



Discrete Semiconductors Selection Guide 2013

Diodes, protection and signal conditioning devices,
bipolar transistors, MOSFETs, thyristors,
power management products





Actual size of DFN2020-6 and DFN1006D-2 package shown

NXP's new DFN package portfolio

DFN: Discrete Flat No-lead

DFN1006D-2 (SOD882D) / DFN1010D-3 (SOT1215)
100% solderable side pads
► Improved electro-thermal behaviour
► For visual solder inspection

DFN2020MD-6 (SOT1220) / DFN1608D-2 (SOD1608)
Heat sink at die pad
► For high power on a small footprint
► Enabling smaller designs

DFN1006D-2 (SOD882D) / DFN1006B-3 (SOT883B)
Reduced height
► Down to 0.37 mm
► For height minimized solutions

DFN2020-6 (SOT1118)
Dual die pad
► Enabling multiple configurations
► Heatsink for thermal excellence

The largest supplier of leadless DFN packages with solutions for almost every discrete application



Our extensive package range provides maximum flexibility

	Ultra small	Very small	Small	Medium power
2 Pins	 DSN0603-2 (SOD962) 0.6 x 0.3 x 0.3 DFN1006D-2 (SOD882D) 1.0 x 0.6 x 0.37 DFN1006-2 (SOD882) 1.0 x 0.6 x 0.48 SOD523 1.2 x 0.8 x 0.6 DFN1608D-2 (SOD1608) 1.6 x 0.8 x 0.37	 SOD323 1.7 x 1.25 x 0.95 SOD323F 1.7 x 1.25 x 0.7	 SOD123F 2.6 x 1.6 x 1.1 SOD123W 2.6 x 1.7 x 1.0	 SOD128 3.8 x 2.6 x 1.0
3 Pins	 DFN1006B-3 (SOT883B) 1.0 x 0.6 x 0.37 DFN1006-3 (SOT883) 1.0 x 0.6 x 0.48 DFN1010D-3 (SOT1215) 1.1 x 1.0 x 0.37 SOT663 1.6 x 1.2 x 0.55 SOT416 1.6 x 0.8 x 0.77	 SOT323 2.0 x 1.25 x 0.95 DFN2020-3 (SOT1061) 2.0 x 2.0 x 0.62	 SOT23 2.9 x 1.3 x 1.0	 SOT89 4.5 x 2.5 x 1.5 SOT428 6.6 x 6.1 x 2.3
4/5 Pins	 WLCSP4* 0.76 x 0.76 x 0.61 DFN1010C-4 (SOT1194) 1.0 x 1.0 x 0.55 WLCSP5* 1.51 x 1.14 x 0.65 SOT665 1.6 x 1.2 x 0.55	 SOT353 2.0 x 1.25 x 0.95	 SOT143B 2.9 x 1.3 x 1.0 SOT753 2.9 x 1.5 x 1.0	 LFAK33 3.3 x 3.3 x 0.85 Power-SO8 4.9 x 4.45 x 1.0 SOT223 6.5 x 3.5 x 1.65
6 Pins	 DFN1010E-6 (SOT1202) 1.0 x 1.0 x 0.33 DFN1010-6 (SOT891) 1.0 x 1.0 x 0.48 DFN1010B-6 (SOT1216) 1.1 x 1.0 x 0.37 DFN1410-6 (SOT886) 1.45 x 1.0 x 0.48 WLCSP6* 1.6 x 1.15 x 0.65 SOT666 1.6 x 1.2 x 0.55	 SOT363 2.0 x 1.25 x 0.95 DFN2020MD-6 (SOT1220) 2.0 x 2.0 x 0.62 DFN2020-6 (SOT1118) 2.0 x 2.0 x 0.62	 SOT457 2.9 x 1.5 x 1.0	 LFAK65D (SOT1205) 4.9 x 4.45 x 1.0
> 8 Pins	 WLCSP9* 1.16 x 1.16 x 0.61 DFN1712-8 (SOT1157) 1.7 x 1.2 x 0.48 DFN1714U-8 (SOT983) 1.7 x 1.35 x 0.5	 WLCSP16* 1.9 x 1.97 x 0.65 DFN2110-9 (SOT1178) 2.1 x 1.0 x 0.48 WLCSP24* 2.45 x 2.4 x 0.65	 DFN2510A-10 (SOT1176) 2.5 x 1.0 x 0.48 DFN2520-9 (SOT1333) 2.5 x 2.0 x 0.48 DFN2512-12 (SOT1158) 2.5 x 2.1 x 0.48	 SOT505 3.0 x 3.0 x 1.1 SOT552 3.0 x 3.0 x 1.1 DFN4020-14 (SOT1334) 4.0 x 2.0 x 0.48

* The exact position of the balls and package dimensions vary.



A partner of excellence, experience and innovation for our customers

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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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Quality is our top priority

Zero-Defect Program

- ▶ Ongoing quality improvement process to eliminate complaints and incidents in production. Originally established to fulfill the stringent automotive business requirements. Performance measured in CPB (Complaints per Billion).

Six Sigma Program NXP

- ▶ Structured process-improvement strategy involving the entire organization by identifying and removing defects and minimizing any spillover within the manufacturing process.

Safe-Launch (DfX)

- ▶ Achieve low CPB (Complaints per Billion) at product launch from the beginning.

Advanced complaint handling

- ▶ Continual process improvement to achieve ‘best in class’ performance in complaint handling and problem solving.

Green products

- ▶ Halogen and lead free, environmental friendly portfolio – Dark Green products are fully RoHS compliant with European Union directive 2002/95/EC.

Automotive quality mindset

- ▶ Nearly all products are qualified acc. to AEC-Q101 standard.

Highly qualified design-in and customer support

- ▶ Direct customer support line: Short reaction time to build and preserve strong customer relationships.

Certification & Standards

- ▶ All international certification standards of note achieved such as ISO9001, ISO/TS 16949 for automotive sites, ISO14001, OHSAS18001.

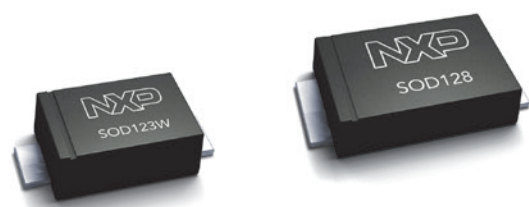


Diodes

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Ultrafast recovery power diodes	25
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Exceeding quality standards is our expectation

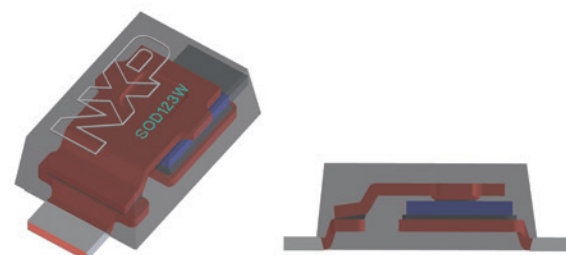
FlatPower packages: SOD123W and SOD128 NXP's medium power solution for shrinking designs



SOD123W and SOD128 package

Small SMD packages for shrinking designs

- ▶ Flat geometry, only 1 mm height
- ▶ Halogene free mold compound
- ▶ AEC-Q101 qualified

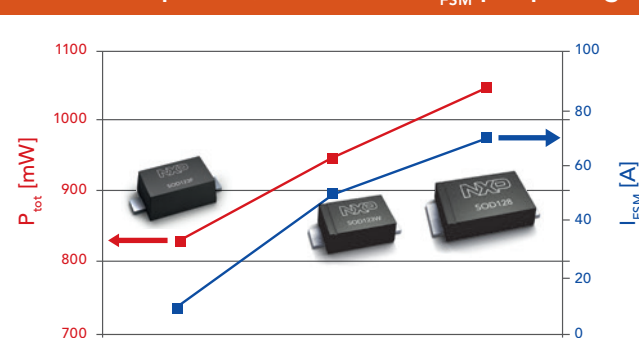


SOD123W and SOD128 design

Robust design

- ▶ High surge capability due to clip bond technology
- ▶ Excellent electro-thermal behaviour

Power dissipation (@ 1 cm²), and I_{FSM} per package



Package name	SOD123F wire bond	SOD123W small clip	SOD128 large clip
Body size (w x l x h)	2.6 x 1.6 x 1.1	2.6 x 1.7 x 1.0	3.8 x 2.5 x 1.0

Schottky diodes

Enabling superior high P_{tot} and I_{FSM}

- ▶ Huge portfolio of Schottky diodes available
- ▶ 20 V – 60 V, 1 A – 5 A, very low V_F
- ▶ Junction temperature up to 175 °C

Large supplier of more than 170 products in FlatPower packages for a lot of medium power rectification and surge protection applications.

TVS diodes

Can replace SMA and SMB products

- ▶ Complete TVS series available
- ▶ 3.5 V – 64 V, 400 W and 600 W
- ▶ Junction temperature up to 185 °C

NEW low V_F Schottky rectifiers in our superflat second generation leadless DFN package

A new portfolio of low V_F MEGA Schottky diodes with outstanding performance in an ultra-small and flat package of 0.37 mm height. The package has tin plated, 100% solderable side pads for easy visual inspection after soldering.



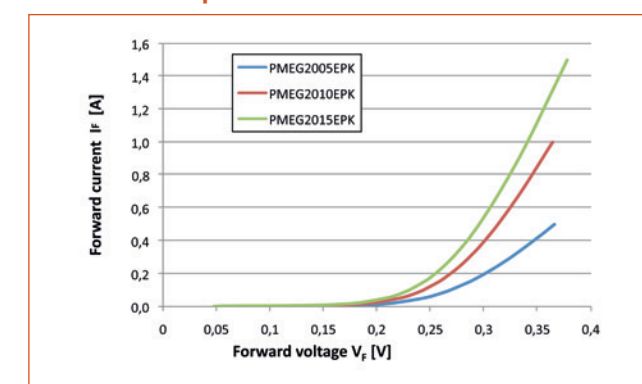
Features and benefits

- ▶ 33% lower V_F on same footprint
- ▶ Low profile of 0.37 mm height
- ▶ Solderable side pads
- ▶ Visual solder inspection

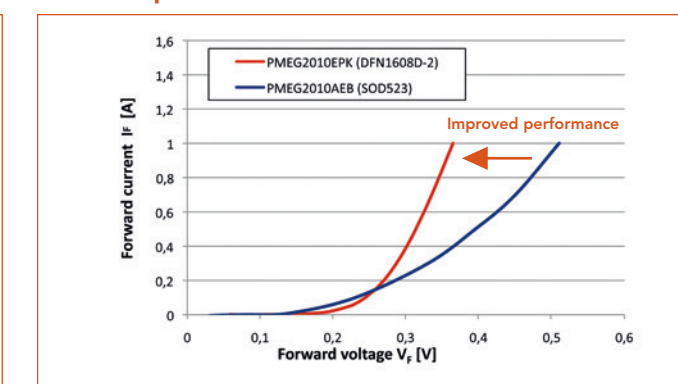
Applications

- ▶ Handheld equipment
- ▶ Backlighting for smart phone
- ▶ Battery charging
- ▶ Shrunk PCB design

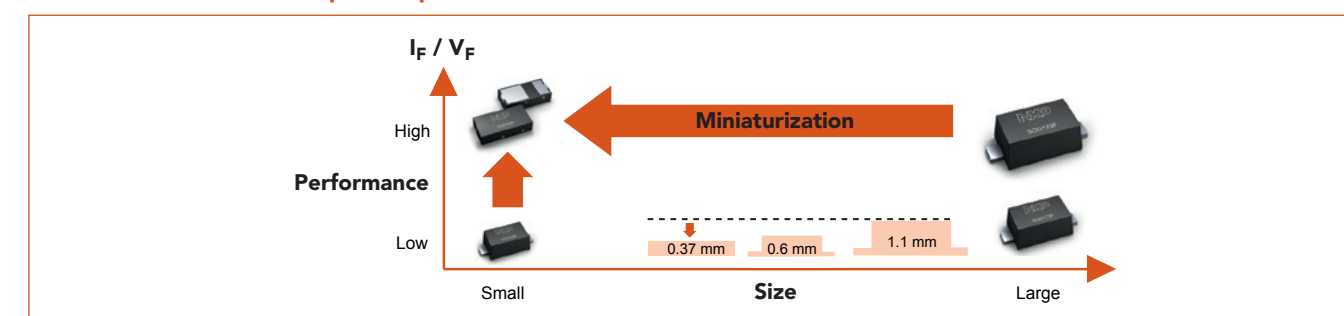
Differentiated portfolio



with best performance



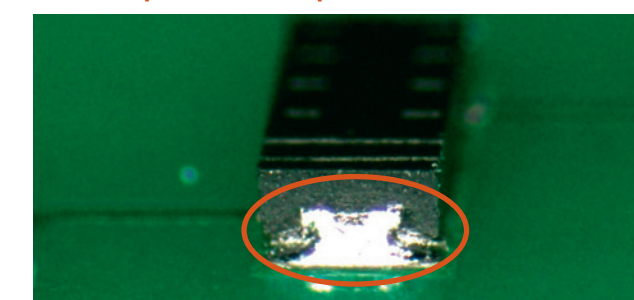
DFN1608D-2 combines improved performance with reduced size



Portfolio of 0.5 A – 1.5 A with low V_F and low I_R types

Type	Main parameters		
	Optimization	V_{Rmax} (V)	$I_{F(av)max}$ (A)
PMEG2005EPK	low V_F	20	0.5
PMEG2010EPK	low V_F	20	1.0
PMEG2015EPK	low V_F	20	1.5
PMEG2020EPK	low V_F	20	2.0
PMEG4005EPK	low I_R	40	0.5
PMEG4010EPK	low I_R	40	1.0
PMEG4015EPK	low I_R	40	1.5
PMEG4020EPK	low I_R	40	2.0

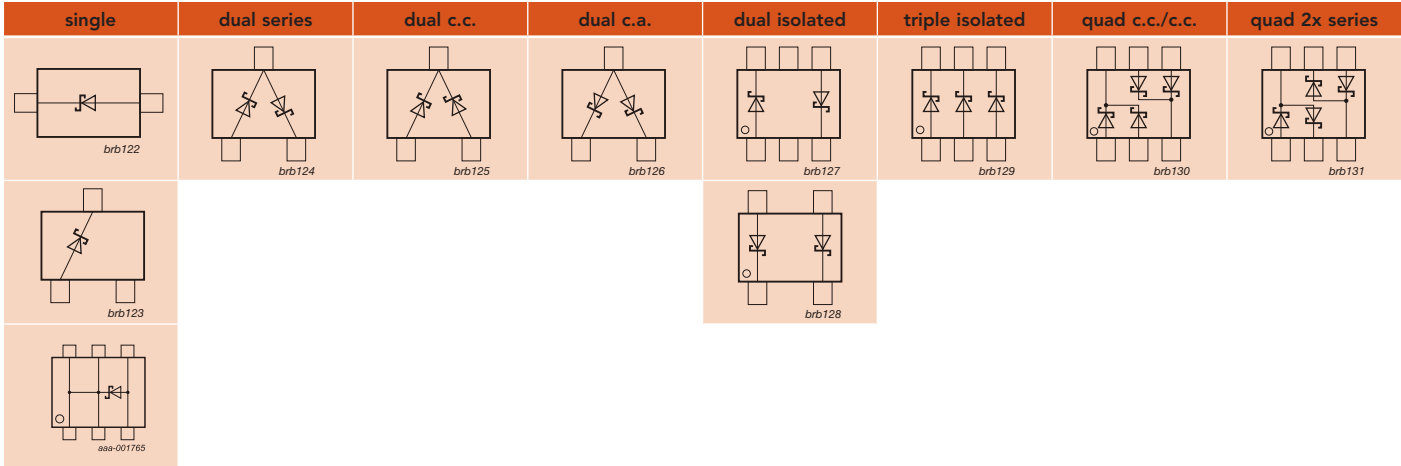
Soldered products onto pcb



General purpose Schottky diodes ≤ 250 mA

types in **bold** represent new products

I _F max (mA)	V _R max (V)	V _F max (mV)	@ I _F (mA)	I _R max (μA)	@ V _R (V)	Package	SOD80C (MiniMelf)	SOD68 (DO-34)	SOT23	SOT143B		SOD123F	SOT323 (SC-70)	SOT363 (SC-88)	SOD323F (SC-90)	SOD323 (SC-76)	SOT666	SOT416 (SC-75)	SOD523 (SC-79)	DFN1006-2 (SOD882)/ DFN1006-3 (SOT883)	
																					
							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 0.48
							P _{tot} (mW)	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					
quad 2x series							BAS70XY														
120	40	370	1	0.5	30	single						BAS40H	BAS40W			RB751V40			RB751S40	RB751CS40	
						single			BAS40			BAS40H	BAS40W			1PS76SB40			1PS79SB40	BAS40L	
		500	10	1	30	dual series			BAS40-04			BAS40-04W							1PS75SB45		
						dual c.c.			BAS40-05			BAS40-05W						1PS75SB45			
						dual c.a.			BAS40-06			BAS40-06W									
						dual isolated				BAS40-07						BAS40-07V					
						quad c.c./c.c.									BAS40-05V						
						quad 2x series							1PS88SB48			BAS40-05V					
quad 2x series							BAS40XY														
200	30	300	10	30	10	single													1PS79SB31		
						single			BAT754												
		340	10	2	25	dual series			BAT754S												
						dual c.c.			BAT754C												
						dual c.a.			BAT754A												
						triple isolated															
		400	10	2	25	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			BAT74S			BAT74V					
						triple isolated									BAT54VV						
						quad c.c./c.c.									BAT54CV						
						quad 2x series							BAT54XY								
		500	200	30	10	single													RB521S30	RB521CS30L	
						600	200	1	10	single									RB520S30	RB520CS30L	
	40	300	10	15	30	single			BAT721							1PS76SB21					
						dual series			BAT721S												
						dual c.c.			BAT721C												
						dual c.a.			BAT721A												
		360	10	0.5	25	single													1PS79SB30		
						single							BAT854W								
		420	30	0.5	25	dual series							BAT854SW								
						dual c.c.						BAT854CW									
						dual c.a.						BAT854AW									
single						BAS86	BAT86				BAT46WH			BAT46WJ							
250	100	850	250	4	75	single															



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)	DFN1006-2 (SOD882)
												
					Size (mm)	2.9 × 1.3 × 1.0	2.0 × 1.25 × 0.95	2.0 × 1.25 × 0.95	1.7 × 1.25 × 0.95	1.6 × 1.2 × 0.55	1.2 × 0.8 × 0.6	1.0 × 0.6 × 0.48
					P _{tot} (mW)	250	250	300	400	300	500	250
30	4	450	1	1	single	BAT17			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

Medium power lowV_F Schottky rectifiers single ≥ 200 mA – Part I

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	SOT457 (SC-74)	SOT23	SOD123W	SOD123F		DFN2020-3 (SOT1061)	SOT323 (SC-70)	SOD323F (SC-90)	SOD323 (SC-76)	SOT666	DFN1608D-2 (SOD1608)	SOD523 (SC-79)	DFN1006-2 (SOD882)	DFN1006D-2 (SOD882D)	DSN0603-2 (SOD962)	
																					
					Size (mm)	3.8 x 2.5 x 1.0	2.9 x 1.5 x 1.0	2.9 x 1.3 x 1.0	2.6 x 1.7 x 1.0	2.6 x 1.6 x 1.1		2.0 x 2.0 x 0.62	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 0.37	1.2 x 0.8 x 0.6	1.0 x 0.6 x 0.48	1.0 x 0.6 x 0.37	0.6 x 0.3 x 0.3
					P _{tot} (mW) @ 1 cm²	1050	540	420	950	830		960	400	830	570	570	780	500	565	660	200
					Optimization																
0.2	20	450	0.06	low V _F																PMEG2002AESF	
	30	480	0.05	low V _F									PMEG3002EJ				PMEG3002AEB	PMEG3002AEL	PMEG3002AELD		
	40	600	0.01	low I _R									PMEG4002EJ				PMEG4002EB	PMEG4002EL	PMEG4002ELD		
	60	600	0.1	low V _F									PMEG6002EJ				PMEG6002EB				
0.5	20	390	0.2	low V _F			PMEG2005ET		PMEG2005EH				PMEG2005EJ	PMEG2005AEA	PMEG2005AEV				PMEG2005BELD		
		410	0.3	low V _F												PMEG2005EPK					
		440	1.5	low V _F													PMEG2005AEL	PMEG2005AELD			
		480	0.03	low I _R												PMEG2005EB					
		500	0.03	low I _R													PMEG2005EL	PMEG2005ELD			
	30	430	0.15	low V _F			PMEG3005ET		PMEG3005EH				PMEG3005EJ	PMEG3005AEA	PMEG3005AEV						
		500	0.5	low V _F													PMEG3005EB	PMEG3005EL	PMEG3005ELD		
	40	470	0.1	low V _F			PMEG4005ET		PMEG4005EH				PMEG4005EJ	PMEG4005AEA	PMEG4005AEV						
		550	1.1	low V _F			BAT720					1PS70SB20									
		590	0.01	low I _R												PMEG4005EPK					
1.0	20	340	1.0	low V _F				PMEG2010ER													
		375	1.9	low V _F							PMEG2010EPA										
		415	0.6	low V _F												PMEG2010EPK					
		430	0.2	low V _F			PMEG2010AET		PMEG2010AEH												
		450	0.05	low I _R				PMEG2010BER													
		490	0.2	low V _F															PMEG2010BELD		
		500	0.2	low V _F			PMEG2010ET		PMEG2010EH				PMEG2010EJ	PMEG2010BEA	PMEG2010BEV						
		550	0.07	low I _R									PMEG2010AEJ	PMEG2010EA BAT760	PMEG2010EV BAT960						
		620	1.5	low V _F													PMEG2010AEB				
	30	450	1.0	low V _F		1PS74SB23															
		360	1.5	low V _F	PMEG3010EP			PMEG3010ER													
		450	0.05	low I _R	PMEG3010BEP			PMEG3010BER													
		520	0.1	low I _R					PMEG3010CEH				PMEG3010CEJ								
		560	0.15	low V _F			PMEG3010ET		PMEG3010EH				PMEG3010EJ	PMEG3010BEA	PMEG3010BEV						
		680	0.5	low V _F													PMEG3010EB				
	40	490	0.05	low V _F	PMEG4010EP			PMEG4010ER													
		490	0.05	low V _F	PMEG4010ETP			PMEG4010ETR													
		570	0.05	low I _R					PMEG4010CEH				PMEG4010CEJ								
		600	0.02	low I _R												PMEG4010EPK					
		640	0.05	low V _F			PMEG4010ET		PMEG4010EH				PMEG4010EJ	PMEG4010BEA	PMEG4010BEV						
	60	530	0.06	low V _F	PMEG6010EP			PMEG6010ER													
		530	0.06	low V _F				PMEG6010ETR													
		650	0.35	low V _F		PMEG6010AED															
		660	0.05	low I _R					PMEG6010CEH				PMEG6010CEJ								

Medium power lowV_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	SOT457 (SC-74)	SOT23	SOD123W	SOD123F		DFN2020-3 (SOT1061)	SOT323 (SC-70)	SOD323F (SC-90)	SOD323 (SC-76)	SOT666	DFN1608D-2 (SOD1608)	SOD523 (SC-79)	DFN1006-2 (SOD882)	DFN1006D-2 (SOD882D)
																			
				Size (mm)	3.8 x 2.5 x 1.0	2.9 x 1.5 x 1.0	2.9 x 1.3 x 1.0	2.6 x 1.7 x 1.0	2.6 x 1.6 x 1.1		2.0 x 2.0 x 0.62	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 0.37	1.2 x 0.8 x 0.6	1.0 x 0.6 x 0.48	1.0 x 0.6 x 0.37
				P _{tot} (mW) @ 1 cm ²	1050	540	420	950	830		960	400	830	570	570	780	500	565	660
Optimization																			
1.5	20	420	0.9	low V _F												PMEG2015EPK			
		660	0.2	low I _R					PMEG2015EH				PMEG2015EJ	PMEG2015EA	PMEG2015EV				
	30	500	1.0	low V _F					PMEG3015EH				PMEG3015EJ		PMEG3015EV				
	40	610	0.03	low I _R												PMEG4015EPK			
2.0	10	460	3.0	low V _F					PMEG1020EH				PMEG1020EJ	PMEG1020EA	PMEG1020EV				
	20	420	1.9	low V _F							PMEG2020EPA								
		450	0.9	low V _F												PMEG2020EPK			
		525	0.2	low V _F					PMEG2020EH				PMEG2020EJ	PMEG2020AEA					
	30	360	3.0	low V _F	PMEG3020EP														
		420	1.5	low V _F	PMEG3020CEP			PMEG3020ER											
		450	0.1	low I _R	PMEG3020BEP														
		470	2.5	low V _F							PMEG3020EPA								
		520	0.05	low I _R	PMEG3020DEP			PMEG3020BER											
		620	1.0	low V _F					PMEG3020EH				PMEG3020EJ						
	40	490	0.1	low V _F	PMEG4020EP			PMEG4020ER											
		490	0.1	low V _F	PMEG4020ETP			PMEG4020ETR											
		535	0.1	low V _F							PMEG4020EPA								
		660	0.03	low I _R												PMEG4020EPK			
	60	530	0.2	low V _F	PMEG6020EP			PMEG6020ER											
		530	0.2	low V _F	PMEG6020ETP			PMEG6020ETR											
		575	0.25	low V _F							PMEG6020EPA								
3.0	10	530	3.0	low V _F					PMEG1030EH				PMEG1030EJ						
	30	360	5.0	low V _F	PMEG3030EP														
		450	0.15	low I _R	PMEG3030BEP														
	40	490	0.2	low V _F	PMEG4030EP														
		490	0.2	low V _F	PMEG4030ETP														
		540	0.1	low I _R				PMEG4030ER											
	60	530	0.2	low V _F	PMEG6030EP														
		530	0.2	low V _F	PMEG6030ETP														
5.0	30	360	8.0	low V _F	PMEG3050EP														
		450	0.25	low I _R	PMEG3050BEP														
	40	490	0.3	low V _F	PMEG4050EP														
		490	0.3	low V _F	PMEG4050ETP														

In the Spotlight

New low V_F Schottky rectifier portfolio in DFN1608D-2 (SOD1608)

Leadless ultra small and flat SMD package (1.6 x 0.8 x 0.37 mm)

4 low V_F devices with V_R = 20 V and I_F up to 2 A

4 low I_F devices with V_R = 40 V and I_F up to 2 A

Solderable side pads for visual soldering inspection

AEC-Q101 qualified



In the Spotlight

Low height, high performance – save board space by replacing SMA & SMB with FlatPower packages

High temperature (175°) rectifiers in Flatpower packages

10 devices with V_R = 40 V, 60 V boost max. junction temperature to 175 °C

Maximum rectified current range of 1 A up to 3 A

Low V_F spec. combined with low I_R characteristics

AEC-Q101 qualified

In SOD123W and SOD128 Flat Power packages - only 1 mm high



In the Spotlight

PMEG2005BELD, PMEG2010BELD

0.5 A and 1 A low V_F Schottky rectifiers in DFN1006D-2 (SOD882D)

Extremely low V_F combined with low I_R due to new wafer fab process module using optimized shallow diffusion

V_F typ = 353 mV @ 0.5 A

I_R typ = 28 µA @ 10 V

Solderable side pads for visual soldering inspection

AEC-Q101 qualified

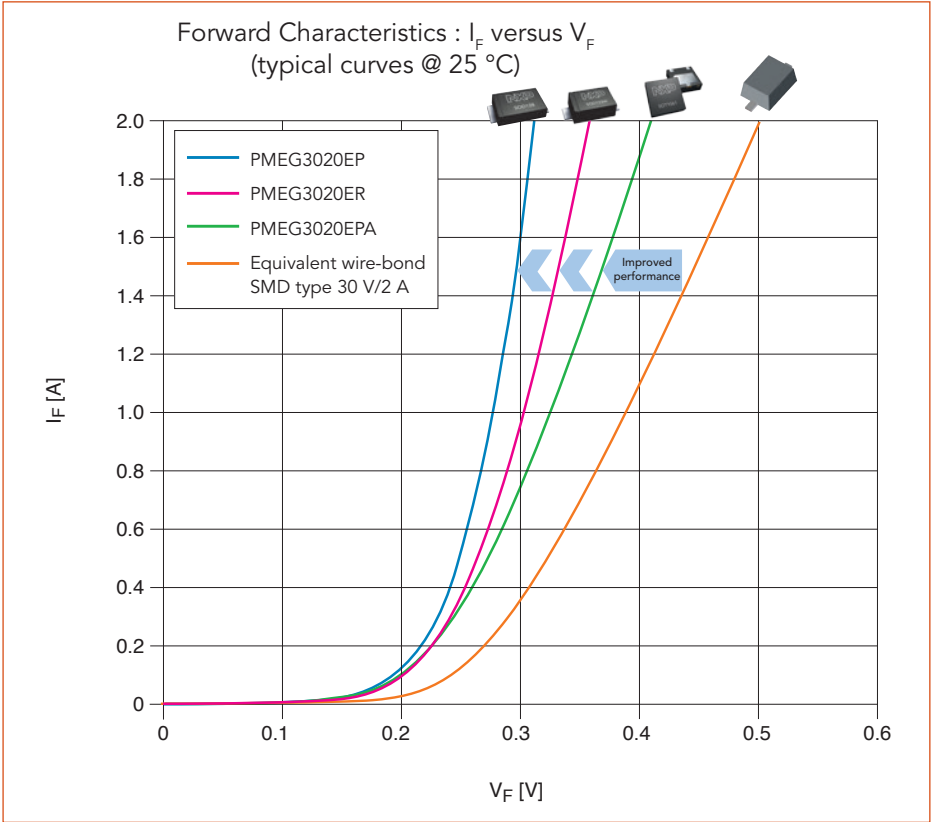


Medium power lowV_F Schottky rectifiers dual ≥ 200 mA

types in **bold** represent new products

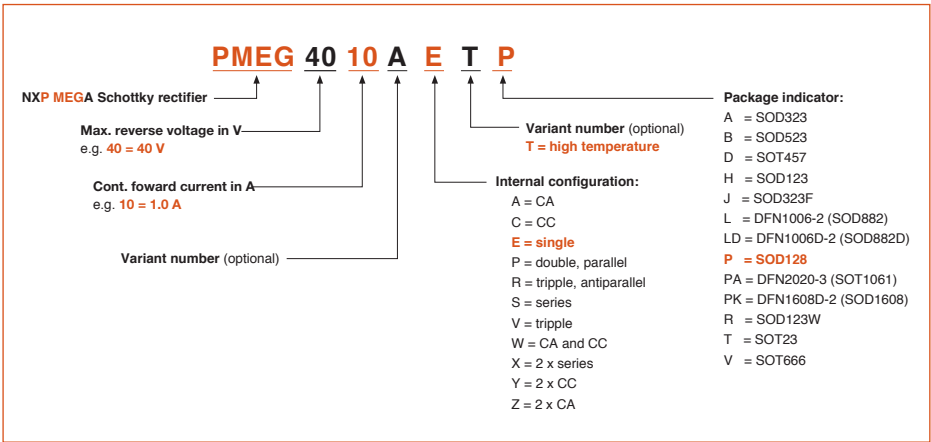
I _F max (A)	V _R max (V)	V _F max (mV) @ I _F max	I _R max (mA) @ V _R max	Optimization	Package	SOT223 (SC-73)	SOT23	DFN2020-3 (SOT1061)	SOT666	
										
						6.5 x 3.5 x 1.65	2.9 x 1.3 x 1.0	2.0 x 2.0 x 0.62	1.6 x 1.2 x 0.55	
						P _{tot} (mW)	1500	250	1000	300
0.2	30	480	0.03	low V _F	dual isolated 				PMEG3002TV	
	60	600	0.1	low V _F					PMEG6002TV	
0.5	20	390	0.2	low V _F	dual c.c. 		PMEG2005CT			
	30	430	0.15	low V _F			PMEG3005CT			
	40	470	0.1	low V _F			PMEG4005CT			
1.0	25	450	1.0	low V _F	dual series 	BAT120S				
				low V _F	dual c.c. 	BAT120C				
				low V _F	dual c.a. 	BAT120A				
	40	500	0.05	low V _F	dual c.c. 			PMEG4010CPA		
	60	540	0.06	low V _F	dual c.c. 			PMEG6010CPA		
				low V _F	dual series 	BAT160S				
		650	0.35	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	

Improved forward characteristics of (MEGA)¹ Schottky rectifiers in new packages



¹⁾ Maximum Efficiency General Application

Nomenclature of lowV_F (MEGA) Schottky rectifiers



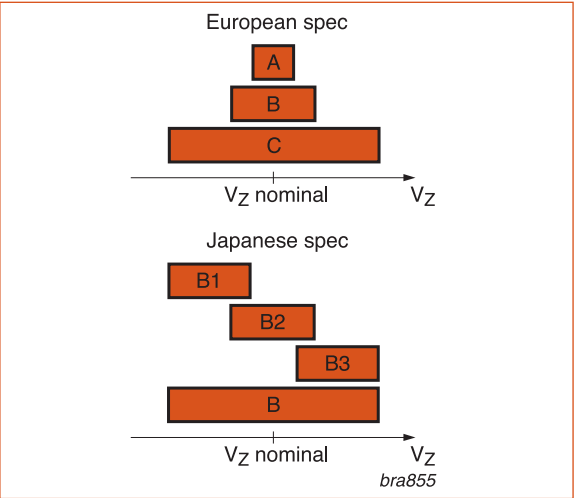
General purpose Zener diodes

I _F max (mA)	P _{ZSM} (W)	V _Z nom (V)	V _Z tolerance	Note	Configuration	Series	Package	Size (mm)	P _{tot} (mW)
500	-	3.3~24	C	Eur	single 	1N47xxA series		4.8 x 2.6 x 0.81	1000
	60	3.6~75				BZX85 series			
250	-	2.1~36	about 2%	special	single 	NZX series		4.25 x 1.85 x 0.56	400
	40	2.4~75	B, C	Eur		BZX79 series			
400	40	2.4~75	C	Eur	single 	BZV90 series		6.5 x 3.5 x 1.65	1500
250	40	2.4~75	C	Eur	single 	BZV49 series		4.5 x 2.5 x 1.5	1000
250	40	2.4~75	B, C	Eur	single 	BZV55 series		3.5 x 1.5 x 1.5	300
200	40	2.4~75	B, C	Eur	dual c.a. 	BZB84 series		2.9 x 1.3 x 1.0	250
			A, B, C		single 	BZX84 series			
			0.2 V	Ave		PLVA600A series			
250	30	5~6.8	0.2 V	Ave	dual c.a. 	PLVA2600A series		2.6 x 1.6 x 1.1	830
250	-	3.0~30	about 2.5%	special	single 	NZH series			
	40	2.4~75	B, C	Eur		BZT52H series			
200	40	2.7~24	B2	Jap	dual isolated 	PZUxDB2 series		2.0 x 1.25 x 0.95	300
200	40	2.4~15	C	Eur	dual c.a. 	BZB784 series		2.0 x 1.25 x 0.95	350
200	30	100	C	Eur	back-to-back 	BZB100A		1.7 x 1.25 x 0.95	300
	40	2.4~36	B2	Jap	single 	PDZ-B series			
250	40	2.4~75	B, C	Eur		BZX384 series			
200	40	2.4~36	B, B1, B2, B3	Jap		PZUxBA series		1.7 x 1.25 x 0.7	550
200	60	100	C	Eur	single 	BZX100A			
200	40	2.4~36	B, B1, B2, B3	Jap		PZUxB series			
250	40	2.4~75	B, C	Eur		BZX84J series			
200	40	2.4~15	C	Eur	dual c.a. 	BZB984 series		1.6 x 1.2 x 0.55	350
200	40	2.4~75	B, C	Eur	single 	BZX585 series		1.2 x 0.8 x 0.6	300
200	40	2.4~75	B, C	Eur	single 	BZX884 series		1.0 x 0.6 x 0.48	250
		2.4~36	B, B2	Jap		PZUxBL series			
250	40	2.4~30	B	Eur	single 	TDZxJ series		1.7 x 1.25 x 0.7	500

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

Zener diodes specifications

Differences in Zener specifications



European spec (BZV, BZX, BZB, 1N47)

y =	C-series	B-series	A-series
	± 5%	± 2%	± 1%
	V _Z (V)	V _Z (V)	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	15.84 - 16.16
BZX84-y18	16.8 - 19.1	17.6 - 18.4	17.82 - 18.18
BZX84-y20	18.8 - 21.2	19.6 - 20.4	19.8 - 20.2
BZX84-y22	20.8 - 23.3	21.6 - 22.4	21.78 - 22.22
BZX84-y24	22.8 - 25.6	23.5 - 24.5	23.76 - 24.24
BZX84-y27	25.1 - 28.9	26.5 - 27.5	26.73 - 27.27
BZX84-y30	28 - 32	29.4 - 30.6	29.70 - 30.30
BZX84-y33	31 - 35	32.3 - 33.7	32.67 - 33.33
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

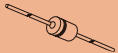
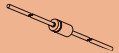
Japanese spec (PZU, PDZ)

y =	B-series	B1-series	B2-series	B3-series
	± 5%	± 2%	± 2%	± 2%
	V _Z (V)	V _Z (V)	V _Z (V)	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	11.1 - 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)
NZX2V1B	2.0 - 2.2	NZX6V2D	6.1 - 6.4	NZX14C	13.8 - 14.3
NZX2V4A	2.3 - 2.5	NZX6V2E	6.3 - 6.6	NZX15A	14.1 - 14.7
NZX2V4B	2.4 - 2.6	NZX6V8A	6.4 - 6.7	NZX15B	14.5 - 15.1
NZX2V7A	2.5 - 2.7	NZX6V8B	6.6 - 6.9	NZX15C	14.9 - 15.5
NZX2V7B	2.6 - 2.8	NZX6V8C	6.7 - 7	NZX15X	14.35 - 15.09
NZX2V7C	2.7 - 2.9	NZX6V8D	6.9 - 7.2	NZX16A	15.3 - 15.9
NZX3V0A	2.8 - 3	NZX7V5A	7 - 7.3	NZX16B	15.7 - 16.5
NZX3V0B	2.9 - 3.1	NZX7V5B	7.2 - 7.6	NZX16C	16.3 - 17.1
NZX3V0C	3 - 3.2	NZX7V5C	7.3 - 7.7	NZX18A	16.9 - 17.7
NZX3V3A	3.1 - 3.3	NZX7V5D	7.5 - 7.9	NZX18B	17.5 - 18.3
NZX3V3B	3.2 - 3.4	NZX7V5X	7.07 - 7.45	NZX18C	18.1 - 19
NZX3V3C	3.3 - 3.5	NZX8V2A	7.7 - 8.1	NZX20A	18.8 - 19.7
NZX3V6A	3.4 - 3.6	NZX8V2B	7.9 - 8.3	NZX20B	19.5 - 20.4
NZX3V6B	3.5 - 3.7	NZX8V2C	8.1 - 8.5	NZX20C	20.2 - 21.2
NZX3V6C	3.6 - 3.8	NZX8V2D	8.3 - 8.7	NZX22A	20.9 - 21.9
NZX3V9A	3.7 - 3.9	NZX9V1A	8.5 - 8.9	NZX22B	21.6 - 22.6
NZX3V9B	3.8 - 4	NZX9V1B	8.7 - 9.1	NZX22C	22.3 - 23.3
NZX3V9C	3.9 - 4.1	NZX9V1C	8.9 - 9.3	NZX24A	22.9 - 24
NZX4V3A	4 - 4.2	NZX9V1D	9.1 - 9.5	NZX24B	23.6 - 24.7
NZX4V3B	4.1 - 4.3	NZX9V1E	9.3 - 9.7	NZX24C	24.3 - 25.5
NZX4V3C	4.2 - 4.4	NZX10A	9.5 - 9.9	NZX24X	22.61 - 23.77
NZX4V3D	4.3 - 4.5	NZX10B	9.7 - 10.1	NZX27A	25.2 - 26.6
NZX4V7A	4.4 - 4.6	NZX10C	9.9 - 10.3	NZX27B	26.2 - 27.6
NZX4V7B	4.5 - 4.7	NZX10D	10.2 - 10.6	NZX27C	27.2 - 28.6
NZX4V7C	4.6 - 4.8	NZX11A	10.4 - 10.8	NZX27X	26.99 - 28.39
NZX4V7D	4.7 - 4.9	NZX11B	10.7 - 11.1	NZX30A	28.2 - 29.6
NZX5V1A	4.8 - 5	NZX11C	10.9 - 11.3	NZX30B	29.2 - 30.6
NZX5V1B	4.9 - 5.1	NZX11D	11.1 - 11.6	NZX30C	30.2 - 31.6
NZX5V1C	5 - 5.2	NZX12A	11.4 - 11.9	NZX30X	29.02 - 30.51
NZX5V1D	5.1 - 5.3	NZX12B	11.6 - 12.1	NZX33A	31.2 - 32.6
NZX5V6A	5.2 - 5.5	NZX12C	11.9 - 12.4	NZX33B	32.2 - 33.6
NZX5V6B	5.3 - 5.6	NZX12D	12.2 - 12.7	NZX33C	33.2 - 34.5
NZX5V6C	5.4 - 5.7	NZX12X	11.44 - 12.03	NZX36A	34.2 - 35.7
NZX5V6D	5.5 - 5.8	NZX13A	12.4 - 12.9	NZX36B	35.3 - 36.8
NZX5V6E	5.6 - 5.9	NZX13B	12.6 - 13.1	NZX36C	36.4 - 38
NZX6V2A	5.7 - 6	NZX13C	12.9 - 13.4	NZX36X	35.36 - 37.19
NZX6V2B	5.8 - 6.1	NZX14A	13.2 - 13.7		
NZX6V2C	6 - 6.3	NZX14B	13.5 - 14		

General purpose switching diodes ≤ 100V

V _R max (V)	V _F max (V)	@ I _F (mA)	I _R max (nA)	@ 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)	DFN1006-2 (SOD882)	DFN1006-3 (SOT883)	DFN1006D-2 (SOD882D)
						Size (mm)																	
						P _{tot} (mW)	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 0.48	1.0 x 0.6 x 0.48	1.0 x 0.6 x 0.37
50	1	50	100	50	4					BAL74													
										BAV74													
70	1	50	1000	70	4					BAL99													
75	1	10	25	20	4			1N4531															
		50	1000	75	4					BAS28													
		100	5000	75	4				BAS32L														
80	1	50	500	80	4								1PS300										
													1PS301										
													1PS302										
90	1	50	500	80	4					BAW56			BAW56W						BAW56T			BAW56M	
															BAW56S								
															BAV756S								
100	1	10	25	20	4		1N4148																
		50	500	80	4							BAS16H				BAS316	BAS16J			BAS516	BAS16L		BAS16LD
										BAS16			BAS16W						BAS16T				
															BAS16VY			BAS16VV					
										BAV70			BAV70W						BAV70T			BAV70M	
															BAV70S								
										BAV99			BAV99W										
															BAV99S								

General purpose switching diodes > 100V

V_R max (V)	V_F max (V)	@ I_F (mA)	I_R max (nA)	@ V_R (V)	t_{rr} max (ns)	Package	SOD27 (DO-35)	SOD80C (MiniMelf)	SOT457 (SC-74)	SOT23	SOT143B	SOD123F	SOD123W	SOT323 (SC-70)	SOT363 (SC-88)	SOD323 (SC-76)	SOD323F (SC-90)	SOD523 (SC-79)
																		
						Size (mm)	4.25 x 1.85 x 0.56	3.5 x 1.5 x 1.5	2.9 x 1.5 x 1.0	2.9 x 1.3 x 1.0	2.9 x 1.3 x 1.0	2.6 x 1.6 x 1.1	2.6 x 1.7 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	1.7 x 1.25 x 0.7	1.2 x 0.8 x 0.6
						P_{tot} (mW)	500	300	500	250	250	830	750	350	300	400	550	500
150	1	100	100	150	50		BAV20	BAV102										
≥ 200	1	100	100	150	50		BAV21	BAV103				BAS21H				BAS321		
				200	50					BAS21				BAS21W				
											BAV23							
										BAV23A				BAS21AW				
										BAV23C								
										BAV23S				BAS21SW				
									BAS21AVD									
									BAS21VD									
																BAS21J	BAS521	
					50					BAS101								
										BAS101S								
											BAW101							
														BAW101S				
												PNS40010ER						
400	1.1	1000	1000	400	1800													

Controlled avalanche switching diodes

V_R max (V)	V_F max (V)	@ I_F (mA)	I_R max (nA) @ V_R max	I_{FSM} max (A)	I_{FRM} max (mA)	C_d max (pF)	t_{rr} max (ns)	Package	SOT23	SOT143B
										
								Size (mm)	2.9 x 1.3 x 1.0	2.9 x 1.3 x 1.0
								P_{tot} (mW)	250	250
60	1	200	100	9	600	2.5	6			BAS56
90	1	200	100	10	600	35	50		BAS29	
									BAS31	
									BAS35	
										

Low leakage current switching diodes

V_R max (V)	V_F max (V)	@ I_F (mA)	I_R max (nA) @ V_R max	t_{rr} max (μs)	Package	SOD80C (MiniMelf)	SOD68 (DO-34)	SOT23	SOD123F	SOT323 (SC-70)	SOD323 (SC-76)	SOT416 (SC-75)	SOD523 (SC-79)
													
					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	2.6 x 1.6 x 1.1	2.0 x 1.25 x 0.95	1.7 x 1.25 x 0.95	1.6 x 0.8 x 0.77	1.2 x 0.8 x 0.6
					P_{tot} (mW)	300	500	250	830	250	400	170	500
75	1	10	5	3					BAS116H		BAS416		BAS716
									BAS116			BAS116T	
									BAV199	BAV199W			
									BAW156				
									BAV170				
125	1	100	1	1.5 typ		BAS45AL	BAS45A						

Hyperfast Power Diodes

types in **bold** represent new products

V_{RRM} (V)	I_{FAV} (A)	V_F (typ) @ 150C (V)	@ I_F (A)	t_r (typ) @ 25C (ns)	SOD59 (TO220AC)	SOD113 (2-pin SOT186A)	SOT78 (TO220AB)	SOT404 (D ² PAK)
500	5	1.4	5	16	BYC5D-500	BYC5DX-500		
	5	1.4	5	19	BYC5-600	BYC5X-600		BYC5B-600
	8	1.4	8	19	BYC8-600	BYC8X-600		BYC8B-600
	8	2	8	12.5		BYC58X-600		
600	8	1.4	8	18	BYC8D-600	BYC8DX-600		
	8	1.4	8	19	BYC8-600P	BYC8X-600P		
	10	1.4	10	19	BYC10-600	BYC10X-600		BYC10B-600
	10	1.4	10	18	BYC10D-600	BYC10DX-600		
	2 x 5	1.4	5	19			BYC10-600CT	
	15	1.4	15	19	BYC15-600	BYC15X-600		
	20	1.4	20	19	BYC20-600	BYC20X-600		
	20	1.4	20	19		BYC20X-600P		
	30	1.4	30	19		BYC30X-600P		

In the Spotlight

Hyperfast recovery power diodes

Comprehensive package offerings

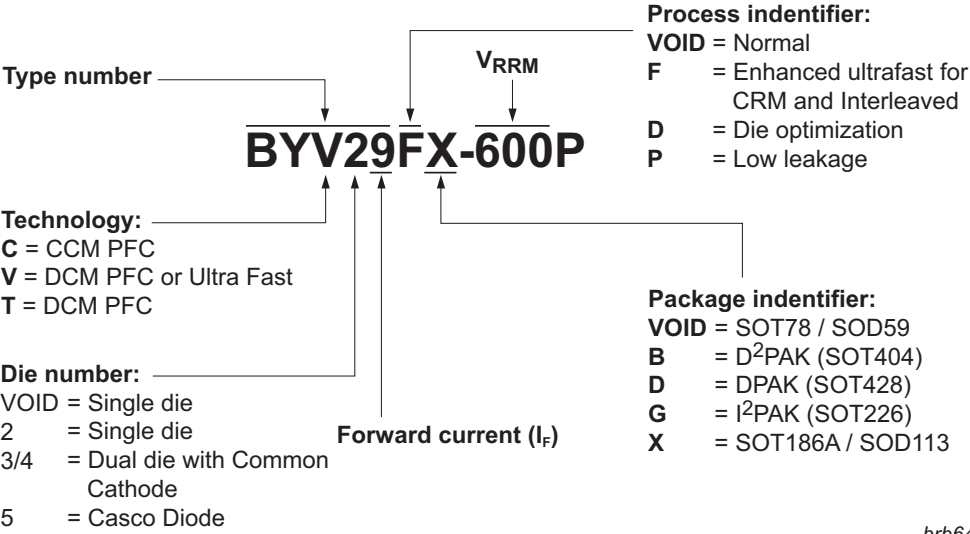
Low leakage current (platinum doped series)

Low reverse recovery current

Low thermal resistance

Reduces switching losses in associated MOSFET or IGBT

Power Diode part numbering



brb644

In the Spotlight

Ultrafast recovery power diodes

Fast switching

High voltage capability

Low forward voltage drop

Low leakage current (platinum doped series)

Low thermal resistance

Soft recovery characteristic

Ultrafast Power Diodes

types in **bold** represent new products

V_{RRM} (V)	I_{FAV} (A)	V_F (typ) @ 150C (V)	@ I_F (A)	t_r (typ) @ 25C (ns)	SOD59 (TO220AC)	SOD113 (2-pin SOT186A)	SOD141 (DO201AD)	SOT78 (TO220AB)	SOT186A (isolated TO220AB)	SOT223	SOT226 (I ² PAK)	SOT404 (D ² PAK)	SOT428 (DPAK)
100	8	0.8	8	20	BYW29E-100								
	2 x 10	0.72	8	20				BYV32E-100					
150	2 x 0.75	0.5	0.5	10						BYV40E-150			
	8	0.8	8	20	BYW29E-150								
	2 x 10	0.72	8	20				BYV32E-150					
	2 x 15	0.78	15	20				BYV42E-150					
200	8	0.8	8	20	BYW29E-200	BYW29EX-200							BYW29ED-200
	2 x 5	0.8	5	15				BYQ28E-200	BYQ28X-200				BYQ28ED-200
	2 x 5	0.8	5	15				BYQ28E-200E					
	14	0.83	14	20	BYV79E-200								
	2 x 8	0.84	8	20				BYQ30E-200					
	2 x 10	0.72	8	20				BYV32E-200			BYV32G-200	BYV32EB-200	
	2 x 10	0.72	8	20				BYV42E-200			BYV42G-200	BYV42EB-200	
	2 x 15	0.78	15	20				BYT28-300					
	2 x 5	0.95	5	50									
	9	0.9	8	50	BYV29-400								
400	2 x 10	0.87	10	50				BYV34-400					
	9	0.9	8	50	BYV29-500	BYV29X-500							
	2 x 5	0.95	5	50				BYT28-500					
	15	0.9	15	50	BYT79-500								BYV29B-500
500	2 x 10	0.87	10	50				BYV34-500					
	2 x 15	0.95	15	50				BYV44-500					
	4	0.88	4	33									
	4	0.82	3	45									
	5	0.97	5	50									
	8	1.07	8	60	BYR29-600	BYR29X-600					BYV25G-600		BYV25D-600
	9	0.97	8	50	BYV29-600	BYV29X-600					BYV29G-600	BYV29B-600	
	15	1	15	50	BYT79-600	BYT79X-600							
	2 x 10	0.92	10	50				BYV34-600	BYV34X-600		BYV34G-600		
	5	1.1	5	17.5	BYV25F-600	BYV25FX-600						BYV25FB-600	BYV25FD-600
600	9	1.25	8	17.5	BYV29F-600	BYV29FX-600						BYV29FB-600	BYV29FD-600
	2 x 10	1.3	10	20				BYV410-600	BYV410X-600				
	8	1.07	8	60	BYR29-800	BYR29X-800							

Power Schottky Diodes

types in **bold** represent new products

V_{RRM} (V)	I_{FAV} (A)	V_F (typ) @ 125C (V)	@ I_F (A)	SOT78 (TO220AB)	SOT186A (isolated TO220AB)
100	2 x 10	0.59	10	NXPS20H100C	NXPS20H100CX
110	2 x 10	0.59	10	NXPS20H110C	

In the Spotlight

Power Schottky Diodes

Negligible switching losses

High junction temperature capability

Low leakage current

Optimized design to give low VF and high Tjmax

Integrated guard ring for voltage stress protection



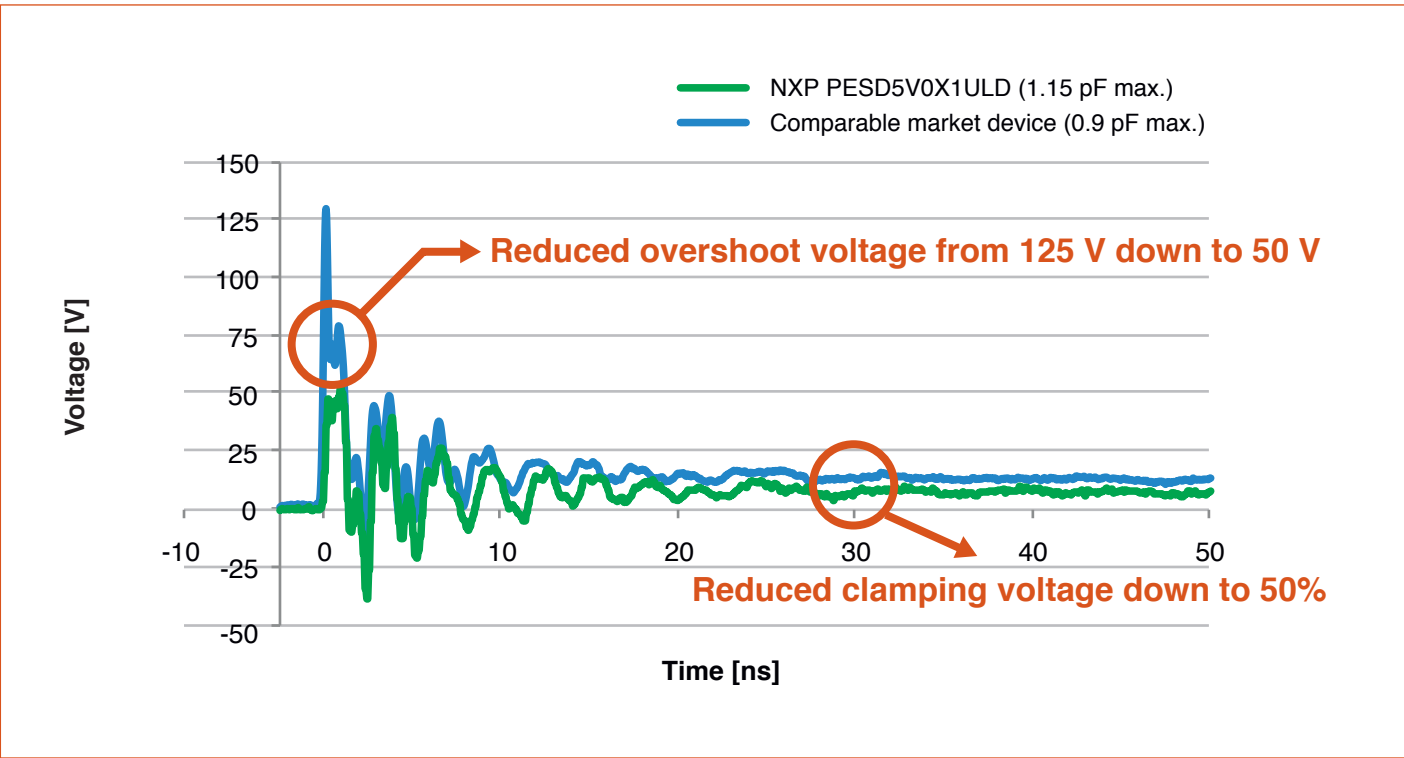
Protection and signal conditioning

Standard ESD protection devices	30
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Signal conditioning and protection	60

Ultra low clamping ESD protection for highly sensitive devices

- ▶ Modern IC process technology nodes feature ultra small structure widths which are highly sensitive to high voltages and currents
- ▶ The excellent clamping performance of the new NXP family reduces dangerous clamping/transient voltages during an ESD strike to a minimum

Optimal clamping performance: 8 kV ESD clamping graph

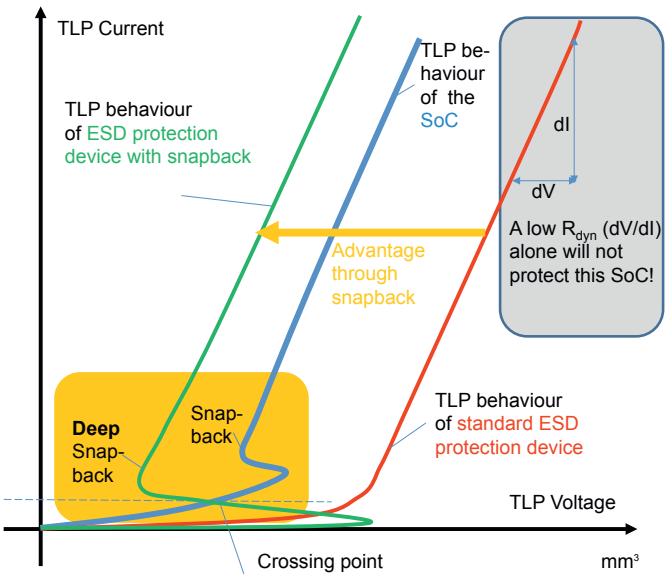


Electrical specifications

Product	V _{RWM}	C _d typ	C _d max	ESD rating max	V _{CL} @ 8 kV ESD pulse after 30 ns	Package	Configuration
PESD5V0X1UB	5 V	0.95 pF	1.15 pF	8 kV	7.5 V	SOD523 (1.2 x 0.8 x 0.6)	
PESD5V0X1UAB	5 V	1.55 pF	1.75 pF	15 kV	11 V		
PESD5V0X1ULD	5 V	0.95 pF	1.15 pF	8 kV	7.5 V	DFN1006D-2 (SOD882D) (1.0 x 0.6 x 0.37)	
PESD5V0X1UALD	5 V	1.55 pF	1.75 pF	15 kV	11 V		
PESD5V0X1BCL	5 V	0.49 pF	0.6 pF	8 kV	18 V	DFN1006-2 (SOD882) (1.0 x 0.6 x 0.5)	
PESD5V0X1BCAL	5 V	0.85 pF	0.95 pF	15 kV	13.3 V		

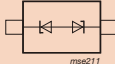
Snap-back ESD protection for ultra-high speed interfaces, protecting sensitive SoCs

- ▶ Modern, very fast SoCs react very fast to transients such as ESD pulses and Transmission Line Pulse (TLP) measurements
- ▶ Standard ESD protection devices react at higher TLP voltages and do not offer sufficient protection
- ▶ NXP's ESD-protection devices with deep snapback protect even these most sensitive SoCs against ESD pulses according to IEC61000-4-2



Device	Configuration	Description	C typ [pF]	ESD rating [kV IEC 61000-4-2]	Package	Size [mm3]
IP3319CX6	Protects and filters one line pair	Common-mode filter with deep snap-back ESD protection for fast data lines such as USB2.0	1.5	15	WLCSP6	1.34 x 0.95 x 0.57
IP4285CZ6-TY	Protects four unidirectional lines	Deep snap-back ESD protection for fast data lines (USB2.0,...)	0.8	12	SOT363	2 x 1.25 x 0.95
IP4285CZ6-TD	Protects four unidirectional lines	Deep snap-back ESD protection for fast data lines (USB2.0,...)	0.8	12	SOT457	2.9 x 1.5 x 1.0
IP4285CZ9-TBB	Protects four unidirectional lines	Deep snap-back ESD protection for ultra fast data lines (HDMI,...)	0.8	12	DFN2110-9 (SOT1178)	2.1 x 1.0 x 0.5
IP4292CZ10-TBR	Protects four unidirectional lines	Deep snap-back ESD protection for ultra fast data lines (USB3.0,...)	0.55	8	DFN2510-10 (SOT1176)	2.5 x 1.0 x 0.5
IP4294CZ10-TBR	Protects four unidirectional lines	Deep snap-back ESD protection for ultra fast data lines (USB3.0,...)	0.5	10	DFN2510-10 (SOT1176)	2.5 x 1.0 x 0.5
IP4238CZ10	Protects four unidirectional lines	Deep snap-back Ethernet surge protection 25 A 8/20	3	30	DFN2626-10 (SOT1197)	2.6 x 2.6 x 0.5

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										
1	0	5	35	42	40	30	0.1		PESD5V0S1USF	DSN0603-2 (SOD962)	0.6 x 0.3 x 0.3
		3.3	207	300	150	30	2		PESD3V3S1UL	DFN1006-2 (SOD882)	1.0 x 0.6 x 0.48
		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		
		36	18	30	150	30	0.01		PESD36VS1UL		
		5	152	200	150	30	1		PESD5V0S1ULD	DFN1006D-2 (SOD882D)	1.0 x 0.6 x 0.37
		12	38	75	150	30	0.05		PESD12VS1ULD		
		15	32	70	150	30	0.05		PESD15VS1ULD		
		24	23	50	150	23	0.05		PESD24VS1ULD		
		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		1.2 x 0.8 x 0.6
		15	32	70	160	30	0.05		PESD15VS1UB		
		24	23	50	160	23	0.05		PESD24VS1UB		
		5	480	530	890	30	4		PESD5V0S1UA	SOD323 (SC-76)	1.7 x 1.25 x 0.95
		12	160	180	600	30	0.1		PESD12VS1UA		
		24	23	50	160	23	0.05		PESD24VS1UA		
		5	480	530	890	30	4		PESD5V0S1UJ	SOD323F (SC-90)	1.7 x 1.25 x 0.7
		12	160	180	600	30	0.1		PESD12VS1UJ		
		5	68	75	150	30	1		PESD9X5.0L	DFN1006-2 (SOD882)	1.0 x 0.6 x 0.48
		7	62	70	150	30	1		PESD9X7.0L		
		2.5	229	300	260	30	6		PESD5Z2.5	SOD523 (SC-79)	1.2 x 0.8 x 0.6
		3.3	172	200	260	30	0.05		PESD5Z3.3		
		5	89	150	180	30	0.05		PESD5Z5.0		
		6	78	150	180	30	0.01		PESD5Z6.0		
		7	69	150	180	30	0.01		PESD5Z7.0		
		12	35	75	200	30	0.01		PESD5Z12		
0	1	5.5	35	45	100	30	0.1		PESD5V0S1BSF	DSN0603-2 (SOD962)	0.6 x 0.3 x 0.3
		5	35	45	130	30	0.1		PESD5V0S1BL	DFN1006-2 (SOD882)	1.0 x 0.6 x 0.48
		5	35	45	130	30	0.1		PESD5V0S1BLD	DFN1006D-2 (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 exponential decay waveform according to IEC 61000-4-2 and IEC 61643-321

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

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										
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		
		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		
4	3	5.5	45	60	-	15	0.1		IP4342CX5/LF	WLCSP5	1.06 x 0.76 x 0.61
		5.5	30	40	-	15	0.1		IP4042CX5/LF		1.28 x 0.91 x 0.65
		3.3	110	300	110	30	1 (@ 3 V)		PESD3V3S4UF	DFN1410-6 (SOT886)	1.45 x 1.0 x 0.48
		5	85	220	110	30	0.1 (@ 4.3 V)		PESD5V0S4UF		
		3	107	125	-	8	1		BZA956A	SOT665	1.6 x 1.2 x 0.55
		4	90	105	-	8	0.5		BZA962A		
		4.3	78	90	-	8	0.1		BZA968A		
		3	200	240	-	8	2		BZA856A	SOT353 (SC-88A)	2.0 x 1.25 x 0.95
		3	107	125	-	8	1		BZA856AL		
		4	165	200	-	8	0.7		BZA862A		
		4	90	105	-	8	0.5		BZA862AL		
		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	SOT457 (SC-74)	2.9 x 1.5 x 1.0
		4	165	200	-	15	0.7		BZA462A		
		14	37	48	-	8	0.075		BZA418A		
		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		

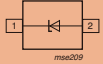
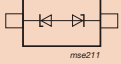
^[1] 8/20 μs exponential decay waveform according to IEC 61000-4-2 and IEC 61643-321

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

Protection and signal conditioning

Low capacitance ESD protection devices – Part 1

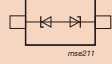
types in **bold** represent new products

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	34	40	45	30	0.3		PESD3V3L1UL	DFN1006-2 (SOD882)	1.0 x 0.6 x 0.48
		5	25	30	42	26	0.1		PESD5V0L1UL		
		5	25	30	42	26	0.1		PESD5V0L1ULD	DFN1006D-2 (SOD882D)	1.0 x 0.6 x 0.37
		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		
		5	12	15	10	30	0.1		PESD5V0L1USF	DSN0603-2 (SOD962)	0.6 x 0.3 x 0.3
		5	4	5	8	14	0.1		PESD5V0V1USF		
		3.3	2.6	3.1	-	9	0.1 (@ 3 V)		PESD3V3U1UL	DFN1006-2 (SOD882)	1.0 x 0.6 x 0.48
		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	SOD323 (SC-76)	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		
		5.5	12	15.4	35	30	0.1		PESD5V0L1BSF	DSN0603-2 (SOD962)	0.6 x 0.3 x 0.3
		5	11	13	45	30	0.01		PESD5V0V1BL	DFN1006-2 (SOD882)	1.0 x 0.6 x 0.48
		5	11	13	45	30	0.01		PESD5V0V1BLD	DFN1006D-2 (SOD882D)	1.0 x 0.6 x 0.37
		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	5.3	6	10	20	0.1		PESD5V0V1BCSF	DSN0603-2 (SOD962)	0.6 x 0.3 x 0.3
		5	5.3	6	20	25	0.1		PESD5V0V1BDSF		
		5.5	3.5	4.5	8	15	0.1		PESD5V0V1BSF		
		12	17	25	290	30	0.01		PESD12VV1BL	DFN1006-2 (SOD882)	1.0 x 0.6 x 0.48
		15	8	10	-	15	0.1		IP4302CX2/A	WLCSP2	0.7 x 0.52 x 0.40

^[1] 8/20 μs exponential decay waveform according to IEC 61000-4-2 and IEC 61643-321

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

Low capacitance ESD protection devices – Part 2

Number of protected lines		V _{RWM} (V)	C _{line} typ (pF)	C _{line} max (pF)	P _{pp} ^[1] max (W)	ESD rating ^[2] max (kV)	I _R max (μA) @ V _{RWM}	Configuration	Type	Package	Size (mm)
Unidirectional	Bidirectional										
0	1	5	2.9	3.5	-	10	0.1		PESD5V0U1BL	DFN1006-2 (SOD882)	1.0 x 0.6 x 0.48
		5	2.9	3.5	-	10	0.1		PESD5V0U1BLD	DFN1006D-2 (SOD882D)	1.0 x 0.6 x 0.37
		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
2	1	3.3	22	28	30	15	0.3		PESD3V3L2UM	DFN1006-3 (SOT883)	1.0 x 0.6 x 0.48
		5	16	19	30	15	0.025		PESD5V0L2UM		
		5	16	19	-	15	0.025		PESD5V0L2UMB	DFN1006B-3 (SOT883B)	1.0 x 0.6 x 0.37
		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		
		3.3	101	-	350	30	2		PESD3V3L2BT	SOT23	2.9 x 1.3 x 1.0
0	2	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	DFN1006-3 (SOT883)	1.0 x 0.6 x 0.48
		5	2.9	3.5	-	10	0.1		PESD5V0U2BMB	DFN1006B-3 (SOT883B)	1.0 x 0.6 x 0.37
		15	13	15	-	15	0.1		IP4303CX4/P	WLCSP4	0.76 x 0.76 x 0.40

