



Discrete semiconductors selection guide 2016

Bipolar transistors, diodes, ESD protection, TVS,
filtering and signal conditioning, and MOSFETs



Our extensive package range provides max

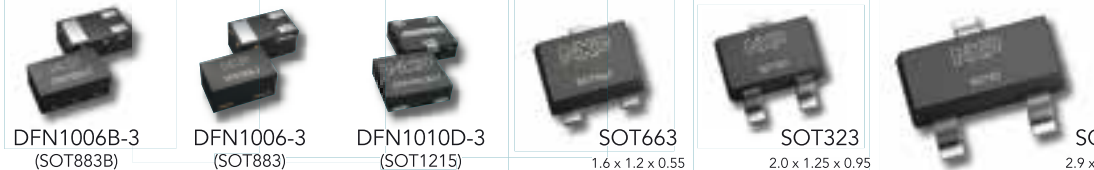
Miniaturization

2 Pins



DSN0402 (SOD992) 0.4 x 0.2 x 0.12 DSN0603-2 (SOD962) 0.6 x 0.3 x 0.3 DSN1006-2 (SOD993) 1.0 x 0.6 x 0.3 DSN1006U-2 (SOD995) 1.0 x 0.6 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 DSN1608D-2 (SOD995) 1.6 x 0.8 x 0.37

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 SOT323 2.0 x 1.25 x 0.95 SOT23 2.9 x 1.6 x 0.9

4/5 Pins



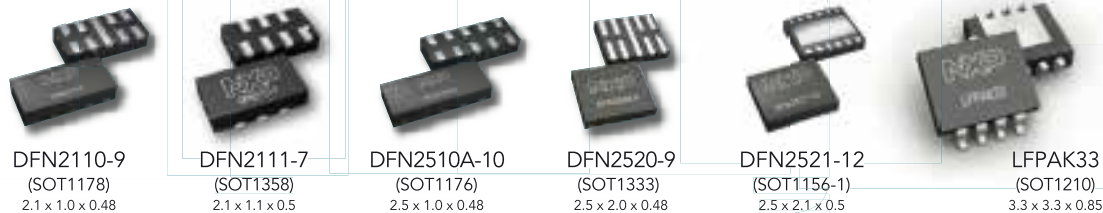
WLCSP4* 0.8 x 0.8 x 0.35 WLCSP5* 1.51 x 1.14 x 0.65 SOT665 1.6 x 1.2 x 0.55 SOT353 2.0 x 1.25 x 0.95

6 Pins



DFN1010B-6 (SOT1216) 1.1 x 1.0 x 0.37 DFN1010-6 (SOT891) 1.0 x 1.0 x 0.48 DFN1410-6 (SOT886) 1.45 x 1.0 x 0.48 WLCSP6 1.48 x 0.98 x 0.35 SOT666 1.6 x 1.2 x 0.55

≥ 7 Pins



DFN2110-9 (SOT1178) 2.1 x 1.0 x 0.48 DFN2111-7 (SOT1358) 2.1 x 1.1 x 0.5 DFN2510A-10 (SOT1176) 2.5 x 1.0 x 0.48 DFN2520-9 (SOT1333) 2.5 x 2.0 x 0.48 DFN2521-12 (SOT1156-1) 2.5 x 2.1 x 0.5 LFPAK33 (SOT1210) 3.3 x 3.3 x 0.85

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Our commitment: quality and reliability

AEC-Q101

- ▶ We qualify our products according to the automotive AEC-Q101 standard and even exceed it's requirements, for instance when doing extended lifetime testing.



- ▶ All our processes and manufacturing plants are subject to regular international and internal audits, including the following:
 - ▶ ISO9001
 - ▶ ISO/TS 16949 for automotive sites
 - ▶ ISO14001
 - ▶ OHSAS18001



- ▶ NXP's Design for Excellence (DfX) program ensures that each new development builds on past learning and that best practices are always employed. The result is continual product improvement.



- ▶ Zero defect is our goal. To ensure continuous improvement failure analysis and the determination to find root causes is performed at all stages of development and production by adoption of quality-analysis tools and methods (e.g. Six-Sigma, Safe-Launch).

Rigorous attention to detail and commitment to quality have yielded a very low product failure rate of a single-digit part per billion (ppb).

Bipolar transistors portfolio

What you get when you choose NXP for bipolar transistors

A comprehensive portfolio for all applications

Best in class performing transistors from general-purpose to low V_{CEsat} transistors

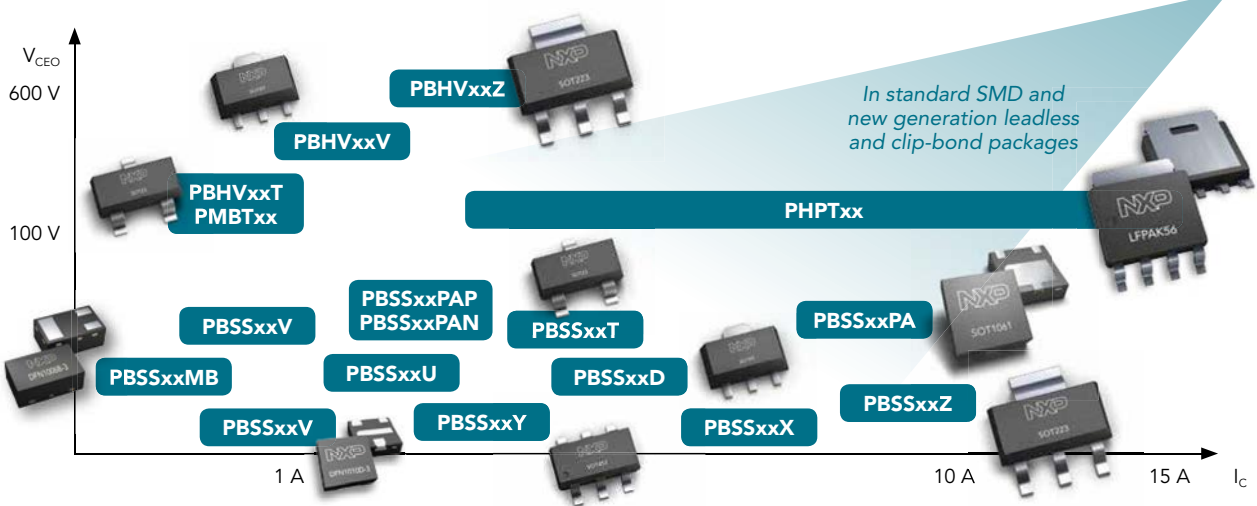
A broad range of packages

Many options for leaded SMD, medium-power clip-bond and ultra-small leadless packages.

A quality product from an experienced, high volume supplier

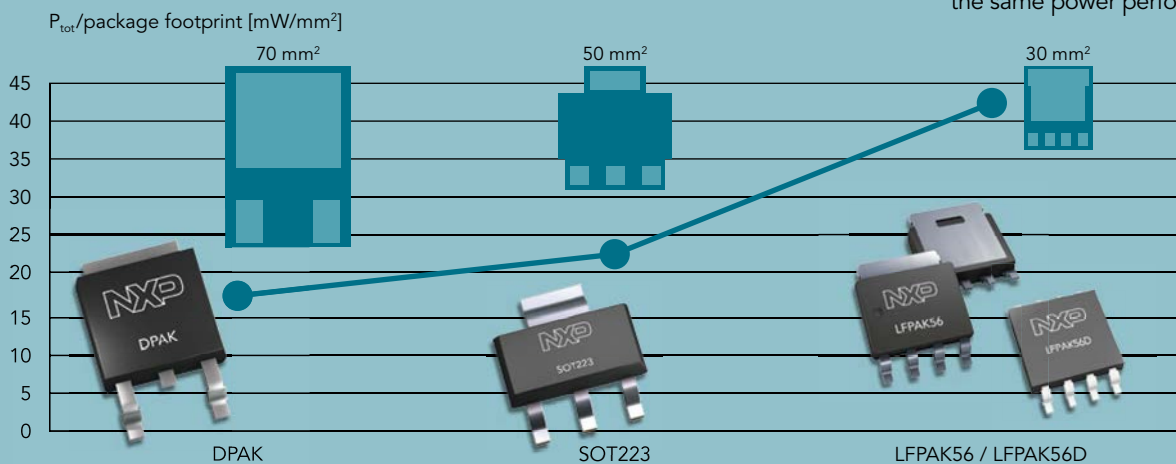
- ▶ NXP is strongly committed to automotive quality standards
- ▶ NXP has a track record of more than 60 years in developing and producing transistors
- ▶ NXP is the #1 in small-signal discretes with a high production capacity

Low V_{CEsat} (BISS) transistors



LFPAK: Same power dissipation but half the size


55% package size reduction while retaining the same power performance




Reduced PCB area requirements comparison of DPAK, SOT223 and LFPAK

High-power transistors up to 3 W


High-power transistors (single)

Package											LFPAK56 (SOT669)
											
Size (mm)											5 x 6 x 1.1
V_{CE0} (V)	I_C (A)	I_{CM} (A)	h_{FE} min/typ	@ 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)	Polarity	
60	3	8	200 / 400	0.5	2	50	270	3	0.3	NPN	PHPT60603NY
			200 / 400	0.5	2	70	360	3	0.3	PNP	PHPT60603PY
100	3		150 / 250	0.5	10	50	330	3	0.3	NPN	PHPT61003NY
			150 / 220	0.5	10	70	360	2	0.2	PNP	PHPT61003PY
	2	6	150 / 250	0.5	10	50	300	2	0.2	NPN	PHPT61002NYC
			150 / 220	0.5	10	70	400	2	0.2	PNP	PHPT61002PYC

High-current, high-power transistors






Package						LFPAK56 (SOT669)
						
Size (mm)						5 x 6 x 1.1
V_{CE0} (V)	I_C (A)	h_{FE} min/typ	@ I_C (A)	@ V_{CE} (V)	Polarity	
40	6	200/400	0.5	2	NPN	PHPT60406NY
40	6	200/400	0.5	2	PNP	PHPT60406PY
40	10	200/400	0.5	2	NPN	PHPT60410NY
40	10	200/400	0.5	2	PNP	PHPT60410PY
40	15	200/400	0.5	2	NPN	PHPT60415NY
40	15	200/400	0.5	2	PNP	PHPT60415PY
60	6	200/400	0.5	2	NPN	PHPT60606NY
60	6	150/250	0.5	2	PNP	PHPT60606PY
60	10	200/400	0.5	2	NPN	PHPT60610NY
60	10	150/250	0.5	2	PNP	PHPT60610PY
100	6	150/250	0.5	10	NPN	PHPT61006NY
100	6	150/220	0.5	10	PNP	PHPT61006PY
100	10	150/250	0.5	10	NPN	PHPT61010NY
100	10	150/220	0.5	10	PNP	PHPT61010PY

High-power transistors (double)

Package											LFPAK56D (SOT1205)	
												
Size (mm)											5 x 6 x 1.1	
V_{CE0} (V)	I_C (A)	I_{CM} (A)	h_{FE} typ	@ 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)	Polarity	$h_{FE1}/$ h_{FE2}	
100	3	6	150	0.5	10	50	300	3	0.2	2XNPN	-	PHPT610030NK
						70	400	3	0.2	2XPNP	-	PHPT610030PK
						50 / 70	300 / 400	3	0.2	NPN/PNP	-	PHPT61003NPK
						50	300	3	0.2	2XNPN	0.95	PHPT610035NK
						70	400	3	0.2	2XPNP	0.9	PHPT610035PK

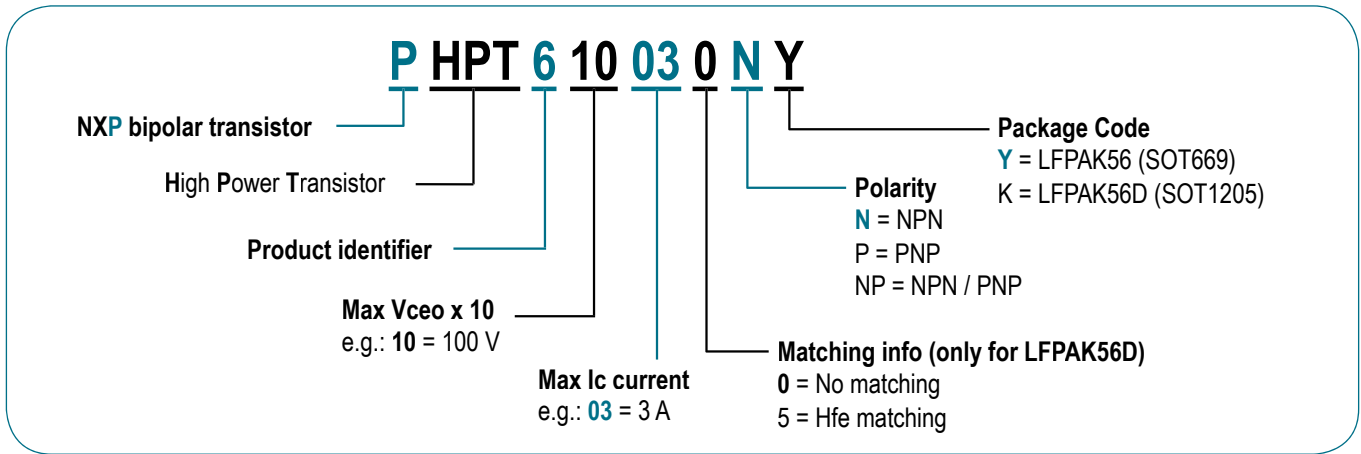
Low V_{CEsat} (BISS) transistors single PNP

types in **bold** represent new products

Package							SOT223 (SC-73)	SOT89 (SC-62)	SOT457 (SC-74)	DFN2020-3 (SOT1061)	DFN2020D-3 (SOT1061D)
											
Size (mm)							6.5 x 3.5 x 1.65	4.5 x 2.5 x 1.5	2.9 x 1.5 x 1.0	2.0 x 2.0 x 0.62	2.0 x 2.0 x 0.62
P _{tot} (mW)							1700	1650	750	1300	1300
V _{CEO} (V)	I _C (A)	I _{CM} (A)	h _{FE} min/typ	@ I _C (A)	@ V _{CE} (V)	V _{CEsat} typ (mV); I _C = 0.5 A; I _B = 0.05 A					
12	5.3	10.6	250 / 400	0.5	2	20		PBSS301PX			
	5.7	11.4	250 / 400	0.5	2	20	PBSS301PZ				
	6	7	220 / 335	0.5	2	20			PBSS5612PA		
20	3	5	200 / –	0.5	2	80 ²⁾			PBSS5320D		
			220 / 450	0.5	2	50		PBSS5320X			
	4	15	250 / 400	0.5	2	35			PBSS301PD		
	5	10	300 / 430	0.5	2	45			PBSS5520X		
	5.1	10.2	250 / 370	0.5	2	25			PBSS302PX		
	5.5	11	250 / 370	0.5	2	25	PBSS302PZ				
	6	7	230 / 345	0.5	2	25				PBSS5620PA	
	6.2	15	250 / 400	0.5	2	18			PBSS4021PX		
6.6	20	250 / 400	0.5	2	16	PBSS4021PZ					
30	2.7	5	200 / 350	0.5	2	87			PBSS4032PD ³⁾		
	3	5	200 / 380	0.5	2	50			PBSS5330X		
			200 / 320	0.5	2	45				PBSS5330PA	PBSS5330PAS
	4.2	10	200 / 350	0.5	2	70			PBSS4032PX ³⁾		
	4.4	10	200 / 350	0.5	2	70	PBSS4032PZ ³⁾				
	5.1	10.2	250 / 400	0.5	2	25			PBSS303PX		
	5.3	10.6	250 / 400	0.5	2	25	PBSS303PZ				
6	7	200 / 335	0.5	2	25				PBSS5630PA		
40	2.0	3.0	215 / –	0.5	5	170			PBSS5240X		
	4	15	200 / 310	0.5	2	46				PBSS302PD	
			250 / 370	0.5	2	33			PBSS5540X		
	5	10	250 / 350	0.5	2	40 ¹⁾	PBSS5540Z				
50	2.0	5	200 / –	0.5	2	90 ²⁾			PBSS5250X		
	3.0	5.0	200 / 300	0.5	2	70				PBSS5350D	
			200 / 375	0.5	2	70			PBSS5350X		
			200 / 300	0.5	2	70	PBSS5350Z				
60	3	6	130 / 220	0.5	5	55					
			130 / –	0.5	5	55	PBSS5360Z				
			180 / 265	0.5	2	55			PBSS303PD		
	4.2	8.4	200 / 295	0.5	2	35			PBSS304PX		
	4.5	9	200 / 295	0.5	2	35	PBSS304PZ				
	5	6	170 / 260	0.5	2	35				PBSS5560PA	
	5	15	200 / 300	0.5	2	30			PBSS4041PX		
5.7	15	200 / 300	0.5	2	22	PBSS4041PZ					
80	3	5	155 / 225	0.5	2	55			PBSS304PD		
			180 / 265	0.5	2	40				PBSS5580PA	
	4.0	10	200 / 300	0.5	2	35			PBSS5480X		
			200 / 280	0.5	2	36			PBSS305PX		
	4.5	9	200 / 280	0.5	2	36	PBSS305PZ				
100	1.0	3.0	150 / 350	0.5	5	100				PBSS9110D	
			150 / 350	0.5	5	90			PBSS9110X		
			150 / –	0.5	5	90	PBSS9110Z				
	2	3	175 / 275	0.5	2	65				PBSS305PD	
	2.7	4	180 / 295	0.5	2	45				PBSS9410PA	
	3.7	7.4	200 / 300	0.5	2	45			PBSS306PX		
4.1	8.2	200 / 300	0.5	5	45	PBSS306PZ					

