 2.9 x 1.5 x 1.0 | | 2.9 x 1.3 x 1.0 | 2.0 x 2.0 x 0.65 | 2.0 x 1.25 x 0.95 | 2.0 x 1.25 x 0.95 | 1.6 x 0.8 x 0.77 | 1.6 x 1.2 x 0.55 | 1.0 x 0.6 x 0.5 |
| P _{tot} (mW) | | | | | | | | | | | | 1700 | 1650 | 750 | | 480 | 1400 | 350 | 430 | 250 | 500 | 250 |
| V _{CEO} (V) | I _C (A) | I _{CM} (A) | h _{FE} min/typ | @ I _C (V) | @ V _{CE} (V) | R _{CEsat} typ (mΩ); I _C /I _B = 10 | V _{CEsat} typ (mV); I _C = 0.5 A; I _B = 0.05 A | V _{CEsat} max (mV) | @ I _C (A) | @ I _B (A) | | | | | | | | | | | | |
| 12 | 5.3 | 10.6 | 250/400 | 0.5 | 2 | 28 ¹⁾ | 20 | 210 | 5.3 | 0.265 | | | | | | | | | | | | |
| | 5.7 | 11.4 | 250/400 | 0.5 | 2 | 30 ¹⁾ | 20 | 245 | 5.7 | 0.285 | PBSS301PZ | | | | | | | | | | | |
| | 6.0 | 7.0 | 220/335 | 0.5 | 2 | 33 ¹⁾ | 20 | 300 | 6 | 0.3 | | | | PBSS5612PA | | | | | | | | |
| 15 | 0.5 | 1.0 | 200/260 | 0.01 | 2 | 300 | 150 | 250 | 0.5 | 0.05 | | | | | | | | | | | PBSS3515M | |
| | | | 200/325 | 0.01 | 2 | 300 | 150 | 250 | 0.5 | 0.05 | | | | | | | | | | | | |
| 20 | 1.0 | 2.0 | 300/450 | 0.1 | 2 | 250 | 125 ²⁾ | 250 | 1 | 0.05 | | | | | | | | | | | | |
| | | 4.0 | 220/440 | 0.1 | 2 | 140 | 75 | 390 | 2 | 0.2 | | | | | | | | | | | | |
| | 2.0 | 3.0 | 225/- | 0.5 | 2 | 115 | 80 ²⁾ | 225 | 2 | 0.2 | | | | | | | | | | | | |
| | | 5.0 | 220/420 | 0.5 | 2 | 75 | 50 | 210 | 2 | 0.2 | | | | | | | | | | | | |
| | 3.0 | 5.0 | 200/- | 0.5 | 2 | 85 | 80 ²⁾ | 400 | 3 | 0.3 | | | | | | | | | | | | |
| | | | 220/450 | 0.5 | 2 | 90 | 50 | 300 | 3 | 0.3 | | | | | | | | | | | | |
| | 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 | | | | | | | | | | | | |
| | 5.0 | 10.0 | 300/430 | 0.5 | 2 | 34 | 45 | 270 | 5 | 0.5 | | | | | | | | | | | | |
| | 5.1 | 10.2 | 250/370 | 0.5 | 2 | 32 ¹⁾ | 25 | 230 | 5.1 | 0.255 | | | | | | | | | | | | |
| | 5.5 | 11.0 | 250/370 | 0.5 | 2 | 34 ¹⁾ | 25 | 265 | 5.5 | 0.275 | | | | | | | | | | | | |
| | 6.0 | 7.0 | 230/345 | 0.5 | 2 | 39 ¹⁾ | 25 | 350 | 6 | 0.3 | | | | | | | | | | | | |
| 6.2 | 15.0 | 250/400 | 0.5 | 2 | 25 | 18 | 240 | 6 | 0.3 | | | | | | | | | | | | | |
| 6.6 | 20.0 | 250/400 | 0.5 | 2 | 22 | 16 | 240 | 7 | 0.35 | | | | | | | | | | | | | |
| 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 | | | | | | | | | | | | |
| | 3.0 | 5.0 | 200/380 | 0.5 | 2 | 80 | 50 | 320 | 3 | 0.3 | | | | | | | | | | | | |
| | 4.2 | 10.0 | 200/350 | 0.5 | 2 | 58 | 70 | 345 | 4 | 0.4 | | | | | | | | | | | | |
| | 4.4 | 10.0 | 200/350 | 0.5 | 2 | 58 | 70 | 400 | 4 | 0.2 | | | | | | | | | | | | |
| | 5.1 | 10.2 | 250/400 | 0.5 | 2 | 32 ¹⁾ | 25 | 230 | 5.1 | 0.255 | | | | | | | | | | | | |
| | 5.3 | 10.6 | 250/400 | 0.5 | 2 | 35 ¹⁾ | 25 | 265 | 5.3 | 0.265 | | | | | | | | | | | | |
| | 6.0 | 7.0 | 200/335 | 0.5 | 2 | 39 ¹⁾ | 25 | 350 | 6 | 0.3 | | | | | | | | | | | | |
| 40 | 0.5 | 1.0 | 200/380 | 0.01 | 2 | 440 | 220 | 350 | 0.5 | 0.05 | | | | | | | | | | | | |
| | | | 200/380 | 0.01 | 2 | 440 | 230 | 350 | 0.5 | 0.05 | | | | | | | | | | | | |
| | 1.0 | 2.0 | 300/- | 0.1 | 5 | 200 | 120 | 310 | 1 | 0.1 | | | | | | | | | | | | |
| | | | 300/520 | 0.1 | 5 | 230 | 130 | 500 | 1 | 0.1 | | | | | | | | | | | | |
| | 1.8 | 3.0 | 300/800 | 0.1 | 5 | 250 | 130 | 500 | 1 | 0.1 | | | | | | | | | | | | |
| | | | 300/510 | 0.1 | 5 | 230 | 130 | 500 | 1 | 0.1 | | | | | | | | | | | | |
| | 2.0 | 3.0 | 300/450 | 0.1 | 5 | 185 | 100 | 530 | 2 | 0.2 | | | | | | | | | | | | |
| | | | 300/- | 0.1 | 2 | 200 | 110 ²⁾ | 350 | 2 | 0.2 | | | | | | | | | | | | |
| | 4.0 | 15.0 | 300/450 | 0.1 | 2 | 150 | 70 | 350 | 2 | 0.2 | | | | | | | | | | | | |
| | | 10.0 | 200/310 | 0.5 | 2 | 55 | 46 | 300 | 4 | 0.4 | | | | | | | | | | | | |
| 5.0 | 10.0 | 250/370 | 0.5 | 2 | 45 | 33 | 375 | 5 | 0.5 | | | | | | | | | | | | | |
| 5.0 | 10.0 | 250/350 | 0.5 | 2 | 55 | 40 ¹⁾ | 160 | 2 | 0.2 | | | | | | | | | | | | | |
| 50 | 2.0 | 3.0 | 200/- | 0.5 | 2 | 150 | 90 ²⁾ | 300 | 2 | 0.1 | | | | | | | | | | | | |
| | | | 200/360 | 0.5 | 2 | 90 | 55 | 270 | 2 | 0.2 | | | | | | | | | | | | |
| | 5.0 | 200/- | 0.5 | 2 | 160 | 90 ²⁾ | 320 | 2 | 0.2 | | | | | | | | | | | | | |
| | | 200/300 | 0.5 | 2 | 120 | 70 | 300 | 2 | 0.2 | | | | | | | | | | | | | |
| | 3.0 | 5.0 | 200/375 | 0.5 | 2 | 120 | 70 | 390 | 3 | 0.3 | | | | | | | | | | | | |
| 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 ¹⁾ | 35 | 310 | 4.2 | 0.21 | | | | | | | | | | | | |
| | 4.5 | 9.0 | 200/295 | 0.5 | 2 | 59 ¹⁾ | 35 | 375 | 4.5 | 0.225 | | | | | | | | | | | | |
| | 5.0 | 6.0 | 170/260 | 0.5 | 2 | 35 ¹⁾ | 55 | 450 | 5 | 0.25 | | | | | | | | | | | | |
| | 5.7 | 15.0 | 200/300 | 0.5 | 2 | 40 | 30 | 300 | 5 | 0.5 | | | | | | | | | | | | |
| | | 15.0 | 200/300 | 0.5 | 2 | 29 | 22 | 285 | 6 | 0.3 | | | | | | | | | | | | |
| 80 | 3.0 | 5.0 | 155/225 | 0.5 | 2 | 71 | 55 | 290 | 3 | 0.3 | | | | | | | | | | | | |
| | 4.0 | 5.0 | 180/265 | 0.5 | 2 | 65 ¹⁾ | 40 | 420 | 4 | 0.2 | | | | | | | | | | | | |
| | | 10.0 | 200/300 | 0.5 | 2 | 50 | 35 | 380 | 5 | 0.5 | | | | | | | | | | | | |
| | 8.0 | 200/280 | 0.5 | 2 | 43 | 36 | 240 | 4 | 0.4 | | | | | | | | | | | | | |
| 4.5 | 9.0 | 200/280 | 0.5 | 2 | 69 ¹⁾ | 36 | 450 | 4.5 | 0.225 | | | | | | | | | | | | | |
| 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 | | | | | | | | | | | | |
| | | | 150/350 | 0.5 | 5 | 170 | 90 | 320 | 1 | 0.1 | | | | | | | | | | | | |
| | | | 150/- | 0.5 | 5 | 170 | 90 | 320 | 1 | 0.1 | | | | | | | | | | | | |
| | 2.0 | 3.0 | 175/275 | 0.5 | 2 | 88 | 65 | 250 | 2 | 0.2 | | | | | | | | | | | | |
| | 2.7 | 4.0 | 180/295 | 0.5 | 2 | 110 ¹⁾ | 45 | 450 | 2.7 | 0.135 | | | | | | | | | | | | |
| 3.7 | 7.4 | 200/300 | 0.5 | 2 | 52 | 45 | 300 | 4 | 0.4 | | | | | | | | | | | | | |
| 4.1 | 8.2 | 200/300 | 0.5 | 5 | 57 | 45 | 325 | 4.1 | 0.41 | | | | | | | | | | | | | |

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

Small-signal transistors

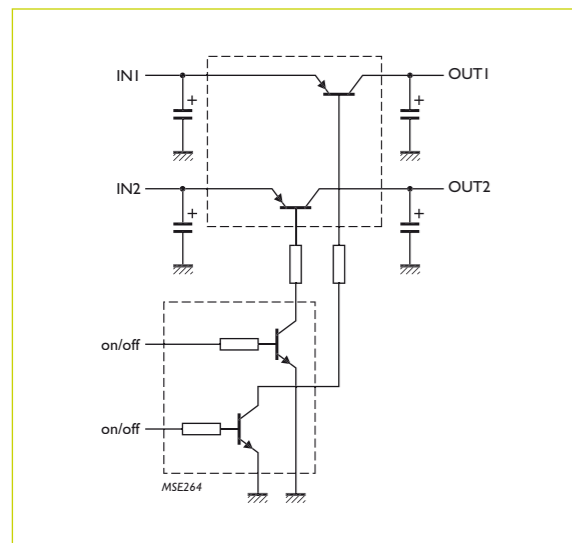
Low V_{CEsat} (BISS) transistors double

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 ²⁾ | 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 ¹⁾ | 250 | 0.5 | 0.05 | PBSS2515VS |
| | | 2 x PNP | 200 | 0.01 | 2 | 170 ¹⁾ | 250 | 0.5 | 0.05 | PBSS3515VS |
| | | NPN/PNP | 200 | 0.01 | 2 | 170 ¹⁾ | 250 | 0.5 | 0.05 | PBSS2515VPN |
| | | NPN/PNP | 200 | 0.01 | 2 | 170 ¹⁾ | 250 | 0.5 | 0.05 | PBSS2515YPN |
| 20 | 7.5 | NPN/NPN | 300 | 0.5 | 2 | 15 | 150 | 4 | 0.2 | PBSS4021SN |
| | 6.3 | PNP/PNP | 250 | 0.5 | 2 | 24 | 225 | 4 | 0.2 | PBSS4021SP |
| | 7.5 / 6.3 | NPN/PNP | 300/250 | 0.5 | 2 | 15/24 | 150/225 | 4 | 0.2 | PBSS4021SPN |
| 30 | 5.7 | NPN/NPN | 300 | 0.5 | 2 | 57 | 250 | 4 | 0.4 | PBSS4032SN ³⁾ |
| | 4.8 | PNP/PNP | 200 | 0.5 | 2 | 70 | 390 | 4 | 0.4 | PBSS4032SP ³⁾ |
| | 5.7 / 4.8 | NPN/PNP | 300/200 | 0.5 | 2 | 57/70 | 250/390 | 4 | 0.4 | PBSS4032SPN ³⁾ |
| 40 | 1.0 | NPN/PNP | 300/250 | 0.5 | 5 | 130/150 | 500 | 1 | 0.1 | PBSS4140DPN |
| | 2.0 | NPN/PNP | 300/250 | 0.5 | 5 | 80/100 | 400/530 | 2 | 0.2 | PBSS4240DPN |
| 50 | 2.7 | 2 x NPN | 300 | 0.5 | 2 | 50 | 340 | 2.7 | 0.27 | PBSS4350SS |
| | | 2 x PNP | 200 | 0.5 | 2 | 60 | 370 | 2.7 | 0.27 | PBSS5350SS |
| | | NPN/PNP | 300/200 | 0.5 | 2 | 50/60 | 340/370 | 2.7 | 0.27 | PBSS4350SPN |
| 60 | 1.0 | 2 x NPN | 200 | 0.5 | 5 | 115 | 250 | 1 | 0.1 | PBSS4160DS |
| | | 2 x PNP | 150 | 0.5 | 5 | 120 | 330 | 1 | 0.1 | PBSS5160DS |
| | | NPN/PNP | 200/150 | 0.5 | 5 | 115/120 | 250/330 | 1 | 0.1 | PBSS4160DPN |
| | 6.7 | NPN/NPN | 300 | 0.5 | 2 | 20 | 190 | 4 | 0.2 | PBSS4041SN |
| | 5.9 | PNP/PNP | 200 | 0.5 | 2 | 35 | 330 | 4 | 0.2 | PBSS4041SP |
| 6.7 / 5.9 | NPN/PNP | 300/200 | 0.5 | 2 | 20/35 | 190/330 | 4 | 0.2 | PBSS4041SPN | |

¹⁾ $I_C/I_B=20$
²⁾ Device mounted on a ceramic PCB, Al₂O₃, standard footprint.
³⁾ Optimized for high speed switching

Dual load switch using double RETs and double BISS transistors



Low V_{CEsat} (BISS) load switches

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) | | 1500 ¹⁾ | 750 ¹⁾ | 600 ¹⁾ | 300 ²⁾ | |
| V_{CE0} (V) | I_C (A) | V_{CEsat} max (mV); $I_C = 0.5$ A; $I_B = 0.05$ A | R1, R2 (kΩ) | | | |
| 15 | 0.5 | 250 | 2.2 | | PBLS1501Y | PBLS1501V |
| | | | 4.7 | | PBLS1502Y | PBLS1502V |
| | | | 10 | | PBLS1503Y | PBLS1503V |
| | | | 22 | | PBLS1504Y | PBLS1504V |
| 20 | 1 | 150 | 2.2 | | PBLS2001D | |
| | | | 4.7 | | PBLS2002D | |
| | | | 10 | | PBLS2003D | |
| | | | 22 | | PBLS2004D | |
| | 1.8 | 70 | 2.2 | | PBLS2021D | |
| | | | 4.7 | | PBLS2022D | |
| | | | 10 | | PBLS2023D | |
| | | | 22 | | PBLS2024D | |
| 3 | 75 | 2.2 | PBLS2001S | | | |
| | | 4.7 | PBLS2002S | | | |
| | | 10 | PBLS2003S | | | |
| | | 22 | | | | |
| 40 | 0.5 | 350 | 2.2 | | PBLS4001Y | PBLS4001V |
| | | | 4.7 | | PBLS4002Y | PBLS4002V |
| | | | 10 | | PBLS4003Y | PBLS4003V |
| | | | 22 | | PBLS4004Y | PBLS4004V |
| | | | 47 | | PBLS4005Y | PBLS4005V |
| | | | 2.2 | | PBLS4001D | |
| | 1 | 170 | 4.7 | | PBLS4002D | |
| | | | 10 | | PBLS4003D | |
| | | | 22 | | PBLS4004D | |
| | | | 47 | | PBLS4005D | |
| | | | 2.2 | | PBLS6001D | |
| | | | 4.7 | | PBLS6002D | |
| 60 | 1 | 180 | 10 | | PBLS6003D | |
| | | | 22 | | PBLS6004D | |
| | | | 47 | | PBLS6005D | |
| | | | 2.2 | | PBLS6021D | |
| | | | 4.7 | | PBLS6022D | |
| | | | 10 | | PBLS6023D | |
| 1.5 | 100 | 22 | | PBLS6024D | | |

¹⁾ Device mounted on a ceramic PCB, Al₂O₃, standard footprint
²⁾ Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint

Key features

- ▶ Low V_{CEsat} (BISS) transistor and resistor-equipped transistor (RET) in one package
- ▶ Low saturation voltage
- ▶ Low 'threshold' voltage (< 1 V) compared to MOSFET
- ▶ Low drive power required
- ▶ Range of small, very small and ultra small packages

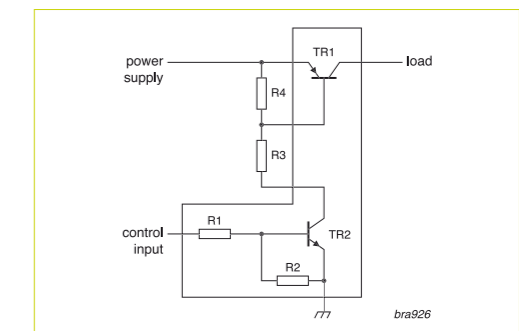
Key benefits

- ▶ Smaller end products
- ▶ Reduced component count
- ▶ Less sourcing effort
- ▶ Fewer solder points increase reliability
- ▶ Cost reduction
- ▶ More efficient, cooler running systems

Key applications

- ▶ Supply line switch
- ▶ Battery charger
- ▶ High-side switch for LEDs, drivers and backlights
- ▶ Portable equipment

BISS load switch



High voltage low V_{CEsat} (BISS) transistors

types in **bold** represent new products

| Package | | | | SOT223 (SC-73) | SOT89 (SC-62) | SOT23 |
|-----------------------|-------------------------------------|----------------------|--------------------|------------------|------------------|------------------|
| Size (mm) | | | | 6.5 x 3.5 x 1.65 | 4.5 x 2.5 x 1.5 | 2.9 x 1.3 x 1.0 |
| P _{tot} (mW) | | | | 1700 | 1300 | 250 |
| Polarity | V _{CESM} ¹⁾ (V) | V _{CEO} (V) | I _C (A) | | | |
| NPN | - | 150 | 1 | PBHV8115Z | | PBHV8115T |
| | | | 2 | PBHV8215Z | | |
| | | 500 | 400 | 0.5 | PBHV8540Z | |
| | 1 | | | PBHV8140Z | | |
| | 500 | | 0.15 | | | PMBTA45 |
| | PNP | - | 150 | 1 | PBHV9115Z | PBHV9115X |
| 2 | | | | PBHV9215Z | | |
| 500 | | | 400 | 0.25 | PBHV9040Z | |
| | | 0.5 | | PBHV9540Z | | |
| | | 500 | 0.15 | | | PBHV9050T |
| | | | 500 | 0.25 | PBHV9050Z | |

¹⁾ Collector-emitter peak voltage

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

| Package | | | | | | | SOT457 (SC-74) | SOT353 (SC-88A) |
|--------------------------|------------------------|-----------------------------|------------------------|------------------------|-------------------------|---------------|-----------------|-------------------|
| Size (mm) | | | | | | | 2.9 x 1.5 x 1.0 | 2.0 x 1.25 x 0.95 |
| P _{tot} (mW) | | | | | | | 500 | 250 |
| Transistor | | | Schottky rectifier | | | Configuration | | |
| V _{CEO} max (V) | I _C max (A) | V _{CEsat} max (mV) | I _F max (A) | V _R max (V) | V _F max (mV) | | | |
| 15 | 0.5 | 250 | 0.5 | 20 | 390 | | | PMEM1505NG |
| 40 | 1.0 | 210 | 1 | 20 | 550 | | | PMEM4010ND |
| | 2.0 | 400 | 1 | 40 | 640 | | PMEM4020ND | |
| 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_F (MEGA) Schottky rectifier and low V_{CEsat} (BISS) transistor in one package
- ▶ High forward current capability
- ▶ Low power dissipation

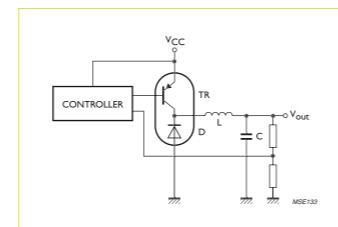
Key benefits

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

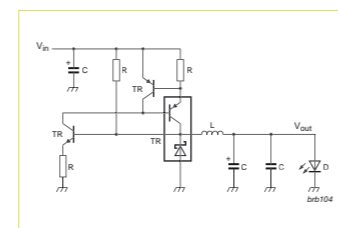
Key applications

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

Step-down DC/DC converter



Power LED driver



Low V_{CEsat} (BISS) RETs

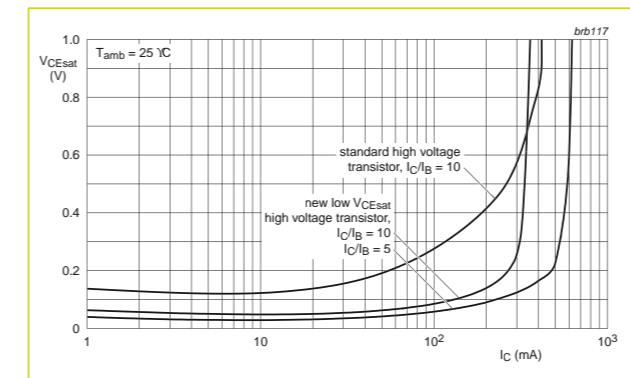
| Package | | | | | | SOT23 | |
|-----------------------|---------------------|---------|---------|---------|-----------|-----------------|--|
| Size (mm) | | | | | | 2.9 x 1.3 x 1.0 | |
| P _{tot} (mW) | | | | | | 250 | |
| V _{CEO} (V) | I _C (mA) | R1 = R2 | R1 (kΩ) | R2 (kΩ) | NPN | PNP | |
| 40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

Advantages of low V_{CEsat} (BISS) technology

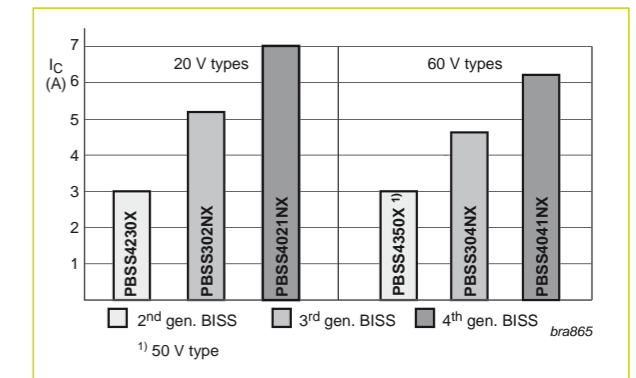
Our BISS (Breakthrough In Small-Signal) transistors show lowest V_{CEsat} values due to an innovative mesh-emitter technology and further technology improvement.