^[1] 8/20 μs exponential decay waveform according to IEC 61000-4-2 and IEC 61643-321

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

In the Spotlight

Lowest capacitance ESD protection in DFN1006D-2: PESD5V0F1BLD

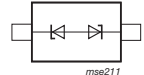
Bidirectional protection for one data line

Ultra low line capacitance of 0.4 pF

Very low package height of 0.37 mm typ

High ESD robustness =10 kV

Ultra small package DFN1006D-2 with solderable sidepads



Low capacitance ESD protection devices – Part 3

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										
3	0	5.5	3	4	-	15	0.1		IP4059CX5/LF	WLCSP5	1.34 x 0.96 x 0.65
4	3	3.3	22	28	30	20	0.3		PESD3V3L4UF	DFN1410-6 (SOT886)	1.45 x 1.0 x 0.48
		5	16	19	30	20	0.025		PESD5V0L4UF		
		3.3	22	28	30	20	0.3		PESD3V3L4UW	SOT665	1.6 x 1.2 x 0.55
		5	16	19	30	20	0.025		PESD5V0L4UW		
		3.3	22	28	30	20	0.3		PESD3V3L4UG	SOT353 (SC-88A)	2.0 x 1.25 x 0.95
		5	16	19	30	20	0.025		PESD5V0L4UG		
		3.3	13	17	25	10	1		PESD3V3V4UK	DFN1010-6 (SOT891)	1.0 x 1.0 x 0.48
		5	12	15	25	15	0.3		PESD5V0V4UK		
		9	6.5	10	28	8	0.1		PESD9V0V4UK		
		3.3	15	18	16	12	0.3		PESD3V3V4UF	DFN1410-6 (SOT886)	1.45 x 1.0 x 0.48
		5	12	15	16	12	0.025		PESD5V0V4UF		
		3.3	15	18	16	12	0.3		PESD3V3V4UW	SOT665	1.6 x 1.2 x 0.55
		5	12	15	16	12	0.025		PESD5V0V4UW		
		3.3	15	18	16	12	0.3		PESD3V3V4UG	SOT353 (SC-88A)	2.0 x 1.25 x 0.95
		5	12	15	16	12	0.025		PESD5V0V4UG		
		5.5	18	20	-	15	0.1		IP4343CX5/LF	WLCSP5	1.06 x 0.76 x 0.61
		5.5	18	20	-	15	0.1		IP4043CX5/LF		1.12 x 1.12 x 0.65

^[1] 8/20 μs exponential decay waveform according to IEC 61000-4-2 and IEC 61643-321 ^[2] acc. to IEC 61000-4-2 (contact discharge)

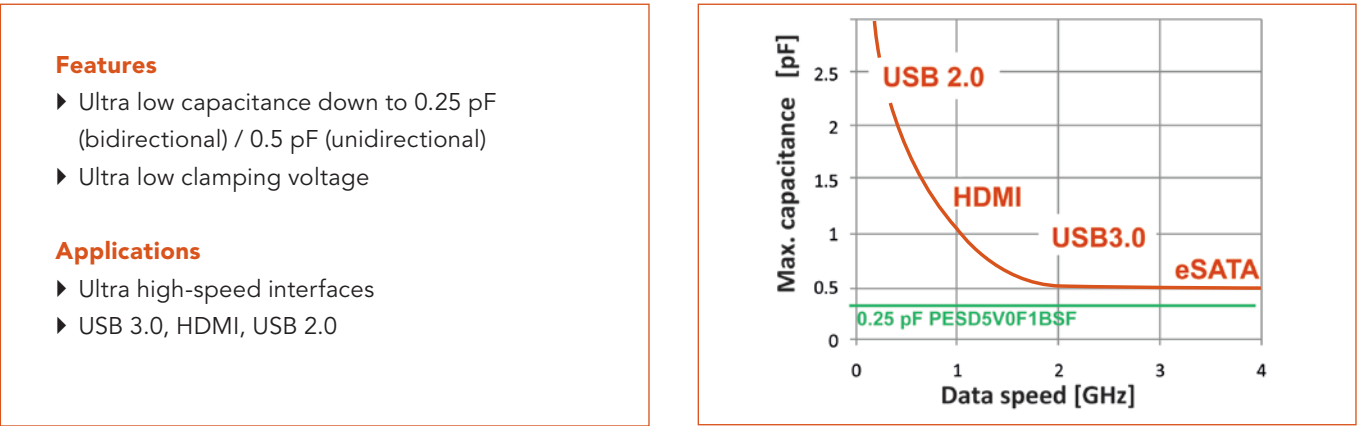
Low capacitance ESD protection devices – Part 4

Number of protected lines		V _{RWM} (V)	C _{line} typ (pF)	C _{line} max (pF)	P _{pp} ^[1] max (W)	ESD rating ^[2] max (kV)	I _R max (μA) @ V _{RWM}	Configuration	Type	Package	Size (mm)
Unidirectional	Bidirectional										
0	4	5	2.9	3.5	-	10	0.1		PESD5V0U4BF	DFN1410-6 (SOT886)	1.45 x 1.0 x 0.48
		5	2.9	3.5	-	10	0.1		PESD5V0U4BW	SOT665	1.6 x 1.2 x 0.55
5	4	3.3	20	24	28	15	2		PESD3V3L5UK	DFN1010-6 (SOT891)	1.0 x 1.0 x 0.48
		5	18.5	22	30	20	0.5		PESD5V0L5UK		
		3.3	22	28	25	20	0.3		PESD3V3L5UF	DFN1410-6 (SOT886)	1.45 x 1.0 x 0.48
		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		
		5	2.9	3.5	-	10	0.1		PESD5V0U5BF	DFN1410-6 (SOT886)	1.45 x 1.0 x 0.48
		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		PESD5V0L6US	SOT96 (SO8)	4.9 x 3.9 x 1.75
0	7	5	8	10	35	10	0.025		PESD5V0L7BS	SOT96 (SO8)	4.9 x 3.9 x 1.75

^[1] 8/20 μs exponential decay waveform according to IEC 61000-4-2 and IEC 61643-321 ^[2] acc. to IEC 61000-4-2 (contact discharge)

Ultra low capacitance devices for high-speed dataline protection

- ▶ Ultra high-speed interfaces allow only a minimum of additional line capacitance for ESD protection
- ▶ NXP new ultra low capacitance ESD protection diodes offer a line capacitance of only 0.25 pF, thereby increase PCB design flexibility



Electrical specifications

Product	Configuration	V _{RWM}	C _d typ	C _d max	ESD rating max	Package	Configuration
PESD5V0F1BSF	1 x bi	5.5	0.25	0.3	10	DSN0603-2 (SOD962)	
PESD5V0F1USF	1 x uni	5.5	0.6	0.75	10	DSN0603-2 (SOD962)	
PESD5V0F1BLD	1 x bi	5	0.4	0.55	10	DFN1006D-2 (SOD882D)	
IP4294CZ10-TBR	4 x uni	5.5	0.50	0.60	10	DFN2510-10	
PESD5V0F5UF	5 x uni	5	0.55	0.7	8	DFN1410-6 (SOT886)	

Available in new innovative DFN1006D-2 (SOD882D) package

Features

- ▶ Reduced height of 0.37 mm typ.
- ▶ Solderable tin-plated side pads

DFN1006D-2

DFN1006D-2 (mounted on PCB)

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

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

types in **bold** represent new products

Number of protected lines		V _{RWM} (V)	C _d typ (pF)	C _d max (pF)	ESD rating ^[1] max (kV)	Configuration	Type	Package	Size (mm)
Unidirectional	Bidirectional								
1	0	5.5	0.45	0.6	10		PESD5V0F1USF	DSN0603-2 (SOD962)	0.6 x 0.3 x 0.3
		5	0.95	1.15	8		PESD5V0X1ULD	DFN1006D-2 (SOD882D)	1.0 x 0.6 x 0.37
		5	1.55	1.75	15		PESD5V0X1UALD	SOD523 (SC-79)	1.2 x 0.8 x 0.6
		5	0.95	1.15	8		PESD5V0X1UB		
		5	1.55	1.75	15		PESD5V0X1UAB		
		16	0.83	0.98	8		PESD16VX1UL	DFN1006-2 (SOD882)	1.0 x 0.6 x 0.48
		5.5	1	1.5	8		PRTR5V0U1T	SOT23	2.9 x 1.3 x 1.0
		80	0.6	0.75	30		NUP1301	SOT323	2.0 x 1.25 x 0.95
		80	0.6	0.75	30		NUP1301U		
0	1	5.5	0.25	0.3	10		PESD5V0F1BSF	DSN0603-2 (SOD962)	0.6 x 0.3 x 0.3
		18	0.4	0.6	10		PESD18VF1BSF	DSN0603-2 (SOD962)	0.6 x 0.3 x 0.3
		5	0.4	0.55	8		PESD5V0F1BLD	DFN1006D-2 (SOD882D)	1.0 x 0.6 x 0.37
		18	0.4	0.6	10		PESD18VF1BL	DFN1006-2 (SOD882)	1.0 x 0.6 x 0.48
		5.5	0.4	0.55	10		PESD5V0F1BL	DFN1006-2 (SOD882)	1.0 x 0.6 x 0.48
		3.3	1.3	1.6	9		PESD3V3X1BL		
		5	0.85	0.95	15		PESD5V0X1BCAL		
		5	0.49	0.6	8		PESD5V0X1BCL		
		5	0.9	1.3	9		PESD5V0X1BL		
		5	0.9	1.3	9		PESD5V0X1BQ	SOT663	1.6 x 1.2 x 0.55
		5	0.9	1.3	9		PESD5V0X1BT	SOT23	2.9 x 1.3 x 1.0
	0	5.5	1	1.5	8		PRTR5V0U2X	SOT143B	2.9 x 1.3 x 1.0
		5.5	1.8	-	12		PRTR5V0U2AX		
		5.5	1	1.5	8		PRTR5V0U2D	SOT457 (SC-74)	2.9 x 1.5 x 1.0
		5.5	1	1.5	8		PRTR5V0U2F	DFN1410-6 (SOT886)	1.45 x 1.0 x 0.48

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

Protection and signal conditioning

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)	Configuration	Type	Package	Size (mm)
Unidirectional	Bidirectional								
2	0	5.5	2	-	15		IP4234CZ6	SOT457 (SC-74)	2.9 x 1.5 x 1.0
		5.5	0.7	-	8		IP4282CZ6	DFN1410-6 (SOT886)	1.45 x 1.0 x 0.48
		5.5	1.3	-	15		IP4359CX4/LF	WLCSP4	0.76 x 0.76 x 0.61
		5.5	0.8	1.0	8		IP4369CX4		0.76 x 0.76 x 0.47
4	0	5.5	1	-	8		IP4220CZ6	SOT457 (SC-74)	2.9 x 1.5 x 1.0
		5.5	1	-	8		IP4221CZ6-S	DFN1410-6 (SOT886)	1.45 x 1.0 x 0.48
		5.5	1	-	8		IP4221CZ6-XS	DFN1010-6 (SOT891)	1.0 x 1.0 x 0.48
		5.5	1	-	8		IP4233CZ6	SOT363 (SC-88)	2.0 x 1.25 x 0.95

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

In the Spotlight

Ultra low capacitance ESD protection in DSN0603-2: PESD5V0F1BSF

Bidirectional protection for one data line in DSN0603-2

Ultra low line capacitance of 0.25 pF

Minimized capacitance variation over voltage

High ESD robustness =10 kV

Ultra small package DSN0603-2 (0.6 x 0.3 x 0.3 mm)

ESD protection for very high-speed interfaces (< 2 pF) – Part 3

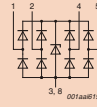
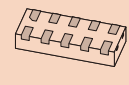
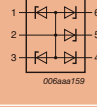
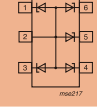
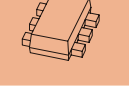
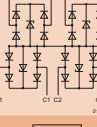
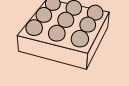
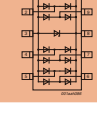
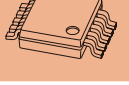
types in **bold** represent new products

Number of protected lines		V _{RWM} (V)	C _{line} typ (pF)	C _{line} max (pF)	ESD rating ^[1] max (kV)	Configuration	Type	Package	Size (mm)
Unidirectional	Bidirectional								
4	0	5.5	1	-	8		PRTR5V0U4D	SOT457 (SC-74)	2.9 x 1.5 x 1.0
		5.5	1	-	8		PRTR5V0U4Y	SOT363 (SC-88)	2.0 x 1.25 x 0.95
		5.5	0.8	-	12		IP4285CZ9-TBB	DFN2110-9 (SOT1178)	2.1 x 1.0 x 0.48
							IP4285CZ6-TD	SOT457 (SC-74)	2.9 x 1.5 x 1.0
							IP4285CZ6-TY	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	0.6	-	8		IP4283CZ10-TBR	DFN2510A-10 (SOT1176)	2.5 x 1.0 x 0.48
		5.5	0.6	-	8		IP4283CZ10-TT	SOT552 (TSSOP10)	3.0 x 3.0 x 1.1
		5.5	0.5	-	8		IP4284CZ10-TBR	DFN2510A-10 (SOT1176)	2.5 x 1.0 x 0.48
		5.5	0.5	-	8				

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

ESD protection for very high-speed interfaces (< 2 pF) – Part 4

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	0.55	-	8	-		IP4292CZ10-TBR	DFN2510A-10 (SOT1176) 	2.5 x 1.0 x 0.48
		5.5	0.5	-	10	-		IP4294CZ10-TBR		
5	4	5	0.5	0.65	8	0.1		PESD5V0F5UF	DFN1410-6 (SOT886) 	1.45 x 1.0 x 0.48
		5	0.5	0.65	8	0.1		PESD5V0F5UW	SOT666 	1.6 x 1.2 x 0.55
8	0	5.5	1.3	-	15	-		IP4309CX9	WLCSP9 	1.16 x 1.16 x 0.61
8	0	5.5	1	-	8	-		PRTR5V0U8S	SOT552 (TSSOP10) 	3.0 x 3.0 x 1.1

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

In the Spotlight

NXP Wafer-Level Chip Scale Package (WLCSP)

Smallest possible solution for ESD and EMI circuits, saving maximum of space

Lowest parasitic inductance to GND contact, ensures best performance

High mechanical robustness



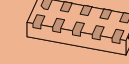
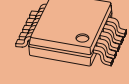
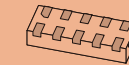
Audio interfaces

types in **bold** represent new products

Baseband interface	Number of protected lines	Line small-signal equivalents		Remark	Type	Package	Size (mm)
		R _{line}	C _{line} (pF)				
Audio	2	0.9 Ω	290	Low-ohmic speaker (< ~8 Ω)	IP4047CX6/LF	WLCSP6 	1.56 x 1.01 x 0.65
		10 Ω	200	Low-ohmic speaker (> ~8 Ω)	IP4048CX5/LF	WLCSP5 	0.91 x 1.28 x 0.65
		68 Ω	110	Single-ended or differential microphone	IP4049CX5/LF		
		470 Ω	20	Single-ended or differential microphone	IP4355CX6/LF	WLCSP6 	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	WLCSP8 	1.67 x 1.67 x 0.65
		0.25 Ω, 3 nH	-	Inductive, low-ohmic differential channel LC filter	IP3048CX5	WLCSP5 	1.51 x 1.14 x 0.65
	5	2.9 kΩ, 1 kΩ / 10 Ω	-	5-channel filter interface with integrated RC-filters and biasing network for audio interfaces	IP4327CX15	WLCSP15 	1.05 x 2.36 x 0.61
	6	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	WLCSP20 	1.91 x 2.52 x 0.65

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

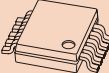
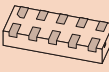
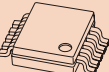
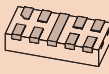
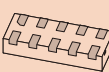
Video interfaces – Part I

Baseband interface	Number of protected lines	C _{line} (pF)	Remark	Type	Package	Size (mm)
Display port	4	0.6	ESD protection for ultra high-speed interfaces	IP4283CZ10-TBR	DFN2510A-10 (SOT1176) 	2.5 x 1.0 x 0.48
		0.6	ESD protection for ultra high-speed interfaces	IP4283CZ10-TT	SOT552 (TSSOP10) 	3.0 x 3.0 x 1.1
		0.55	ESD protection for ultra high-speed interfaces	IP4292CZ10-TBR	DFN2510A-10 (SOT1176) 	2.5 x 1.0 x 0.48
		0.5	ESD protection for ultra high-speed interfaces	IP4294CZ10-TBR		
		0.8	ESD protection for ultra high-speed interfaces	IP4285CZ9-TBB	DFN2110-9 (SOT1178) 	2.1 x 1.0 x 0.48

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

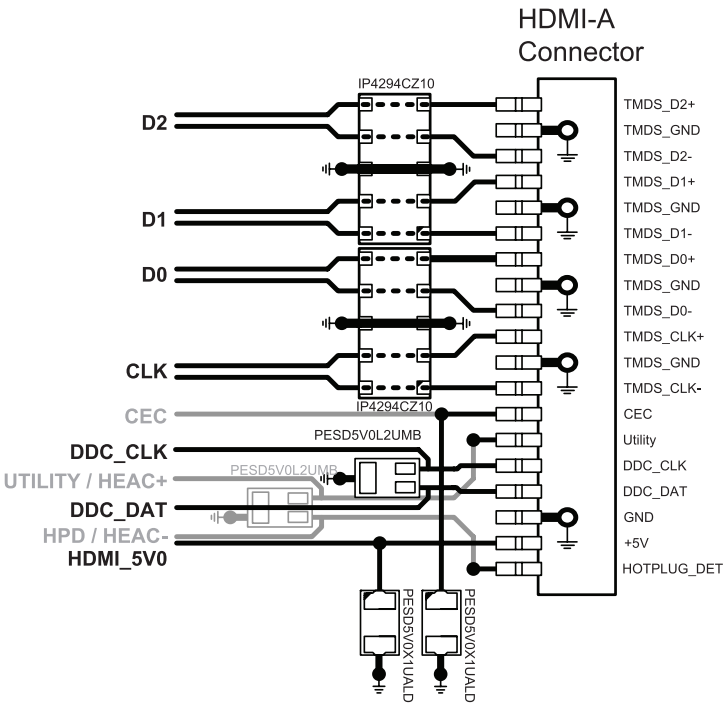
Video interfaces – Part 2

types in **bold** represent new products

Baseband interface	Number of protected lines	C _{line} (pF)	Remark	Type	Package	Size (mm)
HDMI	2	0.7	ESD protection for ultra high-speed interfaces	IP4282CZ6	DFN1410-6 (SOT886) 	1.45 x 1.0 x 0.48
	4	0.7	ESD protection for ultra high-speed interfaces	IP4280CZ10	SOT552 (TSSOP10) 	3.0 x 3.0 x 1.1
		0.6	ESD protection for ultra high-speed interfaces	IP4283CZ10-TBR	DFN2510A-10 (SOT1176) 	2.5 x 1.0 x 0.48
		0.6	ESD protection for ultra high-speed interfaces	IP4283CZ10-TT	SOT552 (TSSOP10) 	3.0 x 3.0 x 1.1
		0.8	ESD protection for ultra high-speed interfaces	IP4285CZ9-TBB	DFN2110-9 (SOT1178) 	2.1 x 1.0 x 0.48
		0.55	ESD protection for ultra high-speed interfaces	IP4292CZ10-TBR	DFN2510A-10 (SOT1176) 	2.5 x 1.0 x 0.48

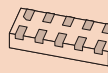
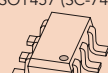
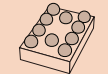
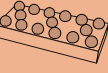
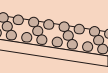
ESD protection acc. to IEC 61000-4-2 (level 4)

IP4294 PESD HDMI application schematic



Video interfaces – Part 3

types in **bold** represent new products

Baseband interface	Number of protected lines	C _{line} (pF)	Resistor (Ω)	Remark	Type	Package	Size (mm)
HDMI	4	0.5	-	ESD protection for ultra high-speed interfaces	IP4294CZ10-TBR	DFN2510A-10 (SOT1176) 	2.5 x 1.0 x 0.48
	5	10	1.75 k, 100 k	HDMI, DDC, CEC, hot plug ESD protection and biasing	IP4310CX8/P	WLCSP8 	1.16 x 1.16 x 0.61
	8	1.3	-	HDMI, TMDS line ESD protection	IP4309CX9	WLCSP9 	1.16 x 1.16 x 0.61
LVDS	2	30	10	EMI filter with ESD protection for MIPI or MDDI	IP3348CX5	WLCSP5 	0.76 x 1.06 x 0.61
	4	0.8	10	Very low clamp ESD protection with 12 kV IEC ruggedness	IP4285CZ6-TD	SOT457 (SC-74) 	2.9 x 1.5 x 1.0
		0.8	10	Very low clamp ESD protection with 12 kV IEC ruggedness	IP4285CZ6-TY	SOT363 (SC-88) 	2.0 x 1.25 x 0.95
		30	10	EMI filter with ESD protection for MIPI or MDDI	IP3348CX10	WLCSP10 	1.56 x 1.06 x 0.61
	6	30	10	EMI filter with ESD protection for MIPI or MDDI	IP3348CX15	WLCSP15 	2.36 x 1.06 x 0.61
	8	30	10	EMI filter with ESD protection for MIPI or MDDI	IP3348CX20	WLCSP20 	3.16 x 1.06 x 0.61

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

Common Mode Filter for MIPI CSI, DSI, (D-PHY)

Baseband interface	Number of protected line pairs unidirectional	Number of protected line pairs bidirectional	Type name	Differential Mode 3 dB frequency (typ.)	Common Mode insertion loss 800 MHz - 2.4 GHz	C _d typical	V _{rwm}	input ESD rating IEC 6100-4-4 (kV) contact	Channel series resistance	Package	Size (mm)
MIPI D-PHY	2	0	PCMF2DFN1	>2 GHz	<-24 dB	0.8 pF	5	15	8 Ohm	DFN2520-9 (SOT1333) 	2.5 x 2.0 x 0.48
MIPI D-PHY	3	0	PCMF3DFN1	>2 GHz	<-24 dB	0.8 pF	5	15	8 Ohm	DFN4020-14 (SOT1334) 	4.0 x 2.0 x 0.48

In the Spotlight

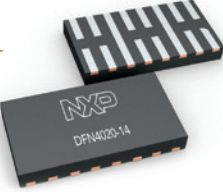
PCMF-series: 2 and 3 line pair Common Mode filters for MIPI, HDMI

Very wide differential pass band >2 GHz

Very broadband common-mode attenuation

Very low clamping ESD protection, excellent SoC protection

Very thin DFN plastic package (0.5 mm max.)



Multichannel EMI filters, ESD protection for LCD and camera – Part I

types in **bold** represent new products

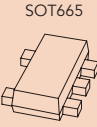
Baseband interface	Number of protected lines	Line small-signal equivalents			Digital interface clock speed (MHz)	Insertion Loss S21 ~ -3 dB (MHz)	Type	Package	Size (mm)
		R _{line} (Ω)	C _{line} (pF)	L _{line} (nH)					
LCD display, camera, keypad	1	75	36	-	~50	155	IP4307CX4/LF	WLCSP4 	0.76 x 0.76 x 0.61
		20	40	-	~50	153	PEMI1QFN/CT		1.0 x 0.6 x 0.48
		20	36	-	~55	170	PEMI1QFN/CR		
		20	32	-	~60	185	PEMI1QFN/CP		
		20	28	-	~70	218	PEMI1QFN/CM		
		20	23	-	~90	264	PEMI1QFN/CK		
		20	19	-	~105	317	PEMI1QFN/CG		
		20	15	-	~130	397	PEMI1QFN/CE		
		45	40	-	~50	145	PEMI1QFN/HT		
		45	36	-	~55	161	PEMI1QFN/HR		
		45	32	-	~60	175	PEMI1QFN/HP		
		45	28	-	~70	206	PEMI1QFN/HM		
		45	23	-	~80	249	PEMI1QFN/HK		
		45	19	-	~100	300	PEMI1QFN/HG		
		45	15	-	~125	376	PEMI1QFN/HE		
		65	40	-	~45	139	PEMI1QFN/LT		
		65	36	-	~50	155	PEMI1QFN/LR		
		65	32	-	~55	168	PEMI1QFN/LP		
		65	28	-	~65	197	PEMI1QFN/LM		
		65	23	-	~80	239	PEMI1QFN/LK		
		65	19	-	~95	288	PEMI1QFN/LG		
		65	15	-	~120	361	PEMI1QFN/LE		
		100	40	-	~45	131	PEMI1QFN/RT		
		100	36	-	~50	145	PEMI1QFN/RR		
		100	32	-	~55	159	PEMI1QFN/RP		
		100	28	-	~60	187	PEMI1QFN/RM		
		100	30	-	~65	200	IP4256CZ3-M		
		100	23	-	~75	227	PEMI1QFN/RK		
		100	19	-	~90	272	PEMI1QFN/RG		
		100	15	-	~115	343	PEMI1QFN/RE		
		200	40	-	~40	119	PEMI1QFN/WT		
		200	36	-	~45	132	PEMI1QFN/WR		
		200	32	-	~50	143	PEMI1QFN/WP		
		200	28	-	~55	169	PEMI1QFN/WM		
		200	23	-	~70	205	PEMI1QFN/WK		
		200	19	-	~80	247	PEMI1QFN/WG		
		200	15	-	~105	311	PEMI1QFN/WE		
	2	10	35	15	~115	350	IP3348CX5	WLCSP5 	0.76 x 1.06 x 0.61
		18	65	40	~60	175	IP3088CX5		0.96 x 1.28 x 0.65
		20	40	-	~50	153	PEMI2STD/CT		1.6 x 1.2 x 0.5
		20	36	-	~55	170	PEMI2STD/CR		
		20	32	-	~60	185	PEMI2STD/CP		
		20	28	-	~70	218	PEMI2STD/CM		

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

Protection and signal conditioning

Multichannel EMI filters, ESD protection for LCD and camera – Part 2

types in **bold** represent new products

Baseband interface	Number of protected lines	Line small-signal equivalents			Digital interface clock speed (MHz)	Insertion Loss S21 ~ -3 dB (MHz)	Type	Package	Size (mm)
		R _{line} (Ω)	C _{line} (pF)	L _{line} (nH)					
LCD display, camera, keypad	2	20	23	-	~90	264	PEMI2STD/CK		1.6 x 1.2 x 0.5
		20	19	-	~105	317	PEMI2STD/CG		
		20	15	-	~130	397	PEMI2STD/CE		
		45	40	-	~50	145	PEMI2STD/HT		
		45	36	-	~55	161	PEMI2STD/HR		
		45	32	-	~60	175	PEMI2STD/HP		
		45	28	-	~70	206	PEMI2STD/HM		
		45	23	-	~80	249	PEMI2STD/HK		
		45	19	-	~100	300	PEMI2STD/HG		
		45	15	-	~125	376	PEMI2STD/HE		
		65	40	-	~45	139	PEMI2STD/LT		
		65	36	-	~50	155	PEMI2STD/LR		
		65	32	-	~55	168	PEMI2STD/LP		
		65	28	-	~65	197	PEMI2STD/LM		
		65	23	-	~80	239	PEMI2STD/LK		
		65	19	-	~95	288	PEMI2STD/LG		
		65	15	-	~120	361	PEMI2STD/LE		
		100	40	-	~45	131	PEMI2STD/RT		
		100	36	-	~50	145	PEMI2STD/RR		
		100	32	-	~55	159	PEMI2STD/RP		
		100	30	-	~65	200	IP4256CZ5-W		
		100	28	-	~60	187	PEMI2STD/RM		
		100	23	-	~75	227	PEMI2STD/RK		
		100	19	-	~90	272	PEMI2STD/RG		
		100	15	-	~115	343	PEMI2STD/RE		
		200	40	-	~40	119	PEMI2STD/WT		
		200	36	-	~45	132	PEMI2STD/WR		
		200	32	-	~50	143	PEMI2STD/WP		
		200	28	-	~55	169	PEMI2STD/WM		
		200	23	-	~70	205	PEMI2STD/WK		
		200	19	-	~80	247	PEMI2STD/WG		
		200	15	-	~105	311	PEMI2STD/WE		
	4	20	40	-	~50	153	PEMI2QFN/CT		1.45 x 1.0 x 0.48
		20	36	-	~55	170	PEMI2QFN/CR		
		20	32	-	~60	185	PEMI2QFN/CP		
		20	28	-	~70	218	PEMI2QFN/CM		
		20	23	-	~90	264	PEMI2QFN/CK		
		20	19	-	~105	317	PEMI2QFN/CG		
		20	15	-	~130	397	PEMI2QFN/CE		
		45	40	-	~50	145	PEMI2QFN/HT		
		45	36	-	~55	161	PEMI2QFN/HR		
		45	32	-	~60	175	PEMI2QFN/HP		
		45	28	-	~70	206	PEMI2QFN/HM		
		45	23	-	~80	249	PEMI2QFN/HK		
		45	19	-	~100	300	PEMI2QFN/HG		
		45	15	-	~125	376	PEMI2QFN/HE		
		65	40	-	~45	139	PEMI2QFN/LT		
		65	36	-	~50	155	PEMI2QFN/LR		
		65	32	-	~55	168	PEMI2QFN/LP		
		65	28	-	~65	197	PEMI2QFN/LM		

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

Multichannel EMI filters, ESD protection for LCD and camera – Part 3

types in **bold** represent new products

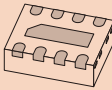
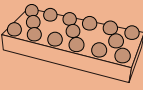
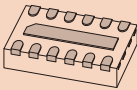
Baseband interface	Number of protected lines	Line small-signal equivalents			Digital interface clock speed (MHz)	Insertion Loss S21 ~ -3 dB (MHz)	Type	Package	Size (mm)
		R _{line} (Ω)	C _{line} (pF)	L _{line} (nH)					
LCD display, camera, keypad	2	45	23	-	~80	249	PEMI2QFN/HK		1.45 x 1.0 x 0.48
		45	19	-	~100	300	PEMI2QFN/HG		
		45	15	-	~125	376	PEMI2QFN/HE		
		65	40	-	~45	139	PEMI2QFN/LT		
		65	36	-	~50	155	PEMI2QFN/LR		
		65	32	-	~55	168	PEMI2QFN/LP		
		65	28	-	~65	197	PEMI2QFN/LM		
		65	23	-	~80	239	PEMI2QFN/LK		
		65	19	-	~95	288	PEMI2QFN/LG		
		65	15	-	~120	361	PEMI2QFN/LE		
		100	40	-	~45	131	PEMI2QFN/RT		
		100	36	-	~50	145	PEMI2QFN/RR		
		100	32	-	~55	159	PEMI2QFN/RP		
		100	30	-	~65	200	IP4256CZ6-F		
		100	28	-	~60	187	PEMI2QFN/RM		
		100	23	-	~75	227	PEMI2QFN/RK		
		100	19	-	~90	272	PEMI2QFN/RG		
		100	15	-	~115	343	PEMI2QFN/RE		
		200	40	-	~40	119	PEMI2QFN/WT		
		200	36	-	~45	132	PEMI2QFN/WR		
		200	32	-	~50	143	PEMI2QFN/WP		
		200	28	-	~55	169	PEMI2QFN/WM		
		200	23	-	~70	205	PEMI2QFN/WK		
		200	19	-	~80	247	PEMI2QFN/WG		
		200	15	-	~105	311	PEMI2QFN/WE		
	4	10	35	15	~115	350	IP3348CX10		1.56 x 1.06 x 0.61
		18	65	40	~60	175	IP3088CX10		1.96 x 1.28 x 0.65
		100	54	-	~30	98	PEMI4CSP/RW		1.56 x 1.06 x 0.61
		100	41	-	~40	125	PEMI4CSP/RT		1.56 x 1.06 x 0.61
		20	40	-	~50	153	PEMI4QFN/CT		1.7 x 1.2 x 0.48
		20	36	-	~55	170	PEMI4QFN/CR		
		20	32	-	~60	185	PEMI4QFN/CP		
		20	28	-	~70	218	PEMI4QFN/CM		
		20	23	-	~90	264	PEMI4QFN/CK		
		20	19	-	~105	317	PEMI4QFN/CG		
		20	15	-	~130	397	PEMI4QFN/CE		
		45	40	-	~50	145	PEMI4QFN/HT		
		45	36	-	~55	161	PEMI4QFN/HR		
		45	32	-	~60	175	PEMI4QFN/HP		
		45	28	-	~70	206	PEMI4QFN/HM		
		45	23	-	~80	249	PEMI4QFN/HK		
		45	19	-	~100	300	PEMI4QFN/HG		

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

Protection and signal conditioning

Multichannel EMI filters, ESD protection for LCD and camera – Part 4

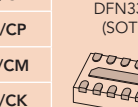
types in **bold** represent new products

Baseband interface	Number of protected lines	Line small-signal equivalents			Digital interface clock speed (MHz)	Insertion Loss S21 ~ -3 dB (MHz)	Type	Package	Size (mm)
		R _{line} (Ω)	C _{line} (pF)	L _{line} (nH)					
LCD display, camera, keypad	4	45	15	-	~125	376	PEMI4QFN/HE	DFN1712-8 (SOT1157) 	1.7 x 1.2 x 0.48
		65	40	-	~45	139	PEMI4QFN/LT		
		65	36	-	~50	155	PEMI4QFN/LR		
		65	32	-	~55	168	PEMI4QFN/LP		
		65	28	-	~65	197	PEMI4QFN/LM		
		65	23	-	~80	239	PEMI4QFN/LK		
		65	19	-	~95	288	PEMI4QFN/LG		
		65	15	-	~120	361	PEMI4QFN/LE		
		100	40	-	~45	131	PEMI4QFN/RT		
		100	36	-	~50	145	PEMI4QFN/RR		
		100	32	-	~55	159	PEMI4QFN/RP		
		100	28	-	~60	187	PEMI4QFN/RM		
		100	23	-	~75	227	PEMI4QFN/RK		
		100	19	-	~90	272	PEMI4QFN/RG		
		100	15	-	~115	343	PEMI4QFN/RE		
		200	40	-	~40	119	PEMI4QFN/WT		
		200	36	-	~45	132	PEMI4QFN/WR		
		200	32	-	~50	143	PEMI4QFN/WP		
		200	28	-	~55	169	PEMI4QFN/WM		
		200	23	-	~70	205	PEMI4QFN/WK		
		200	19	-	~80	247	PEMI4QFN/WG		
		200	15	-	~105	311	PEMI4QFN/WE		
		15	43	18	~60	175	IP3253CZ8-4-TTL	DFN1714-8 (SOT1166) 	1.7 x 1.35 x 0.52
		15	50	18	~50	145	IP3254CZ8-4-TTL		
		40	18	-	~100	300	IP4252CZ8-4 -TTL		
		100	45	-	~40	130	IP4254CZ8-4-TTL		
		100	15	-	~110	330	IP4251CZ8-4-TTL		
		200	45	-	~35	110	IP4253CZ8-4-TTL		
	6	10	35	15	~115	350	IP3348CX15	WLCSP15 	2.36 x 1.06 x 0.61
		18	65	40	~60	175	IP3088CX15		2.96 x 1.28 x 0.65
		100	60	-	~40	120	IP4053CX15/LF		2.96 x 1.32 x 0.65
		100	60	-	~40	120	IP4353CX15/LF		2.38 x 1.05 x 0.61
		100	54	-	~30	98	PEMI6CSP/RW		2.36 x 1.06 x 0.61
		100	41	-	~40	125	PEMI6CSP/RT		2.36 x 1.06 x 0.61
		20	40	-	~50	153	PEMI6QFN/CT	DFN2512-12 (SOT1158) 	2.5 x 1.2 x 0.48
		20	36	-	~55	170	PEMI6QFN/CR		
		20	32	-	~60	185	PEMI6QFN/CP		
		20	28	-	~70	218	PEMI6QFN/CM		
		20	23	-	~90	264	PEMI6QFN/CK		
		20	19	-	~105	317	PEMI6QFN/CG		
		20	15	-	~130	397	PEMI6QFN/CE		
		45	40	-	~50	145	PEMI6QFN/HT		

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

Multichannel EMI filters, ESD protection for LCD and camera – Part 5

types in **bold** represent new products

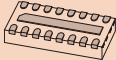
Baseband interface	Number of protected lines	Line small-signal equivalents			Digital interface clock speed (MHz)	Insertion Loss S21 ~ -3 dB (MHz)	Type	Package	Size (mm)
		R _{line} (Ω)	C _{line} (pF)	L _{line} (nH)					
LCD display, camera, keypad	6	45	36	-	~55	161	PEMI6QFN/HR	DFN2512-12 (SOT1158) 	2.5 x 1.2 x 0.48
		45	32	-	~60	175	PEMI6QFN/HP		
		45	28	-	~70	206	PEMI6QFN/HM		
		45	23	-	~80	249	PEMI6QFN/HK		
		45	19	-	~100	300	PEMI6QFN/HG		
		45	15	-	~125	376	PEMI6QFN/HE		
		65	40	-	~45	139	PEMI6QFN/LT		
		65	36	-	~50	155	PEMI6QFN/LR		
		65	32	-	~55	168	PEMI6QFN/LP		
		65	28	-	~65	197	PEMI6QFN/LM		
		65	23	-	~80	239	PEMI6QFN/LK		
		65	19	-	~95	288	PEMI6QFN/LG		
		65	15	-	~120	361	PEMI6QFN/LE		
		100	40	-	~45	131	PEMI6QFN/RT		
		100	36	-	~50	145	PEMI6QFN/RR		
		100	32	-	~55	159	PEMI6QFN/RP		
		100	28	-	~60	187	PEMI6QFN/RM		
		100	23	-	~75	227	PEMI6QFN/RK		
		100	19	-	~90	272	PEMI6QFN/RG		
		100	15	-	~115	343	PEMI6QFN/RE		
		200	40	-	~40	119	PEMI6QFN/WT		
		200	36	-	~45	132	PEMI6QFN/WR		
		200	32	-	~50	143	PEMI6QFN/WP		
		200	28	-	~55	169	PEMI6QFN/WM		
		200	23	-	~70	205	PEMI6QFN/WK		
		200	19	-	~80	247	PEMI6QFN/WG		
		200	15	-	~105	311	PEMI6QFN/WE		
		15	50	18	~50	145	IP3254CZ12-6-TTL		
	15	43	18	~60	175	IP3253CZ12-6-TTL			
	40	18	-	~100	300	IP4252CZ12-6-TTL			
	100	45	-	~40	130	IP4254CZ12-6-TTL			
	100	15	-	~110	330	IP4251CZ12-6-TTL			
200	45	-	~35	110	IP4253CZ12-6-TTL				
7	70	25	-	~75	220	IP4337CX18/LF	WLCSP18 	1.96 x 1.61 x 0.61	
	125	25	60	~60	180	IP3337CX18/LF		2.06 x 1.66 x 0.61	
8	10	35	15	~115	350	IP3348CX20	WLCSP20 	3.16 x 1.06 x 0.61	
	18	65	40	~60	175	IP3088CX20		3.96 x 1.28 x 0.65	
	100	54	-	~30	98	PEMI8CSP/RW		3.16 x 1.06 x 0.61	
	100	41	-	~40	125	PEMI8CSP/RT		3.16 x 1.06 x 0.61	
	20	40	-	~50	153	PEMI8QFN/CT	DFN3312-16 (SOT1159) 	3.3 x 1.2 x 0.48	
	20	36	-	~55	170	PEMI8QFN/CR			
	20	32	-	~60	185	PEMI8QFN/CP			
	20	28	-	~70	218	PEMI8QFN/CM			
	20	23	-	~90	264	PEMI8QFN/CK			
	20	19	-	~105	317	PEMI8QFN/CG			
20	15	-	~130	397	PEMI8QFN/CE				

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

Protection and signal conditioning

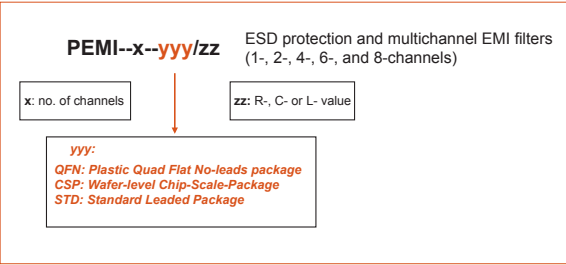
Multichannel EMI filters, ESD protection for LCD and camera – Part 6

types in **bold** represent new products

Baseband interface	Number of protected lines	Line small-signal equivalents			Digital interface clock speed (MHz)	Insertion Loss S21 ~ -3 dB (MHz)	Type	Package	Size (mm)
		R _{line} (Ω)	C _{line} (pF)	L _{line} (nH)					
LCD display, camera, keypad	8	45	40	-	~50	145	PEMI8QFN/HT	DFN3312-16 (SOT1159) 	3.3 x 1.2 x 0.48
		45	36	-	~55	161	PEMI8QFN/HR		
		45	32	-	~60	175	PEMI8QFN/HP		
		45	28	-	~70	206	PEMI8QFN/HM		
		45	23	-	~80	249	PEMI8QFN/HK		
		45	19	-	~100	300	PEMI8QFN/HG		
		45	15	-	~125	376	PEMI8QFN/HE		
		65	40	-	~45	139	PEMI8QFN/LT		
		65	36	-	~50	155	PEMI8QFN/LR		
		65	32	-	~55	168	PEMI8QFN/LP		
		65	28	-	~65	197	PEMI8QFN/LM		
		65	23	-	~80	239	PEMI8QFN/LK		
		65	19	-	~95	288	PEMI8QFN/LG		
		65	15	-	~120	361	PEMI8QFN/LE		
		100	40	-	~45	131	PEMI8QFN/RT		
		100	36	-	~50	145	PEMI8QFN/RR		
		100	32	-	~55	159	PEMI8QFN/RP		
		100	28	-	~60	187	PEMI8QFN/RM		
		100	23	-	~75	227	PEMI8QFN/RK		
		100	19	-	~90	272	PEMI8QFN/RG		
		100	15	-	~115	343	PEMI8QFN/RE		
		200	40	-	~40	119	PEMI8QFN/WT		
		200	36	-	~45	132	PEMI8QFN/WR		
		200	32	-	~50	143	PEMI8QFN/WP		
		200	28	-	~55	169	PEMI8QFN/WM		
		200	23	-	~70	205	PEMI8QFN/WK		
		200	19	-	~80	247	PEMI8QFN/WG		
		200	15	-	~105	311	PEMI8QFN/WE		
	10	15	43	18	~60	175	IP3253CZ16-8-TTL	DFN3314-16 (SOT1168) 	3.3 x 1.35 x 0.53
		15	50	18	~50	145	IP3254CZ16-8-TTL		
		40	18	-	~100	300	IP4252CZ16-8-TTL		
		100	45	-	~40	130	IP4254CZ16-8-TTL		
		100	15	-	~110	330	IP4251CZ16-8-TTL		
		200	45	-	~35	110	IP4253CZ16-8-TTL		
		70	25	-	~75	220	IP4338CX24/LF	WLCSP24 	1.96 x 2.01 x 0.61
		125	25	60	~60	180	IP3338CX24/LF		2.11 x 2.11 x 0.61
		1000	50	-	~7	22	IP4035CX24/LF		2.41 x 2.41 x 0.65
		200	50	-	~35	105	IP4041CX25/LF	WLCSP25 	2.41 x 2.41 x 0.65

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

PEMI-series nomenclature



In the Spotlight

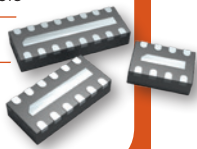
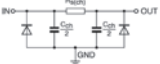
Ultra-small, highly flexible RC filters with superior ESD protection: PEMI-family

Any combination of 5 resistor and 7 capacitor values available

Superior ESD protection with integrated low-pass EMI filter

1.2 mm wide QFN packages

Models for simulation tools available



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	WLCSP11 	1.16 x 1.56 x 0.61
	3	47 Ω / 100 Ω	20	~20	Integrated SIM-card EMI filter and ESD protection	IP4064CX8/LF/P	WLCSP8 	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/P		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/P	DFN1714-8 (SOT1166) 	1.7 x 1.35 x 0.48
		47 Ω / 100 Ω	40	~12	Integrated SIM-card EMI filter and ESD protection	IP4264CZ8-40-TTL		
		47 Ω / 100 Ω	20	~20	Integrated SIM-card EMI filter and ESD protection	IP4264CZ8-20-TTL		
		47 Ω / 100 Ω	10	~20	Integrated SIM-card EMI filter and ESD protection	IP4264CZ8-10-TTL		
	4	-	1	~240	Quad channel low capacitance ESD protection	IP4221CZ6-S	DFN1410-6 (SOT886) 	1.0 x 1.0 x 0.48
	4	-	1	~240	Quad channel low capacitance ESD protection	IP4221CZ6-XS	DFN1010-6 (SOT891) 	1.0 x 1.0 x 0.48
SD-card / MMC	4	47 Ω / 13 kΩ / 56 kΩ	25	~30	MMC ESD protection, pull-up resistors	IP4051CX11/LF	WLCSP11 	1.44 x 1.96 x 0.65
		50 Ω / 75 kΩ / 7 kΩ	18	~50	High-speed MMC ESD protection, pull-up resistors	IP4060CX16/LF	WLCSP16 	1.96 x 1.97 x 0.65
	6	40 Ω	12	>52	(Mini) SD card/trans flash ESD protection, EMI filter	IP4252CZ12-6-TTL	DFN2514-12 (SOT1167) 	2.5 x 1.35 x 0.53
	6	40 Ω / 100 Ω	11	-	6-channel Micro-SD memory card interface ESD protection filter	IP4340CX15	WLCSP15 	1.56 x 1.56 x 0.5
	6	40 Ω / 100 Ω	16.5	-	6 Channel Memory Card Interface Filter with ESD Protection	IP4357CX17	WLCSP17 	1.1 x 2.4 x 0.61
	6 + 2	40 Ω	12	>52	(Mini) SD card/trans flash ESD protection, EMI filter	IP4252CZ16-8-TTL	DFN3314-16 (SOT1168) 	3.3 x 1.35 x 0.53
	7	40 Ω / 50 kΩ / 25 kΩ	18	~20	(Mini) SD/trans flash card ESD protection, EMI filter, pull-up resistors	IP4052CX20/LF	WLCSP20 	2.54 x 1.96 x 0.65
	9	15 Ω / 100 Ω	8.8	-	9-channel SD memory card interface ESD protection filter	IP4350CX24	WLCSP24 	1.95 x 2.11 x 0.61
	6 (+3)	40 Ω / 50 kΩ / 15 kΩ	20	>52	(Mini) SD card/trans flash ESD protection, EMI filter, pull-up resistor	IP4352CX24/LF	WLCSP24 	2.02 x 2.01 x 0.61

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

Please find more ESD protection diodes for very high-speed interfaces on pages 37 - 40

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		0.91 x 0.91 x 0.65
		160	Breakdown 16 V	Power diode	IP4386CX4		0.76 x 0.76 x 0.61
		290	Breakdown 10 V	Power diode	IP4387CX4		
		160	V _{RWM} = 12 V	Power diode with 2 A integrated fuse	IP4389CX4		1.7 x 1.25 x 0.7
		160	V _{RWM} = 12 V	Power diode	PESD12VS1UJ		1.7 x 1.25 x 0.95
		160	V _{RWM} = 12 V	Power diode	PESD12VS1UA		1.7 x 1.25 x 0.7
		480	V _{RWM} = 5 V	Power diode	PESD5V0S1UJ		1.7 x 1.25 x 0.95
		480	V _{RWM} = 5 V	Power diode	PESD5V0S1UA		1.7 x 1.25 x 0.95

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

USB, SATA, LAN – Part I

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 / 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/LF		1.47 x 1.97 x 0.65
		-	1.3	~1 GHz	USB2.0 high-speed ESD protection	IP4359CX4/LF		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/P		1.16 x 1.56 x 0.61
	2	-	0.8	-	MHL and USB2.0 high-speed ESD-protection	IP4369CX4		0.76 x 0.76 x 0.47
	4	-	3	>240	USB2.0 high-speed ESD protection	IP4059CX5/LF		0.96 x 1.34 x 0.65
			1.3	~1 GHz	USB2.0 high-speed ESD protection	IP4358CX6		0.76 x 1.16 x 0.41
USB2.0 (Plastic package)	2	0.5	2	-	>15 kV IEC contact ESD protection with pi-filter	IP4234CZ6		2.9 x 1.5 x 1.0
		-	1.0	-	ESD protection for up to 2 ultra high-speed datalines	PRTR5V0U2X		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		1.45 x 1.0 x 0.48

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

USB, SATA, LAN – Part 2

types in **bold** represent new products

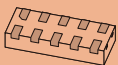
Baseband interface	Number of protected lines	R _{line}	C _{line} (pF)	Remark	Type	Package	Size (mm)
USB2.0 (Plastic package)	2	-	1	ESD protection for up to 2 ultra high-speed datalines	PRTR5V0U2K	DFN1010-6 (SOT891) 	1.0 x 1.0 x 0.48
		-	1	ESD protection for up to 2 ultra high-speed datalines	PRTR5V0U2D	SOT457 (SC-74) 	2.9 x 1.5 x 1.0
		-	1	ESD protection for up to 2 ultra high-speed datalines	PRTR5V0U2F	DFN1410-6 (SOT886) 	1.45 x 1.0 x 0.48
	3 + 1	-	1	USB protection for USB OTG with 5.5 V Vbat protection	PUSBM5V5X4-TL	DFN1616-6 (SOT1189) 	1.6 x 1.6 x 0.48
		-	1	USB protection for USB OTG with 12 V Vbat protection	PUSBM12VX4-TL		
		-	1	USB protection for USB OTG with 15 V Vbat protection	PUSBM15VX4-TL		
		-	1	USB protection for USB OTG with 30 V Vbat protection	PUSBM30VX4-TL		
	4	-	0.8	Very low clamp ESD protection for USB2.0 high-speed with 12 kV IEC ESD protection	IP4285CZ6-TY	SOT363 (SC-88) 	2.0 x 1.25 x 0.95
		-	1	Very low clamp ESD protection for USB2.0 high-speed with 12 kV IEC ESD protection	IP4285CZ6-TD	SOT457 (SC-74) 	2.9 x 1.5 x 1.0
		-	1	Dual ESD protection for USB2.0 high-speed, SD-card, SIM card	IP4220CZ6		
		-	1	Dual ESD protection for USB2.0 high-speed, SD-card, SIM card	PRTR5V0U4D		
		-	1	Dual ESP protection for USB2.0 high-speed, SD-card, SIM card	PRTR5V0U4Y	SOT363 (SC-88) 	2.0 x 1.25 x 0.95
		-	1	ESD protection for USB2.0 high-speed, SD-card, SIM card	IP4221CZ6-S	DFN1410-6 (SOT886) 	1.45 x 1.0 x 0.48
		-	1	Dual ESD protection for USB2.0 high-speed, SD-card, SIM-card	IP4221CZ6-XS	DFN1010-6 (SOT891) 	1.0 x 1.0 x 0.48
		-	-	-	-	-	-

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

Protection and signal conditioning

USB, SATA, LAN – Part 3

types in **bold** represent new products

Baseband interface	Number of protected lines	R_{line}	C_{line} (pF)	Remark	Type	Package	Size (mm)
USB3.0 SuperSpeed USB	4	-	0.5	ESD protection for ultra high-speed interfaces	IP4294CZ10-TBR	DFN2510A-10 (SOT1176) 	2.5 x 1.0 x 0.48
		-	0.55	ESD protection for ultra high-speed interfaces	IP4292CZ10-TBR		

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

In the Spotlight

USB3.0 ESD protection: IP4294CZ10-TBR

Extremely low capacitance of 0.5 pF with minimized voltage dependency

Highest protection for the most sensitive system chips

RF-optimized DFN2510A-10 (SOT1176) package

Pass-through routing

Extremely low crosstalk



Common Mode Filter for USB, SATA, LAN

types in **bold** represent new products

Baseband interface	Number of protected lines	R_{line}	C_{line} (pF)	input ESD rating IEC 6100-4-2	Remark	Type	Package	Size (mm)
USB2.0	2	-	1.5	15 kV	Common Mode filter with ESD protection for high-speed interfaces such as USB 2.0	IP3319CX6	WLCSP6 	1.34 x 0.95 x 0.57

In the Spotlight

IP3319CX6 - Common Mode filter for USB2.0

Very wide differential pass band > 1GHz

Very broadband common-mode attenuation

Very low clamping ESD protection, excellent SoC protection

Very small WLCSP6 package (footprint area 1.34 x 0.95 mm²)



USB, SATA, LAN – Part 4

types in **bold** represent new products

Baseband interface	Number of protected lines	R_{line}	C_{line} (pF)	Remark	Type	Package	Size (mm)
SATA	2	-	0.7	ESD protection for ultra high-speed interfaces	IP4282CZ6	DFN1410-6 (SOT886) 	1.45 x 1.0 x 0.48
	4	-	0.6	ESD protection for ultra high-speed interfaces	IP4283CZ10-TBR	DFN2510A-10 (SOT1176) 	2.5 x 1.0 x 0.48
		-	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-TBR	DFN2510A-10 (SOT1176) 	2.5 x 1.0 x 0.48
		-	0.8	ESD protection for ultra high-speed interfaces	IP4285CZ9-TBB	DFN2110-9 (SOT1178) 	2.1 x 1.0 x 0.48
		-	0.55	ESD protection for ultra high-speed interfaces	IP4292CZ10-TBR	DFN2510A-10 (SOT1176) 	2.5 x 1.0 x 0.48
		-	0.5	ESD protection for ultra high-speed interfaces	IP4294CZ10-TBR		
LAN	1	-	0.6	Ethernet ESD protection $V_{RWM} = 3.3$ V	PESD3V3U1UT	SOT23 	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 line surge ESD protection	IP4233CZ6	SOT363 (SC-88) 	2.0 x 1.25 x 0.95
		-	1	Ethernet ESD protection	IP4220CZ6	SOT457 (SC-74) 	2.9 x 1.5 x 1.0
		-	3	Ethernet line surge ESD protection 25 A	IP4238CZ10	DFN2626-10 (SOT1197) 	2.6 x 2.6 x 0.48

ESD protection acc. to IEC 61000-4-2 (level 4)
Please find more ESD protection diodes for very high-speed interfaces on pages 37 - 40

In the Spotlight

Ethernet surge protection: IP4238CZ10

8/20 surge protection > 25 A

Very low capacitance of $C_d = 3$ pF

Extremely low clamping

Industry standard DFN2626-10 (SOT1197) package

aaa-003744

aaa-003745

NFC Antenna Protection

Interface	Number of protected lines (Bidirectional)	V_{RWM} [V]	C_{line} typ [pF]	C_{line} max [pF]	ESD rating ^[1] max [kV]	Configuration	Type	Package	Size
NFC Antenna	1	18	0.4	0.6	10		PESD18VF1BL	DFN1006-2	1.0 x 0.6 x 0.47
							PESD18VF1BSF	DSN0603-2	0.6 x 0.3 x 0.3

Automotive high-speed networks (AEC-Q10I compliant)

Number of protected lines	V_{RWM} (V)	C_{line} typ (pF)	I_{RM} max @3V (μA)	ESD rating ^[2] max (kV)	Configuration	Type	Package	Size (mm)
4	5.5	0.6	1	8		PESD1LVDS	DFN2510-10 (SOT1165)	2.5 x 1.0 x 0.48
4	5.5	0.6	1	8		PRTR5V0U4D	SOT457	2.9 x 1.5 x 1.0

Automotive LIN/CAN/FlexRay (AEC-Q10I compliant)

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_r max [μA] @ 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	SOT23	2.9 x 1.3 x 1.0
		25	30	230	30	0.01		PESD2CAN		
		11	17	200	23	0.05		PESD1FLEX		
		11	17	200	23	0.05		PESD1CAN-U	SOT323	2.0 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)

TVS diodes, 24 W / 40 W

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

^[1] acc. to IEC 61643-321

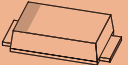
^[2] acc. to IEC 61000-4-2 (contact discharge)

TVS diodes, 400 W

Power (W) (10/1000 μs waveform) ^[1]	V_{RWM} (V)	V_{BR} min (V) @ I_R	V_{BR} typ (V) @ I_R	V_{BR} max (V) @ I_R	I_R (mA)	V_{CL} max (V) @ I_{PP}	I_{PP} (A)	I_{PP} typ (μA) @ V_{RWM}	I_{RM} max (μA) @ V_{RWM}	Type (T _J max = 150 °C)	Type (T _J max = 185 °C)	Package	Size (mm)
350	3.5	5.20	5.60	6.00	10	8.0	43.8	5	600	PTVS3V3S1UR	PTVS3V3S1UTR	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	PTVS5V0S1UTR		
	6.0	6.67	7.02	7.37	10	10.3	38.8	5	400	PTVS6V0S1UR	PTVS6V0S1UTR		
	6.5	7.22	7.60	7.98	10	11.2	35.7	5	250	PTVS6V5S1UR	PTVS6V5S1UTR		
	7.0	7.78	8.20	8.60	10	12.0	33.3	3	100	PTVS7V0S1UR	PTVS7V0S1UTR		
	7.5	8.33	8.77	9.21	1	12.9	31.0	0.2	50	PTVS7V5S1UR	PTVS7V5S1UTR		
	8.0	8.89	9.36	9.83	1	13.6	29.4	0.03	25	PTVS8V0S1UR	PTVS8V0S1UTR		
	8.5	9.44	9.92	10.40	1	14.4	27.8	0.01	10	PTVS8V5S1UR	PTVS8V5S1UTR		
	9.0	10.00	10.55	11.10	1	15.4	26.0	0.005	5	PTVS9V0S1UR	PTVS9V0S1UTR		
	10	11.10	11.70	12.30	1	17.0	23.5	0.005	2.5	PTVS10V1UR	PTVS10V1UTR		
	11	12.20	12.85	13.50	1	18.2	22.0	0.005	2.5	PTVS11V1UR	PTVS11V1UTR		
	12	13.30	14.00	14.70	1	19.9	20.1	0.005	2.5	PTVS12V1UR	PTVS12V1UTR		
	13	14.40	15.15	15.90	1	21.5	18.6	0.001	0.1	PTVS13V1UR	PTVS13V1UTR		
	14	15.60	16.40	17.20	1	23.2	17.2	0.001	0.1	PTVS14V1UR	PTVS14V1UTR		
	15	16.70	17.60	18.50	1	24.4	16.4	0.001	0.1	PTVS15V1UR	PTVS15V1UTR		
	16	17.80	18.75	19.70	1	26.0	15.4	0.001	0.1	PTVS16V1UR	PTVS16V1UTR		
	17	18.90	19.90	20.90	1	27.6	14.5	0.001	0.1	PTVS17V1UR	PTVS17V1UTR		
	18	20.00	21.00	22.10	1	29.2	13.7	0.001	0.1	PTVS18V1UR	PTVS18V1UTR		
	20	22.20	23.35	24.50	1	32.4	12.3	0.001	0.1	PTVS20V1UR	PTVS20V1UTR		
	22	24.40	25.60	26.90	1	35.5	11.3	0.001	0.1	PTVS22V1UR	PTVS22V1UTR		
	24	26.70	28.10	29.50	1	38.9	10.3	0.001	0.1	PTVS24V1UR	PTVS24V1UTR		
	26	28.90	30.40	31.90	1	42.1	9.5	0.001	0.1	PTVS26V1UR	PTVS26V1UTR		
	28	31.10	32.80	34.40	1	45.4	8.8	0.001	0.1	PTVS28V1UR	PTVS28V1UTR		
	30	33.30	35.10	36.80	1	48.4	8.3	0.001	0.1	PTVS30V1UR	PTVS30V1UTR		
	33	36.70	38.70	40.60	1	53.3	7.5	0.001	0.1	PTVS33V1UR	PTVS33V1UTR		
	36	40.00	42.10	44.20	1	58.1	6.9	0.001	0.1	PTVS36V1UR	PTVS36V1UTR		
	40	44.40	46.80	49.10	1	64.5	6.2	0.001	0.1	PTVS40V1UR	PTVS40V1UTR		
	43	47.80	50.30	52.80	1	69.4	5.8	0.001	0.1	PTVS43V1UR	PTVS43V1UTR		
	45	50.00	52.65	55.30	1	72.7	5.5	0.001	0.1	PTVS45V1UR	PTVS45V1UTR		
	48	53.30	56.10	58.90	1	77.4	5.2	0.001	0.1	PTVS48V1UR	PTVS48V1UTR		
	51	56.70	59.70	62.70	1	82.4	4.9	0.001	0.1	PTVS51V1UR	PTVS51V1UTR		
	54	60.00	63.15	66.30	1	87.1	4.6	0.001	0.1	PTVS54V1UR	PTVS54V1UTR		
	58	64.40	67.80	71.20	1	93.6	4.3	0.001	0.1	PTVS58V1UR	PTVS58V1UTR		
	60	66.70	70.20	73.70	1	96.8	4.1	0.001	0.1	PTVS60V1UR	PTVS60V1UTR		
	64	71.10	74.85	78.60	1	103.0	3.9	0.001	0.1	PTVS64V1UR	PTVS64V1UTR		

^[1] 10/1000 μs acc. to IEC 61643-321

TVS diodes, 600 W

Power (W) (10/1000 µs waveform) ⁽¹⁾	V _{RWM} (V)	V _{BR} min (V) @ I _R	V _{BR} typ (V) @ I _R	V _{BR} max (V) @ I _R	I _R (mA)	V _{CL} max (V) @ I _{PP}	I _{PP} (A)	I _{PP} typ (µA) @ V _{PP} ⁽¹⁾	I _{RM} max (µA) @ V _{RWM}	Type (T _J max = 150 °C)	Type (T _J max = 185 °C)	Package	Size (mm)
600	3.5	5.20	5.60	6.00	10	8	75	5	600	PTVS3V3P1UP	PTVS3V3P1UTP		3.8 x 2.6 x 1.0
	5	6.40	6.70	7.00	10	9.2	65.2	5	400	PTVS5V0P1UP	PTVS5V0P1UTP		
	6	6.67	7.02	7.37	10	10.3	58.3	5	400	PTVS6V0P1UP	PTVS6V0P1UTP		
	6.5	7.22	7.60	7.98	10	11.2	53.6	5	250	PTVS6V5P1UP	PTVS6V5P1UTP		
	7	7.78	8.20	8.60	10	12	50	3	100	PTVS7V0P1UP	PTVS7V0P1UTP		
	7.5	8.33	8.77	9.21	1	12.9	46.5	0.2	50	PTVS7V5P1UP	PTVS7V5P1UTP		
	8	8.89	9.36	9.83	1	13.6	44.1	0.03	25	PTVS8V0P1UP	PTVS8V0P1UTP		
	8.5	9.44	9.92	10.40	1	14.4	41.7	0.01	10	PTVS8V5P1UP	PTVS8V5P1UTP		
	9	10.00	10.55	11.10	1	15.4	39	0.005	5	PTVS9V0P1UP	PTVS9V0P1UTP		
	10	11.10	11.70	12.30	1	17	35.3	0.005	2.5	PTVS10VP1UP	PTVS10VP1UTP		
	11	12.20	12.85	13.50	1	18.2	33	0.005	2.5	PTVS11VP1UP	PTVS11VP1UTP		
	12	13.30	14.00	14.70	1	19.9	30.2	0.005	2.5	PTVS12VP1UP	PTVS12VP1UTP		
	13	14.40	15.15	15.90	1	21.5	27.9	0.001	0.1	PTVS13VP1UP	PTVS13VP1UTP		
	14	15.60	16.40	17.20	1	23.2	25.9	0.001	0.1	PTVS14VP1UP	PTVS14VP1UTP		
	15	16.70	17.60	18.50	1	24.4	24.6	0.001	0.1	PTVS15VP1UP	PTVS15VP1UTP		
	16	17.80	18.75	19.70	1	26	23.1	0.001	0.1	PTVS16VP1UP	PTVS16VP1UTP		
	17	18.90	19.90	20.90	1	27.6	21.7	0.001	0.1	PTVS17VP1UP	PTVS17VP1UTP		
	18	20.00	21.00	22.10	1	29.2	20.5	0.001	0.1	PTVS18VP1UP	PTVS18VP1UTP		
	20	22.20	23.35	24.50	1	32.4	18.5	0.001	0.1	PTVS20VP1UP	PTVS20VP1UTP		
	22	24.40	25.60	26.90	1	35.5	16.9	0.001	0.1	PTVS22VP1UP	PTVS22VP1UTP		
	24	26.70	28.10	29.50	1	38.9	15.4	0.001	0.1	PTVS24VP1UP	PTVS24VP1UTP		
	26	28.90	30.40	31.90	1	42.1	14.2	0.001	0.1	PTVS26VP1UP	PTVS26VP1UTP		
	28	31.10	32.80	34.40	1	45.4	13.2	0.001	0.1	PTVS28VP1UP	PTVS28VP1UTP		
	30	33.30	35.10	36.80	1	48.4	12.4	0.001	0.1	PTVS30VP1UP	PTVS30VP1UTP		
	33	36.70	38.70	40.60	1	53.3	11.3	0.001	0.1	PTVS33VP1UP	PTVS33VP1UTP		
	36	40.00	42.10	44.20	1	58.1	10.3	0.001	0.1	PTVS36VP1UP	PTVS36VP1UTP		
	40	44.40	46.80	49.10	1	64.5	9.3	0.001	0.1	PTVS40VP1UP	PTVS40VP1UTP		
	43	47.80	50.30	52.80	1	69.4	8.6	0.001	0.1	PTVS43VP1UP	PTVS43VP1UTP		
	45	50.00	52.65	55.30	1	72.7	8.3	0.001	0.1	PTVS45VP1UP	PTVS45VP1UTP		
	48	53.30	56.10	58.90	1	77.4	7.8	0.001	0.1	PTVS48VP1UP	PTVS48VP1UTP		
	51	56.70	59.70	62.70	1	82.4	7.3	0.001	0.1	PTVS51VP1UP	PTVS51VP1UTP		
	54	60.00	63.15	66.30	1	87.1	6.9	0.001	0.1	PTVS54VP1UP	PTVS54VP1UTP		
	58	64.40	67.80	71.20	1	93.6	6.4	0.001	0.1	PTVS58VP1UP	PTVS58VP1UTP		
	60	66.70	70.20	73.70	1	96.8	6.2	0.001	0.1	PTVS60VP1UP	PTVS60VP1UTP		
	64	71.10	74.85	78.60	1	103	5.8	0.001	0.1	PTVS64VP1UP	PTVS64VP1UTP		