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

Nomenclature for high-power transistors



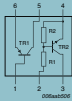
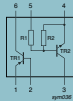
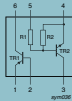


Low V_{CEsat} (BISS) transistors single NPN

Package								SOT23	SOT323 (SC-70)	SOT363 (SC-88)	DFN1006-3 (SOT883)	DFN1006B-3 (SOT883B)	DFN1010D-3 (SOT1215)
Size (mm)								2.9 x 1.3 x 1.0	2.0 x 1.25 x 0.95	2.0 x 1.25 x 0.95	1.0 x 0.6 x 0.48	1.0 x 0.6 x 0.37	1.1 x 1.0 x 0.37
P _{tot} (mW)								480	350	430	250	250	750
V _{CEO} (V)	I _C (A)	I _{CM} (A)	h _{FE} min/typ	@ I _C (A)	@ V _{CE} (V)	V _{CEsat} typ (mV); I _C = 0.5 A; I _B = 0.05 A							
15	0.5	1	200 / 325	0.01	2	-				PBSS2515M	PBSS2515MB		
20	1	3	350 / 470	0.1	2	110 ²⁾	PBSS4120T						
	2	5	220 / 330	0.1	2	45	PBSS4320T						
	4.3	8	300 / 550	0.5	2	21	PBSS4021NT						
30	1	1.5	230 / 380	0.5	2	90						PBSS4130QA	
		3	300 / 450	0.5	2	120 ²⁾	PBSS4130T						
	2	3	300 / 450	0.5	2	70	PBSS4230T						
			230 / 380	0.5	2	75						PBSS4230QA	
2.6	5	300 / 500	0.5	2	80	PBSS4032NT ³⁾							
40	0.5	1	200 / 550	0.01	2	200 ²⁾				PBSS2540M	PBSS2540MB		
			300 / 440	0.5	5	130		PBSS4140U					
			300 / 510	0.5	5	120	PMMT491A						
	2.0	3	300 / 420	0.5	5	130	PBSS4140T						
			350 / 470	0.1	2	70		PBSS4240Y					
3.0	3	300 / 450	0.5	2	70	PBSS4240T							
50	2	5	300 / 495	0.5	2	60	PBSS4350T						
60	1.0	1.5	150 / 240	0.5	2	90						PBSS4160QA	
			200 / 420	0.5	5	120		PBSS4160U					
			200 / 350	0.5	5	110	PBSS4160T						
	2	3	150 / 240	0.5	2	75						PBSS4260QA	
3.8	8	300 / 500	0.5	2	29	PBSS4041NT							
100	1.0	3.0	150 / 400	0.25	10	80				PBSS8110Y			
			150 / 300	0.25	10	70	PBSS8110T						

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

Low V_{CEsat} (BISS) load switches

Package				SOT457 (SC-74)		SOT363 (SC-88)	
							
Size (mm)				2.9 x 1.5 x 1.0		2.0 x 1.25 x 0.95	
P _{tot} (mW)				750 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		
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
60	1	180	2.2				PBLS6001D
			4.7				PBLS6002D
			10				PBLS6003D
			22				PBLS6004D
			47				PBLS6005D
	1.5	100	2.2		PBLS6021D		
			4.7		PBLS6022D		
			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

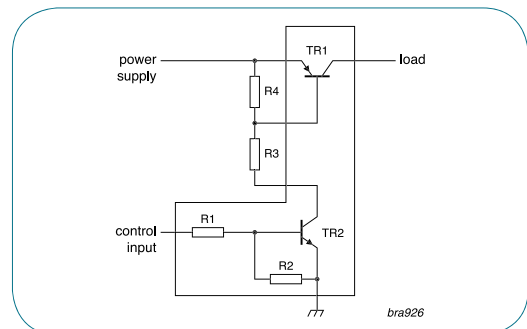
Key features and benefits

- ▶ 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



High-voltage low V_{CEsat} (BISS) transistors

types in **bold** represent new products

Package			SOT223 (SC-73)	SOT89 (SC-62)	SOT1215	SOT23
Size (mm)			6.5 x 3.5 x 1.65	4.5 x 2.5 x 1.5	1.1 x 1.0 x 0.37	2.9 x 1.3 x 1.0
P_{tot} (mW)			1700	1300	750	250
Polarity	V_{CEO} (V)	I_c (A)				
NPN	150	0.5			PBHV8115QA	
		1	PBHV8115Z	PBHV8115X		PBHV8115T
		2	PBHV8215Z			
	180	1				PBHV8118T
		400	0.5	PBHV8540Z	PBHV8540X	
	1		PBHV8140Z			
	500	0.15				PMBTA45
PNP	140	4	PBHV9414Z			
	150	0.5			PBHV9115QA	
		1	PBHV9115Z	PBHV9115X		PBHV9115T
		2	PBHV9215Z			
	600	0.5	PBHV9560Z			
		0.1	PBHV3160Z			
	400	0.25	PBHV9040Z	PBHV9040X		PBHV9040T
		0.5	PBHV9540Z			
	500	0.15	PBHV3160Z			PBHV9050T
		0.25	PBHV9050Z			

In the spotlight

High-voltage low V_{CEsat} (BISS) transistors in SOT223, SOT23 & SOT89

Voltage V_{CEO} up to 600 V

Current I_c up to 4 A (continuous), 10 A (peak)

V_{CEsat} down to 33 mV

AEC-Q101 qualified

New high-voltage low V_{CEsat} (BISS) in DFN1010D-3



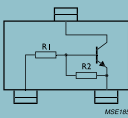


Low V_{CEsat} (BISS) RETs

Package					SOT23	
Size (mm)					2.9 x 1.3 x 1.0	
P_{tot} (mW)					250	
V_{CEO} (V)	I_c (mA)		R1 (k Ω)	R2 (k Ω)	NPN	PNP
40	600	R1 = R2	1	1	PBRN113ET	PBRP113ET
			2.2	2.2	PBRN123ET	PBRP123ET
		R1 \neq R2	1	10	PBRN113ZT	PBRP113ZT
			2.2	10	PBRN123YT	PBRP123YT




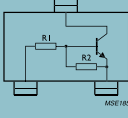
Resistor-equipped transistors (RETs)

RETs 100 mA single - Part 1

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			
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				






RETs 100 mA single - Part 2

types in **bold** represent new products

Package					DFN1006-3 (SOT883)		DFN1006B-3 (SOT883B)		SOT1215				
													
Size (mm)					1.0 x 0.6 x 0.48		1.0 x 0.6 x 0.37		1.1 x 1.0 x 0.37				
P _{tot} (mW)					250		250		750				
V _{CEO} (V)	I _C (mA)	Configuration	R1 (kΩ)	R2 (kΩ)			NPN	PNP	NPN	PNP			
50	100			1	1				PDTA113EM	PDTA113EMB			
		2.2		2.2			PDTC123EM	PDTA123EM	PDTC123EMB	PDTA123EMB			
		4.7		4.7			PDTC143EM	PDTA143EM	PDTC143EMB	PDTA143EMB	PDTC143EQA	PDTA143EQA	
		10		10			PDTC114EM	PDTA114EM	PDTC114EMB	PDTA114EMB	PDTC114EQA	PDTA114EQA	
		22		22			PDTC124EM	PDTA124EM	PDTC124EMB	PDTA124EMB	PDTC124EQA	PDTA124EQA	
		47		47			PDTC144EM	PDTA144EM	PDTC144EMB	PDTA144EMB	PDTC144EQA	PDTA144EQA	
		100		100			PDTC115EM	PDTA115EM	PDTC115EMB	PDTA115EMB			
		1		10						PDTA113ZM	PDTA113ZMB		
		2.2		10			PDTC123YM	PDTA123YM	PDTC123YMB	PDTA123YMB			
		2.2		47			PDTC123JM	PDTA123JM	PDTC123JMB	PDTA123JMB	PDTC123XQA	PDTA123XQA	
		4.7	10			PDTC143XM	PDTA143XM	PDTC143XMB	PDTA143XMB	PDTC143XQA	PDTA143XQA		
		4.7	47			PDTC143ZM	PDTA143ZM	PDTC143ZMB	PDTA143ZMB	PDTC143ZQA	PDTA143ZQA		
		10	47			PDTC114YM	PDTA114YM	PDTC114YMB	PDTA114YMB	PDTC114YQA	PDTA114YQA		
		22	47			PDTC124XM	PDTA124XM	PDTC124XMB	PDTA124XMB				
		47	10			PDTC144VM	PDTA144VM	PDTC144VMB	PDTA144VMB				
		47	22			PDTC144WM	PDTA144WM	PDTC144WMB	PDTA144WMB				
		2.2	-			PDTC123TM	PDTA123TM	PDTC123TMB	PDTA123TMB				
		4.7	-			PDTC143TM	PDTA143TM	PDTC143TMB	PDTA143TMB				
		10	-			PDTC114TM	PDTA114TM	PDTC114TMB	PDTA114TMB				
		22	-			PDTC124TM	PDTA124TM	PDTC124TMB	PDTA124TMB				
47	-			PDTC144TM	PDTA144TM	PDTC144TMB	PDTA144TMB						
100	-			PDTC115TM	PDTA115TM	PDTC115TMB	PDTA115TMB						






Single transistors NPN

types in **bold** represent new products





Package						SOT23	SOT323 (SC-70)	DFN1010D-3 (SOT1215)	DFN1006-3 (SOT883)	DFN1006B-3 (SOT883B)
										
Size (mm)						2.9 x 1.3 x 1.0	2.0 x 1.25 x 0.95	1.1 x 1.0 x 0.37	1.0 x 0.6 x 0.48	1.0 x 0.6 x 0.37
P _{tot} (mW)						250	200	750	250	250
V _{CEO} (V)	I _C (mA)	h _{FE} min/typ	h _{FE} max	f _T min (MHz)						
25	100	450	1200	100			PMST5089			
30	100	110 - 200	450 - 800	100	BC848B	BC848W				
		350	900	100		PMST5088				
32	100	110 - 420	220 - 800	100	BCW31 / 32 / 33					
		180 - 380	310 - 630	250	BCW60B / C / D					
45	100	110 - 420	220 - 800	100	BC847 / A / B / C	BC847W / AW / BW / CW	BC847AQA / BQA / CQA	BC847AM / BM / CM	BC847AMB / BMB / CMB	
		120 - 380	220 - 630	100	BCX70G / H / J / K					
		110 - 200	220 - 450	100	BCW71 / 72					
50	100	500	1250	100	PMBT6429	PMST6429				
		210 - 290	340 - 460	100 - 150	2PD601ART 2PD601ARL 2PD601ASL	2PD601ARW / SW				
60	100	250	650	100	PMBT6428	PMST6428				
60	100	110 - 200	220 - 450	100	BCV71 / 72					
65	100	110 - 200	220 - 450	100	BC846 / A / B	BC846W / AW / BW		BC846BM	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		2PC4617QM / RM	2PC4617QMB / RMB	
	200	210	340	100	2PD601BRL					
45	500	290	460	100	2PD601BSL					
		100 - 250	250 - 600	100	BC817 / -16 / -25 / -40	BC817W / -16W / -25W / -40W	BC817 / -25QA / -40QA			
		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

types in **bold** represent new products

Package						SOT23	SOT323 (SC-70)	DFN1010D-3 (SOT1215)	DFN1006-3 (SOT883)	DFN1006B-3 (SOT883B)
										
Size (mm)						2.9 x 1.3 x 1.0	2.0 x 1.25 x 0.95	1.1 x 1.0 x 0.37	1.0 x 0.6 x 0.48	1.0 x 0.6 x 0.37
P _{tot} (mW)						250	200	750	250	250
V _{CEO} (V)	I _C (mA)	h _{FE} min/typ	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					
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	BC857AQA / BQA / CQA	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		BC856BM	BC856BMB	
100	100	30	-	50	BSS63					
50	150	120 - 270	270 - 560	100		2PA1576Q / R / S		2PA1774QM / RM / SM	2PA1774QMB / RMB / SMB	
	200	210	340	100	2PB709BRL					
		290	460	100	2PB709BSL					
25	500	100	600	80	BCX18					
45	500	100 - 250	250 - 600	80	BC807 / -16 / -25 / -40	BC807W / -16W / -25W / -40W	BC807 / -25QA / -40QA			
		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				

Medium-power general-purpose transistors

Package						SOT223 (SC-73)	SOT89 (SC-62)	DFN2020-3 (SOT1061)	DFN2020D-3 (SOT1061D)
									
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	2.0 x 2.0 x 0.62
P _{tot} (mW)						1700	1300	1300	1300
Polarity	V _{CEO} (V)	I _C (A)	h _{FE} min	h _{FE} max	f _r min (MHz)				
NPN	20	2	85 - 160	375	40	BCP68 / -25	BC868 / -25	BC68PA / BC68-25PA	BC68PAS / BC68-25PAS
	45	1	63 - 100	160 - 250	100	BCP54 / -10 / -16	BCX54 / -10 / -16	BC54PA / BC54-10PA / BC54-16PA	BC54PAS / BC54-10PAS / BC54-16PAS
	60	1	63 - 100	160 - 250	100	BCP55 / -10 / -16	BCX55 / -10 / -16	BC55PA / BC55-10PA / BC55-16PA	BC55PAS / BC55-10PAS / BC55-16PAS
			100	300	100	BSP41	BSR41		
	80	1	63 - 100	160 - 250	100	BCP56 / -10 / -16	BCX56 / -10 / -16	BC56PA / BC56-10PA / BC56-16PA	BC56PAS / BC56-10PAS / BC56-16PAS
			40 - 100	120 - 300	100	BSP43	BSR43		
PNP	20	2	85 - 160	250 - 375	40	BCP69 / -16 / -25	BC869 / -16 / -25	BC69PA / BC69-16PA / BC69-25PA	BC69PAS / BC569-16PAS / BC69-25PAS
	45	1	63 - 100	160 - 250	115 ¹⁾ - 145 ¹⁾	BCP51 / -10 / -16	BCX51 / -10 / -16	BC51PA / BC51-10PA / BC51-16PA	BC51PAS / BC51-10PAS / BC51-16PAS
	60	1	63 - 100	160 - 250	100	BCP52 / -10 / -16	BCX52 / -10 / -16	BC52PA / BC52-10PA / BC52-16PA	BC52PAS / BC52-10PAS / BC52-16PAS
			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	BC53PAS / BC53-10PAS / BC53-16PAS
			40 - 100	120 - 300	100	BSP32 / 33	BSR33		

¹⁾ Typical value

In the spotlight

Medium-power transistors in DFN2020-3 and DFN2020D-3 (with solderable sidepads)

Excellent electrical performance on a small 2 x 2 mm footprint

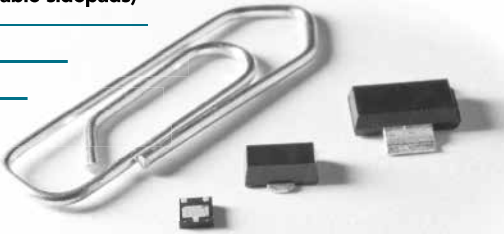
80% board space reduction (DFN2020 vs. SOT89)

100% solderable sidepads (DFN2020D-3)






V_{CEO} ranging from 20 V 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	750	250	200
Polarity	V _{CEO} (V)	I _C (mA)	h _{FE} min	h _{FE} max	f _r 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			
	400	300	50	200	20	PZTA44			PMBTA44	
PNP	100	100	30	-	50				BSS63	
	250	100	50	-	60	BF723				
			50	-	60		BF623		BF823	
	300	100	50	-	60		BF621		BF821	
40			-	50	PZTA92	PXTA92		PMBTA92	PMSTA92	
2 x NPN	300	100	40	-	50			PMBTA42DS		

For high-voltage transistors with increased performance please refer to our high-voltage low V_{CEsat} (BISS) transistor portfolio on page 18.