High voltage low V_{CEsat} (BISS)

V_{CEsat} improvement leads to higher I_C capability

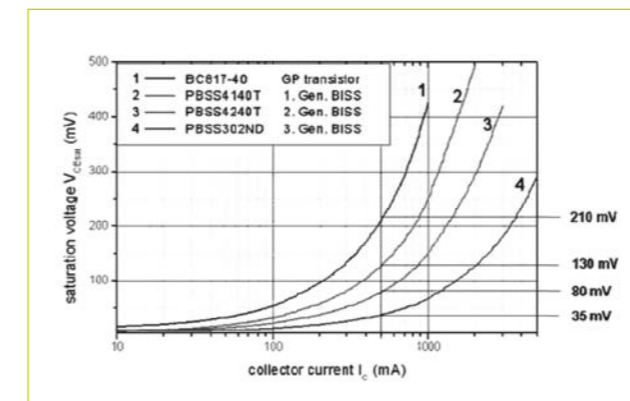


Improved collector current capabilities

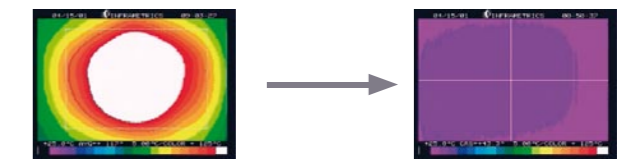


Saturation voltage:

General purpose versus low V_{CEsat} (BISS) transistors (NPN in SOT23/SOT457)



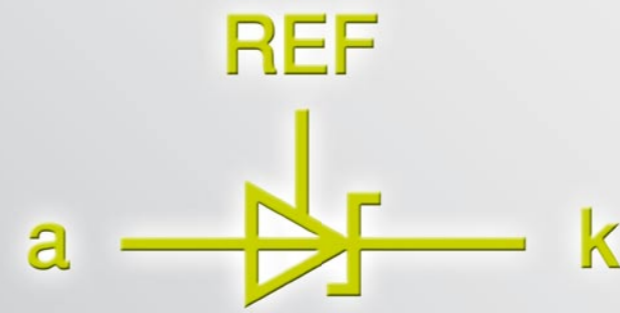
65 % heat reduction by BISS transistors



General purpose transistor T_{case} = 110°C

3rd generation BISS transistor T_{case} = 40°C

Temperature profile of device surface (T_{case}). Comparison of a general purpose transistor and a 3rd generation BISS transistor.



Standard linear products

| | |
|---|----|
| Adjustable shunt voltage regulator IC | 68 |
| Low-dropout adjustable and fixed linear voltage regulator | 69 |
| Discrete voltage regulator | 69 |
| Constant current source | 70 |

Adjustable shunt voltage regulator IC

types in **bold** represent new products

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

¹⁾ optimized for use with dedicated capacitive load

* Normal pinning vs. mirrored pinning

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

Low-dropout adjustable and fixed linear voltage regulator

types in **bold** represent new products

| Package | | | | SOT223 (SC-73) | |
|-----------------------|----------------------|----------------------|------------------------|-----------------------|--------------------|
| Size (mm) | | | | 6.5 x 3.5 x 1.65 | |
| P _{tot} (mW) | | | | 1700 | |
| Pinning configuration | | | | T _{amb} (°C) | |
| V _{max} (V) | I _{max} (A) | V _{out} (V) | V _{tolerance} | 0 to 125 | -40 to 125 |
| 20 | 1 | 1.25 adj | 1% | NX1117CADJZ | NX1117IADJZ |
| | | 1.2 | | NX1117C12Z | NX1117I12Z |
| | | 1.5 | | NX1117C15Z | NX1117I15Z |
| | | 1.8 | | NX1117C18Z | NX1117I18Z |
| | | 1.9 | | NX1117C19Z | NX1117I19Z |
| | | 2.0 | | NX1117C20Z | NX1117I20Z |
| | | 2.5 | | NX1117C25Z | NX1117I25Z |
| | | 2.85 | | NX1117C285Z | NX1117I285Z |
| | | 3.3 | | NX1117C33Z | NX1117I33Z |
| | | 5.0 | | NX1117C50Z | NX1117I50Z |
| | | 12.0 | | NX1117C120Z | NX1117I120Z |

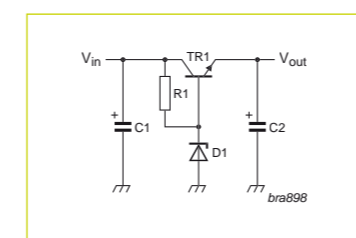
Discrete voltage regulator

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

Key features

- ▶ A bipolar transistor and an integrated Zener diode, internally connected to build a voltage regulator
- ▶ Output voltage options V_{out}: 2.5 V, 3 V, 3.3 V, 5 V and 12 V
- ▶ Output power dissipation capability: 1300 mW in SOT223 and 380 mW in SOT457
- ▶ SMD plastic packages

Standard voltage regulator. PVR-series already include TR1 and D1, internally connected



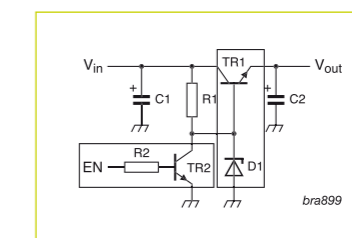
Key benefits

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

Key applications


- ▶ Linear voltage regulation

A resistor-equipped transistor (RET) adds an output enable function



Constant current source

Constant current source

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

Key features

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

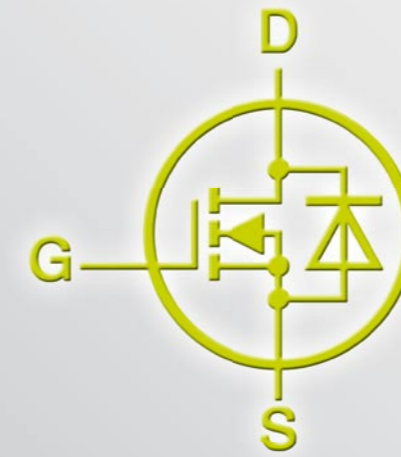
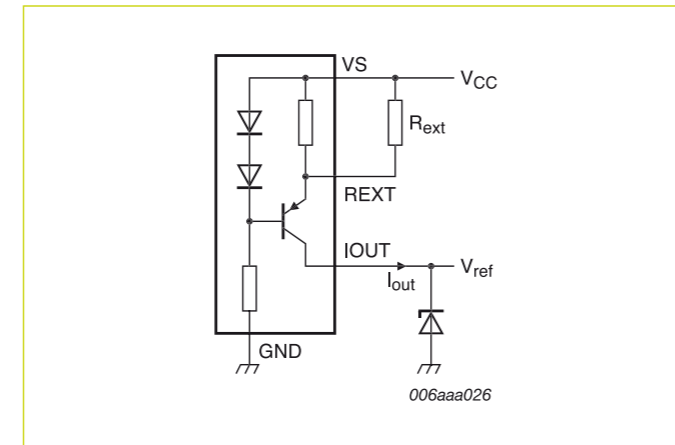
Key benefits

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

Key applications

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

Voltage reference



MOSFETs

Small-signal MOSFETs

72

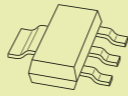
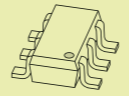





- Small-signal MOSFETs single (N-channel) < 50 V 72
- Small-signal MOSFETs single (N-channel) ≥ 50 V 74
- Small-signal MOSFETs dual (N-channel) 76
- Small-signal MOSFETs single (P-Channel) 76
- Small-signal MOSFET dual (P-channel) and FET-KYs 76

Power MOSFETs

78

- Power MOSFETs single (N-channel) 78
- Power MOSFETs single (P-channel) 84
- Power MOSFETs dual (N- and P-channel) 85

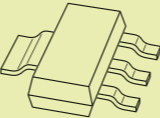
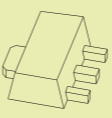
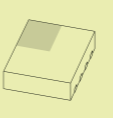
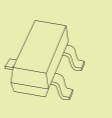



Small-signal MOSFETs single (N-channel) < 50V

| | | | | | | | | | | | | | SOT223 (SC-73) | | TSOP6 SOT457 (SC-74) | SOT23 | SOT363 (SC-88) | SOT323 (SC-70) | SOT416 (SC-75) | SOT883 (SC-101) |
|-----------------------|---------------------|--------------------|-----------------------------|-----------------------------|--------------------------|---------------------------|-------------------------|-------------------|--|-------------------|--------|-------------------|---|-----------------------|---|---|---|---|---|---|
| Package | | | | | | | | | | | | |  | |  |  |  |  |  |  |
| Size (mm) | | | | | | | | | | | | | 6.5 x 3.5 x 1.65 | | 2.9 x 1.5 x 1.0 | 2.9 x 1.3 x 1.0 | 2.0 x 1.25 x 0.95 | 2.0 x 1.25 x 0.95 | 1.6 x 0.8 x 0.77 | 1.0 x 0.6 x 0.5 |
| P _{tot} (mW) | | | | | | | | | | | | | 1700 | | 600 | 250 | 300 | 200 | 150 | 250 |
| V _{DS} (V) | V _{GS} (V) | I _D (A) | V _{GS(th) min} (V) | V _{GS(th) max} (V) | t _{on} typ (ns) | t _{off} typ (ns) | Q _G typ (nC) | ESD protection | R _{DSon} typ (mΩ) @ V _{gs} = | | | | | | | | | | | |
| | | | | | | | | | 10 V | 4.5 V | 2.5 V | 1.8 V | | | | | | | | |
| 12 | 8 | 5.7 | 0.4 | - | 23 | 67 | 10.1 | - | - | 28 | - | 39 | | | | | | | | |
| 20 | 8 | 6.3 | 2 | 4 | 23 | 71 | 10.6 | - | - | 23 | - | 37 | | | PMN28UN | | | | | |
| | | 5.7 | 0.4 | - | 23 | 71 | 10.6 | - | - | 27 | - | 39 | | | PMN23UN | | | | | |
| | | 5.7 | 0.45 | - | 20 | 66 | 7.4 | - | - | 30 | - | 44 | | | PMN27UN | | | | | |
| | | 3.76 | 0.65 | - | 35 | 84 | 5.4 | - | - | 56 | 77 | - | | | PMV30UN ¹⁾ | | | | | |
| | | 2.5 | 0.65 | - | 35 | 84 | 5.4 | - | - | 56 | 77 | - | | | PMV56XN ¹⁾ | | | | | |
| | | 1.05 | 0.4 | - | 6.5 | 65 | - | - | - | 140 | - | 240 | | | SI2302DS | | | | | |
| | 2.28 | 0.45 | 0.95 | 14.5 | 23.5 | 0.89 | - | - | 250 | - | 420 | | | BSH105 | | | | | | |
| | 1 | 0.45 | 1 | 14.5 | 23.5 | 0.89 | - | - | 280 | - | 460 | | | | | PMZ250UN | | | | |
| | 5.9 | 0.5 | 1.5 | 25 | 37 | 5.8 | - | - | 31 | 44 | - | | | PMF280UN | PMR280UN | | | | | |
| | 12 | 2.15 | 0.5 | 1.5 | 16 | 17 | 0.72 | - | - | 270 | 440 | - | | | PMV31XN ¹⁾ | | | | | |
| | 1 | 0.5 | 1.5 | 16 | 17 | 0.72 | - | - | 290 | 460 | - | | | | | PMF290XN | PMR290XN | PMZ270XN | | |
| | 15 | 5.7 | 1 | 2 | 24 | 35 | 13.1 | - | 28 | 34 | - | - | | | PMN34LN | | | | | |
| 4.1 | 1 | 2 | 24 | 35 | 13.1 | - | 55 | 70 | - | - | | | PMN55LN | | | | | | | |
| 30 | 8 | 4.9 | 0.45 | - | 22 | 60 | 9.9 | - | - | 38 | - | 54 | | | PMN34UN | | | | | |
| | | 4.9 | 0.45 | - | 18 | 50 | 9.3 | - | - | 40 | - | 55 | | | PMV40UN ¹⁾ | | | | | |
| | | 1.78 | 0.45 | 0.95 | 11.5 | 22.5 | 0.89 | - | - | 390 | - | 550 | | | | | | PMZ390UN | | |
| | | 0.85 | 0.4 | - | 6 | 27 | - | - | - | 400 ²⁾ | - | 600 ²⁾ | | | BSH103 | | | | | |
| | 0.8 | 0.45 | 1 | 11.5 | 22.5 | 0.89 | - | - | 400 | - | 580 | | | | | PMF400UN | PMR400UN | | | |
| | 12 | 1.87 | 0.5 | 1.5 | 16 | 19.5 | 0.65 | - | - | 350 | 520 | - | | | | | | PMZ350XN | | |
| | 0.87 | 0.35 | | 16 | 19.5 | - | - | - | 370 | 550 | - | | | | | PMF370XN | | | | |
| | 0.9 | 0.5 | 1.5 | 16 | 19.5 | 0.65 | - | - | 370 | 550 | - | | | | | PMG370XN | | PMR370XN | | |
| | 15 | 5.4 | 1 | 2 | 12 | 27 | 13.8 | - | 32 | 40 | - | - | | | PMN40LN | | | | | |
| | 20 | 10 | 1 | 2.8 | 18 | 44 | 24 | - | 20 | 30 | - | - | BSP030 | | | | | | | |
| | | 5.4 | 1 | 2 | 33 | 44 | 6.1 | - | 31 | 38 | - | - | | | PMN38EN | | | | | |
| | | 5.2 | 1 | 2 | 33 | 44 | 6.1 | - | 32 | 42 | - | - | | | PMN45EN | | | | | |
| 5.4 | | 1 | 2 | 12 | 21.5 | 9.4 | - | 35 | 45 | - | - | | | PMV45EN ¹⁾ | | | | | | |
| 4.6 | | 1 | 2 | 8.4 | 17.8 | 8.8 | - | 40 | 49 | - | - | | | PMN49EN | | | | | | |
| 4.7 | | 1 | 2 | 12 | 23.5 | 9.4 | - | 47 | 60 | - | - | | | PMV60EN ¹⁾ | | | | | | |
| 1.9 | | 1 | 2 | 11 | 41 | 6.4 | - | 77 | 102 | - | - | | | BSH108 | | | | | | |
| 2.5 | | 1.5 | - | 12 | 23.5 | 4.6 | - | 74 | 117 | - | - | | | PMV117EN | | | | | | |
| 6 | 1 | 2.8 | 14 | 36 | - | - | 80 | 120 | - | - | BSP100 | | | | | | | | | |
| 1.7 | 1.5 | - | 11.5 | 31 | 4.6 | - | 117 ²⁾ | 190 ²⁾ | - | - | | | SI2304DS | | | | | | | |

¹⁾ enhanced thermal capability
²⁾ max values

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

types in **bold** represent new products

| | | | | | | | | | | SOT223 (SC-73) | | SOT89 (SC-62) | SOT873 | SOT23 | SOT323 (SC-70) | SOT416 (SC-75) | SOT883 (SC-101) | | | |
|-----------------------|---------------------|--------------------|----------------------------|----------------------------|--------------------------|---------------------------|-------------------------|----------------|--|---|-------|---|---|---|---|---|---|------------------------|------------------|--------|
| Package | | | | | | | | | |  | |  |  |  |  |  |  | | | |
| Size (mm) | | | | | | | | | | 6.5 x 3.5 x 1.65 | | 4.5 x 2.5 x 1.5 | 3.3 x 3.3 x 0.85 | 2.9 x 1.3 x 1.0 | 2.0 x 1.25 x 0.95 | 1.6 x 0.8 x 0.77 | 1.0 x 0.6 x 0.5 | | | |
| P _{tot} (mW) | | | | | | | | | | 1700 | | 1300 | 250 | 250 | 200 | 150 | 250 | | | |
| V _{DS} (V) | V _{GS} (V) | I _b (A) | V _{GS(th)} min(V) | V _{GS(th)} max(V) | t _{on} typ (ns) | t _{off} typ (ns) | Q _g typ (nC) | ESD protection | R _{Dson} typ (mΩ) @ V _{gs} = | | | | | | | | | | | |
| | | | | | | | | | 10 V | 4.5 V | 2.5 V | 1.8 V | | | | | | | | |
| 50 | 20 | 0.1 | 0.4 | 1.8 | 2 | 5 | - | - | 2800 | 3800 ³⁾ | - | - | | | | | | BSN20 | | |
| 55 | 8 | 0.3 | 0.4 | 1.3 | 4 | 11 | 1 | - | - | 2300 | 2400 | 3100 | | | | | | BSH121 | | |
| | 10 | 0.335 | 0.4 | 1.3 | 4 | 11 | 1 | - | - | 2300 | 2400 | 3100 | | | | | | BSH111 | | |
| | 13 | 4.9 | 1 | 2 | - | - | - | - | 2KV | - | 30 | - | - | PHT11N06LT | | | | | | |
| 3.5 | | 1 | 2 | - | - | - | - | 2KV | - | 65 | - | - | PHT8N06LT | | | | | | | |
| 2.5 | | 1 | 2 | - | - | - | - | 2KV | - | 120 | - | - | PHT6N06LT | | | | | | | |
| 2.5 | | 2 | 4 | - | - | - | - | 2KV | 120 | - | - | - | PHT6N06T | | | | | | | |
| 60 | 15 | 0.26 | 1 | 3.3 | 3 | 9 | - | 1KV | 2800 | 3800 | - | - | | | | | | PMF3800SN | | |
| | | 0.34 | 1 | - | 3 | 9 | - | 1KV | 2800 | 3800 | - | - | | | | | | 2N7002K | | |
| | | 0.3 | 1 | - | 3 | 9 | - | yes | 2800 | 3800 | - | - | | | | | | BSH112 | | |
| | | 0.3 | 1 | 2.5 | 16 | 60 | 1.09 | 3KV | 1100 | 1300 | - | - | | | | | | 2N7002CK | | |
| | | 0.3 | 1 | 2.5 | tbd | tbd | tbd | - | 2000 ²⁾ | 3000 ²⁾ | - | - | | | | | | | 2N7002P | |
| | | 0.3 | 1 | 2.5 | tbd | tbd | tbd | 2KV | 1600 ²⁾ | 3000 ²⁾ | - | - | | | | | | | 2N7002PW | |
| | | 0.57 | 1 | - | 6 | 7.2 | - | - | 780 | 1100 | - | - | | | | | | | 2N7002BKT | |
| | | 0.55 | 1 | 3 | 6 | 7.2 | 1.05 | - | 780 | 1100 | - | - | | | | | | | 2N7002BKM | |
| | 1.22 | 1 | 3 | 6 | 7.2 | 1.05 | - | 760 | 1100 | - | - | | | | | | | PMF780SN | | |
| | 0.25 | 0.8 | 3 | - | - | - | - | - | 2500 | - | - | - | | | | | | PMR780SN | | |
| 30 | 0.385 | 1 | 2.5 | 2.5 | 11 | 0.69 | - | 780 | 1200 | - | - | | | | | | | PMBF170 | | |
| | 0.475 | 1 | 2.5 | 2.5 | 11 | 0.69 | - | 780 | 1200 | - | - | | | | | | | 2N7002E | | |
| | 0.3 | 1 | 2.5 | 2.5 | 11 | - | - | 2800 | 3800 | - | - | | | | | | | 2N7002F | | |
| | 0.3 | 1 | 2.5 | 2.5 | 11 | - | - | 2800 | 3800 | - | - | | | | | | | 2N7002 | | |
| 100 | 16 | 3.5 | 1 | 2 | 14 | 73 | - | - | - | 200 | - | - | PHT4NQ10LT | | | | | | | |
| | 20 | 0.19 | 1 | - | 3 | 12 | - | - | - | 5000 | - | - | | | | | | | BST82 | |
| | | 0.52 | 1 | - | 3 | 12 | - | - | - | 5000 | - | - | | | | | | | BSP110 | |
| | | 0.85 | 2 | 4 | 19 | 13 | 4.6 | - | 400 | - | - | - | | | | | | | BSH114 | |
| | | 0.15 | 1 | 2.8 | 3 | 12 | - | - | 3500 | - | - | - | | | | | | | BSS123 | |
| | | 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 | - | - | - | | | | | | PMV213SN ¹⁾ | | |
| | | 0.55 | 0.4 | 2 | 10 | 45 | - | - | 1700 | - | 3000 | - | | | | | | | BSP122 | |
| | | 0.4 | 0.8 | 2.8 | 6 | 49 | - | - | 1600 | - | - | - | | | | | | | BSS87 | |
| 220 | 20 | 7.3 | 2 | 4 | 20.8 | 24.3 | 13.2 | - | 320 | - | - | | | | | | | PML260SN | | |
| 240 | 20 | 0.375 | 0.8 | 2 | 6 | 47 | - | - | 2800 | 7500 ²⁾ | - | - | | | | | | | PML340SN | |
| 250 | 20 | 0.35 | 0.8 | 2 | 6 | 47 | - | - | 2800 | - | - | - | | | | | | | BSP89 | |
| 300 | 20 | 0.35 | 0.8 | 2 | 6 | 46 | - | - | 3700 | - | 4800 | - | | | | | | | BSP126 | |
| | | | | | | | | | | | | | | | | | | | | BSP130 |

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

Small-signal MOSFETs dual (N-channel)

types in **bold** represent new products

| Package | | | | | | | | | | SOT363 (SC-88) | SOT666 (SC-88) | | | |
|-----------------------|---------------------|--------------------|----------------------------|----------------------------|--------------------------|---------------------------|-------------------------|----------------|--|--------------------|------------------|-------|------------------|------------------|
| Size (mm) | | | | | | | | | | 2.0 x 1.25 x 0.95 | 1.6 x 1.2 x 0.55 | | | |
| P _{tot} (mW) | | | | | | | | | | 300 | 300 | | | |
| V _{DS} (V) | V _{GS} (V) | I _D (A) | V _{GS(th)} min(V) | V _{GS(th)} max(V) | t _{on} typ (ns) | t _{off} typ (ns) | Q _G typ (nC) | ESD protection | R _{DS(on)} typ (mΩ) @ V _{GS} = | | | | | |
| | | | | | | | | | 10 V | 4.5 V | 2.5 V | 1.8 V | | |
| 20 | 8 | 0.87 | 0.45 | 1 | 14.5 | 23.5 | - | - | - | 280 | - | 460 | PMGD280UN | |
| | 12 | 0.86 | 0.5 | 1.5 | 16 | 17 | 0.72 | - | - | 290 | 460 | - | PMGD290XN | |
| 30 | 8 | 0.71 | 0.45 | 1 | 11.5 | 22.5 | 0.89 | - | - | 400 | - | 580 | PMGD400UN | |
| | 12 | 0.74 | 0.5 | 1.5 | 17 | 19.5 | 0.65 | - | - | 370 | 550 | - | PMGD370XN | |
| | 15 | 0.125 | 0.8 | 1.5 | 17 | 22 | 0.35 | - | - | 1800 | 2900 | - | PMGD8000LN | |
| 60 | 20 | 0.3 | 1 | 2.5 | tbd | tbd | tbd | - | 2000 ²⁾ | 3000 ²⁾ | - | - | 2N7002PS | 2N7002PV |
| | | 0.3 | 1 | 2.5 | tbd | tbd | tbd | 2KV | 1600 ²⁾ | 3000 ²⁾ | - | - | 2N7002BKS | 2N7002BKV |
| | | 0.49 | 1 | - | 6 | 7.2 | 1.05 | - | 780 | 1100 | - | - | PMGD780SN | |