⁽¹⁾ 10/1000 µs acc. to IEC 61643-321

In the Spotlight

High temperature TVS series in FlatPower package

Available in 400 W (PTVSxS1UTR) and 600 W (PTVSxP1UTP) power classes with 35 devices each

Very high maximal junction temperature of 185 °C

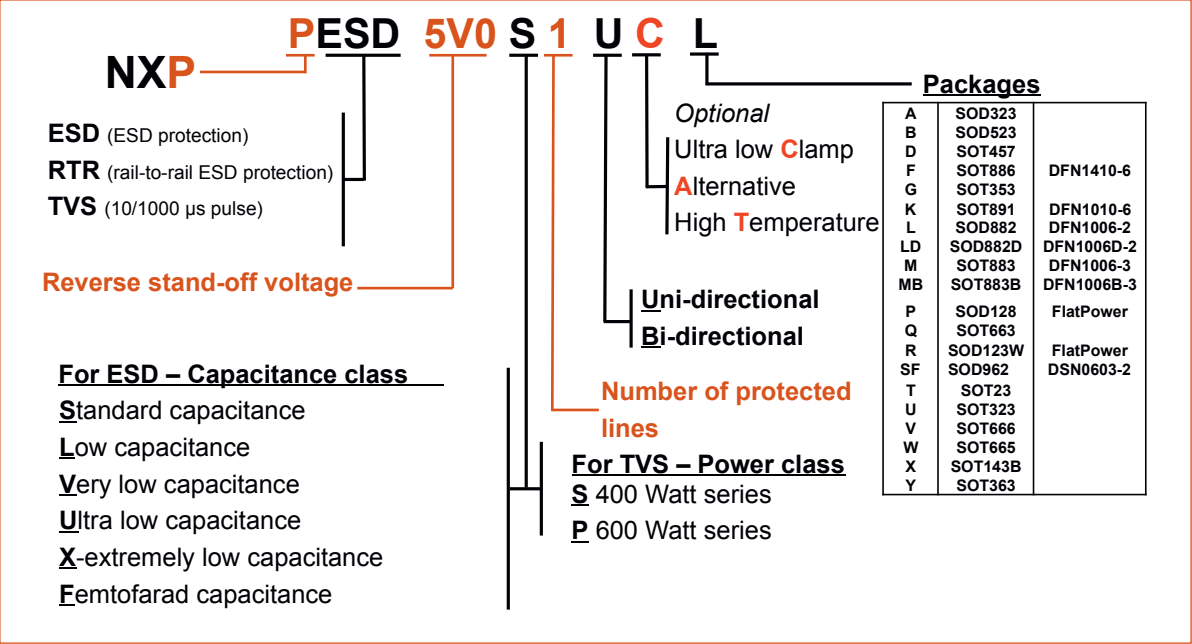
Reverse standoff voltages from 3.3 V to 64 V

Low height, high performance - save board space by replacing SMA & SMB packages with low profile SOD123W and SOD128 packages

AEC-Q101 qualified



Protection and signal conditioning nomenclature



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

IP: Integrated Discretes

yy: identifier

zz: no. of balls/pins

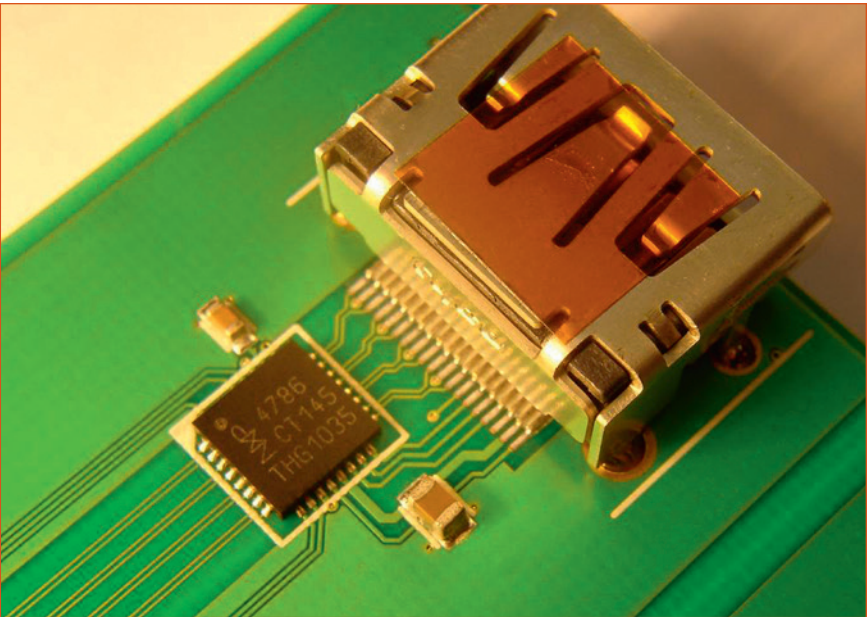
CX: chip scale package (CSP)
CZ: plastic package

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

Signal conditioning and protection

Interface	Number of protected lines	Buffer	Level shifer	C _{line} (pF)	Resistor Ω	LDO	Remark	Type	Package	size
HDMI tx, rx	12	-	yes	0.7	-	-	ESD protection and level shifting for a complete HDMI port	IP4776CZ38	SOT510 (TSSOP38)	9.7 x 4.4 x 1.1
HDMI tx	12	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
HDMI tx	5	yes	yes	-	internal	-	Fully integrated for HDMI control lines including buffer for DDC, CEC and Hot Plug module	IP4791CZ12	DFN2521-12 (SOT1156)	2.5 x 2.1 x 0.48
HDMI tx	13	yes	yes	100 Ω differential impedance	internal	CEC LDO. 5 V LDO	Fully integrated HDMI source solution with current limiter, buffer and level shifter for DDC, CEC and Hot Plug	IP4786CZ32	DFN5050-32 (SOT617)	5.0 x 5.0 x 0.85
HDMI rx	13	yes	yes	100 Ω differential impedance	internal	CEC LDO. 5 V LDO	Fully integrated HDMI sink solution with buffer and level shifter for DDC, CEC and Hot Plug	IP4787CZ32	DFN5050-32 (SOT617)	5.0 x 5.0 x 0.85
HDMI tx	13	yes	yes	100 Ω differential impedance	internal	CEC LDO. 5 V LDO	Fully integrated HDMI source solution with enhanced ESD protection, current limiter, buffer and level shifter for DDC, CEC and Hot Plug	IP4788CZ32	DFN5050-32 (SOT617)	5.0 x 5.0 x 0.85
HDMI tx	13	yes	yes	100 Ω differential impedance	internal	CEC LDO. 5 V LDO	Fully integrated HDMI source solution with small package, current limiter, buffer and level shifter for DDC, CEC and Hot Plug	IP4786CZ32S	DFN4040-32 (SOT1318-1)	4.0 x 4.0 x 0.50
SD 3.0	6	yes	yes	-	internal	1.8 V LDO	Fully integrated SD 3.0 card level shifter with buffer technology, LDO and EMI filter	IP4855CX25	WLSCP25	2.4 x 2.4 x 0.4
SD 3.0	6	yes	yes	-	internal	1.8 V LDO	Fully integrated SD 3.0 card level shifter with buffer technology, LDO and EMI filter	IP4755CZ24	DHVQFN24 (SOT815-1)	3.5 x 5.5 x 0.85

IP4786CZ32



Bipolar transistors

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Single transistors NPN

Package						SOT23	SOT323 (SC-70)	SOT416 (SC-75)	DFN1006-3 (SOT883)	DFN1006B-3 (SOT883B)
										
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 0.48	1.0 x 0.6 x 0.37
P _{tot} (mW)						250	200	150	250	250
V _{CEO} (V)	I _C (mA)	h _{FE} min	h _{FE} max	f _T min (MHz)						
25	100	450	1200	100			PMST5089			
		110 - 200	450 - 800	100		BC848B	BC848W			
30	100	350	900	100			PMST5088			
		110 - 420	220 - 800	100		BCW31 / 32 / 33				
32	100	180 - 380	310 - 630	250		BCW60B / C / D				
		120 - 270	270 - 560	100						
40	100								2PC4617QM / RM	2PC4617QMB / RMB
45	100	110 - 420	220 - 800	100		BC847 / A / B / C	BC847W / AW / BW / CW	BC847T / AT / BT / CT	BC847AM / BM / CM	BC847AMB / BMB / CMB
		120 - 380	220 - 630	100		BCX70G / H / J / K				
		110 - 200	220 - 450	100		BCW71 / 72				
		500	1250	100		PMBT6429				
50	100	210 - 290	340 - 460	100 - 150		2PD601ART 2PD601ARL 2PD601ASL	2PD601ARW / SW			
		250	650	100		PMBT6428	PMST6428			
		110 - 200	220 - 450	100		BCV71 / 72				
60	100	110 - 200	220 - 450	100		BC846 / A / B	BC846W / AW / BW	BC846T / AT / BT		BC846BMB
80	100	20	80	60		BSS64				
50	150	120 - 200	240 - 400	80		NXP3875Y / G				
	150	120 - 270	270 - 560	100			2PC4081Q / R / S	2PC4617Q / R		
	200	210	340	100		2PD601BRL				
		290	460	100		2PD601BSL				
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	-	50		PMBTA06	PMSTA06			

Single transistors PNP

Package						SOT23	SOT323 (SC-70)	SOT416 (SC-75)	DFN1006-3 (SOT883)	DFN1006B-3 (SOT883B)
										
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 0.48	1.0 x 0.6 x 0.37
P _{tot} (mW)						250	200	150	250	250
V _{CEO} (V)	I _C (mA)	h _{FE} min	h _{FE} max	f _T min (MHz)						
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	2PA1774QMB / RMB / SMB
45	100	210 - 290	340 - 460	70 - 80		2PB709ART 2PB709ARL 2PB709ASL	2PB709ARW / SW			
		180 - 380	310 - 630	100		BCX71H / J / K				
		120 - 215	260 - 500	100		BCW69 / 70				
		125 - 420	250 - 800	100		BC857 / A / B / C	BC857W / AW / BW / CW	BC857T / AT / BT / CT	BC857AM / BM / CM	BC857AMB / BMB / CMB
60	100	120	260	150		BCW89				
65	100	125 - 200	250 - 475	100		BC856 / A / B	BC856W / AW / BW	BC856T / AT / BT		
100	100	30	-	50		BSS63				
50	150	120 - 270	270 - 560	100			2PA1576Q / R / S	2PA1774Q / R / S		
	200	210	340	100		2PB709BRL				
		290	460	100		2PD709BSL				
25	500	100	600	80		BCX18				
45	500	100 - 250	250 - 600	80		BC807 / -16 / -25 / -40	BC807W / -16W / -25W / -40W			
		100	600	80		BCX17				
50	500	85 - 170	170 - 340	100 - 140		2PB710ARL 2PB710ASL	2PB1219AQ / R / S			
60	500	100	-	50			PMSTA55			
80	500	100	-	50		PMBTA56	PMSTA56			

Double transistors

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 _T 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	100	200	450	100	BC817DS		
	65	100	110	-	100		BC857BS	BC857BV
			200	450	100		BC856S	
	45	500	160	400	80		BC856BS	
NPN/PNP	40	100	120	450	100		PUMZ1	PEMZ1
	45	100	200	450	100		BC847BPN	BC847BVN
	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		

Single and double switching transistors

types in **bold** represent new products

Package							SOT223 (SC-73)	SOT89 (SC-62)	SOT23	SOT323 (SC-70)	SOT363 (SC-88)	SOT666	DFN1006-3 (SOT883)	DFN1006B-3 (SOT883B)
														
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 0.48	1.0 x 0.6 x 0.37
P _{tot} (mW)							1700	1300	250	200	300	300	250	250
Configuration							single	single	single	single	double	double	single	single
Polarity	V _{CEO} (V)	I _C (mA)	h _{FE} min	h _{FE} max	f _T min (MHz)	t _{off} (ns)								
NPN	12	100	40	120	400	20			BSV52					
	40	200	100	300	180	1200			PMBS3904	PMSS3904				
	15	600	40	120	500	20			PMBT2369	PMST2369				
	40	200	100	300	300	250			MMBT3904					
									PMBT3904	PMST3904	PMBT3904YS	PMBT3904VS	PMBT3904M	PMBT3904MB
	30	600	100	300	250	250			PMBT2222	PMST2222				
	40	600	100	300	300	250	PZT4401	PXT4401	PMBT4401	PMST4401				
								MMBT2222A						
						PZT2222A	PXT2222A	PMBT2222A	PMST2222A					
	40	800	100	300	300	250			BSR14					
PNP	40	100	100	300	150	700			PMBS3906	PMSS3906				
	40	200	100	300	250	300			MMBT3906					
									PMBT3906	PMST3906	PMBT3906YS	PMBT3906VS	PMBT3906M	PMBT3906MB
	40	600	100	300	200	350	PZT4403	PXT4403	PMBT4403	PMST4403				
						365			PMBT2907					
	60	600	100	300	200	300				PMST2907A				
									BSR16					
							365	PZT2907A	PXT2907A	PMBT2907A				
NPN/PNP	40	200	100	300	300/250	250/300					PMBT3946YPN	PMBT3946VPN		

Medium power general purpose transistors

Package						SOT223 (SC-73)	SOT89 (SC-62)	DFN2020-3 (SOT1061)
								
Size (mm)						6.5 x 3.5 x 1.65	4.5 x 2.5 x 1.5	2.0 x 2.0 x 0.62
P _{tot} (mW)						1700	1300	1100
Polarity	V _{CEO} (V)	I _C (A)	h _{FE} min	h _{FE} max	f _T min (MHz)			
NPN	20	2	85 - 160	375	40	BCP68 / -25	BC868 / -25	BC68PA / BC68-25PA
	45	1	63 - 100	160 - 250	100	BCP54 / -10 / -16	BCX54 / -10 / -16	BC54PA / BC54-10PA / BC54-16PA
	60	1	63 - 100	160 - 250	100	BCP55 / -10 / -16	BCX55 / -10 / -16	BC55PA / BC55-10PA / BC55-16PA
			100	300	100	BSP41	BSR41	
	80	1	63 - 100	160 - 250	100	BCP56 / -10 / -16	BCX56 / -10 / -16	BC56PA / BC56-10PA / BC56-16PA
PNP	20	2	85 - 160	250 - 375	40	BCP69 / -16 / -25	BC869 / -16 / -25	BC69PA / BC69-16PA / BC69-25PA
	45	1	63 - 100	160 - 250	115 ¹⁾ - 145 ¹⁾	BCP51 / -10 / -16	BCX51 / -10 / -16	BC51PA / BC51-10PA / BC51-16PA
	60	1	63 - 100	160 - 250	100	BCP52 / -10 / -16	BCX52 / -10 / -16	BC52PA / BC52-10PA / BC52-16PA
			40 - 100	120 - 300	100	BSP31	BSR30 / 31	
	80	1	63 - 100	160 - 250	115 ¹⁾ - 145 ¹⁾	BCP53 / -10 / -16	BCX53 / -10 / -16	BC53PA / BC53-10PA / BC53-16PA
						40 - 100	120 - 300	100
						BSP32 / 33	BSR33	

¹⁾ Typical value

In the Spotlight

Medium power transistors in DFN2020-3

Excellent electrical performance on a small 2 x 2 mm footprint

80% board space reduction (DFN2020-3 vs. SOT89)

V_{CEO} ranging from 20 to 80 V

High collector current capability I_C up to 2 A

AEC-Q101 qualified



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 _{CEO} (V)	I _C (mA)	h _{FE} min	h _{FE} max	f _T min (MHz)					
NPN	80	100	20	-	60				BSS64	
	140	300	60	250	100				PMBT5550	PMST5550
	160	300	80	250	100				PMBT5551/BSR19A	PMST5551
	250	100	50	-	60	BF722	BF622		BF822	
	300	100	50	-	60	BF720	BF620		BF820	BF820W
			40	-	50	PZTA42	PXTA42		PMBTA42	PMSTA42
	350	100	40	-	70	BSP19	BST39			
PNP	400	300	50	200	20	PZTA44			PMBTA44	
	100	100	30	-	50				BSS63	
	250	100	50	-	60	BF723				
			50	-	60		BF623		BF823	
	300	100	50	-	60		BF621		BF821	
						40	-	50	PZTA92	PXTA92
						40	-	50		PMSTA92
2 x NPN						300	100	40	-	50
									PMBTA42DS	

For high voltage transistors with increased performance please refer to our high voltage low V_{CEsat} (BISS) transistor portfolio on page 77.

Matched pair transistors

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

¹⁾ I_{C1}/I_{E2}

Key features

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

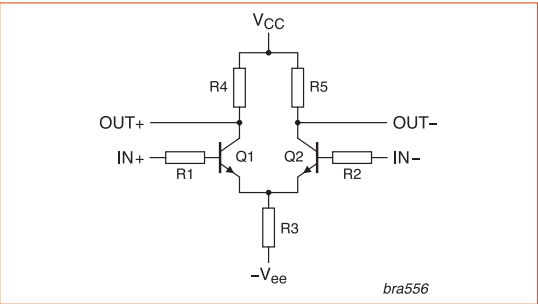
Key benefits

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

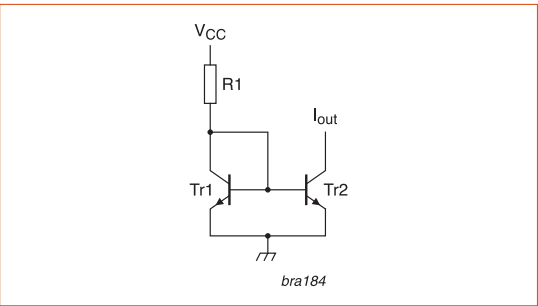
Key applications

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

Differential amplifier



Current mirror



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 _{CEO} (V)	I _C (mA)	h _{FE} min	f _T min (MHz)			
NPN	30	500	10000	125			PMBTA13
			20000	125	PZTA14	PXTA14	PMBTA14
				220		BCV29	BCV27
	45	1000	2000	200	BSP50	BST50	
			10000	220		BCV49	BCV47
	60	1000	2000	200	BSP51	BST51	
			2000	200	BSP52	BST52	
	80	1000	2000	200			
PNP	30	500	20000	125			PMBTA64
				220		BCV28	BCV26
	45	1000	2000	200	BSP60	BST60	
			10000	220		BCV48	BCV46
	60	1000	2000	200	BSP61	BST61	
			2000	200	BSP62	BST62	
	80	1000	2000	200			
			2000	200			

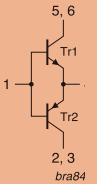
Schmitt trigger

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

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 _{CEO} (V)	I _C (mA)	Noise figure max (dB)	h _{FE} min	h _{FE} max	f _T min (MHz)		
NPN	30	100	4	200	450	100	BC849B	BC849BW
				420	800	100	BC849C	BC849CW
	45	100	4	200	450	100	BC850B	BC850BW
				420	800	100	BC850C	BC850CW
PNP	30	100	4	220	475	100	BC859B	BC859BW
				420	800	100	BC859C	BC859CW
	45	100	4	220	475	100	BC860B	BC860BW
				420	800	100	BC860C	BC860CW

MOSFET driver

V _{CEO} (V)	I _C (mA)	I _{cm} [A]	Type	Package	Remark	Configuration
30	0.1	0.2	BCV65	SOT143B 	General purpose transistors	
40	0.6	1	PMD2001D	SOT457 	Switching transistors with reduced storage time	
	1	2	PMD3001D		Low V _{CEsat}	

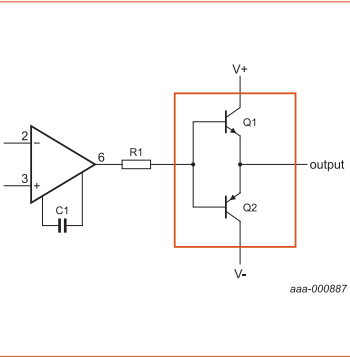
Key features and benefits

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

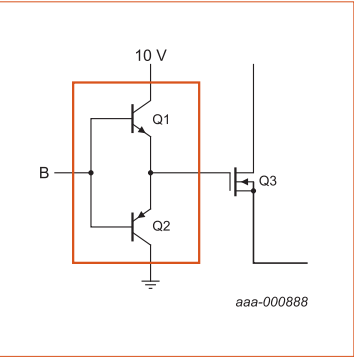
Key applications

- ▶ Power management
 - (Half) bridge push-pull driver
 - Isolated DC/DC converters
 - Secondary synchronous rectification
- ▶ Peripheral driver
 - (Half) bridge push-pull driver
 - Motor driver
 - Brushless DC motor driver
 - Operational amplifier (Op-amp) output current booster

Op-amp booster



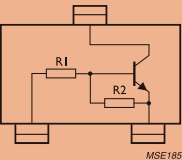
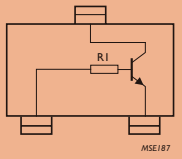
MOSFET driver Faster switching, lower losses

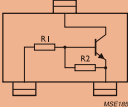
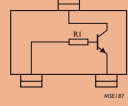


Medium frequency transistors

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

RETs 100 mA single

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

Package					SOT416 (SC-75)		DFN1006-3 (SOT883)		DFN1006B-3 (SOT883B)	
										
Size (mm)					1.6 x 0.8 x 0.77		1.0 x 0.6 x 0.48		1.0 x 0.6 x 0.37	
P _{tot} (mW)					150		250		250	
V _{CEO} (V)	I _C (mA)	Configuration	R1 (kΩ)	R2 (kΩ)	NPN	PNP	NPN	PNP	NPN	PNP
50	100		1	1		PDTA113EE		PDTA113EM		PDTA113EMB
			2.2	2.2	PDTC123EE	PDTA123EE	PDTC123EM	PDTA123EM	PDTC123EMB	PDTA123EMB
			4.7	4.7	PDTC143EE	PDTA143EE	PDTC143EM	PDTA143EM	PDTC143EMB	PDTA143EMB
			10	10	PDTC114EE	PDTA114EE	PDTC114EM	PDTA114EM	PDTC114EMB	PDTA114EMB
			22	22	PDTC124EE	PDTA124EE	PDTC124EM	PDTA124EM	PDTC124EMB	PDTA124EMB
			47	47	PDTC144EE	PDTA144EE	PDTC144EM	PDTA144EM	PDTC144EMB	PDTA144EMB
			100	100	PDTC115EE	PDTA115EE	PDTC115EM	PDTA115EM	PDTC115EMB	PDTA115EMB
			1	10		PDTA113ZE		PDTA113ZM		PDTA113ZMB
			2.2	10	PDTC123YE	PDTA123YE	PDTC123YM	PDTA123YM	PDTC123YMB	PDTA123YMB
			2.2	47	PDTC123JE	PDTA123JE	PDTC123JM	PDTA123JM	PDTC123JMB	PDTA123JMB
			4.7	10	PDTC143XE	PDTA143XE	PDTC143XM	PDTA143XM	PDTC143XMB	PDTA143XMB
			4.7	47	PDTC143ZE	PDTA143ZE	PDTC143ZM	PDTA143ZM	PDTC143ZMB	PDTA143ZMB
			10	47	PDTC114YE	PDTA114YE	PDTC114YM	PDTA114YM	PDTC114YMB	PDTA114YMB
			22	47	PDTC124XE	PDTA124XE	PDTC124XM	PDTA124XM	PDTC124XMB	PDTA124XMB
			47	10	PDTC144VE	PDTA144VE	PDTC144VM	PDTA144VM	PDTC144VMB	PDTA144VMB
			47	22	PDTC144WE	PDTA144WE	PDTC144WM	PDTA144WM	PDTC144WMB	PDTA144WMB
			2.2	-	PDTC123TE	PDTA123TE	PDTC123TM	PDTA123TM	PDTC123TMB	PDTA123TMB
			4.7	-	PDTC143TE	PDTA143TE	PDTC143TM	PDTA143TM	PDTC143TMB	PDTA143TMB
			10	-	PDTC114TE	PDTA114TE	PDTC114TM	PDTA114TM	PDTC114TMB	PDTA114TMB
			22	-	PDTC124TE	PDTA124TE	PDTC124TM	PDTA124TM	PDTC124TMB	PDTA124TMB
			47	-	PDTC144TE	PDTA144TE	PDTC144TM	PDTA144TM	PDTC144TMB	PDTA144TMB
			100	-	PDTC115TE	PDTA115TE	PDTC115TM	PDTA115TM	PDTC115TMB	PDTA115TMB

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 _{CEO} (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		PIMD3	PUMH11	PUMD3	PUMB11	PEMH11	PEMD3	PEMB11
			22	22		PIMD2	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
		R1 ≠ R2	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	
			2.2	-			PUMH30	PUMD30	PUMB30	PEMH30	PEMD30	PEMB30
		Only R1	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

RETs 500 mA

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 _{CEO} (V)	I _C (mA)		R1 (kΩ)	R2 (kΩ)	NPN/NPN	NPN/PNP	NPN	PNP
50	100	R1 = R2	1.0	1.0			PDTD113ET	PDTB113ET
			2.2	2.2			PDTD123ET	PDTB123ET
		R1 ≠ R2	1.0	10	PIMN31	PIMC31	PDTD113ZT	PDTB113ZT
			2.2	10			PDTD123YT	PDTB123YT
		Only R1	2.2	-			PDTD123TT	PDTB123TT

Low V_{CEsat} (BISS) RETs

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

In the Spotlight

Low V_{CEsat} (BISS) transistors

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

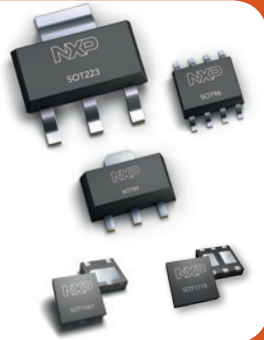
Voltage range from 12 V to 100 V

Flexible package options, from standard SMD to brand new medium power leadless package DFN2020-3 (SOT1061) (2 x 2 x 0.65 mm)

Provides benchmark reduced on-state-resistance

New double BISS transistors in DFN2020 (SOT1118)

New 2A BISS transistors in SOT89 available: PBSS4240X and PBSS5240X



New lowV_{CEsat} transistors in DFN1010D-3

Package											DFN1010D-3 (SOT1215)
											
Size (mm)											1.1 x 1.0 x 0.37
P _{tot} (mW)											750
V _{CEO} (V)	I _C (A)	I _{CM} (A)	h _{FE} min/typ	@ I _C (A)	@ V _{CE} (V)	R _{CEsat} typ (mΩ); @ I _C /I _B =10	V _{CEsat} typ (mV); I _C = 0.5 A; I _B = 0.05	V _{CEsat} max (mV)	@ I _C (A)	@ I _B (A)	
30	1	1.5	240	0.5	2	170	85	225	1	0.1	PBSS4130QA
			200	0.5	2	170	85	235	1	0.1	PBSS5130QA
	2	3	240	0.5	2	140	75	360	2	0.2	PBSS4230QA
			200	0.5	2	155	70	440	2	0.2	PBSS5230QA
60	1	1.5	160	0.5	2	170	85	220	1	0.1	PBSS4160QA
			115	0.5	2	240	120	310	1	0.1	PBSS5160QA
	1.3	2	115	0.5	2	215	105	450	1.3	0.13	PBSS5260QA
			160	0.5	2	135	85	360	2	0.2	PBSS4260QA

In the Spotlight

New Low V_{CEsat} transistor in DFN1010D-3

High I_C performance on ultra small footprint

Collector current up to 2 A

V_{CE} 30 V and 60 V

Leadless DFN1010D-3 (SOT1215) SMD package with tinplated sidepads (1.1 x 1.0 x 0.37)

AEC-Q101 qualified

Release in mid 2013



Low V_{CEsat} (BISS) double transistors

Package										SOT96 (SO8)	SOT457 (SC-74)	SOT363 (SC-88)	SOT666	DFN2020-6 (SOT1118)
														
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	2.0 x 2.0 x 0.652
P _{tot} (mW)										2000 ²⁾	750	430	500	1300
V _{CEO} (V)	I _C (A)	Polarity	h _{FE} min	@ I _C (A)	@ V _{CE} (V)	V _{CEsat} typ (mV); I _C = 0.5 A; I _B = 0.05 A	V _{CEsat} max (mV)	@ I _C (A)	@ I _B (A)					
15	0.5	2 x NPN	200	0.01	2	170 ¹⁾	250	0.5	0.05				PBSS2515VS	
		2 x PNP	200	0.01	2	170 ¹⁾	250	0.5	0.05				PBSS3515VS	
		NPN/PNP	200	0.01	2	170 ¹⁾	250	0.5	0.05				PBSS2515VPN	
		NPN/PNP	200	0.01	2	170 ¹⁾	250	0.5	0.05			PBSS2515YPN		
20	7.5	NPN/NPN	300	0.5	2	15	150	4	0.2	PBSS4021SN				
	6.3	PNP/PNP	250	0.5	2	24	225	4	0.2	PBSS4021SP				
	7.5 / 6.3	NPN/PNP	300/250	0.5	2	15/24	150/225	4	0.2	PBSS4021SPN				
30	1	NPN/NPN	210	0.5	2	75	100	0.5	0.05					PBSS4130PAN
		PNP/PNP	170	0.5	2	85	140	0.5	0.05					PBSS4130PAP
		NPN/PNP	210/170	0.5	2	75/85	100/140	0.5	0.05					PBSS4130PANP
	2	NPN/NPN	230	0.5	2	60	80	0.5	0.05					PBSS4230PAN
		PNP/PNP	210	0.5	2	75	110	0.5	0.05					PBSS4230PAP
		NPN/PNP	230/210	0.5	2	60/75	80/100	0.5	0.05					PBSS4230PANP
	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⁾				
40	5.7 / 4.8	NPN/PNP	300/200	0.5	2	57/70	250/390	4	0.4	PBSS4032SPN ³⁾				
	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			
	1	NPN/NPN	150	0.5	2	90	120	0.5	0.05					PBSS4160PAN
		PNP/PNP	120	0.5	2	125	180	0.5	0.05					PBSS4160PAP
		NPN/PNP	150/120	0.5	2	90/125	120/180	0.5	0.05					PBSS4160PANP
	2	NPN/NPN	210	0.5	2	70	90	0.5	0.05					PBSS4260PAN
		PNP/PNP	140	0.5	2	100	140	0.5	0.05					PBSS4260PAP
		NPN/PNP	210/140	0.5	2	70/100	90/140	0.5	0.05					PBSS4260PANP
	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				
120	1	NPN/NPN	240	0.1	2	90	120	0.5	0.05					PBSS4112PAN
		PNP/PNP	190	0.1	2	150	220	0.5	0.05					PBSS4112PAP
		NPN/PNP	240/190	0.1	2	90/150	120/220	0.5	0.05					PBSS4112PANP

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

Bipolar transistors

In the Spotlight

New double low VCEsat (BISS) transistors in DFN2020 (SOT1118)

High performance on small footprints

Voltage-range from 30 V to 120 V

Current I_C up to 2 Amp.

Leadless medium power DFN2020-6 (SOT1118) Surface-Mounted Device (SMD) plastic package (2 x 2 x 0.65 mm)

P_{tot} up to 2000 mW



Low V_{CEsat} (BISS) transistors single NPN

Package											SOT223 (SC-73)	SOT89 (SC-62)	SOT457 (SC-74)		SOT23	DFN2020-3 (SOT1061)	SOT323 (SC-70)	SOT363 (SC-88)	SOT416 (SC-75)	SOT666	DFN1006-3 (SOT883)	DFN1006B-3 (SOT883B)
																						
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 0.62	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 0.48	1.0 x 0.6 x 0.37
P _{tot} (mW)											1700	1650	750		480	1400	350	430	250	500	250	250
V _{CEO} (V)	I _C (A)	I _{CM} (A)	h _{FE} min/typ	@ I _C (A)	@ V _{CE} (V)	R _{CEsat} typ (mΩ); I _C /I _B = 10	V _{CEsat} typ (mV); I _C = 0.5 A; I _B = 0.05 A	V _{CEsat} max (mV)	@ I _C (A)	@ I _B (A)												
12	5.3	10.6	300/530	0.5	2	27 ¹⁾	18	200	5.3	0.265	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	PBSS2515MB
			200/425	0.01	2	300	200	250	0.5	0.05								PBSS2515E				
20	1.0	3.0	350/470	0.1	2	220	110 ²⁾	250	1	0.05				PBSS4120T								
	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				PBSS4320T								
	3.0	5.0	220/390	0.5	2	85	40	310	3	0.3			PBSS4320X									
	4.0	15.0	300/450	0.5	2	50	30	280	4	0.4												
	4.3	8.0	300/550	0.5	2	36	21	220	4	0.2				PBSS301ND								
	5.0	10.0	300/450	0.5	2	32	35	220	5	0.5				PBSS4021NT								
	5.3	10.6	300/570	0.5	2	27 ¹⁾	20	200	5.3	0.265				PBSS4520X								
	5.8	10.2	300/570	0.5	2	30 ¹⁾	20	250	5.8	0.29	PBSS302NZ				PBSS302NX							
	6.0	7.0	280/440	0.5	2	33 ¹⁾	20	275	6	0.3												
	7.0	15.0	300/550	0.5	2	19	12	210	7	0.35												
8.0	20.0	300/550	0.5	2	14	9	170	8	0.4	PBSS4021NZ			PBSS4021NX									
30	1.0	3.0	300/450	0.5	2	240	120 ²⁾	270	1	0.05				PBSS4130T								
	2.0	3.0	300/450	0.5	2	120	70	320	2	0.2				PBSS4230T								
	2.6	5.0	300/500	0.5	2	76	80	320	3	0.3				PBSS4032NT ³⁾								
	3.0	5.0	300/490	0.5	2	80	45	300	3	0.3				PBSS4330X								
	3.0	5.0	300/465	0.5	2	75	40	300	3	0.3												
	3.5	6.0	300/500	0.5	2	50	70	300	4	0.4												
	4.7	10.0	300/500	0.5	2	45	57	250	4	0.4				PBSS4032NX ³⁾								
	5.1	10.2	300/480	0.5	2	30 ¹⁾	20	220	5.1	0.255				PBSS303NX								
	5.4	10.0	300/500	0.5	2	45	57	340	4.9	0.27	PBSS4032NZ ³⁾											
	5.5	11.0	300/480	0.5	2	31 ¹⁾	20	240	5.5	0.275	PBSS303NZ											
6.0	7.0	280/450	0.5	2	35 ¹⁾	21	275	6	0.3													
40	0.5	1.0	200/550	0.01	2	380	200 ²⁾	250	0.5	0.05											PBSS2540M	PBSS2540MB
			200/350	0.01	2	380	190	250	0.5	0.05												
	1.0	3.0	300/-	0.5	5	150	70	440	2	0.2												
			300/440	0.5	5	240	130	500	1	0.1												
		2.0	300/510	0.5	5	230	120	500	1	0.1					PMMT491A							
	2.0	3.0	300/420	0.5	5	150	130	500	1	0.1												
			300/400	0.5	5	150	70	400	2	0.2												
			300/-	0.5	5	280	140	510	2	0.2												
			350/470	0.1	2	120	70	320	2	0.2												
		300/450	0.5	2	120	70	320	2	0.2													
4.0	15.0	300/520	0.5	2	55	35	300	4	0.4													
	10.0	300/500	0.5	2	40	21	355	5	0.5				PBSS4540X									
5.0	10.0	300/500	0.5	2	42	25	355	5	0.5	PBSS4540Z												
50	2.0	5.0	300/495	0.5	2	100	60	260	2	0.2				PBSS4350T								
			300/-	0.5	2	160	90 ²⁾	320	2	0.2												
	3.0	5.0	200/280	0.5	2	110	65	290	2	0.2												
			300/460	0.5	2	75	50	370	3	0.3				PBSS4350D								
			200/280	0.5	2	110	60 ¹⁾	290	2	0.2	PBSS4350Z											
60	1.0	2.0	200/400	0.5	5	200	110	250	1	0.1											PBSS4160V	
			200/420	0.5	5	230	120	280	1	0.1												
			200/350	0.5	5	200	110	250	1	0.1						PBSS4160U						
		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				PBSS304NX								
	5.2	10.4	300/520	0.5	2	39 ¹⁾	25	280	5.2	0.26	PBSS304NZ											
	6.0	7.0	280/440	0.5	2	34 ¹⁾	22	290	6	0.3												
6.2	15.0	300/500	0.5	2	25	17	230	6	0.3				PBSS4041NX									
7.0	15.0	300/500	0.5	2	17.5	13	195	7	0.35	PBSS4041NZ												
80	3.0	6.0	240/360	0.5	2	67	40	255	3	0.3												
	4.0	10.0	250/400	0.5	2	43 ¹⁾	25	230	4	0.2				PBSS4480X								
	4.6	9.2	300/470	0.5	2	37 ¹⁾	25	240	4.6	0.23				PBSS305NX								
	5.1	10.2	300/470	0.5	2	38 ¹⁾	25	270	5.1	0.255	PBSS305NZ											
	5.6	7.0	270/425	0.5	2	40 ¹⁾	25	320	5.6	0.28												
100	1.0	3.0	150/400	0.25	10	160	80	200	1	0.1												
			150/300	0.25	10	165	70	200	1	0.1												
			150/290	0.25	10	160	75	200	1	0.1												
			150/290	0.25	10	165	73	200	1	0.1												
			150/290	0.25	10	160	73	200	1	0.1	PBSS8110Z											
	3.0	4.0	170/275	0.5	2	72	45	360	4	0.4												
	4.5	9.0	200/330	0.5	2	38 ¹⁾	27	245	4.5	0.225				PBSS306NX								
	5.1	10.2	200/330	0.5	2	43 ¹⁾	27	300	5.1	0.255	PBSS306NZ											
5.2	6.0	180/285	0.5	2	48 ¹⁾	30	340	5.2	0.26													

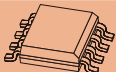
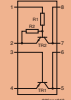
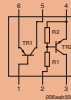
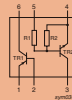
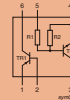
Low V_{CEsat} (BISS) transistors single PNP

Package											SOT223 (SC-73)	SOT89 (SC-62)	SOT457 (SC-74)		SOT23	DFN2020-3 (SOT1061)	SOT323 (SC-70)	SOT363 (SC-88)	SOT416 (SC-75)	SOT666	DFN1006-3 (SOT883)	DFN1006B-3 (SOT883B)
																						
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 0.62	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 0.48	1.0 x 0.6 x 0.37
P _{tot} (mW)											1700	1650	750		480	1400	350	430	250	500	250	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	PBSS301PX										
	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	PBSS3515MB
			200/325	0.01	2	300	150	250	0.5	0.05								PBSS3515E				
20	1.0	2.0	300/450	0.1	2	250	125 ²⁾	250	1	0.05				PBSS5120T								
	2.0	4.0	220/440	0.1	2	140	75	390	2	0.2									PBSS5220V			
		3.0	225/-	0.5	2	115	80 ²⁾	225	2	0.2				PBSS5220T								
		5.0	220/420	0.5	2	75	50	210	3	0.2				PBSS5320T								
	3.0	5.0	200/-	0.5	2	85	80 ²⁾	400	3	0.3			PBSS5320D									
			220/450	0.5	2	90	50	300	3	0.3			PBSS5320X									
	3.5	8.0	250/400	0.5	2	55	35	375	4	0.2				PBSS4021PT								
	4.0	15.0	250/400	0.5	2	50	35	280	4	0.4			PBSS301PD									
	5.0	10.0	300/430	0.5	2	34	45	270	5	0.5			PBSS5520X									
	5.1	10.2	250/370	0.5	2	32 ¹⁾	25	230	5.1	0.255			PBSS302PX									
	5.5	11.0	250/370	0.5	2	34 ¹⁾	25	265	5.5	0.275	PBSS302PZ											
30	6.0	7.0	230/345	0.5	2	39 ¹⁾	25	350	6	0.3						PBSS5620PA						
	6.2	15.0	250/400	0.5	2	23	18	240	6	0.3			PBSS4021PX									
	6.6	20.0	250/400	0.5	2	22	16	240	7	0.35	PBSS4021PZ											
	1.0	3.0	260/350	0.5	2	220	110	225	1	0.05				PBSS5130T								
	2.0	3.0	300/450	0.1	2	160	70	350	2	0.2				PBSS5230T								
	2.4	5.0	200/320	0.5	2	110	95	330	2	0.2				PBSS4032PT ³⁾								
	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			PBSS5330X									
	3.0	5.0	200/320	0.5	2	75	45	320	3	0.3						PBSS5330PA						
	4.2	10.0	200/350	0.5	2	58	70	345	4	0.4			PBSS4032PX ³⁾									
	4.4	10.0	200/350	0.5	2	58	70	400	4	0.2	PBSS4032PZ ³⁾											
	5.1	10.2	250/400	0.5	2	32 ¹⁾	25	230	5.1	0.255			PBSS303PX									
40	5.3	10.6	250/400	0.5	2	35 ¹⁾	25	265	5.3	0.265	PBSS303PZ											
	6.0	7.0	200/335	0.5	2	39 ¹⁾	25	350	6	0.3						PBSS5630PA						
	0.5	1.0	200/380	0.01	2	440	220	350	0.5	0.05										PBSS3540M	PBSS3540MB	
			200/380	0.01	2	440	230	350	0.5	0.05								PBSS3540E		PBSS5140V		
	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						PBSS5140U						
			300/800	0.1	5	250	130	500	1	0.1												
			300/510	0.1	5	230	130	500	1	0.1					PBMT591A PBSS5140T							
	1.8	3.0	300/450	0.1	5	185	100	530	2	0.2									PBSS5240V			
	2.0	3.0	215/-	0.5	5	340	170	500	2	0.2			PBSS5240X									
			300/-	0.1	2	200	110 ²⁾	350	2	0.2								PBSS5240Y				
			300/450	0.1	2	150	70	350	2	0.2												
	4.0	15.0	200/310	0.5	2	55	46	300	4	0.4				PBSS302PD								
	10.0	250/370	0.5	2	45	33	375	5	0.5			PBSS5540X										
5.0	10.0	250/350	0.5	2	55	40 ¹⁾	160	2	0.2	PBSS5540Z												
50	3.0	5.0	200/-	0.5	2	150	90 ²⁾	300	2	0.1					PBSS5250T							
	2.0	5.0	200/360	0.5	2	90	55	270	2	0.2				PBSS5350T								
			200/-	0.5	2	160	90 ²⁾	320	2	0.2			PBSS5250X									
	3.0	5.0	200/300	0.5	2	120	70	300	2	0.2				PBSS5350D								
			200/375	0.5	2	120	70	390	3	0.3			PBSS5350X									
	200/300	0.5	2	120	70	300	2	0.2	PBSS5350Z											PBSS5160V		
60	1.0	2.0	150/250	0.5	5	220	120	330	1	0.1							PBSS5160U					
			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				PBSS5160T PBSS4041PT								
	3.0	6.0	180/265	0.5	2	70	55	290	3	0.3			PBSS303PD									
	4.2	8.4	200/295	0.5	2	53 ¹⁾	35	310	4.2	0.21			PBSS304PX									
	4.5	9.0	200/295	0.5	2	59 ¹⁾	35	375	4.5	0.225	PBSS304PZ											
80	5.0	6.0	170/260	0.5	2	35 ¹⁾	35	450	5	0.25						PBSS5560PA						
	5.0	15.0	200/300	0.5	2	40	30	300	5	0.5			PBSS4041PX									
	5.7	15.0	200/300	0.5	2	29	22	285	6	0.3	PBSS4041PZ											
	3.0	5.0	155/225	0.5	2	71	55	290	3	0.3				PBSS304PD								
		5.0	180/265	0.5	2	65 ¹⁾	40	420	4													

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

Low V_{CEsat} (BISS) transistors

Low V_{CEsat} (BISS) load switches

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		1.6 x 1.2 x 0.55
P _{tot} (mW)				1500 ¹⁾	750 ¹⁾	600 ¹⁾	300 ²⁾
V _{CEO} (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
			4.7				PBLS1502Y
			10				PBLS1503Y
			22				PBLS1504Y
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			
40	0.5	350	2.2				PBLS4001Y
			4.7				PBLS4002Y
			10				PBLS4003Y
			22				PBLS4004Y
			47				PBLS4005Y
	1	170	2.2			PBLS4001D	
			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	
	1.5	100	10			PBLS6023D	
			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

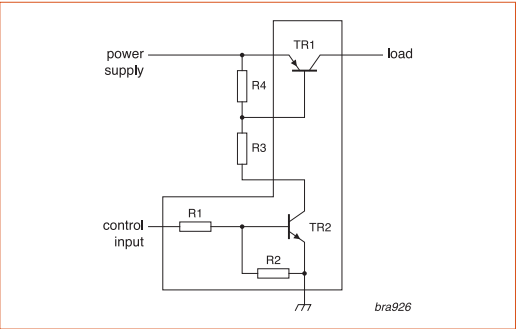
Key features and benefits

- ▶ Very small input current drives high load current
- ▶ High efficiency and low voltage drop due to low V_{CEsat} (BISS) pass transistor
- ▶ Replaces expensive P-MOSFETs
- ▶ Inherent reverse current blocking
- ▶ Automotive qualified according to AEC-Q101

Key applications

- ▶ Fan driver
- ▶ Battery charge switch
- ▶ Supply line switch
- ▶ High side load

Low V_{CEsat} (BISS) load switch – the optimal choice for supply-line and high-side switches



Low V_{CEsat} (BISS) transistors

High voltage low V_{CEsat} (BISS) 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 _{CESM} ¹⁾	V _{CEO} (V)	I _C (A)			
NPN	-	150	1	PBHV8115Z		PBHV8115T
		180	1	PBHV8215Z		PBHV8118T
	500	400	0.5	PBHV8540Z		PBHV8540T
		500	0.15	PBHV8140Z		PMBTA45
PNP	-	150	1	PBHV9115Z	PBHV9115X	PBHV9115T
			2	PBHV9215Z		
	500	400	0.25	PBHV9040Z		PBHV9040T
			0.5	PBHV9540Z		
		500	0.15			PBHV9050T
			0.25	PBHV9050Z		

¹⁾ Collector-emitter peak voltage

In the Spotlight

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

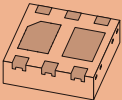
- Voltage V_{CEO} up to 500 V
- Current I_C up to 1 A (continuous), 2 A (peak)
- V_{CEsat} down to 33 mV at $I_B = 20$ mA
- AEC-Q101 qualified

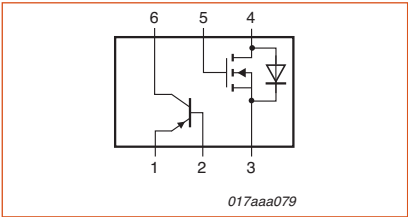


Low V_{CEsat} (BISS) RETs

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

Low V_{CEsat} (BISS) transistor PNP – N-channel MOSFET combination

Package											DFN2020-6 (SOT1118)
											
Size (mm)											2.0 x 2.0 x 0.62
P_{tot} (mW)											1300
V_{CE0} (V)	I_C (A)	$h_{FE\ min}$	$h_{FE\ max}$	@ I_C (mA)	@ V_{CE} (V)	$R_{CEsat\ typ}$ (mΩ)	V_{DS} (V)	V_{GS} (V)	I_D (A)	$R_{Dson\ typ}$ (mΩ)	
40	2	300	800	100	5	240	30	0.7	0.66	390	PBSM5240PF
40	2	100	-	100	5	240	30	0.7	0.66	390	PBSM5240PFH



Combination of Low V_{CEsat} transistor with N-channel MOSFET in the very small and ultra thin leadless package DFN2020-6 (SOT1118)

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. Benefit from :

Reduction in board space

- ▶ Stable performance at smaller footprint ▶ $I_C = 0.5\text{ A}$; $V_{CE0} = 40 - 45\text{ V}$

		
SOT23	SOT416 (SC-75)	DFN1006B-3 (SOT883B)
8.15 mm ²	4.4 mm ²	1.17 mm ²
BC817xx	PBSS2540E	PBSS2540MB
General purpose transistor	BISS transistor technology	BISS transistor technology

Improved collector current capabilities

- ▶ 17.87 mm² footprint

		
SOT89 (SC-62)	SOT89 (SC-62)	SOT89 (SC-62)
1 A	3 A	6.2 A
BCX51	PBSS5350X	PBSS4021PX
General purpose transistor	BISS transistor technology	BISS transistor technology

High voltage power bipolar transistors (for lighting, self oscillating power supplies and industrial applications)

V_{CESM} (V)	$I_{C(DC)}$ (max) (A)	25 °C ind. t_i (typ) (ns)	@ I_C (A)	h_{FE} (typ)	@ I_C (A)	SOT54 (TO92)	SOT78 (TO220AB)	SOT186A (isolated TO220AB)	SOT404 (D ² PAK)	SOT428 (DPAK)
700	1	80	1	7.5	0.8	BUJ100LR				
	1	80	1	7.5	0.8	PHE13003A				
	1	50	1	14	0.75	BUJ100				
	1.5	100	0.5	9	1	PHE13003C				
	1.5	100	0.5	9	1	PHD13003C*				
	4	30	2	12.5	3		BUJ103A	BUJ103AX		BUJ103AD
	4	30	2	12.5	3					BUJD103AD*
	4	100	2	17	2		PHE13005	PHE13005X		
	4	100	2	17	2		PHD13005*			
	8	20	5	11	4		BUJ105A		BUJ105AB	BUJ105AD
	8	20	5	11	4					BUJD105AD*
	8	40	5	9	5		PHE13007			
	10	20	5	11	6		BUJ106A			
	12	100	5	7	8		PHE13009			
850	4	30	2	12.5	3		BUJD203A*	BUJD203AX*		BUJD203AD*
1000	5	145	2.5	12	3		BUJ303A	BUJ303AX		BUJ303AD
1050	4	370	2.5	17.5	2		BUJ302A	BUJ302AX		BUJ302AD
	5	200	2.5	10.5	3		BUJ303B			
	5	200	2.5	15.5	3					BUJ303CD
1200	6	170	2.5	15.5	3		BUJ403A	BUT11APX-1200		

* Integrated freewheeling diode

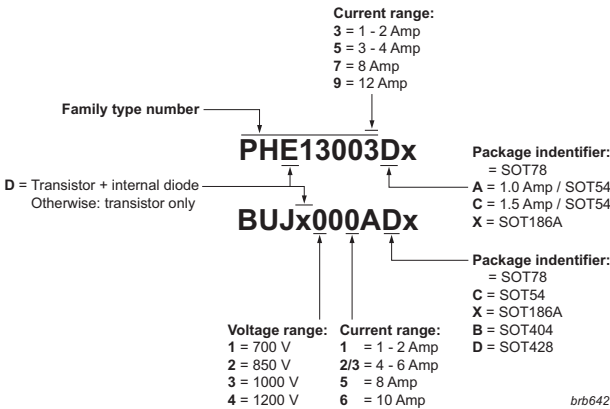
Key features and benefits

- ▶ Planar technology for voltage blocking stability and long-term reliability at elevated temperature
- ▶ Fast and smooth turn-off performance for low switching losses and improved efficiency
- ▶ Low saturation voltage for low conduction losses and improved efficiency
- ▶ Lowest overall power dissipation for lowest temperature rise and improved reliability
- ▶ Tightly-controlled manufacturing process for narrower gain (h_{FE}) spread and easier circuit optimization
- ▶ Flat gain (h_{FE}) vs current characteristic for correct circuit operation under all conditions
- ▶ Transistor design possesses inherent avalanche ruggedness

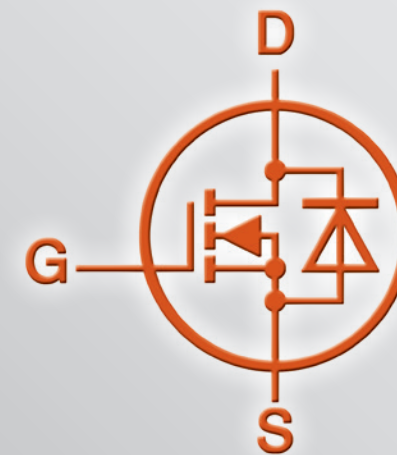
Key applications

- ▶ Compact Fluorescent Lamps
- ▶ Electronic ballasts for fluorescent lamps
- ▶ Electronic transformers for Low Voltage Tungsten Halogen lighting
- ▶ Power supplies and chargers – e.g. for mobile phones

PHx/BUJx series part numbering



brb642



MOSFETs

Small-signal MOSFETs

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

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

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Small-signal MOSFETs dual

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Small-signal MOSFETs single (P-Channel)

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Small-signal MOSFET – Schottky combination

92

Small-signal MOSFETs in new DFN2020-6 (SOT1118) dual package

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Small-signal MOSFETs in new DFN2020MD-6 (SOT1220) single package

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Small-signal MOSFETs in new DFN1010 single and dual package

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Power MOSFETs

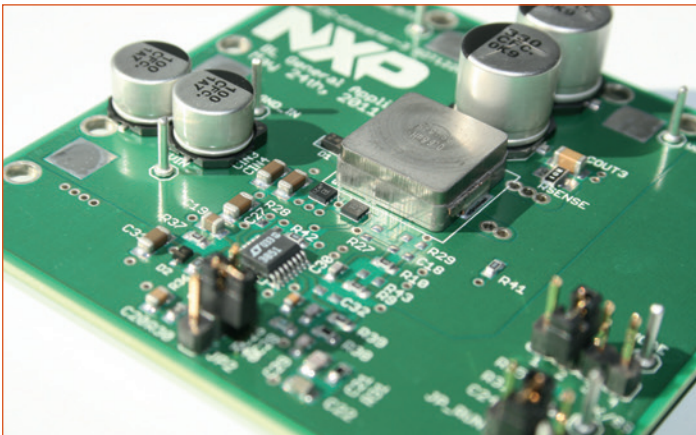
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Automotive MOSFETs

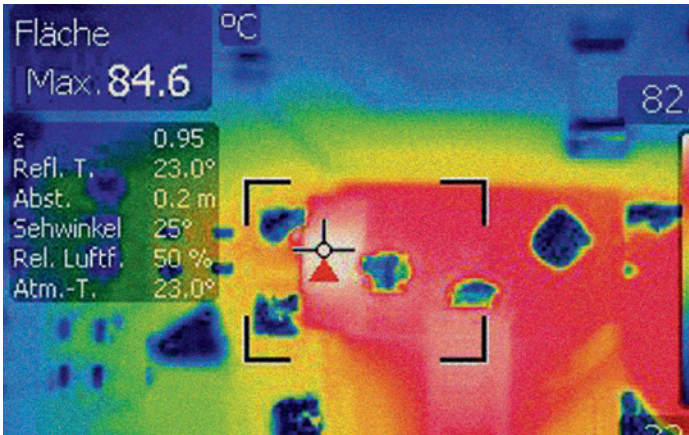
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Fit more functions on a PCB with small, thin medium-power packages

MOSFETs in DFN package for DC-DC converter



Demo-PCB DC-DC down-conversion with 2 PMPBEN MOSFETs
Condition: Vin=10 V; Vout = 1.5 V @ 6 A; fsw = 490 kHz

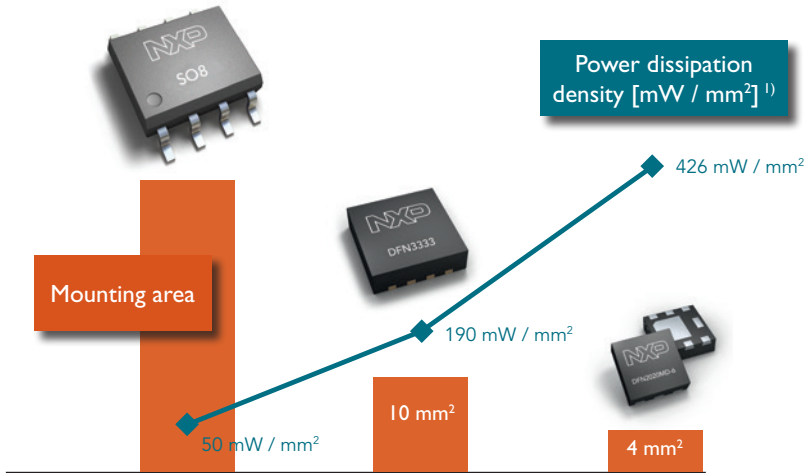


The cursor points to the hot spot in the photo area (max. temperature value in degree Celsius) Ta = 25 degree Celsius

- FETs stay cool with 6 A load current
- Less increase of R_{DSon} and lower losses

Use DFN2020MD-6 to replace SO8 in medium power applications

Mounting area / power density comparison



1) Power dissipation density - measured at 6 cm² mounting pad on single sided copper FR4PCB, normalized to 1 mm²

Small-signal MOSFETs in new DFN2020MD-6 (SOT1220) single package

Package														DFN2020MD-6 (SOT1220)
														
Size (mm)														2.0 x 2.0 x 0.62
P _{tot} (mW)														>1500
Polarity	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 (kV)	R _{DSon} typ (mΩ) @ V _{GS} =				
										10 V	4.5 V	2.5 V	1.8 V	
Nch	20	8	11.3	0.4	1	29	52	8.8	-		14	17	21	PMPB12UN
			9.4	0.4	1	26	43	4.7	-		19	25	36	PMPB20UN
		12							2kV		10			PMPB10XNE
			10.4	0.4	0.9	33	67	13.4	-		18	21	23	PMPB15XN
	30	12							2kV		23			PMPB23XNE
			10.3	0.5	1.5	34	44	7.2	-		16	22		PMPB16XN
									2kV		13			PMPB13XNE
									2kV		29			PMPB29XNE
		20	5.5	0.45	1.2	23	41	5.1	-		37	55		PMPB33XN
			13	1	2	19	26	13.7	-	12	14			PMPB11EN
			10.4	1	2	26	17	7.2	-	16.5	21			PMPB20EN
			60	16	12.4	1	3	32	24	12.1	-	34	40	
Pch	20	12	11.8	0.47	0.9	108	142	67	-		15	17	21	PMPB15XP
			10.3	0.47	0.9	70	79	28.8	-		19	21	27	PMPB19XP
			7.9	0.47	0.9	54	85	15	-		30	35	45	PMPB33XP
									2kV		20			PMPB20XPE
	30	12							2kV		29			PMPB29XPE
									2kV		43			PMPB43XPE
									-		47			PMPB47XP
			8.8	1	2.5	41	47	30	-	24	32			PMPB27EP
													PMPB48EP	

NXP package
100% solderable side pads

100% solder wetting solution
with new 2 x 2 mm leadless package DFN2020MD-6

- Optimal visual solder inspection
- High-quality solder connections

Packages from other suppliers

- No complete wetting on side pad
- Quality of solder connection difficult to determine
- Very limited options for optical solder inspection

In the Spotlight

PMPB40SNA - Automotive compliant 60 V N-ch MOSFET with ID max of 12.9 A

60 V N-ch with R_{DSon} of typ. 40mΩ @ 4.5 V

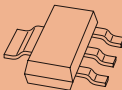
Only 15% of the size of a standard SO8 package with same power dissipation level

Small and leadless ultra thin SMD plastic package: 2 x 2 x 0.65 mm

Exposed drain pad for excellent thermal conduction

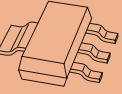
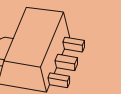
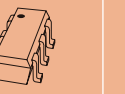
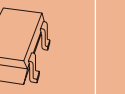
Tin-plated 100% solderable side pads for optical solder inspection

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

Package														SOT223 (SC-73)		SOT89 (SC-62)	TSOP6 SOT457 (SC-74)	SOT23	SOT363 (SC-88)	SOT323 (SC-70)	SOT416 (SC-75)	DFN1006-3 (SOT883)	DFN1006B-3 (SOT883B)
																							
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	2.0 x 1.25 x 0.95	1.6 x 0.8 x 0.77	1.0 x 0.6 x 0.48	1.0 x 0.6 x 0.37
P _{tot} (mW)														1700		1300	600	250	300	200	150	250	250
item	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 (kV)	R _{DSon} typ (mΩ) @ V _{GS} =													
										10 V	4.5 V	2.5 V	1.8 V										
N-channel single	12	8	5.7	0.4		23	67	10.1	-		28		39				PMN28UN						
			8.2	0.4	1	31	55	9	-		15	18	26				PMN15UN						
			5.8	0.4	1	55	255	7.4			15	18	25					PMV16UN					
			3.3	0.4	1	34	186	5.8			25	30	39					PMV28UN					
			6	0.4	1	44	168	6.4	-		27	35	58				PMN25UN						
			5.7	0.45		20	66	7.4	-		30		44					PMV30UN ¹⁾					
			2.8	0.4	1	38	56	2.2			45	58	85						PMG45UN				
			3.76	0.65		35	84	5.4	-		56	77						PMV56XN ¹⁾					
			2.5	0.65		35	84	5.4	-		56	77						SI2302DS					
			2.3	0.4	1	26	83	2.4	-		64	78	110					PMV65UN					
			1.9	0.4	1	35	48	2.2			63	77	114							PMF63UN			
			1.05	0.4		6.5	65		-		140		240					BSH105					
			1.5	0.4	1	18	24	1.1	-		140	175	237					PMV170UN					
			2.28	0.45	0.95	14.5	23.5	0.89	-		250		420								PMZ250UN	PMZB290UN	
			1	0.45	1	14.5	23.5	0.89	-		280		460							PMF280UN	PMR280UN		
			0.7	0.5	0.95	10	117	0.45	2 kV		380	620	1100							PMR290UNE			
			1	0.5	0.95	10	117	0.45	2 kV		290	420	600										PMZB290UNE
	12	5.7	0.5	1.5	39	196	6.4	-		27	37						PMN22XN						
		3.2	0.5	1.5	39	144	4.9			28	39							PMV30XN					
		5.9	0.5	1.5	25	37	5.8	-		31	44							PMV31XN ¹⁾					
		2.15	0.5	1.5	16	17	0.72	-		270	440										PMZ270XN	PMZB300XN	
		1	0.5	1.5	16	17	0.72	-		290	460									PMR290XN			
		4.9	0.45		18	50	9.3	-		40		55					PMV40UN ¹⁾						
		0.9	0.5	1.05	20	81	0.77	2 kV		370	470	630									PMZB370UNE		
		1.78	0.45	0.95	11.5	22.5	0.89	-		390		550								PMZ390UN	PMZB420UN		
		0.85	0.4		6	27		-		400		600					BSH103						
		0.8	0.45	1	11.5	22.5	0.89	-		400		580							PMF400UN	PMR400UN			
		0.45	0.45	0.95	11.5	22.5	0.89	-		1000	1100	1400									PMZ1000UN		
		0.4	0.6	1.1	26	88	0.52	2 kV		1000	1400	2000					NX3008NBK		NX3008NBKW	NX3008NBKT		NX3008NBKMB	
	4.8	0.5	1.5	39	176	6.4	-		19	26							PMV20XN						
	1.63	0.5	1.5	27	38	1.9	-		77	104								PMF77XN					
	1.2	0.5	1.5	18	23	0.87	-		185	255							PMV185XN						
	0.9	0.5	1.5	23	19	0.74			234	324								PMF250XN					
	1.87	0.5	1.5	16	19.5	0.65	-		350	520										PMZ350XN	PMZB380XN		
	0.87	0.35		16	19.5		-		370	550								PMF370XN					
	0.9	0.5	1.5	16	19.5	0.65	-		370	550									PMR370XN				
	30	20	5.4	1	2	12	27	13.8	-	32	40						PMN40LN						
			6.7	1	2.5	15	285	12.4		16	20						PMN20EN						
			5.2	1	2.5	19	140	8.6		17	22							PMV22EN ¹⁾					
			7.4	1	2.5	33	249	12.5	-	21	26						PMT21EN						
			10	1	2.8	18	44	24	-	20	30						BSP030						
			6.2	1	2.5	33	134	9.6	-	23	31						PMN25EN						
			6	1	2.5	33	134	9.6	-	29	36						PMT29EN						
			3.1	1	2.5	18	78	6.5		28	37								PMV37EN				
			5.1	1	2.5	19	77	6.2		25	32						PMN35EN						
			5.2	1	2	33	44	6.1	-	32	42						PMN45EN						
			5.4	1	2	12	21.5	9.4	-	35	45								PMV45EN ¹⁾				
			4.7	1	2	12	23.5	9.4	-	47	60								PMV60EN ¹⁾				
			2.1	1	2.5	11	20	2.6	-	70	90								PMV90EN				
			1.9	1	2.5	17	21	3.1	-	67	87										PMF87EN		
			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	190									SI2304DS					
	0.18	0.8	1.5	10	51	0.34		2700	3000	4000								NX3020NAK		NX3020NAKW	NX3020NAKT		

¹⁾ enhanced thermal capability **bold values are max values** ²⁾ Max values

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

Package														SOT223 (SC-73)		SOT89 (SC-62)	TSOP6 SOT457 (SC-74)	SOT23	SOT363 (SC-88)	SOT323 (SC-70)	SOT416 (SC-75)	DFN1006-3 (SOT883)	DFN1006B-3 (SOT883B)
																							
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	2.0 x 1.25 x 0.95	1.6 x 0.8 x 0.77	1.0 x 0.6 x 0.48	1.0 x 0.6 x 0.37
P _{tot} (mW)														1700		1300	600	250	300	200	150	250	250
item	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 (kV)	R _{DSon} typ (mΩ) @ V _{GS} =													
										10 V	4.5 V	2.5 V	1.8 V										
N-channel single	50	20	0.1	0.4	1.8	2	5		-	2800	3800							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	2.5	2	4					2 kV	120				PHT6N06T								
	3.5		1	2					2 kV		65			PHT8N06LT									
	2.5		1	2					2 kV		120			PHT6N06LT									
	60	20	1.22	1	3	6	7.2	1.05	-	760	1100											PMZ760SN	
			0.55	1	3	6	7.2	1.05	-	780	1100										PMR780SN		
			0.36	0.9	1.5	5	13	0.72		900	1000						BSS138P		BSS138PW				
			0.36	0.48	1.6	10	58	0.6	1.5 kV	1000	1100	1400					BSS138BK		BSS138BKW				
			0.3	1	2.5	7	15	0.6	-	1000	1300						2N7002P		2N7002PW	2N7002PT			
			0.3	1	2.5	11	19	0.5	2 kV	1000	1300						2N7002BK		2N7002BKW	2N7002BKT	2N7002BKM	2N7002BKMB	
			0.3	1	2.5	16	60	1.09	3 kV	1100	1300						2N7002CK						
			0.34	1		3	9		1 kV	2800	3800						2N7002K						
			0.19	1.1	2.1	12	34	0.33	yes	3000	3700						NX7002AK		NX7002AKW				
		30	0.385	1	2.5	2.5	11	0.69	-	780	1200						2N7002E						
			0.475	1	2.5	2.5	11	0.69	-	780	1200						2N7002F						
			0.3	1	2.5	2.5	11	-	-	2800	3800						2N7002						
	100	20	3	2	4				-	57					PHT6NQ10T								
			3.3	1.3	2.5	9	14	7.4	-	190	200				PMT200EN								
			0.85	2	4	19	13	4.6	-	400							BSH114						
			1.3	1.3	2.5	6	11	2.4	-	760	800				PMT760EN								
			0.15	1	2.8	3	12		-	3500							BSS123						
			0.19	1		3	12		-		5000						BST82						
			0.52	1	-	3	12	-	-		5000				BSP110								
		30	1.9	2	4	10.5	12.5	7	-	213							PMV213SN ¹⁾						
	200	20	0.4	0.8	2.8	6	49		-	1600						BSS87							
			0.55	0.4	2	10	45		-	1700		3000		BSP122									
	240		0.375	0.8	2	6	47		-	2800		7500		BSP89									
	250		0.35	0.8	2	6	47		-	2800				BSP126									
	300		0.35	0.8	2	6	46		-	3700		4800		BSP130									