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		PZTA14	PXTA14	PMBTA14
	45	1000	2000	200	BSP50	BST50	BCV27
			10000		220	BCV49	BCV47
	80	1000	2000	200	BSP51	BST51	
						BSP52	BST52
PNP	30	500	20000	125			PMBTA64
				220		BCV28	BCV26
	45	1000	2000	200	BSP60	BST60	
			10000		220	BCV48	BCV46
	80	1000	2000	200	BSP61	BST61	
						BSP62	BST62


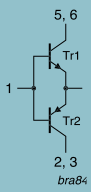

Schmitt triggers

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 (A)	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}	

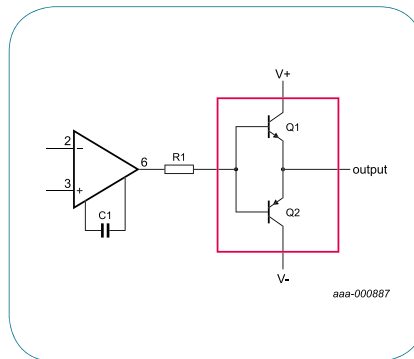
Key features and benefits

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

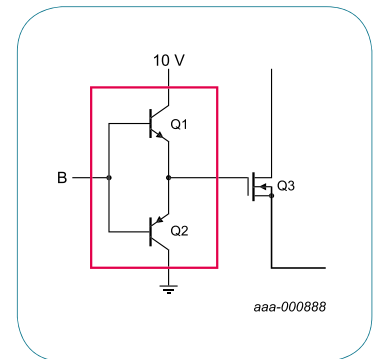
Key applications

- ▶ 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
 - Op-amp output current booster



Op-amp booster



MOSFET driver for faster switching, lower losses



Medium-frequency transistors

						SOT23	SOT323 (SC-70)
Package							
Size (mm)						2.9 x 1.3 x 1.0	2.0 x 1.25 x 0.95
P_{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		85	>275	BFS20	BFS20W
		30	65	225	260	BFS19	
	40	25	67	220	380	BF840	
PNP	30	25	25	50	250	BF824	BF824W
	40		50	-	>325	BF550	

What you get when you choose NXP for diodes and rectifiers

A comprehensive portfolio for all kind of applications

NXP is continually innovating parts by reducing power consumption and size while boosting performance and reliability

A broad range of packages

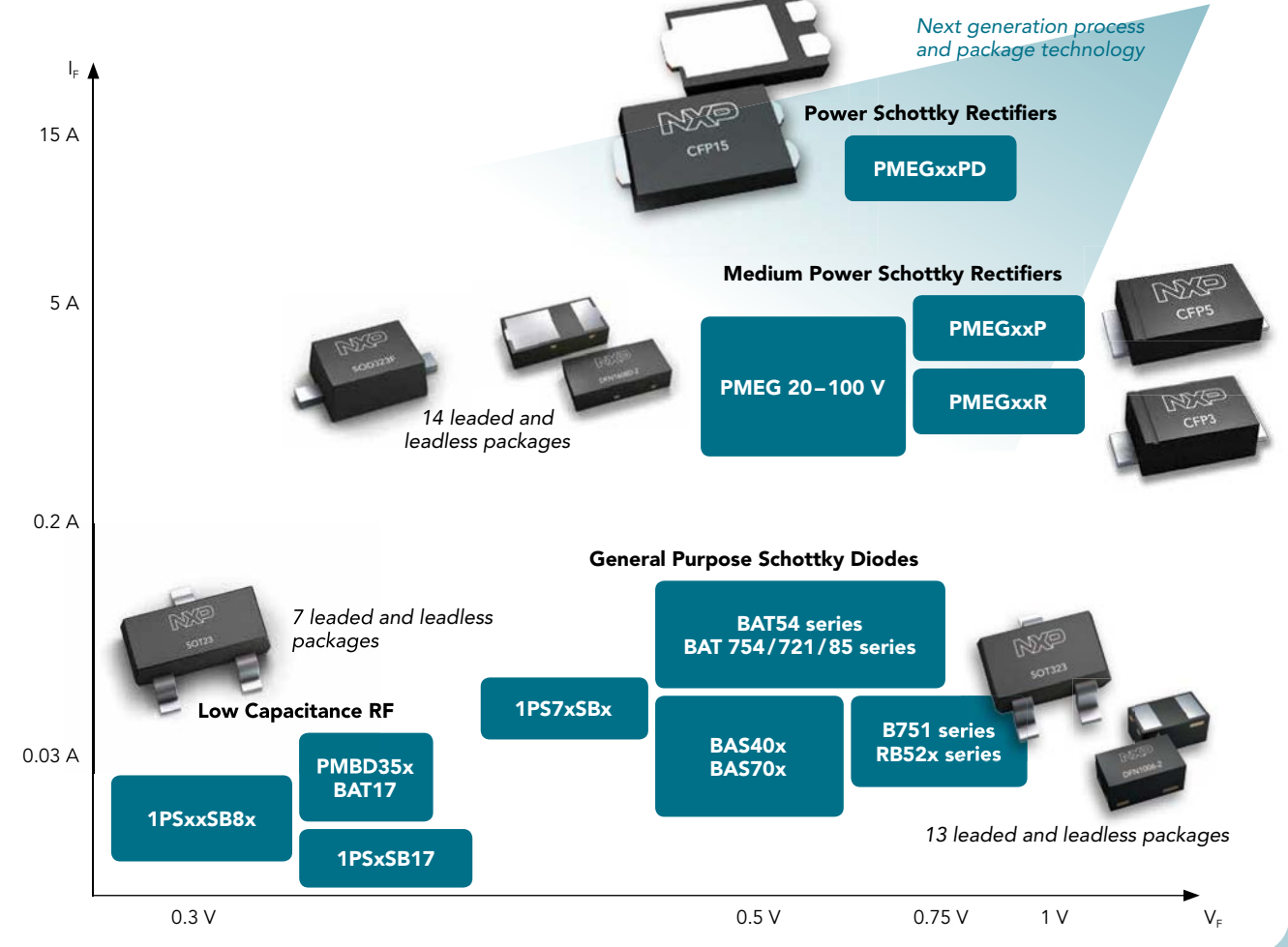
Including standard leaded SMD, medium-power clip-bond and ultra-small leadless packages with dimensions down to 0.6 x 0.3 x 0.3 mm

A quality product from an experienced, high volume supplier

- ▶ NXP is strongly committed to automotive quality standards
- ▶ NXP has a track record of more than 60 years in developing and producing diodes
- ▶ NXP is the #1 in small-signal discretes with a high production capacity

Portfolio Overview Diodes

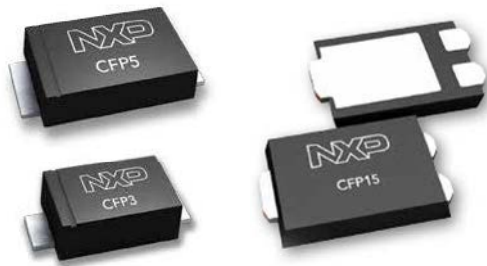
Schottky Diodes



NXP's FlatPower packages CFP3, CFP5, and CFP15

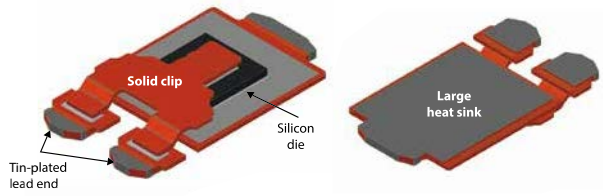
The medium-power solution for shrinking designs

Small SMD FlatPower packages in three different versions



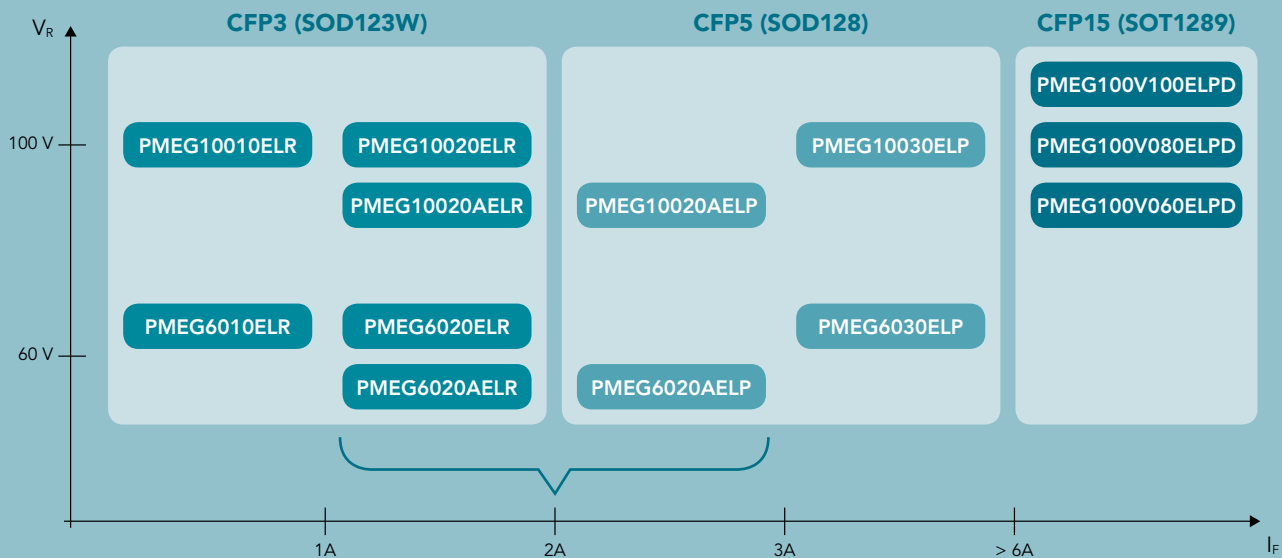
- ▶ Flat geometry, of down to 0.78 mm height
- ▶ Halogen-free mold compound
- ▶ AEC-Q101 qualified

Robust design



- ▶ High-power capability due to wire-free clip-bond technology and heatsink
- ▶ Automatic optical inspection of solder joint due to tin-plated lead ends
- ▶ Benchmark flat design of only 0.7 mm height

Low I_R Schottky Portfolio, AEC-Q101



NXP offers more than 200 products in FlatPower packages, to support a wide range of applications for medium-power rectification and surge protection.

Medium-power low V_F Schottky rectifiers single ≥ 200 mA - Leadless DSN packages

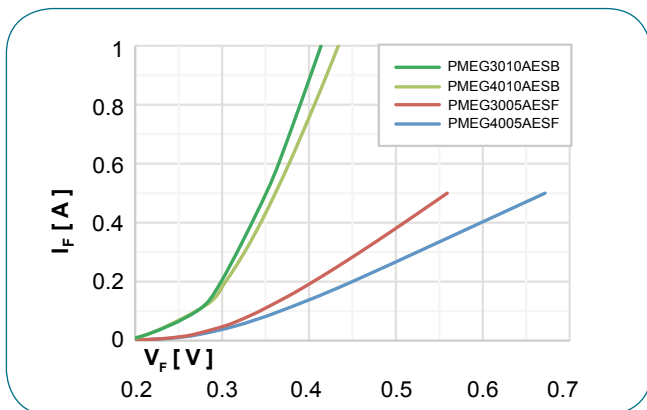
types in **bold** represent new products

I_F max (A)	V_R max (V)	V_F max (mV) @ I_F max	I_R max (mA) @ V_R max	Package	DSN0603-2 (SOD962)	DSN1006-2 (SOD993)	DSN1006U-2 (SOD995)
				Size (mm)	0.6 x 0.3 x 0.3	1.0 x 0.6 x 0.28	1.0 x 0.6 x 0.28
				P_{tot} (mW) @ 1 cm ²	525	1.000	1.190
Optimization							
0.2	20	420	0.045	Low V_F	PMEG2002AESF		
		490	0.0035	Low I_R	PMEG2002ESF		
	30	470	0.08	Low V_F	PMEG3002AESF		
		535	0.009	Low I_R	PMEG3002ESF		
	40	525	0.08	Low V_F	PMEG4002AESF		
		600	0.0065	Low I_R	PMEG4002ESF		
0.5	20	550	0.045	Low V_F	PMEG2005AESF		
		620	0.0035	Low I_R	PMEG2005ESF		
	30	630	0.08	Low V_F	PMEG3005AESF		
		720	0.009	Low I_R	PMEG3005ESF		
	40	820	0.08	Low V_F	PMEG4005AESF		
		880	0.0065	Low I_R	PMEG4005ESF		
1	30	480	1.25	Low V_F		PMEG3010AESB	PMEG3010AESA
		565	0.045	Low I_R		PMEG3010ESF	
	40	505	0.115	Low V_F		PMEG4010AESB	
		610	0.04	Low I_R		PMEG4010ESB	
	60	625	0.65	Low V_F		PMEG6010AESB	
		730	0.03	Low I_R		PMEG6010ESB	

Forward characteristic survey of Schottkys in DSN1006-2

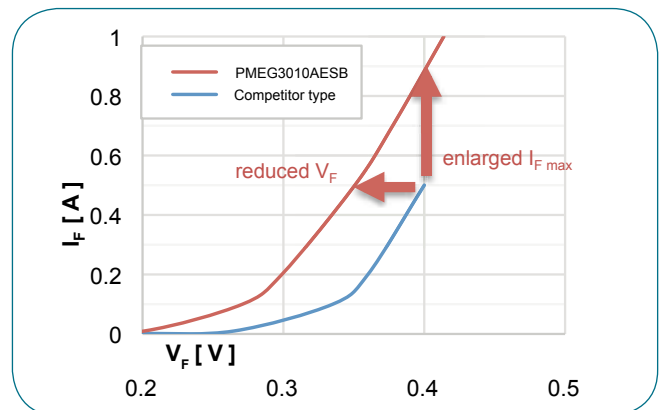
$V_R: 30V, I_F: I_A$ (typical data)

Selected DSN Schottky rectifier



This diagram shows the broad variety of the DSN portfolio

PMEG3010AESB versus competitor type



NXP type has higher forward current specified and has benchmark low V_F

In the spotlight

PMEG3010AESB, PMEG6010ESB, low V_F Schottky Rectifier

30 / 40 / 60 V, 1A Schottky rectifier in DSN1006-2 (SOD993) package

Low forward voltage, V_F max = 480 mV @ 1 A (PMEG3010AESB)









Low leakage current, I_R max = 30 μ A @ 60 V (PMEG6010ESB)

High surge capability up to $I_{FSM} = 10$ A

Ideal for LED backlighting in mobile applications



Medium-power low V_F Schottky rectifiers single ≥ 200 mA - Leaded packages

I_F max (A)	V_R max (V)	V_F max (mV) @ I_F max	I_R max (mA) @ V_R max	Package	SOT457 (SC-74)	SOT23	SOD123F	SOT323 (SC-70)	SOD323F (SC-90)	SOD323 (SC-76)	SOT666	SOD523 (SC-79)	
													
				Size (mm)	2.9 x 1.5 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	1.7 x 1.25 x 0.7	1.7 x 1.25 x 0.95	1.6 x 1.2 x 0.55	1.2 x 0.8 x 0.6	
				P_{tot} (mW) @ 1 cm ²	540	420	830	400	830	570	570	500	
				Optimization									
0.2	30	480	0.05	low V_F					PMEG3002EJ			PMEG3002AEB	
	40	600	0.01	low I_R					PMEG4002EJ			PMEG4002EB	
	60	600	0.1	low V_F					PMEG6002EJ			PMEG6002EB	
0.5	20	390	0.2	low V_F		PMEG2005ET	PMEG2005EH		PMEG2005EJ	PMEG2005AEA	PMEG2005AEV		
		480	0.03	low I_R								PMEG2005EB	
	30	430	0.15	low V_F		PMEG3005ET	PMEG3005EH		PMEG3005EJ	PMEG3005AEA	PMEG3005AEV		
		500	0.5	low V_F									PMEG3005EB
	40	470	0.1	low V_F		PMEG4005ET	PMEG4005EH		PMEG4005EJ	PMEG4005AEA	PMEG4005AEV		
		550	1.1	low V_F			BAT720		1PS70SB20				
1	20	430	0.2	low V_F		PMEG2010AET	PMEG2010AEH						
		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	low V_F	1PS74SB23								
		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	
		570	0.05	low I_R			PMEG4010CEH		PMEG4010CEJ				
		600	0.02	low I_R									
		640	0.05	low V_F		PMEG4010ET	PMEG4010EH		PMEG4010EJ	PMEG4010BEA	PMEG4010BEV		
	60	650	0.35	low V_F	PMEG6010AED								
		660	0.05	low I_R			PMEG6010CEH		PMEG6010CEJ				
	1.5	20	660	0.2	low I_R			PMEG2015EH		PMEG2015EJ	PMEG2015EA	PMEG2015EV	
		30	500	1	low V_F			PMEG3015EH		PMEG3015EJ		PMEG3015EV	
2	10	460	3	low V_F			PMEG1020EH		PMEG1020EJ	PMEG1020EA	PMEG1020EV		
	20	525	0.2	low V_F			PMEG2020EH		PMEG2020EJ	PMEG2020AEA			
	30	620	1	low V_F			PMEG3020EH		PMEG3020EJ				
3	10	530	3	low V_F			PMEG1030EH		PMEG1030EJ				