¹⁾ enhanced thermal capability ²⁾ max values

Small-signal MOSFETs single (P-channel)

| Package | | | | | | | | | | SOT223 (SC-73) | SOT89 (SC-62) | TSOP6 SOT457 (SC-74) | SOT23 |
|-----------------------|---------------------|--------------------|----------------------------|----------------------------|--------------------------|---------------------------|-------------------------|----------------|--|------------------|-----------------|----------------------|-----------------------|
| Size (mm) | | | | | | | | | | 6.5 x 3.5 x 1.65 | 4.5 x 2.5 x 1.5 | 2.9 x 1.5 x 1.0 | 2.9 x 1.3 x 1.0 |
| P _{tot} (mW) | | | | | | | | | | 1700 | 1300 | 600 | 250 |
| V _{DS} (V) | V _{GS} (V) | I _D (A) | V _{GS(th)} min(V) | V _{GS(th)} max(V) | t _{on} typ (ns) | t _{off} typ (ns) | Q _G typ (nC) | ESD protection | R _{DS(on)} typ (mΩ) @ V _{GS} = | | | | |
| | | | | | | | | | 10 V | 4.5 V | 2.5 V | 1.8 V | |
| 12 | 8 | 1.52 | 0.4 | - | 6.5 | 65 | - | - | - | 80 | - | 140 | |
| | | 0.75 | 0.4 | - | 6.5 | 65 | - | - | - | 180 | - | 420 | BSH207 |
| 20 | 12 | 4.8 | 0.55 | 0.95 | 16 | 117 | 10 | - | - | 48 | 65 | - | PMN50XP |
| | | 3.9 | 0.55 | 0.95 | 28 | 101 | 7.6 | - | - | 65 | 90 | - | PMV65XP ¹⁾ |
| 30 | 8 | 0.47 | 0.4 | - | 6.5 | 65 | - | - | - | 660 | - | 1100 | BSH203 |
| | 20 | 3 | 1 | 2.8 | 20 | 50 | - | - | 220 | 330 | - | - | BSP250 |
| 50 | 20 | 0.52 | 1 | - | 6.5 | 65 | - | - | 630 | 890 | - | - | BSH202 |
| | | 0.13 | 0.8 | 2 | 3 | 7 | - | - | 6000 | - | - | - | BSS84 |
| 60 | 20 | 0.3 | 1 | - | 6.5 | 65 | - | - | 2100 | 2700 | - | - | BSH201 |
| 200 | 20 | 0.225 | 0.8 | 2.8 | 5 | 20 | - | - | 10000 | - | - | - | BSP220 |
| 240 | 20 | 0.2 | 0.8 | 2.8 | 5 | 20 | - | - | 10000 | - | - | - | BSS192 |
| 250 | 20 | 0.225 | 0.8 | 2.8 | 5 | 10 | - | - | 10000 | - | - | - | BSP225 |
| 300 | 20 | 0.21 | 1.95 | 2.8 | 5 | 15 | - | - | 17000 ²⁾ | - | - | - | BSP230 |

¹⁾ enhanced thermal capability ²⁾ max values


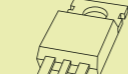




Small-signal MOSFET dual (P-channel) and FET-KYs

types in **bold** represent new products

| Package | | | | | | | | | | | | | SOT1118 | | | |
|-----------------------|---------------------|---------------------|--------------------|----------------------------|----------------------------|--------------------------|---------------------------|-------------------------|----------------|--------------------|--------------------|--------------------------|--|-------|-------|--------------------|
| Size (mm) | | | | | | | | | | | | | 2.0 x 2.0 x 0.65 | | | |
| P _{tot} (mW) | | | | | | | | | | | | | >500 | | | |
| Configuration | V _{DS} (V) | V _{GS} (V) | I _D (A) | V _{GS(th)} min(V) | V _{GS(th)} max(V) | t _{on} typ (ns) | t _{off} typ (ns) | Q _G typ (nC) | ESD protection | I _F (A) | V _R (V) | V _F typ. (mA) | R _{DS(on)} typ (mΩ) @ V _{GS} = | | | |
| | | | | | | | | | | | | | 4.5 V | 2.5 V | 1.8 V | |
| dual | 20 | 8 | 3.3 | 0.5 | 1.5 | tbd | tbd | tbd | 800 V | - | - | - | 65 | 95 | 130 | PMDPB65UP |
| single + schottky | 20 | 8 | 3.3 | 0.5 | 1.5 | tbd | tbd | tbd | 800 V | 2 | 30 | 455 | 65 | 95 | 130 | PMFPB6545UP |
| | | | 3.3 | 0.5 | 1.5 | tbd | tbd | tbd | 800 V | 2.2 | 30 | 325 | 65 | 95 | 130 | PMFPB6532UP |

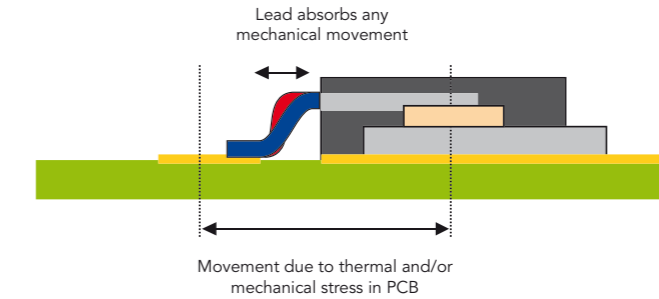
Power MOSFETs single (N-channel)

types in **bold** represent new products

| V_{DS} (max) (V) | $R_{DS(on)}$ (max) (mΩ) @ $V_{gs} = 10$ V | $R_{DS(on)}$ (max) (mΩ) @ $V_{gs} = 4.5$ V | I_D (max) (A) @ 25 °C | Power-SO8 (LFPAK) | TO-220AB (SOT78) | D2PAK (SOT404) | DPAK (SOT428) | SO8 (SOT96-1) | IPAK (SOT533) |
|--------------------|---|--|-------------------------|---|--|---|---|---|---|
| | | | |  |  |  |  |  |  |
| | | | | 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 | 4.9 x 3.9 x 1.75 | 6 x 6.6 x 2.3 |
| 20 | 2.65 | 3.7 | 100 | PH3120L | | | | | |
| | - | 2.7 | 100 | PH2520U | | | | | |
| | - | 5 | 32 | | | | | PSMN006-20K | |
| | - | 16 @ 5 V | 44.7 | | | | PHD38N02LT | | |
| | - | 20 @ 5 V | 10.9 | | | | | PHKD6N02LT | |
| 25 | 1.2 | 1.85 | 100 | PSMN1R2-25YL | | | | | |
| | 1.5 | 2.2 | 100 | PSMN1R5-25YL | | | | | |
| | 2.5 | 3.9 | 100 | PH2525L | | | | | |
| | 2.8 | 4.1 | 100 | PH2625L | | | | | |
| | 4 | - | 99 | PH4025L | | | | | |
| | 4.95 | - | 75 | | | | PHD96NQ03LT | | |
| | 5.5 | 8.2 | 81.7 | PH5525L | | | | | |
| | 5.8 | - | 75 | | | | PSMN005-25D | | |
| | 6 | - | 75 | | | | PHD108NQ03LT | | |
| | 6.3 | 9.5 | 78.7 | PH6325L | | | | | |
| | 6.3 | 10.6 | 75 | | | | PHD97NQ03LT | | |
| | 6.6 | - | 75 | | | | | | PHU97NQ03LT |
| | 9 | 13 | 66 | PH9025L | | | | | |
| | 9 | - | 66.4 | | | | PHD78NQ03LT | | PHU78NQ03LT |
| | 9 | - | 61 | | PHP78NQ03LT | | | | |
| | 9.5 | - | 75 | | | | PHD77NQ03T | | PHU77NQ03T |
| | 10.5 | - | 66 | | | PHB66NQ03LT | PHD66NQ03LT | | |
| | - | 3 | 100 | PH2925U | | | | | |

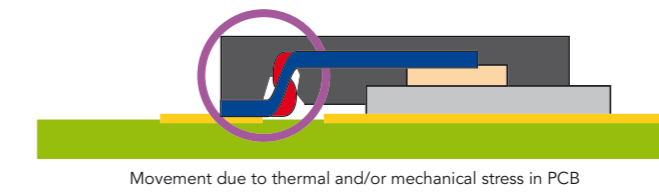
LFPAK for mechanical & thermal ruggedness

NXP LFPAK



LFPAK pins provide compliance and allow for thermal expansion due to temperature difference between the MOSFET & PCB and also mechanical strain due to PCB bending & flexing






QFN Based Power-SO8



QFN sawn or micro-lead pins are fully encapsulated and do not allow for movement. Cracks in the mould compound can lead to moisture ingress & ionic contamination causing early failure of the MOSFET





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 | PSMN1R3-30YL | | | | |
| | 1.7 | 2.1 | 100 | | PSMN1R6-30PL | | | |
| | 1.7 | 2.6 | 100 | PSMN1R7-30YL | | | | |
| | 1.8 | - | - | | PSMN1R8-30PL | | | |
| | 2 | 3.2 | 100 | PSMN2R0-30YL | | | | |
| | 2.1 | 2.8 | 100 | | PSMN2R0-30PL | | | |
| | 2.4 | 3.9 | 100 | PSMN2R5-30YL | | | | |
| | 2.7 | - | - | | PSMN2R7-30PL | | | |
| | 2.8 | - | 75 | | PSMN003-30P | | | |
| | 3 | 4.8 | 100 | PSMN3R0-30YL | | | | |
| | 3.2 | - | 100 | PH3230S | | | | |
| | 3.3 | 4.5 | 100 | PH3330L | | | | |
| | 3.4 | - | - | | PSMN3R4-30PL | | | |
| | 3.5 | 5.6 | 100 | PSMN3R5-30YL | | | | |
| | 3.8 | - | 98 | PH3830L | | | | |
| | 4 | 6.5 | 99 | PSMN4R0-30YL | | | | |
| | 4.3 | 6.2 | 100 | | PSMN4R3-30PL | | | |
| | 4.3 | - | 95.9 | PH4330L | | | | |
| | 4.4 | - | 30.4 | | | | | PHK31NQ03LT |
| | 4.8 | - | 84 | PH4830L | | | | |
| | 5 | 8 | 84 | PSMN5R0-30YL | | | | |
| | 5.5 | - | 20 @ 80 °C | | | | | PSMN005-30K |
| | 5.5 | - | 75 | | PHP101NQ03LT | PHD101NQ03LT | | PHU101NQ03LT |
| | 5.7 | - | 80 | PH5330E | | | | |
| | 5.9 | - | 76.7 | PH8030L | | | | |
| | 6 | 9.7 | 76.7 | PH6030L | | | | |
| | 6 | 9.7 | 73 | PSMN6R0-30YL | | | | |
| | 6.5 | - | 23.7 | | | | | PHK28NQ03LT |
| 7 | 11.3 | 65 | PSMN7R0-30YL | | | | | |
| 7.9 | 11 | 68 | PH7030L | | | | | |
| 8 | 13.8 | 55 | PSMN9R0-30YL | | | | | |
| 8.2 | - | 67 | PH8230E | | | | | |
| 8.9 | - | 20.3 | | | | | PHK18NQ03LT | |
| 9 | 12.5 | 63 | PH9030L | | | | | |
| 9.9 | - | 63 | PH9930L | | | | | |

Power MOSFETs single (N-channel)

types in **bold** represent new products


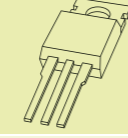
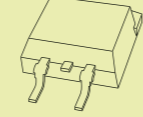

| V_{DS} (max) (V) | R_{DSon} (max) (mΩ) @ $V_{gs} = 10\text{ V}$ | R_{DSon} (max) (mΩ) @ $V_{gs} = 4.5\text{ V}$ | I_D (max) (A) @ 25 °C | TO-220AB (SOT78) | D2PAK (SOT404) | DPAK (SOT428) | SO8 (SOT96-1) |
|--------------------------|---|--|---|---|---|---|---|
| | | | |  |  |  |  |
| | | | | 15.6 x 10 x 4.4 | 11 x 10 x 4.3 | 6 x 6.6 x 2.3 | 4.9 x 3.9 x 1.75 |
| 30 | 10 | - | 75 | | | PHD71NQ03LT | |
| | 13 | - | 68.9 | | | PHD63NQ03LT | |
| | 13.5 | 20 | 10 | | | | SI4410DY |
| | 17 | - | 43.4 | PHP36N03LT | | PHD36N03LT | |
| | 20 | 26 | 13.8 | | | | PHK13N03LT |
| | 20 | 26 | 10.4 | | | | PHKD13N03LT |
| | 22.0 | - | - | PSMN022-30PL | | | |
| | 30 | - | 6.3 | | | | PHN203 |
| | 100 | 200 | 3.4 | | | | PHN210 |
| | 100 | 200 | 3.4 | | | | PHN210T |
| | - | 14 | 11.8 | | | | PHK12NQ03LT |
| | 36 | 4 | - | 75 | | PSMN004-36B | |

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) | 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 | |
| 40 | 2 | - | - | PSMN2R0-40YS | | | | |
| | 2.1 | - | 100 | | PSMN2R2-40PS | | | |
| | 2.8 | - | - | | PSMN2R8-40PS | | | |
| | 2.8 | - | 100 | PSMN2R6-40YS | | | | |
| | 3.3 | - | - | PSMN3R3-40YS | | | | |
| | 4.1 | - | 94.5 | PH4840S | | | | |
| | 4.2 | - | 100 | PSMN4R0-40YS | | | | |
| | 4.3 | - | 75 | | PHP176NQ04T | | | |
| | 4.6 | - | 100 | | PSMN4R5-40PS | | | |
| | 5.2 | - | 75 | | PHP143NQ04T | | | |
| | 5.7 | - | - | PSMN5R8-40YS | | | | |
| | 7.6 | - | 77 | | PSMN8R0-40PS | | | |
| | 8 | - | 75 | | PHP101NQ04T | PHB101NQ04T | | |
| | 8.6 | - | 70 | PSMN8R3-40YS | | | | |
| | 14 | - | - | PSMN014-40YS | | | | |
| | 55 | 3.7 | - | 75 | | PHP191NQ06LT | PHB191NQ06LT | |
| | | 5.8 | - | 75 | | PSMN005-55P | PSMN005-55B | |
| | | 7 | - | 75 | | PHP110NQ06LT | PHB110NQ06LT | |
| 7.1 | | - | 75 | | PHP119NQ06T | PHB119NQ06T | | |
| 8.3 | | 9.9 | 62.5 | PH955L | | | | |
| 10.5 | | - | 75 | | | | PSMN010-55D | |
| 17.3 | | 21 | 40 | PH1955L | | | | |
| 20 | | - | 54 | | PHP54N06T | | | |
| 36 | | 45 | 24 | PH3855L | | | | |
| 70 | | - | 19 | | PHP21N06LT | PHB21N06LT | PHD21N06LT | |
| 75 | | - | 21 | | PHP21N06T | | | |
| 75 | | - | 20.3 | | PHP20N06T | PHB20N06T | | |
| 77 | - | 18 | | | | PHD20N06T | | |

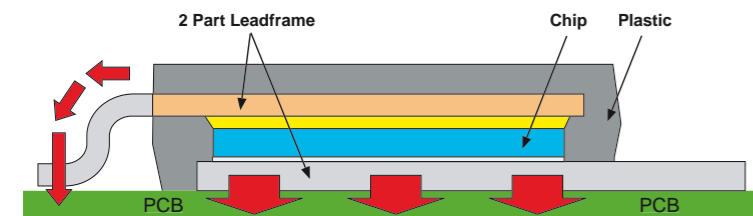
Power MOSFETs single (N-channel)


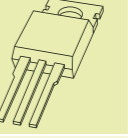
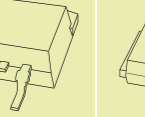
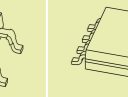

types in **bold** represent new products

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

Power-SO8 (LFPAK) Design

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



| V _{DS} (max) (V) | R _{DSon} (max) (mΩ) @ V _{gs} = 10 V | R _{DSon} (max) (mΩ) @ V _{gs} = 4.5 V | I _D (max) (A) @ 25 °C | Power-SO8 (LFPAK) | TO-220AB (SOT78) | D2PAK (SOT404) | DPAK (SOT428) | SO8 (SOT96-1) |
|---------------------------------|--|---|---|---|---|---|---|---|
| | | | |  |  |  |  |  |
| | | | | 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 | 4.9 x 3.9 x 1.75 |
| 100 | 8.8 | - | 75 | | PSMN009-100P | PSMN009-100B | | |
| | 15 | - | 75 | | PSMN015-100P | PSMN015-100B | | |
| | 23 | - | 34.3 | | PH20100S | | | |
| | 25 | - | 47 | | | PHP45NQ10T | PHB45NQ10T | |
| | 25 | - | 47 | | | PHP45NQ10TA | | |
| | 25 | - | 47 | | | | | PSMN025-100D |
| | 28 | - | 47 | | | | PHB47NQ10T | |
| | 28 | - | 11.6 | | | | | PHK12NQ10T |
| | 38 | - | 6.3 @ 80 °C | | | | | PSMN038-100K |
| | 40 | - | 35 | | | | | PHD34NQ10T |
| | 50 | - | 28 | | | | PHB27NQ10T | |
| | 90 | - | 18 | | | PHP18NQ10T | PHB18NQ10T | PHD18NQ10T |
| | 90 | - | 3 | | | | | |
| | 90 | - | 3 | | | | | PHKD3NQ10T |
| | 105 | 25 | - | 47 | | PHP45NQ11T | | |
| 110 | 15 | - | 75 | | PSMN015-110P | | | |
| | 40 | - | 35 | | PHP34NQ11T | | | |
| | 50 | - | 27.6 | | PHP27NQ11T | | | |
| | 70 | - | 23 | | PHP23NQ11T | | | |
| | 90 | - | 18 | | PHP18NQ11T | | | |

NXP Power solutions make your PC Energy Efficient

MOSFETs for high efficiency power management


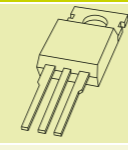
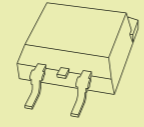
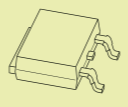
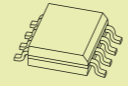

Smaller, faster, cooler

- ▶ Class leading LFPAK package with state of the art Trench 6 silicon technology
 - **Smaller:** Power-SO8 form factor LFPAK
 - **Faster:** Best in class switching performance
 - **Cooler:** Higher efficiency equals lower temperatures
 - **Easier:** easier to use in development and production than other Power-SO8 packages

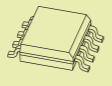
High performance MOSFETs for DC-DC converters, OR-ing and load switching

- ▶ Supported by Secure supply/Capacity availability (Silicon & Package)

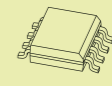
Power MOSFETs single (N-channel)

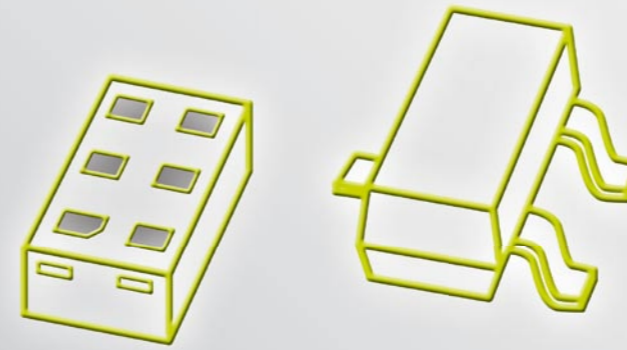
| V_{DS} (max) (V) | R_{DSon} (max) (mΩ) @ $V_{gs} = 10\text{ V}$ | R_{DSon} (max) (mΩ) @ $V_{gs} = 4.5\text{ V}$ | I_D (max) (A) @ 25 °C | Power-SO8 (LFPAK) | TO-220AB (SOT78) | D2PAK (SOT404) | DPAK (SOT428) | SO8 (SOT96-1) | HVSON8 (SOT873-1) |
|--------------------------|---|--|----------------------------------|---|---|--|--|---|---|
| | | | |  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 |  4.9 x 3.9 x 1.75 |  3.3 x 3.3 x 0.85 |
| 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 | | | | | PHK5NQ15T | |
| | 85 | - | 3.5 @ 80 °C | | | | | PSMN085-150K | |
| 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 | | | | | PSMN165-200K | |
| | 294 | - | 8.8 | | | | | | PML260SN |
| 400 | - | 8.7 | | PHP9NQ20T | | PHD9NQ20T | | | |
| 220 | 386 | - | 7.3 | | | | | PML340SN | |

Power MOSFETs single (P-channel)

| 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 | 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 |

Power MOSFETs dual (N- and P-channel)

| 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 | Configuration | SO8 (SOT96-1) |
|--------------------------|---|--|----------------------------------|--------------------|---|
| | | | | |  4.9 x 3.9 x 1.75 |
| 20 | - | 20 @ 5 V | 10.9 | dual N-channel | PHKD6N02LT |
| 30 | 20 | 26 | 10.4 | dual N-channel | PHKD13N03LT |
| 30 | 30 | - | 6.3 | dual N-channel | PHN203 |
| 30 | 100 | 200 | 3.4 | dual N-channel | PHN210 PHN210T |
| 30, -30 | 100, 250 | - | 3.5, -2.3 @ 80 °C | complementary pair | PHC21025 |
| -30 | 250 | - | -2.3 @ 80 °C | dual P-channel | PHP225 |
| 100 | 90 | - | 3 | dual N-channel | PHKD3NQ10T |
| 300, -300 | 6000, 17000 | - | 0.34, -0.235 @ 80 °C | complementary pair | PHC2300 |



Packages

| | |
|---|-----|
| Package cross reference | 88 |
| Packing methods | 90 |
| Minimized outline drawings and reflow soldering footprint | 96 |
| Package overview | 107 |