¹⁾ enhanced thermal capability **bold values are max values**

In the Spotlight

PMT200EN & PMT760EN - 100 V N-ch low R_{DSon} types

100 V N-ch MOSFET in latest Trench technology

For LCD backlighting, LED driver and Load switching

Low R_{DSon} (190mOhm and 760mOhm) in SOT223 with high ID max current

Low QG and low switching times for fast switching performance

P_{tot} up to 2000 mW



In the Spotlight

2N7002BKx - 2N7002 ESD-protected 60 V N-channel MOSFET-series in several SMD packages

ESD protection up to 2 kV in several SMD packages

Available in single and dual configuration

Very fast switching

TrenchMOS technology

AEC-Q101 qualified

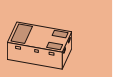


Small-signal MOSFETs dual

	Package														SOT363 (SC-88)	SOT666
																
	Size (mm)														2.0 x 1.25 x 0.95	1.6 x 1.2 x 0.55
	P _{tot} (mW)														300	300
N-channel dual	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 (kV)		R _{DSon} typ (mΩ) @ V _{GS} =					
											10 V	4.5 V	2.5 V	1.8 V		
	20	8	1.2	0.4	1	22	24	0.88	-			130	tbd		PMGD130UN	
			0.87	0.45	1	14.5	23.5	0	-			280		460	PMGD280UN	
			0.8	0.5	0.95	10	117	0.45	2 kV			290	420	600	PMDT290UNE	
		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	
			0.35	0.6	1.1	26	88	0.52	2 kV			1000	1400	2000	NX3008NBKS	NX3008NBKV
		12	1	0.5	1.5	18	20	0.7	-			175	tbd		PMGD175XN	
			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	
		20	0.18	0.8	1.5	10	51	0.34	yes		2700	3000	4000		NX3020NAKS	NX3020NAKV
	60	20	0.36	0.9	1.5	5	13	0.72	-		900	1000			BSS138PS	
			0.32	0.48	1.6	10	58	0.6	1.5 kV		1000	1100	1400		BSS138BKS	
			0.3	1	2.5	7	15	0.6	-		1000	1300			2N7002PS	2N7002PV
			0.3	1	2.5	11	19	0.5	2 KV		1000	1300			2N7002BKS	2N7002BKV
			0.17	1.1	2.1	12	34	0.33	yes		3000	3700			NX7002AKS	
P-channel dual	20	8	0.55	0.5	1.3	48	152	0.76	2 kV			670	1200	1800		PMDT670UPE
	30	8	0.2	0.6	1.1	49	103	0.55	2 kV			2800	5300		NX3008PBKS	NX3008PBKV
	50	20	0.16	1.1	2.1	24	73	0.26	1 kV		4500	5700			BSS84AKS	BSS84AKV

Package	Type	Polarity	V _{DS} (V)	V _{GS} (V)	ESD protection	ID (A)	V _{GS(th)} min (V)		V _{GS(th)} max (V)	t _{on} typ (ns)	t _{off} typ (ns)	Q _G typ (nC)	R _{DSon} typ (mOhm) @VGS =			
													10 V	4.5 V	2.5 V	1.8 V
SOT666 	NX1029X	N	60	20	2	0.33	1.1		2.1	11	19	0.5	1000	1300		
		P	50	20	1	0.17	1.1		2.1	24	73	0.26	4500	5100		
	NX3008CBKV	N	30	8	2	0.4	0.6		1.1	26	88	0.52		1000	1400	2000
		P	30	8	2	0.22	0.6		1.1	49	103	0.55		2800	5300	
	PMDT290UCE	N	20	8	2	0.8	0.5		0.95	10	117	0.45		290	420	600
		P	20	8	2	0.55	0.5		1.3	48	152	0.76		670	1200	1800
SOT363 	NX3008CBKS	N	30	8	2	0.35	0.6		1.1	26	88	0.52		1000	1400	2000
		P	30	8	2	0.2	0.6		1.1	49	103	0.55		2800	5300	
DFN2020-6 	PMCPB5530X	N	20	12	-	5.3	0.4		0.9	19	56	14.4		26	33	50
		P	20	12	-	4.5	0.47		0.9	18	56	16.5		55	75	110

Small-signal MOSFETs single (P-channel)

Package														SOT223 (SC-73)	SOT89 (SC-62)	SOT457 (SC-74)	SOT23	SOT363 (SC-88)	SOT323 (SC-70)	SOT416 (SC-75)	DFN1006-3 (SOT883)	DFN1006B-3 (SOT883B)
																						
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	2.0 x 1.25 x 0.95	1.6 x 0.8 x 0.77	1.0 x 0.6 x 0.48	1.0 x 0.6 x 0.37
P _{tot} (mW)														1700	1300	600	250	300	200	150	250	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 (kV)	R _{DSon} typ (mΩ) @ V _{GS} =													
									10 V	4.5 V	2.5 V	1.8 V										
12	8	1.52	0.4	-	6.5	65	-	-	-	80	-	140			BSH207							
		0.75	0.4	-	6.5	65	-	-	-	180	-	420			BSH205 ¹⁾							
20	8	5.7	0.45	0.95	39	122	21	-	-	27	36	57			PMN27UP							
		5.3	0.45	0.95	41	122	14.7	2	-	30	38	51			PMV33UPE ¹⁾							
		5.4	0.45	0.95	34	128	15.5	-	-	34	42	57			PMN34UP	PMV32UP ¹⁾						
		6	0.45	0.95	29	84	15.6	4	-	37	45	59			PMN40UPE							
		4	0.47	0.9	-	-	10.5	3	-	50	57	70			PMN50UPE	PMV50UPE ¹⁾						
		1.2						-	-	80					PMV75UP*							
		1.2	0.45	0.95	33	52	3.3	-	-	170	210	280			PMV160UP							
		1.4	0.45	0.95	9	35	1.3	1.8	-	330	420	520						PMZB350UPE				
		0.48	0.5	1.3	48	152	0.76	2	-	670	1200	1800				PMR670UPE		PMZB670UPE				
		2	0.5	1.1	7	50	6	-	-	100	-	-			NX2301P							
	12	5.7	0.75	1.25	37	66	15	2	-	27	39	-			PMN27XPE							
		5.7	0.75	1.25	44	60	11.5	2	-	41	56	-			PMN42XPE							
		4.1 / 3.5	0.75	1.25	24	84	8.5	-	-	48	71	-			PMN48XP	PMV48XP ¹⁾						
		3.9	0.55	0.95	28	101	7.6	-	-	65	90	-				PMV65XP ¹⁾						
		4.1	0.75	1.25	20	57	5.2	2	-	70	101			PMN70XPE								
		3.2	0.45	1	20	170	5	-	-	80	95	120			PMN80XP							
		2	0.65	1.15	48	64	4.8	-	-	90	125	-				PMG85XP						
		1	0.65	1.15	26	44	2.6	-	-	175	240	-					PMF170XP					
30	8	0.23	0.6	1.1	49	103	0.55	2	-	2800	5300	-			NX3008PBK		NX3008PBKW	NX3008PBKT		NX3008PBKMB		
		0.47	0.4	-	6.5	65	-	-	-	660	-	1100			BSH203							
	20	3	1	2.8	20	50	-	-	220	330		-	BSP250									
		0.52	1	-	6.5	65	-	-	630	890		-			BSH202							
50	20	0.2	1.1	2.1	24	73	0.26	1	5300	6000	-	-			BSS84AK		BSS84AKW	BSS84AKT	BSS84AKM	BSS84AKMB		
		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⁾ SOT23 with enhanced thermal performance * Product in development

In the Spotlight

PMZB350UPE - smallest low R_{DSon}
P-ch load switch in DFN1006

20 V P-ch with R_{DSon} of typ. 330mOhm @ 4.5 V

I_D max of 1.4 A for medium current load switch

Ultra small footprint (1.0 x 0.6 mm) and low height (0.37 mm)

Low voltage gate drive with V_{GSth} typ. at 0.7 V

R_{DSon} specified down to 1.8 V for low drive voltages



In the Spotlight

20 V, 100 mΩ P-channel enhancement mode
Field-Effect Transistor (FET) – NX2301P

Housed in a small SMD plastic package SOT23

Very fast switching

TrenchMOS technology

AEC-Q101 qualified

1.8 V R_{DSon} rated for Low Voltage Gate Drive



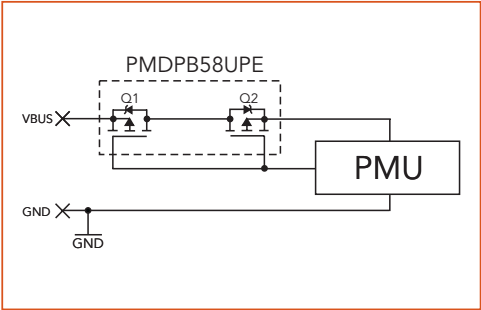
Small-signal MOSFET – Schottky combination

Package															DFN2020-6 (SOT1118)
															
Size (mm)															2.0 x 2.0 x 0.62
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)	I _F (A)	V _R (V)	V _F typ. (mV)	R _{DSon} typ (mΩ) @ V _{GS} =			
												4.5 V	2.5 V	1.8 V	
single + schottky	20	8	3.7	0.4	1	20	170	5.7	2	30	455	80	95	120	PMFPB8040XP
			3.7	0.4	1	20	170	5.7	2.2	30	325	80	95	120	PMFPB8032XP

Small-signal MOSFETs in new DFN2020-6 (SOT1118) dual package

Package															DFN2020-6 (SOT1118)
															
Size (mm)															2.0 x 2.0 x 0.62
P _{tot} (mW)															>500
Configuration	Polarity	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 (kV)	R _{DSon} typ (mΩ) @ V _{GS} =				
											10 V	4.5 V	2.5 V	1.8 V	
dual	N	20	8	5.8	0.4	1	21	22	3.1	-		30	39	56	PMDPB28UN
				5.1	0.4	1	36	35	2	-		40	53	82	PMDPB42UN
				5	0.4	1	21	23	2.9	1600 V		38	52	65	PMDPB38UNE
		30	12	4	0.5	1.5	25	23	1.9	-		55	86		PMDPB56XN
				20	4.5	1	2.5	19	20	3	-	46	67		PMDPB70EN
				12	3.1	0.5	1.5	17	24	1.7	1800 V		95	130	PMDPB95XNE
	P	20	12	4.5	0.5	1.5	28	56	8.1	-		55	75		PMDPB55XP
				4.2	0.75	1.25	23	48	5	2000 V		66	98		PMDPB70XPE
				3.8	0.45	1	18	160	5.2	-		70	89		PMDPB70XP
		30	12	3.7	0.4	1	20	170	5.7	-		80	95	120	PMDPB80XP
				4.5	0.45	0.95	22	55	6.3	2000 V		58	74	97	PMDPB58UPE
				3.7	0.45	0.95	18	68	5.4	2000 V		82	107	142	PMDPB85UPE
	N	20	12	5.3	0.4	0.9	19	56	14.4	-		32	40	60	PMDPB30XN
MOS+RET	P	30	12	3.4	0.45	1	18	160	5.2	-		85	105		PMC85XP
Complementary	N	20	12	5.3	0.4	0.9	19	56	14.4	-		32	40	60	PMCPB5530X
Complementary	P	20	12	4.5	0.5	1.5	28	56	8.1	-		55	75		PMCPB5530X

USB OTG Vbus protection



In the Spotlight

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

ESD protected MOSFET of >1 kV HBM

Very low R_{DSon} of <70 mΩ at V_{GS} = 4.5 V

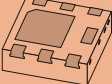
1.8 V R_{DSon} rating for operation at low voltage gate drive levels

Best-in-class thermal performance due to extra heatsink

Smallest 2 x 2 mm leadless package dual P-channel; 0.65 mm package height



Small-signal MOSFETs in new DFN2020MD-6 (SOT1220) single package

Package														DFN2020MD-6 (SOT1220)
														
Size (mm)														2.0 x 2.0 x 0.62
P _{tot} (mW)														>1500
Polarity	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 (kV)	R _{DSon} typ (mΩ) @ V _{GS} =				
										10 V	4.5 V	2.5 V	1.8 V	
Nch	20	8	11.3	0.4	1	29	52	8.8	-		14	17	21	PMPB12UN
Nch	20	8	9.4	0.4	1	26	43	4.7	-		19	25	36	PMPB20UN
Nch	20	12	12.9	0.4	0.9	48	104	23	2.2 kV		10	12	16	PMPB10XNE
Nch	20	12	10.4	0.4	0.9	33	67	13.4	-		18	21	23	PMPB15XN
Nch	20	12	10.1	0.4	0.9	29	63	11.6	2.1 kV		19	23	31	PMPB23XNE
Nch	30	12	10.3	0.5	1.5	34	44	7.2	-		16	22		PMPB16XN
Nch	30	12	11.3	0.4	0.9	42	103	24	2.2 kV		13	14	17	PMPB13XNE
Nch	30	12	5	0.4	0.9	25	65	12.4	2.1 kV		28	32	37	PMPB29XNE
Nch	30	12	5.5	0.45	1.2	23	41	5.1	-		37	55		PMPB33XN
Nch	30	20	13	1	2	19	26	13.7	-	12	14			PMPB11EN
Nch	30	20	10.4	1	2	26	17	7.2	-	16.5	21			PMPB20EN
Nch	60	16	12.4	1	3	32	24	12.1	-	34	40			PMPB40SNA
Pch	12	12	11.8	0.47	0.9	108	142	67	-		15	17	21	PMPB15XP
Pch	20	12	10.3	0.47	0.9	70	79	28.8	-		19	21	27	PMPB19XP
Pch	20	12	7.9	0.47	0.9	54	85	15	-		30	35	45	PMPB33XP
Pch	20	12	10.3	0.47	0.9	73	142	30	2.4 kV		19	22	28	PMPB20XPE
Pch	20	12	5	0.47	0.9	65	137	30	2.3 kV		28	31	36	PMPB29XPE
Pch	20	12	5	0.47	0.9	47	83	15.6	2.3 kV		39	45	56	PMPB43XPE
Pch	30	12	5	0.47	0.9	48	48	14	-		47	54	74	PMPB47XP
Pch	30	20	8.8	1	2.5	41	47	30	-	24	32			PMPB27EP
Pch	30	20	6.8	1	2.5	25	37	17	-	40	55			PMPB48EP

Small-signal MOSFETs in new DFN1010 (SOT1215 single and SOT1216 dual package)

types in **bold** represent new products

Package												DFN1010D-3 (SOT1215)	DFN1010B-6 (SOT1216)
													
Size (mm)												1.1 x 1.0 x 0.37	1.1 x 1.0 x 0.37
	Polarity	V _{DS} (V)	V _{GS} (V)	I _D (A)	V _{GS(th)} min (V)	V _{GS(th)} max (V)	ESD protection	R _{DSon} typ (mΩ) @ V _{GS} =					
								10 V	4.5 V	2.5 V	1.8 V		
Single	Nch	12	8	3.2	0.4	0.9	1.5 kV		48	60	75	PMXB40UNE	
Single	Pch	-12	8	-2.4	-0.9	-0.47	1.5 kV		81	100	145	PMXB65UPE	
Single	Nch	20	8	1.1	0.4	1	1 kV		300	430	750	PMXB240UNE	
Single	Pch	-20	8	-0.9	-0.95	-0.45	2 kV		475	720	1050	PMXB350UPE	
Single	Pch	-20	8	-2.3	-0.9	-0.47	2 kV		93	115	160	PMXB75UPE	
Single	Nch	20	8	3.2	0.4	0.9	2 kV		51	64	80	PMXB43UNE	
Single	Nch	30	20	2.7	1	2.5	2 kV	68	80			PMXB65ENE	
Single	Nch	30	20	2.9	1	2	none (100 V)	58	69			PMXB56EN	
Single	Pch	-30	20	-2	-2.5		1 kV	118	150			PMXB120EPE	
Dual	Nch	20	8	0.55	0.45	0.95	1 kV		700	1225	2000		PMDXB600UNE
Dual	Pch	-20	8	-0.45	-0.95	-0.45	1 kV		1140	1950	3120		PMDXB950UPE
Compl.	Nch	20	8	0.55	0.45	0.95	1 kV		700	1225	2000		PMCXB900UE
	Pch	-20	8	-0.45	-0.95	-0.45	1 kV		1140	1950	3120		

Featured application: wide SOA



NextPower Live! – MOSFETs for a non-stop world

Reliable linear mode performance AND low $R_{DS(on)}$ efficiency in “hot-swap” and “soft-start” applications.

Non-stop Applications

- ▶ Cloud computing
- ▶ Network storage
- ▶ Communications infrastructure
- ▶ Industrial process control
- ▶ Transaction processing
- ▶ Traffic monitoring & signalling
- ▶ CCTV security

Non-stop Equipment

- ▶ Blade servers
- ▶ Routers, switches & base stations
- ▶ RAID arrays
- ▶ Industrial PCs
- ▶ Programmable Logic Controllers (PLCs)
- ▶ Digital video recorders
- ▶ “Hot-swap” & “soft-start” systems

Mobile phones, ATMs, the internet, traffic signals – so much of our daily life depends on 24/7/365 computers, communications, and storage, made possible by rack-based systems that can be maintained with the power on. NextPower Live MOSFETs are designed specifically for such applications:

- ▶ When a replacement board is plugged into a live system, it is important that the in-rush current is carefully controlled, so as to protect the components on the board and ensure that other parts of the system experience no power disruption. This application requires MOSFETs with strong linear mode performance and a wide safe operating area (SOA) to manage current effectively and reliably.
- ▶ Once the replacement board is safely installed, the MOSFET is turned fully ON. In this mode of operation, a low $R_{DS(on)}$ value is of primary importance, helping to keep temperatures low while maximizing system efficiency.
- ▶ Only NextPower Live MOSFETs offer reliable linear mode performance **AND** low $R_{DS(on)}$ efficiency.

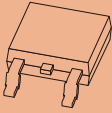
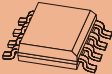
NextPower Live Portfolio

Package	30 V for 12 V supplies used in computing applications	100 V for 48 V supplies used in computing telecommunications
D ² PAK (SOT404) 	PSMN1R5-30BLE PSMN3R4-30BLE	PSMN4R8-100BSE PSMN7R6-100BSE
LFPAK56 (Power-SO8) 	PSMN2R40-30YLE	PSMN012-100YSE
LFPAK33 		(specifically for PoE applications) PSMN040-100MSE PSMN075-100MSE

Available Now Available Q1/2013

Power MOSFETs 20V - 25V

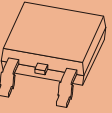
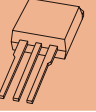
types in **bold** represent new products

Package	Typenumber	V _{DS} [max] (V)	R _{DSon} [max] @ V _{GS} = 10 V (mΩ)	R _{DSon} [max] @ V _{GS} = 4.5 V (mΩ)	I _D [max] (A)	Q _{G(tot)} [typ] (nC)
D²PAK (SOT404) 	PHB66NQ03LT	25	10.5		66	12
DPAK (SOT428) 	PHD38N02LT	20			44.7	15.1
	PHD97NQ03LT	25	6.3	10.6	75	11.7
Power SO8 (LFPAK56) 	PH3120L	20	2.65	3.7	100	48.5
	PH2520U	20		2.7	100	78
	PSMN0R9-25YLC	25	0.99	1.25	100	51
	PSMN1R1-25YLC	25	1.15	1.5	100	39
	PSMN1R2-25YL	25	1.2	1.85	100	50.6
	PSMN1R2-25YLC	25	1.3	1.7	100	31
	PSMN1R5-25YL	25	1.5	2.2	100	36
	PSMN1R7-25YLC	25	1.9	2.5	100	28
	PSMN1R9-25YLC	25	2.05	2.7	100	27
	PSMN2R2-25YLC	25	2.4	3.15	100	18
	PSMN2R9-25YLC	25	3.15	4.1	100	16
	PSMN3R2-25YLC	25	3.4	4.45	100	14
	PSMN3R7-25YLC	25	3.9	5.1	97	10.1
	PSMN4R0-25YLC	25	4.5	5.8	84	10.9
	PSMN6R0-25YLB	25	6.1	7.9	73	9
	PSMN6R5-25YLC	25	6.5	8.5	64	8.4
	PSMN7R5-25YLC	25	7.4	9.8	56	7
	PSMN9R0-25YLC	25	9.1	12.3	46	5.6
	PSMN010-25YLC	25	10.6	14	39	5
	PSMN012-25YLC	25	12.6	16.6	33	3.8
	PH2925U	25		3	100	92
LFPAK33 (SOT1210) 	PSMN2R8-25MLC	25	2.8	3.75	70	16.3
	PSMN3R9-25MLC	25	4.15	5.55	70	9.7
	PSMN9R0-25MLC	25	8.65	11.3	55	5.4
SC-75 (SOT416) 	PMR280UN	20		340	0.98	0.89
	PMR290XN	20		350	0.97	0.72
	PMR290UNE	20		380	0.7	0.45
SO8 (SOT96-1) 	PSMN006-20K	20		5	32	32
	PHKD6N02LT	20			10.9	15.3

For the most up to date product information go to www.nxp.com/mosfets (updated daily!)

Power MOSFETs 30V

types in **bold** represent new products

Package	Typenumber	V _{DS} [max] (V)	R _{DSon} [max] @ V _{GS} = 10 V (mΩ)	R _{DSon} [max] @ V _{GS} = 4.5 V (mΩ)	I _D [max] (A)	Q _{G(tot)} [typ] (nC)
D²PAK (SOT404) 	PSMNR90-30BL	30	1	1.3	120	118
	PSMN1R5-30BLE	30	1.5	1.85	120	228
	PSMN1R8-30BL	30	1.8	2.1	100	83
	PSMN1R6-30BL	30	1.9	2.2	100	101
	PSMN2R0-30BL	30	2.1	2.9	100	55
	PSMN2R7-30BL	30	3	3.7	100	32
	PSMN3R4-30BL	30	3.3	3.8	100	31
	PSMN3R4-30BLE	30	3.4	5	120	81
	PSMN4R3-30BL	30	4.1	5.2	100	19
	PSMN017-30BL	30	17	23.3	32	5.1
DPAK (SOT428) 	PHD101NQ03LT	30	5.5		75	23
	PHD71NQ03LT	30	10		75	13.2
D²PAK (SOT226) 	PSMN1R1-30EL	30	1.3	1.4	120	118
	PSMN017-30EL	30	17	23.4	32	5.1
Power-SO8 (LFPAK56) 	PSMN1R0-30YLC	30	1.15	1.4	100	50
	PSMN1R2-30YLC	30	1.25	1.65	100	38
	PSMN1R3-30YL	30	1.3	1.95	100	46.6
	PSMN1R5-30YL	30	1.5	1.9	100	36.2
	PSMN1R5-30YLC	30	1.55	2.05	100	30
	PSMN1R7-30YL	30	1.7	2.1	100	36.2
	PSMN2R0-30YL	30	2	2.63	100	30
	PSMN2R0-30YLE	30	2	3.5	100	87
	PSMN2R2-30YLC	30	2.15	2.8	100	26
	PSMN2R5-30YL	30	2.4	3.16	100	27
	PSMN2R6-30YLC	30	2.8	3.65	100	18
	PSMN3R0-30YL	30	3	4.04	100	21
	PSMN3R2-30YLC	30	3.5	4.55	100	14.2
	PSMN3R5-30YL	30	3.5	4.61	100	19
	PSMN3R7-30YLC	30	3.95	5.15	100	14
	PSMN4R0-30YL	30	4	5.25	100	17.6
	PSMN4R1-30YLC	30	4.35	5.7	92	11
	PSMN4R5-30YLC	30	4.8	6.1	84	9.6
	PSMN5R0-30YL	30	5	6.7	91	14.1
	PSMN6R0-30YL	30	6	7.87	79	11
	PSMN5R9-30YL	30	6.1	9	78	10.5
	PSMN6R0-30YLB	30	6.5	8.1	71	9
	PSMN7R0-30YL	30	7	9.1	76	10
	PSMN7R0-30YLC	30	7.1	8.9	61	7.9
	PSMN8R0-30YLC	30	7.9	10	54	7
	PSMN9R0-30YL	30	8	11.03	61	8.7
	PSMN8R0-30YL	30	8.3	12.2	62	9
	PSMN9R1-30YL	30	9.1	13.6	57	8.4
	PSMN9R5-30YLC	30	9.8	12.1	44	5
	PSMN011-30YL	30	10.7	16.1	51	7.3
	PSMN011-30YLC	30	11.6	14.5	37	4.9
	PSMN013-30YLC	30	13.6	16.9	32	4

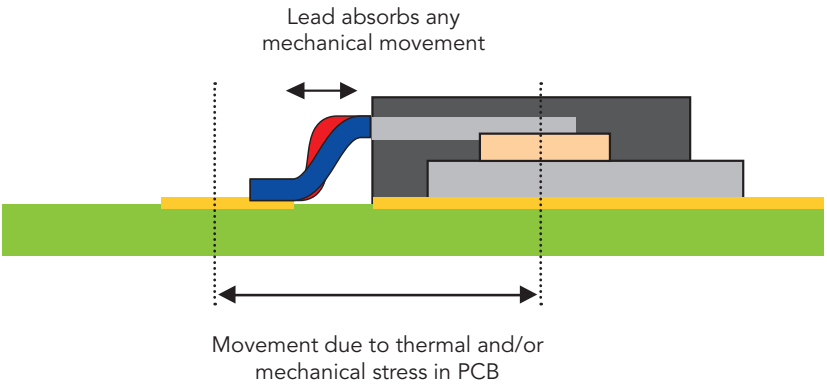
Power MOSFETs 30V – Part 2

types in **bold** represent new products

Package	Typenumber	V _{DS} [max] (V)	R _{DS(on)} [max] @ V _{GS} = 10 V (mΩ)	R _{DS(on)} [max] @ V _{GS} = 4.5 V (mΩ)	I _D [max] (A)	Q _{G(tot)} [typ] (nC)
LFPAK33 (SOT1210)	PSMN2R9-30MLC	30	2.95	3.8	70	16.7
	PSMN3R0-30MLC	30	3.15	4.05	70	16.1
	PSMN4R4-30MLC	30	4.65	6	70	10.6
	PSMN7R0-30MLC	30	7	9	67	8.2
	PSMN9R8-30MLC	30	9.8	12.4	50	5
	PSMN013-30MLC	30	13.6	16.9	39	3.7
	PSMN020-30MLC	30	18.1	27	31.8	4.6
DFN3333-8 (SOT873-1)	PSMN9R0-30LL	30	9	13	21	20.6
	PSMN013-30LL	30	13	19	21	12.2
	PSMN017-30LL	30	17	25	15	10
SO8 (SOT96-1)	PHK31NQ03LT	30	4.4	5.6	30.4	33
	PSMN005-30K	30	5.5	8		34
	PHK28NQ03LT	30	6.5	7.7	23.7	30.3
	PHK18NQ03LT	30	8.9	12.5	20.3	10.6
	SI4410DY	30	13.5	20	10	21.5
	PHK13NQ03LT	30	20	26	13.8	10.7
	PHKD13NQ03LT	30	20	26	10.4	10.7
	PHN203	30	30	55	6.3	14.6
	PHN210T	30	100	200	3.4	6
	PHC21025	30	250	400		10
	PHK12NQ03LT	30		14	11.8	

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

Power MOSFETs 30V – Part 3

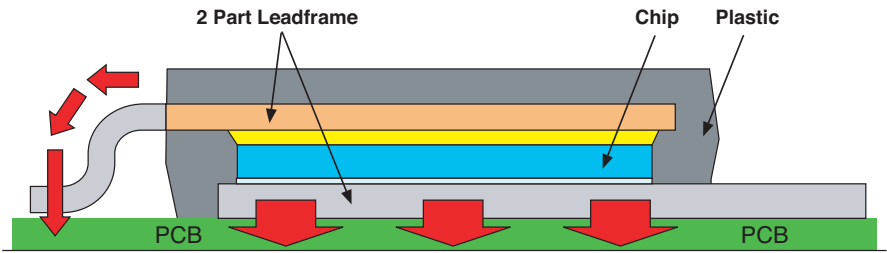
types in **bold** represent new products

Package	Typenumber	V _{DS} [max] (V)	R _{DS(on)} [max] @ V _{GS} = 10 V (mΩ)	R _{DS(on)} [max] @ V _{GS} = 4.5 V (mΩ)	I _D [max] (A)	Q _{G(tot)} [typ] (nC)
TO-220AB (SOT78)	PSMN1R1-30PL	30	1.3	1.4	120	118
	PSMN1R6-30PL	30	1.7	2.1	100	101
	PSMN1R8-30PL	30	1.8	2.3	100	83
	PSMN2R0-30PL	30	2.1	2.8	100	55
	PSMN2R7-30PL	30	2.7	3.6	100	32
	PSMN3R4-30PL	30	3.4	4.1	100	31
	PSMN4R3-30PL	30	4.3	6.2	100	19
	PHP36N03LT	30	17	22	43.4	18.5
	PSMN017-30PL	30	17	23.4	32	5.1
	PSMN022-30PL	30	22	34	30	4.4
TO-236AB (SOT23)	PMV22EN	30	22	29	5.2	8.6
	PMV37EN	30	36	47	3.1	6.5
	PMV45EN	30	42	54	5.4	9.4
	PMV60EN	30	55	72	4.7	9.4
	PMV90EN	30	84	115	2.1	2.6
	PMV117EN	30	117	190	2.5	4.6
	SI2304DS	30	117	190	1.7	4.6
	BSH108	30	120		1.9	6.4
	PMV20XN	30		25	4.8	6.4
	PMV40UN	30		47	4.9	9.3
	PMV185XN	30		250	1.2	0.87
	BSH103	30		400		2.1
	NX3008NBK	30		1400	0.4	0.52

For the most up to date product information go to www.nxp.com/mosfets (updated daily!)

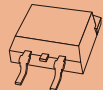
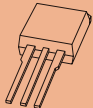
Power-SO8 (LFPAK) Design

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



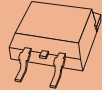
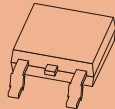
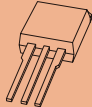
Power MOSFETs 40 V - 50 V

types in **bold** represent new products

Package	Typenumber	V _{DS} [max] (V)	R _{DSon} [max] @ V _{GS} = 10 V (mΩ)	I _D [max] (A)	Q _{G(tot)} [typ] (nC)
D²PAK (SOT404) 	PSMN1R1-40BS	40	1.3	120	136
	PSMN2R2-40BS	40	2.2	100	130
	PSMN2R8-40BS	40	2.9	100	71
	PSMN4R5-40BS	40	4.5	100	35
	PSMN8R0-40BS	40	7.6	77	21
I²PAK (SOT226) 	PSMN1R5-40ES	40	1.6	120	136
Power-SO8 (LFPAK56) 	PSMN1R6-40YLC	40	1.55	100	59
	PSMN1R8-40YLC	40	1.8	100	45
	PSMN2R6-40YS	40	2.8	100	63
	PSMN3R3-40YS	40	3.3	100	49
	PH4840S	40	4.1	94.5	67
	PSMN4R0-40YS	40	4.2	100	38
	PSMN5R8-40YS	40	5.7	90	28.8
	PSMN8R3-40YS	40	8.6	70	20
	PSMN014-40YS	40	14	46	12
	PSMN023-40YLC	40	23	24	4.3
TO-220AB (SOT78) 	PSMN1R5-40PS	40	1.6	120	136
	PSMN1R9-40PL*	40	1.7	150	
	PSMN2R2-40PS	40	2.1	100	110
	PSMN2R3-40PL*	40	2.2		
	PSMN2R8-40PS	40	2.8	100	71
	PSMN4R5-40PS	40	4.6	100	35
	PSMN8R0-40PS	40	7.6	77	17

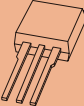
* Product in development
For the most up to date product information go to www.nxp.com/mosfets (updated daily!)

Power MOSFETs 55 V - 60 V

Package	Typenumber	V _{DS} [max] (V)	R _{DSon} [max] @ V _{GS} = 10 V (mΩ)	I _D [max] (A)	Q _{G(tot)} [typ] (nC)
D²PAK (SOT404) 	PHB191NQ06LT	55	3.7	75	95.6
	PHB21N06LT	55	70	19	
	PHB20N06T	55	75	20.3	11
	PSMN1R7-60BS	60	2	120	137
	PSMN3R0-60BS	60	3.2	100	130
	PSMN004-60B	60	3.6	75	168
	PSMN4R6-60BS	60	4.4	100	70.8
	PSMN7R6-60BS	60	7.8	92	38.7
	PSMN015-60BS	60	14.8	50	20.9
	PHB32N06LT	60	37	34	17
DPAK SOT428) 	PHD20N06T	55	77	18	11
Power-SO8 (LFPAK56) 	PH955L	55	8.3	62.5	42
	PSMN5R5-60YS	60	5.2	100	56
	PSMN7R0-60YS	60	6.4	89	45
	PSMN8R5-60YS	60	8	76	39
	PSMN012-60YS	60	11.1	59	28.4
	PSMN017-60YS	60	15.7	44	20
	PSMN030-60YS	60	24.7	29	13
TO-220AB (SOT78) 	PHP191NQ06LT	55	3.7	75	95.6
	PHP20N06T	55	75	20.3	11
I²PAK (SOT226) 	PSMN2R0-60ES	60	2.2	120	137
	PSMN3R0-60ES	60	3	100	130
TO-220AB (SOT78) 	PSMN2R0-60PS	60	2.2	120	137
	PSMN2R8-60PL*	60	2.6		
	PSMN2R9-60PS*	60	2.9		
	PSMN3R0-60PS*	60	3	100	130
	PSMN3R5-60PL*	60	3.4		
	PSMN3R9-60PS*	60	3.9	150	
	PSMN4R3-60PL*	60	4.3		
	PSMN4R6-60PS	60	4.6	100	70.8
	PSMN7R6-60PS	60	7.8	92	38.7
	PSMN015-60PS	60	14.8	50	20.9

* Product in development
For the most up to date product information go to www.nxp.com/mosfets (updated daily!)

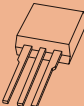
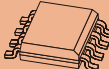
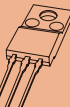
Power MOSFETs 75 V - 80 V

Package	Typenumber	V _{DS} [max] (V)	R _{DSon} [max] @ V _{GS} = 10 V (mΩ)	I _D [max] (A)	Q _{G(tot)} [typ] (nC)
D ² PAK (SOT404) 	PSMN005-75B	75	5	75	165
	PSMN008-75B	75	8.5	75	122.8
	PHB110NQ08T	75	9	75	113.1
	PHB29N08T	75		27	19
	PSMN2R8-80BS	80	3	120	139
	PSMN3R3-80BS	80	3.5	120	111
	PSMN4R4-80BS	80	4.5	100	125
	PSMN5R0-80BS	80	5.1	100	101
	PSMN6R5-80BS	80	6.9	100	71
	PSMN8R7-80BS	80	8.7	90	52
	PSMN012-80BS	80	11	74	36
	PSMN017-80BS	80	17	50	26
	PSMN050-80BS	80	46	22	11
I ² PAK (SOT226) 	PSMN3R3-80ES	80	3.3	120	139
	PSMN3R5-80ES	80	3.5	120	139
	PSMN4R3-80ES	80	4.3	120	111
Power-SO8 (LFPAK56) 	PSMN8R2-80YS	80	8.5	82	55
	PSMN011-80YS	80	11	67	45
	PSMN013-80YS	80	12.9	60	37
	PSMN018-80YS	80	18	45	26
	PSMN026-80YS	80	27.5	34	20
	PSMN045-80YS	80	45	24	12.5
TO-220AB (SOT78) 	PSMN005-75P	75	5	75	165
	PHP79NQ08LT	75	16	73	30
	PHP29N08T	75		27	19
	PSMN3R3-80PS	80	3.3	120	139
	PSMN3R5-80PS	80	3.5	120	139
	PSMN4R4-80PS	80	4.1	100	112
	PSMN4R3-80PS	80	4.3	120	111
	PSMN5R0-80PS	80	4.7	100	87
	PSMN6R5-80PS	80	6.9	100	71
	PSMN8R7-80PS	80	8.7	90	52
	PSMN012-80PS	80	11	74	36
	PSMN017-80PS	80	17	50	26
	PSMN050-80PS	80	46	22	9

For the most up to date product information go to www.nxp.com/mosfets (updated daily!)

Power MOSFETs 100 V

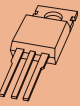
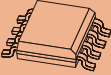
types in **bold** represent new products

Package	Typenumber	V _{DS} [max] (V)	R _{DSon} [max] @ V _{GS} = 10 V (mΩ)	I _D [max] (A)	Q _{G(tot)} [typ] (nC)
D ² PAK (SOT404) 	PSMN3R8-100BS	100	3.9	120	170
	PSMN4R8-100BSE*	100	4.8	120	196
	PSMN5R6-100BS	100	5.6	100	141
	PSMN7R0-100BS	100	6.8	100	125
	PSMN009-100B	100	8.8	75	156
	PSMN9R5-100BS	100	9.6	89	82
	PSMN013-100BS	100	13.9	68	59
	PSMN015-100B	100	15	75	90
	PSMN016-100BS	100	16	57	49
	PHB45NQ10T	100	25	47	61
	PSMN027-100BS	100	26.8	37	30
	PHB47NQ10T	100	28	47	66
	PSMN034-100BS	100	34.5	32	23.8
	PHB27NQ10T	100	50	28	30
DPAK (SOT428) 	PSMN025-100D	100	25	47	61
I ² PAK (SOT226) 	PSMN4R3-100ES	100	4.3	120	170
	PSMN5R0-100ES	100	5	120	170
	PSMN7R0-100ES	100	6.8	100	125
	PSMN8R5-100ES	100	8.5	100	111
	PSMN013-100ES	100	13.9	68	59
Power-SO8 (LFPAK56) 	PSMN012-100YS	100	12	60	64
	PSMN016-100YS	100	16.3	51	54
	PSMN020-100YS	100	20.5	43	41
	PH20100S	100	23	34.3	39
	PSMN028-100YS	100	27.5	42	33
	PSMN039-100YS	100	39.5	28.1	23
SO8 (SOT96-1) 	PSMN069-100YS	100	72.4	17	14
	PHK12NQ10T	100	28	11.6	35
	PSMN038-100K	100	38		43
TO-220AB (SOT78) 	PHKD3NQ10T	100	90	3	21
	PSMN4R3-100PS	100	4.3	120	170
	PSMN5R0-100PS	100	5	120	170
	PSMN5R6-100PS	100	5.6	100	141
	PSMN7R0-100PS	100	6.8	100	125
	PSMN8R5-100PS	100	8.5	100	111
	PSMN009-100P	100	8.8	75	156
	PSMN9R5-100PS	100	9.6	89	82
	PSMN013-100PS	100	13.9	68	59
	PSMN015-100P	100	15	75	90
	PSMN016-100PS	100	16	57	49
	PHP45NQ10T	100	25	47	61
	PSMN027-100PS	100	26.8	37	30
	PSMN034-100PS	100	34.5	32	23.8
TO-220F (SOT186A) 	PHP18NQ10T	100	90	18	21
	PSMN4R6-100XS	100	4.6	70.4	153
	PSMN5R0-100XS	100	5	67.5	153
	PSMN5R6-100XS	100	5.6	61.8	145
	PSMN7R0-100XS	100	6.8	55	121
	PSMN8R5-100XS	100	8.5	49	100
	PSMN9R5-100XS	100	9.6	44.2	81.5
	PSMN013-100XS	100	13.9	35.2	57.5
	PSMN016-100XS	100	16	32.1	46.2
	PSMN027-100XS	100	26.8	23.4	30

* Product in development

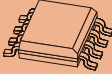
For the most up to date product information go to www.nxp.com/mosfets (updated daily!)

Power MOSFETs 105 V - 150 V

Package	Typenumber	V _{DS} [max] (V)	R _{DSon} [max] @ V _{GS} = 10 V (mΩ)	I _D [max] (A)	Q _{G(tot)} [typ] (nC)
 TO-220AB (SOT78)	PHP45NQ11T	105	25	47	60
	PSMN015-110P	110	15	75	90
	PHP27NQ11T	110	50	27.6	30
	PHP23NQ11T	110	70	23	22
	PHP18NQ11T	110	90	18	21
 D²PAK (SOT404)	PSMN030-150B	150	30	55.5	98
	PSMN035-150B	150	35	50	79
	PHB45NQ15T	150	42	45.1	32
 DPAK (SOT428)	PSMN063-150D	150	63	29	55
 Power-SO8 (LFPAK56)	PSMN059-150Y	150	59	43	27.9
 SO8 (SOT96)	PHK5NQ15T	150	75	5	29
	PSMN085-150K	150	85		40
 TO-220AB (SOT78)	PSMN030-150P	150	30	55.5	98
	PSMN035-150P	150	35	50	79
	PHP30NQ15T	150	63	29	55
	PHP28NQ15T	150	65	28.5	24

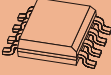
For the most up to date product information go to www.nxp.com/mosfets (updated daily!)

P channel

Package	Typenumber	V _{DS} [max] (V)	R _{DSon} [max] @ V _{GS} = 10 V (mΩ)	R _{DSon} [max] @ V _{GS} = 4.5 V (mΩ)	I _D [max] (A)	Q _{G(tot)} [typ] (nC)
 SO8	PMK30EP	-30	19	30	-14.9	50
	PMK35EP	-30	19	35	-14.9	42
	PHP225	-30	250	400		10
	PMK50XP	-20		50	-7.9	10
	PHK04P02T	-16		120	-4.66	7.2

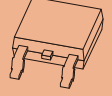
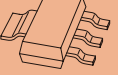
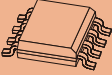
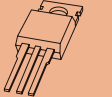
For the most up to date product information go to www.nxp.com/mosfets (updated daily!)

Multi-chip

Package	Typenumber	V _{DS} [max] (V)	R _{DSon} [max] @ V _{GS} = 10 V (mΩ)	I _D [max] (A)	Q _{G(tot)} [typ] (nC)
 SO8 (SOT96-1)	PHKD6N02LT	20			10.9
	PHKD13N03LT	30	20	26	10.4
	PHN203	30	30	55	6.3
	PHN210T	30	100	200	3.4
	PHC21025	30	250	400	
	PHKD3NQ10T	100	90		3
	PHC2300	300	6000		

For the most up to date product information go to www.nxp.com/mosfets (updated daily!)

Power MOSFETs 200 V - 300 V

Package	Typenumber	V _{DS} [max] (V)	R _{DSon} [max] @ V _{GS} = 10 V (mΩ)	I _D [max] (A)	Q _{G(tot)} [typ] (nC)
 D²PAK (SOT404)	PSMN057-200B	200	57	39	96
	PSMN070-200B	200	70	35	77
	PHB33NQ20T	200	77	32.7	32.2
	PHB20NQ20T	200	130	20	65
 DFN3333-8 (SOT873-1)	PML260SN	200	294	8.8	13.3
	PML340SN	220	386	7.3	13.2
 DPAK (SOT428)	PSMN130-200D	200	130	20	65
	PHD9NQ20T	200	400	8.7	24
 Power-SO8 (LFPAK56)	PSMN102-200Y	200	102	21.5	30.7
 SC-73 (SOT223)	BSP122	200	2500	0.55	
 SO8 (SOT96-1)	PSMN165-200K	200	165		40
	PHC2300	300	6000		6.24
 TO-220AB (SOT78)	PSMN057-200P	200	57	39	96
	PSMN070-200P	200	70	35	77
	PHP33NQ20T	200	77	32.7	32.2
	PHP20NQ20T	200	130	20	65
	PHP9NQ20T	200	400	8.7	24

For the most up to date product information go to www.nxp.com/mosfets (updated daily!)

TrenchMOS - PH types part numbering

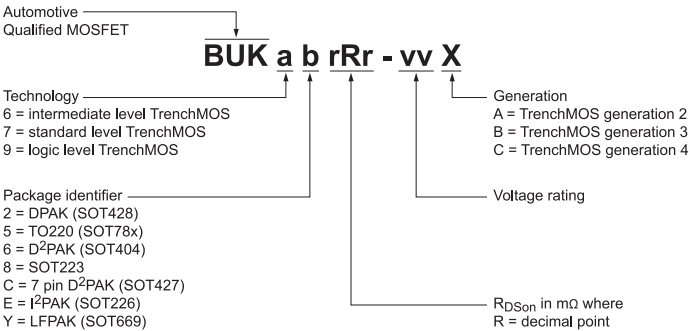
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MOSFET Brand name	Package type	Current rating I _D (A)	MOSFET type N-ch or P-ch		Q-Trench	MOSFET voltage V _{DSS}	Gate threshold voltage		Trench MOS	
PH	B = D ² PAK	44 = 44 A	N = N-ch		Q = low gate charge Q _{GD}	02 = 20 V	‘Blank’ = Standard level		T = Trench	
PH	D = DPAK	33 = 33 A	P = P-ch			03 = 25 - 30 V	L = logic level			
PH	P = TO220AB	20 = 20 A				06 = 55 - 60 V				
PH	T = SOT223	12 = 12 A				08 = 75 - 80 V				
PH	X = SOT186A (isolated TO220AB)					10 = 100 V				
PH	K = SO8					11 = 110 V				
PH	KD = Dual SO8					15 = 150 V				

30 V N-channel Automotive TrenchMOS

types in **bold** represent new products

Package name	Type number	V _{DS} [max] [V]	R _{DSon} [max] @ 10 V [mΩ]	R _{DSon} [max] @ 5 V [mΩ]	I _D [max] @ 25 °C [A]	R _{th(j-mb)} [max] [K/W]
Power-SO8 (LFPAK56) 	BUK7Y07-30B	30	7		75	1.42
	BUK7Y10-30B	30	10		67	1.76
	BUK7Y20-30B	30	20		39.5	2.53
	BUK9Y07-30B	30	6	7	75	1.42
	BUK9Y11-30B	30	9	11	59	2
	BUK9Y22-30B	30	19	22	37.7	2.53
D ² PAK (SOT404) 	BUK761R3-30E	30	1.3		120	0.43
	BUK761R4-30E	30	1.45		120	0.46
	BUK961R4-30E	30	1.2	1.4	120	0.42
	BUK961R5-30E	30	13	1.5	120	0.46
	BUK661R6-30C	30	1.6	2.5	120	0.49
	BUK661R8-30C	30	1.9	2.8	120	0.57
	BUK662R5-30C	30	2.8	3.9	100	0.74
	BUK663R5-30C	30	3.5	5.2	100	0.95
	BUK7607-30B	30	7		75	0.95
	BUK761R8-30C	30	1.8		100	0.45
	BUK762R7-30B	30	2.7		75	0.5
	BUK763R4-30B	30	3.4		75	0.59
	BUK9605-30A	30	4.6	5	75	0.65
	BUK9607-30B	30	5	7	75	0.95
	BUK962R8-30B	30	2.4	2.8	75	0.5
DPAK (SOT428) 	BUK6209-30C	30	9.8	15	50	1.87
	BUK6213-30A	30	13		55	1.4
	BUK6213-30C	30	14	22	47	2.52
	BUK624R5-30C	30	4.5	6	90	0.95
	BUK625R2-30C	30	5.2	7.5	90	1.17
	BUK7207-30B	30	7		75	0.95
	BUK724R5-30C	30	4.5		75	0.95
	BUK9207-30B	30	5	7	75	0.95
	BUK9213-30A	30	11	13	75	1
	BUK9214-30A	30	12	14	63	1.4
TO-220AB (SOT78A) 	BUK751R6-30E	30	1.6		120	0.43
	BUK951R6-30E	30	1.4	1.6	120	0.43
	BUK652R0-30C	30	2.2	3	120	0.49
	BUK652R1-30C	30	2.4	3	120	0.57
	BUK653R3-30C	30	3.3	4.4	100	0.74
	BUK653R7-30C	30	3.9	5.8	100	0.95
	BUK7507-30B	30	7		75	0.95
	BUK752R7-30B	30	2.7		75	0.5
	BUK9507-30B	30	5	7	75	0.95
	BUK952R8-30B	30	2.4	2.8	75	0.5
I ² PAK (SOT226) 	BUK9E1R6-30E	30	1.4	1.6	120	0.43
	BUK7E1R6-30E	30	1.6		120	0.43
	BUK6E2R0-30C	30	2.2	3	120	0.49
	BUK7E2R7-30B	30	2.7		75	0.5
	BUK9E04-30B	30	3	4	75	0.59

Automotive TrenchMOS Part Numbering



40 V N-channel Automotive TrenchMOS – Part I

types in **bold** represent new products

Package name	Type number	V _{DS} [max] [V]	R _{DSon} [max] @ 10 V [mΩ]	R _{DSon} [max] @ 5 V [mΩ]	I _D [max] @ 25 °C [A]	R _{th(j-mb)} [max] [K/W]
Power-SO8 (LFPAK56) 	BUK7Y12-40E*	40	12.2		50	2.5
	BUK7Y21-40E*	40	20.9		31	3.7
	BUK7Y29-40E*	40	29.2		24	4.7
	BUK7Y4R4-40E*	40	4.4		100	1.0
	BUK7Y7R6-40E*	40	7.6		79	1.6
	BUK9Y12-40E*	40	9.9	12.2	50	2.5
	BUK9Y21-40E*	40	17	21	31	3.7
	BUK9Y29-40E*	40	24	29	23	4.7
	BUK9Y3R0-40E*	40	2.4	3.0	100	0.7
	BUK9Y3R5-40E*	40	2.9	3.5	100	0.8
	BUK9Y4R4-40E*	40	3.7	4.4	100	1.0
	BUK9Y7R6-40E*	40	6.2	7.6	79	1.6
	BUK7Y08-40B	40	8		75	1.42
	BUK7Y13-40B	40	13		58	1.8
	BUK7Y25-40B	40	25		35.3	2.53
	BUK9Y09-40B	40	8	9	75	1.42
	BUK9Y14-40B	40	11	14	56	1.8
	BUK9Y27-40B	40	24	27	34	2.53
LFPAK56D (SOT1205) 	BUK7K18-40E*	40	17.4		30	4.0
	BUK7K25-40E	40	25			4.7
	BUK7K6R2-40E*	40	5.9		40	2.2
	BUK7K6R8-40E*	40	6.8			2.4
	BUK7K8R7-40E*	40	8.5		30	2.8
	BUK9K18-40E*	40	16	19.5	30	4.0
	BUK9K25-40E*	40	23	27	24	4.7
	BUK9K6R2-40E	40	6	6.2	40	2.2
	BUK9K6R8-40E*	40	6.1	6.9	40	2.4
	BUK9K8R7-40E*	40	7.8	8.9	30	2.8
D ² PAK (SOT404) 	BUK761R6-40E	40	1.6		120	0.43
	BUK761R7-40E	40	1.6		120	0.46
	BUK762R0-40E	40	2		120	0.51
	BUK762R6-40E	40	2.6		100	0.57
	BUK762R9-40E	40	2.9		100	0.64
	BUK764R0-40E	40	4		75	0.82
	BUK765R3-40E	40	4.9		75	1.09
	BUK768R1-40E	40	7.2		75	1.56
	BUK961R6-40E	40	1.4	1.6	120	0.43
	BUK961R7-40E	40	1.5	1.7	120	0.46
	BUK962R1-40E	40	1.8	2.1	120	0.51
	BUK962R6-40E	40	2.4	2.8	100	0.57
	BUK963R1-40E	40	2.7	3.1	100	0.64
	BUK964R1-40E	40	3.5	4.1	75	0.82
	BUK965R4-40E	40	4.4	5.4	75	1.09
	BUK968R3-40E	40	6.4	7.9	75	1.56
	BUK661R9-40C	40	1.9	2.6	120	0.49

* represent products in development

40 V N-channel Automotive TrenchMOS – Part 2

types in **bold** represent new products

Package name	Type number	V _{DS} [max] [V]	R _{DSon} [max] @ 10 V [mΩ]	R _{DSon} [max] @ 5 V [mΩ]	I _D [max] @ 25 °C [A]	R _{th(j-mb)} [max] [K/W]
D ² PAK SOT404	BUK662R4-40C	40	2.3	3.2	120	0.57
	BUK663R2-40C	40	3.2	4.8	100	0.74
	BUK664R6-40C	40	4.6	6.1	100	0.95
	BUK7604-40A	40	4.5		75	0.5
	BUK7608-40B	40	8		75	0.95
	BUK762R0-40C	40	2		100	0.45
	BUK763R1-40B	40	3.1		75	0.5
	BUK763R6-40C	40	3.6		100	0.74
	BUK764R3-40B	40	4.3		75	0.59
	BUK765R2-40B	40	5.2		75	0.74
	BUK9604-40A	40	4	4.4	75	0.5
	BUK9606-40B	40	5	6.4	75	0.74
	BUK9609-40B	40	7	9	75	0.95
	BUK963R2-40B	40	2.8	3.2	100	0.5
	BUK964R4-40B	40	4	4.4	75	0.59
D2PAK-7 (SOT427)	BUK7C1R2-40E*	40	1.2		250	0.43
	BUK7C1R4-40E*	40	1.4		250	0.47
	BUK9C1R3-40E*	40	1.1	1.3	250	0.43
DPAK (SOT428)	BUK6212-40C	40		16.3	50	1.87
	BUK6218-40C	40			42	2.52
	BUK625R0-40C	40	5	6.9	90	0.95
	BUK626R2-40C	40	6.2	8.8	90	1.17
	BUK7208-40B	40	8		75	0.95
	BUK725R0-40C	40	5		75	0.95
TO-220AB (SOT78A)	BUK9209-40B	40	7	9	75	0.95
	BUK751R8-40E	40	1.8		120	0.43
	BUK752R3-40E	40	2.3		120	0.51
	BUK753R1-40E	40	3.1		100	0.64
	BUK758R3-40E	40	7.4		75	1.56
	BUK951R8-40E	40	1.7	1.84	120	0.43
	BUK952R3-40E	40	2.2	2.5	120	0.51
	BUK953R2-40E	40	2.8	3.2	100	0.64
	BUK958R5-40E	40	6.6	8.1	75	1.56
	BUK652R3-40C	40	2.3	3.1	120	0.49
	BUK652R6-40C	40	2.7	3.8	120	0.57
	BUK653R4-40C	40	3.6	5.3	100	0.74
	BUK654R8-40C	40	4.8	6.5	100	0.95
	BUK7508-40B	40	8		75	0.95
	BUK752R3-40C	40	2.3		100	0.45
	BUK753R1-40B	40	3.1		75	0.5
	BUK754R0-40C	40	4		100	0.74
	BUK754R3-40B	40	4.3		75	0.59
	BUK755R2-40B	40	5.2		75	0.74
	BUK9504-40A	40	4	4.4	75	0.5
	BUK9506-40B	40	5	6.4	75	0.74
	BUK9509-40B	40	7	9	75	0.95
	BUK953R2-40B	40	2.8	3.2	100	0.5
	BUK954R4-40B	40	4	4.4	75	0.59
I ² PAK (SOT226)	BUK7E1R8-40E	40	1.8		120	0.43
	BUK7E1R9-40E	40	1.9		120	0.46
	BUK7E2R3-40E	40	2.3		120	0.51
	BUK7E3R1-40E	40	3.1		100	0.64
	BUK7E8R3-40E	40	7.4		75	1.56
	BUK9E1R8-40E	40	1.7	1.84	120	0.43
	BUK9E2R3-40E	40	2.2	2.5	120	0.51
	BUK9E3R2-40E	40	2.8	3.2	100	0.64
	BUK9E8R5-40E	40	6.6	8.1	75	1.56

* represent products in development

55 V - 60 V N-channel Automotive TrenchMOS – Part I

types in **bold** represent new products

Package name	Type number	V _{DS} [max] [V]	R _{DSon} [max] @ 10 V [mΩ]	R _{DSon} [max] @ 5 V [mΩ]	I _D [max] @ 25 °C [A]	R _{th(j-mb)} [max] [K/W]
Power-SO8 (LFPAK56)	BUK9Y12-55B	55	11	12	61.8	1.42
	BUK7Y12-55B	55	12		61.8	1.42
	BUK9Y19-55B	55	17.3	19	46	1.8
	BUK7Y18-55B	55	18		47.4	1.76
	BUK7Y35-55B	55	35		28.43	2.53
	BUK9Y40-55B	55	36	40	26	2.5
	BUK9Y6R0-60E*	60	5.2	6.0	100	0.7
	BUK7Y6R0-60E*	60	6.0		100	0.7
	BUK9Y7R2-60E*	60	6.2	7.2	100	0.8
	BUK7Y7R2-60E*	60	7.2		100	0.8
	BUK7Y8R7-60E*	60	8.7		89	1.0
	BUK9Y15-60E*	60	13.1	15.1	53	1.6
	BUK7Y15-60E*	60	15.1		53	1.6
	BUK9Y25-60E*	60	21.6	25.0	33	2.5
	BUK7Y25-60E*	60	25		33	2.5
	BUK9Y43-60E*	60	37	43.2	20	3.7
	BUK7Y43-60E*	60	43		20	3.7
	BUK9Y59-60E*	60	51	59.3	15	4.7
	BUK7Y59-60E*	60	59		16	4.7
LFPAK56D (SOT1205)	BUK9K12-60E*	60	10.7	11.5	40	2.2
	BUK7K12-60E*	60	11.2		40	2.2
	BUK9K13-60E*	60	12.0	12.9	40	2.4
	BUK7K13-60E*	60	12.5		40	2.4
	BUK9K17-60E*	60	16.1	17.5	30	2.8
	BUK7K17-60E*	60	17.0		30	2.8
	BUK9K35-60E	60	32	35	22	4.0
	BUK7K35-60E*	60	35		22	4.0
	BUK9K52-60E	60	49	55	17	4.7
	BUK7K52-60E*	60	52		17	4.7
D ² PAK (SOT404)	BUK662R7-55C	55	2.7	3.8	120	0.45
	BUK663R5-55C	55	3.4	4.3	120	0.57
	BUK964R2-55B	55	3.7	4.2	75	0.5
	BUK764R0-55B	55	4		75	0.5
	BUK664R4-55C	55	4.9	6.6	100	0.74
	BUK9606-55B	55	5.4	6	75	0.58
	BUK9606-55A	55	5.8	6.3	75	0.5
	BUK7606-55B	55	6		75	0.59
	BUK7606-55A	55	6.3		75	0.5
	BUK6607-55C	55	6.5	8.7	100	0.95
	BUK9608-55B	55	7	8.4	75	0.74
	BUK7607-55B	55	7.1		75	0.74
	BUK9608-55A	55	7.5	8	75	0.59
	BUK7608-55A	55	8		75	0.59
	BUK9609-55A	55	8	9	75	0.71
	BUK7609-55A	55	9		75	0.71
	BUK9610-55A	55	9	10	75	0.75
	BUK7610-55AL	55	10		75	0.5
	BUK9611-55A	55	10	11	75	0.9
	BUK9612-55B	55	10	12	75	0.95
	BUK7611-55A	55	11		75	0.9
	BUK7611-55B	55	11		75	0.95
	BUK9614-55A	55	13	14	73	1
	BUK7614-55A	55	14		73	0.9

* represent products in development

55 V - 60 V N-channel Automotive TrenchMOS – Part 2

types in **bold** represent new products

Package name	Type number	V _{DS} [max] [V]	R _{DSon} [max] @ 10 V [mΩ]	R _{DSon} [max] @ 5 V [mΩ]	I _D [max] @ 25 °C [A]	R _{th(j-mb)} [max] [K/W]
D²PAK (SOT404) 	BUK9616-55A	55	15	16	66	1.1
	BUK9618-55A	55	16	18	61	1.1
	BUK9620-55A	55	18	20	54	1.2
	BUK7620-55A	55	20		54	1.2
	BUK9624-55A	55	21.7	24	46	1.4
	BUK7624-55A	55	24		47	1.4
	BUK9628-55A	55	25	28	42	1.5
	BUK7628-55A	55	28		42	1.5
	BUK9635-55A	55	32	35	34	1.8
	BUK7635-55A	55	35		35	1.7
	BUK9675-55A	55	68	75	20	2.4
	BUK7675-55A	55	75		20.3	2.4
	BUK962R5-60E	60	2.3	2.5	120	0.43
	BUK762R4-60E	60	2.4		120	0.43
	BUK962R8-60E	60	2.5	2.8	120	0.46
	BUK762R6-60E	60	2.6		120	0.46
	BUK963R3-60E	60	3	3.3	120	0.51
	BUK763R1-60E	60	3.1		120	0.51
	BUK763R9-60E	60	3.9		100	0.57
	BUK964R2-60E	60	3.9	4.2	100	0.57
	BUK964R8-60E	60	4.4	4.8	100	0.64
	BUK764R4-60E	60	4.5		100	0.64
	BUK966R5-60E	60	5.9	6.5	75	0.82
	BUK766R0-60E	60	6		75	0.82
	BUK969R0-60E	60	8	9	75	1.09
	BUK768R3-60E	60	8.3		75	1.09
	BUK9614-60E	60	12.8	14	56	1.56
	BUK7613-60E	60	13		58	1.56
D2PAK-7 (SOT427) 	BUK6C2R1-55C	55	2.3	3.1	228	0.5
	BUK9C2R2-60E*	60	1.9	2.2	250	0.43
	BUK7C1R8-60E*	60	1.8		250	0.43
	BUK7C2R2-60E*	60	2.2		250	0.47
DPAK (SOT428) 	BUK6207-55C	55	7.8	10	90	0.95
	BUK6210-55C	55	9.6	13.2	78	1.17
	BUK7210-55B	55	10		75	0.95
	BUK9212-55B	55	10	12	75	0.95
	BUK7212-55B	55	12		75	0.95
	BUK9215-55A	55	13.6	15	62	1.3
	BUK7215-55A	55	15		62	1.3
	BUK9219-55A	55	17.6	19	55	1.3
	BUK6217-55C	55	19	24.5	44	1.87
	BUK7219-55A	55	19		55	1.3

* represent products in development

55 V - 60 V N-channel Automotive TrenchMOS – Part 3

Package name	Type number	V _{DS} [max] [V]	R _{DSon} [max] @ 10 V [mΩ]	R _{DSon} [max] @ 5 V [mΩ]	I _D [max] @ 25 °C [A]	R _{th(j-mb)} [max] [K/W]
DPAK (SOT428) 	BUK9222-55A	55	20	22	48	1.5
	BUK7222-55A	55	22		48	1.5
	BUK9225-55A	55	22	25	43	1.6
	BUK7225-55A	55	25		43	1.6
	BUK9230-55A	55	27	30	38	1.7
	BUK6228-55C	55	29	38	31	2.52
	BUK7230-55A	55	30		38	1.7
	BUK9237-55A	55	33	37	32	1.94
	BUK7237-55A	55	37		32.3	1.9
	BUK9245-55A	55	40	45	28	2.1
	BUK9277-55A	55	69	77	18	2.93
	BUK7277-55A	55	77		18	2.9
	BUK92150-55A	55	125	140	11	4.1
	BUK72150-55A	55	150		11	4.1
TO-220AB (SOT78A) 	BUK653R2-55C	55	3.2	4.2	120	0.45
	BUK954R2-55B	55	3.7	4.2	75	0.5
	BUK653R5-55C	55	3.9	4.9	120	0.57
	BUK754R0-55B	55	4		75	0.5
	BUK654R6-55C	55	5.4	7	100	0.74
	BUK7506-55A	55	6.3		75	0.5
	BUK6507-55C	55	7	9	100	0.95
	BUK9508-55B	55	7	8.4	75	0.74
	BUK7507-55B	55	7.1		75	0.74
	BUK7508-55A	55	8		75	0.59
	BUK7509-55A	55	9		75	0.71
	BUK7510-55AL	55	10		75	0.5
	BUK9511-55A	55	10	11	75	0.9
	BUK9512-55B	55	10	12	75	0.95
	BUK7511-55B	55	11		75	0.95
	BUK9514-55A	55	13	14	73	1
	BUK7514-55A	55	14		73	0.9
	BUK9516-55A	55	15	16	66	1.1
	BUK7516-55A	55	16		65.7	1.1
	BUK9518-55A	55	16	18	61	1.1
	BUK7520-55A	55	20		54	1.2
	BUK9524-55A	55	21.7	24	46	1.4
	BUK7528-55A	55	28		42	1.5
	BUK9535-55A	55	32	35	34	1.8
	BUK7535-55A	55	35		35	1.7

55 V - 60 V N-channel Automotive TrenchMOS – Part 4

types in **bold** represent new products

Package name	Type number	V _{DS} [max] [V]	R _{DSon} [max] @ 10 V [mΩ]	R _{DSon} [max] @ 5 V [mΩ]	I _D [max] @ 25 °C [A]	R _{th(j-mb)} [max] [K/W]
TO-220AB (SOT78A) 	BUK9575-55A	55	68	75	20	2.4
	BUK7575-55A	55	75		20.3	2.4
	BUK752R7-60E	60	2.6		120	0.43
	BUK952R8-60E	60	2.6	2.8	120	0.43
	BUK953R5-60E	60	3.4	3.7	120	0.51
	BUK753R5-60E	60	3.5		120	0.51
	BUK954R8-60E	60	4.5	4.9	100	0.64
	BUK754R7-60E	60	4.6		100	0.64
	BUK7514-60E	60	13		58	1.56
	BUK9515-60E	60	13	15	54	1.56
I ² PAK (SOT226) 	BUK6E3R2-55C	55	3.2	4.2	120	0.45
	BUK9E06-55B	55	5.4	6	75	0.58
	BUK9E06-55A	55	5.8	6.3	75	0.5
	BUK9E08-55B	55	7	8.4	75	0.74
	BUK7E07-55B	55	7.1		75	0.74
	BUK7E11-55B	55	11		75	0.95
	BUK7E2R6-60E	60	2.6		120	0.43
	BUK9E2R8-60E	60	2.6	2.8	120	0.43
	BUK9E3R7-60E	60	3.4	3.7	120	0.51
	BUK7E3R5-60E	60	3.5		120	0.51
	BUK9E4R9-60E	60	4.5	4.9	100	0.64
	BUK7E4R6-60E	60	4.6		100	0.64
	BUK7E13-60E	60	13		58	1.56
	BUK9E15-60E	60	13	15	54	1.56
SC-73 (SOT223) 	BUK9832-55A	55	29	32	12	15
	BUK9880-55A	55	73	80	7	15
	BUK7880-55A	55	80		7	15
	BUK98150-55A	55	137	150	5.5	15
	BUK78150-55A	55	150		5.5	15