In the spotlight

Schottky Rectifier in SOD123F and SOD323F

Broad portfolio base of 36 types, 20 / 60 V, 0.2 - 3 A

Optimized either for low V_F or low I_R

High surge capability up to 10 A





High thermal capability due to flat-lead design

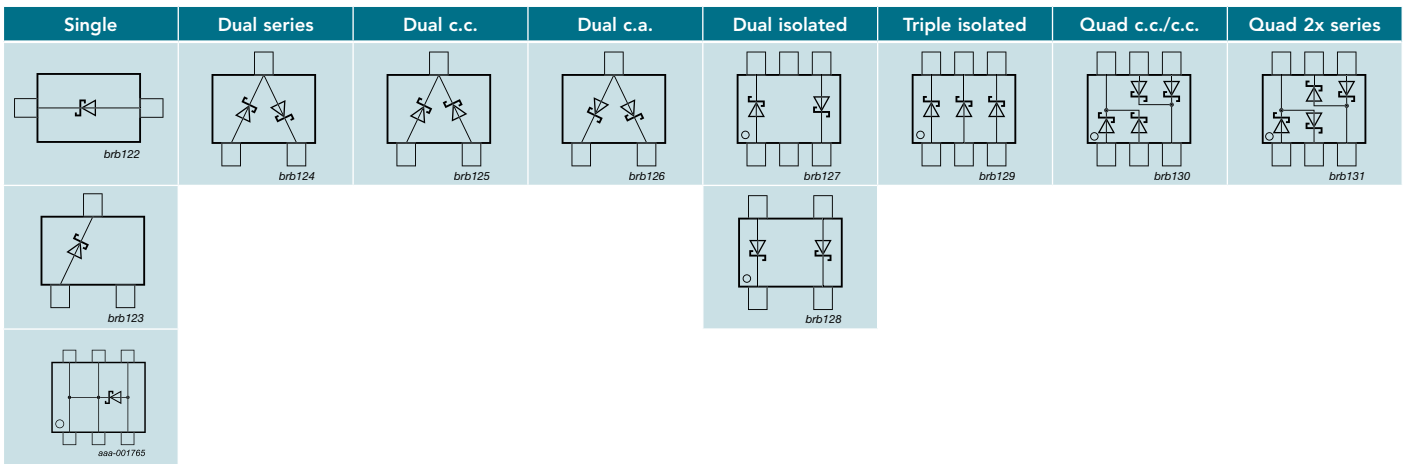
AEC-Q101 qualified

Ideal for DC/DC conversion, free-wheeling, reverse polarity protection








































General-purpose Schottky diodes ≤ 250 mA

I_F max (mA)	V_R max (V)	V_F max (mV)	@ I_F (mA)	I_R max (μA)	@ V_R (V)	Package	SOD80C (MiniMelf)	SOD68 (DO-34)	SOT23	SOT143B	
											
						Size (mm)	3.5 x 1.5 x 1.5	3.04 x 1.6 x 0.55	2.9 x 1.3 x 1.0	2.9 x 1.3 x 1.0	
P_{tot} (mW)	300	500	250	250							
70	70	750	10	0.1	50	single			BAS70		
						dual series			BAS70-04		
						dual c.c.			BAS70-05		
						dual c.a.			BAS70-06		
						dual isolated				BAS70-07	
						triple isolated					
120	40	500	10	1	30	quad 2x series					
						single			BAS40		
						dual series			BAS40-04		
						dual c.c.			BAS40-05		
						dual c.a.			BAS40-06		
						dual isolated				BAS40-07	
200	30	300	10	30	10	quad 2x series					
						single			BAT754		
						dual series			BAT754S		
		340	10	2	25	25	dual c.c.			BAT754C	
							dual c.a.			BAT754A	
							triple isolated				
	400	10	2	2	25	single	BAS85	BAT85	BAT54		
						dual series			BAT54S		
						dual c.c.			BAT54C		
						dual c.a.			BAT54A		
						dual isolated				BAT74	
						triple isolated					
	40	300	10	15	30	quad c.c./c.c.					
						quad 2x series					
						single			BAT721		
		360	10	0.5	25	25	dual series			BAT721S	
							dual c.c.			BAT721C	
							dual c.a.			BAT721A	
420	30	0.5	0.5	25	single						
					dual series						
					dual c.c.						
50	450	10	5	40	dual c.a.						
					single	BAS86	BAT86				
					single						
250	100	850	250	4	75	single					



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	Europe	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	Europe		BZX79 series			
400	40	2.4~75	C	Europe	Single 	BZV90 series		6.5 x 3.5 x 1.65	1500
250	40	2.4~75	C	Europe	Single 	BZV49 series		4.5 x 2.5 x 1.5	1000
250	40	2.4~75	B, C	Europe	Single 	BZV55 series		3.5 x 1.5 x 1.5	400
200	40	2.4~75	B, C	Europe	Dual c.a. 	BZB84 series		2.9 x 1.3 x 1.0	250
			A, B, C		Single 	BZX84 series			
250	30	5~6.8	0.2 V	Ave	Single 	PLVA600A series			
250	-	3.0~30	About 2.5%	Special	Single 	NZH series		2.6 x 1.6 x 1.1	830
	40	2.4~75	B, C	Europe		BZT52H series			
200	40	10	B2	Japan	Dual isolated 	PZU10DB2 series		2.0 x 1.25 x 0.95	300
200	40	2.4~15	C	Europe	Dual c.a. 	BZB784 series		2.0 x 1.25 x 0.95	350
200	30	100	C	Europe	Back-to-back 	BZB100A		1.7 x 1.25 x 0.95	300
	40	2.4~36	B2	Japan	Single 	PDZ-B series			
250	40	2.4~75	B, C	Europe	Single 	BZX384 series			
200	40	2.4~36	B, B1, B2, B3	Japan	Single 	PZUxBA series			
200	60	100	C	Europe	Single 	BZX100A		1.7 x 1.25 x 0.7	550
200	40	2.4~36	B, B1, B2, B3	Japan	Single 	PZUxB series			
250	40	2.4~75	B, C	Europe	Single 	BZX84J series			
200	40	2.4~15	C	Europe	Dual c.a. 	BZB984 series		1.6 x 1.2 x 0.55	350
200	40	2.4~75	B, C	Europe	Single 	BZX585 series		1.2 x 0.8 x 0.6	300
200	40	2.4~75	B, C	Europe	Single 	BZX884 series		1.0 x 0.6 x 0.48	250
		2.4~36	B, B2	Japan		PZUxBL series			
250	40	2.4~30	B	Europe	Single 	TDZxJ series		1.7 x 1.25 x 0.7	500




















Notes:

Japan: B selection: app. 5% V_Z tolerance, B1, B2, B3 selections: app. 2% V_Z tolerance in sequential intervals
 Europe: A selection: app. 1% V_Z tolerance, B selection: app. 2% V_Z tolerance, C selection: app. 5% V_Z tolerance;
 the selections are in overlapping intervals

Ave: low-voltage avalanche regulator diodes
 Dual c.a.: dual common anode




















General-purpose high-speed switching diodes < 90V

types in **bold** represent new products







V_F max (V)	V_R max (V)	I_F (mA)	I_R max (nA)	$@ V_R$ (V)	t_{rr} max (ns)	Package	SOD80C (MiniMelf)	SOT23	SOT143B	SOT323 (SC-70)	SOT363 (SC-88)	DFN1010D-3 (SOT1215)	DFN1006-3 (SOT883)	
														
							Size (mm)	3.5 x 1.5 x 1.5	2.9 x 1.3 x 1.0	2.9 x 1.3 x 1.0	2.0 x 1.25 x 0.95	2.0 x 1.25 x 0.95	1.1 x 1.0 x 0.37	1.0 x 0.6 x 0.48
							P_{tot} (mW)	500	250	250	200	300	540	250
50	1	50	100	50	4			BAL74						
								BAV74						
70	1	50	1000	70	4			BAL99						
										BAS28				
75	1	50	1000	75	4									
		100	5000	75	4		BAS32L							
80	1	50	500	80	4					1PS300				
										1PS301				
										1PS302				
90	1	50	500	80	4			BAW56		BAW56W		BAW56QA	BAW56M	
											BAW56S			
												BAW756S		

General-purpose, high-speed switching diodes 100V

types in **bold** represent new products

















V_F max (V)	V_R max (V)	I_F (mA)	I_R max (nA)	$@ V_R$ (V)	t_{rr} max (ns)	Package	SOT23	SOD123F	SOT323 (SC-70)	SOT363 (SC-88)	SOD323 (SC-76)	SOD323F (SC-90)	SOT666	SOD523 (SC-79)	DFN1010D-3 (SOT1215)	DFN1006-2 (SOD882)	DFN1006-3 (SOT883)	DFN1006D-2 (SOD882D)	
																			
							Size (mm)	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	1.2 x 0.8 x 0.6	1.1 x 1.0 x 0.37	1.0 x 0.6 x 0.48	1.0 x 0.6 x 0.48	1.0 x 0.6 x 0.37
							P_{tot} (mW)	250	830	200	300	400	550	180	500	540	250	250	250
100	1	50	500	80	4			BAS16H			BAS316	BAS16J		BAS516		BAS16L		BAS16LD	
							BAS16		BAS16W					BAS16QA					
										BAS16VY		BAS16VW							
							BAV70		BAV70W						BAV70QA		BAV70M		
										BAV70S									
							BAV99		BAV99W							BAV99QA			
										BAV99S									

Controlled-avalanche switching diodes

V_R max (V)	V_F max (V)	I_F (mA)	I_F max (nA) @ V_R max	I_{FSM} max (A)	I_{FRM} max (mA)	C_j max (pF)	t_{rr} max (ns)	Package	SOT23	SOT143B
										
									Size (mm)	Size (mm)
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

types in **bold** represent new products

V_R max (V)	V_F max (V)	I_F (mA)	I_R max (nA) @ V_R max	t_{rr} max (μ s)	Package	SOD80C (MiniMelf)	SOD68 (DO-34)	SOT23	SOD123F	SOT323 (SC-70)	SOD323 (SC-76)	SOD523 (SC-79)	DFN1010D-3 (SOT1215)	DFN1006-3 (SOT883)	DFN1006-2 (SOD882)
															
						Size (mm)	Size (mm)	Size (mm)	Size (mm)	Size (mm)	Size (mm)	Size (mm)	Size (mm)	Size (mm)	Size (mm)
						300	500	250	830	250	400	500	540	250	250
75	1	10	5	3					BAS116H		BAS416	BAS716			BAS116L
								BAS116				BAS116QA			
								BAV199		BAV199W					
								BAW156							
								BAV170				BAV170QA	BAV170M		
125	1	100	1	1.5 typ		BAS45AL	BAS45A								

ESD protection, TVS diodes, and EMI filtering

What you get when you choose NXP

Solutions for wide application fields

- ▶ High-speed data lines
- ▶ General interfaces
- ▶ Automotive protection
- ▶ Supply lines

A broad range of packages that simplify PCB design

A quality product from an experienced, high volume supplier

- ▶ NXP is strongly committed to automotive quality standards
- ▶ NXP has a track record of more than 12 years in developing and producing ESD / TVS devices
- ▶ NXP is the #1 in ESD protection with a high production capacity

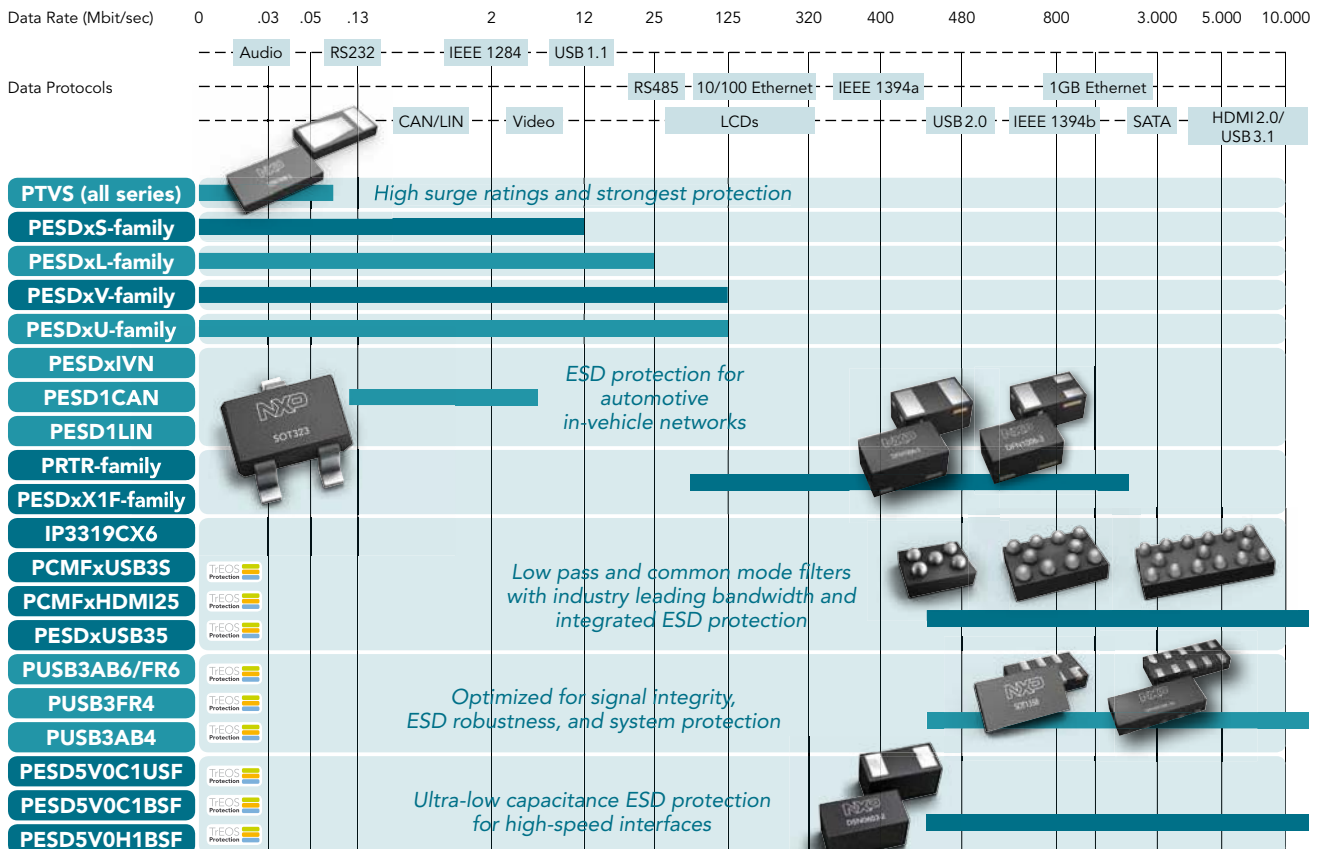
USB3 / Type C
 USB2 / Type C
 USB Vbus / charger port / Type C
 NFC antenna
 Wireless charging
 Audio speaker
 Battery contact, Vbat
 Keys/buttons
 SIM, SD3
 Audio



CAN, LIN
 FlexRay
 BroadR-Reach
 SENT
 LVDS



Portfolio Overview Diodes



Tiny but mighty – DSN0402

Reliable ESD protection on minimal space

DSN0402-2 (SOD992) features and benefits

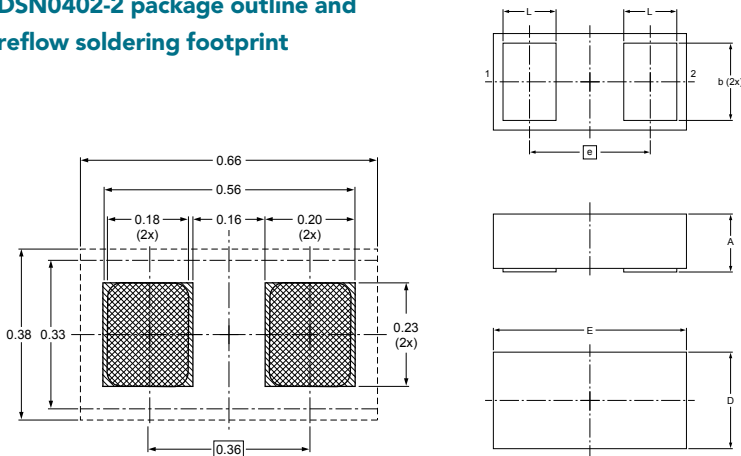
- ▶ Ultra-small dimensions: 0.4 x 0.2 mm (01005 inch)
- ▶ 45% less package area compared to DSN0603-2
- ▶ Only 120 µm in height
- ▶ Coated sidewalls enable easier soldering
- ▶ Polarity marking
- ▶ Halogen and antimony free; RoHS compliant



DSN0402-2 (SOD992)

Single package
0.4 x 0.2 x 0.12 mm

DSN0402-2 package outline and reflow soldering footprint



Dimensions (mm are the original dimensions)

Unit	A	E	D	L	b	e
max	0.14	0.42	0.22	0.12	0.17	
nom	0.12	0.40	0.20	0.11	0.16	0.25
min	0.10	0.38	0.18	0.10	0.15	

Ultra-low capacitance in DSN0402

Type	V_{rwm}	Config	C_d typ	C_d max	V_{esd}
PESD5V0F1BSH	5 V	Bi	0.25 pF	0.3 pF	8 kV

Ultra low-capacitance ESD protection devices – Part 2

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	1	5	0.5	0.65	10	 brb051	PESD5V0X2UMB	DFN1006B-3 (SOT883B) 	1.0 x 0.6 x 0.37	
							PESD5V0X2UM	DFN1006-3 (SOT883) 	1.0 x 0.6 x 0.48	
			PESD5V0X2UAMB	DFN1006B-3 (SOT883B) 	1.0 x 0.6 x 0.37					
			PESD5V0X2UAM	DFN1006-3 (SOT883) 	1.0 x 0.6 x 0.48					
			PESD5V0X1BQ	SOT663 	1.6 x 1.2 x 0.55					
			PESD5V0X1BT	SOT23 	2.9 x 1.3 x 1.0					
	0	5.5	1	1.5	8	 001aaa490	PRTR5V0U2X	SOT143B 	2.9 x 1.3 x 1.0	
							PRTR5V0U2AX			
							0	5.5	1.8	-
		1	1.5	8	 001aaa490					

⁽¹⁾ according to IEC 61000-4-5 (contact discharge)