Package cross reference

types in **bold** represent new products

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

types in **bold** represent new products

| NXP | Industry standard names | Size (l x w x h) | Pins/leads | P _{tot} (mW) | Package | Competitor synonyms | | | | | | | |
|----------------|-------------------------|-------------------|------------|-----------------------|---------|---------------------|---------|------------|------------|----------|------------|---------|------------|
| | | | | | | Rohm | Toshiba | ON Semi | Renesas | Infineon | Diodes Inc | KEC | Vishay |
| SOT353 | SC-88A | 2.0 x 1.25 x 0.95 | 5 | 300 | | UMD5/UMT5 | USV | SC-88A | CMPAK-5(T) | | | USV | SOT353 |
| SOT665 | - | 1.6 x 1.2 x 0.55 | 5 | 300 | | EMD5/EMT5 | ESV | SOT-553 | VSON-5 | | | TESV | |
| SOT1082 | VSON6U | 2.3 x 3.5 x 0.85 | 6 | - | | | | | | | | | |
| SOT363 | SC-88 | 2.0 x 1.25 x 0.95 | 6 | 300 | | UMD6/UMT6 | US6 | SC-88 | CMPAK-6 | SOT363 | SOT-363 | US6 | SOT363 |
| SOT457 | SC-74 | 2.9 x 1.5 x 1.0 | 6 | 750 | | SMD6/SMT6 | SM6 | SC-74 | TSOP-6 | SC74 | | TSOP6 | TSOP-6 |
| SOT666 | - | 1.6 x 1.2 x 0.55 | 6 | 300 | | EMD6/EMT6 | ES6 | SOT-563 | SMFPAK-6 | SOT666 | SOT563 | TES6 | SC89-6lead |
| SOT1118 | - | 2.0 x 2.0 x 0.65 | 6 | 1300 | | | | 6 Lead DFN | | | DFN2020B-6 | | |
| SOT886 | XSON6 | 1.45 x 1.0 x 0.5 | 6 | 250 | | | | | | | | | |
| SOT891 | XSON6 | 1.0 x 1.0 x 0.5 | 6 | - | | | | | CS6 | | | | |
| SOT505 | TSSOP8 | 3.0 x 3.0 x 1.1 | 8 | - | | | | | | TSSOP-8 | | | TSSOP8 |
| SOT873 | HVSON8 | 3.3 x 3.3 x 0.85 | 8 | 1500 | | | | | | | | | |
| SOT96 | SO8 | 4.9 x 3.9 x 1.75 | 8 | 1500 | | SOP8 | FM8 | SOIC-8 NB | SOP-8 | | | FLP-8 | SO8 |
| SOT983 | HXSON8 | 1.7 x 1.35 x 0.5 | 8 | - | | | | | | | TSSOP38 | | |
| SOT1059 | XSON10U | 1.0 x 2.5 x 0.5 | 10 | - | | | | | | | | | |
| SOT552 | TSSOP10 | 3.0 x 3.0 x 1.1 | 10 | - | | | | | | Micro10 | | TSSOP10 | |
| SOT984 | HXSON12 | 2.5 x 1.35 x 0.5 | 12 | - | | | | | | | | | |
| SOT108 | SO14 | 8.65 x 3.9 x 1.75 | 14 | - | | SOP14 | | | | | DSO14 | | |
| SOT402 | TSSOP14 | 5.0 x 4.4 x 1.1 | 14 | - | | | | | | | | | |
| SOT109 | SO16 | 9.9 x 3.9 x 1.75 | 16 | - | | SOP16 | | SOIC-16 | | | DSO16 | | FLP-16 |
| SOT519 | SSOP16 | 4.9 x 3.9 x 1.73 | 16 | - | | | | | | | | | |
| SOT985 | HXSON16 | 3.3 x 1.35 x 0.5 | 16 | - | | | | | | Micro10 | | TSSOP10 | |
| SOT163 | SO20 | 12.8 x 7.5 x 2.65 | 20 | 1250 | | | | | | | | | |
| SOT360 | TSSOP20 | 6.5 x 4.4 x 1.1 | 20 | - | | | | | | TSSOP20 | | TSSOP20 | |
| SOT510 | TSSOP38 | 9.7 x 4.4 x 1.1 | 38 | - | | | | | | | | TSSOP38 | |
| SOT357 | TQFP64 | 10 x 10 x 1 | 64 | - | | | | | | | | | |

Packing methods

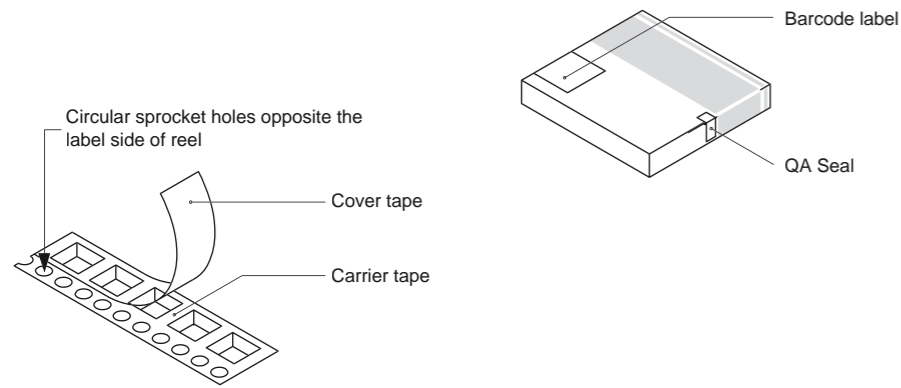
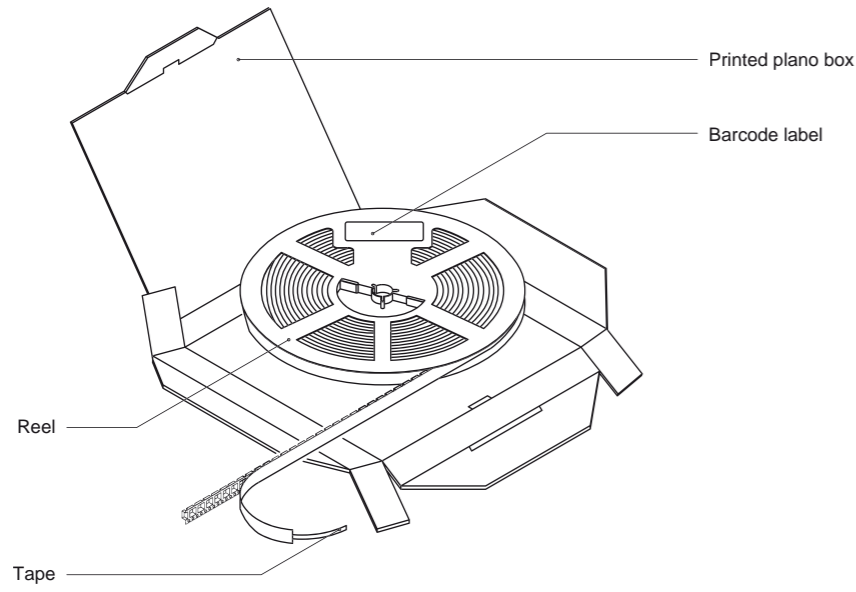
types in **bold** represent new products

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

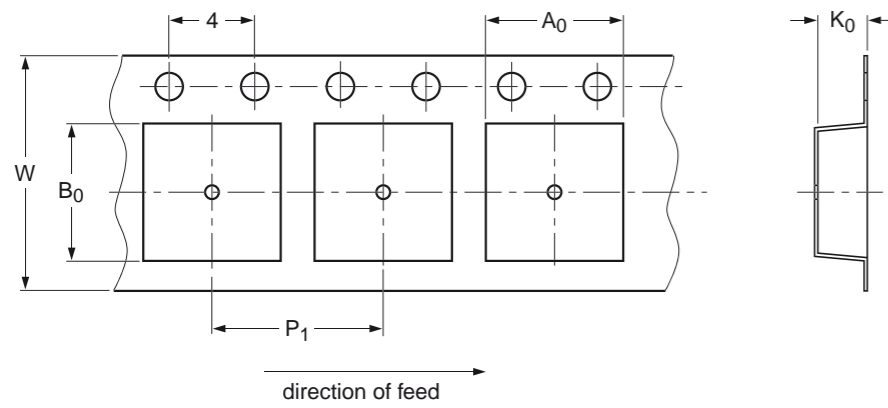
types in **bold** represent new products

| Package | Packing method and tape dimension | Reel dimension (d x w) | Taping | Package | Packing quantity | | | | | | | | |
|----------------|-----------------------------------|------------------------|--------|---------|------------------|------|------|------|------|------|------|-------|------|
| | | | | | 1000 | 1400 | 2500 | 3000 | 4000 | 5000 | 8000 | 10000 | |
| SOT89 | 8 mm pitch, 12 mm tape and reel | 180 x 12 mm | T1 | | -115 | - | - | - | - | - | - | - | - |
| | 8 mm pitch, 12 mm tape and reel | 330 x 12 mm | T1 | | - | - | - | - | -135 | - | - | - | - |
| | 8 mm pitch, 12 mm tape and reel | 180 x 12 mm | T3 | | -146 | - | - | - | - | - | - | - | - |
| | 8 mm pitch, 12 mm tape and reel | 180 x 12 mm | T4 | | -147 | - | - | - | - | - | - | - | - |
| SOT143B | 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 |
| SOT223 | 8 mm pitch, 12 mm tape and reel | 180 x 12 mm | | | -115 | - | - | - | - | - | - | - | - |
| | 8 mm pitch, 12 mm tape and reel | 330 x 12 mm | | | - | - | - | - | -135 | - | - | - | - |
| SOT353 | 4 mm pitch, 8 mm tape and reel | 180 x 8 mm | T1 | | - | - | - | -115 | - | - | - | - | - |
| | 4 mm pitch, 8 mm tape and reel | 286 x 8 mm | T1 | | - | - | - | - | - | - | - | - | -135 |
| | 4 mm pitch, 8 mm tape and reel | 180 x 8 mm | T2 | | - | - | - | - | -125 | - | - | - | - |
| | 4 mm pitch, 8 mm tape and reel | 286 x 8 mm | T2 | | - | - | - | - | - | - | - | - | -165 |
| SOT665 | 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 | - | - | - | - |
| SOT363 | 4 mm pitch, 8 mm tape and reel | 180 x 8 mm | T1 | | - | - | - | -115 | - | - | - | - | - |
| | 4 mm pitch, 8 mm tape and reel | 286 x 8 mm | T1 | | - | - | - | - | - | - | - | - | -135 |
| | 4 mm pitch, 8 mm tape and reel | 180 x 8 mm | T2 | | - | - | - | - | -125 | - | - | - | - |
| | 4 mm pitch, 8 mm tape and reel | 286 x 8 mm | T2 | | - | - | - | - | - | - | - | - | -165 |
| SOT457 | 4 mm pitch, 8 mm tape and reel | 180 x 8 mm | T1 | | - | - | - | -115 | - | - | - | - | - |
| | 4 mm pitch, 8 mm tape and reel | 286 x 8 mm | T1 | | - | - | - | - | - | - | - | - | -135 |
| | 4 mm pitch, 8 mm tape and reel | 180 x 8 mm | T2 | | - | - | - | - | -125 | - | - | - | - |
| | 4 mm pitch, 8 mm tape and reel | 286 x 8 mm | T2 | | - | - | - | - | - | - | - | - | -165 |
| SOT666 | 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 | - | - | - | - |
| SOT1118 | 4 mm pitch, 8 mm tape and reel | 180 x 8 mm | | | - | - | - | -115 | - | - | - | - | - |
| SOT886 | 4 mm pitch, 8 mm tape and reel | 180 x 8 mm | T1 | | - | - | - | - | - | - | -115 | - | - |
| | 4 mm pitch, 8 mm tape and reel | 180 x 8 mm | T4 | | - | - | - | - | - | - | -132 | - | - |
| SOT891 | 4 mm pitch, 8 mm tape and reel | 180 x 8 mm | T4 | | - | - | - | - | - | - | -132 | - | - |
| SOT505 | 8 mm pitch, 12 mm tape and reel | 330 x 12 mm | | | - | - | -118 | - | - | - | - | - | - |
| SOT873 | 8 mm pitch, 12 mm tape and reel | 180 x 12 mm | | | - | -118 | - | - | - | - | - | - | - |
| SOT96 | 8 mm pitch, 12 mm tape and reel | 180 x 12 mm | | | -115 | - | - | - | - | - | - | - | - |
| | 8 mm pitch, 12 mm tape and reel | 330 x 12 mm | | | - | - | -118 | - | - | - | - | - | - |

Tape and reel pack for SMD packages



Carrier tape - tape and reel

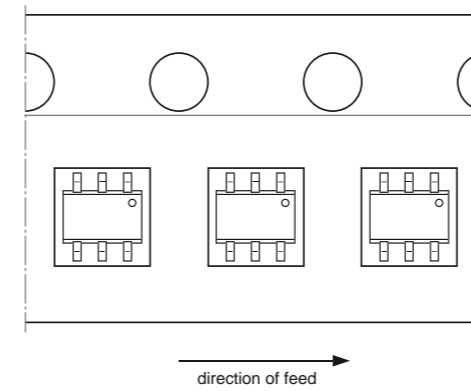


P1 = pitch (see table packing methods)
W = tape width (see table packing methods)

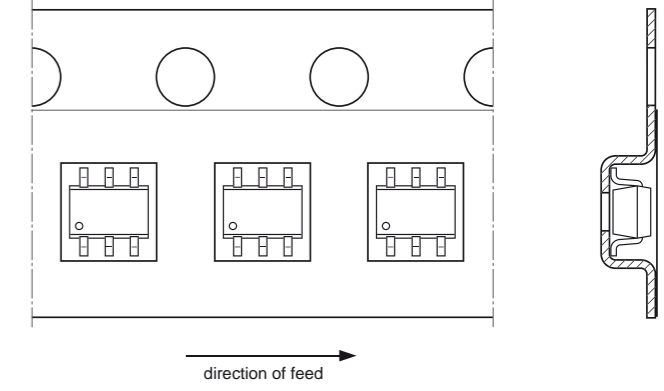
Compartment width (A_0), length (B_0) and depth (K_0) depending on package

Product orientation (tape and reel pack) T1-T4

T1 taping

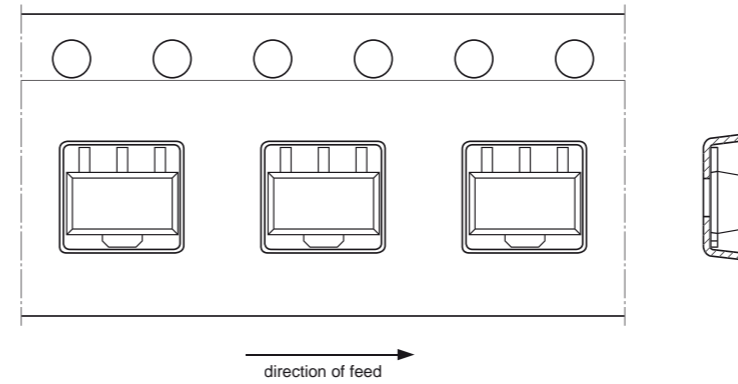


T2 taping

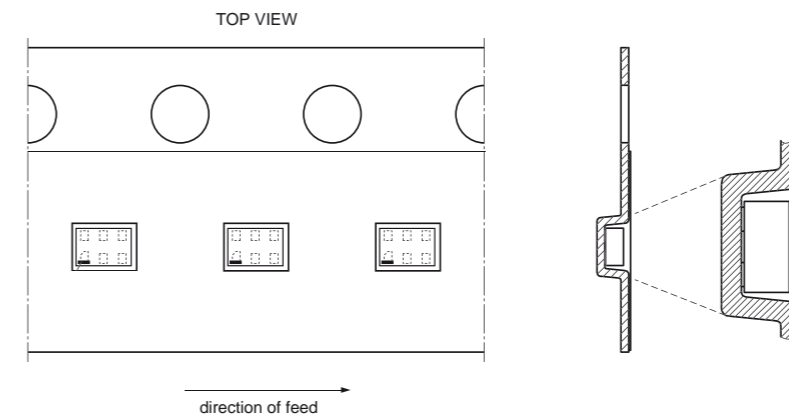


T3 taping

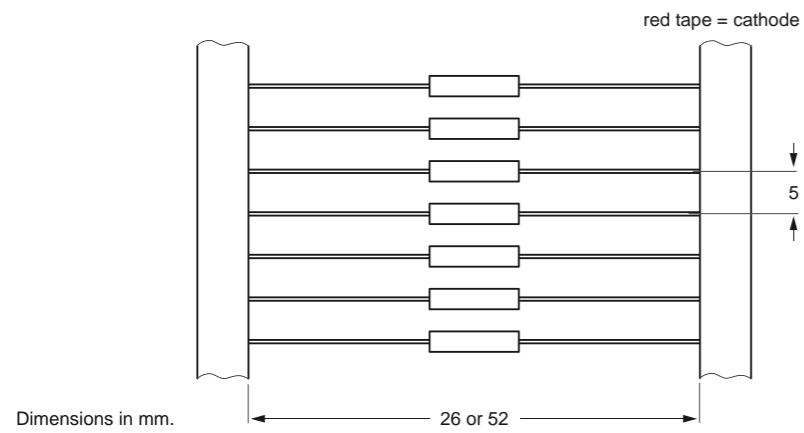
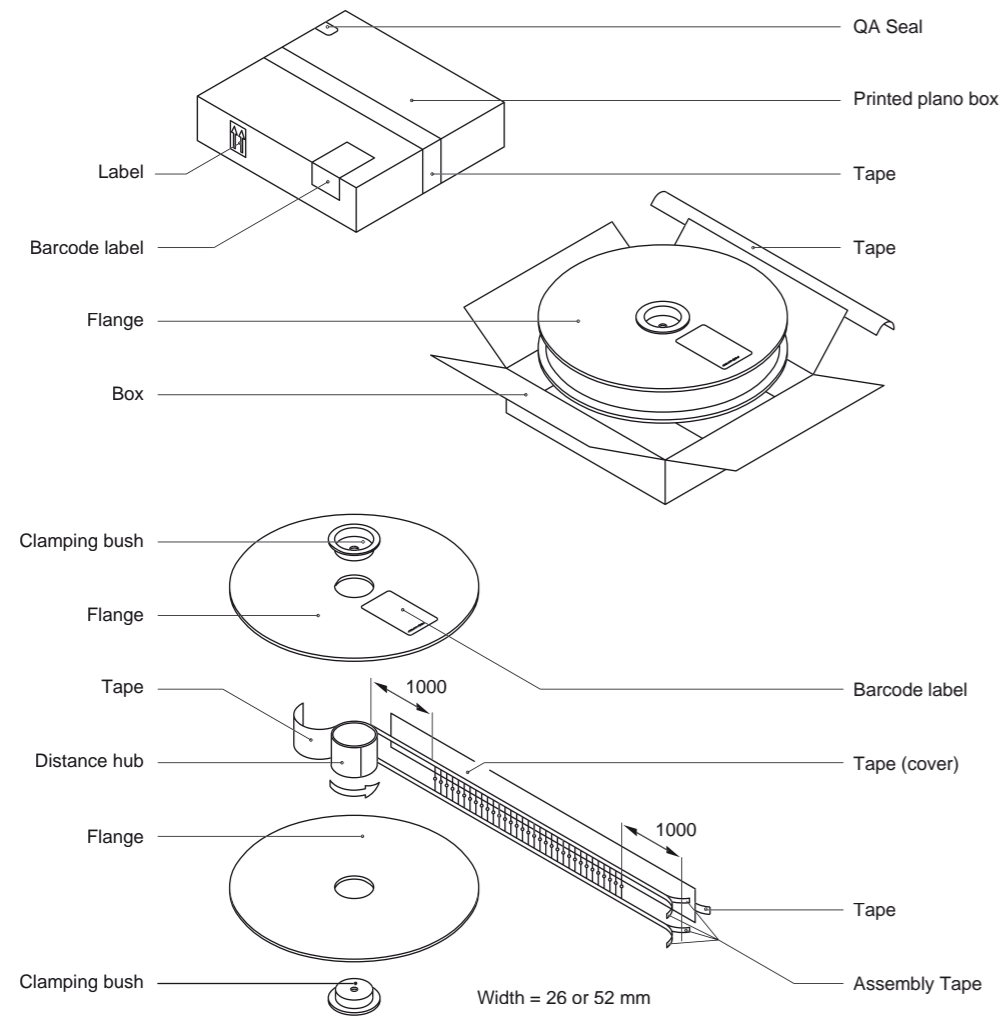
Standard product orientation SOT89 (T3)



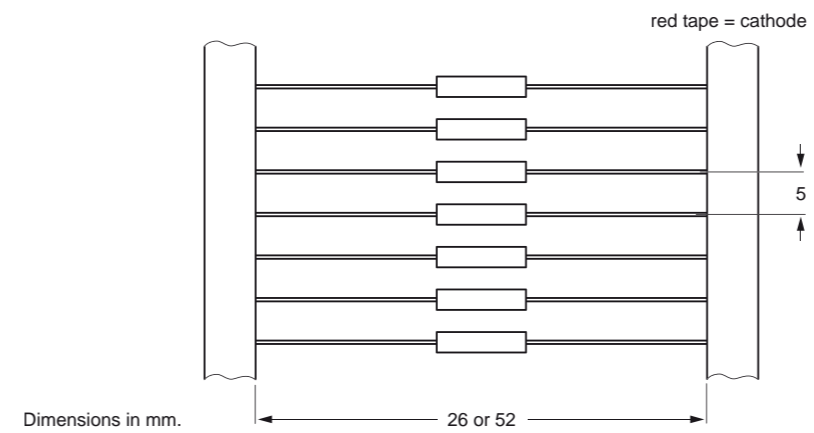
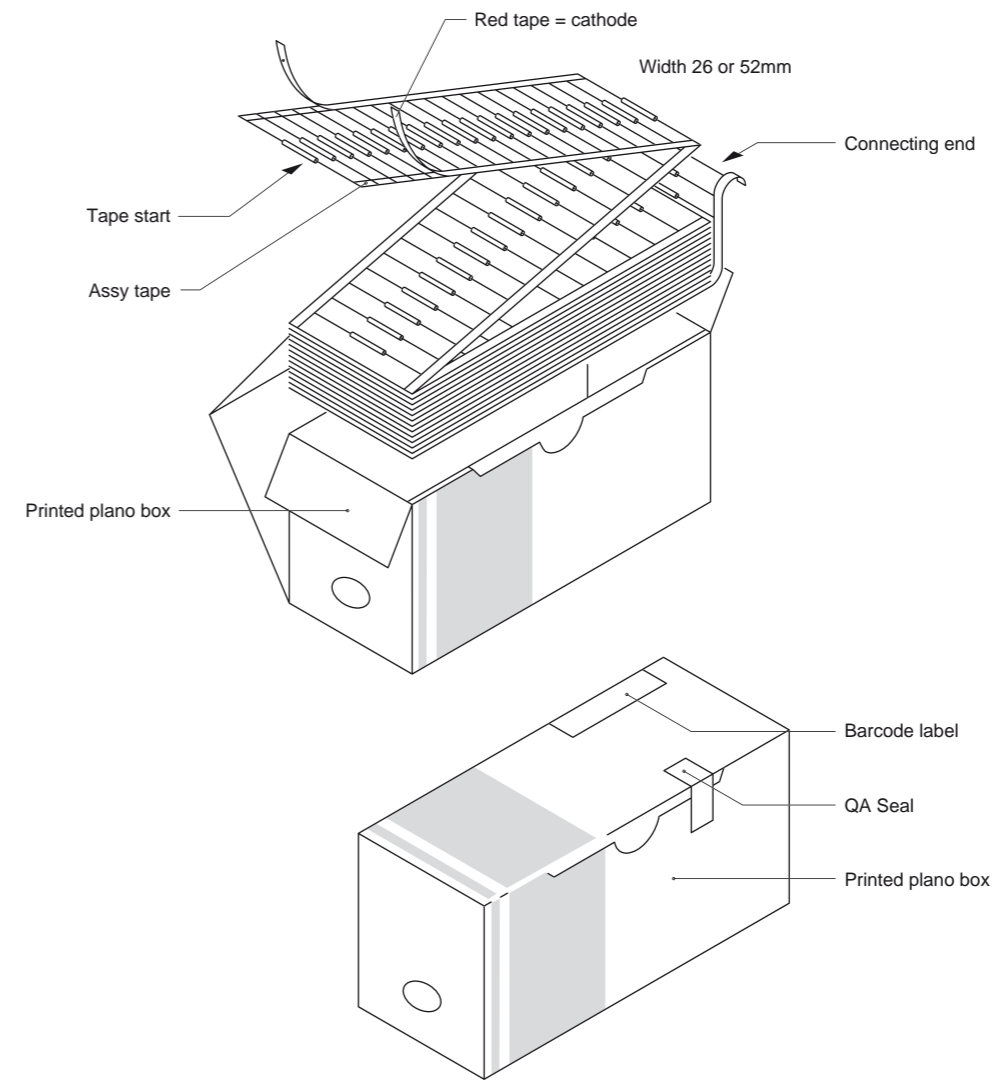
T4 taping