75 V - 80 V N-channel Automotive TrenchMOS – Part I

types in **bold** represent new products

Package name	Type number	V _{DS} [max] [V]	R _{DSon} [max] @ 10 V [mΩ]	R _{DSon} [max] @ 5 V [mΩ]	I _D [max] @ 25 °C [A]	R _{th(j-mb)} [max] [K/W]
Power-SO8 (LFPAK56) 	BUK7Y18-75B	75	18		49	1.42
	BUK9Y19-75B	75	18	19	48.2	1.42
	BUK7Y28-75B	75	28		35.5	1.76
	BUK9Y30-75B	75	28	30	34	1.8
	BUK9Y58-75B	75	53	58	20.73	2.53
	BUK7Y54-75B	75	54		21.4	2.53
	BUK9Y7R8-80E*	80	7.2	7.8	100	0.6
	BUK7Y7R8-80E*	80	7.8		100	0.6
	BUK9Y9R9-80E*	80	9.1	9.9	93	0.7
	BUK7Y9R9-80E*	80	9.9		93	0.7
	BUK9Y12-80E*	80	10.9	11.9	77	0.8
	BUK9Y14-80E*	80	13.0	14.2	66	1.0
	BUK9Y25-80E*	80	23	25	39	1.6
	BUK7Y25-80E*	80	25		39	1.6
	BUK9Y41-80E*	80	38	41	24	2.5
	BUK7Y41-80E*	80	41		24	2.5
	BUK9Y72-80E*	80	66	72	15	3.7
	BUK7Y72-80E*	80	72		15	3.7
	BUK9Y98-80E	80	90	98	11	4.7
	BUK7Y98-80E*	80	98		11	4.7
LFPAK56D (SOT1205) 	BUK9K19-80E*	80	18	19	38	2.2
	BUK7K19-80E*	80	18		39	2.2
	BUK9K21-80E*	80	20	21	35	2.4
	BUK7K21-80E*	80	20		35	2.4
	BUK9K29-80E*	80	27	29	27	2.8
	BUK7K29-80E*	80	28		27	2.8
	BUK9K57-80E*	80	56	59	16	4.0
	BUK7K57-80E*	80	57		16	4.0
D ² PAK (SOT404) 	BUK9K85-80E*	80	84	89	12	4.7
	BUK7K85-80E*	80	86		12	4.7
	BUK663R7-75C	75	4	5.3	120	0.49
	BUK764R0-75C	75	4		100	0.45
	BUK664R8-75C	75	5	6.3	120	0.57
	BUK9606-75B	75	5.5	6.1	75	0.5
	BUK7606-75B	75	5.6		75	0.5
	BUK6607-75C	75	7	8.6	100	0.74
	BUK9609-75A	75	8.5	9	75	0.65
	BUK7609-75A	75	9		75	0.65
	BUK6610-75C	75	10	12.5	78	0.95

* represent products in development

75 V - 80 V N-channel Automotive TrenchMOS – Part 2

types in **bold** represent new products

Package name	Type number	V _{DS} [max] [V]	R _{DSon} [max] @ 10 V [mΩ]	R _{DSon} [max] @ 5 V [mΩ]	I _D [max] @ 25 °C [A]	R _{th(j-mb)} [max] [K/W]
D ² PAK (SOT404) 	BUK7613-75B	75	13		75	0.95
	BUK9616-75B	75	14	16.4	67	0.95
	BUK9623-75A	75	22	23	53	1.1
	BUK7623-75A	75	23		53	1.1
	BUK763R8-80E	80	3.8		120	0.43
	BUK964R2-80E	80	4	4.2	120	0.43
	BUK764R2-80E	80	4.2		120	0.46
	BUK964R7-80E	80	4.5	4.7	120	0.46
	BUK769R6-80E	80	9.6		75	0.82
	BUK9611-80E	80	10	11	75	0.82
D ² PAK-7 (SOT427) 	BUK6C3R3-75C	75	3.4	4.3	181	0.5
	BUK7C3R1-80E*	80	3.1		215	0.43
	BUK9C3R8-80E*	80	3.5	3.8	194	0.43
	BUK7C3R8-80E*	80	3.8		186	0.47
DPAK (SOT428) 	BUK6211-75C	75	11	13.2	74	0.95
	BUK7214-75B	75	14		70	0.95
	BUK6215-75C	75	15	18	57	1.17
	BUK9217-75B	75	15	17	64	0.95
	BUK9226-75A	75	24.6	26	45	1.3
	BUK7226-75A	75	26		45	1
	BUK6226-75C	75	29	35	33	1.87
	BUK6246-75C	75	46	56	22	2.52
TO-220AB (SOT78A) 	BUK654R0-75C	75	4.2	5.3	120	0.49
	BUK754R3-75C	75	4.3		100	0.45
	BUK655R0-75C	75	5.3	6.5	120	0.57
	BUK9506-75B	75	5.5	6.1	75	0.5
	BUK7506-75B	75	5.6		75	0.5
	BUK6507-75C	75	7.6	9.1	100	0.74
	BUK7509-75A	75	9		75	0.65
	BUK6510-75C	75	10.4	12.4	77	0.95
	BUK7513-75B	75	13		75	0.95
	BUK9516-75B	75	14	16.4	67	0.95
	BUK753R8-80E	80	4		120	0.43
	BUK954R4-80E	80	4.2	4.4	120	0.43
	BUK6E4R0-75C	75	4.2	5.3	120	0.49
	BUK7E4R3-75C	75	4.3		100	0.45
I ² PAK (SOT226) 	BUK7E4R0-80E	80	4		120	0.43
	BUK9E4R4-80E	80	4.2	4.4	120	0.43

* represent products in development

100 V N-channel Automotive TrenchMOS – Part I

types in **bold** represent new products

Package name	Type number	R _{DSon} [max] @ 10 V [mΩ]	R _{DSon} [max] @ 5 V [mΩ]	I _D [max] @ 25 °C [A]	R _{th(j-mb)} [max] [K/W]
Power-SO8 (LFPAK56) 	BUK7Y12-100E*	12.2		90	0.6
	BUK9Y15-100E*	15.1	15	71	0.7
	BUK7Y19-100E*	18.6		59	0.8
	BUK9Y22-100E*	22	22	51	1.0
	BUK7Y33-100B	33		35	1.42
	BUK9Y34-100B	33	34	35.2	1.42
	BUK9Y38-100E*	38	38	30	1.6
	BUK7Y38-100E*	38		30	1.6
	BUK9Y53-100B	49	53	23	2
	BUK7Y53-100B	53		24.8	1.76
	BUK9Y65-100E*	63	65	18	2.5
	BUK7Y65-100E*	65		18	2.5
	BUK9Y104-100B	99	104	14.8	2.53
	BUK7Y102-100B	102		15	2.53
	BUK9Y113-100E*	110	113	11	3.7
	BUK7Y113-100E*	113		11	3.7
	BUK9Y153-100E*	149	153	9	4.7
	BUK7Y153-100E*	153		9	4.66
	BUK9K29-100E	27	29	30	2.2
	BUK7K29-100E*	28		30	2.2
LFPAK56D (SOT1205) 	BUK7K32-100E*	31		27	2.4
	BUK9K32-100E*	32	32	27	2.4
	BUK9K45-100E	42	45	21	2.8
	BUK7K45-100E	44		21	2.8
	BUK9K89-100E	85	89	12.5	4.0
	BUK7K89-100E*	88		12	4.0
	BUK7K134-100E*	134		9	4.7
	BUK9K134-100E*	139	139	9	4.7
D ² PAK (SOT404) 	BUK765R0-100E	5		120	0.43
	BUK965R8-100E	5.6	5.8	120	0.43
	BUK768R1-100E	8.1		100	0.57
	BUK969R3-100E	8.9	9.3	100	0.57
	BUK9610-100B	9.7	10	75	0.5
	BUK7610-100B	10		75	0.5
	BUK7613-100E	13		72	0.82
	BUK9615-100E	14	15	66	0.82
	BUK9615-100A	14.4	15	75	0.65
	BUK9620-100B	18.5	20	63	0.75
	BUK7619-100B	19		64	0.74
	BUK7620-100A	20		63	0.75
	BUK7626-100B	26		49	0.95
	BUK9628-100A	27	28	49	0.9

* represent products in development

100 V N-channel Automotive TrenchMOS

types in **bold** represent new products

Package name	Type number	R_{DSon} [max] @ 10 V [mΩ]	R_{DSon} [max] @ 5 V [mΩ]	I_D [max] @ 25 °C [A]	$R_{th(j-mb)}$ [max] [K/W]
D ² PAK (SOT404) 	BUK9629-100B	27	29	46	0.95
	BUK7628-100A	28		47	0.9
	BUK7631-100E	31		34	1.56
	BUK9635-100A	34	35	41	1
	BUK7635-100A	35		41	1
	BUK9637-100E	36	37	30.7	1.56
	BUK9640-100A	39	40	39	0.95
	BUK7640-100A	40		37	1.1
	BUK9660-100A	58	60	26	1.4
	BUK7660-100A	60		26	1.4
	BUK9675-100A	72	75	23	1.5
	BUK7675-100A	75		23	1.5
	BUK96180-100A	173	180	11	2.8
D2PAK-7 (SOT427) 	BUK7C4R5-100E*	4.5		169	0.43
	BUK9C5R3-100E*	5.1	5.3	154	0.43
	BUK7C5R4-100E*	5.4		147	0.47
DPAK (SOT428) 	BUK7227-100B	27		48	0.95
	BUK9230-100B	28	30	47	0.95
	BUK9240-100A	39	40	33	1.3
	BUK7240-100A	40		34	1.3
	BUK9275-100A	72	75	21.7	1.7
	BUK7275-100A	75		21.7	1.7
TO-220AB (SOT78A) 	BUK755R4-100E	5		120	0.43
	BUK956R1-100E	6	6	120	0.43
	BUK9510-100B	10	10	75	0.5
	BUK7510-100B	10		75	0.5
	BUK9515-100A	14	15	75	0.65
	BUK7515-100A	15		75	0.5
	BUK9520-100B	19	20	63	0.75
	BUK9520-100A	19	20	63	0.75
	BUK7520-100A	20		63	0.75
	BUK7526-100B	26		49	0.95
	BUK9529-100B	27	29	46	0.95
	BUK7528-100A	28		47	0.9
	BUK9535-100A	34	35	41	1
	BUK7535-100A	35		41	1
	BUK7540-100A	40		37	1.1
	BUK9575-100A	72	75	23	1.5
	BUK7575-100A	75		23	1.5
I ² PAK (SOT226) 	BUK7E5R2-100E	5.2		120	0.43
	BUK9E6R1-100E	5.9	6.1	120	0.43
SC-73 (SOT223) 	BUK9875-100A	72	75	7	15
	BUK98180-100A	173	180	4.6	15

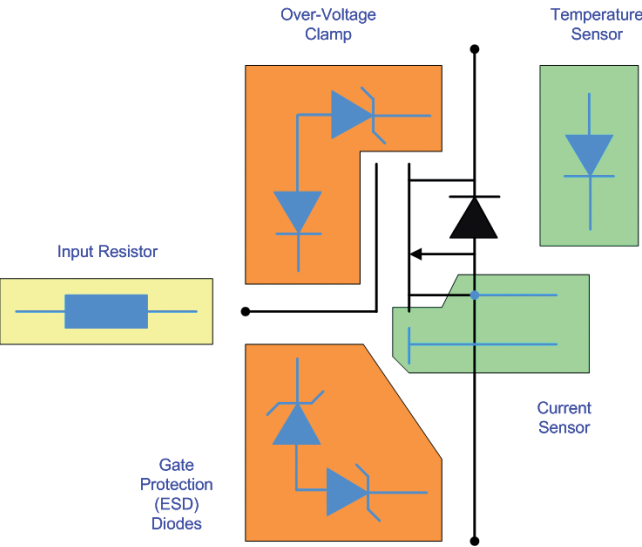
* represent products in development

TrenchPLUS MOSFETs

TrenchPLUS is a range of standard MOSFETs with additional protection features, such as current and temperature sensing components, overvoltage clamps, and gate protection (ESD) diodes. The system microcontroller can use data gathered from

these sensors to implement cost-effective protection features, thus eliminating the need to design with protected power devices. All the standard products listed below offer one or more “PLUS” features. Custom versions can be developed for high-volume applications.

V_{GS} (V)	R_{DSon} (max) @ 10 V (mΩ)	R_{DSon} (max) @ 5 V (mΩ)	I_D (max) @ 25 °C (A)	Temp Sense	Gate Source Clamps	Gate Drain Clamps	Current Sensing	Gate Resistor	Surface Mount Package			Leaded Package	
									7-pin D ² PAK (SOT427)	5-pin D ² PAK (SOT426)	SO20 (SOT163)	TO220AB (SOT78C)	5-pin TO220 (SOT263B-01)
													
									10.0 x 15 x 4.5	10.0 x 15 x 4.5	13.0 x 10 x 2.65	15.0 x 10.0 x 4.5	10.0 x 19 x 4.5
34	3.3		75		✓	✓		✓				BUK7L3R3-34BRC	
34	6		75		✓	✓		✓				BUK7L06-34ARC	
34	11		75		✓	✓		✓				BUK7L11-34ARC	
40	4.1		75	✓						BUK714R1-40BT			BUK794R1-40BT
40	5		75		✓		✓			BUK7105-40AIE			BUK7905-40AIE
40	5		75	✓	✓					BUK7105-40ATE			BUK7905-40ATE
40	5		75				✓						BUK7905-40AI
40	6		75	✓	✓		✓		BUK7C06-40AITE				
40	6.6	7	75	✓	✓	✓				BUK9107-40ATC			BUK9907-40ATC
40	7		75	✓	✓	✓				BUK7107-40ATC			BUK7907-40ATC
40	8		75		✓		✓			BUK7108-40AIE			BUK7908-40AIE
55	6.6	7	75	✓	✓					BUK9107-55ATE			BUK9907-55ATE
55	7		75		✓		✓			BUK7107-55AIE			BUK7907-55AIE
55	7		75	✓	✓					BUK7107-55ATE			BUK7907-55ATE
55	8		75	✓	✓		✓		BUK7C08-55AITE				
55	9	10	75	✓			✓		BUK9C10-55BIT				



TrenchPLUS MOSFETs

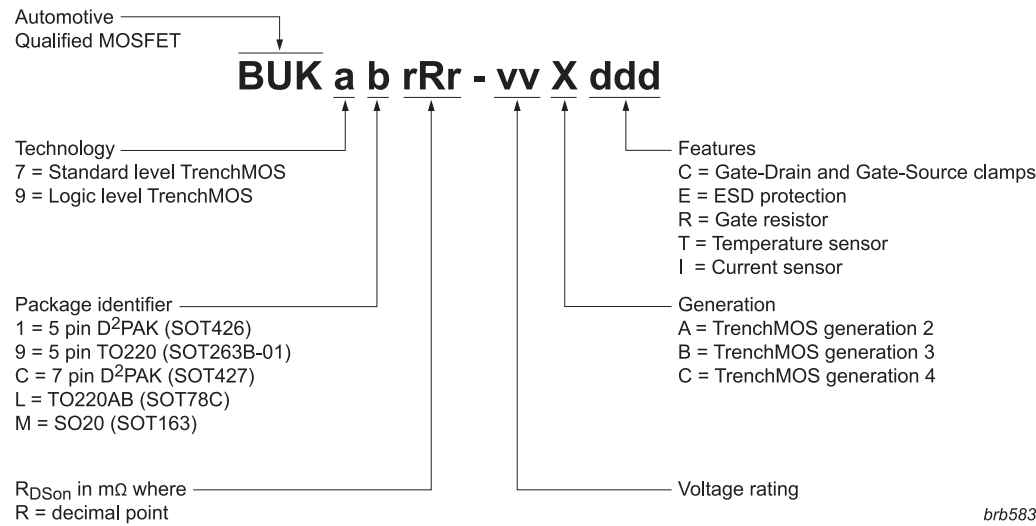
V _{DS} (V)	R _{DSon} (max) @ 10 V (mΩ)	R _{DSon} (max) @ 5 V (mΩ)	I _D (max) @ 25 °C (A)	Temp Sense	Gate Source Clamps	Gate Drain Clamps	Current Sensing	Gate Resistor	Surface Mount Package			Leaded Package	
									7-pin D ² PAK (SOT427)	5-pin D ² PAK (SOT426)	SO20 (SOT163)	TO220AB (SOT78C)	5-pin TO220 (SOT263B-01)
													
									10.0 x 15 x 4.5	10.0 x 15 x 4.5	13.0 x 7.5 x 2.65	15.0 x 10.0 x 4.5	10.0 x 19 x 4.5
55	9+23	10+25	17+9	✓			✓				BUK9MGP-55PTS		
55	14+14	15+15	13+13	✓			✓				BUK9MJJ-55PSS		
55	14+14	15+15	13+13	✓			✓				BUK9MJJ-55PTT		
55	14+90	15+100	13+4	✓			✓				BUK9MJT-55PRF		
55	23+23	25 + 25	9+9	✓			✓				BUK9MPP-55PRR		
55	27+27	30+30	8+8	✓			✓				BUK9MMM-55PNN		
55	45+45	50+50	6+6	✓			✓				BUK9MLL-55PLL		
55	56+56	65+65	5+5	✓			✓				BUK9MRR-55PGG		
65	6.5	7	75	✓			✓		BUK9C07-65BIT				
65	9.2	10	75	✓			✓		BUK9C10-65BIT				
65	11+11	12+12	15+15	✓			✓				BUK9MHH-65PNN		
65	13+13	14+14	13+13	✓			✓				BUK9MFF-65PSS		
65	16+16	17+17	11+11	✓			✓				BUK9MJJ-65PLL		
65	25+25	27+27	8+8	✓			✓				BUK9MPP-65PLL		
65	33+33	36+36	7+7	✓			✓				BUK9MNN-65PKK		
65	61+61	67+67	5+5	✓			✓				BUK9MRR-65PKK		
65	90+90	100+100	4+4	✓			✓				BUK9MTT-65PBB		
75	7		75	✓	✓					BUK7109-75ATE			BUK7909-75ATE
75	9		75		✓		✓			BUK7109-75AIE			BUK7909-75AIE
75	10		75	✓	✓		✓		BUK7C10-75AITE				



Thyristors

AC Thyristor Triacs	120
AC Thyristors	120
3-quadrant triacs	121
4-quadrant triacs	122
Silicon Controlled Rectifiers	123

Automotive TrenchPLUS Part Numbering



brb583

AC Thyristor Triacs

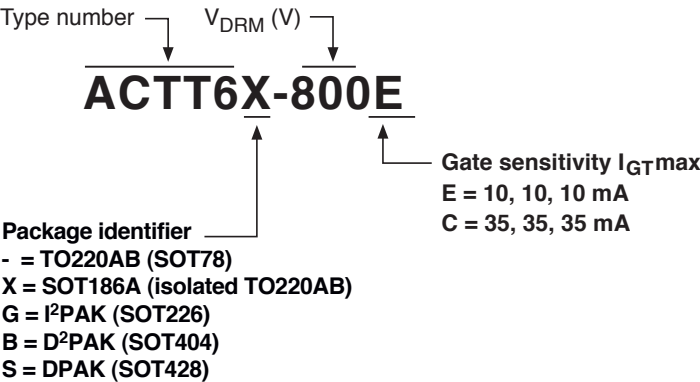
(3Q triacs with overvoltage guarantee)

types in **bold** represent new products

$I_{T(RMS)}$ (A)	V_{DRM} (V)	I_{GT} (max) (mA)	SOT78 (TO220AB)	SOT186A	SOT226 (I ² PAK)	SOT404 (D ² PAK)	SOT428 (DPAK)
2	800	E					
4	800	C/E		ACTT2X			ACTT2S
6	800	E	ACTT6	ACTT6X	ACTT6G	ACTT6B	ACTT4S

I_{GT} key:
C 35 mA
E 10 mA

AC Thyristor Triacs part numbering



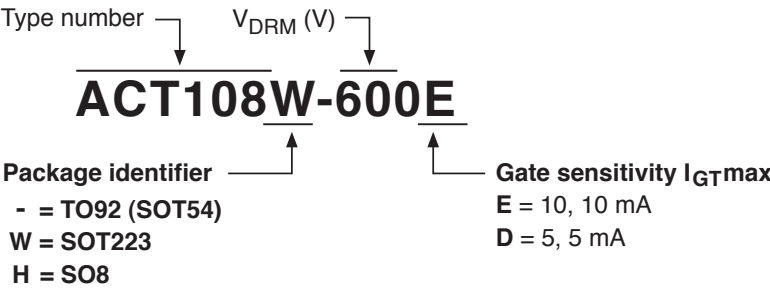
AC Thyristors

(negative gate triggering only, 'Common' mounting base, overvoltage guarantee)

$I_{T(RMS)}$ (A)	V_{DRM} (V)	I_{GT} (max) (mA)	SOT54 (TO92)	SOT223	SO8
0.2	600	D			
0.8	600	D	ACT108	ACT108W	ACT102H
	600	E	ACT108	ACT108W	

I_{GT} key:
D 5 mA
E 10 mA

AC Thyristors part numbering



3-quadrant triacs

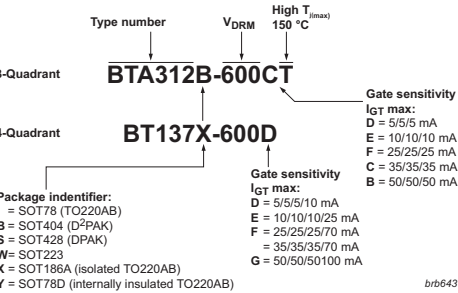
3-quadrant triacs

types in **bold** represent new products

$I_{T(RMS)}$ (A)	V_{DRM} (V)	I_{GT} (max) (mA)	SOT54 (TO92)	SOT78 (TO220AB)	SOT78D (internally insulated TO220AB)	SOT186A (isolated TO220AB)	SOT223	SOT404 (D ² PAK)	SOT428 (DPAK)
0.8	600 / 800	D					BTA2008W		
	600 / 800	D/E	BTA2008						
1	600 / 800	B/E/ER	BTA201						
	600 / 800	E					BTA201W		
	600	B/C/D/E/F					BTA204W*		
	800	C/E					BTA204W*		
2	600 / 800	D/E				BTA202X			
4	600	B/C/D/E/F		BTA204		BTA204X			BTA204S
	800	B/C/E		BTA204		BTA204X			BTA204S
	1000	C				BTA204X			BTA204S
6	800	CT/ET		BTA206		BTA206X			
8	600	B/D/E/F		BTA208		BTA208X			BTA208S
	800	B/E/F		BTA208		BTA208X			BTA208S
	1000	B				BTA208X			
	1000	C				BTA208X		BTA208B	
	1000	C0				BTA208X			
10	600 / 800	C/D/E		BTA310		BTA310X			
	600 / 800	BT/CT/ET		BTA410*	BTA410Y*	BTA410X*			
	600	D		BTA312		BTA312X		BTA312B	
	600	CT		BTA312				BTA312B	
12	600 / 800	B/C/E		BTA312		BTA312X		BTA312B	
	600 / 800	C			BTA312Y				
	800	CT		BTA312				BTA312B	
	800	ET		BTA312					
	600 / 800	B/C			BTA412Y*				
16	600	BT		BTA316				BTA316B	
	600	D		BTA316					
	600 / 800	B/C/E		BTA316		BTA316X		BTA316B	
	600 / 800	ET		BTA316		BTA316X			
	800	B0		BTA316					
	600 / 800	B/C			BTA416Y*				
20	800	BT/CT		BTA420*		BTA420X*			
25	600	BT		BTA225					
	600 / 800	B		BTA225				BTA225B	

I_{GT} key: B 50 mA; B0 10-50 mA; C 35 mA; C0 5-35 mA; D 5 mA; E 10 mA; F 25 mA
T: High T_{j(max)} 150 °C *Large chip / high I_{TSM}

3-quadrant triacs part numbering



In the spotlight

Planar passivated high commutation three quadrant triac
BTA310,BTA410 series

- 3Q technology for improved noise immunity
- High commutation capability with maximum false trigger immunity
- High immunity to false turn-on by dV/dt
- High junction operating temperature capability
- High voltage capability
- Less sensitive gate for high noise immunity
- Planar passivated for voltage ruggedness and reliability



4-quadrant triacs

$I_{T(RMS)}$ (A)	V_{DRM} (V)	I_{GT} (max) (mA)	SOT54 (TO92)	SOT78 (TO220AB)	SOT78D (internally insulated TO220AB)	SOT82	SOT186A (isolated TO220AB)	SOT223	SOT404 (D ² PAK)	SOT428 (DPAK)
0.6	400	5/5/5/7	MAC97A6							
	600	5/5/5/7	MAC97A8							
	600	3/3/3/7						BT131W		
1	600 / 800	3/3/3/7	BT131							
	600 / 800	5/5/5/7	BT131-D							
	600 / 800	10/10/10/10	BT131-E							
	600 / 800	3/3/3/5	Z0103MA/NA					Z0103MN/NN		
	600 / 800	5/5/5/7	Z0107MA/NA					Z0107MN/NN		
	600 / 800	10/10/10/10	Z0109MA/NA					Z0109MN/NN		
	600 / 800	3/3/3/5	Z0103MA0/NA0**					Z0103MN0/NN0**		
	600 / 800	5/5/5/7	Z0107MA0/NA0**					Z0107MN0/NN0**		
	600 / 800	10/10/10/10	Z0109MA0/NA0**					Z0109MN0/NN0**		
	600	5/5/5/10	BT132-D*							
	600	D/E/-						BT134W*		
	800	-						BT134W*		
	600	D/E/-/G				BT134				
	800	E/-				BT134				
	600 / 800	D/E		BT234*			BT234X*			
4	600	D/-		BT136			BT136X			BT136S
	600	F					BT136X			BT136S
	600 / 800	E		BT136			BT136X		BT136B	BT136S
	800	F								BT136S
	800	-					BT136X			BT136S
	600	F/-/G					BT236X			
6	800	-/G					BT236X			
	600	D/-/G		BT137			BT137X			BT137S
	600	E		BT137			BT137X		BT137B	BT137S
8	600	F					BT137X		BT137B	BT137S
	800	E		BT137			BT137X			BT137S
	800	F							BT137B	BT137S
	800	-		BT137			BT137X		BT137B	
	800	G							BT137B	BT137S
	600	D		BT138			BT138X			
12	600	-/G		BT138			BT138X		BT138B	
	600	F					BT138X		BT138B	
	600 / 800	E		BT138	BT138Y		BT138X		BT138B	
	800	F					BT138X			
	800	-		BT138			BT138X			
	800	G		BT138						
	600	E/-		BT139			BT139X		BT139B	
16	600	F					BT139X		BT139B	
	600	G					BT139X		BT139B	
	800	E		BT139					BT139B	
	800	F							BT139B	
	800	-		BT139			BT139X		BT139B	
	800	G		BT139					BT139B	
	600									
20	600	50/50/50/75						MAC223A8X		
25	400	50/50/50/75		MAC223A6						
	600 / 800	-		BTA140						

* Large chip / high I_TSM ** Enhanced immunity to false triggering

I_{GT} key:
D 5 mA (10 mA in 3+)
E 10 mA (25 mA in 3+)
F 25 mA (70 mA in 3+)
- 35 mA (70 mA in 3+)
G 50 mA (100 mA in 3+)

In the spotlight

Planar passivated Silicon Controlled Rectifier (SCR)
TYN16 series

High junction operating temperature capability

High thermal cycling performance

High voltage capability

Planar passivated for voltage ruggedness and reliability

Silicon Controlled Rectifiers

types in **bold** represent new products

$I_{T(RMS)}$ (A)	V_{DRM} & V_{RRM} (V)	I_{GT} (max) (mA)	SOT54 (TO92)	SOT78 (TO220AB)	SOT82	SOT186A (isolated TO220AB)	SOT223	SOT404 (D ² PAK)	SOT428 (DPAK)	SOT533 (IPAK)
0.8	600	0.5 μA min - 7 μA max	N0118GA							
	400	0.012	EC103D1							
	200 / 400 / 600	0.2	BT149B/D/G							
	200 / 400 / 600	0.2	BT169B/D/G							
	400	0.015 min - 0.05 max	BT169D-L							
	600	0.015 min - 0.05 max	BT169G-L							
	800	0.1	BT169H							
	500 / 600	0.02 min - 0.2 max	BT168E/G							
1	200	0.2					MCR08BT1			
	600	0.02 min - 0.2 max					BT168GW			
	600	0.07 min - 0.45 max					BT168GWF**			
4	600	0.2					BT148W-R*			
	400 / 500 / 600	0.2			BT148-R					
	600	0.2							BT150S-R	
8	500	0.2		BT150-R						
	800	0.05							BT258S-LT	
	500 / 600 / 800	0.2		BT258-R		BT258X-R				
	600	0.2								BT258U-R
	800	0.2							BT258S-R	
	600	5							BT300S-R	
12	500 / 650	5		BT151-L*					BT151S-L*	
	500 / 650 / 800	15		BT151-R*		BT151X-R*			BT151S-R*	
	650	15							BTH151S-R*	
	500 / 650 / 800	15		BT151-C		BT151X-C				BT151U-C
	500 / 1000	15		BT151-RT*						
16	600	15		TYN16-CT		TYN16X-CT				
	600 / 800	25		TYN16-RT*		TYN16X-RT*				
20	400 / 600 / 800	32		BT152-R		BT152X-R		BT152B-R		
	500	32		BT152-RT						
	800	32		TYN20-T		TYN20X-T				
25	800	35		BT145-R						

* Large chip / high I_TSM ** Hi-Com / fast turn-off T: high T_{j(max)} 150 °C

SCRs part numbering

Type number

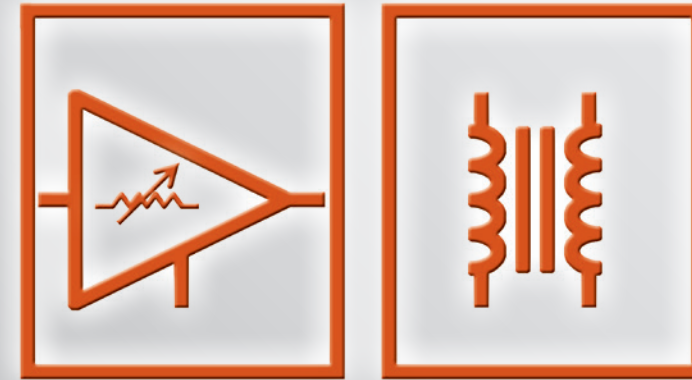
BT151X-650R

V_{DRM} (V)

Package identifier

- = TO220AB (SOT78)
B = D²PAK (SOT404)
S = DPAK (SOT428)
U = IPAK (SOT533/TO251)
W = SOT223
X = SOT186A (isolated TO220AB)
BT149, BT168 & BT169 use TO92 package
BT148 uses SOT82 package

msd848

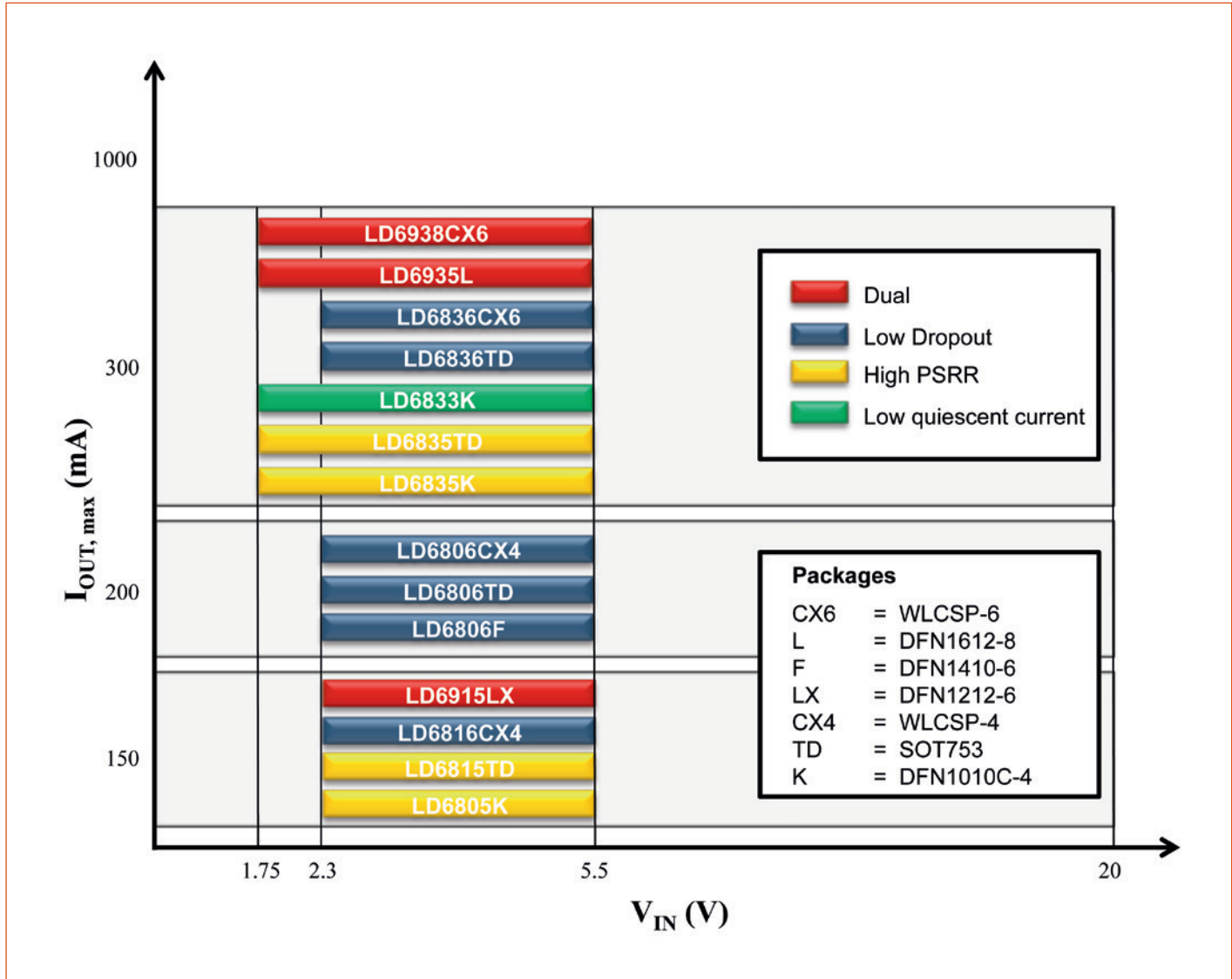


Power management devices

Low-dropout regulator / low-voltage	128
DC/DC converter	136
Adjustable shunt voltage regulator	138
Constant current source	140

The power management portfolio

As an overview this diagram shows our most popular low-voltage LDO regulators – optimized for applications with challenging space requirements, high battery lifetime and a superior operating stability.



NXP, your one-stop-shop for high-quality products, supplies an attractive portfolio of power management devices.

High DC/DC performance on very small board space

DC6M4/5/6 series 6MHz step-down converter in WLCSP6 package with ultra-low output voltage ripple

Highlights

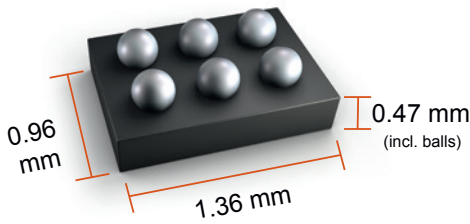
- ▶ Very high switching frequency of 6 MHz to use coils as small as 470 nH
- ▶ Very small WLCSP6 package for further board space reduction
- ▶ Ultra-low output voltage ripple of 7 mV (typ)

Key features

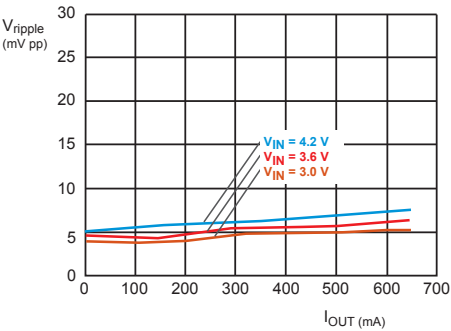
- ▶ Input voltage range 2.3 V - 5.5 V
- ▶ Available with output currents of 425, 500, 650 mA
- ▶ Inrush, short circuit & temperature protection
- ▶ Optimized for load range of 40 mA to 650 mA with an efficiency of up to 95%
- ▶ Low quiescent current of 0.2 μ A (typ) in shutdown
- ▶ Available with Auto/PWM mode select, output voltage select or power good/XSHUTDOWN option

NXP's new DC/DC converters are an ideal solution for mobile applications and battery driven devices. The DC6M4/5/6 series combine the advantages of very small WLCSP6 packages and high switching frequencies with an ultra-low output voltage ripple.

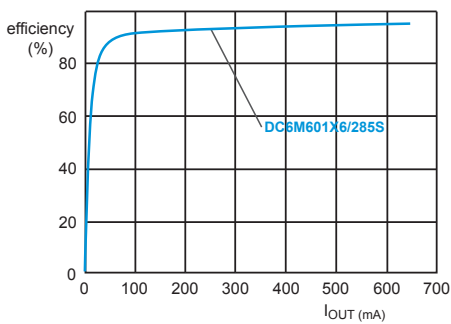
6-Ball WLCSP Package



Output voltage ripple



Conversion efficiency

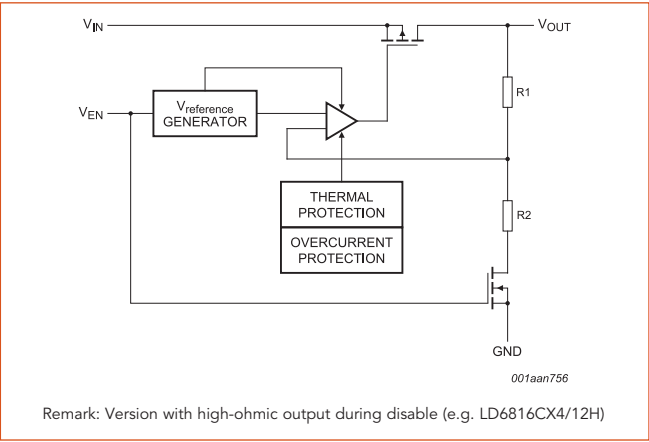


LD6816 ultra low-dropout voltage regulators – 150 mA

Package							WLCSP4	
								
Size (mm)							0.76 × 0.76 × 0.47	
P _{tot} (mW)							770	
V _{IN} (V)	I _{OUT} typ (mA)	Quiescent current (μA)	V _{do} drop @ 150 mA typ (mV)	Output noise typ (μVrms)	PSRR @ 1 kHz (dB)	Output voltage (V)*	LD6816CX4/xxH high-ohmic output stage	LD6816CX4/xxP pull-down output stage
2.3 - 5.5	150	70	45	30	55	1.2	LD6816CX4/12H	LD6816CX4/12P
						1.3	LD6816CX4/13H	LD6816CX4/13P
						1.4	LD6816CX4/14H	LD6816CX4/14P
						1.5	LD6816CX4/15H	LD6816CX4/15P
						1.6	LD6816CX4/16H	LD6816CX4/16P
						1.8	LD6816CX4/18H	LD6816CX4/18P
						2.0	LD6816CX4/20H	LD6816CX4/20P
						2.1	LD6816CX4/21H	LD6816CX4/21P
						2.2	LD6816CX4/22H	LD6816CX4/22P
						2.3	LD6816CX4/23H	LD6816CX4/23P
						2.5	LD6816CX4/25H	LD6816CX4/25P
						2.7	LD6816CX4/27H	LD6816CX4/27P
						2.8	LD6816CX4/28H	LD6816CX4/28P
						2.9	LD6816CX4/29H	LD6816CX4/29P
						3.0	LD6816CX4/30H	LD6816CX4/30P
						3.3	LD6816CX4/33H	LD6816CX4/33P
						3.6	LD6816CX4/36H	LD6816CX4/36P

* Other output voltages are available on request

Functional diagram: High-ohmic output



Key features

- ▶ Ultra low-dropout voltage (45 mV @ 150 mA)
- ▶ Very low output noise (30 μVrms)
- ▶ Thermal shutdown protection and current limiter

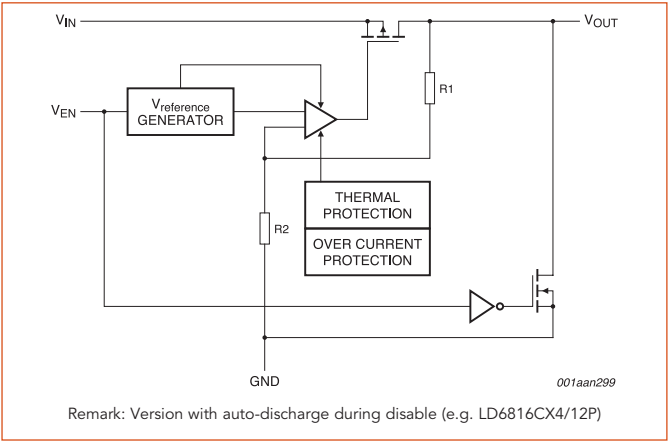
Key benefits

- ▶ Very small WLCSP package
- ▶ Very low standby and supply current for battery-powered solutions
- ▶ No additional noise bypass capacitor needed

Key applications

- ▶ Mobile phones, PC tablets, DSCs (digital still cameras), video cameras, game pads, notebooks, netbooks, ultrabooks

Functional diagram: Auto-discharge (pull-down)



In the spotlight

LDOs in ultra-small WLCSP package

State-of-the-art wafer-level chip scale technology

Dimensions of only 0.76 x 0.76 x 0.47 mm

High power dissipation of 770 mW



LD6806 ultra low-dropout voltage regulators – 200 mA

Package							WLCSP4		DFN1410-6 (SOT886)		SOT753	
												
Size (mm)							0.76 × 0.76 × 0.47		1.45 × 1.0 × 0.48		2.9 × 1.5 × 1.0	
P _{tot} (mW)							770		450		800	
V _{IN} (V)	I _{OUT} typ (mA)	Quiescent current (μA)	V _{ds} drop @ 200 mA typ (mV)	Output noise typ (μVrms)	PSRR @ 1 kHz (dB)	Output voltage (V)*	LD6806CX4/xxH high-ohmic output stage	LD6806CX4/xxP pull-down output stage	LD6806F/xxH high-ohmic output stage	LD6806F/xxP pull-down output stage	LD6806TD/xxH high-ohmic output stage	LD6806TD/xxP pull-down output stage
2.3 - 5.5	200	70	60	30	55	1.2	LD6806CX4/20H	LD6806CX4/20P	LD6806F/20H	LD6806F/20P	LD6806TD/20H	LD6806TD/20P
						1.3	LD6806CX4/21H	LD6806CX4/21P	LD6806F/21H	LD6806F/21P	LD6806TD/21H	LD6806TD/21P
						1.4	LD6806CX4/14H	LD6806CX4/14P	LD6806F/14H	LD6806F/14P	LD6806TD/14H	LD6806TD/14P
						1.5	LD6806CX4/15H	LD6806CX4/15P	LD6806F/15H	LD6806F/15P	LD6806TD/15H	LD6806TD/15P
						1.6	LD6806CX4/16H	LD6806CX4/16P	LD6806F/16H	LD6806F/16P	LD6806TD/16H	LD6806TD/16P
						1.8	LD6806CX4/18H	LD6806CX4/18P	LD6806F/18H	LD6806F/18P	LD6806TD/18H	LD6806TD/18P
						2.0	LD6806CX4/20H	LD6806CX4/20P	LD6806F/20H	LD6806F/20P	LD6806TD/20H	LD6806TD/20P
						2.1	LD6806CX4/21H	LD6806CX4/21P	LD6806F/21H	LD6806F/21P	LD6806TD/21H	LD6806TD/21P
						2.2	LD6806CX4/22H	LD6806CX4/22P	LD6806F/22H	LD6806F/22P	LD6806TD/22H	LD6806TD/22P
						2.3	LD6806CX4/23H	LD6806CX4/23P	LD6806F/23H	LD6806F/23P	LD6806TD/23H	LD6806TD/23P
						2.5	LD6806CX4/25H	LD6806CX4/25P	LD6806F/25H	LD6806F/25P	LD6806TD/25H	LD6806TD/25P
						2.7	LD6806CX4/27H	LD6806CX4/27P	LD6806F/27H	LD6806F/27P	LD6806TD/27H	LD6806TD/27P
						2.8	LD6806CX4/28H	LD6806CX4/28P	LD6806F/28H	LD6806F/28P	LD6806TD/28H	LD6806TD/28P
						2.9	LD6806CX4/29H	LD6806CX4/29P	LD6806F/29H	LD6806F/29P	LD6806TD/29H	LD6806TD/29P
						3.0	LD6806CX4/30H	LD6806CX4/30P	LD6806F/30H	LD6806F/30P	LD6806TD/30H	LD6806TD/30P
						3.3	LD6806CX4/33H	LD6806CX4/33P	LD6806F/33H	LD6806F/33P	LD6806TD/33H	LD6806TD/33P
						3.6	LD6806CX4/36H	LD6806CX4/36P	LD6806F/36H	LD6806F/36P	LD6806TD/36H	LD6806TD/36P

* Other output voltages are available on request

Key features

- ▶ Ultra low-dropout voltage (60 mV @ 200 mA)
- ▶ Very low output noise (30 μVrms)
- ▶ Thermal shutdown protection and current limiter

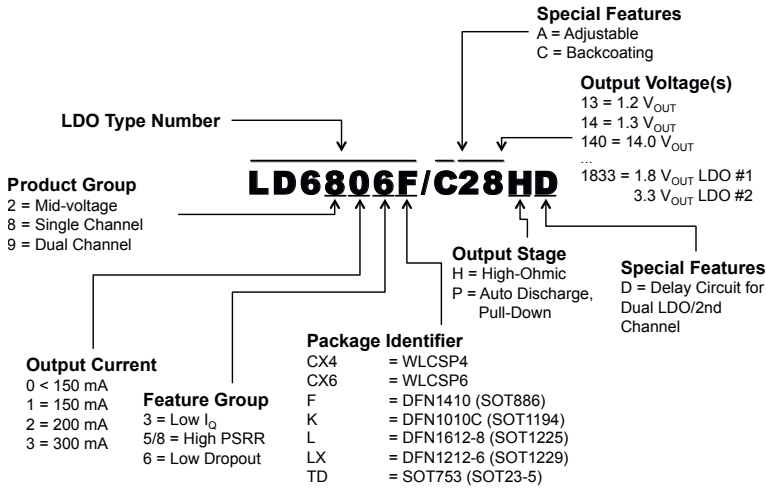
Key benefits

- ▶ Very small WLCSP package
- ▶ Very low standby and supply current for battery-powered solutions
- ▶ No additional noise bypass capacitor needed

Key applications

- ▶ Mobile phones, PC tablets, DSCs (digital still cameras), video cameras, game pads, notebooks, netbooks, ultrabooks

Part numbering for LDOs



Power management devices

In the spotlight

LDOs in very small DFN package

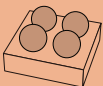
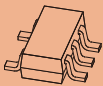
State-of-the-art dual-flat no-leads (DFN) package technology

Dimensions of only 1.45 x 1.0 x 0.5 mm

High power dissipation of 450 mW

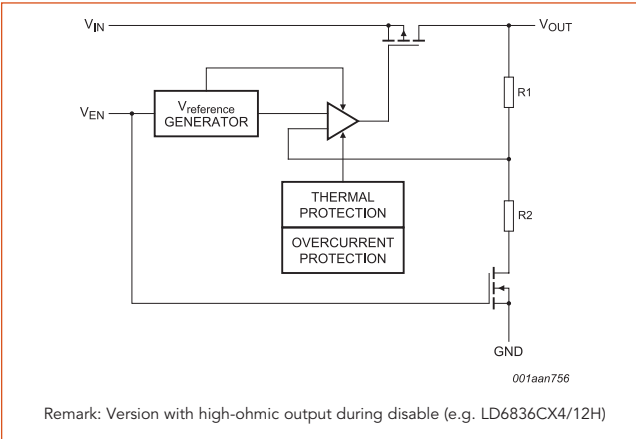


LD6836 ultra low-dropout voltage regulators – 300 mA

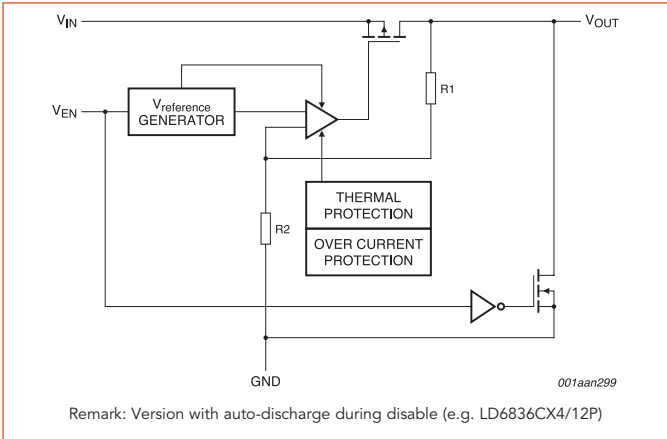
Package							WLCSP4		SOT753	
										
Size (mm)							0.76 × 0.76 × 0.47		2.9 × 1.5 × 1.0	
P _{tot} (mW)							770		800	
V _{IN} (V)	I _{OUT} typ (mA)	Quiescent current (μA)	V _{do} drop @ 300 mA typ (mV)	Output noise typ (μVrms)	PSRR @ 1 kHz (dB)	Output voltage (V)*	LD6836CX4/xxH high-ohmic output stage	LD6836CX4/xxP pull-down output stage	LD6836TD/xxH high-ohmic output stage	LD6836TD/xxP pull-down output stage
2.3 - 5.5	300	70	90	30	55	1.2	LD6836CX4/12H	LD6836CX4/12P	LD6836TD/12H	LD6836TD/12P
						1.3	LD6836CX4/13H	LD6836CX4/13P	LD6836TD/13H	LD6836TD/13P
						1.4	LD6836CX4/14H	LD6836CX4/14P	LD6836TD/14H	LD6836TD/14P
						1.5	LD6836CX4/15H	LD6836CX4/15P	LD6836TD/15H	LD6836TD/15P
						1.6	LD6836CX4/16H	LD6836CX4/16P	LD6836TD/16H	LD6836TD/16P
						1.8	LD6836CX4/18H	LD6836CX4/18P	LD6836TD/18H	LD6836TD/18P
						2.0	LD6836CX4/20H	LD6836CX4/20P	LD6836TD/20H	LD6836TD/20P
						2.1	LD6836CX4/21H	LD6836CX4/21P	LD6836TD/21H	LD6836TD/21P
						2.2	LD6836CX4/22H	LD6836CX4/22P	LD6836TD/22H	LD6836TD/22P
						2.3	LD6836CX4/23H	LD6836CX4/23P	LD6836TD/23H	LD6836TD/23P
						2.5	LD6836CX4/25H	LD6836CX4/25P	LD6836TD/25H	LD6836TD/25P
						2.7	LD6836CX4/27H	LD6836CX4/27P	LD6836TD/27H	LD6836TD/27P
						2.8	LD6836CX4/28H	LD6836CX4/28P	LD6836TD/28H	LD6836TD/28P
						2.9	LD6836CX4/29H	LD6836CX4/29P	LD6836TD/29H	LD6836TD/29P
						3.0	LD6836CX4/30H	LD6836CX4/30P	LD6836TD/30H	LD6836TD/30P
						3.3	LD6836CX4/33H	LD6836CX4/33P	LD6836TD/33H	LD6836TD/33P
						3.6	LD6836CX4/36H	LD6836CX4/36P	LD6836TD/36H	LD6836TD/36P

* Other output voltages are available on request

Functional diagram: High-ohmic output



Functional diagram: Auto-discharge (pull-down)



Key features

- ▶ Ultra low-dropout voltage (90 mV @ 300 mA)
- ▶ Very low output noise (30 μVrms)
- ▶ Thermal shutdown protection and current limiter

Key benefits

- ▶ Very small WLCSP package
- ▶ Very low standby and supply current for battery-powered solutions
- ▶ No additional noise bypass capacitor needed

Key applications

- ▶ Mobile phones, PC tablets, DSCs (digital still cameras), video cameras, game pads, notebooks, netbooks, ultrabooks

In the spotlight

SOT753 general purpose package

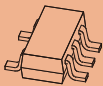
General purpose package SOT753 (SOT23-5 footprint)

Dimensions of only 2.9 x 1.5 x 1.0 mm

Very high power dissipation of 800 mW

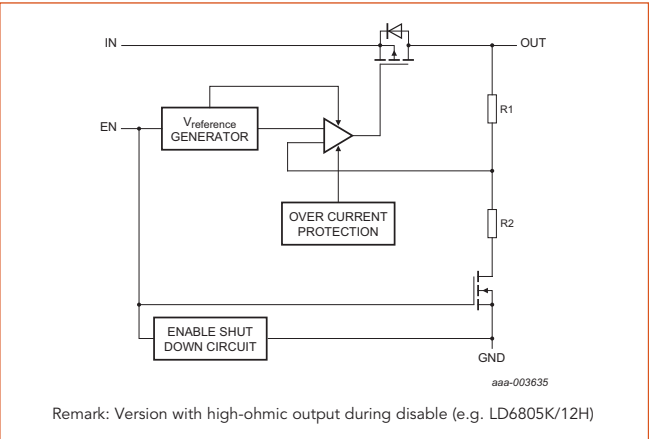


LD6805 and LD6815 high-PSRR low-dropout voltage regulators – 150 mA

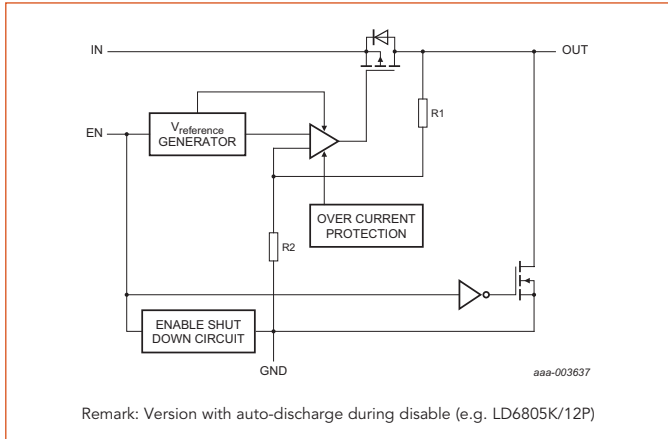
Package							DFN1010C-4 (SOT1194)		SOT753	
										
Size (mm)							1.0 × 1.0 × 0.55		2.9 × 1.5 × 1.0	
P _{tot} (mW)							400		800	
V _{IN} (V)	I _{OUT} typ (mA)	Quiescent current (μA)	V _{do} drop @ 150 mA typ (mV)	Output noise typ (μVrms)	PSRR @ 1 kHz (dB)	Output voltage (V)*	LD6805K/xxH high-ohmic output stage	LD6805K/xxP pull-down output stage	LD6815TD/xxH high-ohmic output stage	LD6815TD/xxP pull-down output stage
2.3 - 5.5	150	35	250	40	75	1.2	LD6805K/12H	LD6805K/12P	LD6815TD/12H	LD6815TD/12P
						1.3	LD6805K/13H	LD6805K/13P		
						1.4	LD6805K/14H	LD6805K/14P	-	-
						1.5	LD6805K/15H	LD6805K/15P	LD6815TD/15H	LD6815TD/15P
						1.6	LD6805K/16H	LD6805K/16P	-	-
						1.8	LD6805K/18H	LD6805K/18P	LD6815TD/18H	LD6815TD/18P
						1.85	LD6805K/185H	-	-	-
						2.0	LD6805K/20H	LD6805K/20P	-	-
						2.1	LD6805K/21H	LD6805K/21P	LD6815TD/21H	LD6815TD/21P
						2.2	LD6805K/22H	LD6805K/22P	-	-
						2.3	LD6805K/23H	LD6805K/23P	-	-
						2.5	LD6805K/25H	LD6805K/25P	LD6815TD/25H	LD6815TD/25P
						2.8	LD6805K/28H	LD6805K/28P	LD6815TD/28H	LD6815TD/28P
						2.9	LD6805K/29H	LD6805K/29P	LD6815TD/29H	LD6815TD/29P
						3.0	LD6805K/30H	LD6805K/30P	LD6815TD/30H	LD6815TD/30P
						3.1	LD6805K/31H	LD6805K/31P	-	-
						3.3	LD6805K/33H	LD6805K/33P	LD6815TD/33H	LD6815TD/33P
						3.6	LD6805K/36H	LD6805K/36P	LD6815TD/36H	LD6815TD/36P

* Other output voltages are available on request

Functional diagram: High-ohmic output



Functional diagram: Auto-discharge (pull-down)



Key features

- ▶ High power supply ripple rejection (PSRR)
- ▶ Very low quiescent current and low noise (40 μVrms)
- ▶ Small package size

Key benefits

- ▶ Very small package for mobile applications
- ▶ Very low standby and supply current for battery-powered solutions
- ▶ No additional noise bypass capacitor needed

Key applications

- ▶ Mobile phones, PC tablets, DSCs (digital still cameras), video cameras, game pads, notebooks, netbooks, ultrabooks

In the spotlight

High-PSRR LDO in very small DFN package

State-of-the-art dual-flat no-leads (DFN) package technology

Dimensions of only 1.0 x 1.0 x 0.55 mm

High power dissipation of 400 mW



LD6835 high PSRR low-dropout voltage regulators – 300 mA

types in **bold** represent new products

Package							DFN1010C-4 (SOT1194)		SOT753**	
										
Size (mm)							1.0 x 1.0 x 0.55		2.9 x 1.5 x 1.0	
P _{tot} (mW)							400		800	
V _{IN} (V)	I _{OUT} typ (mA)	Quiescent current (µA)	V _{do} drop @ 300 mA typ (mV)	Output noise typ (µVrms)	PSRR @ 1 kHz (dB)	Output voltage (V)*	LD6835K/xxH high-ohmic output stage	LD6835K/xxP pull-down output stage	LD6835TD/xxH high-ohmic output stage	LD6835TD/xxP pull-down output stage
1.75 - 5.5	300	30	240	50	75	1.2	LD6835K/12H	LD6835K/12P	LD6835TD/12H	LD6835TD/12P
						1.4	LD6835K/14H	LD6835K/14P	LD6835TD/14H	LD6835TD/14P
						1.5	LD6835K/15H	LD6835K/15P	LD6835TD/15H	LD6835TD/15P
						1.8	LD6835K/18H	LD6835K/18P	LD6835TD/18H	LD6835TD/18P
						2.5	LD6835K/25H	LD6835K/25P	LD6835TD/25H	LD6835TD/25P
						2.6	LD6835K/26H	LD6835K/26P	LD6835TD/26H	LD6835TD/26P
						2.8	LD6835K/28H	LD6835K/28P	LD6835TD/28H	LD6835TD/28P
						2.85	-	LD6835K/285P	-	-
						2.9	LD6835K/29H	LD6835K/29P	LD6835TD/29H	LD6835TD/29P
						3.0	LD6835K/30H	LD6835K/30P	LD6835TD/30H	LD6835TD/30P
						3.1	LD6835K/31H	LD6835K/31P	LD6835TD/31H	LD6835TD/31P
						3.3	LD6835K/33H	LD6835K/33P	LD6835TD/33H	LD6835TD/33P
						3.6	LD6835K/36H	LD6835K/36P	LD6835TD/36H	LD6835TD/36P

* Other output voltages are available on request ** Under development

Key features

- ▶ High power supply ripple rejection (PSRR)
- ▶ Very low quiescent current (30 µA) and low noise (50 µVrms)
- ▶ Small package size

Key benefits

- ▶ Very small package for mobile applications
- ▶ Very low standby and supply current for battery-powered solutions
- ▶ No additional noise bypass capacitor needed

Key applications

- ▶ Mobile phones, Tablet PCs, DSCs (digital still cameras), video cameras, game pads, notebooks, netbooks, ultrabooks

In the spotlight

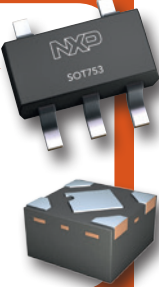
High-PSRR LDO with soft-start

Soft-start guarantees a constant start-up time

Limits the inrush current

Prevents unwanted input voltage dip

Ensures defined start-up behavior



LD6833 low quiescent current low-dropout voltage regulators – 300 mA

types in **bold** represent new products

Package							DFN1010C-4 (SOT1194)	
								
Size (mm)							1.0 x 1.0 x 0.55	
P _{tot} (mW)							400	
V _{IN} (V)	I _{OUT} typ (mA)	Quiescent current (µA)	V _{do} drop @ 150 mA typ (mV)	Output noise typ (µVrms)	PSRR @ 1 kHz (dB)	Output voltage (V)*	LD6833K/xxH high-ohmic output stage	LD6833K /xxP pull-down output stage
1.75 - 5.5	300	10	200	10	75	1.2	LD6833K/12H	LD6833K/12P
						1.4	LD6833K/14H	LD6833K/14P
						1.5	LD6833K/15H	LD6833K/15P
						1.8	LD6833K/18H	LD6833K/18P
						2.5	LD6833K/25H	LD6833K/25P
						2.6	LD6833K/26H	LD6833K/26P
						2.8	LD6833K/28H	LD6833K/28P
						2.9	LD6833K/29H	LD6833K/29P
						3.0	LD6833K/30H	LD6833K/30P
						3.1	LD6833K/31H	LD6833K/31P
						3.3	LD6833K/33H	LD6833K/33P
						3.6	LD6833K/36H	LD6833K/36P

* Other output voltages are available on request

Key features

- ▶ Ultra low quiescent current (10 µA) and ultra low noise (10 µVrms)
- ▶ High power supply ripple rejection (PSRR)

Key benefits

- ▶ Very low standby and supply current for battery-powered solutions
- ▶ Very small package for mobile applications
- ▶ No additional noise bypass capacitor needed

Key applications

- ▶ Mobile phones, Tablet PCs, DSCs (digital still cameras), video cameras, game pads, notebooks, netbooks, ultrabooks

In the spotlight

Ultra-low quiescent current

Soft-start ensures defined start-up behavior

Foldback circuit limits short circuit current

Temperature watchdog for over-temperature protection



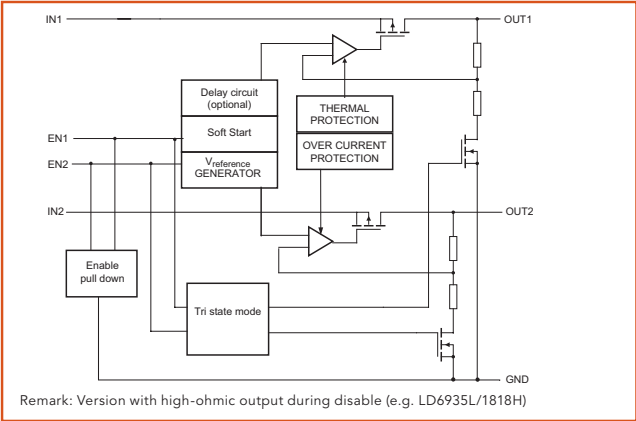
LD6915, LD6935 and LD6938 dual high-PSRR low-dropout voltage regulators – 150 mA and 300 mA

types in **bold** represent new products

Package							DFN1212-6 (SOT1229)				DFN1612-8 (SOT1225)		WLCSP6	
														
Size (mm)							1.2 x 1.2 x 0.4 mm				1.6 x 1.2 x 0.4 mm		1.2 x 0.8 x 0.47 mm	
P _{tot} (mW)							400				600		800	
V _{IN} (V)	Quiescent current (µA)	Output noise typ (µVrms)	PSRR @ 1kHz (dB)	I _{OUT} typ (mA)	V _{DO} drop @ 300 mA typ (mV)	Output voltage (V)*	LD6915LX/xxH high-ohmic output stage	LD6915LX/xxP pull-down output stage	LD6915LX/xxHD high-ohmic & delay circuit	LD6915LX/xxPD pull-down & delay circuit	LD6935L/xxH** high-ohmic output stage	LD6935L/xxP** pull-down output stage	LD6938CX6/xxH high-ohmic output stage	LD6938CX6/xxP pull-down output stage
1.75 - 5.5	30	50	75	2 x 150 (LD6915)	120 (LD6915)	1.2/1.2	-	-	-	-	-	-	-	LD6938CX6/1212P
						1.2/1.5	-	-	-	-	-	-	-	LD6938CX6/1215P
						1.2/1.8	-	-	-	-	-	-	-	LD6938CX6/1218P
						1.5/2.8	-	-	-	-	LD6935L/1528H	LD6935L/1528P	-	-
						1.8/1.5	-	LD6915LX/1815P	-	-	-	-	-	-
						1.8/1.8	-	LD6915LX/1818P	-	-	-	LD6935L/1818P	LD6938CX6/1818H	LD6938CX6/1818P
						1.8/1.25	-	-	-	-	-	-	-	LD6938CX6/18125P
						1.8/2.8	-	LD6915LX/1828P	-	-	-	LD6935L/1828P	-	-
						1.8/3.3	-	-	-	-	-	-	-	LD6938CX6/1833P
						2.8/1.8	-	LD6915LX/2818P	-	LD6915LX/2818PD	-	-	-	-
						2.8/2.8	-	-	-	-	LD6935L/2828H	-	-	LD6938CX6/2828P
						2.85/1.8	-	-	-	-	-	-	-	LD6938CX6/28518P
						2.85/3.0	-	-	-	-	-	-	-	LD6938CX6/28530P
				2 x 300 (LD6935, LD6938)	240 (LD6935, LD6938)	3.0/1.8	-	LD6915LX/3018P	-	-	LD6935L/3018H	LD6935L/3018P	-	LD6938CX6/3018P
						3.0/2.8	LD6915LX/3028H	LD6915LX/3028P	-	-	-	-	-	-
						3.0/3.0	-	-	-	-	-	LD6935L/3030P	-	LD6938CX6/3030P
						3.1/1.7	-	-	-	-	-	-	-	-
						3.1/3.1	-	-	-	-	-	LD6935L/3131P	-	-
						3.3/1.25	-	-	-	-	-	-	-	LD6938CX6/33125P
						3.3/1.8	-	LD6915LX/3318P	-	-	LD6935L/3318H	-	-	-
						3.3/2.8	LD6915LX/3328H	LD6915LX/3328P	LD6915LX/3328HD	-	LD6935L/3328H	-	-	LD6938CX6/3328P
						3.3/2.85	-	-	-	-	-	-	LD6938CX6/33285H	LD6938CX6/33285P
						3.3/3.0	-	-	-	-	-	LD6935L/3330P	-	LD6938CX6/3330P
						3.3/3.3	-	LD6915LX/3333P	-	-	-	LD6935L/3333P	-	LD6938CX6/3333P
						3.6/1.2	-	LD6915LX/3612P	-	-	-	-	LD6938CX6/3612H	-

* Other output voltages are available on request ** optionally available with delay circuit