In the spotlight

Lowest capacitance ESD protection in DFN1006B-3: PESD5V0X2UAMB

Unidirectional double protection for two signal lines

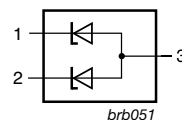
Ultra-low line capacitance of 0.8 pF

Very low package height of 0.37 mm typ

High ESD robustness of 15 kV

AEC-Q101 qualified

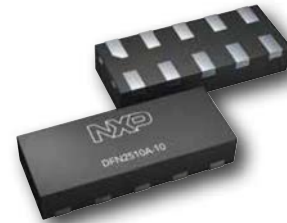
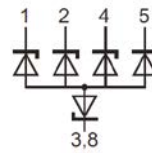
Ideal for high-speed data lines, portable electronics, and communication systems



In the spotlight

PUSB3AB4 - ESD protection in very small DFN2510A-10 package for USB3.1 @ 10 Gbps and Thunderbolt

- Protects four very fast data lines of sensitive system chips
- Lowest clamping in the 0.2 pF class
- Very small DFN2510A-10 package (2.5 x 1.0 x 0.48 mm)
- Capacitance < 0.2 pF



Ultra low-capacitance ESD protection devices – 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	0.5	-	10	-		IP4294CZ10-TBR	DFN2510A-10 (SOT1176)	2.5 x 1.0 x 0.48		
		3.3	0.27	-			15	0.1				PUSB3FR4
0	3	3.3	0.17	0.2		PUSB3AB4						
5	4	5	0.55	0.7	8	0.1		PESD5V0F5UF	DFN1410-6 (SOT886)	1.45 x 1.0 x 0.48		
								PESD5V0F5UV	SOT666	1.6 x 1.2 x 0.55		
0	6	5.5	0.27	0.35	10	-		PUSB3TB6	DFN2111-7 (SOT1358)	2.1 x 1.1 x 0.48		
6	0	3.3	0.25	-			15	0.1				PUSB3FR6
0	6	3.3	0.15	0.2			15				PUSB3AB6	

⁽¹⁾ according to IEC 61000-4-2 (contact discharge)

Low-capacitance ESD protection devices – Part 2

types in **bold** represent new products

Number of protected lines		V _{RWM} (V)	C _{line} typ (pF)	C _{line} max (pF)	P _{pp} ^[1] max (W)	ESD rating ^[2] max (kV)	I _r max (μA) @ V _{RWM}	Configuration	Type	Package	Size (mm)		
Unidirectional	Bidirectional												
0	1	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
				5	2.9	3.5	-		10	0.1	PESD5V0U1BL	DFN1006-2 (SOD882)	1.0 x 0.6 x 0.48
											PESD5V0U1BLD	DFN1006D-2 (SOD882D)	1.0 x 0.6 x 0.37
											PESD5V0U1BB	SOD523 (SC-79)	1.2 x 0.8 x 0.6
		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		
					30	15	0.025		PESD5V0L2UM				
		5	16	19	-	15	0.025		PESD5V0L2UMB	DFN1006B-3 (SOT883B)	1.0 x 0.6 x 0.37		
					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	

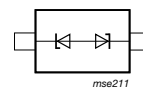
^[1] 8 / 20 μs exponential decay waveform according to IEC 61000-4-5 and IEC 61643-321

^[2] according to IEC 61000-4-5 (contact discharge)















In the spotlight

PESD12VV1BL: Lowest capacitance ESD protection in DFN1006-2

- Bidirectional protection for one data line
- Very low line capacitance of 17 pF
- High ESD robustness of 30 kV
- AEC-Q101 qualified
- Ultra-small package DFN1006-2 (SOD882) with a height of only 0.48 mm typ
- Ideal for portable electronics, communication systems, or audio and video equipment



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 (μ A) @ 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		
0	5	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

^[1] 8 / 20 μ s exponential decay waveform according to IEC 61000-4-5 and IEC 61643-321

^[2] according to IEC 61000-4-5 (contact discharge)

Standard ESD protection devices – Part 2

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 (μ A) @ V_{RWM}	Configuration	Type	Package	Size (mm)	
Unidirectional	Bidirectional											
2	1	3.3	200	275	150	23	3	 mme212	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
		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	 SOT23	2.9 x 1.3 x 1.0		
		5	152	200	260	30	1	PESD5V0S2UAT				
		15	32	70	160	30	0.05	PESD15VS2UAT				
		24	23	50	160	23	0.05	PESD24VS2UAT				
		0	2	5	35	45	130	30	0.1	 B6178	PESD5V0S2BQA	 SOT1215
4	3	3.3	110	300	110	30	1 (@ 3 V)	 D06Gaa3156	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	8	1	 mme216	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	8	2	 mme214	BZA856A	 SOT353 (SC-88A)	2.0 x 1.25 x 0.95
		3	200	240	-	8	2	BZA456A		 SOT457 (SC-74)	2.9 x 1.5 x 1.0	
		4	165	200	-	15	0.7	BZA462A				
		15	37	48	-	8	0.1	BZA420A				
		3.3	215	300	200	30	0.8	PESD3V3S4UD				
		5	165	220	200	30	0.2	PESD5V0S4UD				
		24	40	70	200	23	0.015	PESD24VS4UD				
5	4	3.3	215	300	200	30	0.8	 mme217	PESD3V3S5UD	 SOT457 (SC-74)	2.9 x 1.5 x 1.0	
		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	 mme218	BZA408B			

^[1] 8 / 20 μ s exponential decay waveform according to IEC 61000-4-5 and IEC 61643-321

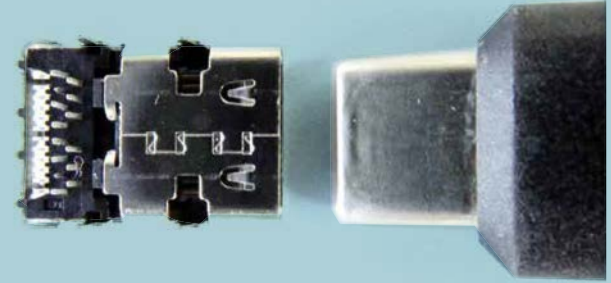
^[2] according to IEC 61000-4-2 (contact discharge)

NXP paves the way for USB Type-C connector

USB 3.x protection and filtering

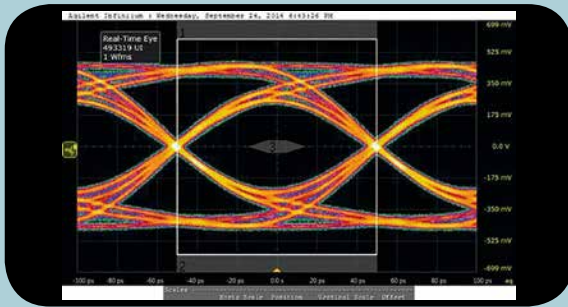


USB Type-C evaluation board with NXP protection solutions



USB Type-C receptacle

USB Type-C plug



PUSB3FR4 on standard FR4 testboard

PUSB3FR4 and the new Type-C connector

The perfect match. PUSB3FR4 supports protection for the new Type-C connector, in order to enable direction-agnostic connection, faster charging and the smallest solution to support SuperSpeed USB.

USB 3.1 introduces data rates up to 10 Gbps

As shown in the eye diagram, NXP offers protection, which supports data rates up to 10 Gbps with low capacitance and optimized package layouts.

USB 3.x and eSATA protection and filtering for high-speed and super-speed lines

types in **bold** represent new products

Baseband interface	Number of protected lines	C _{i1} (pF)	ESD rating max (kV)	R _{dyn} (Ω)	Remark	Type	Package	Size (mm)			
USB3.0 - 5 Gbps	4	0.55	8	0.3 / 0.4	ESD Protection for high-speed interfaces	IP4292CZ10-TBR	DFN2510A-10 (SOT1176)	2.5 x 1.0 x 0.48			
		0.5	10			PUSB3F96					
USB3.1 - 10 Gbps	4	0.17	15	0.4		PUSB3AB4	DFN2111-7 (SOT1358)	2.1 x 1.1 x 0.48			
		0.29	15	0.27		PUSB3FR6					
		0.27	15	0.5		PUSB3TB6					
	6	0.15	15	0.4		PUSB3AB6	DFN2510A-10 (SOT1176)	2.5 x 1.0 x 0.48			
						PUSB3FR4					
						PESD5V0R1BSF					
	1	0.1	10	0.45		PESD5V0H1BSF	DSN0603-2 (SOD962)	0.6 x 0.3 x 0.3			
						0.15			15	0.25	PESD5V0C1BSF
						0.2			20	0.23	PESD3V3CIBSF
						0.45			20	0.1	PESD5V0C1USF
						0.25			15	0.16	PESD1USB3S
	2	0.25	15	0.14		PCMF1USB3S	WLCSP5	1.2 x 0.8 x 0.6			

http://www.nxp.com/products/discretes-and-logic/esd-protection-tvs-filtering-and-signal-conditioning/usb-type-c-protection-family:GRP_13811

Common Mode Filter for video interfaces

types in **bold** represent new products

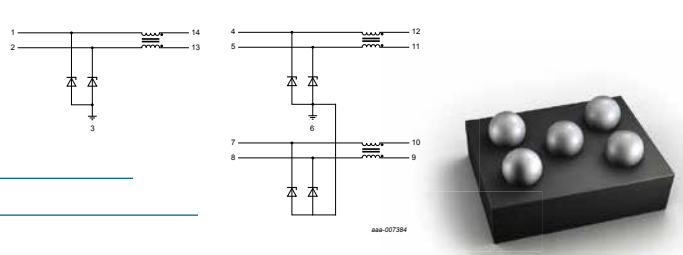
Baseband interface	Number of protected line pairs unidirectional	Number of protected line pairs bidirectional	Type	Differential Mode 3 dB frequency (typ.)	C_d pF typical	V_{RWM}	ESD rating ⁽¹⁾ max (kV)	Channel series resistance	Package	Size (mm)
MIPI D-PHY	2		PCMF2DFN1	>2 GHz	0.8			5 Ω	DFN2520-9 (SOT1333)	2.5 x 2.0 x 0.48
	3		PCMF3DFN1	>2 GHz					DFN4020-14 (SOT1334)	4.0 x 2.0 x 0.48
HDMI2.0	1	0	PCMF1HDMI2S	>6 GHz	0.3	5	15	3 Ω	WLCSP5	0.8 x 1.2 x 0.5
	2		PCMF2HDMI2S						WLCSP10	1.6 x 1.2 x 0.5
	3		PCMF3HDMI2S						WLCSP15	2.4 x 1.2 x 0.5

⁽¹⁾ according to IEC 61000-4-2 (contact discharge)

In the spotlight

PCMFxHDMI2S series:
1, 2 and 3 line pair Common Mode Filters with ESD protection for HDMI 1.4 and 2.0

- Very wide differential pass band >6 GHz
- Very broadband Common Mode attenuation
- Very low clamping ESD protection, excellent SoC protection
- Smallest footprint



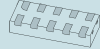

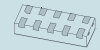

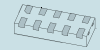


Ethernet protection

types in **bold** represent new products

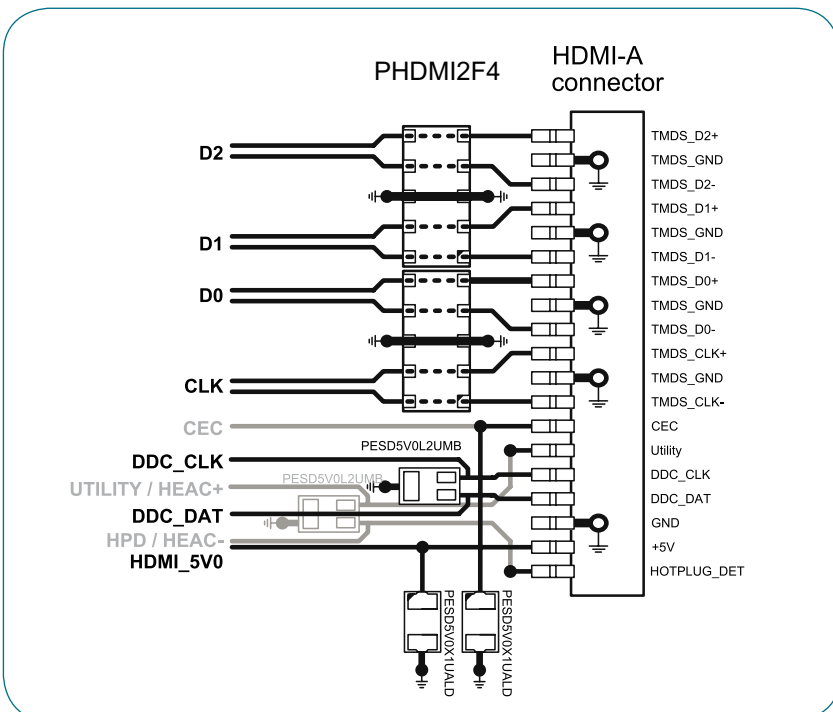
Baseband interface	Number of protected lines	C_{line} (pF)	Remark	Type	Package	Size (mm)
LAN	1	0.6	Ethernet ESD protection $V_{RWM} = 3.3$ V	PESD3V3U1UT	SOT23	2.9 x 1.3 x 1.0
			Ethernet ESD protection $V_{RWM} = 5.0$ V	PESD5V0U1UT		
			Ethernet ESD protection $V_{RWM} = 12$ V	PESD12VU1UT		
			Ethernet ESD protection $V_{RWM} = 15$ V	PESD15VU1UT		
			Ethernet ESD protection $V_{RWM} = 24$ V	PESD24VU1UT		
	4	1	Ethernet ESD protection	IP4220CZ6	SOT457 (SC-74)	2.9 x 1.5 x 1.0

Video interface protection




types in **bold** represent new products

Baseband interface	Number of protected lines	C _{line} (pF)	Remark	Type	Package	Size (mm)
Display port	4	0.6	ESD protection for ultra high-speed interfaces	IP4283CZ10-TBR	DFN2510A-10 (SOT1176) 	2.5 x 1.0 x 0.48
		0.55	ESD protection for ultra high-speed interfaces	IP4292CZ10-TBR		
		0.5	ESD protection for ultra high-speed interfaces	IP4294CZ10-TBR		
			ESD protection for ultra high-speed interfaces	PHDMI2F4		
		0.8	ESD protection for ultra high-speed interfaces	IP4285CZ9-TBB	DFN2110-9 (SOT1178) 	2.1 x 1.0 x 0.48
HDMI	4	0.6	ESD protection for ultra high-speed interfaces	IP4283CZ10-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 HDMI 2.0	PHDMI2F4		
			ESD protection for ultra high-speed interfaces	IP4294CZ10-TBR		
LVDS	4	0.8	Very low clamp ESD protection with 12 kV IEC ruggedness	PUSB2X4D	SOT457 (SC-74) 	2.9 x 1.5 x 1.0
		0.8	Very low clamp ESD protection with 12 kV IEC ruggedness	PUSB2X4Y	SOT363 (SC-88) 	2.0 x 1.25 x 0.95

PHDMI2F4 PESD HDMI application schematic



LCD/camera protection and filtering

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)					
	4	40	18	-	~100	300	IP4252CZ8-4 -TTL	 DFN1714-8 (SOT1166)	1.7 x 1.35 x 0.52
		100	45	-	~40	130	IP4254CZ8-4-TTL		
			15	-	~110	330	IP4251CZ8-4-TTL		
		200	45	-	~35	110	IP4253CZ8-4-TTL		
	6	40	18	-	~100	300	IP4252CZ12-6-TTL	 DFN2514-12 (SOT1167)	2.5 x 1.35 x 0.53
		100	45	-	~40	130	IP4254CZ12-6-TTL		
			15	-	~110	330	IP4251CZ12-6-TTL		
		200	45	-	~35	110	IP4253CZ12-6-TTL		
		100	54	-	~35	98	PEMI6CSP/RW		
	8	40	18	-	~100	300	IP4252CZ16-8-TTL	 DFN3314-16 (SOT1168)	3.3 x 1.35 x 0.53
		100	45	-	~40	130	IP4254CZ16-8-TTL		
			15	-	~110	330	IP4251CZ16-8-TTL		
		200	45	-	~35	110	IP4253CZ16-8-TTL		
		100	54	-	~35	98	PEMI8CSP/RW/P		

Automotive high-speed network protection

types in **bold** represent new products

Number of protected lines	V_{RWM} (V)	C_{line} typ (pF)	I_{RM} max @3V (μ A)	ESD rating ^[1] max (kV)	Configuration	Type	Package	Size (mm)
4	5.5	0.5	1	10		PESD2LVDS	DFN2510A-10 (SOT1176)	2.5 x 1.0 x 0.5
	5.5	0.6	1	8		PESD1LVDS	DFN2510-10 (SOT1165)	2.5 x 1.0 x 0.48
	5.5	0.6	1	8		PRTR5V0U4D	SOT457	2.9 x 1.5 x 1.0

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

Automotive in-vehicle network bus line protection

types in **bold** represent new products

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_p max [μ A] @ V_{RWM}	Configuration	Type	Package	Size (mm)
1	15 (diode 1) 24 (diode 2)	13	17	160	23	0.05		PESD1LIN	SOD323 (SC-76)	1.7 x 1.25 x 0.95
2	24	11	17	200	23	0.05		PESD1CAN	SOT23	2.9 x 1.3 x 1.0
		25	30	230	30	0.01		PESD2CAN		
		11	17	200	23	0.05		PESD1FLEX		
		9.3	12	150	23	0.05		PESD1CAN-U	SOT323	2.0 x 1.25 x 0.95
1	26.5	9.3	11	150	23	0.05		PESD1IVN-U	SOT323	2.0 x 1.25 x 0.95
							PESD2IVN-U			