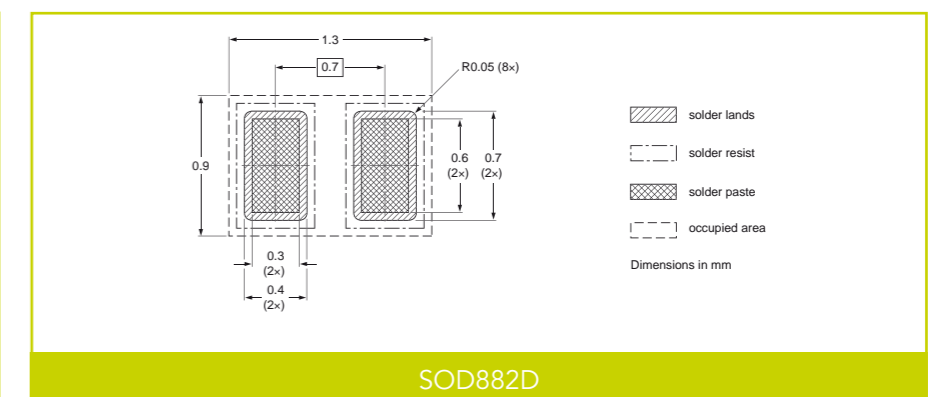
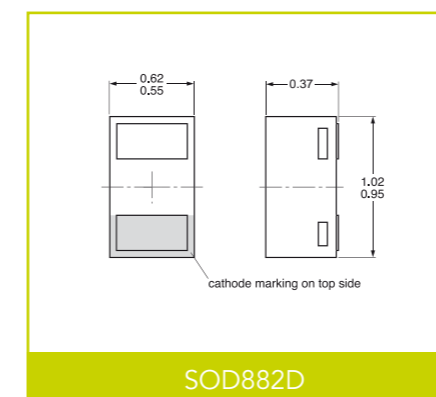
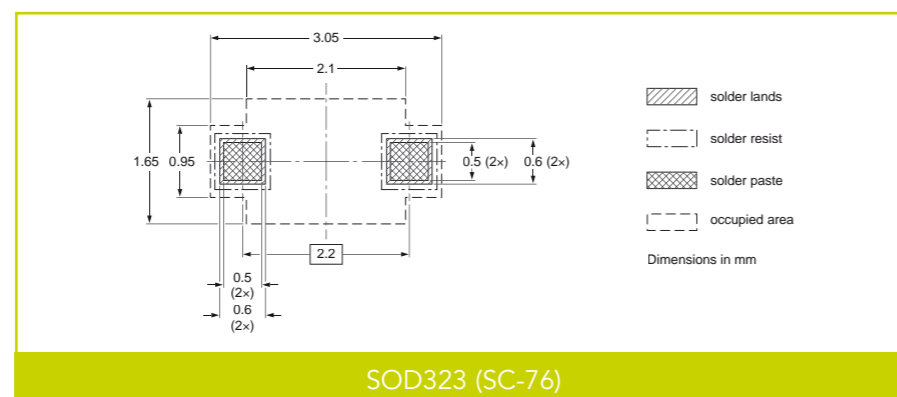
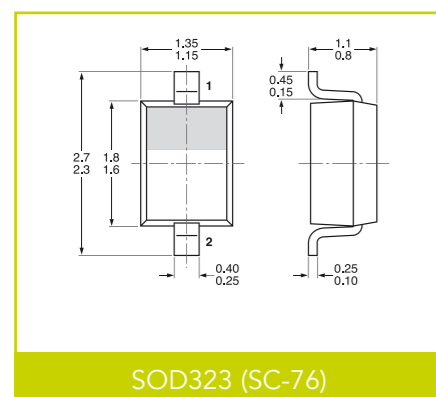
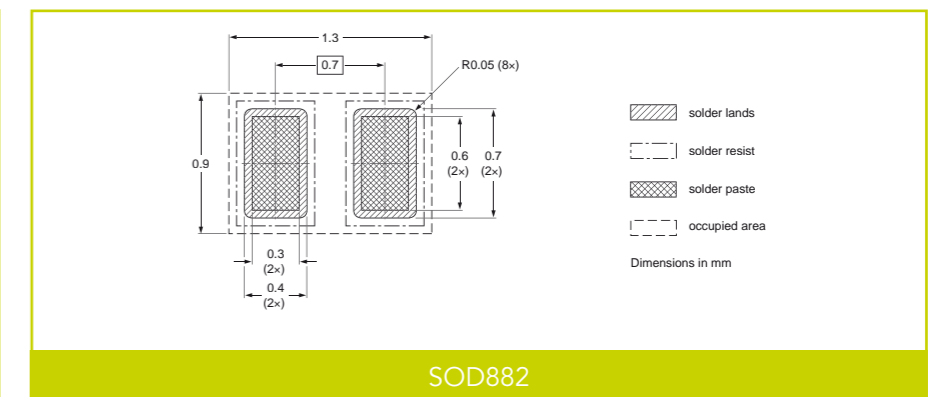
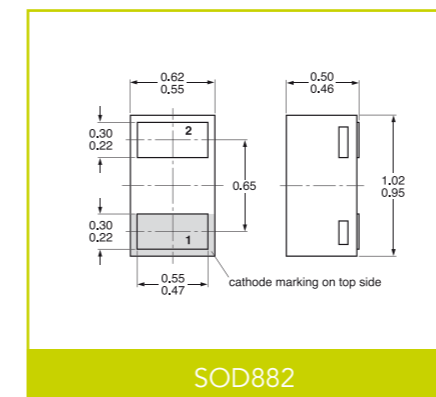
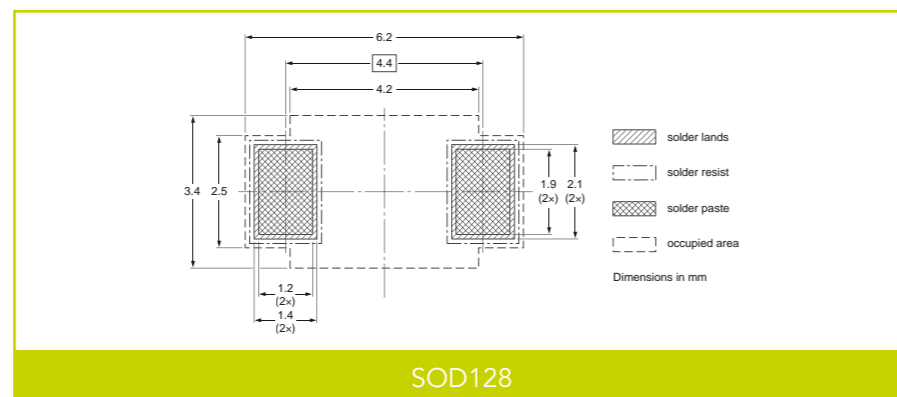
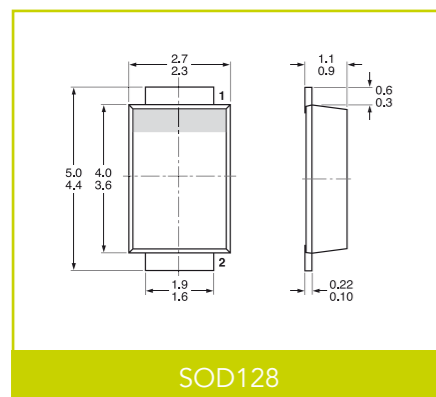
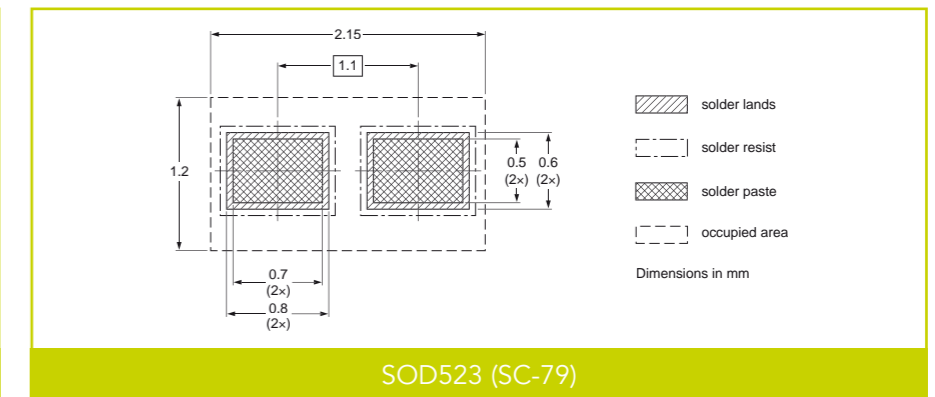
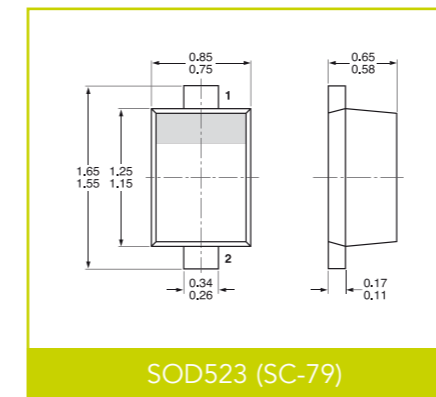
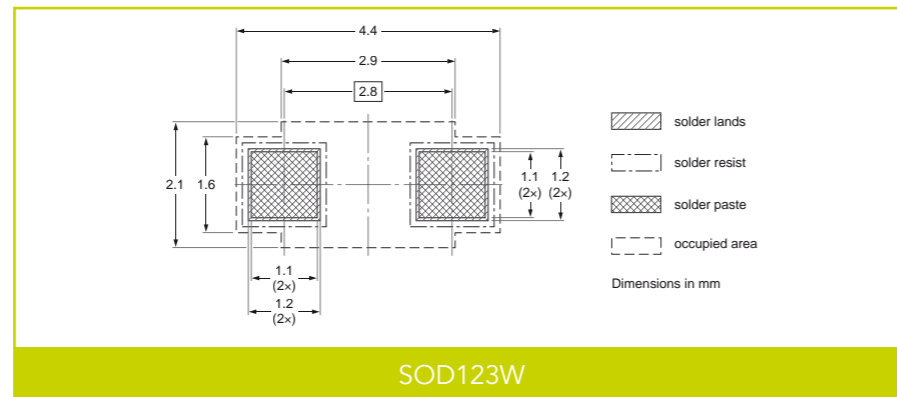
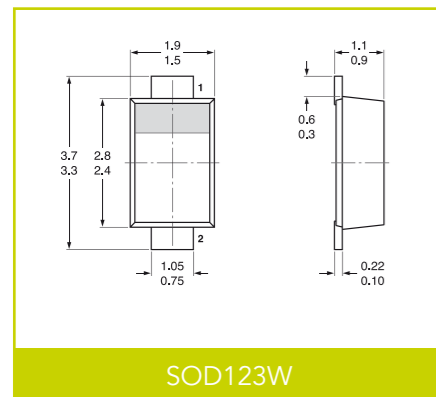
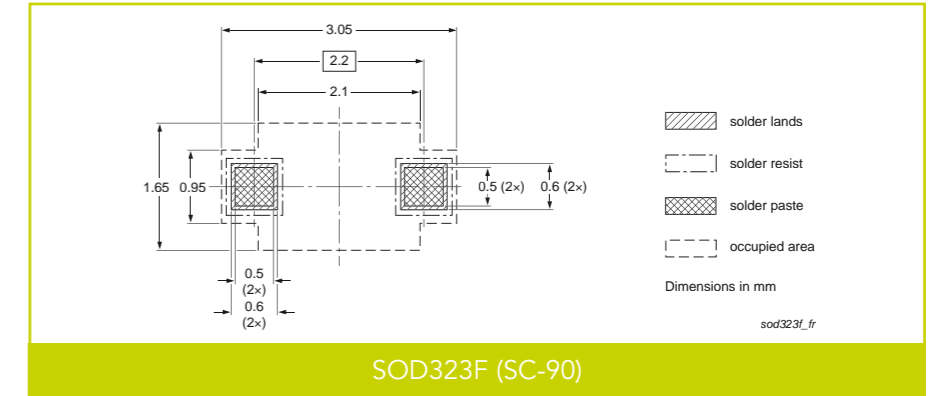
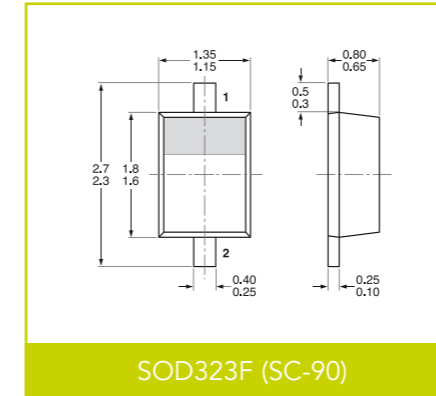
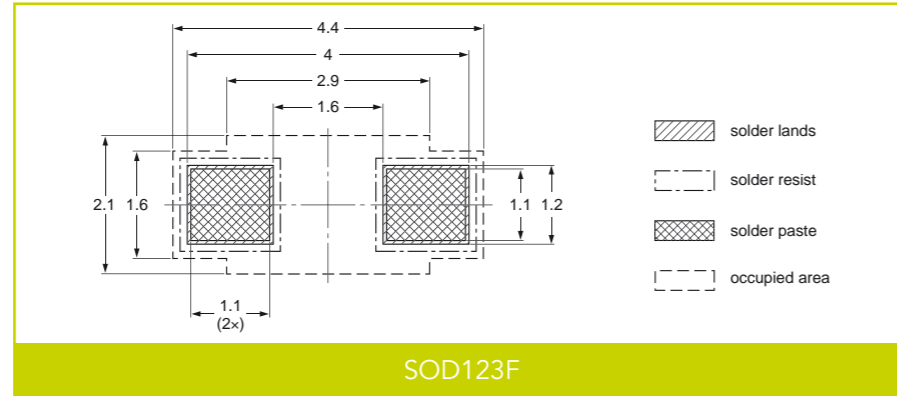
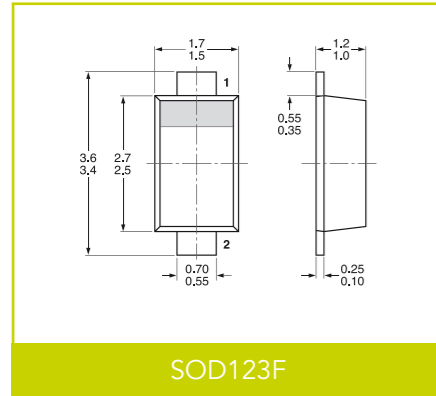
Reel pack axial tape for glass diodes



Ammo pack axial tape for glass diodes

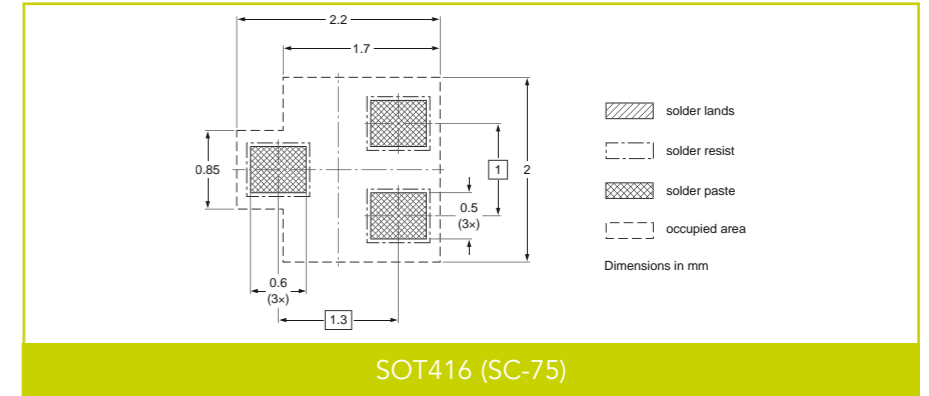
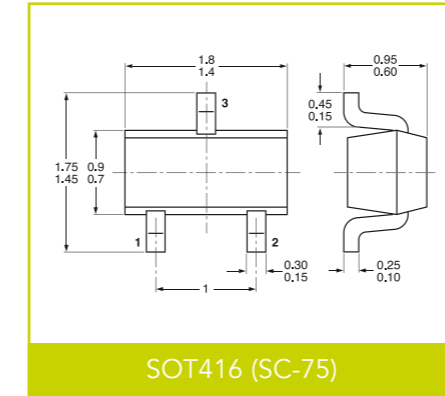
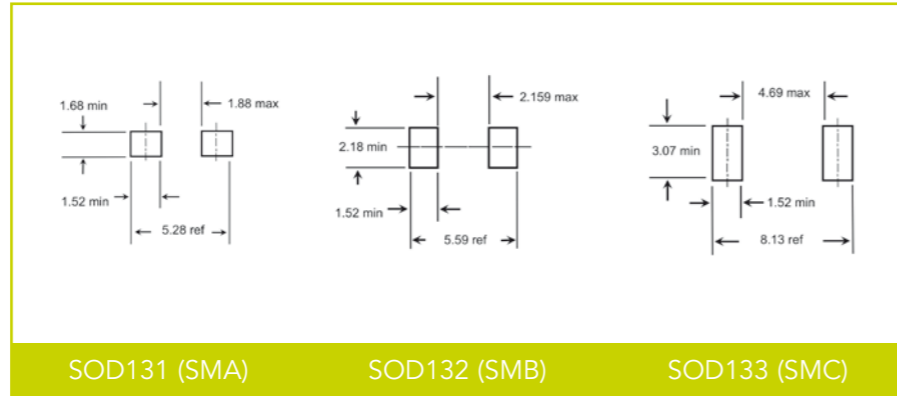
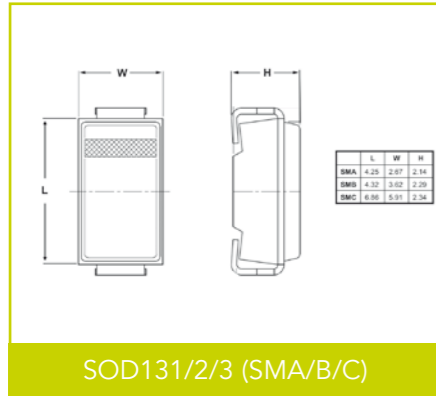