Functional diagram: High-ohmic output



Key features

- ▶ High power supply ripple rejection (PSRR)
- ▶ Very low quiescent current (30 µA)
- ▶ Soft-start, thermal shutdown, foldback, current limiter, optional with delay circuit

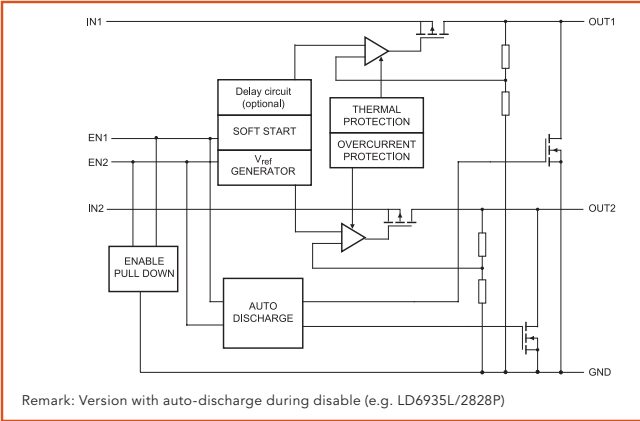
Key benefits

- ▶ Very low standby and supply current for battery-powered solutions
- ▶ Small packages for board space reduction
- ▶ No additional noise bypass capacitor needed

Key applications

- ▶ Mobile phones, tablet PCs, DSCs (digital still cameras), video cameras, game pads, notebooks, netbooks, ultrabooks

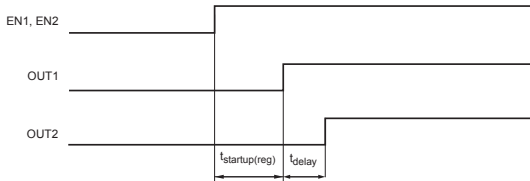
Functional diagram: Auto-discharge (pull-down)



In the spotlight

Delay Circuit

- ▶ The delay circuit prevents an unwanted input voltage dip when both outputs are enabled at the same time by delaying the second LDO



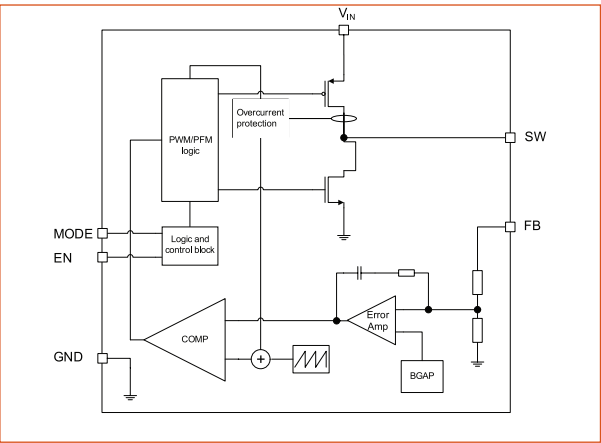
DC6M401, DC6M402 small size 6 MHz DC/DC buck converter – 425 mA

types in **bold** represent new products

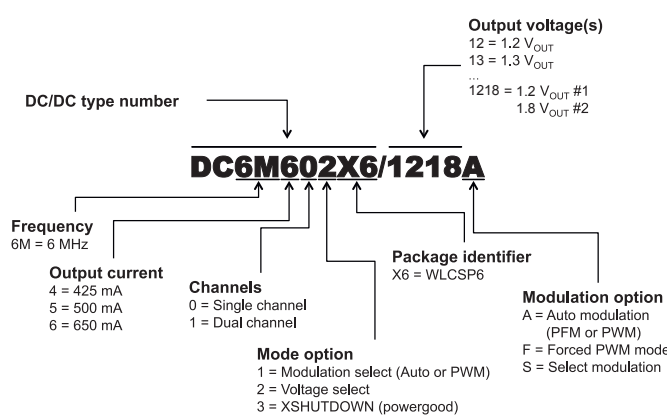
Package										WLCSP6
Size (mm)										1.36 x 0.96 x 0.47
P _{tot} (mW)										800
V _{IN} (V)	I _{OUT} (mA)	Operation frequency (MHz)	Quiescent current typ (µA)	Output voltage ripple typ (mV)	Efficiency up to (%)	Output voltage (V)*	DC6M401/xxxxS Modulation select		DC6M402/xxxxxA Voltage select auto modulation	
2.3 - 5.5	425	6	0.2	7	95	1.8	DC6M401X6/18S		-	
						2.85	DC6M401X6/285S		-	
						1.8 / 2.85	-		DC6M402X6/18285A	

* Other output voltages are available on request

Functional diagram



Part numbering for DC/DC converter



Key features

- ▶ True 6 MHz operation frequency
- ▶ Ultra-low output ripple of 7 mV (typ)
- ▶ Very high efficiency of up to 95%
- ▶ Inrush current limiter (soft start)
- ▶ Protection through thermal shutdown and current limiter

Key benefits

- ▶ Very small WLCSP package for board space reduction
- ▶ Only very small inductor or PCB coil needed (470 nH)
- ▶ Optimized for SD card and SIM card applications

Key applications

- ▶ Mobile phones, PC tablets, DSCs (digital still cameras), video cameras, game pads, notebooks, netbooks, ultrabooks
- ▶ Battery operated applications requiring a lower-than-battery-voltage supply with high currents and high-efficiency down conversion

In the spotlight

6 MHz DC/DC buck converter in WLCSP6 package

- High frequency (6MHz) allows usage of small 470 nH inductor
- Very small package → Waferlevel chip scale package
- Ultra-low output ripple of 7 mV (typ)
- Very high efficiency of up to 95%
- 425 mA, 500 mA and 650 mA output
- 3 mode types available (PWM/PFM, voltage selection, XSHUTDOWN)



DC6M501, DC6M502, DC6M503 small size 6 MHz DC/DC buck converter – 500 mA

types in **bold** represent new products

Package							WLCSP6			
										
Size (mm)							1.36 x 0.96 x 0.47			
P _{tot} (mW)							800			
V _{IN} (V)	I _{OUT} (mA)	Operation frequency (MHz)	Quiescent current typ (µA)	Output voltage ripple typ (mV)	Efficiency up to (%)	Output voltage (V)*	DC6M501/xxxxS Modulation select	DC6M502/xxxxxA Voltage select auto modulation	DC6M502/xxxxxF Voltage select forced PWM	DC6M503/xxxxA XSHUTDOWN auto modulation
2.3 - 5.5	500	6	0.2	7	95	1.2	DC6M501X6/12S	-	-	DC6M503X6/12A
						1.5	DC6M501X6/15S	-	-	DC6M503X6/15A
						1.8	DC6M501X6/18S	-	-	DC6M503X6/18A
						1.2 / 1.5		DC6M502X6/1215A	DC6M502X6/1215F	-
						1.2 / 1.8	-	DC6M502X6/1218A	DC6M502X6/1218F	-
						1.5 / 1.8	-	DC6M502X6/1518A	DC6M502X6/1518F	-

* Other output voltages are available on request

Key features

- ▶ True 6 MHz operation frequency
- ▶ Ultra-low output ripple of 7 mV (typ)
- ▶ Very high efficiency of up to 95%
- ▶ Inrush current limiter (soft start)
- ▶ Protection through thermal shutdown and current limiter

- ▶ Only very small inductor or PCB coil needed (470 nH)
- ▶ Supports SMIA standard (XSHUTDOWN/powergood)

Key applications

- ▶ Mobile phones, tablet PCs, DSCs (digital still cameras), video cameras, game pads, notebooks, netbooks, ultrabooks
- ▶ Battery operated applications requiring a lower-than-battery-voltage supply with high currents and high-efficiency down conversion

Key benefits

- ▶ Very small WLCSP package for board space reduction

DC6M601, DC6M602, DC6M603 small size 6 MHz DC/DC buck converter – 650 mA

types in **bold** represent new products

Package							WLCSP6			
										
Size (mm)							1.36 x 0.96 x 0.47			
P _{tot} (mW)							800			
V _{IN} (V)	I _{OUT} (mA)	Operation frequency (MHz)	Quiescent current typ (µA)	Output voltage ripple typ (mV)	Efficiency up to (%)	Output voltage (V)*	DC6M601/xxS Modulation select	DC6M602/xxxxxA Voltage select auto modulation	DC6M602/xxxxxF Voltage select forced PWM	DC6M603/xxxA XSHUTDOWN auto modulation
2.3 - 5.5	650	6	0.2	7	95	1.2	DC6M601X6/12S	-	-	DC6M603X6/12A
						1.5	DC6M601X6/15S	-	-	DC6M603X6/15A
						1.8	DC6M601X6/18S	-	-	DC6M603X6/18A
						2.85	DC6M601X6/285S	-	-	-
						1.2 / 1.5	-	DC6M602X6/1215A	DC6M602X6/1215F	-
						1.2 / 1.8	-	DC6M602X6/1218A	DC6M602X6/1218F	-
						1.5 / 1.8	-	DC6M602X6/1518A	DC6M602X6/1518F	-

* Other output voltages are available on request

Key features

- ▶ True 6 MHz operation frequency
- ▶ Ultra-low output ripple of 7 mV (typ)
- ▶ Very high efficiency of up to 95%
- ▶ Inrush current limiter (soft start)
- ▶ Protection through thermal shutdown and current limiter

- ▶ Only a very small inductor or PCB coil is needed (470 nH)
- ▶ Supports SMIA standard (XSHUTDOWN/powergood)

Key applications

- ▶ Mobile phones, tablet PCs, DSCs (digital still cameras), video cameras, game pads, notebooks, netbooks, ultrabooks
- ▶ Battery operated applications requiring a lower-than-battery-voltage supply with high currents and high-efficiency down conversion

Key benefits

- ▶ Very small WLCSP package for board space reduction

TL431 adjustable shunt voltage regulator with V_{ref} = 2.495 V

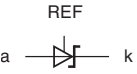
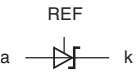
Package				SOT23		
						
Size (mm)				2.9 x 1.3 x 1.0		
P _{tot} (mW)				580		
Pinning configuration				Normal pinning*	Mirrored pinning*	
V _{KA} (V)	I _K (mA)	V _{ref}	T _{amb} (°C)			
36	100	2.495	2%	0 to 70	TL431CDBZR ¹⁾	
				-40 to 85	TL431IDBZR ¹⁾	
				-40 to 125	TL431QDBZR ¹⁾	
			1%	-40 to 125	TL431FDT ²⁾	TL431MFDT ²⁾
				-40 to 125	TL431SDT ³⁾	TL431MSDT ³⁾
				-40 to 125	TL431ACDBZR ¹⁾	
		0.5%	-40 to 85	TL431AIDBZR ¹⁾		
			-40 to 125	TL431AQDBZR ¹⁾		
			-40 to 125	TL431AFDT ²⁾	TL431AMFDT ²⁾	
			-40 to 125	TL431ASDT ³⁾	TL431AMSDT ³⁾	
			-40 to 70	TL431BCDBZR ¹⁾		
			-40 to 85	TL431BIDBZR ¹⁾		
			-40 to 125	TL431BQDBZR ¹⁾		
-40 to 125	TL431BFDT ²⁾	TL431BMFDT ²⁾				
-40 to 125	TL431BSDT ³⁾	TL431BMSDT ³⁾				

¹⁾ Offers enhanced stability area and very low load capacity requirement

²⁾ Offers higher ElectroMagnetic Interference (EMI) ruggedness, e.g. for Switch Mode Power Supply

³⁾ Is designed for standard requirements and linear applications

* Normal pinning vs. mirrored pinning for TL431

	Pin	Symbol	Description	Simplified outline	Grafic symbol
Normal pinning	1	k	cathode		
	2	REF	reference		
	3	a	anode		
Mirrored pinning	1	REF	reference		
	2	k	cathode		
	3	a	anode		

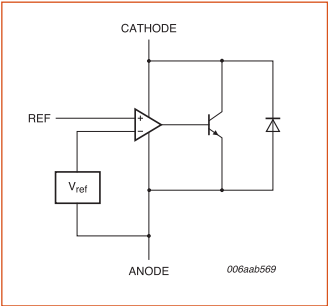
Key benefits

- ▶ Simple solution to achive a stabilized voltage
- ▶ Any output voltage from 2.5 to 36 V can be set by just two external resistors
- ▶ Full temperature range from -40 to 125 °C
- ▶ Low temperature drift: typically 6 mV (between 0 and 70 °C)
- ▶ Low output noise
- ▶ High quality level according AEC-Q100

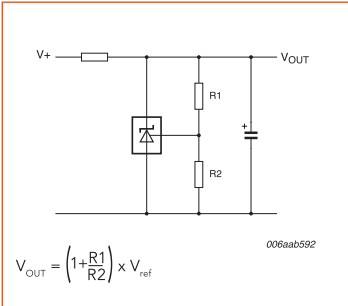
Key applications

- ▶ Shunt voltage regulator
- ▶ Precision current limiter
- ▶ Precision constant current sink
- ▶ Isolated feedback loop for Switch Mode Power Supply (SMPS)

Functional diagram



Shunt voltage regulator



Any voltage in the given range can be set by only 2 external resistors

Constant current source

Package	SOT353 (SC-88A)						
							
Size (mm)	2.0 x 1.25 x 0.95						
P _{tot} (mW)	335						
Type	PSSI2021SAY						
Description	maximum supply voltage	maximum supply current	typical stabilized output current	minimum stabilized output current	maximum stabilized output current	typical load stability of stabilized output current	typical output current change over ambient temperature
Parameter	V _s max (V)	I _s max (mA)	I _{out} typ (μA)	I _{out} min (mA)	I _{out} max (mA)	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

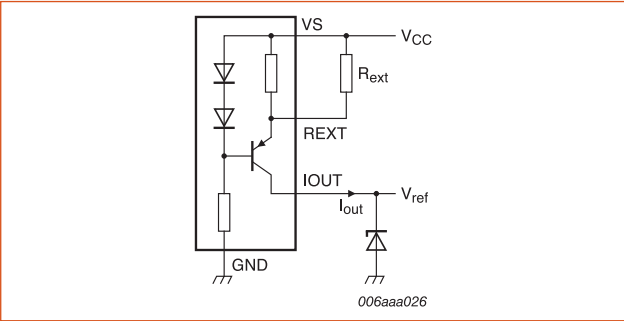
Key features and benefits

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

Key applications

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

Voltage reference

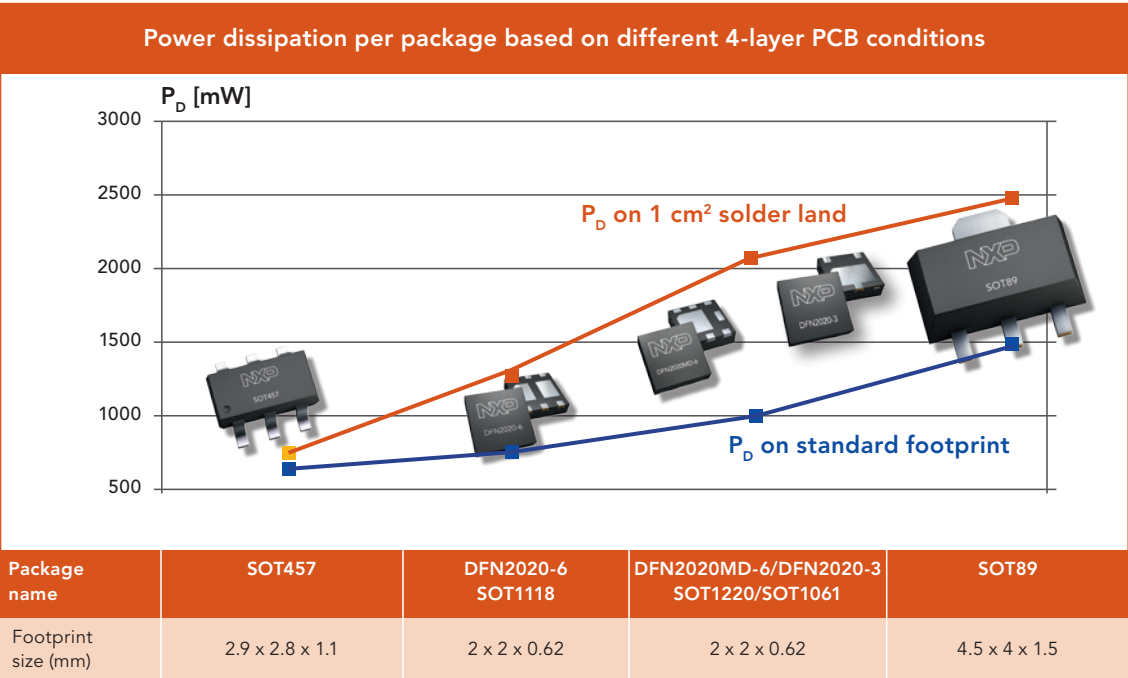


Packages

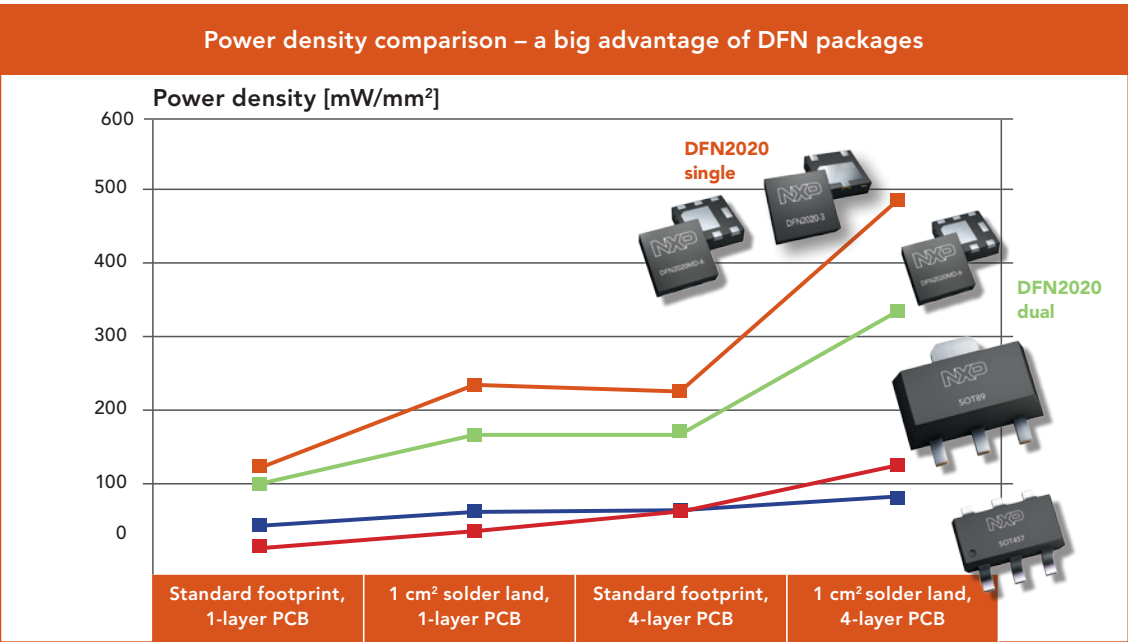
Package details and packing methods	144
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Minimized outline drawings and reflow soldering footprint	158

New DFN packages with best-in-class thermal capabilities

Thermal capability comparison



DFN packages have the best heat dissipation capabilities



Our extensive package range provides maximum flexibility

	Ultra small	Very small	Small	Medium power
2 Pins	DSN0603-2 (SOD962) 0.6 x 0.3 x 0.3 DFN1004D-2 (SOD882) 1.0 x 0.6 x 0.37 DFN1006-2 (SOD882) 1.0 x 0.6 x 0.48 DFN1608D-2 (SOD1408) 1.6 x 0.8 x 0.37	SOD323 1.7 x 1.25 x 0.95 SOD323F 1.7 x 1.25 x 0.7	SOD123F 2.6 x 1.6 x 1.1 SOD123W 2.6 x 1.7 x 1.0	SOD128 3.8 x 2.6 x 1.0
3 Pins	DFN1006B-3 (SOT883) 1.0 x 0.6 x 0.37 DFN1006-3 (SOT1215) 1.1 x 1.0 x 0.37 DFN1010D-3 (SOT1216) 1.1 x 1.0 x 0.37 SOT416 1.6 x 0.8 x 0.77	SOT323 2.0 x 1.25 x 0.95 DFN2020-3 (SOT1061) 2.0 x 2.0 x 0.62	SOT23 2.9 x 1.3 x 1.0	SOT89 4.5 x 2.5 x 1.5 SOT428 6.6 x 6.1 x 2.3
4/5 Pins	WLSP4* (SOT1194) 0.76 x 0.76 x 0.61 DFN1010C-4 (SOT1194) 1.0 x 1.0 x 0.35 WLSP5* (SOT1194) 1.51 x 1.14 x 0.65 SOT665 1.6 x 1.2 x 0.55	SOT353 2.0 x 1.25 x 0.95	SOT143B 2.9 x 1.3 x 1.0 SOT753 2.9 x 1.5 x 1.0	LPFAK33 3.3 x 3.3 x 0.85 Power-SO8 4.9 x 4.45 x 1.0 SOT223 6.5 x 3.5 x 1.65
6 Pins	DFN1010E-6 (SOT1202) 1.0 x 1.0 x 0.33 DFN1010-6 (SOT891) 1.0 x 1.0 x 0.48 DFN1010B-6 (SOT1216) 1.1 x 1.0 x 0.37 DFN1410-6 (SOT886) 1.45 x 1.0 x 0.48 WLSP6* (SOT1194) 1.6 x 1.15 x 0.65 SOT666 1.6 x 1.2 x 0.55	SOT363 2.0 x 1.25 x 0.95 DFN2020MD-6 (SOT1220) 2.0 x 2.0 x 0.62 DFN2020-6 (SOT1118) 2.0 x 2.0 x 0.62	SOT457 2.9 x 1.5 x 1.0	LPFAK65D (SOT1205) 4.9 x 4.45 x 1.0
> 8 Pins	WLSP9* (SOT1157) 1.56 x 1.16 x 0.61 DFN1712-8 (SOT1157) 1.7 x 1.2 x 0.48 DFN1714U-8 (SOT983) 1.7 x 1.35 x 0.5	WLSP16* (SOT1178) 1.9 x 1.17 x 0.65 DFN2110-9 (SOT1178) 2.1 x 1.0 x 0.48 WLSP24* (SOT1118) 2.45 x 2.4 x 0.65	DFN2510A-10 (SOT1176) 2.5 x 1.0 x 0.48 DFN2520-9 (SOT1333) 2.5 x 2.0 x 0.48 DFN2512-12 (SOT1158) 2.5 x 2.1 x 0.48	SOT505 3.0 x 3.0 x 1.1 SOT552 3.0 x 3.0 x 1.1 DFN4020-14 (SOT1334) 4.0 x 2.0 x 0.48

A partner of excellence, experience and innovation for our customers

Package details and packing methods SMD – Part 1

Package details					Packing methods																		
Pins	Package	Package size (l x w x h) (mm)	Lead pitch (mm)	Package	Packing method and tape dimension	Reel dimension (d x w) (mm)	Taping	Packing quantity and ordering code (12NC ending)															
								500	800	1000	1400	1500	2000	2500	3000	4000	4500	5000	6000	8000	9000	10000	
2	DFN1006-2 (SOD882)	1.0 x 0.6 x 0.48	0.65		2 mm pitch, 8 mm tape and reel	180 x 8	-																-315
	DFN1006D-2 (SOD882D)	1.0 x 0.6 x 0.37	0.65		2 mm pitch, 8 mm tape and reel	180 x 8	-																-315
	DFN1608D-2 (SOD1608)	1.6 x 0.8 x 0.37	0.94		2 mm pitch, 8 mm tape and reel	180 x 8	-														-315		
	DSN0603-2 (SOD962)	0.6 x 0.3 x 0.3	0.4		2 mm pitch, 8 mm tape and reel	180 x 8	-															-315	
	SOD80C (MiniMelf)	3.5 x 1.5 x 1.5	-		4 mm pitch, 8 mm tape and reel	180 x 8	-							-115									
					4 mm pitch, 8 mm tape and reel	330 x 8	-															-135	
	SOD123F	2.6 x 1.6 x 1.1	-		4 mm pitch, 8 mm tape and reel	180 x 8	-								-115								
	SOD123W	2.6 x 1.7 x 1.0	-		4 mm pitch, 8 mm tape and reel	180 x 8	-								-115								
	SOD128	3.8 x 2.5 x 1.0	-		4 mm pitch, 12 mm tape and reel	180 x 12	-									-115							
	SOD323 (SC-76)	1.7 x 1.25 x 0.95	-		4 mm pitch, 8 mm tape and reel	180 x 8	-								-115								
					4 mm pitch, 8 mm tape and reel	286 x 8	-															-135	
	SOD323F (SC-90)	1.7 x 1.25 x 0.7	-		4 mm pitch, 8 mm tape and reel	180 x 8	-								-115								
					4 mm pitch, 8 mm tape and reel	286 x 8	-															-135	
	SOD523 (SC-79)	1.2 x 0.8 x 0.6	-		2 mm pitch, 8 mm tape and reel	180 x 8	-														-315		
					4 mm pitch, 8 mm tape and reel	180 x 8	-							-115									
					4 mm pitch, 8 mm tape and reel	286 x 8	-																-135
3	DFN1006-3 (SOT883)	1.0 x 0.6 x 0.48	0.65		2 mm pitch, 8 mm tape and reel	180 x 8	-															-315	
	DFN1006B-3 (SOT883B)	1.0 x 0.6 x 0.37	0.65		2 mm pitch, 8 mm tape and reel	180 x 8	T4															-315	
	DFN1010D-3 (SOT1215)	1.1 x 1.0 x 0.37	0.75		4 mm, 8 mm tape and reel	180 x 8	T3										-115						
	DFN2020-3 (SOT1061)	2.0 x 2.0 x 0.62	1.3		4 mm pitch, 8 mm tape and reel	180 x 8	-								-115								
	SOT23	2.9 x 1.3 x 1.0	0.95		4 mm pitch, 8 mm tape and reel	180 x 8	-									-215							
					4 mm pitch, 8 mm tape and reel	286 x 8	-															-235	
	SOT89 (SC-62)	4.5 x 2.5 x 1.5	1.5		8 mm pitch, 12 mm tape and reel	180 x 12	T1			-115													
					8 mm pitch, 12 mm tape and reel	330 x 12	T1								-135								
					8 mm pitch, 12 mm tape and reel	180 x 12	T3			-146													
					8 mm pitch, 12 mm tape and reel	180 x 12	T4			-147													
	SOT323 (SC-70)	2.0 x 1.25 x 0.95	0.65		4 mm pitch, 8 mm tape and reel	180 x 8	-								-115								
					4 mm pitch, 8 mm tape and reel	286 x 8	-															-135	
	SOT416 (SC-75)	1.6 x 0.8 x 0.77	0.5		4 mm pitch, 8 mm tape and reel	180 x 8	-								-115								
					4 mm pitch, 8 mm tape and reel	286 x 8	-															-135	
	SOT663	1.2 x 1.6 x 0.55	0.5		4 mm pitch, 8 mm tape and reel	180 x 8	-									-115							

Package details and packing methods SMD – Part 2

Package details					Packing methods																		
Pins	Package	Package size (l x w x h) (mm)	Lead pitch (mm)	Package	Packing method and tape dimension	Reel dimension (d x w) (mm)	Taping	Packing quantity and ordering code (12NC ending)															
								500	800	1000	1400	1500	2000	2500	3000	4000	4500	5000	6000	8000	9000	10000	
4	DFN1010C-4 (SOT1194)	1.0 x 1.0 x 0.52	0.65		2 mm pitch, 8 mm tape and reel	180 x 8	-																-115
	SOT143B	2.9 x 1.3 x 1.0	1.9		4 mm pitch, 8 mm tape and reel	180 x 8	-									-215							
					4 mm pitch, 8 mm tape and reel	286 x 8	-															-235	
	SOT223 (SC-73)	6.5 x 3.5 x 1.65	2.3		8 mm pitch, 12 mm tape and reel	180 x 12	-			-115													
8 mm pitch, 12 mm tape and reel					330 x 12	-									-135								
5	SOT753	2.9 x 1.5 x 1.0	0.95		4 mm pitch, 8 mm tape and reel	180 x 8	T1									-115							
					4 mm pitch, 8 mm tape and reel	180 x 8	T2									-125							
	SOT353 (SC-88A)	2.0 x 1.25 x 0.95	0.65		4 mm pitch, 8 mm tape and reel	180 x 8	T1								-115								
					4 mm pitch, 8 mm tape and reel	286 x 8	T1														-135		
					4 mm pitch, 8 mm tape and reel	180 x 8	T2									-125							
	SOT665	1.6 x 1.2 x 0.55	0.5		4 mm pitch, 8 mm tape and reel	286 x 8	T2															-165	
2 mm pitch, 8 mm tape and reel					180 x 8	-														-315			
6	DFN1010E-6 (SOT1202)	1.0 x 1.0 x 0.33	0.35		4 mm pitch, 8 mm tape and reel	180 x 8	T4												-132				
					4 mm pitch, 8 mm tape and reel	180 x 8	T4													-132			
	DFN1010-6 (SOT891)	1.0 x 1.0 x 0.48	0.35		4 mm pitch, 8 mm tape and reel	180 x 8	T4												-132				
	DFN1010B-6 (SOT1216)	1.1 x 1.0 x 0.37	0.35		4 mm, 8 mm tape and reel	180 x 8	T3												-115				
	DFN1410-6 (SOT886)	1.45 x 1.0 x 0.48	0.5		4 mm pitch, 8 mm tape and reel	180 x 8	T1												-115				
					4 mm pitch, 8 mm tape and reel	180 x 8	T4													-132			
	DFN1616-6 (SOT1189)	1.6 x 1.6 x 0.48	0.5		4 mm pitch, 8 mm tape and reel	180 x 8	-											-115					
	DFN2020-6 (SOT1118)	2.0 x 2.0 x 0.62	0.65		4 mm pitch, 8 mm tape and reel	180 x 8	-									-115							
	DFN2020MD-6 (SOT1220)	2.0 x 2.0 x 0.62	0.65		4 mm pitch, 8 mm tape and reel	180 x 8	-									-115							
	SOT363 (SC-88)	2.0 x 1.25 x 0.95	0.65		4 mm pitch, 8 mm tape and reel	180 x 8	T1									-115							
					4 mm pitch, 8 mm tape and reel	286 x 8	T1															-135	
					4 mm pitch, 8 mm tape and reel	180 x 8	T2									-125							
					4 mm pitch, 8 mm tape and reel	286 x 8	T2															-165	
	SOT457 (SC-74)	2.9 x 1.5 x 1.0	0.95		4 mm pitch, 8 mm tape and reel	180 x 8	T1									-115							
					4 mm pitch, 8 mm tape and reel	286 x 8	T1															-135	
					4 mm pitch, 8 mm tape and reel	180 x 8	T2									-125							
4 mm pitch, 8 mm tape and reel					286 x 8	T2															-165		
SOT666	1.6 x 1.2 x 0.55	0.5		2 mm pitch, 8 mm tape and reel	180 x 8	-														-315			
				4 mm pitch, 8 mm tape and reel	180 x 8	-											-115						

Package details and packing methods SMD – Part 3

Package details					Packing methods																	
Pins	Package	Package size (l x w x h) (mm)	Lead pitch (mm)	Package	Packing method and tape dimension	Reel dimension (d x w) (mm)	Taping	Packing quantity and ordering code (12NC ending)														
								500	800	1000	1400	1500	2000	2500	3000	4000	4500	5000	6000	8000	9000	10000
8	DFN3333-8 (SOT873-1)	3.3 x 3.3 x 1.0	0.65		8 mm pitch, 12 mm tape and reel	180 x 12	-				-118											
	SOT96 (SO8)	4.9 x 3.9 x 1.75	1.27		8 mm pitch, 12 mm tape and reel	180 x 12	-			-115												
					8 mm pitch, 12 mm tape and reel	330 x 12	-						-118									
	SOT505 (TSSOP8)	3.0 x 3.0 x 1.1	0.65		8 mm pitch, 12 mm tape and reel	330 x 12	-						-118									
	DFN1712-8 (SOT1157)	1.7 x 1.2 x 0.48	0.4		4 mm pitch, 8 mm tape and reel	180 x 8	-								-132							
	DFN1714-8 (SOT1166)	1.7 x 1.35 x 0.52	0.4		4 mm pitch, 8 mm tape and reel	180 x 8	T1								-115							
					4 mm pitch, 8 mm tape and reel	180 x 8	T2								-132							
DFN1714U-8 (SOT983)	1.7 x 1.35 x 0.48	0.4		4 mm pitch, 8 mm tape and reel	180 x 8	-								-118								
9	DFN2110-9 (SOT1178)	2.1 x 1.0 x 0.48	0.4		4 mm pitch, 8 mm tape and reel	180 x 8	-								-115							
10	DFN2510-10 (SOT1165)	2.5 x 1.0 x 0.48	0.5		4 mm pitch, 8 mm tape and reel	180 x 8	-										-115					
	DFN2510A-10 (SOT1176)	2.5 x 1.0 x 0.48	0.5		4 mm pitch, 8 mm tape and reel	180 x 8	-									-115						
	SOT552 (TSSOP10)	3.0 x 3.0 x 1.1	0.5		8 mm pitch, 12 mm tape and reel	330 x 12	-						-118									
	DFN2626-10 (SOT1197)	2.6 x 2.6 x 0.48	0.5		4 mm pitch, 8 mm tape and reel	180 x 8	-								-115							
12	DFN2521-12 (SOT1156)	2.5 x 2.1 x 0.48	0.4		4 mm pitch, 8 mm tape and reel	180 x 8	-								-132							
	DFN2512-12 (SOT1158)	2.5 x 1.2 x 0.48	0.4		4 mm pitch, 8 mm tape and reel	180 x 8	-								-132							
	DFN2514-12 (SOT1167)	2.5 x 1.35 x 0.53	0.4		4 mm pitch, 8 mm tape and reel	180 x 8	-								-132							
	DFN2514U-12 (SOT984)	2.5 x 1.35 x 0.48	0.4		4 mm pitch, 8 mm tape and reel	180 x 8	-								-118							
14	SOT108 (SO14)	8.65 x 3.9 x 1.75	1.27		8 mm pitch, 16 mm tape and reel	330 x 16	-						-118									
	SOT337 (SSOP14)	6.2 x 5.3 x 2	0.65		12 mm pitch, 16 mm tape and reel	330 x 16	-						-118									
	SOT402 (TSSOP14)	5.0 x 4.4 x 1.1	0.65		8 mm pitch, 12 mm tape and reel	330 x 12	-							-118								
16	SOT519 (SSOP16)	4.9 x 3.9 x 1.73	0.635		8 mm pitch, 12 mm tape and reel	330 x 12	-						-118									
	DFN3312-16 (SOT1159)	3.3 x 1.2 x 0.48	0.4		4 mm pitch, 12 mm tape and reel	180 x 12	-								-132							
	DFN3314-16 (SOT1168)	3.3 x 1.35 x 0.53	0.4		4 mm pitch, 8 mm tape and reel	180 x 8	-								-132							
	DFN3314U-16 (SOT985)	3.3 x 1.35 x 0.48	0.4		4 mm pitch, 12 mm tape and reel	180 x 12	-								-118							
20	SOT163 (SO20)	12.8 x 7.5 x 2.65	1.27		12 mm pitch, 24 mm tape and reel	180 x 24	-	-115														
					12 mm pitch, 24 mm tape and reel	330 x 24	-					-118										
	SOT360 (TSSOP20)	6.5 x 4.4 x 1.1	0.65		12 mm pitch, 16 mm tape and reel	330 x 16	-							-118								
32	DFN5050-32 (SOT617)	5.0 x 5.0 x 1.0	0.5		8 mm pitch, 12 mm tape and reel	330 x 12	T1										-118*					
36	SOT357	10.0 x 10.0 x 1.2	0.5		16 mm pitch, 24 mm tape and reel	330 x 24	-					-118										
38	SOT510 (TSSOP38)	9.7 x 4.4 x 1.1	0.5		8 mm pitch, 16 mm tape and reel	330 x 16	-						-118									

* valid for IP4788CZ32
** valid for IP4786CZ32
valid for IP4787CZ32

Packing methods glass diodes, single ended and through hole packages

Pins / leads	Package	Packing method and tape/reel/tube dimensions	Package	Ordering code (12 NC ending)	Packing quantity
2	SOD27	26 mm tape ammo pack, axial		-143	5000 pcs
		52 mm tape ammo pack, axial		-133	10000 pcs
		52 mm reel pack, axial		-113	10000 pcs
	SOD59	Rail packing, 50 pcs/tube, tube length = 520 mm		-127	20 tubes x 50 pcs
	SOD66	52 mm tape ammo pack, axial		-133	10000 pcs
		52 mm reel pack, axial		-113	10000 pcs
	SOD68	26 mm tape ammo pack, axial		-143	5000 pcs
		52 mm reel pack, axial		-113	10000 pcs
	SOD113	52 mm tape ammo pack, axial		-133	10000 pcs
		Rail packing, 50 pcs/tube, tube length = 520 mm		-127	20 tubes x 50 pcs
3	SOD141	52 mm tape ammo pack, axial		-133	12000 pcs
		Bulk pack, 500 pcs. per carrier		-112	20 carriers x 500 pcs
		Bulk pack, 1000 pcs/carrier		-112	5 carriers x 1000 pcs
		55 mm reel packing, 2000 pcs/reel, reel dimensions = 380 x 55 mm		-116	5 reels x 2000 pcs
	SOT54	Ammo packing, 18 mm tape, 2000 pcs/carrier, reel dimensions = 350 x 55 mm		-126	5 carriers x 2000 pcs
		Bulk pack, 1000 pcs/carrier		-412	5 carriers x 1000 pcs
	SOT78	Rail packing, 50 pcs/tube, tube length = 520 mm		-127	20 tubes x 50 pcs
	SOT78D	Rail packing, 50 pcs/tube, tube length = 520 mm		-127	20 tubes x 50 pcs
	SOT82	Rail packing, 50 pcs/tube, tube length = 390 mm		-127	20 tubes x 50 pcs
	SOT186A	Rail packing, 50 pcs/tube, tube length = 520 mm		-127	20 tubes x 50 pcs
5	SOT226	Rail packing, 50 pcs/tube, tube length = 520 mm		-127	20 tubes x 50 pcs
				-127	20 tubes x 50 pcs
				-127	20 tubes x 50 pcs
				-127	20 tubes x 50 pcs
				-127	20 tubes x 50 pcs
5	SOT533	Rail packing		-127	75 tubes x 50 pcs
				-127	75 tubes x 50 pcs
				-127	75 tubes x 50 pcs
				-127	75 tubes x 50 pcs
				-127	75 tubes x 50 pcs
5	SOT263B-1	Rail packing		-127	20 tubes x 50 pcs
				-127	20 tubes x 50 pcs
				-127	20 tubes x 50 pcs
				-127	20 tubes x 50 pcs
				-127	20 tubes x 50 pcs



Single Ended and Through Hole Packages

2 Pins



SOD59
15.7 x 9.98 x 4.5

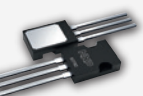


SOD113
15.5 x 10.0 x 4.3

3 Pins



SOT54
4.6 x 3.9 x 5.1



SOT82
10.8 x 7.5 x 2.55



SOT226
11.0 x 10.0 x 4.3



SOT533
6.1 x 6.6 x 2.3



SOT186A
15.5 x 10.0 x 4.3



SOT78
15.6 x 10.0 x 4.4

Package details and packing methods WLCSP – Part 1

BasicType	length x width x height	# of balls	pitch	Package	Package
IP3048C x 5	1.51 x 1.14 x 0.65	5	0.5		WLCSP5
IP3088CX10	3.96 x 1.28 x 0.65	10	0.5		WLCSP10
IP3088CX15	3.96 x 1.28 x 0.65	15	0.5		WLCSP15
IP3088CX20	3.96 x 1.28 x 0.65	20	0.5		WLCSP20
IP3088CX5	3.96 x 1.28 x 0.65	5	0.5		WLCSP5
IP3337CX18	2.06 x 1.66 x 0.61	18	0.4		WLCSP18
IP3338CX24	2.11 x 2.11 x 0.61	24	0.4		WLCSP24
IP3348CX10	1.06 x 0.76 x 0.61	10	0.4		WLCSP10
IP3348CX15	1.06 x 0.76 x 0.61	15	0.4		WLCSP15
IP3348CX20	1.06 x 0.76 x 0.61	20	0.4		WLCSP20
IP3348CX5	1.06 x 0.76 x 0.61	5	0.4		WLCSP5
IP4027CX20	2.43 x 1.92 x 0.65	20	0.5		WLCSP20
IP4035CX24	2.45 x 2.41 x 0.65	24	0.5		WLCSP24
IP4041CX25	2.41 x 2.41 x 0.65	25	0.5		WLCSP25
IP4042CX5	1.34 x 0.94 x 0.65	5	0.5		WLCSP5
IP4043CX5	1.12 x 1.12 x 0.41	5	0.5		WLCSP5
IP4047CX6	1.56 x 1.01 x 0.65	6	0.5		WLCSP6
IP4048CX5	1.28 x 0.91 x 0.65	5	0.5		WLCSP5
IP4049CX5	1.28 x 0.91 x 0.65	5	0.5		WLCSP5
IP4052CX20	2.54 x 1.96 x 0.65	20	0.5		WLCSP20
IP4053CX15	2.96 x 1.32 x 0.65	15	0.5		WLCSP15
IP4054CX15	2.96 x 1.32 x 0.65	15	0.5		WLCSP15
IP4059CX5	1.34 x 0.96 x 0.65	5	0.5		WLCSP5
IP4060CX16	1.97 x 1.96 x 0.65	16	0.5		WLCSP16
IP4064CX8	1.41 x 1.41 x 0.65	8	0.5		WLCSP8
IP4065CX11	1.97 x 1.47 x 0.65	11	0.5		WLCSP11
IP4085CX4	0.91 x 0.91 x 0.65	4	0.5		WLCSP4
IP4302CX2	0.7 x 0.52 x 0.38	2	0.4		WLCSP2
IP4303CX4	0.76 x 0.76 x 0.61	4	0.4		WLCSP4

Package details and packing methods WLCSP – Part 2

BasicType	length x width x height	# of balls	pitch	Package	Package
IP4306CX2	0.67 x 0.49 x 0 x 38	2	0.4		WLCSP2
IP4309CX9	1.16 x 1.16 x 0.61	9	0.4		WLCSP9
IP4310CX8	1.16 x 1.16 x 0.61	8	0.4		WLCSP8
IP4320CX9	1.16 x 1.16 x 0.61	9	0.4		WLCSP9
IP4327CX15	2.36 x 1.05 x 0.61	15	0.4		WLCSP15
IP4337CX18	1.96 x 1.61 x 0.61	18	0.4		WLCSP18
IP4338CX24	2.01 x 1.96 x 0.61	24	0.4		WLCSP24
IP4340CX15	1.56 x 1.56 x 0.47	15	0.4		WLCSP15
IP4342CX5	1.06 x 0.76 x 0.20	5	0.4		WLCSP5
IP4343CX5	0.93 x 0.93 x 0.61	5	0.4		WLCSP5
IP4350CX24	2.11 x 1.95 x 0.61	24	0.4		WLCSP24
IP4352CX24	2.02 x 2.01 x 0.61	24	0.4		WLCSP24
IP4353CX15	2.36 x 1.06 x 0.61	15	0.4		WLCSP15
IP4355CX6	1.16 x 0.76 x 0.61	6	0,4		WLCSP6
IP4357CX17	2.4 x 1.1 x 0.61	17	0,4		WLCSP17
IP4359CX4	0.76 x 0.76 x 0.61	4	0,4		WLCSP4
IP4364CX8	1.41 x 1.41 x 0.65	8	0,4		WLCSP8
IP4365CX11	1.56 x 1.16 x 0.61	11	0,4		WLCSP11
IP4366CX8	1.41 x 1.41 x 0.65	8	0,4		WLCSP8
IP4386CX4	0.91 x 0.91 x 0.65	4	0,4		WLCSP4
IP4387CX4	0.91 x 0.91 x 0.65	4	0,4		WLCSP4
IP4389CX4	0.76 x 0.76 x 0.5	4	0,4		WLCSP4
IP5002CX8	1.62 x 1.57 x 0.65	8	0,5		WLCSP8
PEMI4CSP-RT	1.56 x 1.05 x 0.61	10	0,4		WLCSP10
PEMI4CSP-RW	1.56 x 1.05 x 0.61	10	0,4		WLCSP10
PEMI6CSP-RT	2.36 x 1.05 x 0.61	15	0,4		WLCSP15
PEMI6CSP-RW	2.36 x 1.05 x 0.61	15	0,4		WLCSP15
PEMI8CSP-RT-P	3.16 x 1.05 x 0.61	20	0,4		WLCSP20
PEMI8CSP-RW-P	3.16 x 1.05 x 0.61	20	0,4		WLCSP20

Package cross reference

Pins / leads	NXP	Industry standard names	Size (l x w x h) (mm)	P _{tot} (mW)	Package	Competitor synonyms								
						Rohm	Toshiba	ON Semi	Renesas	Infineon	Diodes Inc	KEC	Vishay	Semtech
2	DFN1006-2 (SOD882)	-	1.0 x 0.6 x 0.48	250			CTS2	SOD923-2		TSLP-2-1	XI-DFN1006-2	ULP-2	LLP1006-2M LLP1006-2L	SLP1006P2
	DFN1006D-2 (SOD882D)	-	1.0 x 0.6 x 0.37	250		VMN2	CTS2	DSN2, 1.0 x 0.6		TSLP-2-7/-17	X2-DFN1006-2	ULP-2	LLP1006-2L LLP1006-2M	SLP1006P2T
	DFN1608D-2 (SOD1608)	-	1.6 x 0.8 x 0.37	780		KMD2		DSN2 1.6 x 0.8						
	DSN0603-2 (SOD962)	-	0.6 x 0.3 x 0.3	-		GMD2	SC2	DSN2, X3DFN-2 WLCSP2	MP6	TSSLP-2-1	X3-DFN0603-2	ELP-2	CLP0603	
	SOD27	DO-35	4.25 x 1.85 x 0.56	500		GSD			DO-35		DO-35		DO-204AH	
	SOD66	DO-41	4.8 x 2.6 x 0.81	1300		GSR	DO-41				DO-41		DO-204AL	
	SOD68	DO-34	3.04 x 1.6 x 0.55	500		MSD								
	SOD80C	MiniMelf	3.5 x 1.5 x 1.5	300		LLDS			LLD		MiniMELF		MiniMELF	
	SOD123F	-	2.6 x 1.6 x 1.1	830			S-Flat	SOD-123-FL			PowerDI123			
	SOD123W	-	2.6 x 1.7 x 1.0	900		PMDU	S-Flat	SOD-123-FL	SRP-F		PowerDI123	SMF		
	SOD128	-	3.8 x 2.5 x 1.0	1000		PMDT	M-Flat							
	SOD323	SC-76	1.7 x 1.25 x 0.95	400			USC	SOD-323	URP	SOD323	SOD-323	USC	SOD323	SOD323
	SOD323F	SC-90	1.7 x 1.25 x 0.7	830		UMD2	US-Flat				PowerDI323			
	SOD523	SC-79	1.2 x 0.8 x 0.6	500		EMD2	ESC/TESC	SOD-523	UFP	SC79	SOD523	ESC	SOD523	SOD523
	3	DFN1006-3 (SOT883)	SC-101	1.0 x 0.6 x 0.48	250			SS CSP2			TSLP-3-4	X1-DFN1006-3		
DFN1006B-3 (SOT883B)		-	1.0 x 0.6 x 0.37	250			CST3			TSLP-3-1, -7, -8	X2-DFN1006-3			SLP1006P3T
DFN1010D-3 (SOT1215)			1.1 x 1.0 x 0.37	750		(VMT3)	(VESM)	(SOT723)			(DFN1411)			
DFN2020-3 (SOT1061)		HUSON3	2.0 x 2.0 x 0.65	1300				WDFN3			U-DFN2020-3 Type B 2.0 x 2.0 x 0.6		PowerPAK SC706L	
SOT23		-	2.9 x 1.3 x 1.0	250		SSD3/ SST3	S-Mini TSM	SOT-23		SOT23	SOT-23	SOT-23	SOT23	SOT23
SOT89		SC-62	4.5 x 2.5 x 1.5	1300		MPT3	PW-Mini	SOT-89	UPAK (SOT89)	SOT89		SOT-89		
SOT323		SC-70	2.0 x 1.25 x 0.95	200		UMD3/ UMT3 TUMT3	USM	SC-70	CMAK/CMPAK	SOT323	SOT-323	USM	SC-70 3 leads	
SOT404 (D ² PAK)		-	11.0 x 11.0 x 4.3	-		LPDS/ LPTS	TO-220SM	D ² PAK D ² PAK 3	TO-220S / SMD TO-263 LDBAK(S)-(T)	TO263-3	TO263 (D ² PAK)	D ² PAK	TO-263 3-lead TO-263AB / D ² PAK	
SOT416		SC-75	1.6 x 0.8 x 0.77	150		EMD3/ EMT3	SSM	SC-75	SMPAK	SC75	SOT523	TESV	SC-75A	SC-75
SOT428 (DPAK)		-	6.6 x 6.1 x 2.3	-				DPAK	TO-252 (MP-3ZK)	TO-252-3/-3-23		DPAK, - (MOSFET) DPAK (1)	TO-252, TO-252 reverse	
4	SOT143B	-	2.9 x 1.3 x 1.0	250			CP4		MPAK-4R	SOT143	SOT-143			SOT-143
	SOT223	SC-73	6.5 x 3.5 x 1.65	1700				SOT-223		SOT223	SOT-223	SOT-223	SOT223	
5	SOT353	SC-88A	2.0 x 1.25 x 0.95	300		UMD5/ UMT5	USV	SC-88A	CMPAK-5(T)		SOT353	USV	SOT353	SC70-5L
	SOT665	-	1.6 x 1.2 x 0.55	300		EMD5/ EMT5	ESV	SOT-553	VSON-5			TESV		

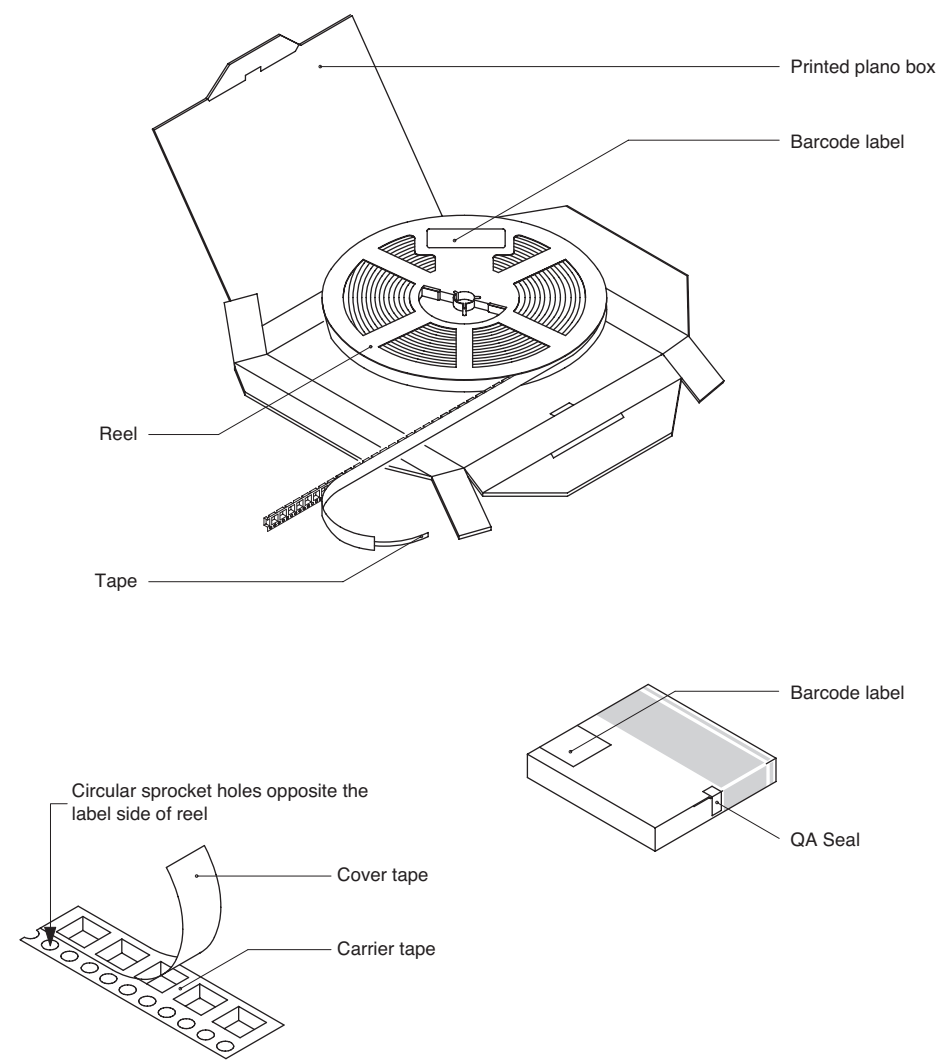
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Package cross reference

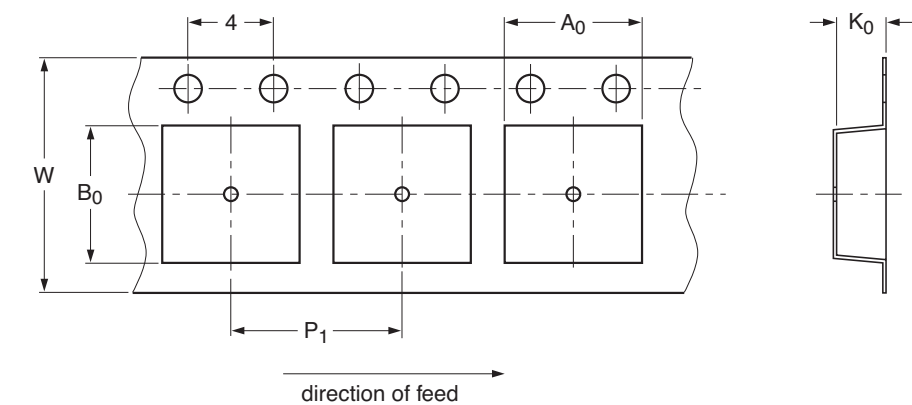
Pins / leads	NXP	Industry standard names	Size (l x w x h) (mm)	P _{tot} (mW)	Package	Competitor synonyms								
						Rohm	Toshiba	ON Semi	Renesas	Infineon	Diodes Inc.	KEC	Vishay	Semtech
6	DFN1010-6 (SOT891)	XSON6	1.0 x 1.0 x 0.48	-			CS6	SOT963						
	DFN1010B-6 (SOT1216)	-	1.1 x 1.0 x 0.37	-			(FS6)	(SOT063)			(SOT963)			
	DFN1410-6 (SOT886)	XSON6	1.45 x 1.0 x 0.48	250										SLP1510N6
	DFN2020-6 (SOT1118)	-	2.0 x 2.0 x 0.62	1300			UDFN6	6 Lead DFN WDFN6			UDFN2020-6 Type B		PowerPAK SC-70 Thin PowerPAK SC-70	
	DFN2020MD-6 (SOT1220)		2.0 x 2.0 x 0.62	1700			UDFN6B	UDFN-6 WDFN6			UDFN2020-6 Type E		PowerPAK SC-70 Thin PowerPAK SC-70	
	SOT363	SC-88	2.0 x 1.25 x 0.95	300		UMD6/ UMT6	US6 UF6 USV	SC-88	CMPAK-6	SOT363	SOT-363	US6	SC70-6	SC70-6L
	SOT457	SC-74	2.9 x 1.5 x 1.0	750		SMD6/	SM6 VS-6	SC-74 TSOP-6	TSOP-6	SC74 TSOP6	SOT23-6 SOT26	TSOP6	TSOP6 TSOP-6	SOT23-6L
	SOT666	-	1.6 x 1.2 x 0.55	300		EMD6/	ES6 ESV	SOT-563	SMFPAK-6	SOT666	SOT563	TES6	SC89-6lead	SC-89
	DFN1010E-6 (SOT1202)	-	1.0 x 1.0 x 0.33	-				(SOT963)		TLSP-6-1				
8	SOT96	SO8	4.9 x 3.9 x 1.75	1500		SOP8	FM8	SOIC-8 NB	SOP-8			FLP-8	SO8	
	SOT505	TSSOP8	3.0 x 3.0 x 1.1	-				TSSOP-8				TSSOP8		
	DFN1712-8 (SOT1157)	HXSON8	1.2 x 1.7 x 0.48	-				UDFN8, 1.8 x 1.2, 0.4P						
	DFN1714-8 (SOT1166)	HUSON8	1.7 x 1.35 x 0.52	-										SLP1713P8
	DFN1714U-8 (SOT983)	HXSON8	1.7 x 1.35 x 0.48	-				UDFN 1.7 x 1.35, 0.4P						SLP1713P8
9	DFN2110-9 (SOT1178)	XSON9	1.0 x 2.1 x 0.48	-										SLP2010P8T
	DFN2520-9 (SOT1333)	-	2.5 x 2.0 x 0.48	-				WDFN 10 2.5 x 2 UDFN 10 2.5 x 2						
10	DFN2510-10 (SOT1165)	XSON10	1.0 x 2.5 x 0.48	-				UDFN10 2.5 x 1, 0.5P		TSLP-9-1				SLP1610P4
	DFN2510A-10 (SOT1176)	XSON10	1.0 x 2.5 x 0.48	-				UDFN10 2.5 x 1, 0.5P		TSLP-9-1				SLP1610P4
	SOT552	TSSOP10	3.0 x 3.0 x 1.1	-				Micro10		TSSOP10				MSOP-10L
12	DFN2512-12 (SOT1158)	HXSON12	2.5 x 1.2 x 0.48	-				UDFN12, 2.5 x 1.2, 0.4P						
	DFN2514-12 (SOT1167)	HUSON12	2.5 x 1.35 x 0.53	-				UDFN12, 2.5 x 1.35, 0.4P						SLP2513P12
	DFN2514U-12 (SOT984)	HXSON12	2.5 x 1.35 x 0.48	-										SLP2513P12
	DFN2521-12 (SOT1156)	-	2.5 x 2.1 x 0.48	-										
14	SOT108	SO14	8.65 x 3.9 x 1.75	-		SOP14				DSO14				
	DFN4020-14 (SOT1334)	-	4.0 x 2.0 x 0.48	-				WDFN 16 4 x 2 UDRN 16 4 x 2						
16	DFN3312-16 (SOT1159)	HXSON16	3.3 x 1.2 x 0.48	-				UDFN16, 3.5 x 1.2, 0.4P						
	DFN3314-16 (SOT1168)	HUSON16	3.3 x 1.35 x 0.53	-										SLP3313P16
	DFN3314U-16 (SOT985)	HXSON16	3.3 x 1.35 x 0.48	-				UDFN16, 3.3 x 1.35, 0.4P						SLP3313P16
20	SOT360	TSSOP20	6.5 x 4.4 x 1.1	-				TSSOP20		TSSOP20				
38	SOT510	TSSOP38	9.7 x 4.4 x 1.1	-						TSSOP38				

Types in brackets (...) show footprint compatibility only

Tape and reel pack for SMD and WLCSP packages



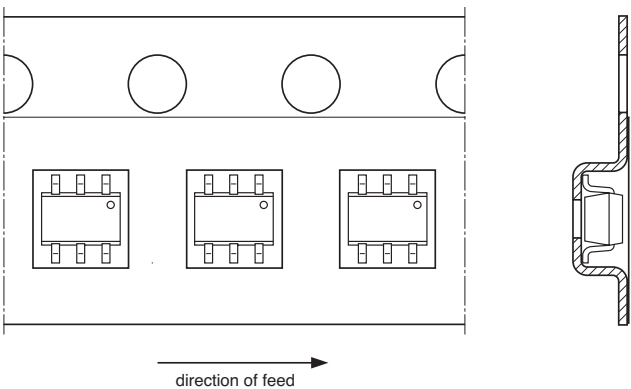
Carrier tape - tape and reel



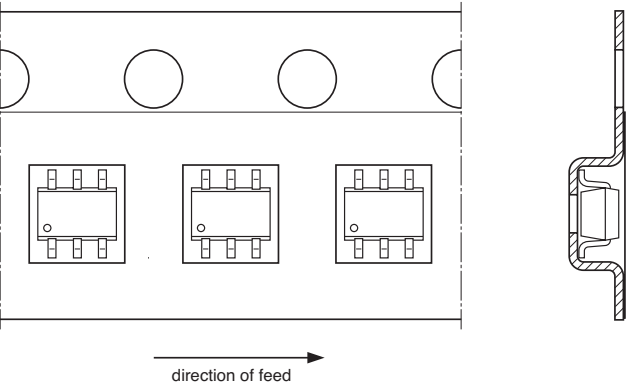
P1 = pitch (see table packing methods)
W = tape width (see table packing methods)
Compartment width (A_0), length (B_0) and depth (K_0) depending on package

Product orientation (tape and reel pack) T1-T4

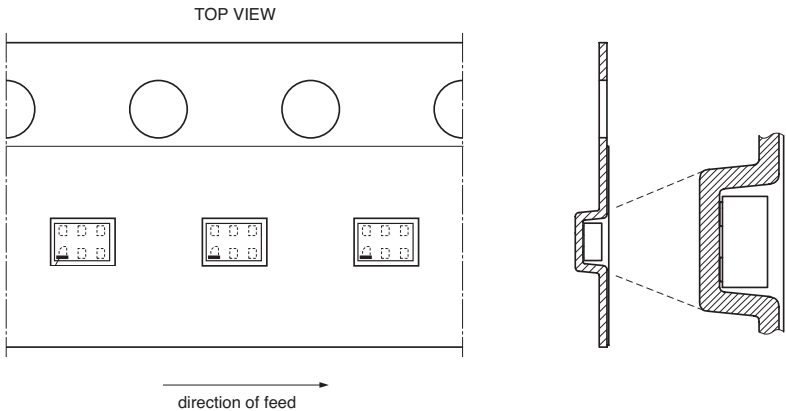
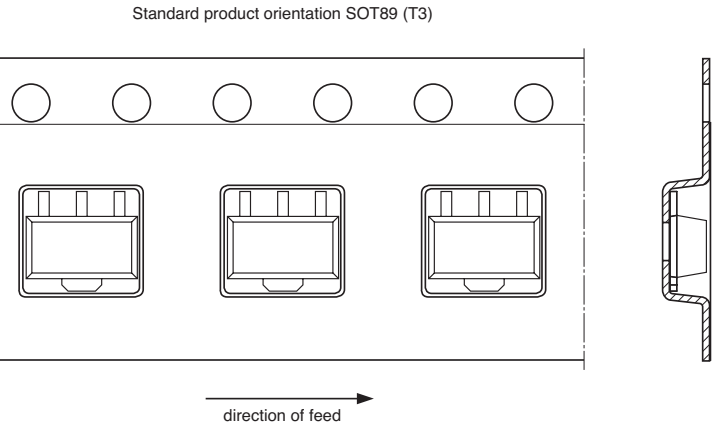
T1 taping



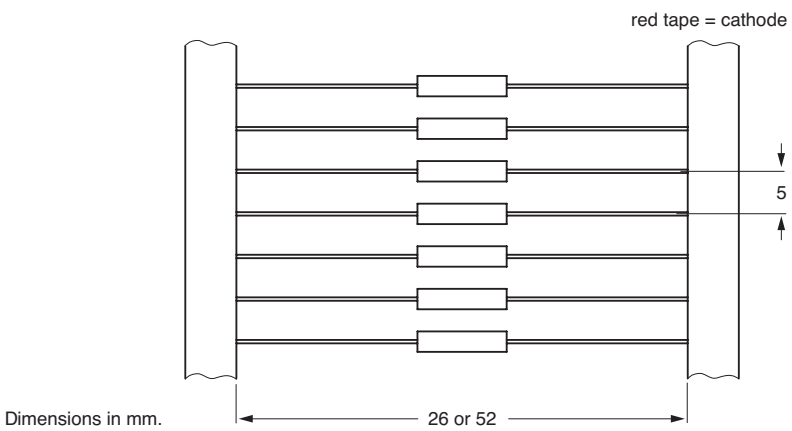
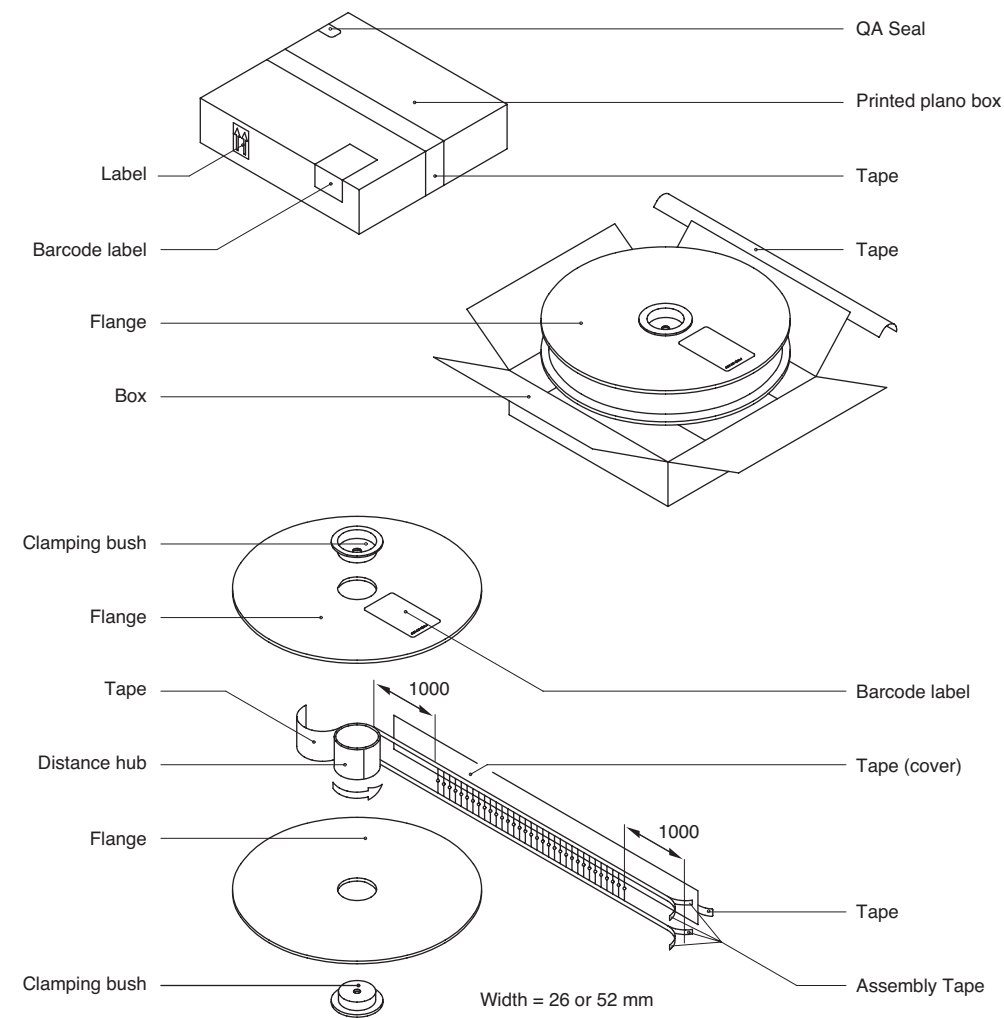
T2 taping