^[1] 8 / 20 μ s surge pulse according to IEC 61000-4-5

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

In the spotlight

PESD2IVN-U: CAN bus protection in very small SOT323 package

Protection for 2 in-vehicle network BUS lines

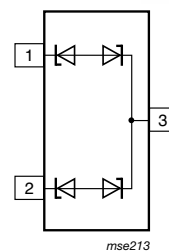
High reverse standoff voltage $V_{RWM} = 26.5$ V

Very small SOT323 package (2.0 x 1.25 x 0.95 mm)


AEC-Q101 compliant

ESD robustness of up to 23 kV (contact)

Very good capacitance matching

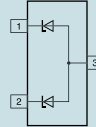

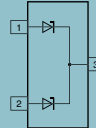



TVS diodes for mobile applications

Power (W) (10 / 1000 μ s 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 ⁽¹⁾ (V) @ I_{PP}	I_{PP} ⁽¹⁾ (A)	I_{RM} typ (μ A) @ V_{RWM}	I_{RM} max (μ A) @ V_{RWM}	Type	Package	Size (mm)
300	7.5	8.33	8.77	9.21	1	12.9	23.3	0.3	50	PTVS7V5U1UPA	 DFN2020-3 (SOT1061)	2.0 x 2.0 x 0.62
	10	11.1	11.7	12.3	1	17	17.6	0.008	2.5	PTVS10VU1UPA		
	12	13.3	14	14.7	1	19.9	15.1	0.005	2.5	PTVS12VU1UPA		
	15	16.7	17.6	18.5	1	24.4	12.3	0.001	0.1	PTVS15VU1UPA		
	18	20	21	22.1	1	29.2	10.3	0.001	0.1	PTVS18VU1UPA		
	26	28.9	30.4	31.9	1	42.1	7	0.001	0.1	PTVS26VU1UPA		


⁽¹⁾ 10 / 1000 μ s according to IEC 61643-321

TVS diodes, 24/40 W

Power (W) (10 / 1000 μ s 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 ⁽¹⁾ max (kV)	C_{line} typ (pF)	V_{CL} max ⁽¹⁾ (V) @ I_{PP}	I_{PP} ⁽¹⁾ (A)	I_{RM} max (μ A) @ V_{RWM}	Configuration	Type	Package	Size (mm)		
24	3	5.32	5.6	5.88	20	30	210	8	3	5	 mmc212	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	 brs004	MMBZ12VAL			 SOT23	2.9 x 1.3 x 1.0
	12	14.25	15	15.75	1	30	85	21	1.9	0.005		MMBZ15VAL				
	14.5	17.1	18	18.9	1	30	70	25	1.6	0.005		MMBZ18VAL				
	17	19	20	21	1	30	65	28	1.4	0.005		MMBZ20VAL				
	22	25.65	27	28.35	1	30	48	40	1	0.005		MMBZ27VAL				
	26	31.35	33	34.65	1	30	45	46	0.87	0.005		MMBZ33VAL				
	8.5	11.4	12	12.6	1	30	110	17	2.35	0.005		MMBZ12VDL				
	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⁾ 10 / 1000 μ s according to IEC 61643-321 ⁽²⁾ according to IEC 61000-4-2 (contact discharge)

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 ⁽¹⁾ (V) @ I _{FP}	I _{FP} ⁽¹⁾ (A)	I _{RM} 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)
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 according 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 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



Small-signal MOSFET portfolio

What you get when you choose NXP for small-signal MOSFETs

A comprehensive portfolio for all applications

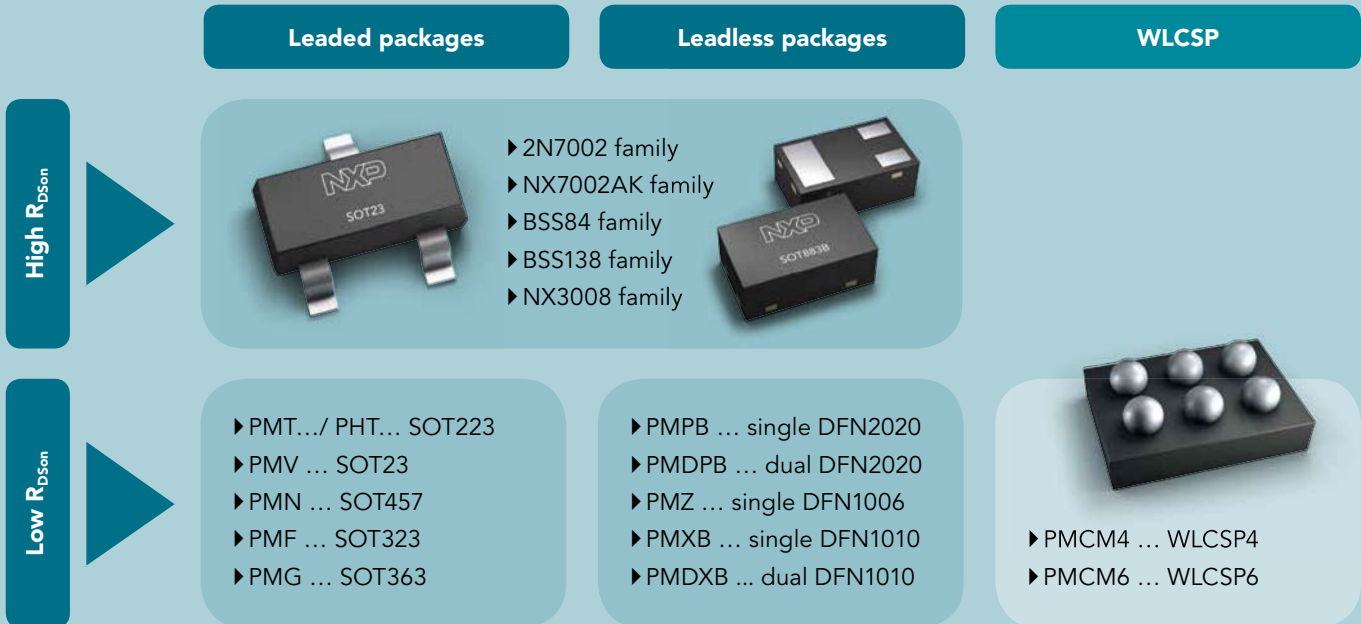
Best in class performing transistors from commodity to low R_{DSon} MOSFETs

A broad range of packages

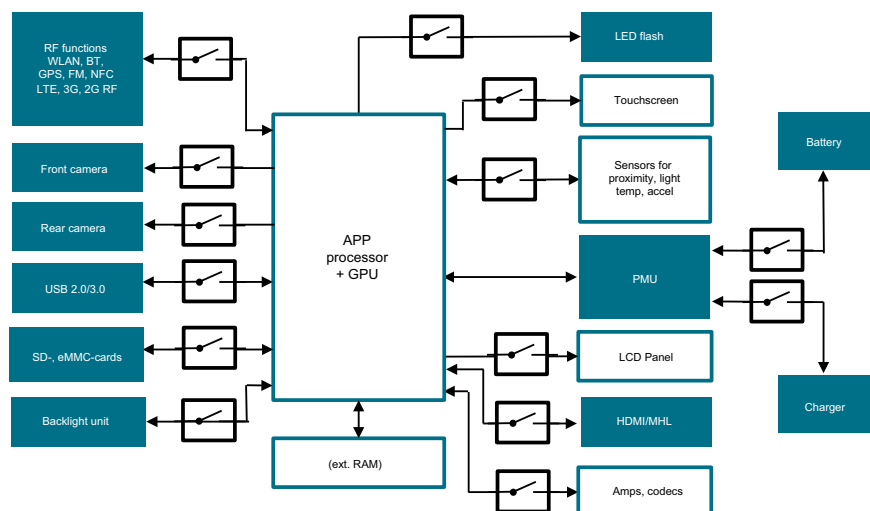
Many options for WLCSP, leaded SMD and ultra-small leadless packages.

A quality product from an experienced, high volume supplier

- ▶ NXP is strongly committed to automotive quality standards
- ▶ NXP has a track record of more than 60 years in developing and producing discretes
- ▶ NXP is the #1 in small-signal discretes with a high production capacity



Block diagram for typical MOSFET application



Small-signal MOSFETs in ultra-small DFN1006 and DFN1006B packages

types in **bold** represent new products

Package											DFN1006-3 (SOT883)	DFN1006B-3 (SOT883B)					
Size (mm)											1.0 x 0.6 x 0.48	1.0 x 0.6 x 0.37					
P _{tot} (mW)											250	250					
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	1.5 V	1.2 V		
N-channel	20	8	1.9	0.45	0.95	5.3	16	1.6	2	-	120	160	210	270	-	PMZ130UNE	
			1.6	0.45	0.95	5.3	16	1.6	2	-	170	200	240	300	-		PMZB150UNE
			1	0.5	0.95	6	86	0.45	2	-	270	360	470	600	-	PMZ290UNE2	PMZB290UNE2
			0.6	0.45	0.95	5.6	19	0.4	1	-	470	620	845	1125	2210	PMZ600UNE	PMZB600UNE
	30	8	1.5	0.45	0.95	5	17	1.6	2	-	210	240	270	300	-	PMZ200UNE	PMZB200UNE
			1	0.45	0.95	4	12	0.8	2	-	390	460	30	610	-	PMZ390UNE	PMZB390UNE
			0.59	0.45	0.95	4	12	0.6	2	-	550	660	770	890	-	PMZ550UNE	PMZB550UNE
	60	20	0.45	1.1	2.1	5	12	0.5	2	1000	1300	-	-	-	-	2N700BKM	2N7002BKMB
0.35			1.1	2.1	4.7	6.9	1	2	2200	2500	-	-	-	-	NX7002BKM	NX7002BKMB	
P-channel	20	8	1.4	0.45	0.95	4	26	1.3	1.8	-	330	420	520	-	-	PMZ350UPE	PMZB350UPE
			0.5	0.45	0.95	2.3	13.5	1.19	1	-	1020	1270	1700	2300	3500	PMZ950UPE	PMZB950UPE
	30	8	1	0.45	0.95	2.9	22	1.45	2	-	430	470	750	950	-	PMZ320UPE	PMZB320UPE
			0.41	0.45	0.95	3	14	0.7	2	-	1200	1700	2100	3000	-	PMZ1200UNE	PMZB1200UPE
	50	20	0.23	1.1	2.1	13	48	0.26	1	4500	5700	-	-	-	-	BSS84AKM	BSS84AKMB

Key features

- ▶ N- and P-channel
- ▶ Low R_{DSon} down to 120 mΩ
- ▶ I_D up to 1.9 A
- ▶ Low voltage drive (V_{GS(th)} = 0.65 V typ)
- ▶ Voltage range of 20 to 60 V
- ▶ ESD protection of up to 2 kV

Package

- ▶ 1.0 x 0.6 mm footprint
- ▶ Single package with different heights:
 - 0.5 mm for DFN1006 (SOT883)
 - 0.37 mm for DFN1006B (SOT883B)
- ▶ Power dissipation (P_{tot}) of 360 mW

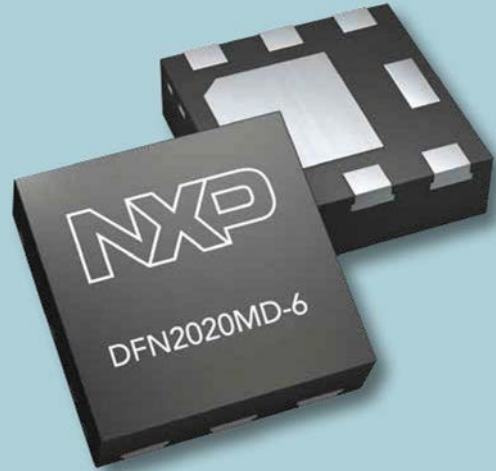
Key applications

- ▶ Smartphones
- ▶ Wearables
- ▶ Tablets

DFN1006 – The ideal replacement for SOT416

The image shows a large SOT416 package on the left and a much smaller DFN1006 package on the right. A large blue arrow points from the SOT416 to the DFN1006, with the text "75% size reduction!" written inside the arrow.

DFN2020 – The low R_{DSon} choice for values $> 10\text{ m}\Omega$



In the spotlight

PMPB15XP – Low R_{DSon} P-channel MOSFET in DFN2020

12 V P-channel with R_{DSon} of $15\text{ m}\Omega$ @ $V_{GS} = 4.5\text{ V}$ (typ)

I_D max of 11.8 A for medium current load switch

Small and leadless ultrathin SMD plastic package: $2.0 \times 2.0 \times 0.65\text{ mm}$

Exposed drain pad for excellent thermal conduction

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

DFN2020MD-6 (SOT1220)

Single package
 $2 \times 2 \times 0.65\text{ mm}$

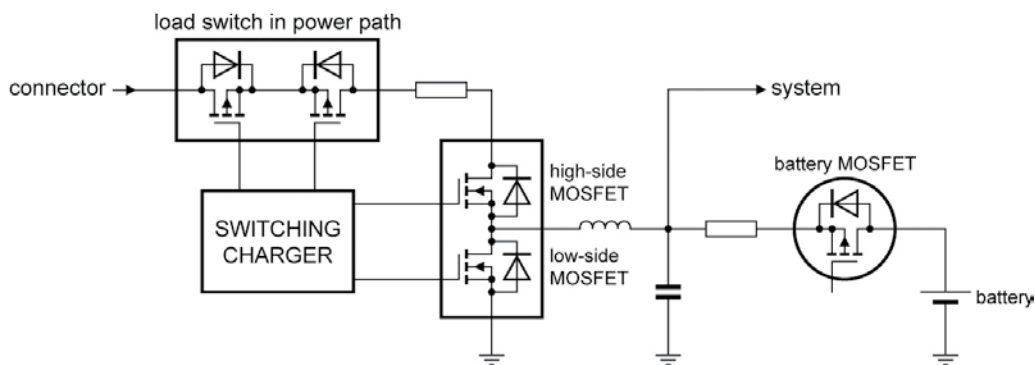
Key features

- ▶ N- and P-channel
- ▶ Low R_{DSon} down to $10\text{ m}\Omega$
- ▶ I_D up to 13 A
- ▶ Low voltage drive ($V_{GS(th)} = 0.65\text{ V}$ typ)
- ▶ Voltage range of 12 to 100 V
- ▶ ESD protection of 3 kV

Package

- ▶ $2.0 \times 2.0 \times 0.65\text{ mm}$ package size
- ▶ Single and dual packages
- ▶ High power dissipation (P_{tot}) of 1250 mW for single and dual packages
- ▶ Single package with tin-plated, solderable side pads for improved mounting and automotive conformity

Generic charging path application



Products for charging path application

Type	Package	V_{DS}/V_{GS} (V)	I_D (A)	ESD protection (kV)	R_{DSon} typ ($\text{m}\Omega$) @ $V_{GS} =$				Application
					10 V	4.5 V	2.5 V	1.8 V	
PMPB15XP	DFN2020MD-6	12 / 12	11.8	1.5	-	15	17	21	Charger Switch, Battery FET
PMPB20EN	DFN2020MD-6	30 / 20	10.4	-	16.5	20.5	-	-	Buck Converter
PMPB10XNE	DFN2020MD-6	20 / 18	12.9	2.2	-	10	12	16	Battery Pack

Small-signal MOSFETs in WLCSP4 and WLCSP6 packages



WLCSP6

Single package
1.48 x 0.98 x 0.35 mm

Key features

- ▶ N- and P-channel
- ▶ Low R_{DSon} down to 15 mΩ
- ▶ I_D up to 9.6 A
- ▶ Low voltage drive ($V_{GSth} = 0.6$ V typ)
- ▶ V_{DS} voltage of 12V
- ▶ ESD protection of 2 kV

Package

- ▶ Two package outlines
 - WLCSP4: 0.78x0.78 mm package size
 - WLCSP6: 1.48x0.98 mm package size
- ▶ Ultra-low height of 0.35 mm
- ▶ High power dissipation (P_{tot}) of 1300 mW

In the spotlight

PMCM6501VPE– Ultra-low R_{DSon} P-ch MOSFET in WLCSP6

12 V P-ch with R_{DSon} of typ. 19 mΩ @ $V_{GS} = 4.5$ V

I_D max of 8.2 A for high current load switch

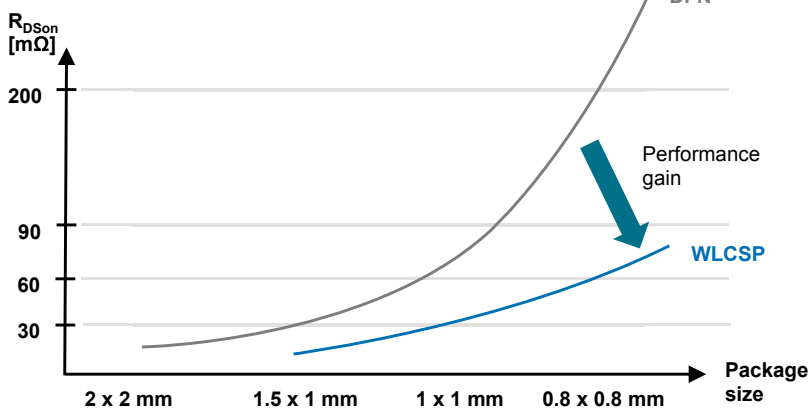
Ultra-small footprint: 1.48 x 0.98 x 0.35 mm