2-Pin SMD Packages

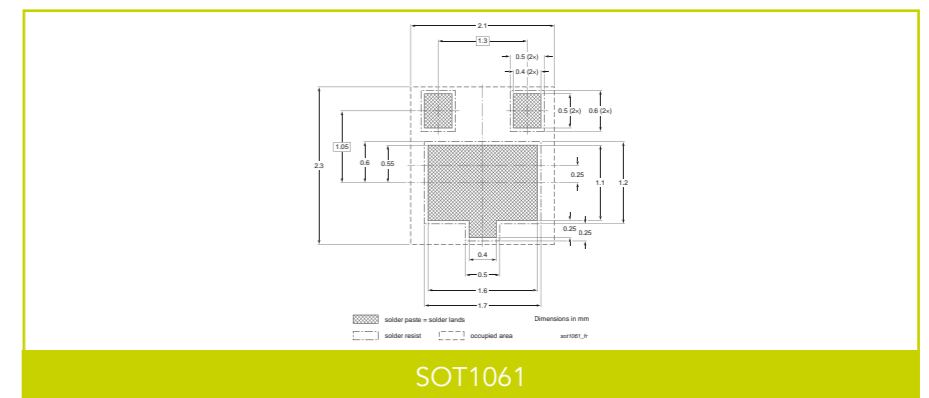
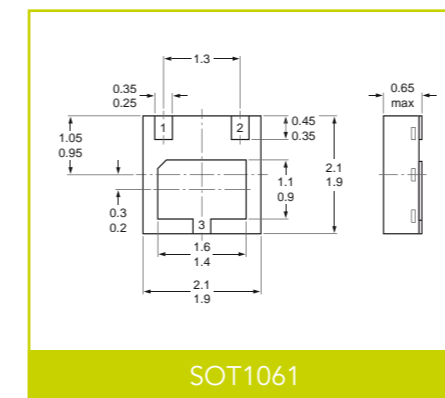
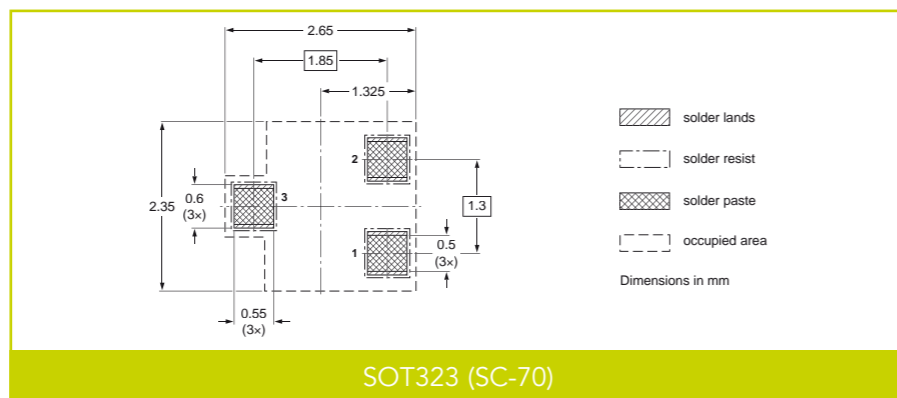
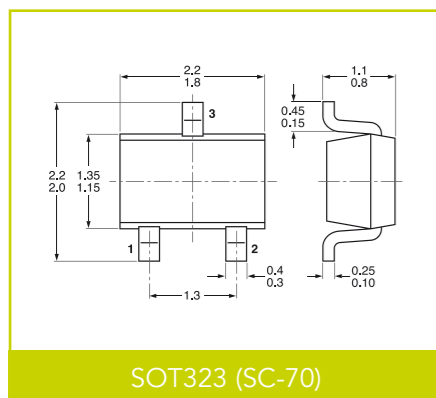
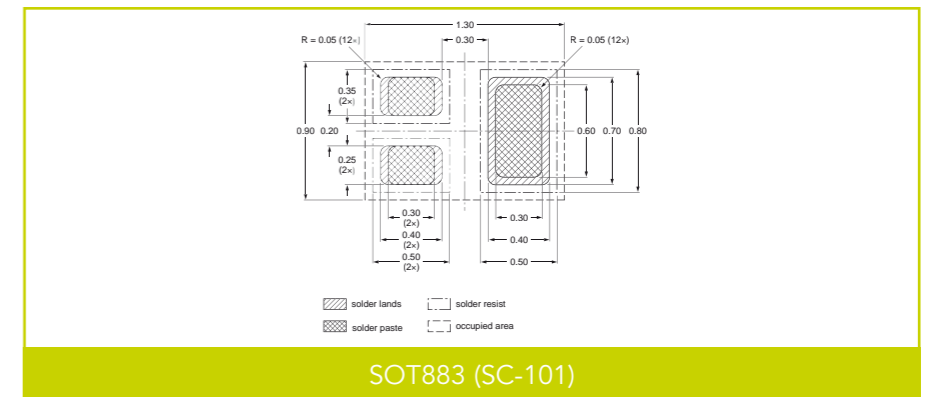
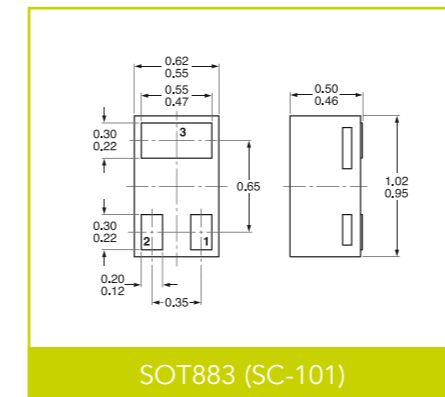
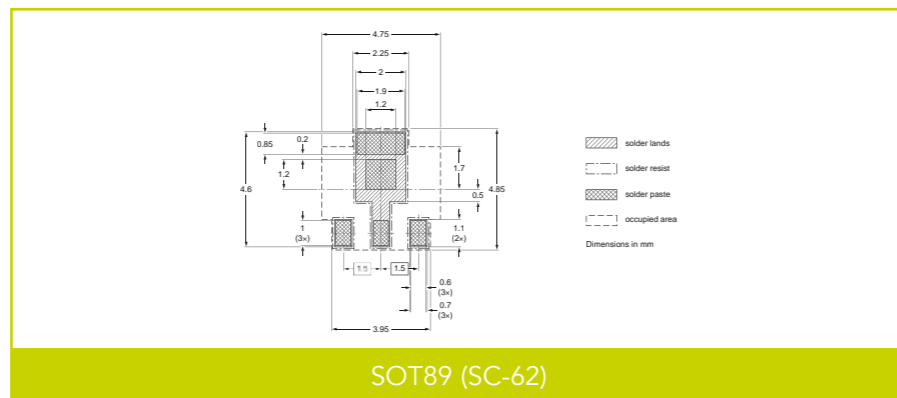
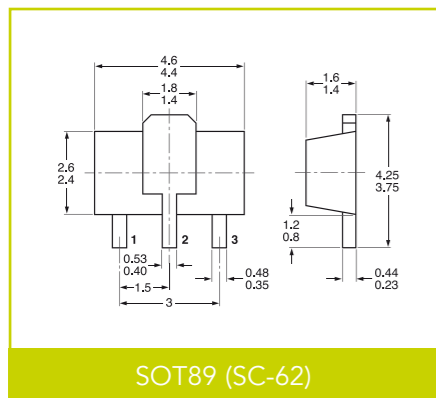
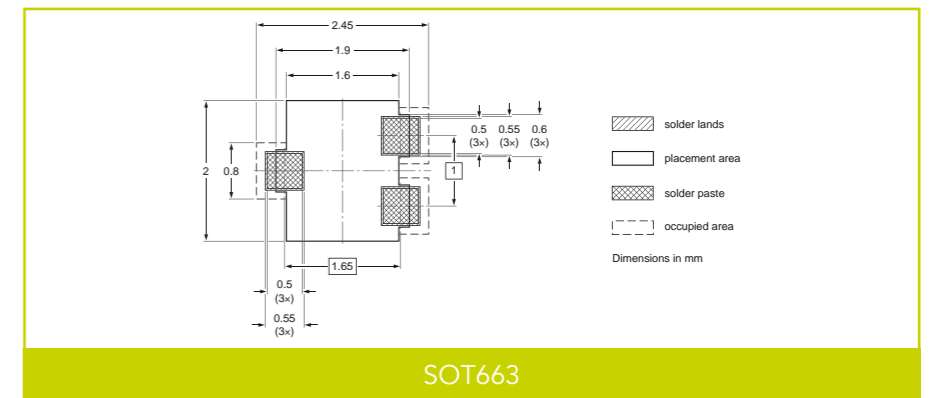
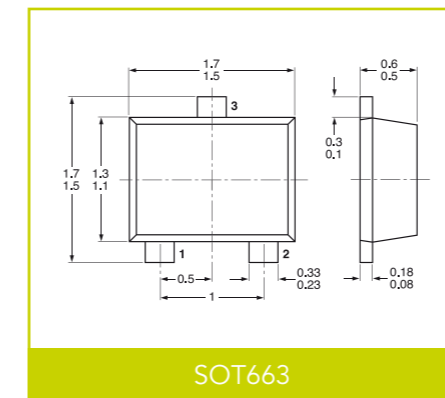
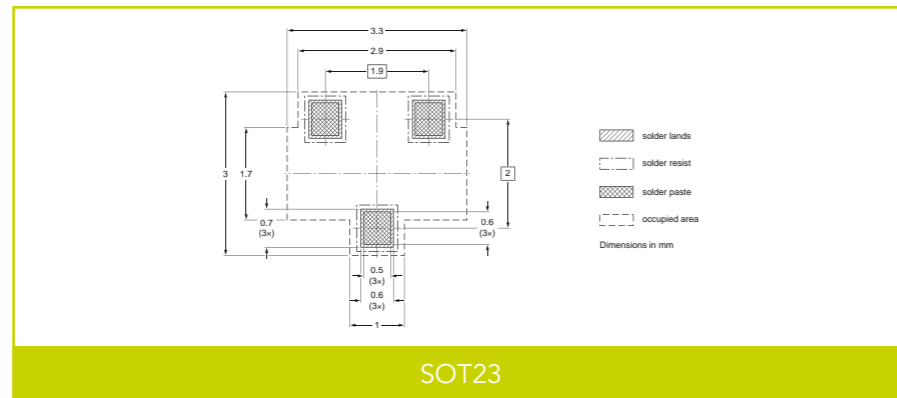
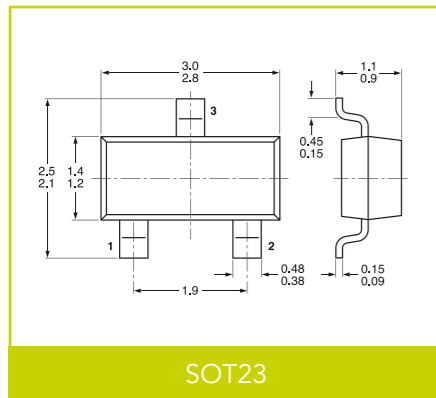


Dimensions in mm

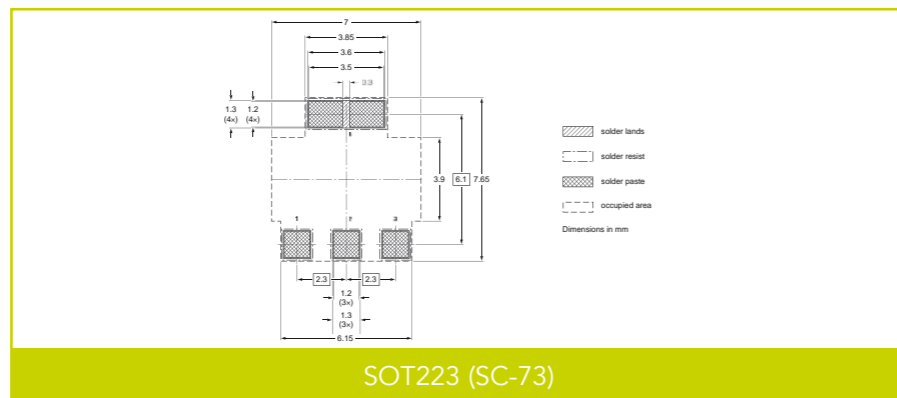
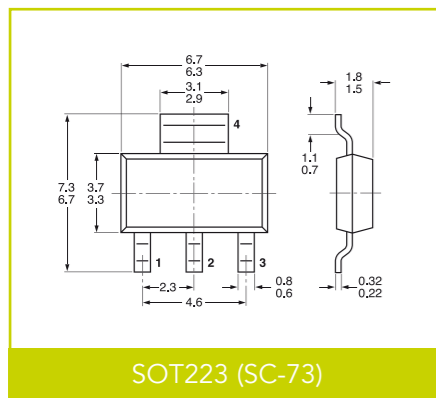
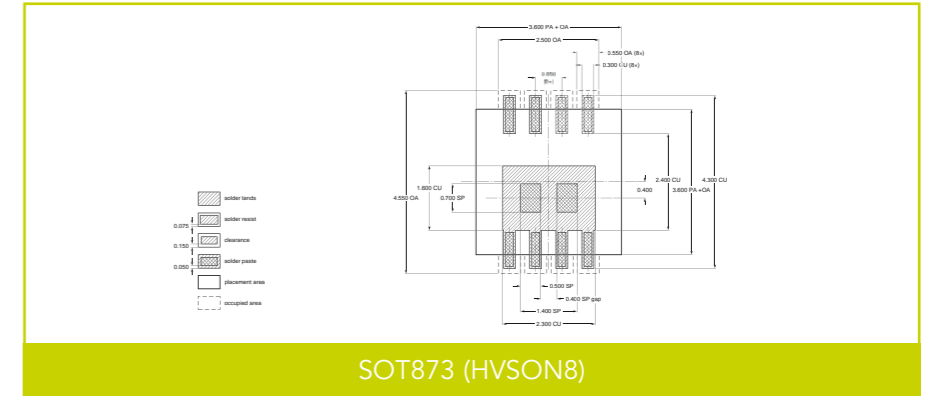
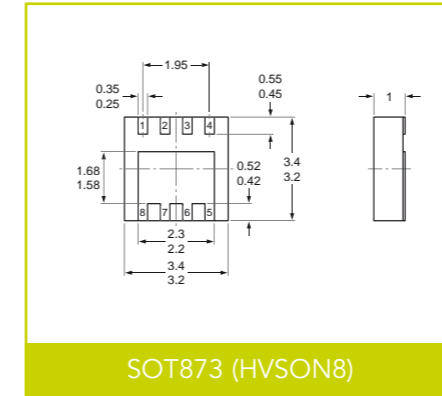
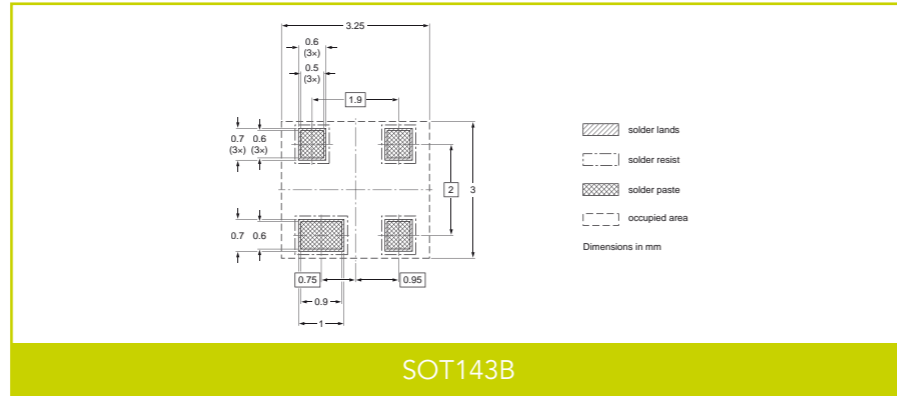
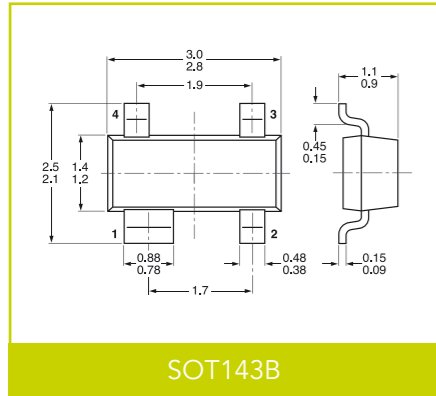
Dimensions in mm



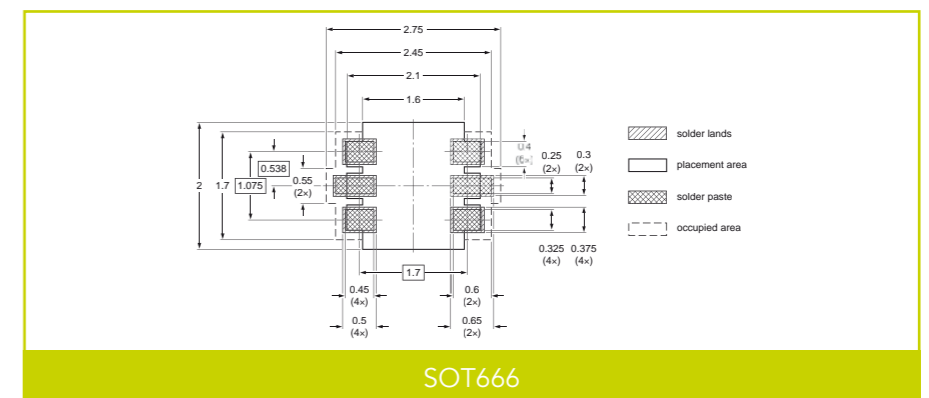
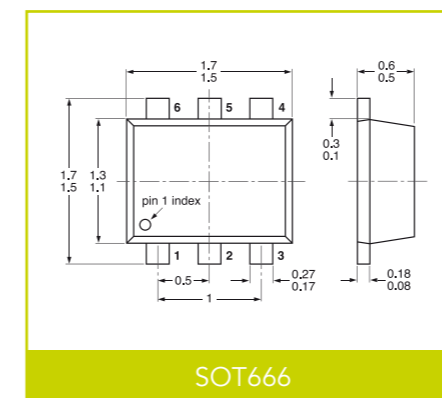
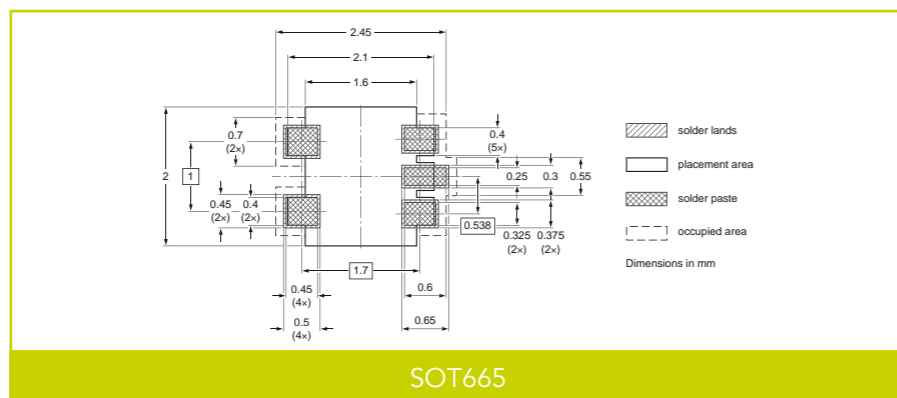
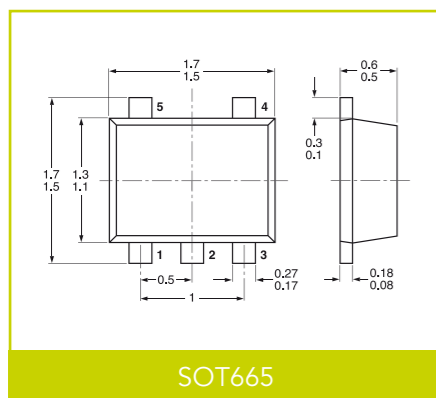
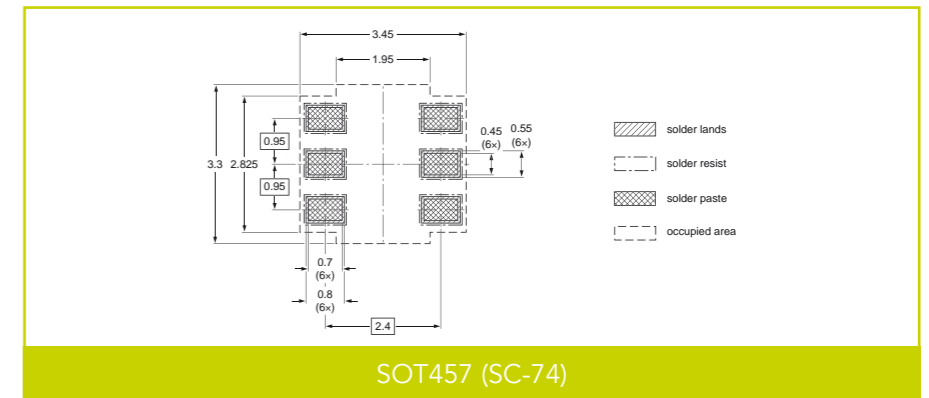
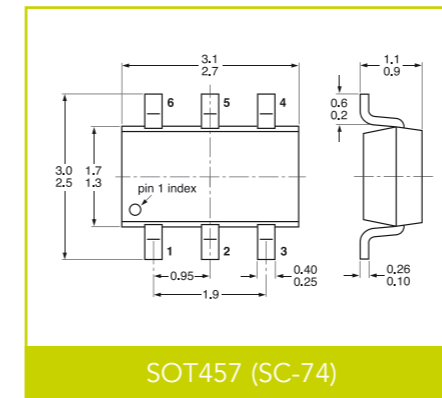
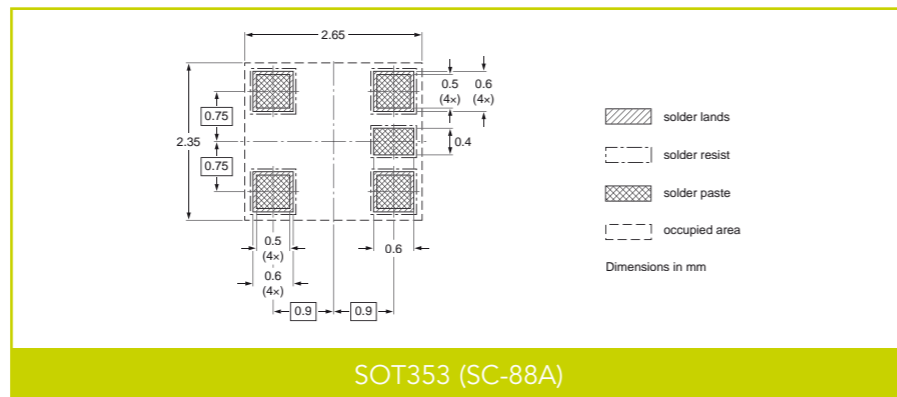
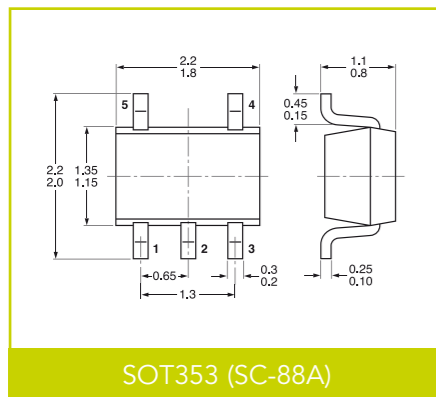
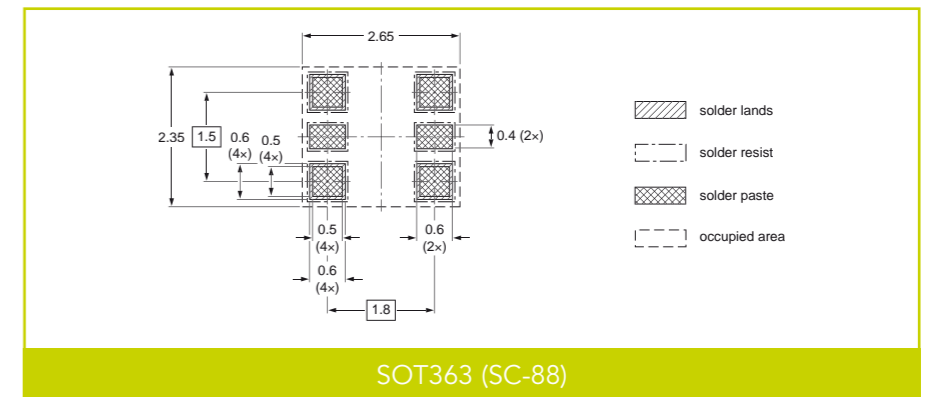
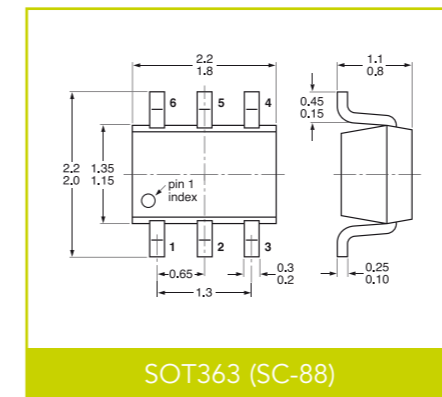
3-Pin SMD Packages