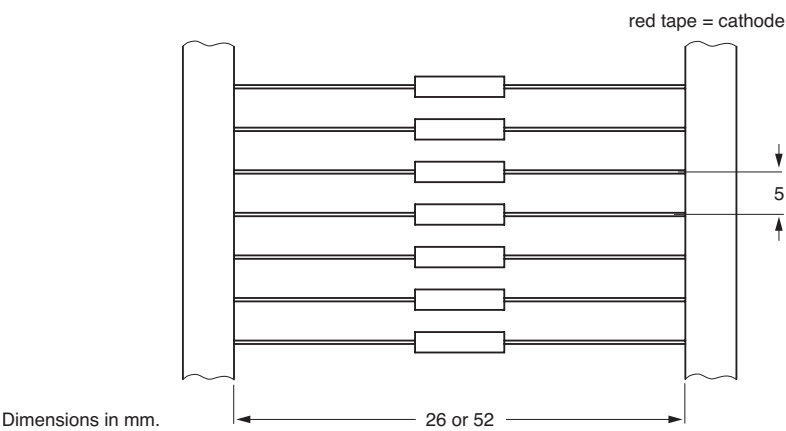
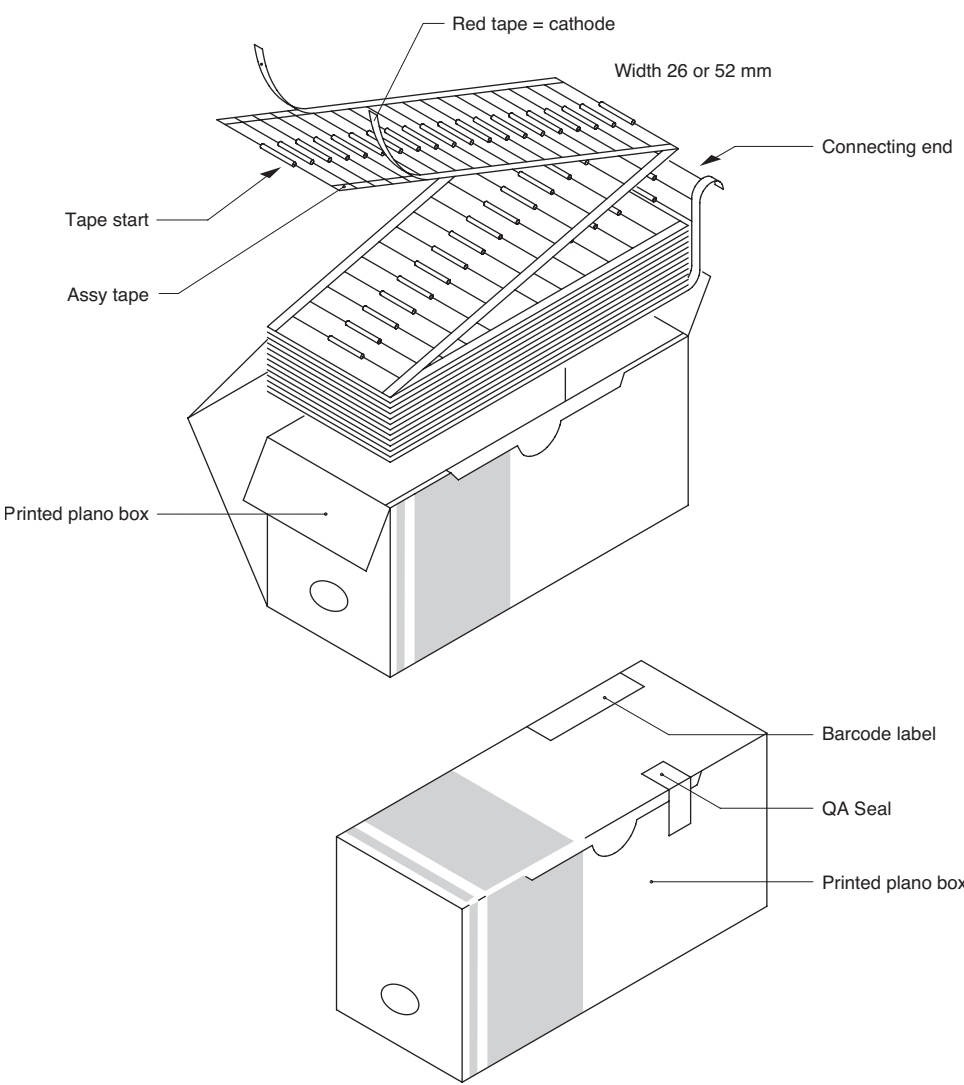
T3 taping



Reel pack axial tape for glass diodes



Ammo pack axial tape for glass diodes

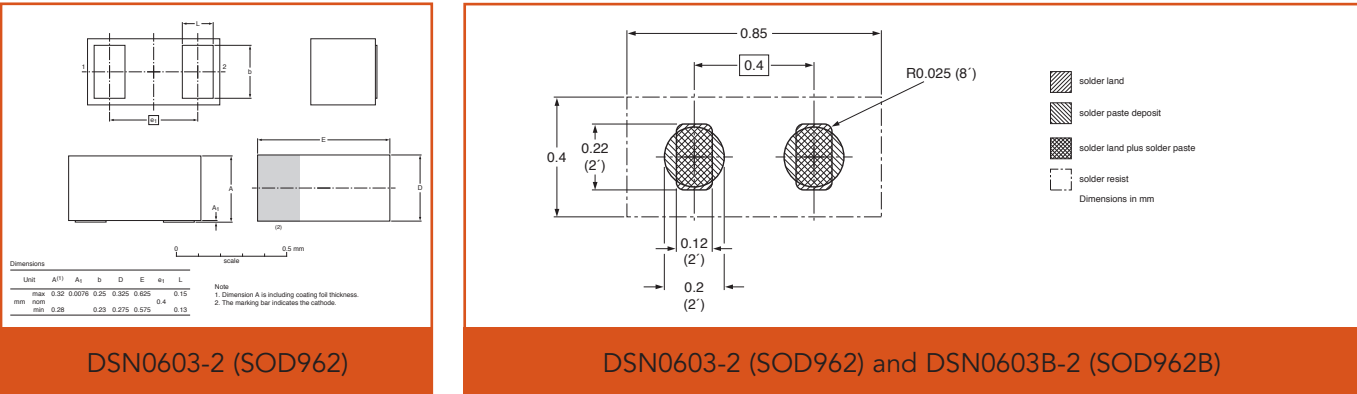
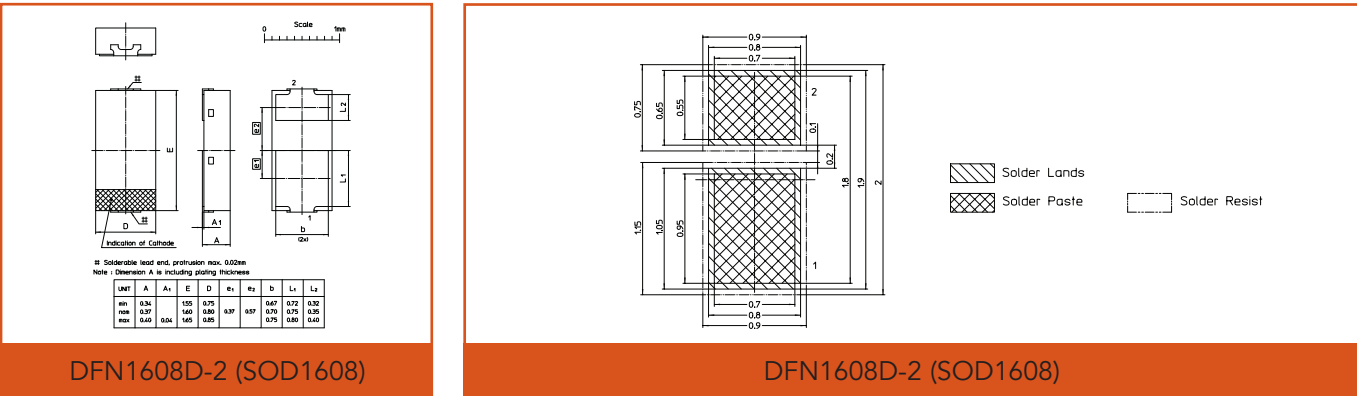
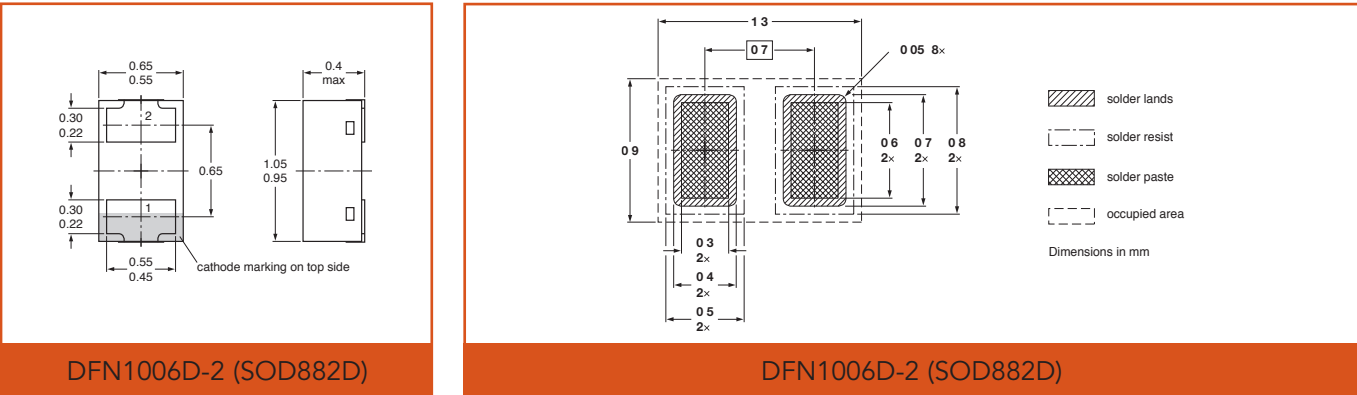
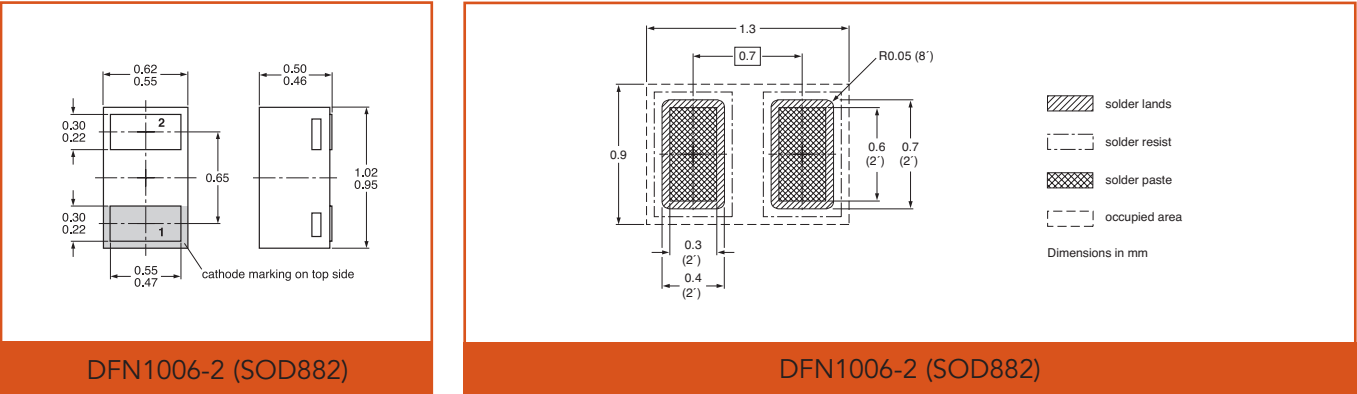


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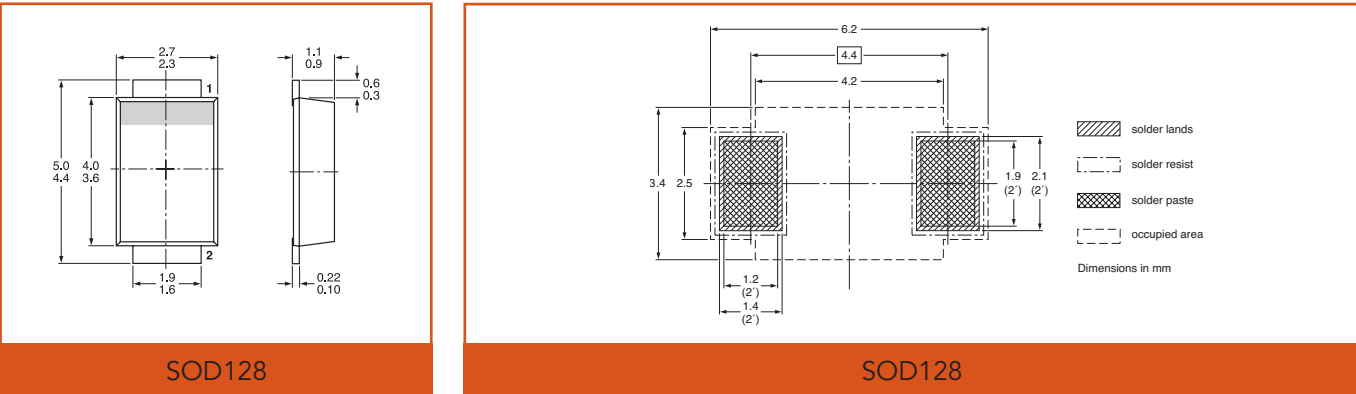
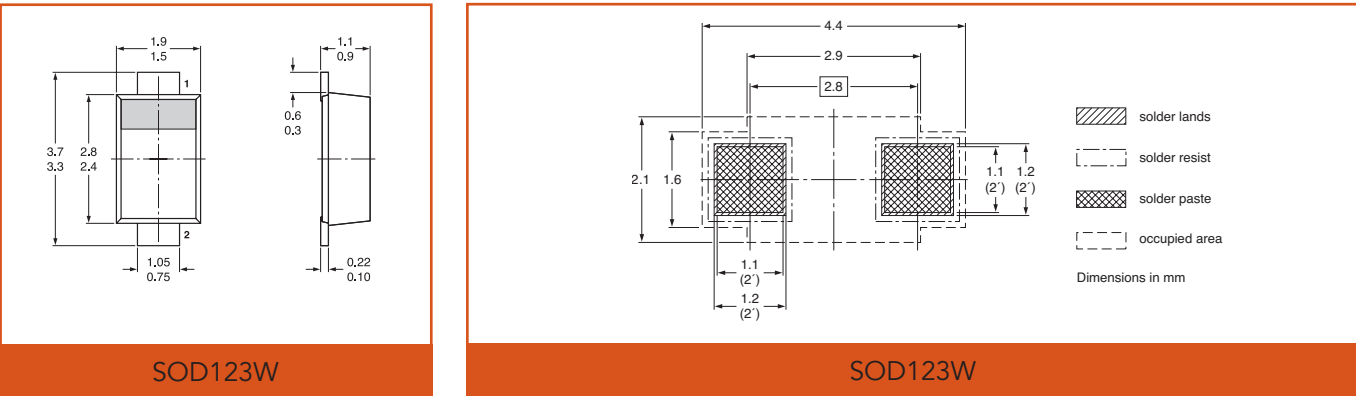
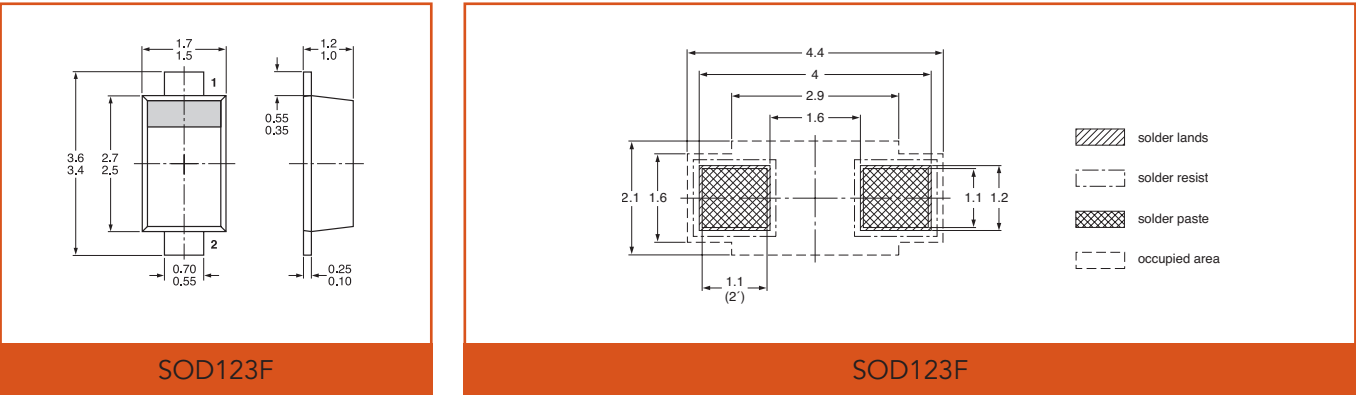
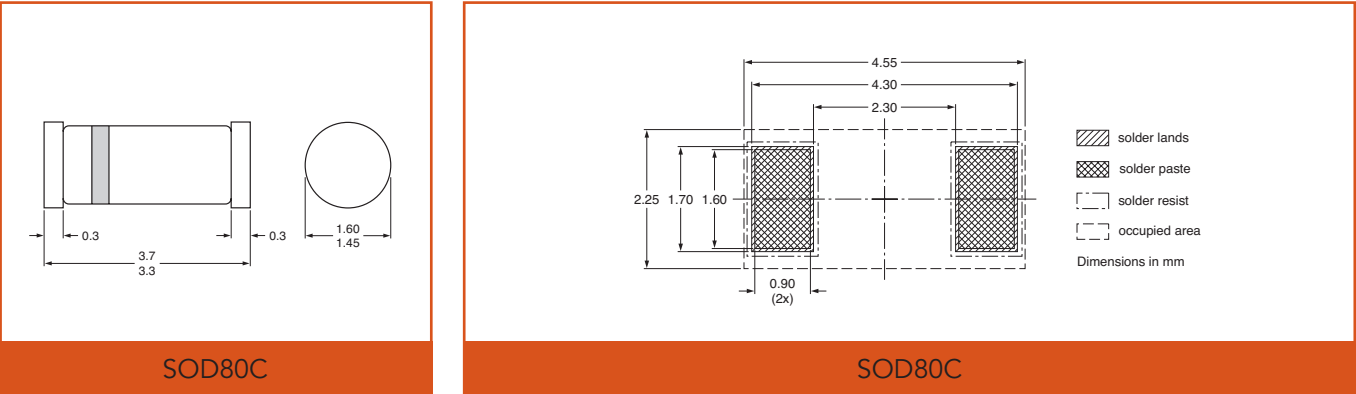
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2-Pin SMD Packages



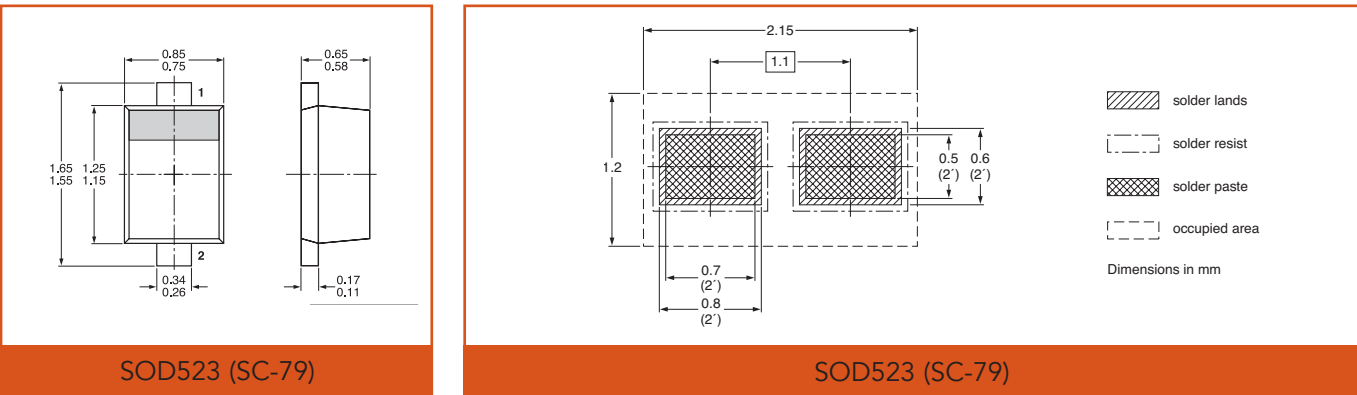
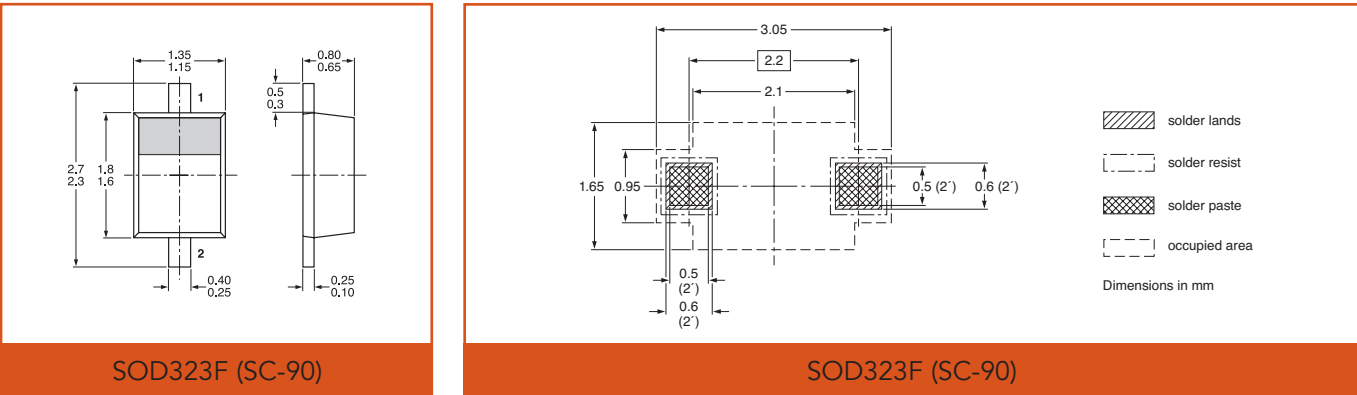
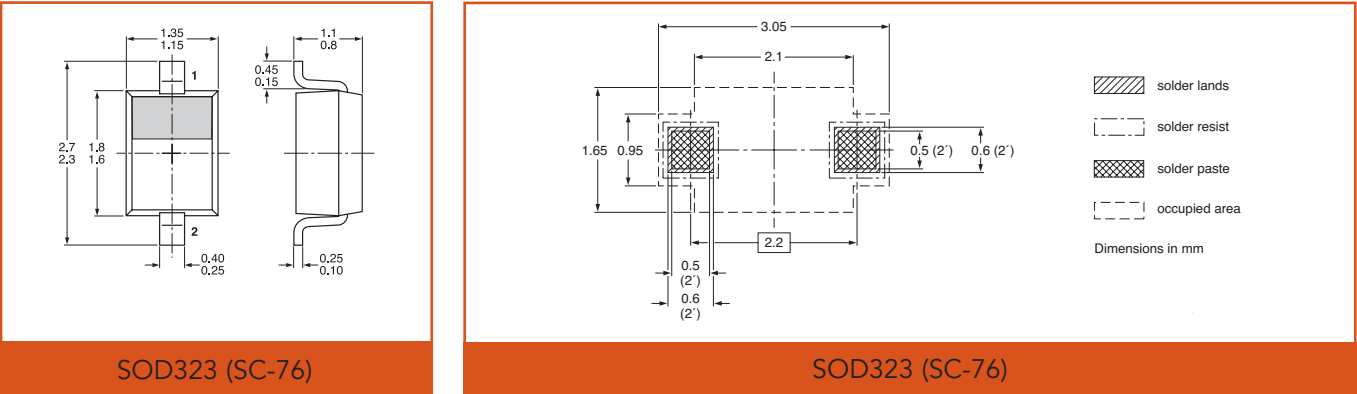
Dimensions in mm

2-Pin SMD Packages

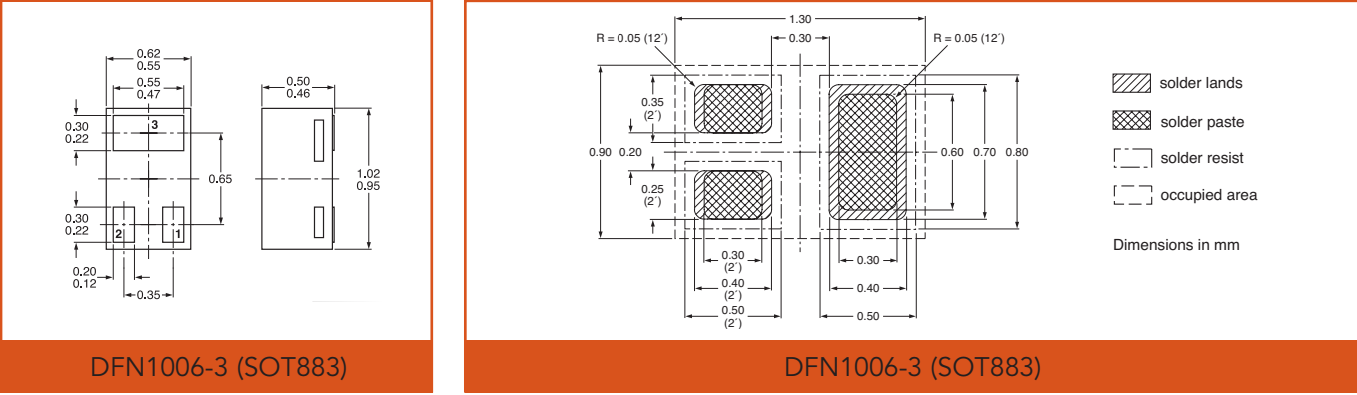


Dimensions in mm

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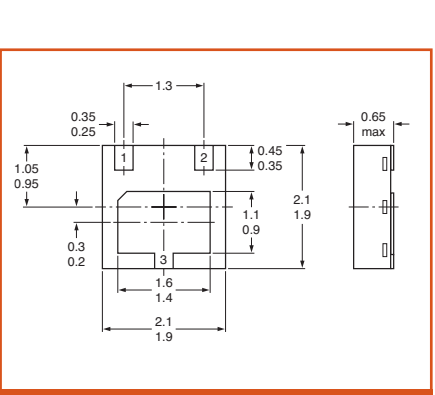
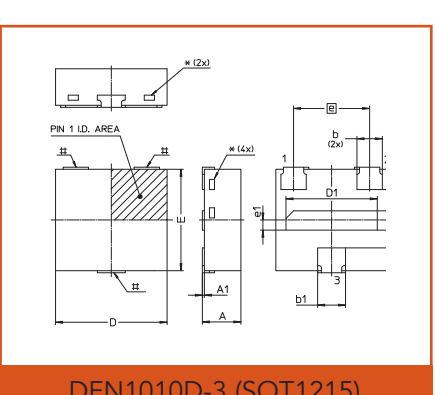
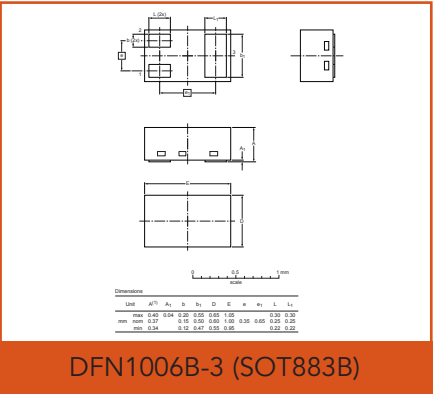


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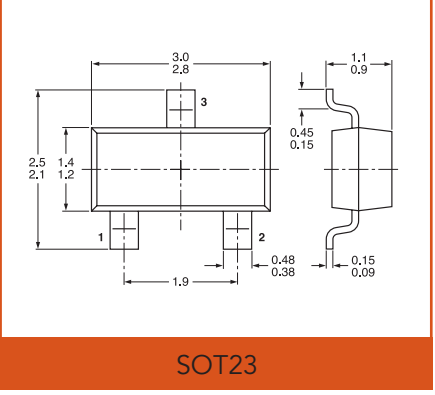


Dimensions in mm

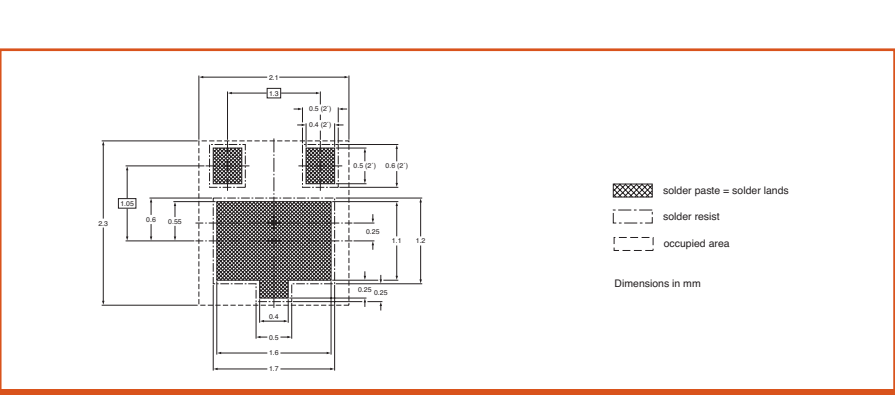
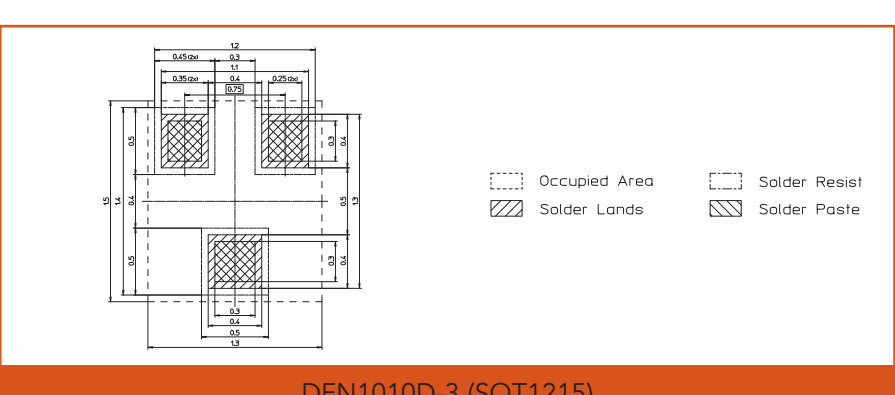
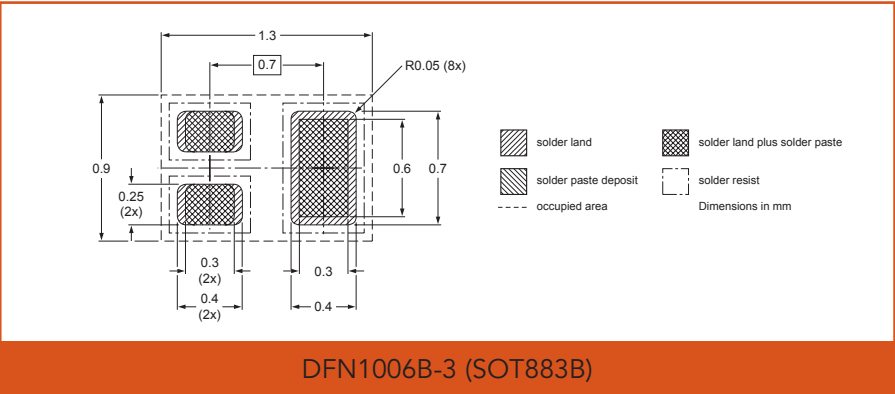
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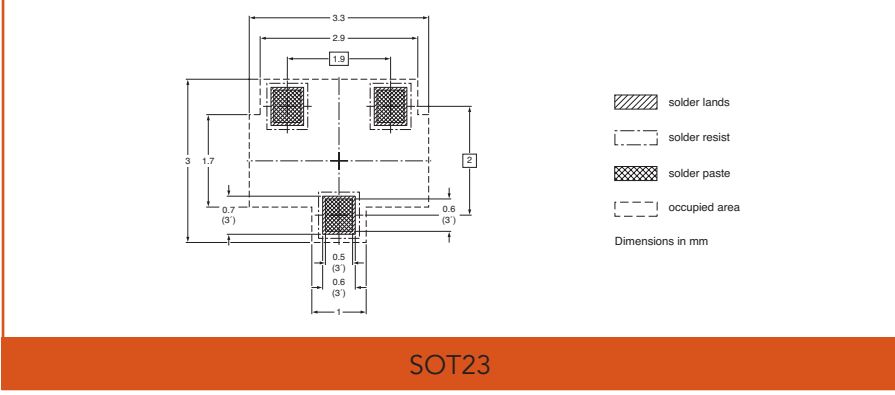
SOT23



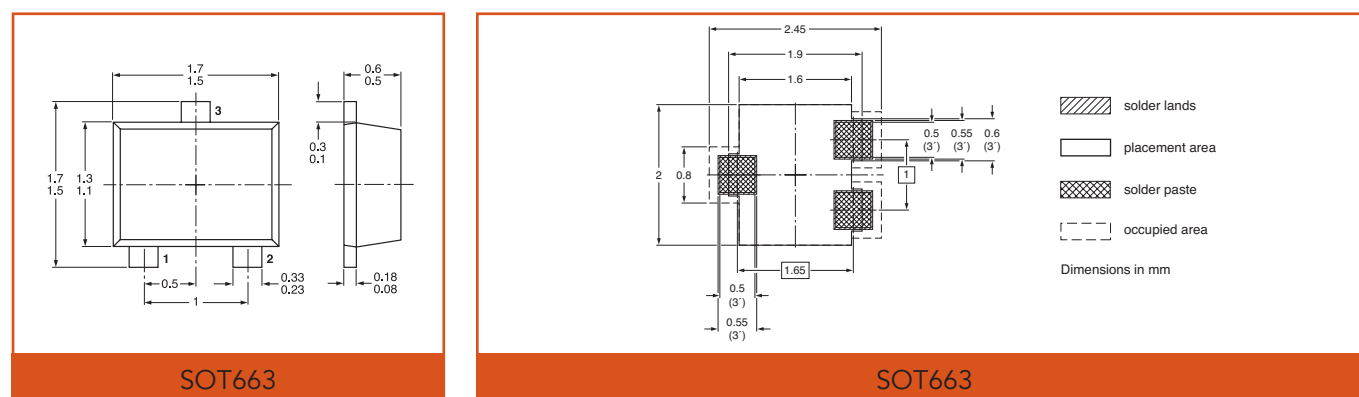
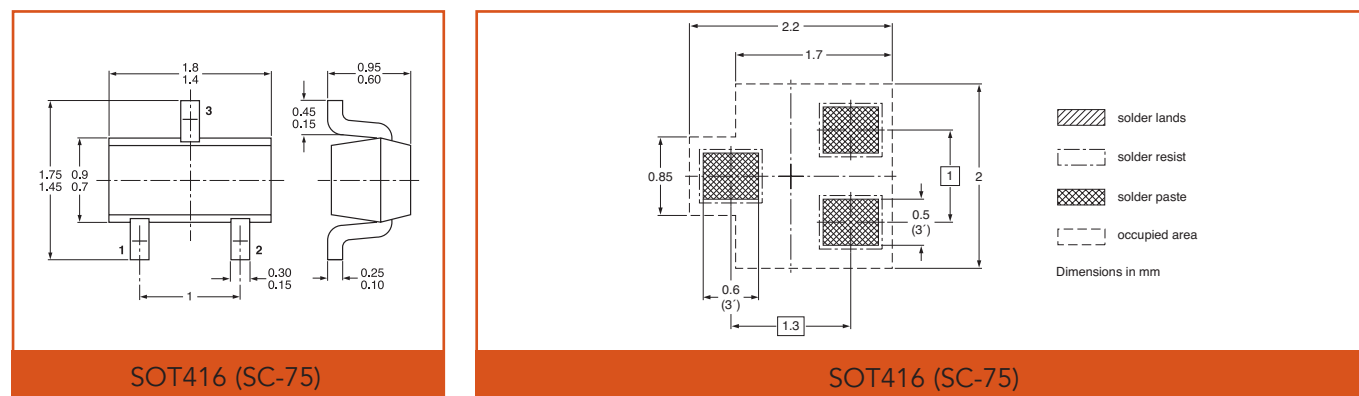
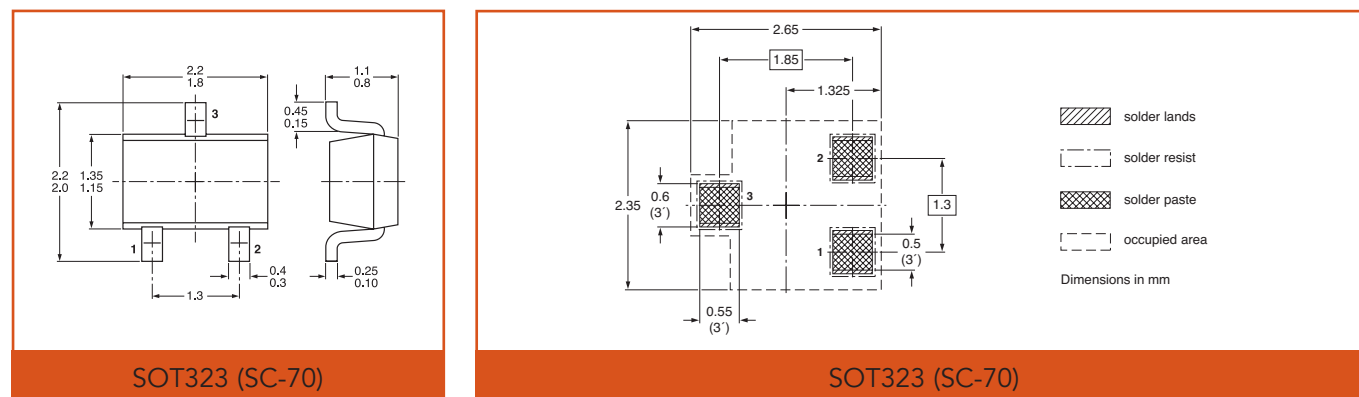
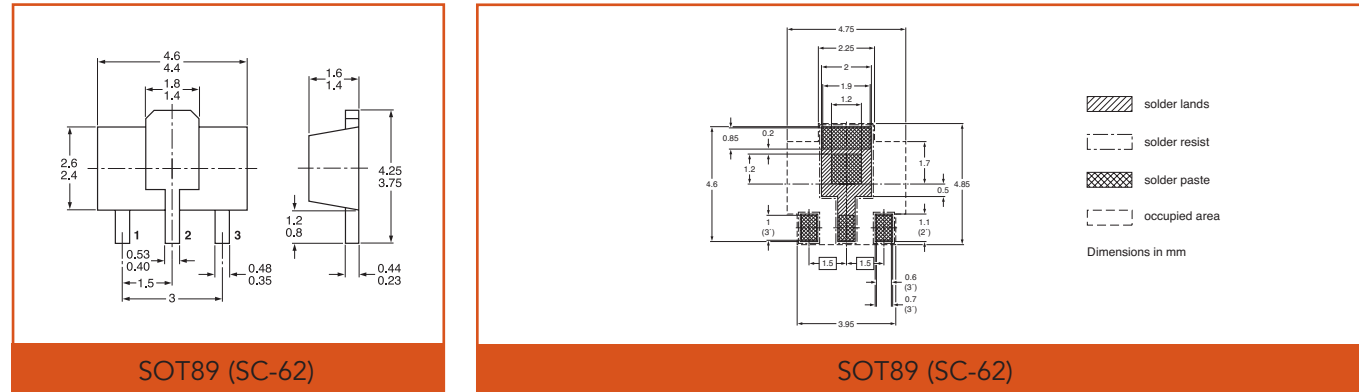
Dimensions in mm



SOT23

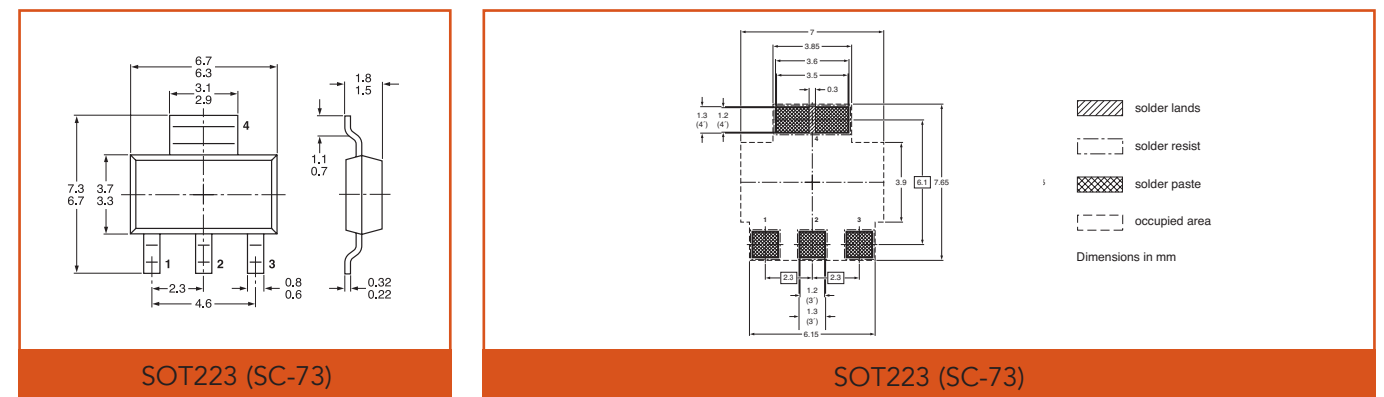
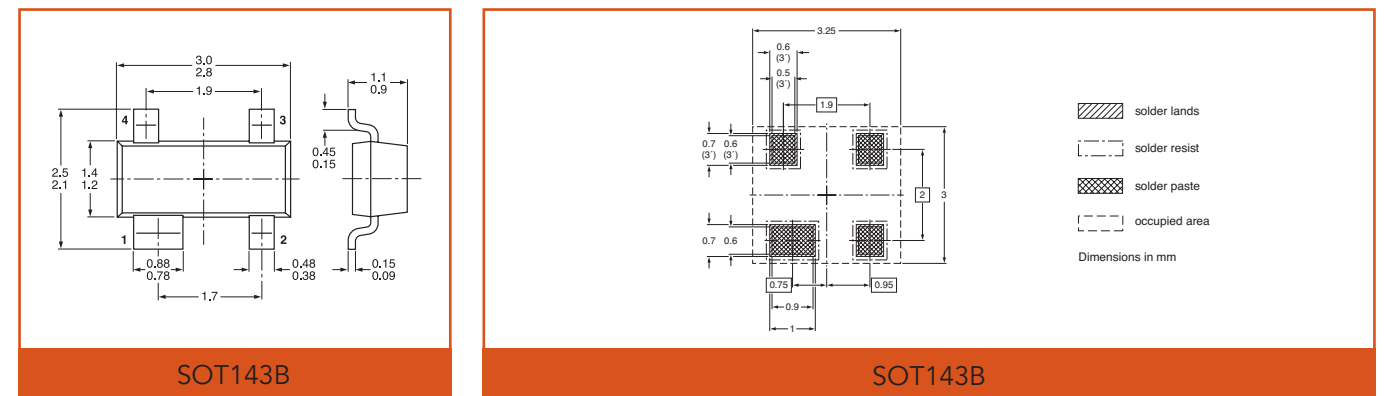
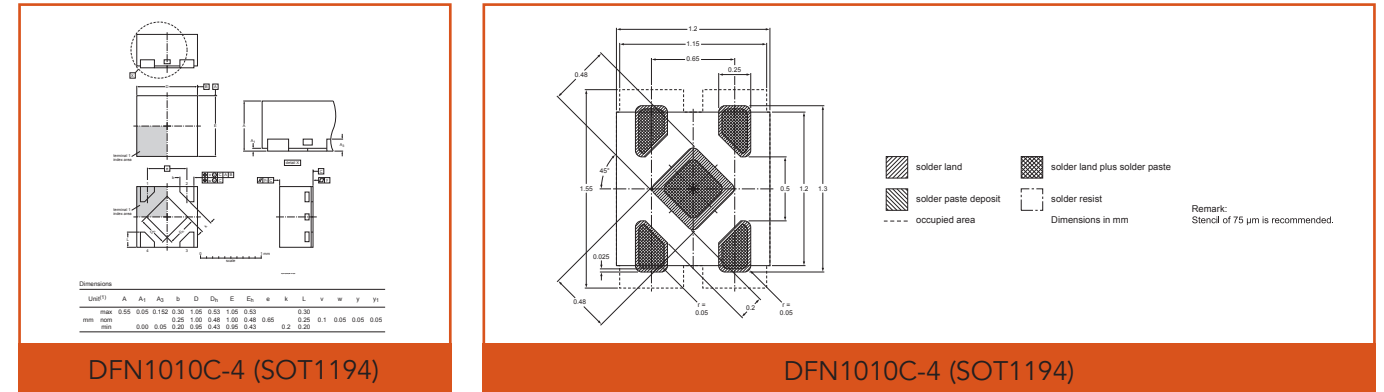


3-Pin SMD Packages

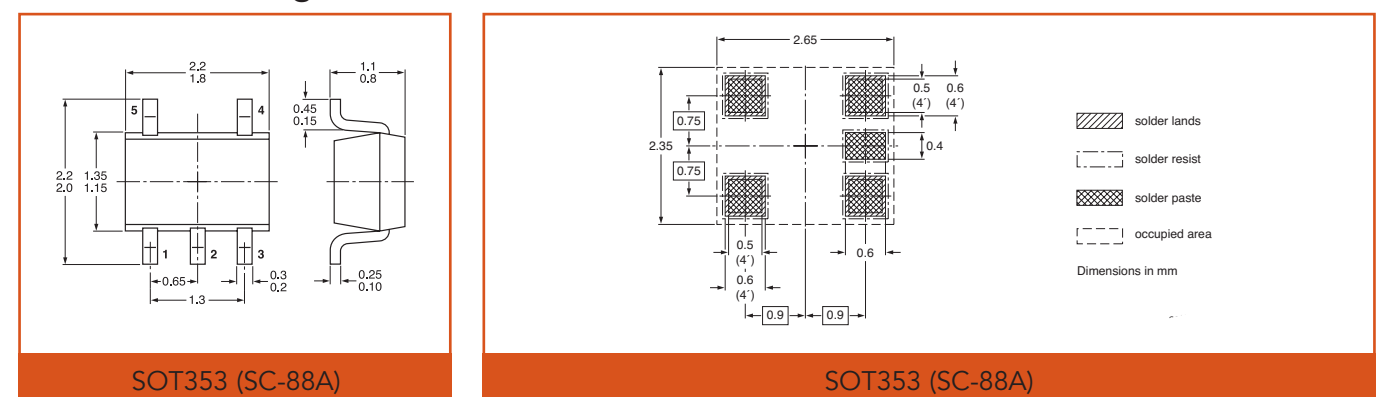


Dimensions in mm

4-Pin SMD Packages

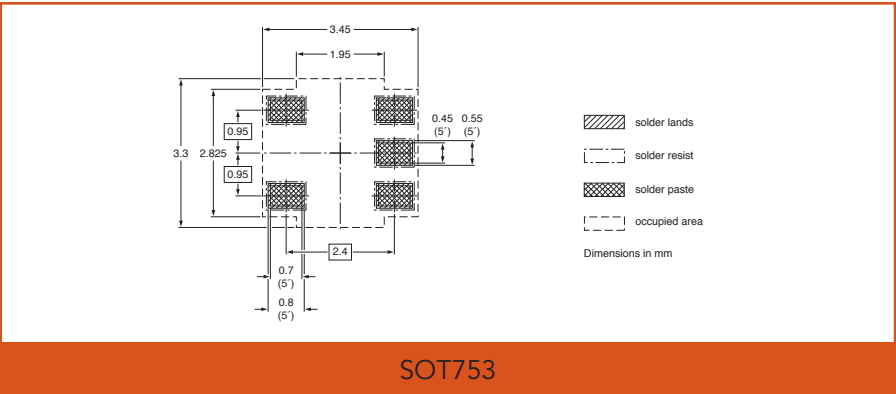
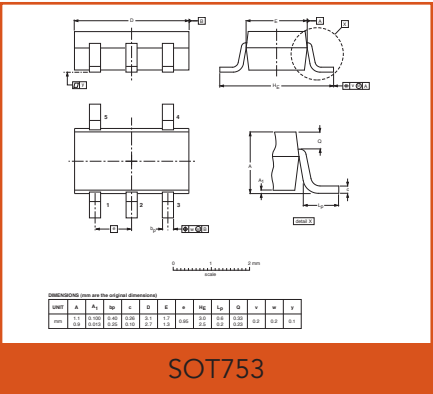
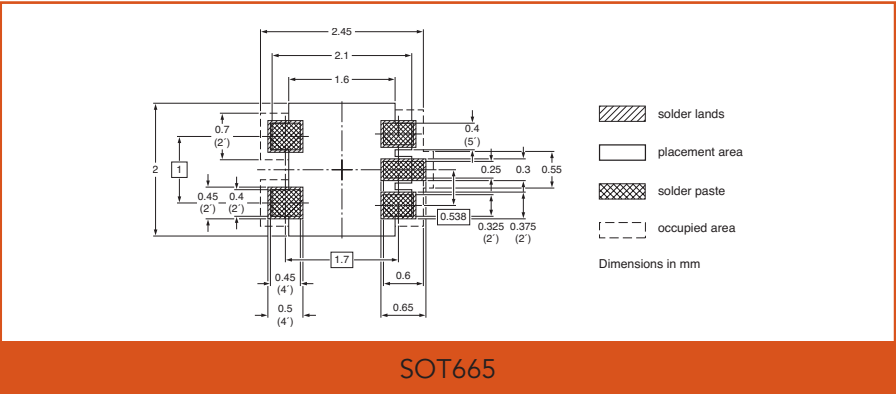
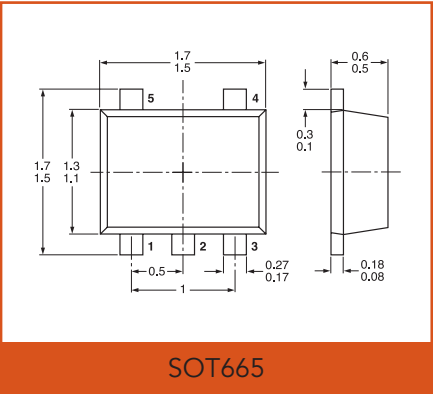


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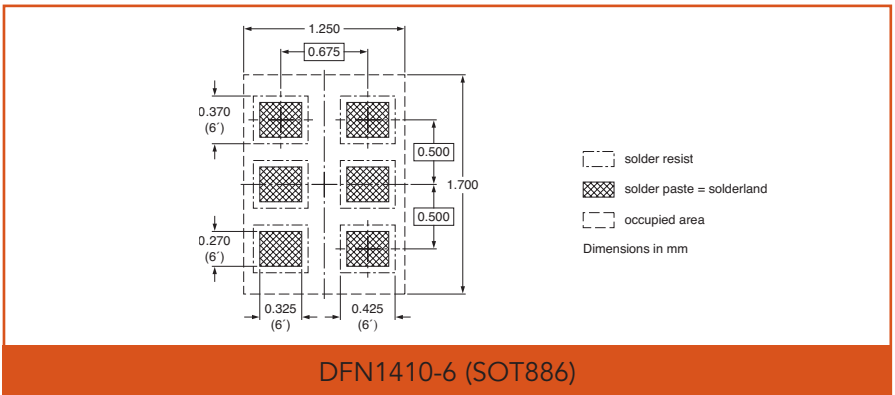
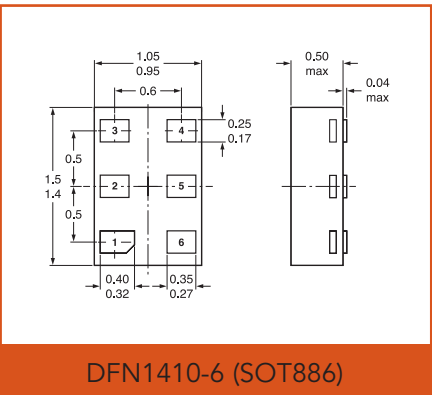
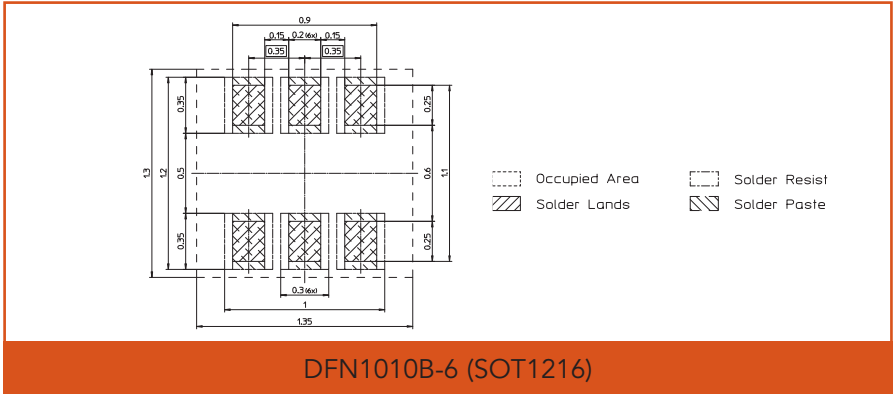
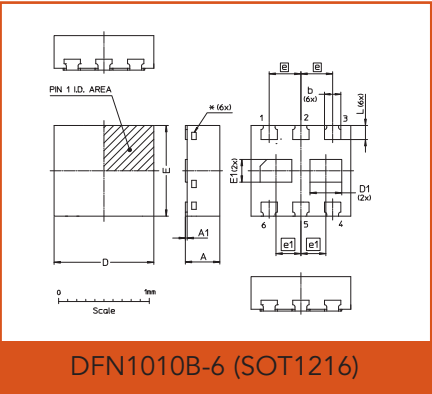


Dimensions in mm

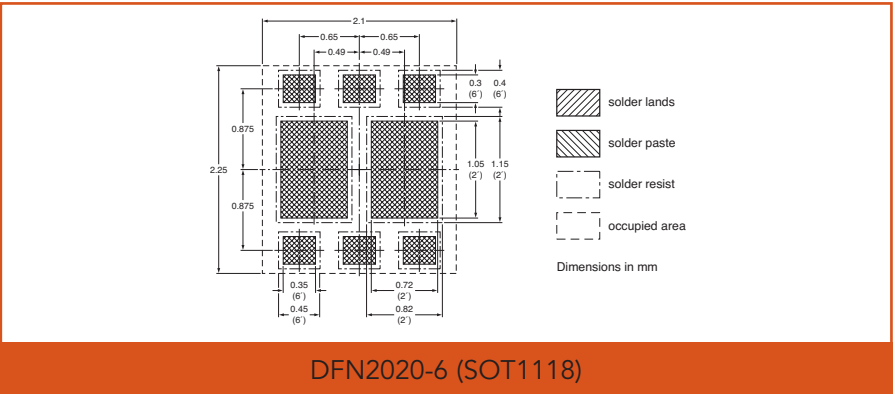
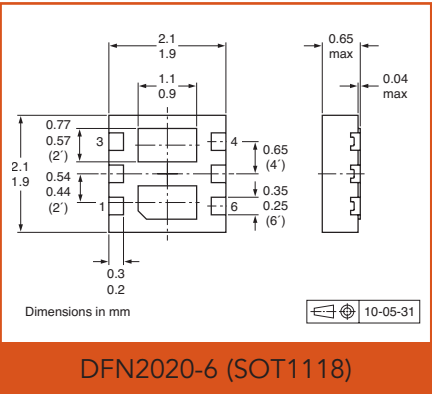
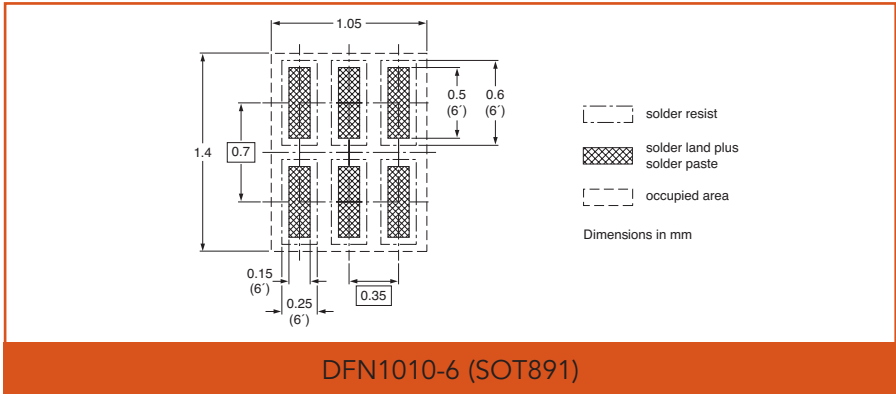
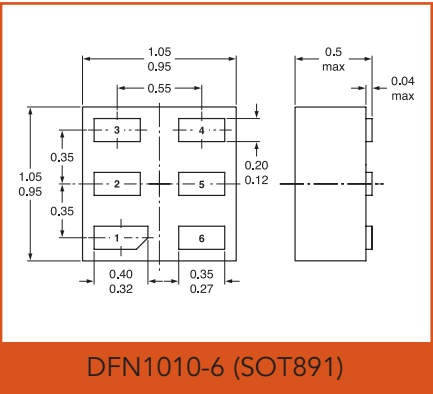
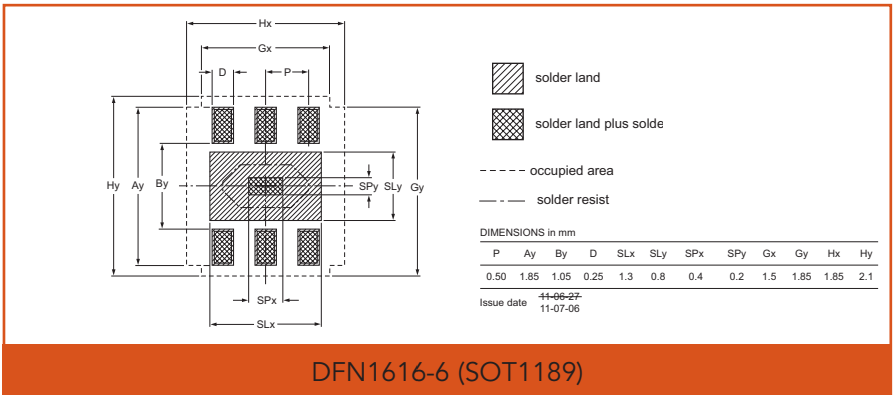
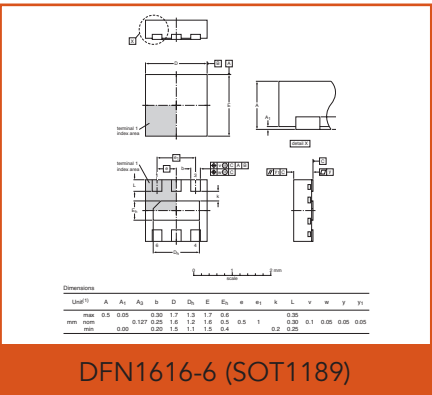
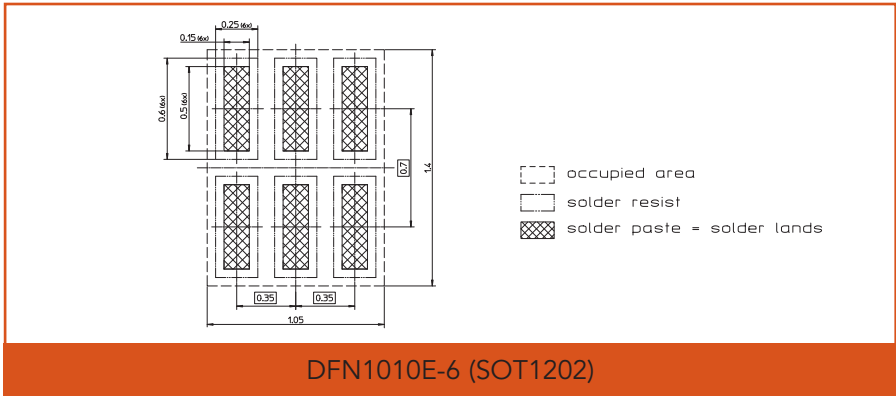
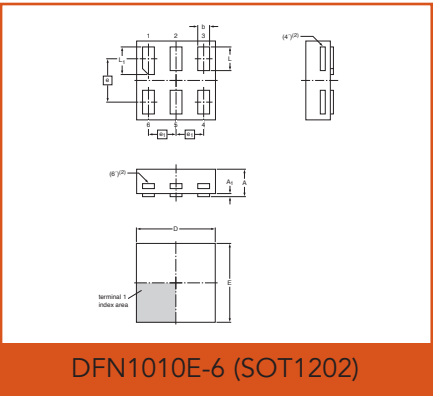
5-Pin SMD Packages



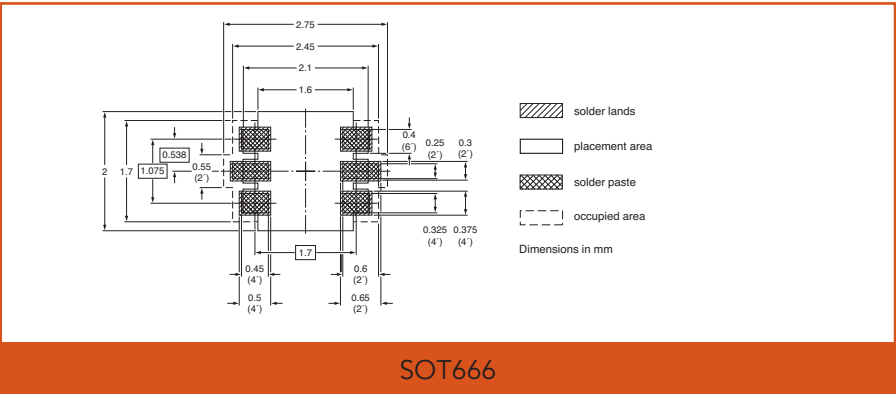
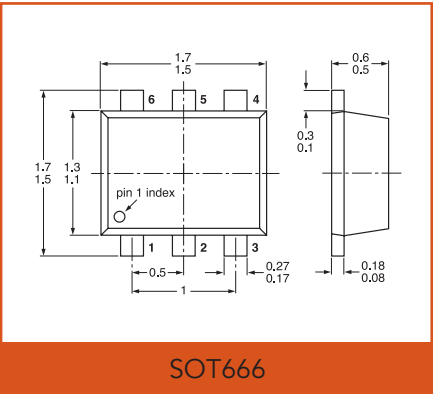
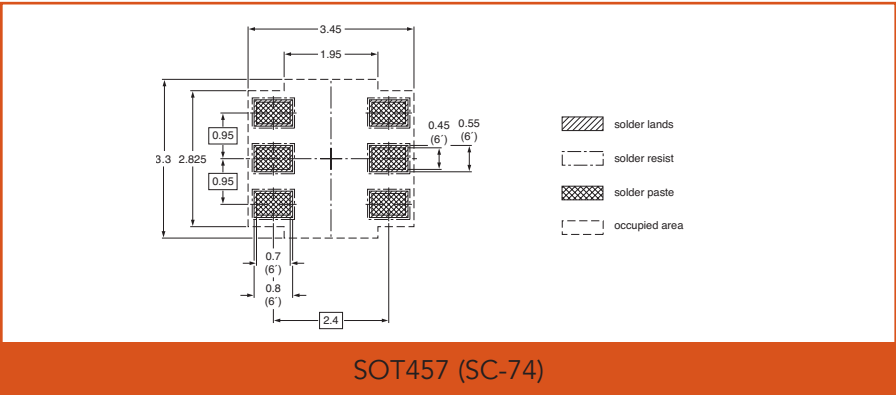
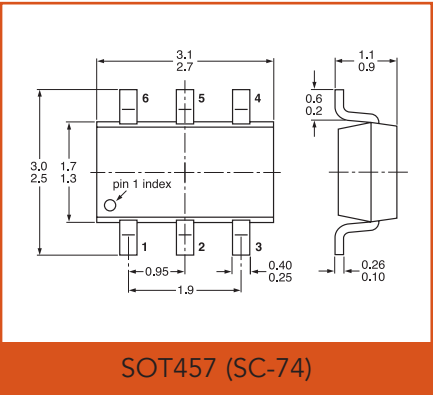
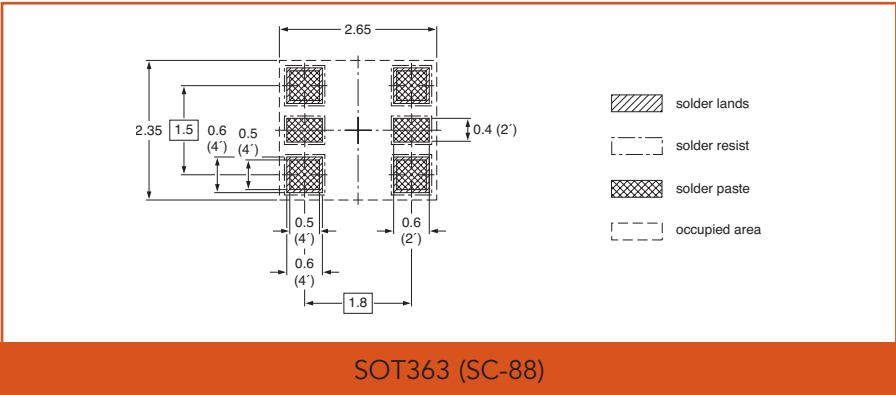
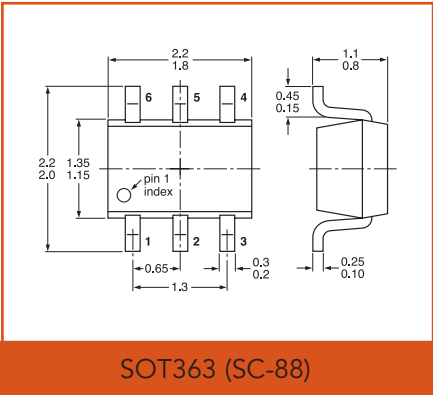
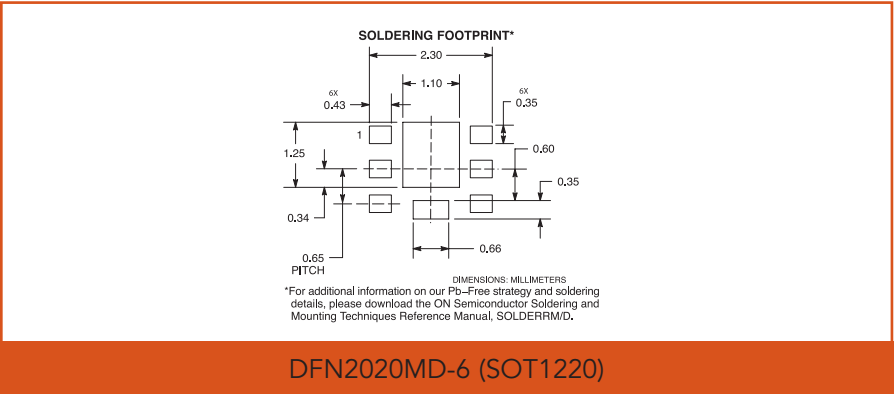
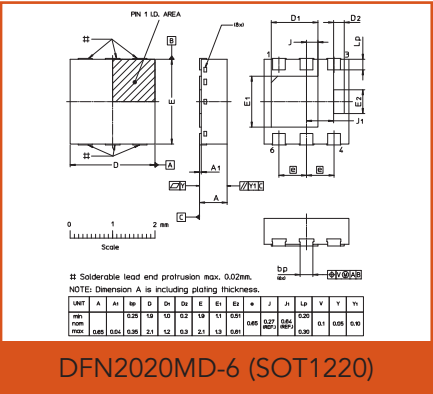
6-Pin SMD Packages