Low voltage gate drive with V_{GSth} typ. 0.6V

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

types in **bold** represent new products

Package											WLCSP4	WLCSP6			
Size (mm)											0.78 x 0.78 x 0.35	1.48 x 0.98 x 0.35			
P _{tot} (mW)											1300	1300			
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} =					
										4.5 V	2.5 V	1.8 V	1.5 V		
N	12	8	5	0.4	0.9	6.3	27	5.5	2	57	66	77	90	PMCM440VNE	
			6	0.4	0.9	6.3	30	6	2	36	46	60	86	PMCM4401VNE	
			8.4	0.4	0.9	11	80	15.4	2	21	24	28	33		PMCM650VNE
			9.6	0.4	0.9	10.8	97.5	16.1	2	15	18	22	30		PMCM6501VNE
P	12	8	4.9	0.4	0.9	4.8	25.1	6.8	2	55	77	110	-	PMCM4401VPE	
			8.2	0.4	0.9	8	72	19.6	2	19	25	37	-		PMCM6501VPE



MOSFETs in WLCSP

- ▶ Improved R_{DSon} performance compared to DFN packages
- ▶ Smallest footprint
- ▶ High power capability of 1300 mW
- ▶ Ideal for mobile and space-constrained applications

Automotive-compliant small-signal MOSFETs

Package																
Size (mm)																
P _{tot} (mW)																
Polarity	Configuration	V _{DS} (V)	V _{GS} (V)	I _D (A)	V _{GS(th)}	V _{GS(th)}	t _{on} typ	t _{off} typ	Q _G typ	ESD protection (kV)	R _{DSon} typ (mΩ) @ V _{GS} =					
					min (V)	max (V)	(ns)	(ns)	(nC)		10 V	4.5 V	2.5 V	1.8 V		
N-channel	single	20	8	4.7	0.45	1	8.2	39.5	6.2	2	-	24	29	40		
			12	6.3	0.75	1.25	16	44	9.9	2	-	16	24	-		
		30	8	0.4	0.6	1.1	26	88	0.52	2	-	1000	1400	2000		
			12	3.1	0.75	1.25	9	19	2.9	2	-	55	72	-		
			20	5.5	1	2.5	8	33	12.6	2	17	22	-	-		
				3.9	1	2.5	6.3	14.1	6	2	30	39	-	-		
		40	3	1	2.5	6	11	3.6	2	54	70	-	-			
			20	3.1	1	2.5	-	-	1	65	88	-	-			
		60	20	2.5	1	2.5	14	14	2.4	1	95	120	-	-		
				4	1.3	2.7	4.5	13.5	7.5	1	42	48	-	-		
				3.1	1.3	2.7	9	33	12.7	2	46	52	-	-		
				4	1.3	2.7	4	10.5	6.2	2.7	72	85	-	-		
				2.1	1.3	2.7	6.4	15.9	5.9	2	96	108	-	-		
				1.5	1.3	2.7	6.3	13	3.9	2	176	196	-	-		
				0.8	1.3	2.7	5.3	10.2	2.4	2	300	332	-	-		
				0.36	0.9	1.5	5	13	0.72	-	900	1000	-	-		
				0.36	0.48	1.6	10	58	0.6	1.5	1000	1100	1400	-		
				0.3	1	2.5	11	19	0.5	2	1000	1300	-	-		
		80	20	0.3	1	2.5	16	60	1.09	3	1100	1300	-	-		
				0.2	0.8	1.5	5	36	0.39	yes	2700	3000	4000	-		
				1.9	1.3	2.7	3.5	9.5	4.8	2	175	195	-	-		
				2.8	1.3	2.7	5	15	9.9	2.8	80	92	-	-		
		100	20	1.1	1.3	2.7	2	9	3	2	345	390	-	-		
				1.5	1.3	2.7	4.8	9.3	4.5	1	285	300	-	-		
	20	8	0.8	0.5	0.95	10	117	0.45	2	-	380	620	1100			
			30	8	0.4	0.6	1.1	26	88	0.52	2	-	1000	1400	2000	
	60	20	0.3	1	2.5	11	19	0.5	2	1000	1300	-	-			
			0.36	0.48	1.6	10	58	0.6	1.5	1000	1100	1400	-			
	0.36	0.9	1.5	5	13	0.72	-	900	1000	-	-	-	-			
														6	0.45	0.95
P-channel	single	8	2	0.5	1.1	7	50	6	-	-	100	155	210			
			4.5	0.45	0.95	11	83	14.7	2	-	27	38	50			
		20	5.7	0.75	1.25	15	37	15	2	-	27	39	-			
			5.7	0.75	1.25	17	33	11.5	2	-	41	56	-			
			4.5	0.75	1.25	7.9	59	11	2	-	28	42	-			
			3.5	0.75	1.25	11	61	8.5	-	-	48	71	-			
			4.1	0.75	1.25	15	51	8.7	-	-	48	72	-			
			2.8	0.75	1.25	7	36	5	2	-	67	99	-			
			4.1	0.75	1.25	7	40	5.2	2	-	70	101	-			
			2.3	0.7	1.3	5.3	36	3.4	2	-	100	155	-			
		30	8	0.23	0.6	1.1	49	103	0.55	2	-	2800	5300	-		
			20	4.2	1	3	6.1	3.7	12.8	2	35	47	-	-		
		40	20	1.5	1	2.5	4	26	4.7	1	180	220	-	-		
		50	20	0.2	1.1	2.1	24	73	0.26	1	5300	6000	-	-		
		60	20	2.2	1	3	-	-	-	2	99	110	-	-		
				0.9	1	3	-	-	-	2	217	241	-	-		
				2.3	1	3	-	-	-	2	156	177	-	-		
		70	20	2.3	1	3	-	-	-	2	156	177	-	-		
				20	8	0.55	0.5	1.3	48	152	0.76	2	-	670	1200	1800
				30	8	0.2	0.6	1.1	49	103	0.55	2	-	2800	5300	-
		50	20	0.16	1.1	2.1	24	73	0.26	1	5300	6000	-	-		
				20	8	0.73	0.5	0.95	10	117	0.45	2	-	290	420	600
		N	Compl	20	8	0.73	0.5	0.95	10	117	0.45	2	-	290	420	600
		P		20	8	0.5	0.5	1.3	48	152	0.76	2	-	670	1200	1800

Small-signal MOSFETs single (N-channel)

Package														
Size (mm)														
P _{tot} (mW)														
V _{DS} (V)	V _{GS} (V)	I _D (A)	V _{GS(th)} min (V)	V _{GS(th)} max (V)	t _{on} typ (ns)	t _{off} typ (ns)	Q _G typ (nC)	ESD protection (kV)	R _{DSon} typ (mΩ) @ V _{GS} =					
									10 V	4.5 V	2.5 V	1.8 V		
20	8	4.7	0.45	1	8.2	39.5	6.2	2	-	24	29	40		
		1.9	0.4	1	8	31	2.2	2	-	63	77	114		
		2.2	0.4	1	6	21	2.6	2	-	64	78	110		
		1.9	0.45	0.95	5.3	16	1.6	2	-	120	155	195		
		1.6	0.45	0.95	5.3	16	1.6	2	-	155	190	235		
		1	0.5	0.95	6	86	0.45	2	-	270	360	470		
		6	0.45	0.95	5.6	19	0.4	1	-	470	620	845		
		12	6.3	0.75	1.25	16	44	9.9	2	-	16	24	-	
	8.6		0.47	0.9	7	135	7.7	-	-	15	18	22		
	9.1		0.4	0.9	9	31	12	1	-	15	19	22		
5.4	0.4		0.9	7	35	6.2	-	-	24	30	40			
		6	0.4	0.9	5.5	22	5.1	1	-	28	38	42		
30	8	1.5	0.45	0.95	5	17	1.6	2	-	210	240	270		
		1	0.45	0.95	4	12	0.8	2	-	390	460	530		
		0.59	0.45	0.95	4	12	0.6	2	-	550	660	770		
		0.4	0.6	1.1	26	88	0.52	2	-	1000	1400	2000		
		12	7.2	0.4	0.9	8	33	12.4	2	-	19	22	17	
	5.7		0.4	0.9	9	34	7	-	-	33	42	54		
	4.4		0.4	0.9	9	34	7	-	-	36	43	56		
			0.9	0.5	1.5	8	11	0.74	2	-	234	324	-	
		20	7.6	1	2	9	9	7.2	-	17	21	-	-	
	5.5		1	2.5	8	33	12.6	2	17	22	-	-		
	3.9		1	2.5	6.3	14.1	6	2	30	39	-	-		
	3.1		1	2.5	18	78	6.5	-	28	37	-	-		
	4.5		1	2.5	3	11	6	1	30	44	-	-		
	5.1		1	2	3	11	3.6	-	35	43	-	-		
		2.1	1	2.5	3	15	2.6	2	70	90	-	-		
		0.18	0.8	1.5	10	51	0.34	-	2700	3000	4000	-		
40	20	3.1	1	2.5	-	-	-	1	65	88	-	-		
2.5		1	2.5	14	14	2.4	1	95	120	-	-			
55	10	0.3	0.4	1.3	4	11	1	3	-	2300	2400	3100		
60	20	3.1	1.3	2.7	9	33	12.7	2	46	52	-	-		
		2.1	1.3	2.7	6.4	15.9	5.9	2	96	108	-	-		
		1.5	1.3	2.7	6.3	13	3.9	2	176	196	-	-		
		0.8	1.3	2.7	5.3	10.2	2.4	2	300	332	-	-		
		0.19	0.8	1.5	6	11	0.33	yes	2800	3500	4500	-		
		0.27	0.5	1.5	7.9	12.5	0.49	2	2100	2200	2600	-		
		0.1	0.6	1.4	2	5		2	2800	3800	-	-		
		0.19	1.1	2.1	12	34	0.33	yes	3000	3700	-	-		
		0.27	1.1	2.1	4.7	6.9	1	2	2200	2500	-	-		
100	20	1.5	1.3	2.7	4.8	9.3	4.5	1	285	300	-	-		
		1.1	1.3	2.7	5.7	10.2	2.9	1	527	555	-	-		

Small-signal MOSFETs single (P-channel)

Package													
Size (mm)													
P _{tot} (mW)													
V _{DS} (V)	V _{GS} (V)	I _D (A)	V _{GS(th)} min (V)	V _{GS(th)} max (V)	t _{on} typ (ns)	t _{off} typ (ns)	Q _G typ (nC)	ESD protection (kV)	R _{DSon} typ (mΩ) @ V _{GS} =				
									10 V	4.5 V	2.5 V	1.8 V	
20	8	5.7	0.45	0.95	39	122	21	-	-	27	36	57	
		5.6	0.45	0.95	11	83	14.7	2	-	27	38	50	
		5.3	0.45	0.95	41	122	14.7	2	-	30	38	51	
		5.4	0.45	0.95	34	128	15.5	-	-	34	42	57	
		6	0.45	0.95	29	84	15.6	4	-	37	45	59	
		4	0.47	0.9	-	-	10.5	3	-	50	57	70	
		2	0.5	1.1	7	50	6	-	-	100	155	210	
		1.2	0.45	0.95	33	52	3.3	-	-	170	210	280	
		0.75	0.4	-	6.5	65	-	-	-	180	-	420	
	1.4	0.45	0.95	9	35	1.3	1.8	-	330	420	520		
	0.5	0.45	0.95	2.3	13.5	1.19	1	-	1020	1270	1700		
	12	4.5	0.75	1.25	7.9	59	11	2	-	28	42	-	
		5.7	0.75	1.25	37	66	15	2	-	27	39	-	
		6.8	0.47	0.9	12	62	15	-	-	30	35	48	
		5.7	0.75	1.25	44	60	11.5	2	-	41	56	-	
		4.1 / 3.5	0.75	1.25	24	84	8.5	-	-	48	71	-	
		4.4	0.47	0.9	7	135	7.7	-	-	48	60	82	
		4.7	0.47	0.9	5.1	141	8.5	-	-	50	64	88	
3.9		0.55	0.95	28	101	7.6	-	-	65	90	-		
3.3		0.75	1.25	7	36	5	2	-	67	99	-		
4.1		0.75	1.25	20	57	5.2	2	-	70	101	-		
8	3.9	0.47	0.9	6	120	5	-	-	72	88	110		
	3.2	0.47	0.9	6	120	5	-	-	77	95	120		
	3.2	0.45	1	20	170	5	-	-	80	95	120		
	2	0.65	1.15	48	64	4.8	-	-	90	125	-		
	2.3	0.7	1.3	5.3	36	3.4	2	-	100	155	-		
	1	0.65	1.15	26	44	2.6	-	-	175	240	-		
	1	0.45	0.95	2.9	22	1.45	2	-	400	480	600		
	0.41	0.45	0.95	3	14	0.7	2	-	1200	1700	2100		
	0.23	0.6	1.1	49	103	0.55	2	-	2800	5300	-		
	20	4.2	1	3	6.1	3.7	12.8	2	35	47	-	-	
3.3		1	3	-	-	-	2	60	96	-	-		
40	20	1.8	1	2.5	10	40	4.7	1	180	220	-	-	
50	20	0.2	1.1	2.1	24	73	0.26	1	5300	6000	-	-	
60	20	2.2	1	3	-	-	-	2	99	110	-	-	
		0.9	1	3	-	-	-	2	217	241	-	-	
70	20	2.3	1	3	-	-	-	2	156	177	-	-	





Small-signal MOSFET–Schottky combination

Package													DFN2020-6 (SOT1118)		
Size (mm)													2.0 x 2.0 x 0.65		
P _{tot} (mW)													1250		
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	PMF8040XP
			3.7	0.4	1	20	170	5.7	2.2	30	325	80	95	120	PMF8032XP

Small-signal MOSFETs dual

Package											
Size (mm)											
P _{tot} (mW)											
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)		
N-channel	20	8	0.8	0.5	0.95	10	117	0.45	2		
			0.6	0.45	0.95	5.6	19	0.4	1		
	30	12	5.3	0.4	0.9	4	40	14.4	-		
			0.59	0.45	0.95	4	12	0.6	2		
		8	0.35	0.6	1.1	26	88	0.52	2		
			3.1	0.75	1.25	9	19	2.9	2		
			12	3.1	0.5	1.5	6	18	1.65	1.8	
			1	0.5	1.5	6.5	14	0.7	2		
	60	20	0.18	0.8	1.5	10	51	0.34	yes		
			0.18	0.8	1.5	6	11	0.33	yes		
			0.26	0.5	1.5	7.9	12.5	0.49	2		
			0.17	1.1	2.1	12	34	0.33	yes		
P-channel	20	8	0.55	0.5	1.3	48	152	0.76	2		
			4.5	0.45	0.95	7	41	6.3	2		
			0.5	0.45	0.95	2.3	13.5	1.19	1		
		12	3.7	0.45	0.95	6	47	5.4	2		
			4.5	0.47	0.9	4	135	16.5	-		
			4.2	0.75	1	7	33	5	2		
	30	8	3.7	0.4	1	6	120	5.7	-		
			0.41	0.45	0.95	3	14	0.7	2		
			0.2	0.6	1.1	49	103	0.55	2		
		12	3.8	0.45	1	3	112	5.2	-		
			0.16	1.1	2.1	24	73	0.26	1		
			50	20	0.16	1.1	2.1	24	73	0.26	1

Small-signal MOSFETs complementary

Package	Type	Polarity	V _{DS} (V)	V _{GS} (V)	I _D (A)	V _{GS(th)} min (V)	V _{GS(th)} max (V)	
 SOT666 (1.6 x 1.2 x 0.55)	NX1029X	N	60	20	0.33	1.1	2.1	
		P	50	20	0.17	1.1	2.1	
	NX3008CBKV	N	30	8	0.4	0.6	1.1	
		P	30	8	0.22	0.6	1.1	
PMDT290UCE	N	20	8	0.8	0.5	0.95		
	P	20	8	0.55	0.5	1.3		
 SOT363 (SC-88) (2.0 x 1.25 x 0.95)	NX3008CBKS	N	30	8	0.35	0.6	1.1	
	P	30	8	0.2	0.6	1.1		
 DFN1010B-6 (1.1 x 1.0 x 0.37)	PMCXB900UE	N	20	8	0.6	0.45	0.95	
		P	20	8	0.5	0.45	0.95	
	PMCXB1000UE	N	30	8	0.59	0.45	0.95	
		P	30	8	0.41	0.45	0.95	
 DFN2020-6 (2.0 x 2.0 x 0.65)	PMCPB5530X	N	20	12	5.3	0.4	0.9	
		P	20	12	4.5	0.47	0.9	