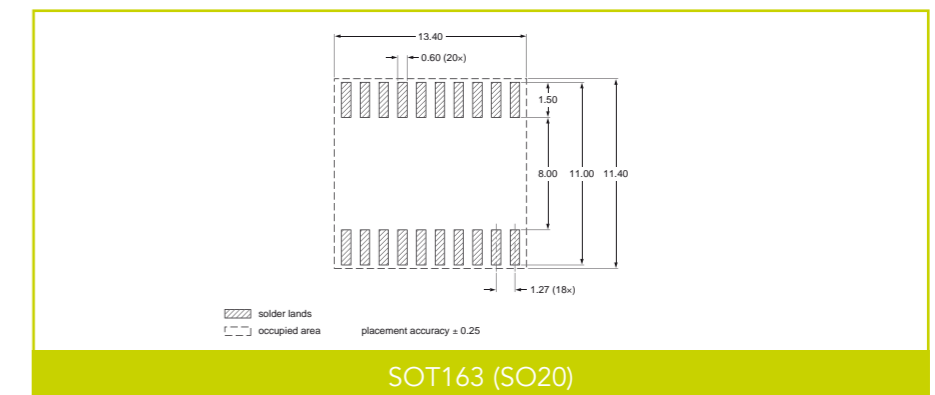
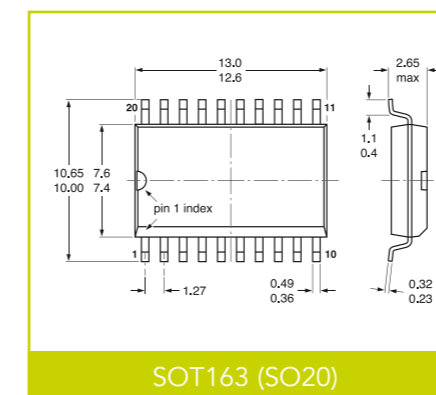
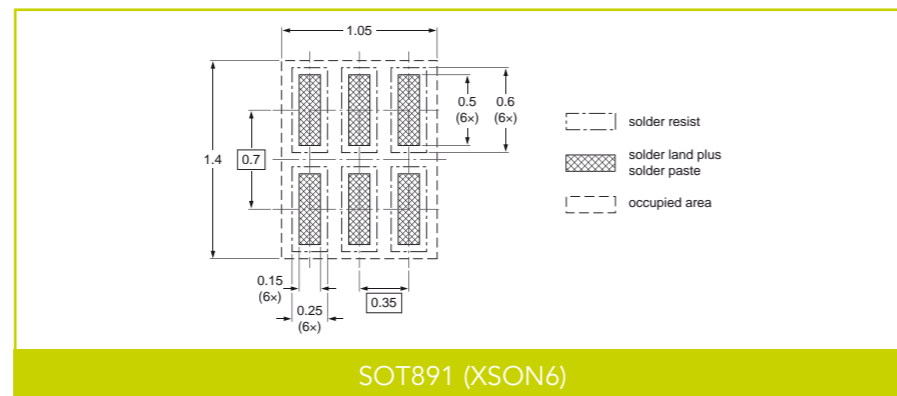
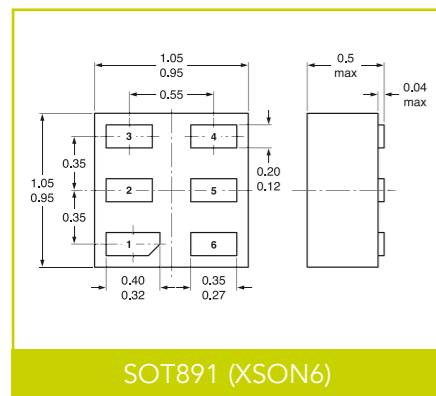
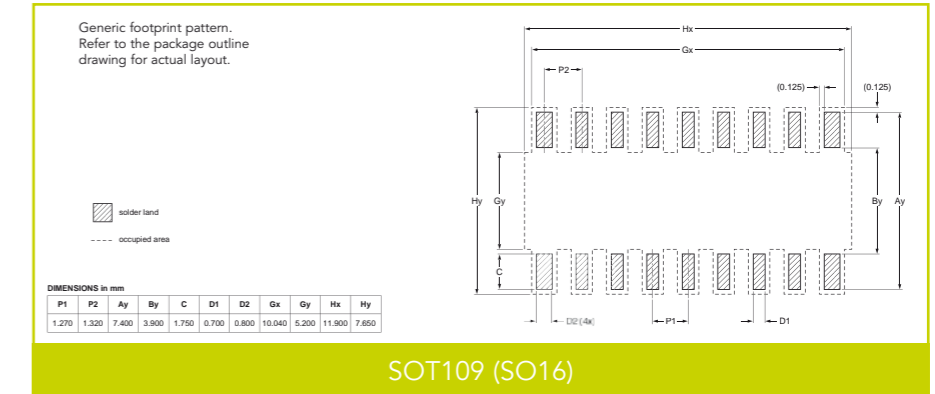
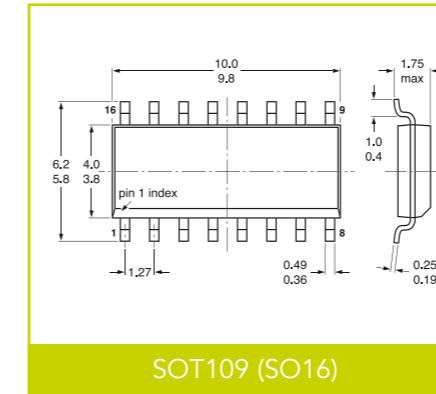
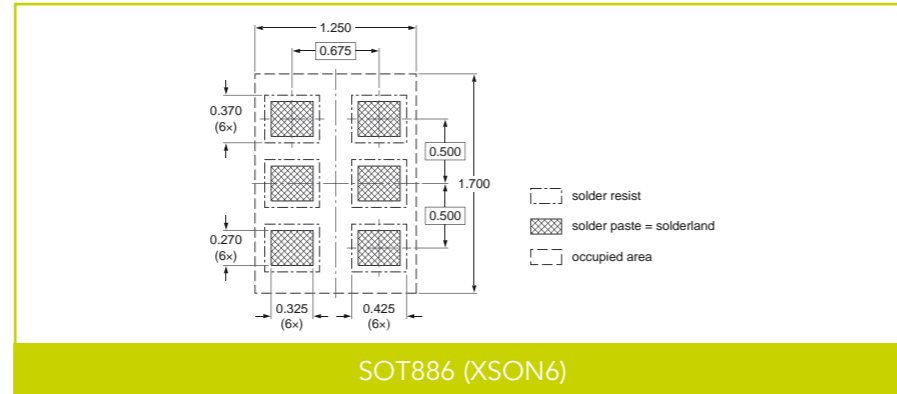
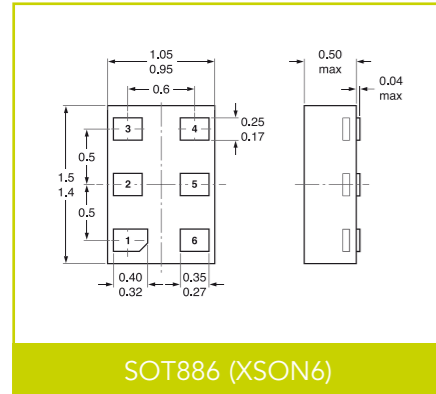


4-/5-Pin SMD Packages

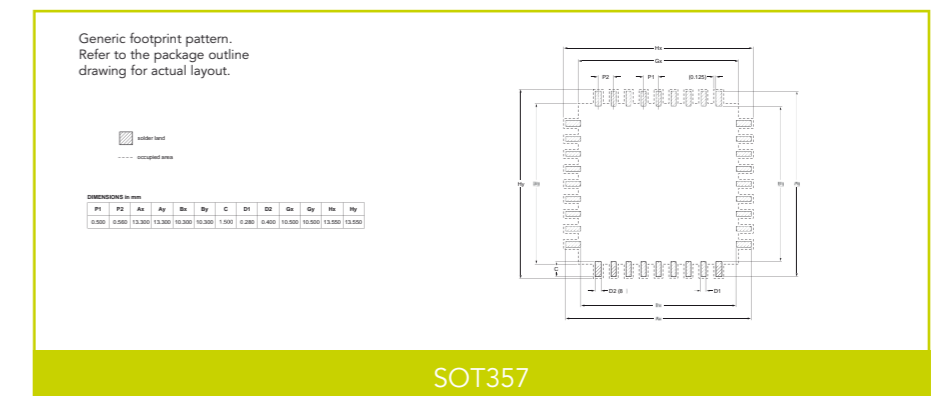
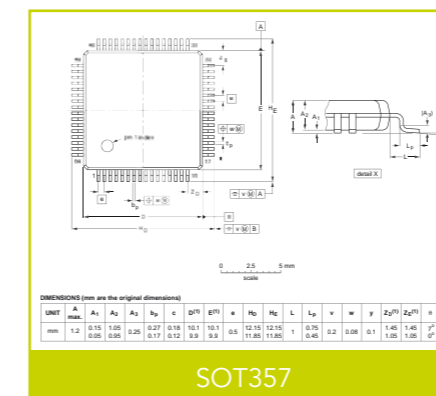
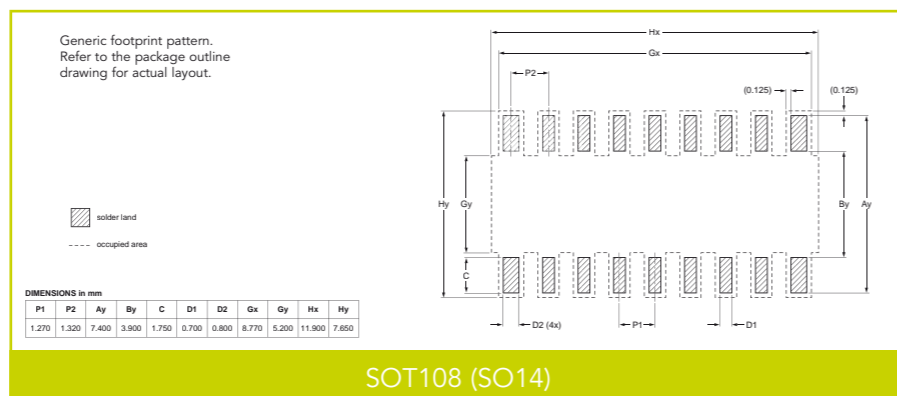
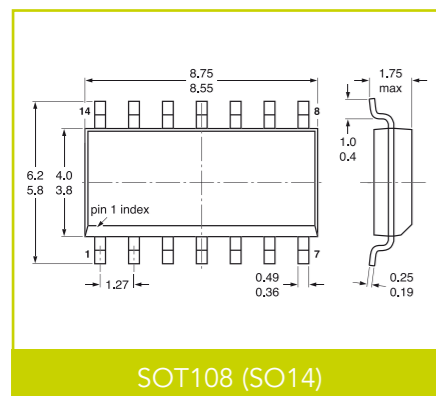
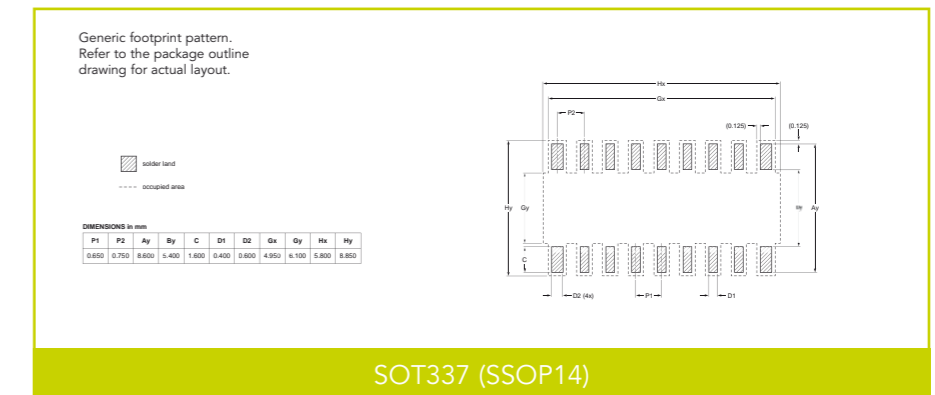
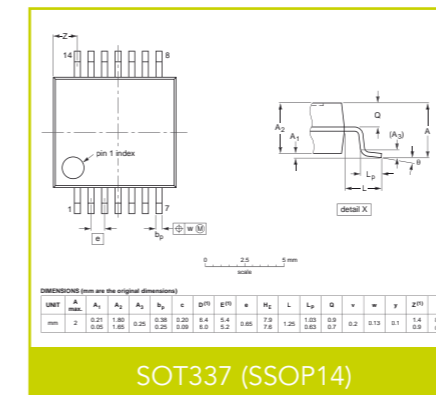
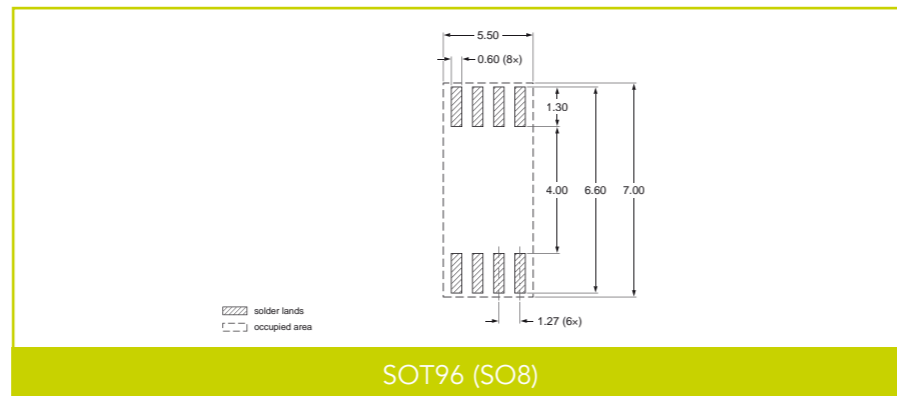
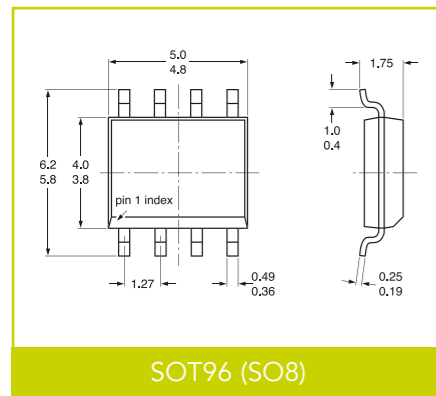


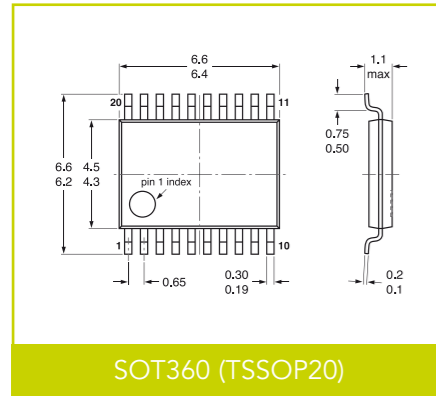
6-Pin SMD Packages



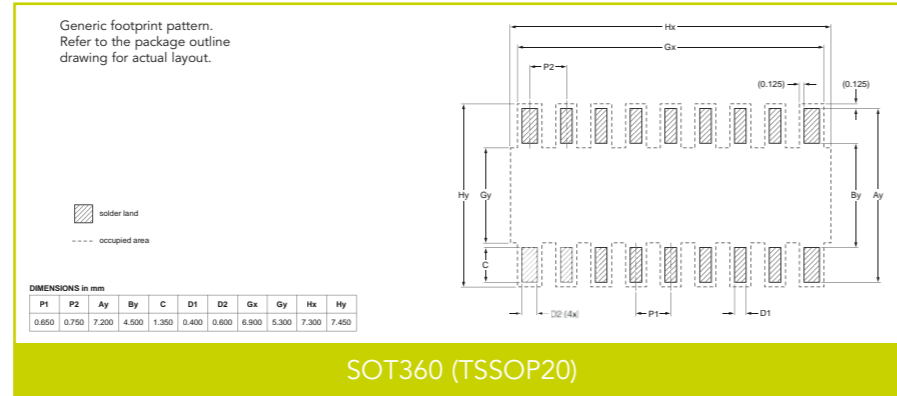


Multi-Pin SMD Packages

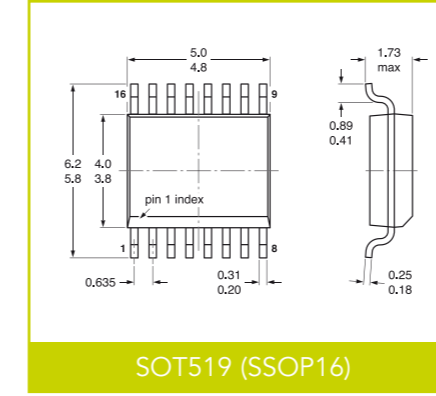




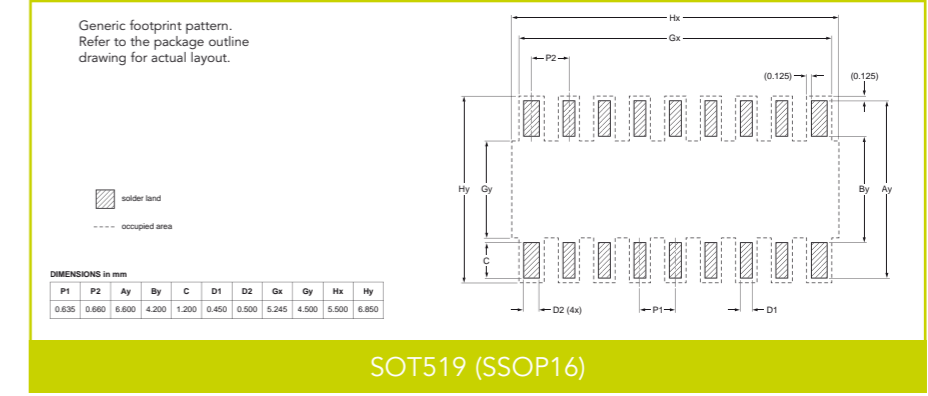
SOT360 (TSSOP20)



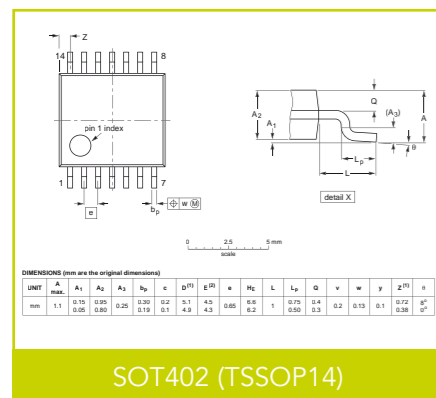
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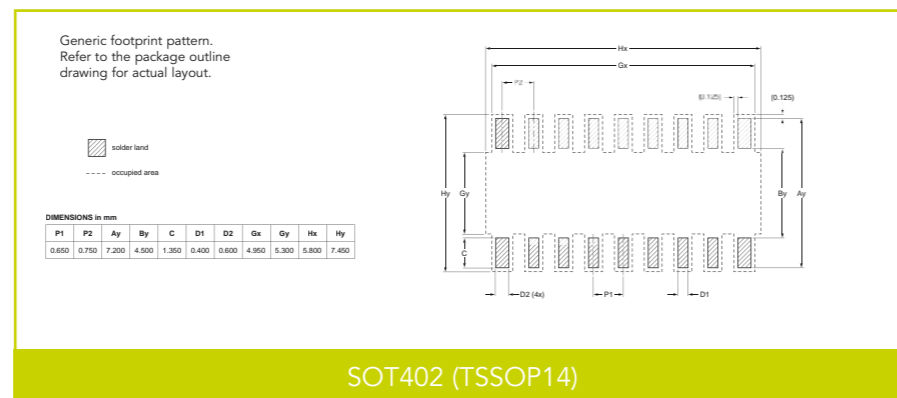
SOT519 (SSOP16)



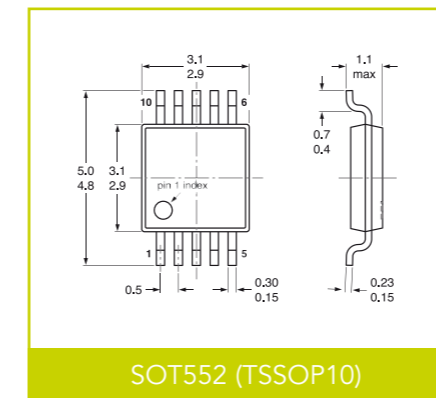
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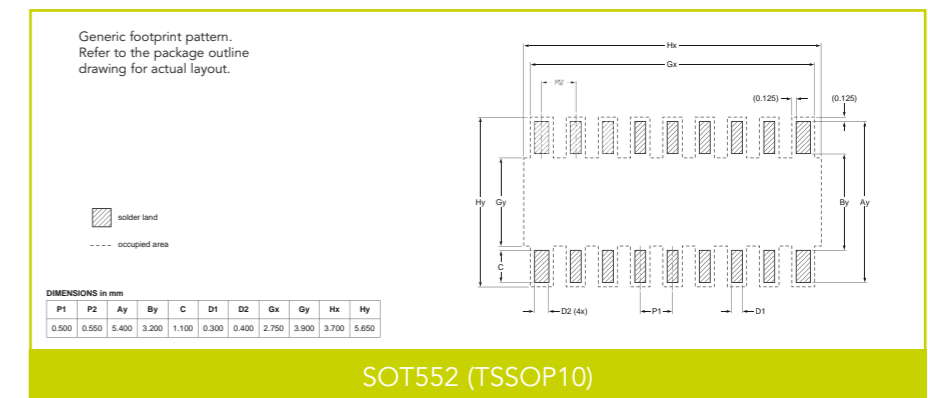
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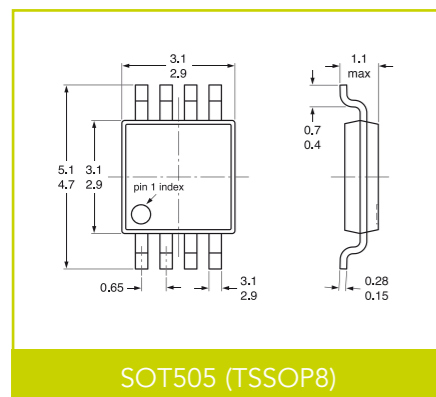
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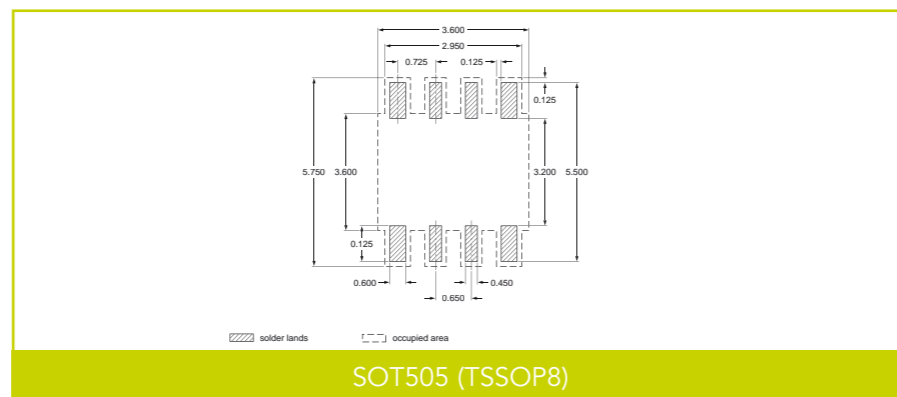
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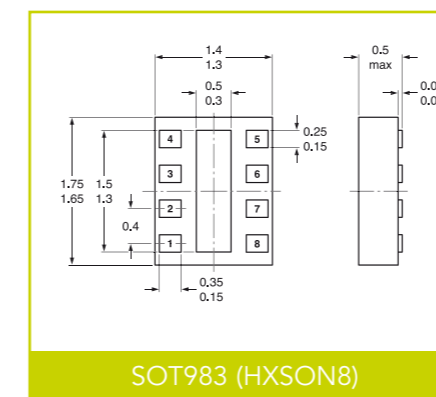
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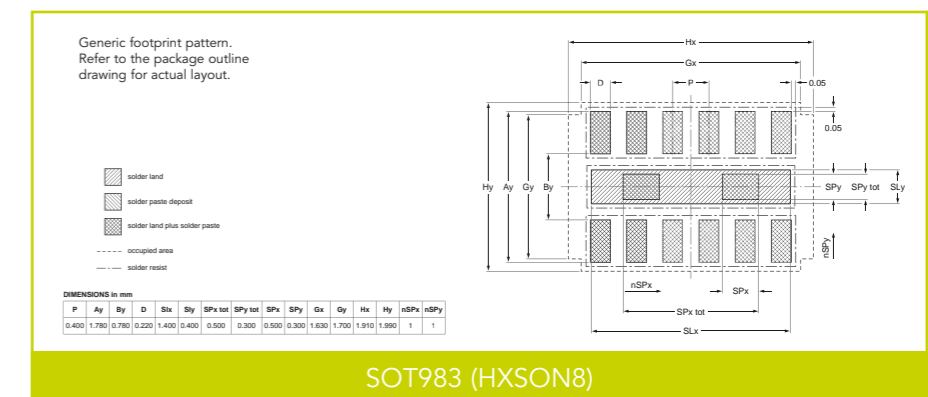
SOT505 (TSSOP8)



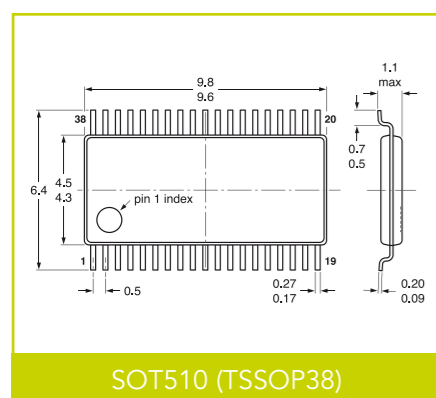
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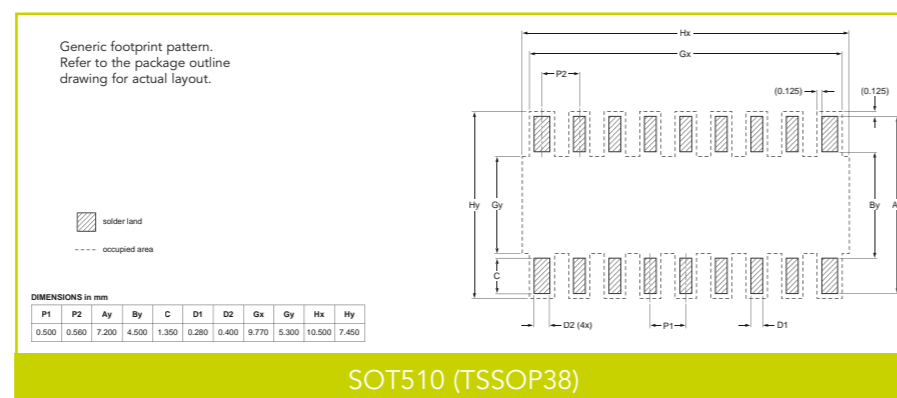
SOT983 (HXSON8)