6-Pin SMD Packages

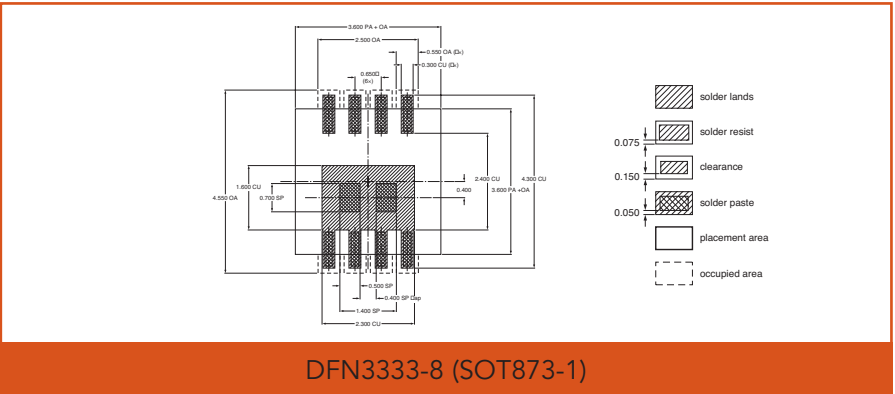
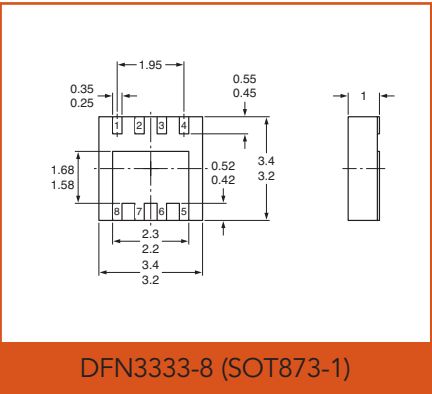
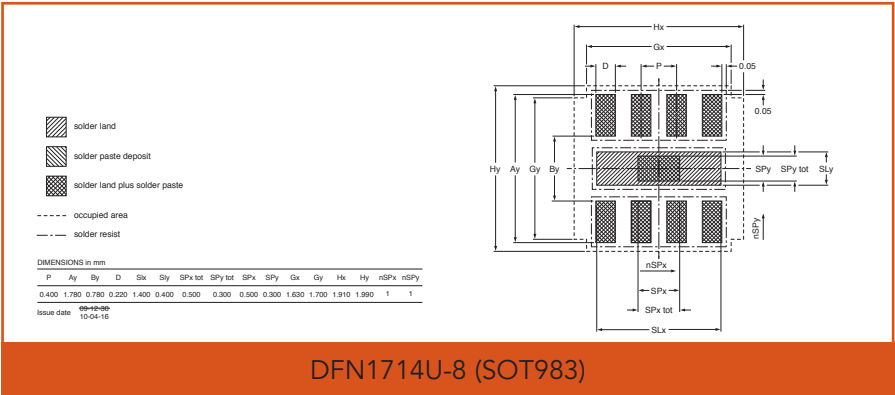
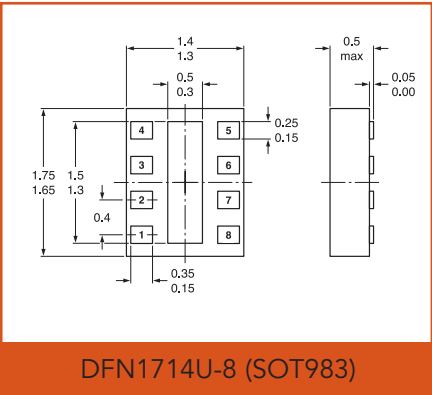
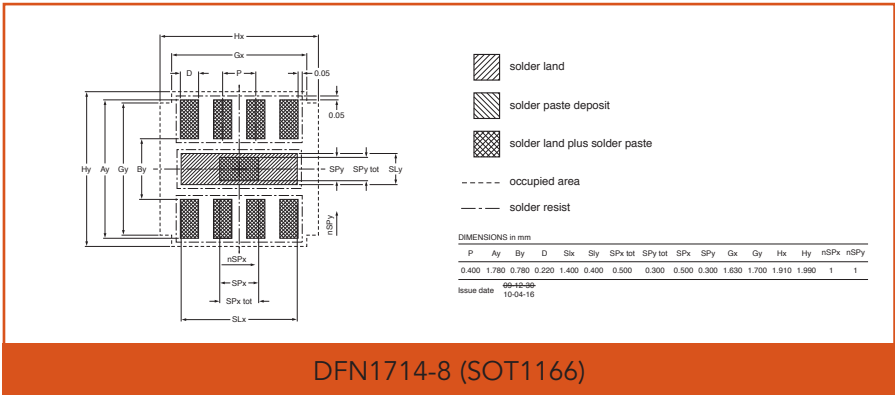
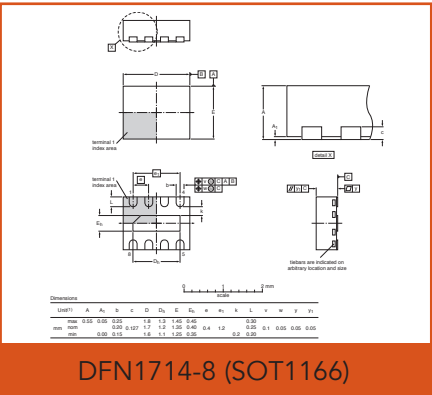
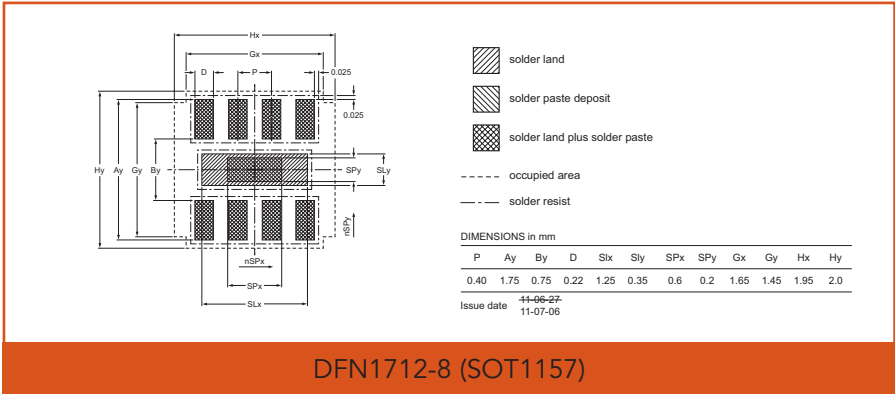
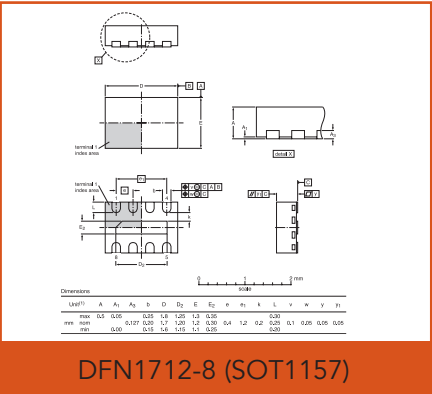


6-Pin SMD Packages



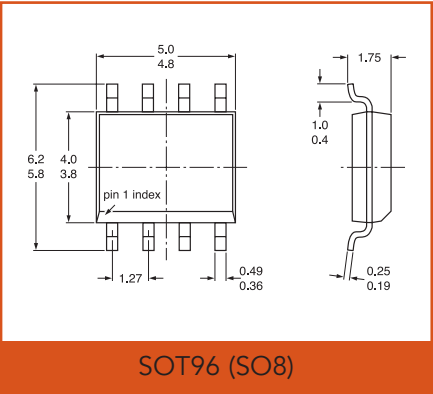
Dimensions in mm

8-Pin SMD Packages

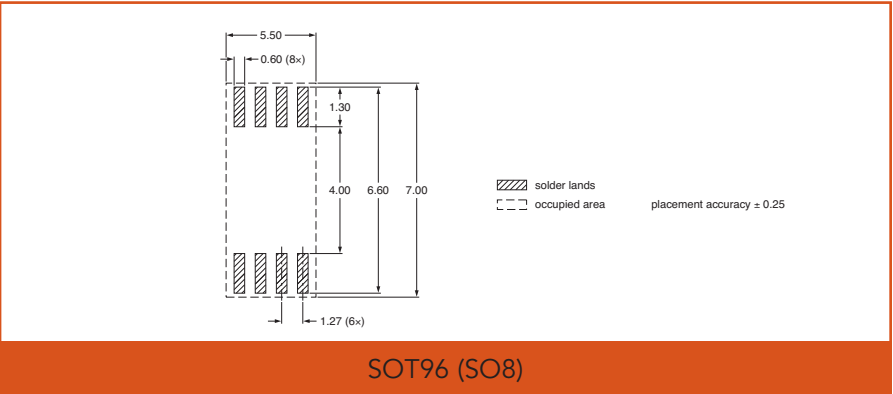


Dimensions in mm

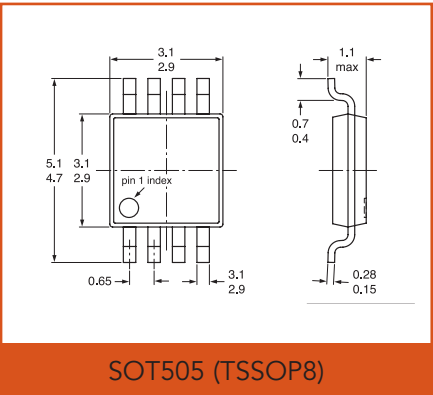
8-Pin SMD Packages



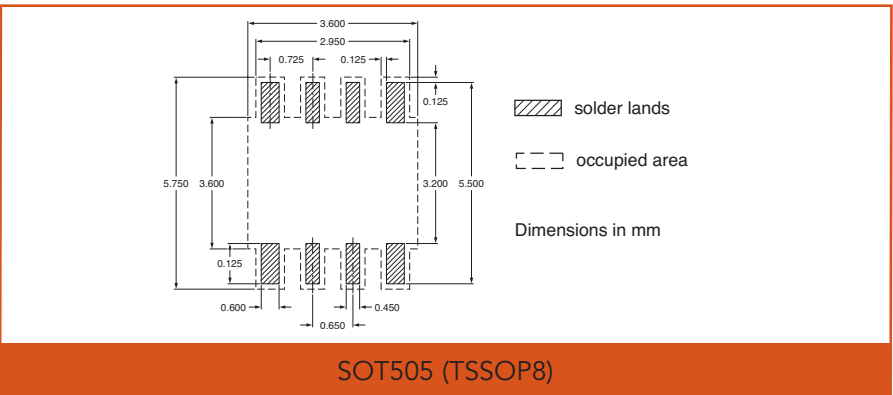
SOT96 (SO8)



SOT96 (SO8)

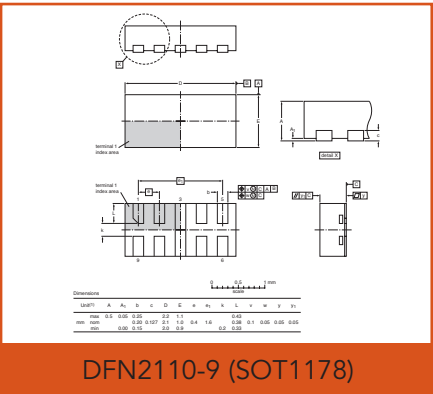


SOT505 (TSSOP8)

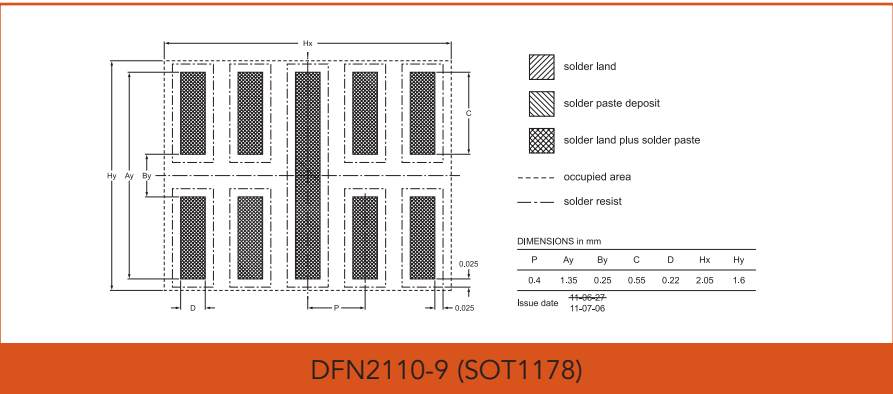


SOT505 (TSSOP8)

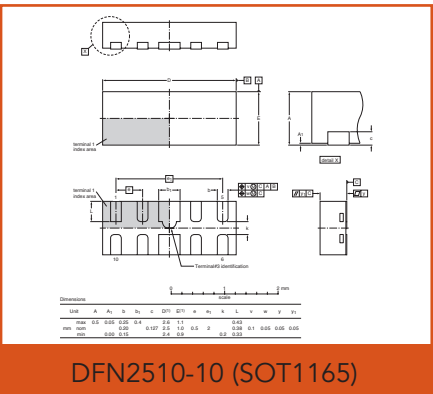
More than 8-Pin Packages



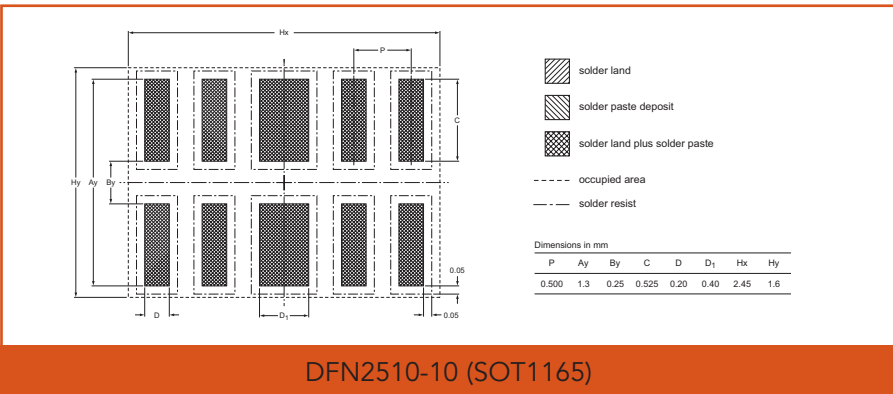
DFN2110-9 (SOT1178)



DFN2110-9 (SOT1178)



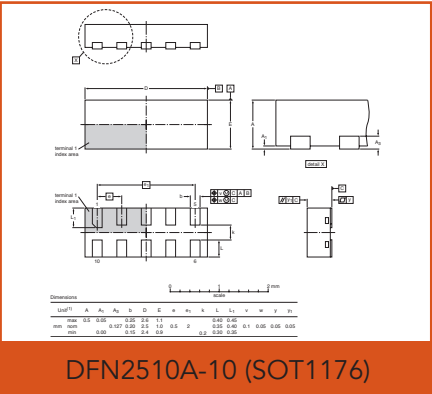
DFN2510-10 (SOT1165)



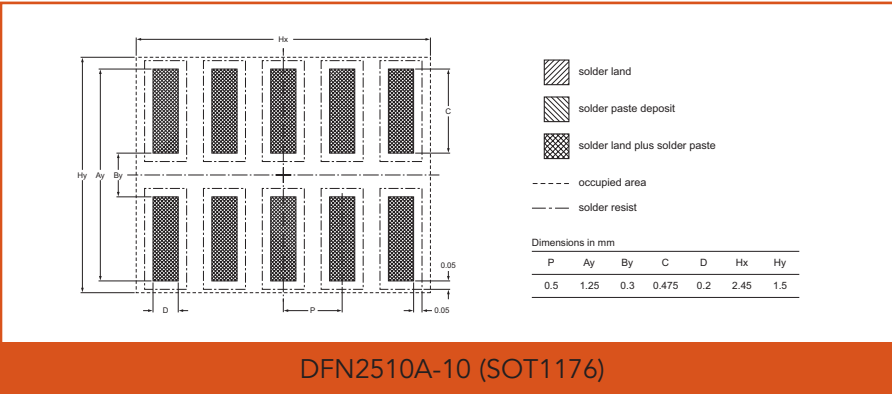
DFN2510-10 (SOT1165)

Dimensions in mm

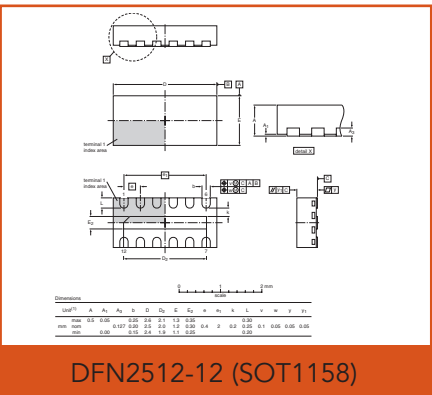
More than 8-Pin Packages



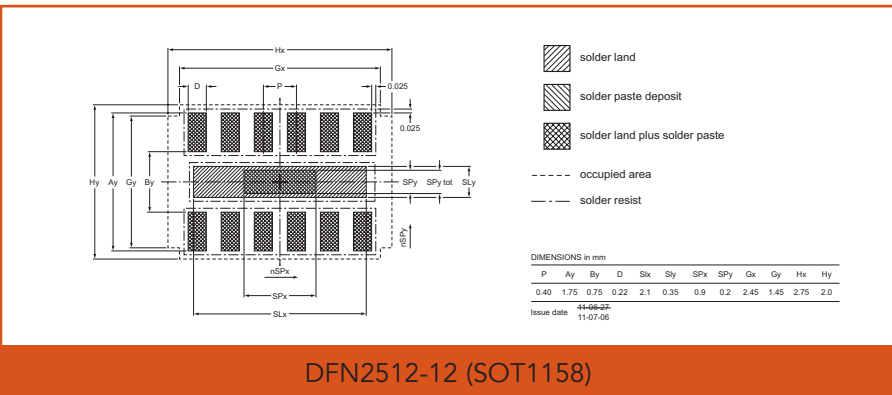
DFN2510A-10 (SOT1176)



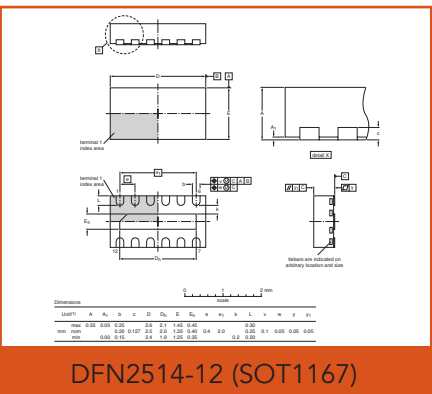
DFN2510A-10 (SOT1176)



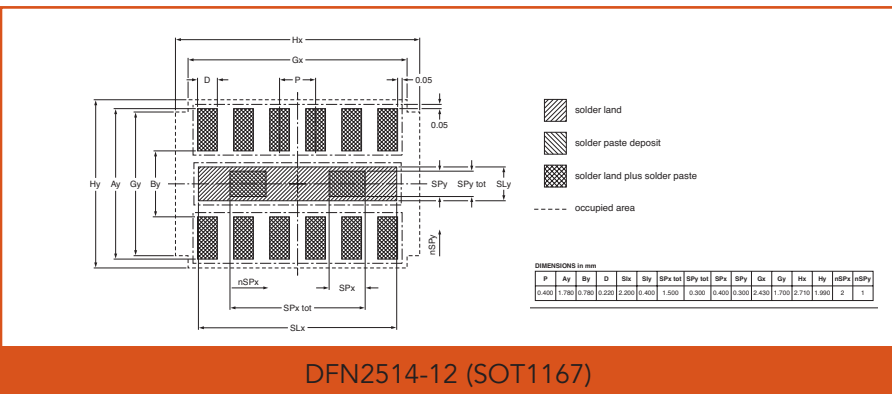
DFN2512-12 (SOT1158)



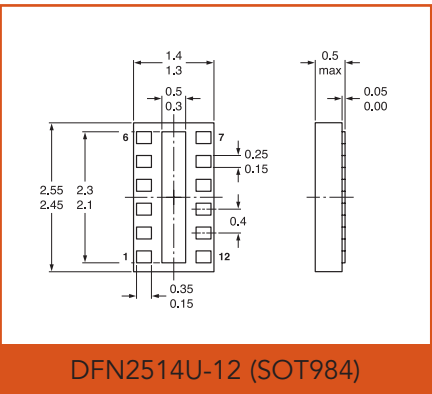
DFN2512-12 (SOT1158)



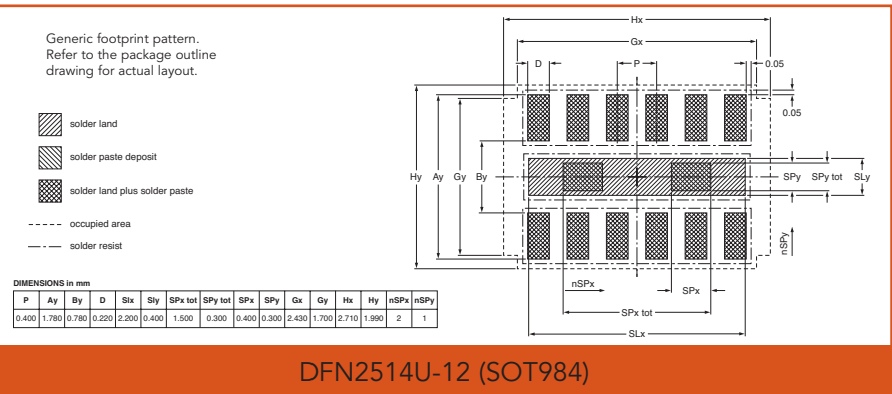
DFN2514-12 (SOT1167)



DFN2514-12 (SOT1167)



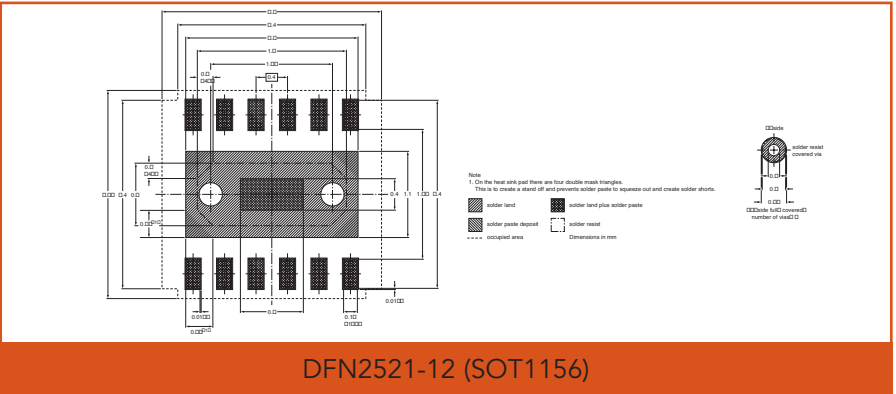
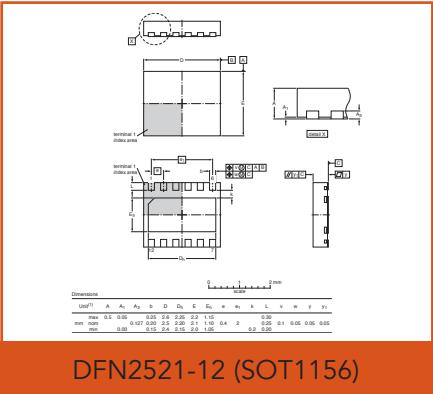
DFN2514U-12 (SOT984)



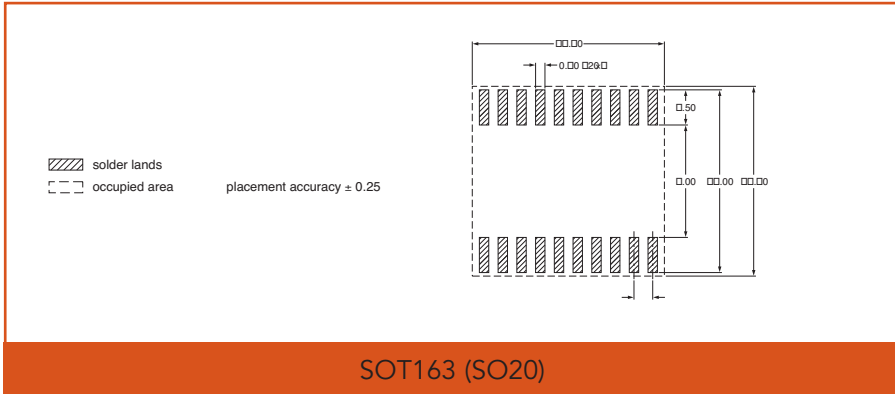
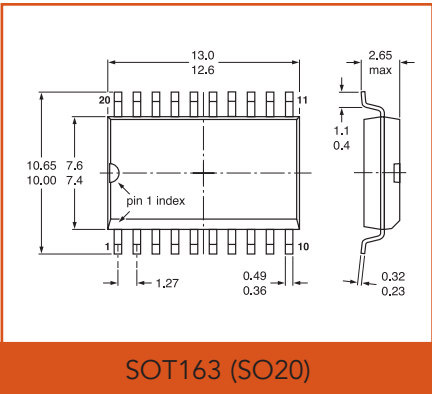
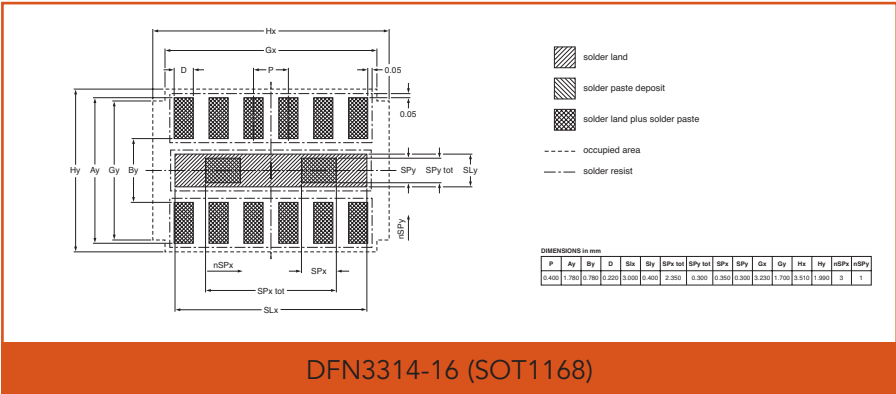
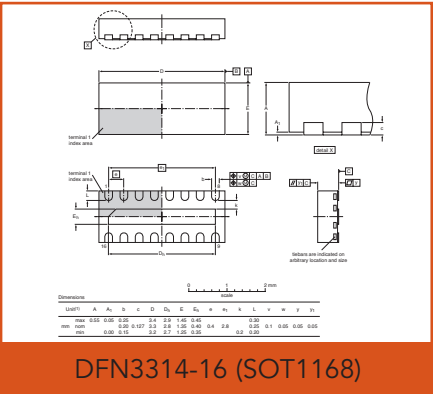
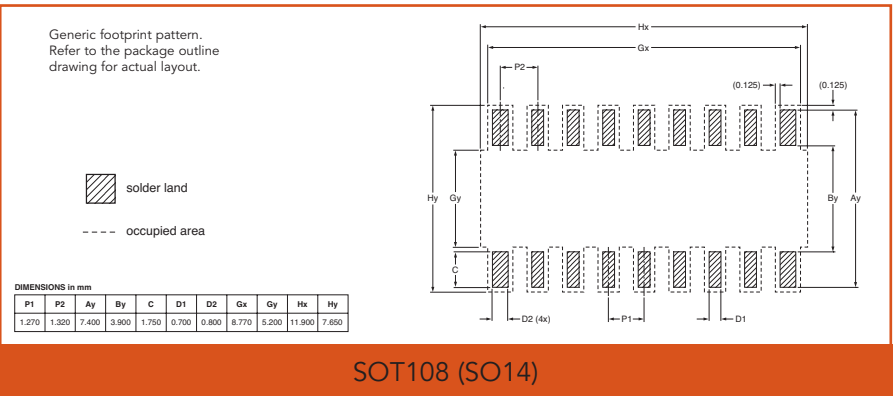
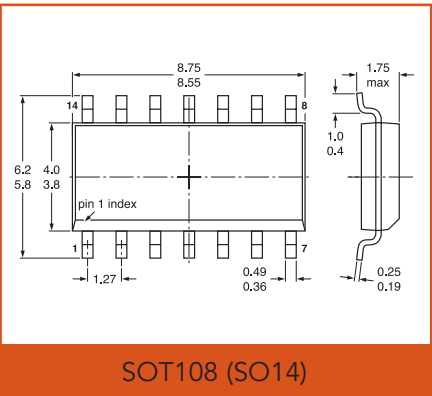
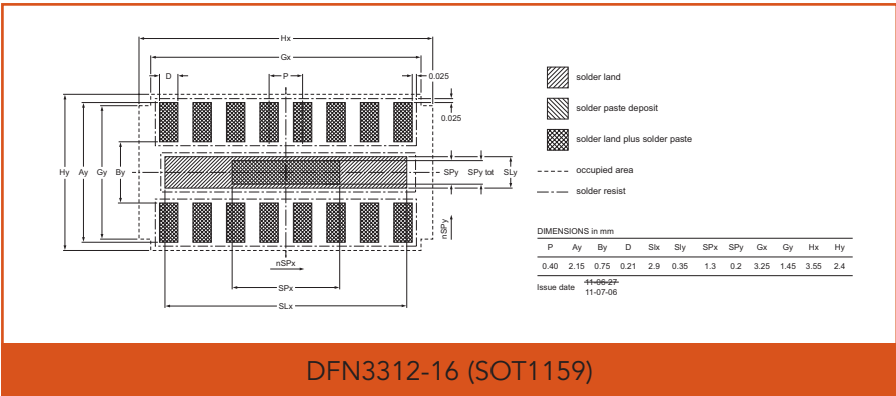
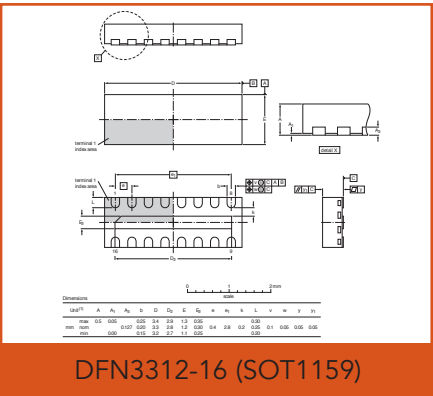
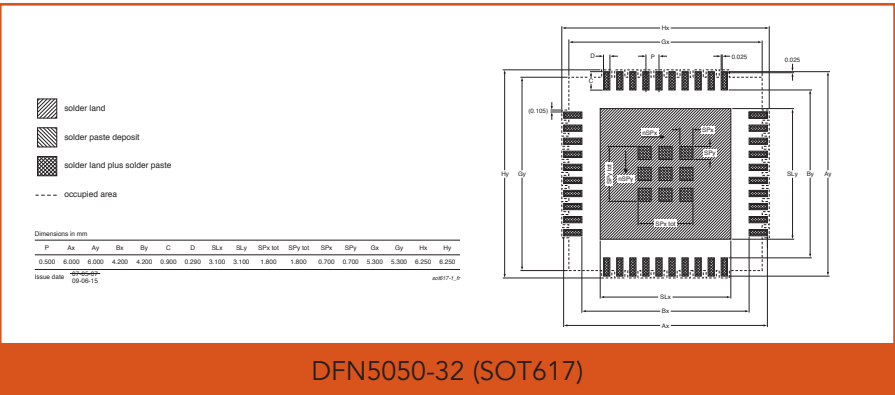
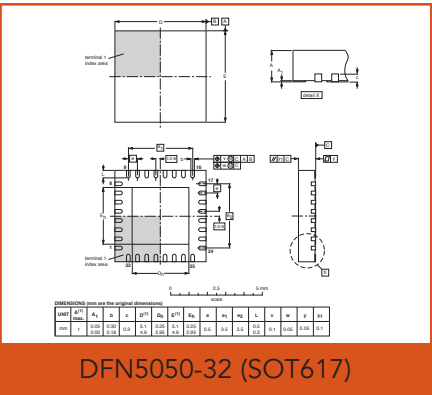
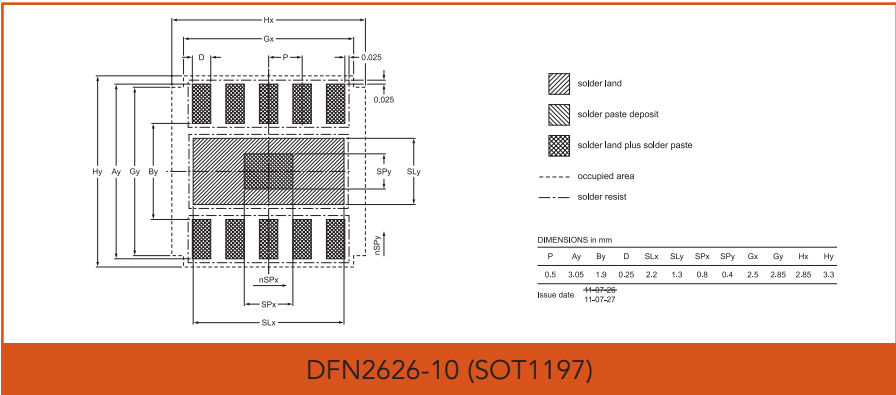
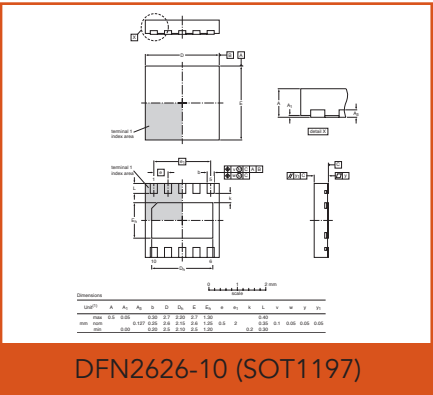
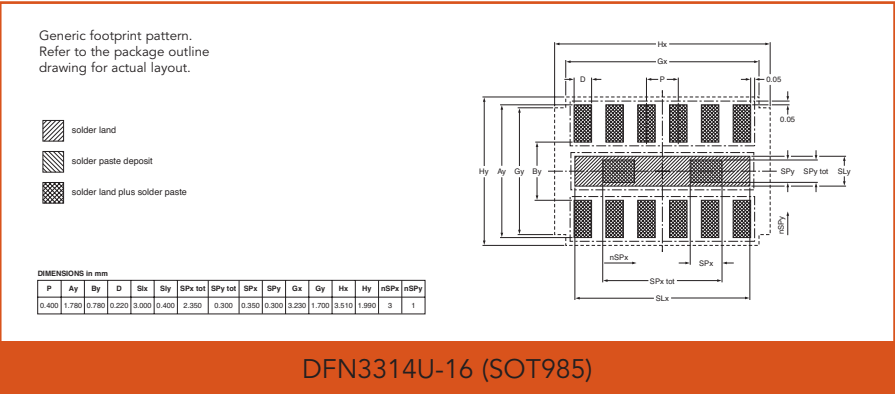
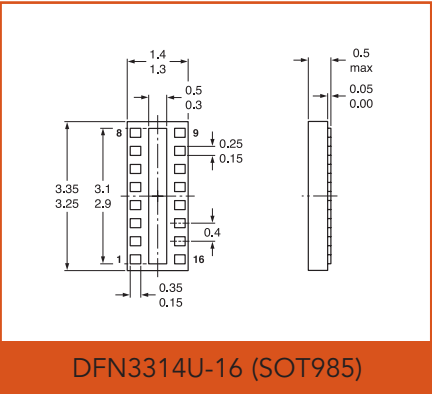
DFN2514U-12 (SOT984)

Dimensions in mm

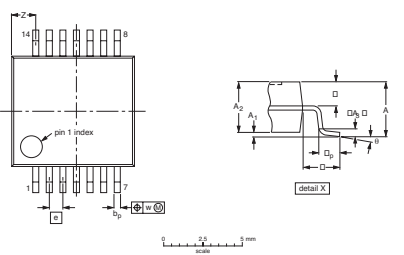
More than 8-Pin Packages



More than 8-Pin Packages



More than 8-Pin Packages

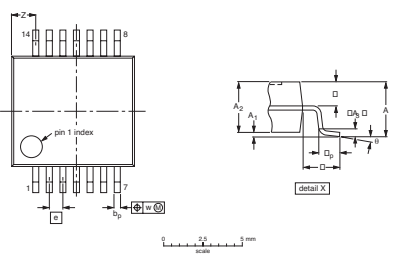


Generic footprint pattern. Refer to the package outline drawing for actual layout.

--- solder land
--- occupied area

UNIT	A ₁	A ₂	A ₃	A ₄	e	D ⁽¹⁾	e ⁽¹⁾	e	H ₂	L	L ₂	Q	v	w	y	Z ⁽¹⁾	h
mm	2	0.21	1.82	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25

SOT337 (SSOP14)



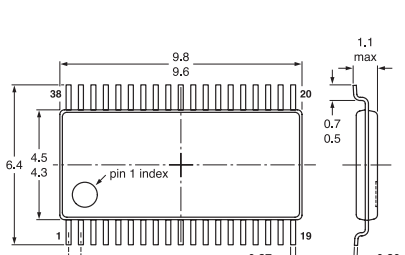
Generic footprint pattern. Refer to the package outline drawing for actual layout.

--- solder land
--- occupied area

P1	P2	Ay	By	C	D1	D2	Gx	Gy	Hx	Hy
0.650	0.750	0.650	0.650	1.000	0.400	0.600	0.900	0.100	0.850	0.850

SOT337 (SSOP14)

More than 8-Pin Packages

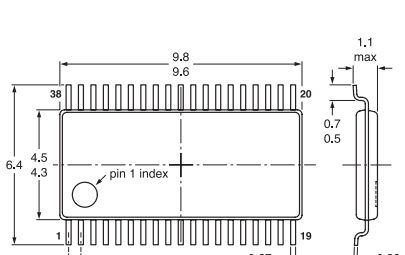


Generic footprint pattern. Refer to the package outline drawing for actual layout.

--- solder land
--- occupied area

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

SOT510 (TSSOP38)

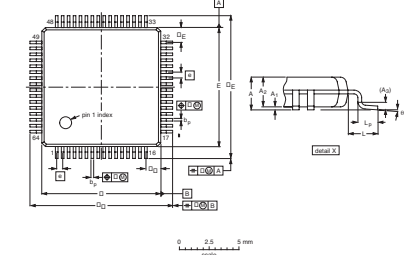


Generic footprint pattern. Refer to the package outline drawing for actual layout.

--- solder land
--- occupied area

P1	P2	Ay	By	C	D1	D2	Gx	Gy	Hx	Hy
0.635	0.660	6.600	4.200	1.200	0.450	0.500	5.245	4.500	5.500	6.850

SOT519 (SSOP16)

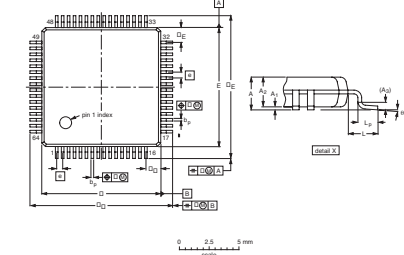


Generic footprint pattern. Refer to the package outline drawing for actual layout.

--- solder land
--- occupied area

UNIT	A ₁	A ₂	A ₃	A ₄	e	D ⁽¹⁾	e ⁽¹⁾	e	H ₂	L	L ₂	Q	v	w	y	Z ⁽¹⁾	h
mm	1.2	0.15	1.05	0.25	0.25	0.18	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1

SOT357

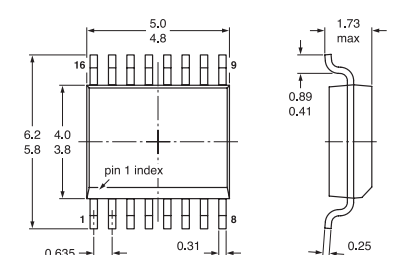


Generic footprint pattern. Refer to the package outline drawing for actual layout.

--- solder land
--- occupied area

P1	P2	Ay	By	C	D1	D2	Gx	Gy	Hx	Hy
0.500	0.500	10.500	10.500	10.500	1.000	0.200	0.400	10.500	10.500	10.500

SOT357

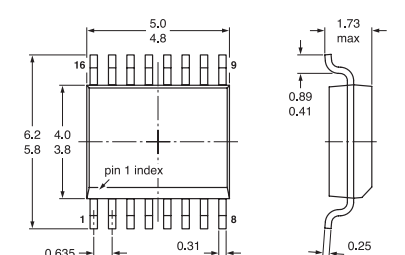


Generic footprint pattern. Refer to the package outline drawing for actual layout.

--- solder land
--- occupied area

P1	P2	Ay	By	C	D1	D2	Gx	Gy	Hx	Hy
0.635	0.660	6.600	4.200	1.200	0.450	0.500	5.245	4.500	5.500	6.850

SOT519 (SSOP16)

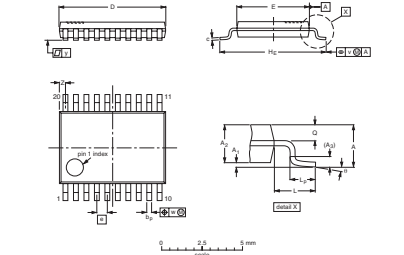


Generic footprint pattern. Refer to the package outline drawing for actual layout.

--- solder land
--- occupied area

P1	P2	Ay	By	C	D1	D2	Gx	Gy	Hx	Hy
0.635	0.660	6.600	4.200	1.200	0.450	0.500	5.245	4.500	5.500	6.850

SOT519 (SSOP16)

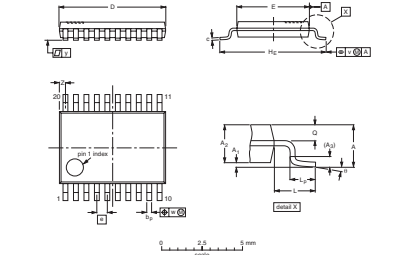


Generic footprint pattern. Refer to the package outline drawing for actual layout.

--- solder land
--- occupied area

UNIT	A ₁	A ₂	A ₃	A ₄	e	D ⁽¹⁾	e ⁽¹⁾	e	H ₂	L	L ₂	Q	v	w	y	Z ⁽¹⁾	h
mm	1.1	0.15	0.95	0.25	0.25	0.18	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1

SOT360 (TSSOP20)

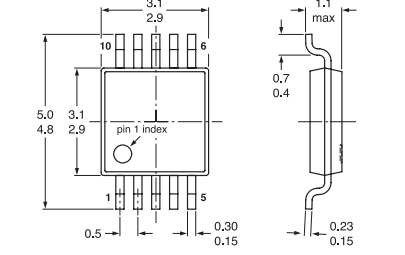


Generic footprint pattern. Refer to the package outline drawing for actual layout.

--- solder land
--- occupied area

P1	P2	Ay	By	C	D1	D2	Gx	Gy	Hx	Hy
0.650	0.750	7.200	4.500	1.350	0.400	0.600	0.900	0.100	0.850	0.850

SOT360 (TSSOP20)

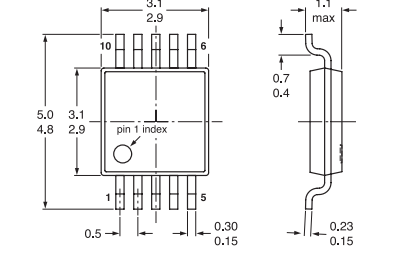


Generic footprint pattern. Refer to the package outline drawing for actual layout.

--- solder land
--- occupied area

P1	P2	Ay	By	C	D1	D2	Gx	Gy	Hx	Hy
0.500	0.550	5.400	3.200	1.100	0.300	0.400	2.750	3.900	3.700	5.650

SOT552 (TSSOP10)

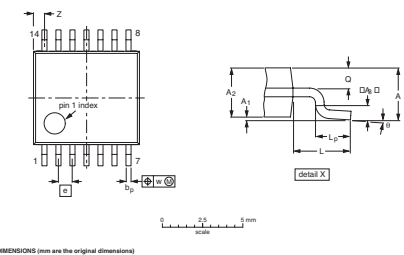


Generic footprint pattern. Refer to the package outline drawing for actual layout.

--- solder land
--- occupied area

P1	P2	Ay	By	C	D1	D2	Gx	Gy	Hx	Hy
0.500	0.550	5.400	3.200	1.100	0.300	0.400	2.750	3.900	3.700	5.650

SOT552 (TSSOP10)

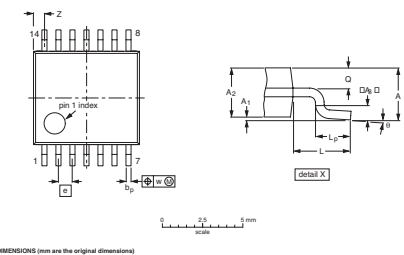


Generic footprint pattern. Refer to the package outline drawing for actual layout.

--- solder land
--- occupied area

UNIT	A ₁	A ₂	A ₃	A ₄	e	D ⁽¹⁾	e ⁽¹⁾	e	H ₂	L	L ₂	Q	v	w	y	Z ⁽¹⁾	h
mm	1.1	0.15	0.95	0.25	0.25	0.18	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1

SOT402 (TSSOP14)



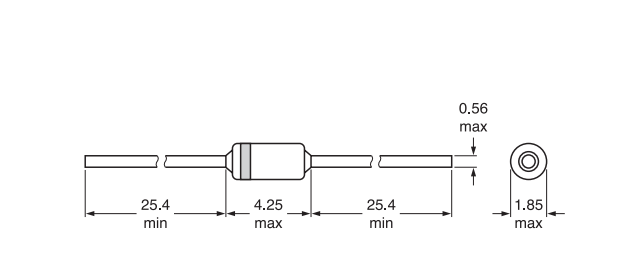
Generic footprint pattern. Refer to the package outline drawing for actual layout.

--- solder land
--- occupied area

P1	P2	Ay	By	C	D1	D2	Gx	Gy	Hx	Hy
0.650	0.750	7.200	4.500	1.350	0.400	0.600	0.900	0.100	0.850	0.850

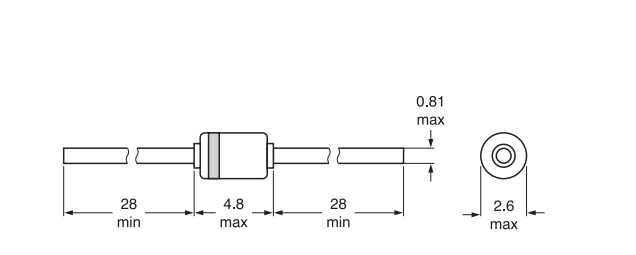
SOT402 (TSSOP14)

Glass diodes



Dimensions in mm

SOD27 (DO-35)

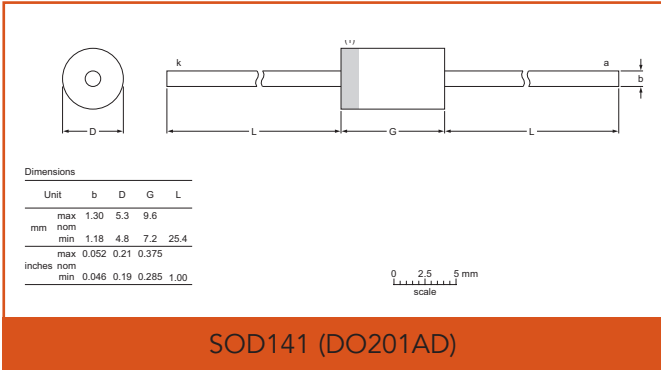
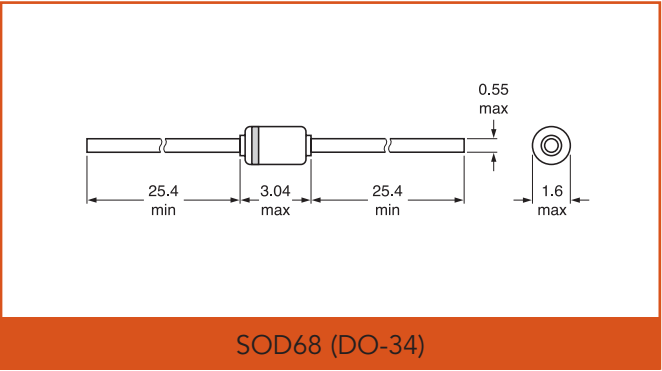


Dimensions in mm

SOD66 (DO-41)

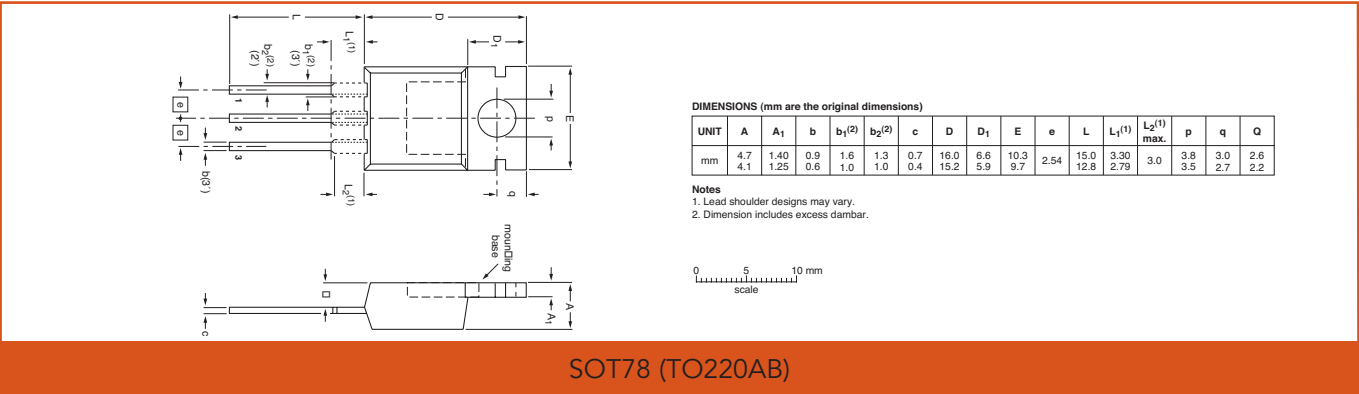
Minimized outline drawings and reflow soldering footprint

Glass diodes

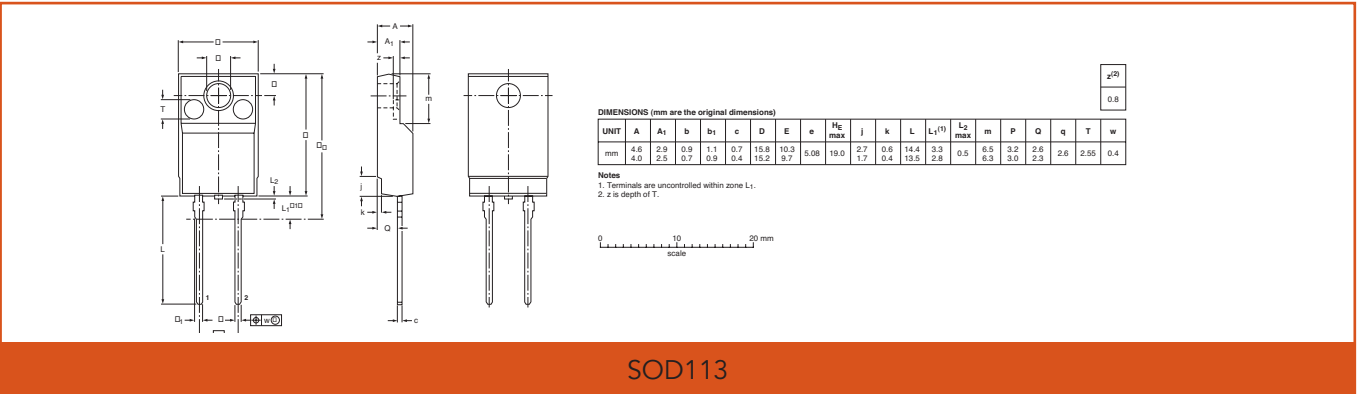
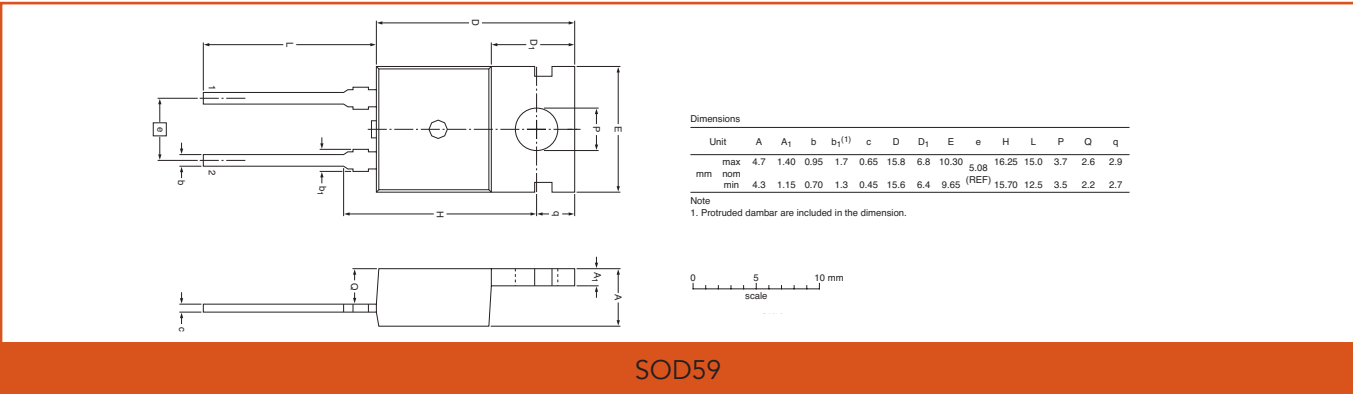
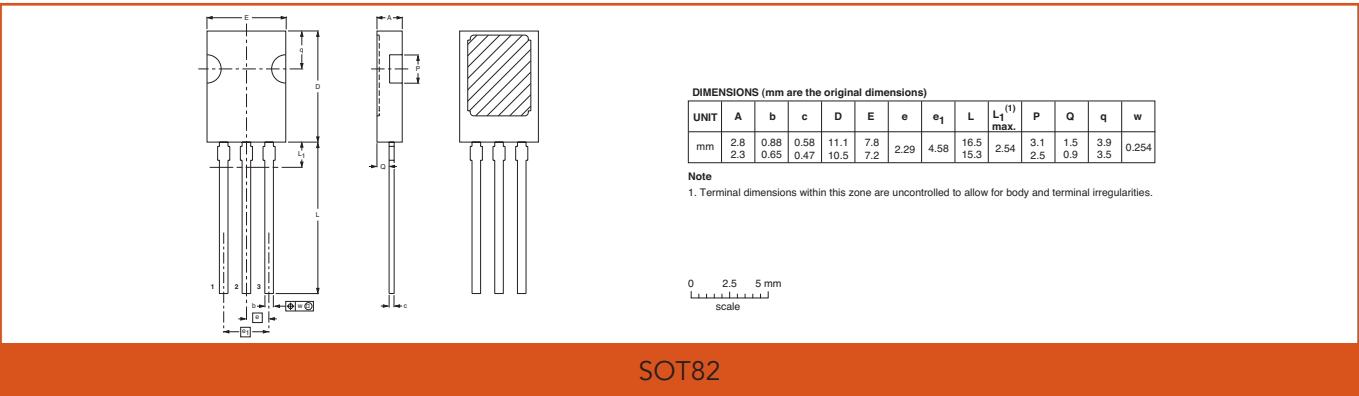
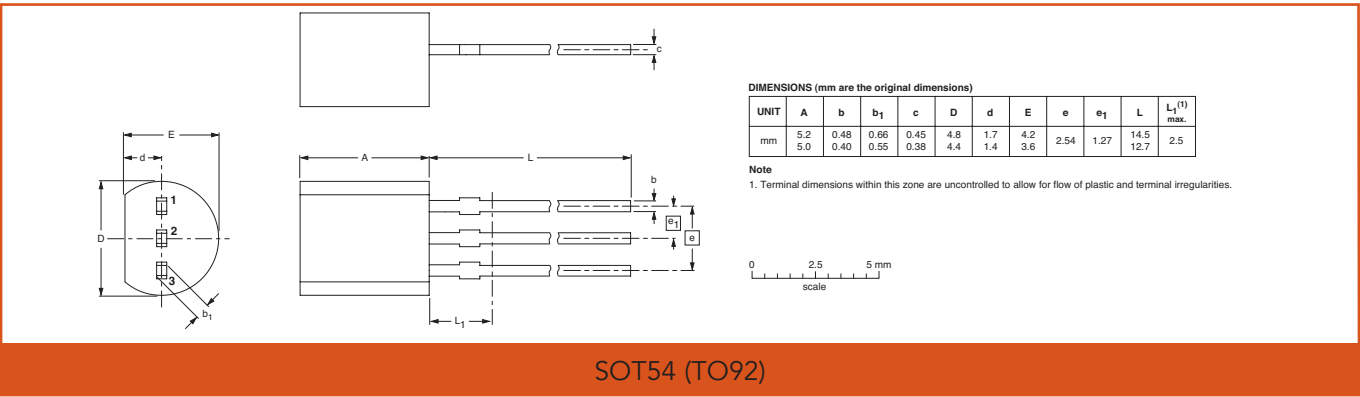
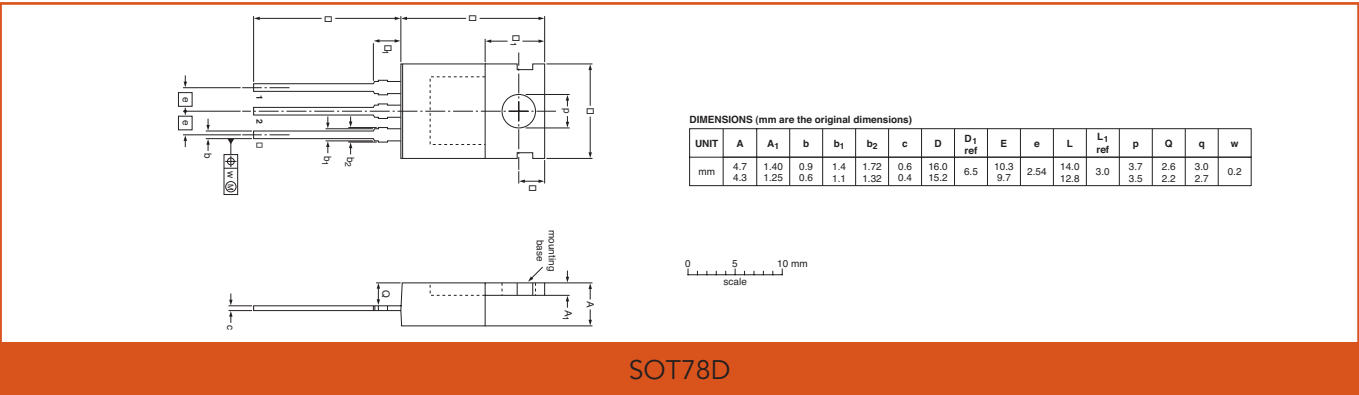
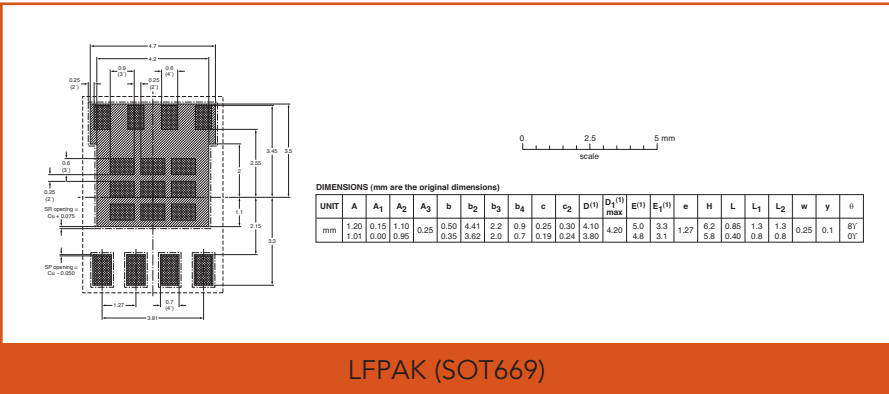
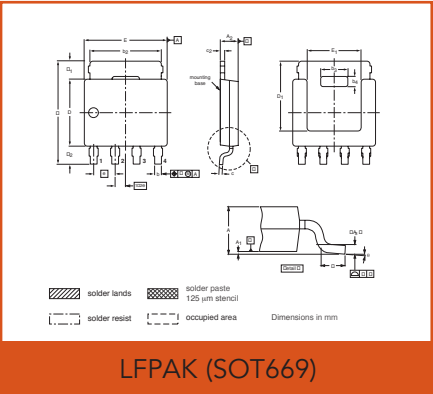


Minimized outline drawings and reflow soldering footprint

Single Ended and Through Hole Packages



Single Ended and Through Hole Packages



Dimensions in mm

Dimensions in mm

Single Ended and Through Hole Packages

UNIT	A	A ₁	b	c	D	D ₁	E	e	L	L ₁	Q	w
mm	4.5	1.40	0.85	1.3	0.7	11	1.6	10.3	2.54	15.0	3.30	2.6
	4.1	1.27	0.60	1.0	0.4		1.2	9.7		13.5	2.79	2.2

Notes:
1. Terminal dimensions within this zone are uncontrolled.
2. Both recesses are $\pm 2.5^\circ$ 0.8 max. depth

0 5 10 mm scale

SOT186A (isolated TO220AB)

UNIT	A	A ₁	b	b ₁	c	D _{max}	D ₁	E	e	L	L ₁	Q
mm	4.5	1.40	0.85	1.3	0.7	11	1.6	10.3	2.54	15.0	3.30	2.6
	4.1	1.27	0.60	1.0	0.4		1.2	9.7		13.5	2.79	2.2

0 5 10 mm scale

SOT226

UNIT	A	A ₁	b	c	D	D ₁	E	e	L	L ₁	L ₂	L ₃ ⁽¹⁾	L ₄ ⁽²⁾ max.	m	p	p ₁	q	Q	Q ₁	Q ₂	R	w
mm	4.5	1.39	0.85	0.7	15.8	6.4	10.3	1.7	9.8	5.9	5.2	2.4	0.5	0.8	3.8	4.3	3.0	2.0	4.5	8.2	0.5	0.4
	4.1	1.27	0.70	0.4	15.2	5.9	9.7		9.7	5.3	5.0	1.6		0.6	3.6	4.1	2.7					

0 5 10 mm scale

SOT263B-1

UNIT	A	A ₁	b	c	D	D ₁	E	e	L	L ₁	L ₂	L ₃	L ₄	m	p	p ₁	q	Q	Q ₁	Q ₂	R	w
mm	4.5	1.40	0.85	0.64	11	1.6	10.3	2.54	15.0	3.30	2.6											
	4.1	1.27	0.60	0.48		1.2	9.7		13.5	2.79												

0 5 10 mm scale

SOT404 (D²PAK)

UNIT	A	A ₁	b	c	D	D ₁	E	e	L	L ₁	L ₂	L ₃	L ₄	m	p	p ₁	q	Q	Q ₁	Q ₂	R	w
mm	4.5	1.40	0.85	0.64	11	1.6	10.3	2.54	15.0	3.30	2.6											
	4.1	1.27	0.60	0.48		1.2	9.7		13.5	2.79												

0 5 10 mm scale

SOT404 (D²PAK)

Single Ended and Through Hole Packages

UNIT	A	A ₁	b	c	D	D ₁	E	e	L	L ₁	L ₂	L ₃	L ₄	m	p	p ₁	q	Q	Q ₁	Q ₂	R	w
mm	2.38	0.93	0.89	1.1	5.46	0.58	6.22	4.4	6.73	5.21	4.57	2.285	9.6	2.7	1.1	1.0	0.3					
	2.22	0.46	0.71	0.9	5.00	0.20	5.82		6.47	5.00	BSC ⁽¹⁾	BSC ⁽¹⁾										

0 5 10 mm scale

SOT428 (DPAK)

UNIT	A	A ₁	b	c	D	D ₁	E	e	L	L ₁	L ₂	L ₃	L ₄	m	p	p ₁	q	Q	Q ₁	Q ₂	R	w
mm	2.38	0.93	0.89	1.1	5.46	0.58	6.22	4.4	6.73	5.21	4.57	2.285	9.6	2.7	1.1	1.0	0.3					
	2.22	0.46	0.71	0.9	5.00	0.20	5.82		6.47	5.00	BSC ⁽¹⁾	BSC ⁽¹⁾										

0 5 10 mm scale

SOT428 (DPAK)

UNIT	A	A ₁	b	c	D ₁	D ₂	E	E ₁	e	e ₁	L	L ₁ ⁽²⁾ max	Q	w
mm	2.38	0.93	0.89	0.56	1.10	6.22	6.73	5.21	4.57	2.285	9.6	2.7	1.1	0.3
	2.22	0.46	0.71	0.46	0.96	5.96	6.47	5.00	BSC ⁽¹⁾	BSC ⁽¹⁾	9.2		1.0	

0 2.5 5 mm scale

SOT533

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Power management devices: A broad portfolio with a wide package collection – covering all application segments

									
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	Portable								
	Computing								
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* AECQ100 qualification (under development)

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