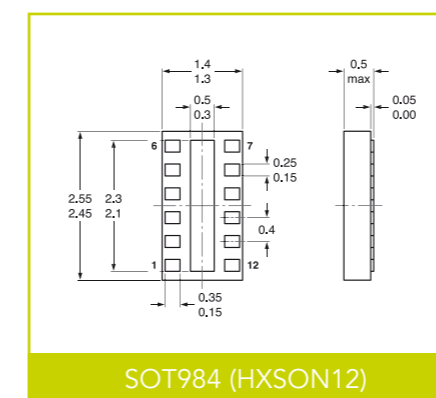
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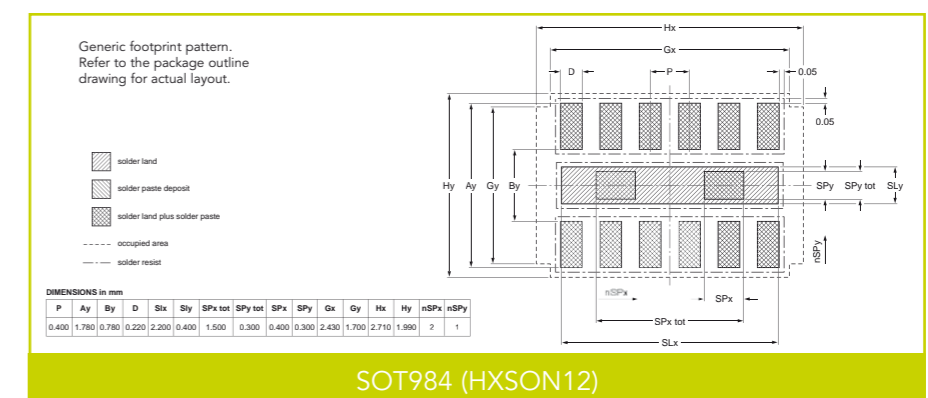
SOT510 (TSSOP38)



SOT510 (TSSOP38)

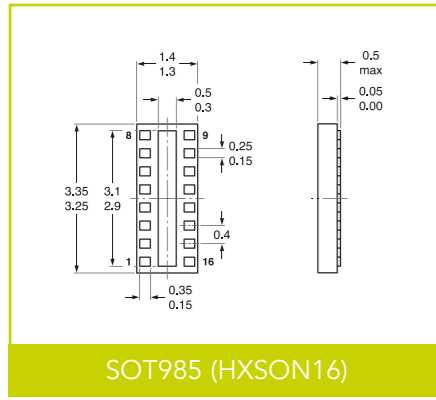


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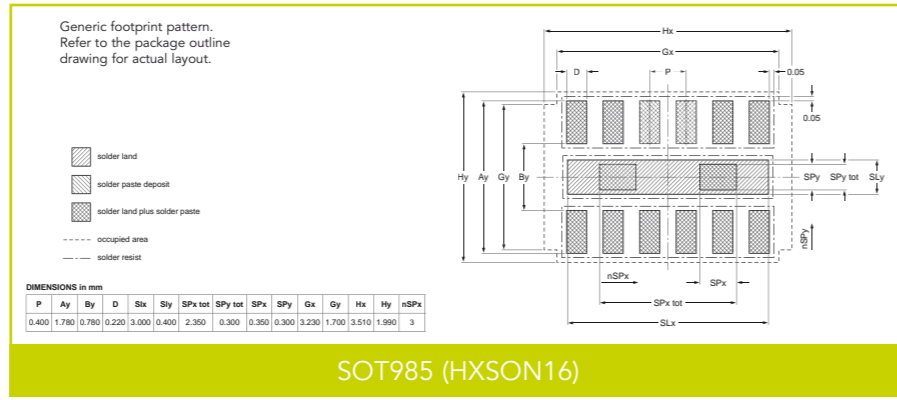


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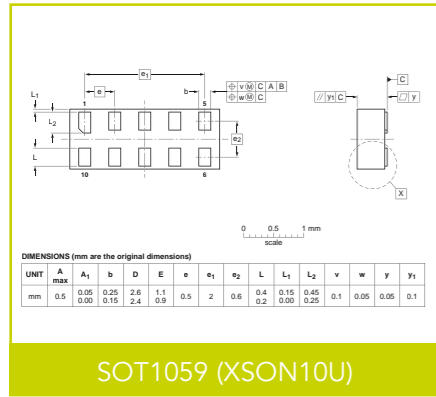
Minimized outline drawings and reflow soldering footprint



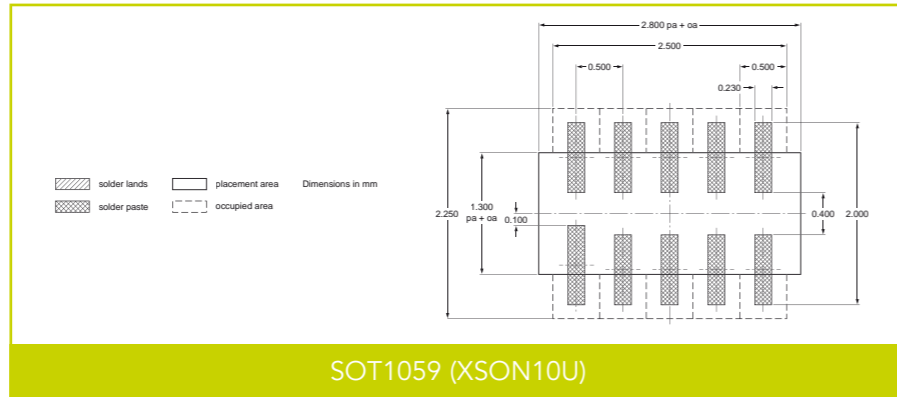
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SOT985 (HXSON16)

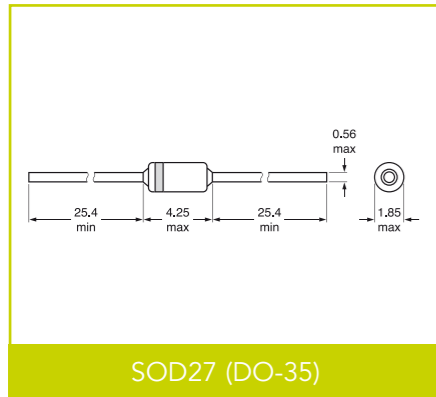


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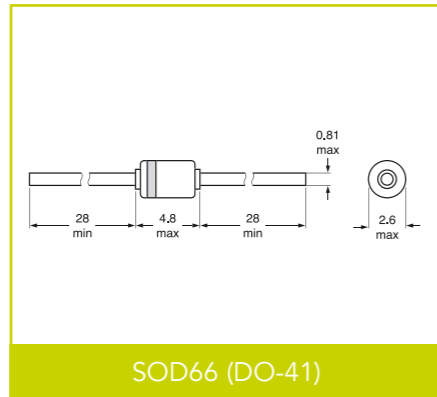


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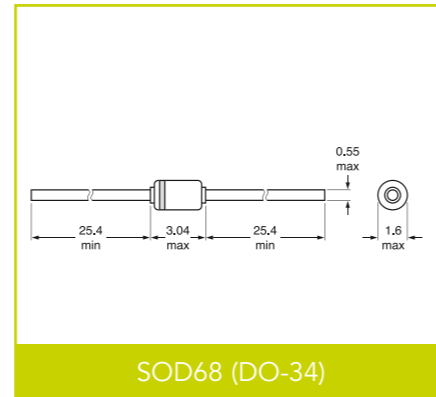
Glass diodes



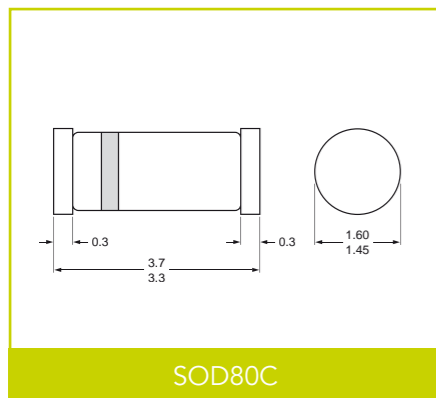
SOD27 (DO-35)



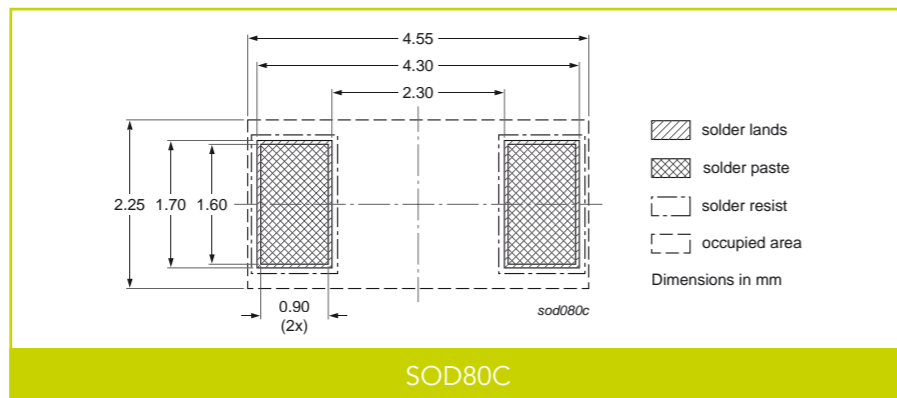
SOD66 (DO-41)



SOD68 (DO-34)



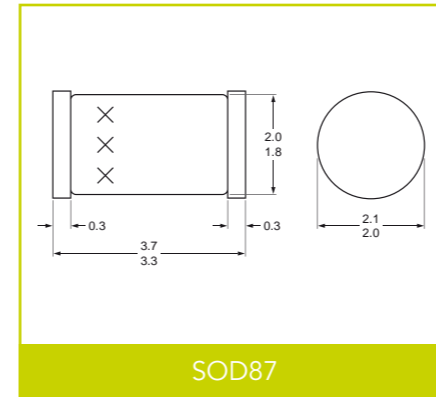
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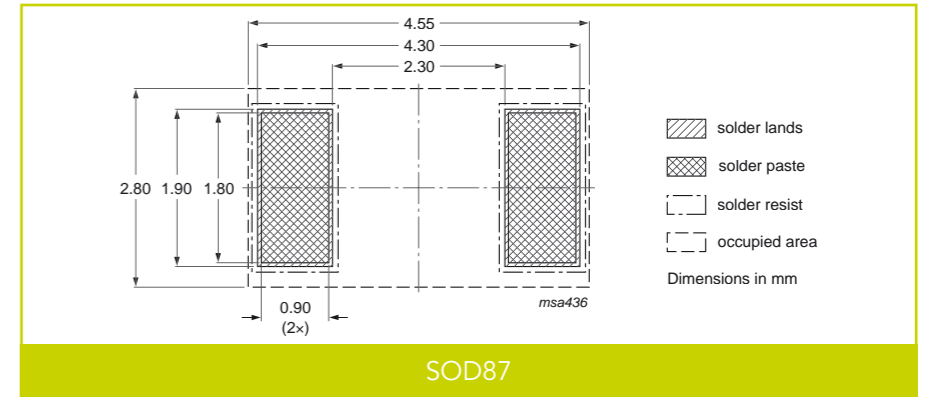
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Dimensions in mm

Minimized outline drawings and reflow soldering footprint



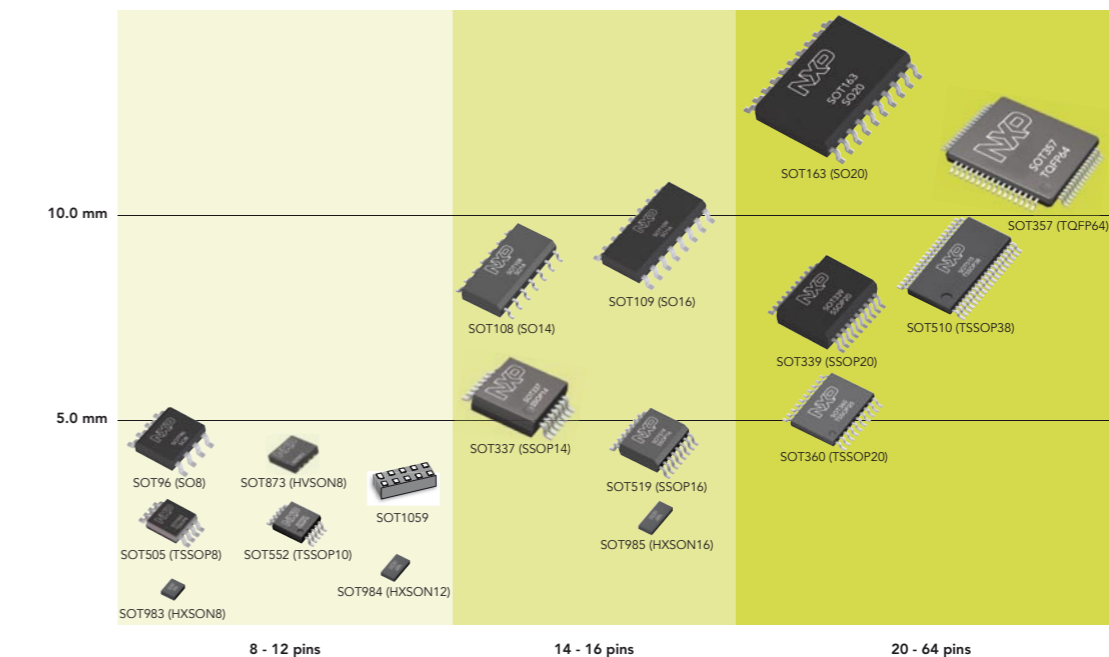
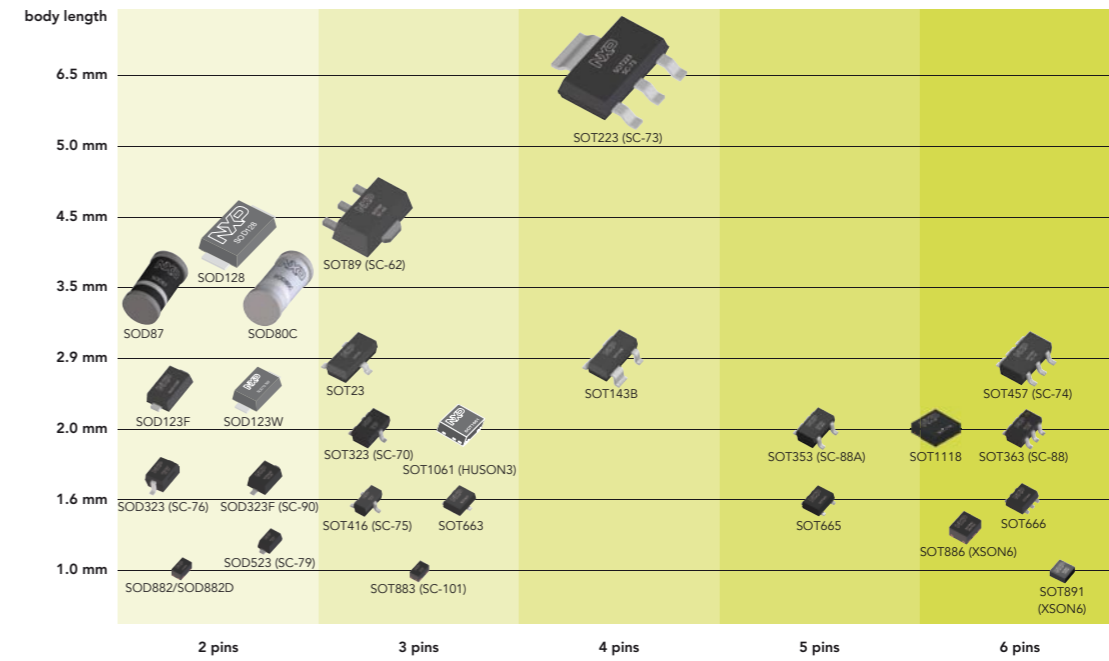
SOD87



SOD87

Dimensions in mm

Package overview



| Type Number | Page Number | Type Number | Page Number | Type Number | Page Number | Type Number | Page Number | Type Number | Page Number |
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| 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 |
| 1PS105B82 | 14 | 2PD602ARL | 48 | BAS70-07S | 9 | BAV199W | 21 | BC856S | 49 |
| 1PS665B17 | 14 | 2PD602ASL | 48 | BAS70-07V | 9 | BAV20 | 20 | BC856T / AT / BT | 48 |
| 1PS665B82 | 14 | BAL74 | 18 | BAS70H | 9 | BAV21 | 20 | BC856W / AW / BW | 48 |
| 1PS705B20 | 11 | BAL99 | 18 | BAS70L | 9 | BAV23 | 20 | BC857 / A / B / C | 48 |
| 1PS705B82 | 14 | BAS101 | 20 | BAS70VV | 9 | BAV23A | 20 | BC857AM / BM / CM | 48 |
| 1PS705B84 | 14 | BAS101S | 20 | BAS70W | 9 | BAV23C | 20 | BC857BS | 49 |
| 1PS705B85 | 14 | BAS116 | 21 | BAS70XY | 9 | BAV23S | 20 | BC857BV | 49 |
| 1PS705B86 | 14 | BAS116H | 21 | BAS716 | 21 | BAV70 | 18 | BC857T / AT / BT / CT | 48 |
| 1PS745B23 | 10 | BAS116T | 21 | BAS85 | 8 | BAV70M | 19 | BC857W / AW / BW / CW | 48 |
| 1PS755B45 | 9 | BAS16 | 18 | BAS86 | 8 | BAV70S | 19 | BC858B | 48 |
| 1PS765B10 | 9 | BAS16H | 19 | BAT120A | 12 | BAV70T | 19 | BC858W | 48 |
| 1PS765B17 | 14 | BAS16J | 19 | BAT120C | 12 | BAV70W | 19 | BC859B | 51 |
| 1PS765B21 | 9 | BAS16L | 19 | BAT120S | 12 | BAV756S | 19 | BC859BW | 51 |
| 1PS765B40 | 9 | BAS16T | 19 | BAT160A | 12 | BAV99 | 18 | BC859C | 51 |
| 1PS765B70 | 9 | BAS16VV | 19 | BAT160C | 12 | BAV99S | 19 | BC859CW | 51 |
| 1PS795B10 | 9 | BAS16VY | 19 | BAT160S | 12 | BAV99W | 19 | BC860B | 51 |
| 1PS795B17 | 14 | BAS16W | 19 | BAT17 | 14 | BAW101 | 20 | BC860BW | 51 |
| 1PS795B30 | 9 | BAS21 | 20 | BAT46WH | 9 | BAW101S | 20 | BC860C | 51 |
| 1PS795B31 | 9 | BAS21AW | 20 | BAT46WJ | 9 | BAW156 | 21 | BC860CW | 51 |
| 1PS795B40 | 9 | BAS21H | 20 | BAT54 | 8 | BAW56 | 18 | BC868 / -25 | 65 |
| 1PS795B70 | 9 | BAS21J | 20 | BAT54A | 8 | BAW56M | 19 | BC869 / -16 / -25 | 65 |
| 1PS885B48 | 9 | BAS21SW | 20 | BAT54AW | 9 | BAW56S | 19 | BCM61B | 50 |
| 1PS885B82 | 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 |

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| BCW69 / 70 | 48 | BSP41 | 65 | BZX84 series | 16 | IP3254CZ16 | 36 | IP4264CZ8-20 | 38 |
| BCW71 / 72 | 48 | BSP43 | 65 | BZX84J series | 16 | IP3254CZ8 | 36 | IP4264CZ8-40 | 38 |
| BCW89 | 48 | BSP50 | 51 | BZX84-y10 | 17 | IP3337CX18/LF | 36 | IP4280CZ10 | 30 |
| BCX17 | 48 | BSP51 | 51 | BZX84-y11 | 17 | IP3338CX24/LF | 36 | IP4281CZ10 | 30 |
| BCX18 | 48 | BSP52 | 51 | BZX84-y12 | 17 | IP4025CX20/LF | 32 | IP4282CZ6 | 33 |
| BCX19 | 48 | BSP60 | 51 | BZX84-y13 | 17 | IP4027CX20/LF | 32 | IP4282CZ6 | 30 |
| BCX51 / -10 / -16 | 65 | BSP61 | 51 | BZX84-y15 | 17 | IP4041CX25/LF | 36 | IP4283CZ10-TB | 30 |
| BCX52 / -10 / -16 | 65 | BSP62 | 51 | BZX84-y16 | 17 | IP4042CX5/LF | 37 | IP4283CZ10-TT | 30 |
| BCX53 / -10 / -16 | 65 | BSP89 | 76 | BZX84-y18 | 17 | IP4043CX5/LF | 37 | IP4284CZ10-TB | 31 |
| BCX54 / -10 / -16 | 65 | BSR14 | 49 | BZX84-y20 | 17 | IP4044CX8/LF | 38 | IP4284CZ10-TT | 31 |
| BCX55 / -10 / -16 | 65 | BSR16 | 49 | BZX84-y22 | 17 | IP4047CX6/LF | 32 | IP4286CZ6-TBF | 31 |
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| BF570 | 52 | BSS123 | 77 | BZX84-y30 | 17 | IP4053CX15/LF | 36 | IP4306CX2/LF | 37 |
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| BF621 | 51 | BSS63 | 48 | BZX84-y36 | 17 | IP4055CX6/LF | 32 | IP4309CX9 | 31 |
| BF622 | 51 | BSS64 | 48 | BZX84-y39 | 17 | IP4056CX8 | 39 | IP4310CX8 | 31 |
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| BF820W | 51 | BST52 | 51 | BZX84-y47 | 17 | IP4065CX11 | 39 | IP4350CX24/LF | 38 |
| BF821 | 51 | BST60 | 51 | BZX84-y4V3 | 17 | IP4067CX9/LF | 38 | IP4352CX24/LF | 38 |
| BF822 | 51 | BST61 | 51 | BZX84-y4V7 | 17 | IP4078CX6 | 39 | IP4353CX15/LF | 36 |
| BF823 | 51 | BST62 | 51 | BZX84-y51 | 17 | IP4085CX4 | 38 | IP4355CX6/LF | 32 |
| BF824 | 52 | BST82 | 77 | BZX84-y56 | 17 | IP4088CX20/LF | 36 | IP4358CX6 | 31 |
| BF824W | 52 | BSV52 | 49 | BZX84-y5V1 | 17 | IP4110CX20/LF | 32 | IP4359CX4 | 30 |
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| BFS20W | 52 | BZA420A | 25 | BZX84-y6V2 | 17 | IP4153CX15/LF | 36 | IP4363CX10/LF | 32 |
| BSH103 | 75 | BZA456A | 25 | BZX84-y6V8 | 17 | IP4158CX8 | 39 | IP4364CX8/LF | 38 |
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| MMBZ6V8AL | 44 | NZX22A | 17 | NZX6V2D | 17 | PBLS4003D | 61 | PBSS305PD | 58 |
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| NX1117C15Z | 69 | NZX24C | 17 | NZX6V8D | 17 | PBLS4004Y | 61 | PBSS306PX | 58 |
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