4 steps select a power MOSFET

1

Select a voltage, e.g. 40 V

2

Select a package, e.g. LFPAK56

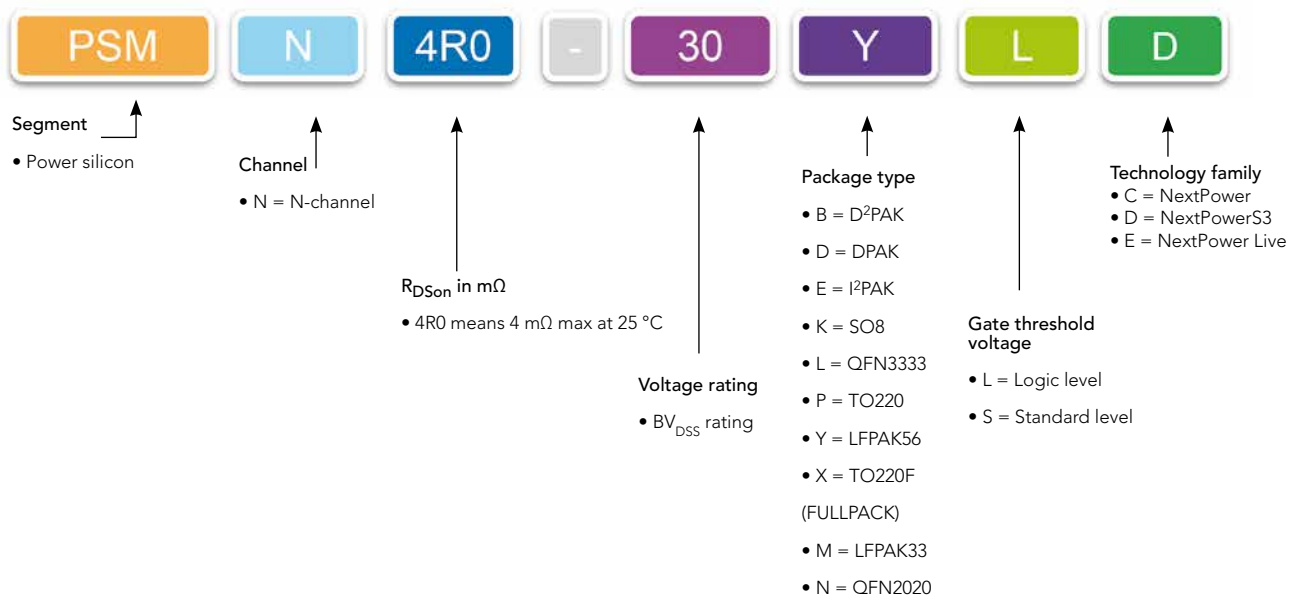
3

Choose an R_{DSon} from our extensive range

4

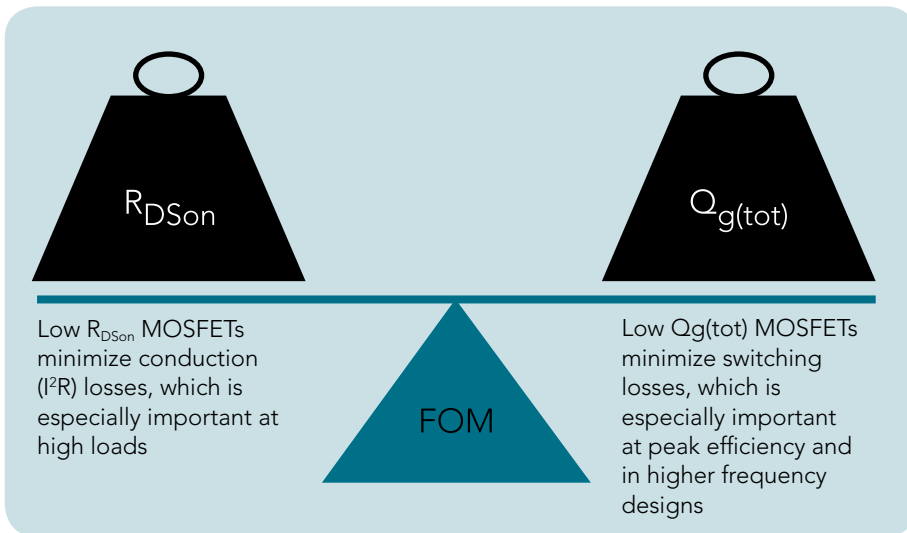
Select a type and visit www.nxp.com/mosfets to download datasheets and models, and order samples

PSMN part numbering



Featured product: NextPowerS3

NextPowerS3 – perfectly balanced for DC/DC switching applications



The challenge

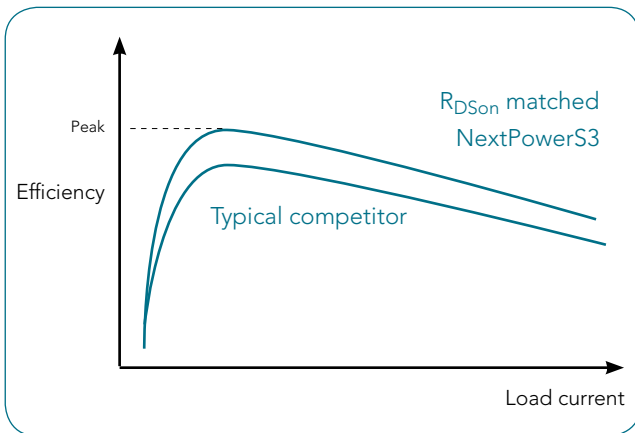
Low $R_{DS(on)}$ MOSFETs typically need a big die.

Low $Q_{g(tot)}$ MOSFETs typically need a small die.

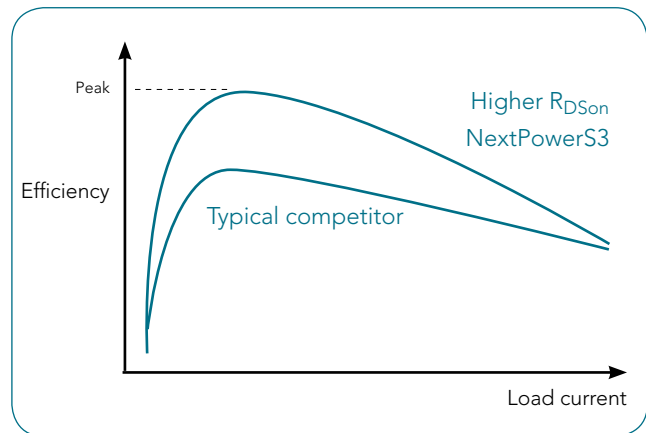
The challenge for manufacturers is to create optimized power MOSFETs that have both low $R_{DS(on)}$ and low $Q_{g(tot)}$.

Welcome to NextPowerS3.

The Figure of Merit (FOM) of a MOSFET is calculated as the product of the $R_{DS(on)}$ and $Q_{g(tot)}$. A low FOM indicates good MOSFET performance in switching applications.



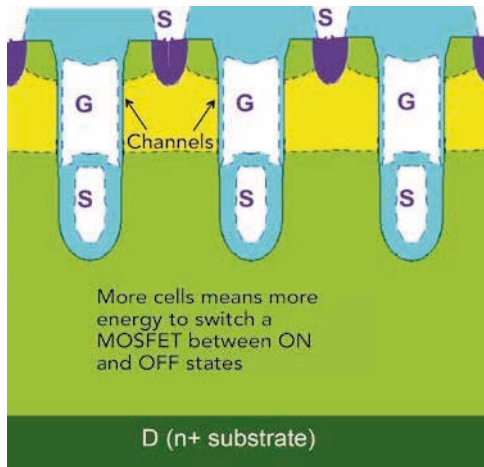
Comparing the performance of a NextPowerS3 MOSFET with a competitor of similar $R_{DS(on)}$ typically shows an efficiency performance advantage across the load range. Since conduction losses are the same for both devices, the advantage is more noticeable at lower loads where switching losses contribute proportionally more.



Using a NextPowerS3 MOSFET, with a higher $R_{DS(on)}$ than a competitor device, reduces the $Q_{g(tot)}$ still further, resulting in an improved peak efficiency. At higher loads, increased conduction losses cancel out the switching advantages and the two parts show similar performance.

Featured product: NextPowerS3 – the technology

Typical competitor



The importance of cell design

The outstanding performance of NextPowerS3 is largely attributable to NXP's unique "Super-junction" technology and optimization of cell structures.

Most manufacturers of low-voltage MOSFETs use "Split Gate" technology to achieve low R_{DSon} .

NextPowerS3 uses a different approach to its cell design.

The drive for R_{DSon}

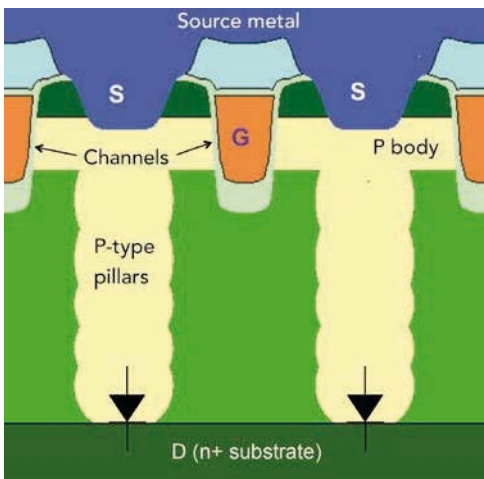
A MOSFET's R_{DSon} is given by the formula:

$$R_{DSon} = R_{channel} + R_{drift} + R_{substrate} + (R_{package})$$

Many manufacturers focus on reducing $R_{channel}$ to drive R_{DSon} down.

NXP's Super-junction allows for an optimization of all three components for reduction in R_{DSon} , while also enhancing switching performance and Safe Operating Area (SOA).

NextPowerS3



Maximizing switching performance

Switching losses result from the energy required to charge / discharge all the cell capacitances across the device. The total charge required is referred to as $Q_{g(tot)}$.

With NextPower S3, $Q_{g(tot)}$ is lower and switching losses are kept to a minimum. This is especially beneficial at peak efficiency and in higher-frequency designs, which have a higher number of switching events.

SOA and other benefits

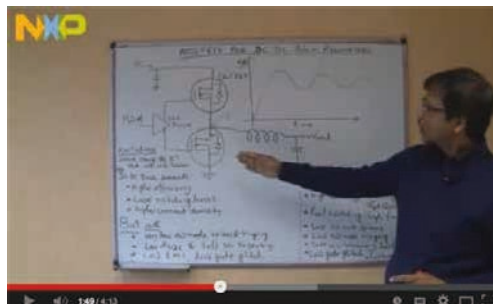
When a device is operating in its linear mode, the channel current generates localized heating effects, which can cause failure.

NXP has optimized the cell structure to keep this heating effect under control. As a result, NextPowerS3 enjoys a particularly strong SOA, which is important in hot-swap, e-Fuse, and power OR-ing designs.



Reverse recovery and diode leakage in SMPS

www.nxp.com/quicklearning33



NextPowerS3 MOSFETs for DC/DC buck regulators





www.nxp.com/quicklearning32

Featured product: NextPower Live

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 $R_{DS(on)}$ 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
TO220 		PSMN4R8-100PSE PSMN7R8-100PSE
LFPAK56 (Power-SO8) 	PSMN2R0-30YLE	PSMN013-100YSE
LFPAK33 		(specifically for PoE applications) PSMN040-100MSE PSMN075-100MSE



Power MOSFET operation in linear mode
www.nxp.com/quicklearning34



MOSFETs for Power-over-Ethernet (PoE) PSE applications
www.nxp.com/quicklearning36

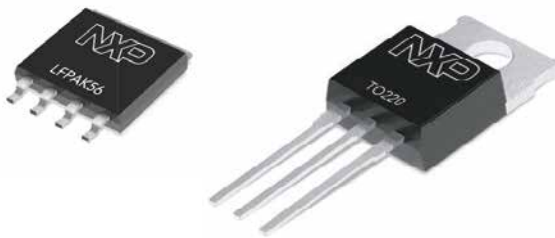


Next Power Live! MOSFETs for HOT SWAP and Power over Ethernet
www.nxp.com/quicklearning29

NextPower Cordless portfolio

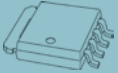


Type number	V_{DS} [max] (V)	$R_{DS(on)}$ [max] @ $V_{GS} = 10$ V (m Ω)	$R_{DS(on)}$ [max] @ $V_{GS} = 4.5$ V (m Ω)	I_D [max] (A)	EAS at rated current [mJ]	Package	Gate threshold
PSMN0R9-30YLD	30	0.87	1.09	300	-		Logic Level
PSMN1R0-30YLD	30	1.02	1.3	300	-		Logic Level
PSMN2R0-30YL	30	2	2.63	100	151	LFPAK56	Logic Level
PSMN2R0-30YLE	30	2	3.5	100	370	LFPAK56	Logic Level
PSMN2R5-30YL	30	2.4	3.16	100	103	LFPAK56	Logic Level
PSMN2R6-30YLC	30	2.8	3.65	100	50	LFPAK56	Logic Level
PSMN1R9-40PL	40	1.7	1.94	150	1008	TO220 (SOT78)	Logic Level
PSMN2R1-40PL	40	2.2	2.6	150	622	TO220 (SOT78)	Logic Level
PSMN1R5-40PS	40	1.6	-	120	1400	TO220 (SOT78)	Standard Level
PSMN2R2-40PS	40	2.1	-	100	1240	TO220 (SOT78)	Standard Level
PSMN2R5-60PL	60	2.6	3.15	150	655	TO220 (SOT78)	Logic Level
PSMN2R6-60PS	60	2.9	-	150	519	TO220 (SOT78)	Standard Level
PSMN3R3-60PL	60	3.4	3.8	130	404	TO220 (SOT78)	Logic Level
PSMN3R9-60PS	60	3.9	-	130	372	TO220 (SOT78)	Standard Level
PSMN4R2-60PL	60	4.3	4.3	130	372	TO220 (SOT78)	Logic Level
PSMN7R6-60PS	60	7.8	-	92	110	TO220 (SOT78)	Standard Level

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



Heavy-duty tools with large batteries require MOSFETs that withstand higher currents. NXP's TO-220 NextPower Cordless devices handle up to 150A. The high-reliability LFPAK56 is ideal for smaller tools and space-constrained applications.

Power MOSFETs 30 V – Part I

Package	Type number	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)
LFPAK56; Power-SO8 (SOT669) 	PSMN0R9-30YLD	30	0.87	1.09	300	51
	PSMN1R0-30YLD	30	1.02	1.3	300	38.2
	PSMN1R0-30YLC	30	1.15	1.4	100	50
	PSMN1R2-30YLD	30	1.24	1.6	100	32
	PSMN1R2-30YLC	30	1.25	1.65	100	38
	PSMN1R3-30YL	30	1.3	1.95	100	46.6
	PSMN1R4-30YLD	30	1.42	1.85	100	27.6
	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
	PSMN2R4-30YLD	30	2.4	3.1	100	18
	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
	PSMN3R0-30YLD	30	3.1	4	100	14.5
	PSMN3R2-30YLC	30	3.5	4.55	100	14.2
	PSMN3R5-30YL	30	3.5	4.61	100	19
	PSMN4R0-30YL	30	4	5.25	100	17.6
	PSMN4R0-30YLD	30	4	5.5	95	9.6
	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
	PSMN6R0-30YLD	30	6	8.35	66	6.7
	PSMN6R1-30YLD	30	6	8.35	66	6.4
	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
	PSMN7R5-30YLD	30	7.5	10.2	51	5.8
	PSMN9R1-30YL	30	9.1	13.6	57	8.4
PSMN9R5-30YLC	30	9.8	12.1	44	5	
PSMN011-30YLC	30	11.6	14.5	37	4.9	
PSMN013-30YLC	30	13.6	16.9	32	4	
LFPAK33 (SOT1210) 	PSMN2R4-30MLD	30	2.4	3.2	70	16
	PSMN2R9-30MLC	30	2.95	3.8	70	16.7
	PSMN3R0-30MLC	30	3.15	4.05	70	16.1
	PSMN4R2-30MLD	30	4.3	5.7	70	9.2
	PSMN4R4-30MLC	30	4.65	6	70	10.6
	PSMN7R0-30MLC	30	7	9	67	8.2
	PSMN7R5-30MLD	30	7.6	10.3	57	5.8
	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
D ² PAK (SOT404) 	PSMNR90-30BL	30	1	1.4	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
	PSMN022-30BL	30	22.6	29.6	30	4.4

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

Power MOSFETs 40 V

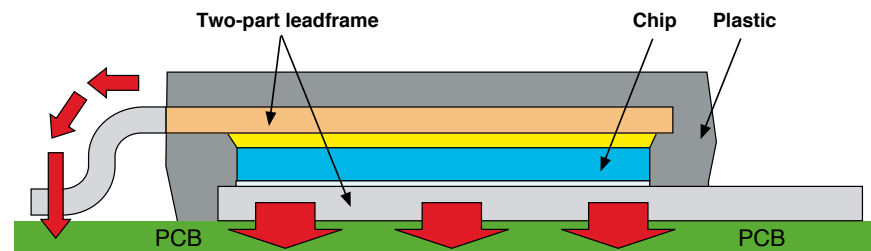
types in **bold** represent new products

Package	Type number	V_{DS} [max] (V)	$R_{DS(on)}$ [max] @ $V_{GS} = 10$ V (m Ω)	$R_{DS(on)}$ [max] @ $V_{GS} = 4.5$ V (m Ω)	I_D [max] (A)	$Q_{G(tot)}$ [typ] (nC)
LFAK56; Power-SO8 (SOT669)	PSMN1R0-40YLD	40	1.1	1.4	100	59
	PSMN1R4-40YLD	40	1.4	1.85	100	45
	PSMN1R6-40YLC	40	1.55	1.8	100	59
	PSMN1R8-40YLC	40	1.8	2.1	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
D ² PAK (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
TO-220AB (SOT78)	PSMN8R0-40BS	40	7.6		77	21
	PSMN1R5-40PS	40	1.6		150	136
	PSMN1R9-40PL	40	1.7	1.94	150	230
	PSMN2R1-40PL	40	2.2	2.6	150	168.9
	PSMN2R2-40PS	40	2.1		100	110
	PSMN2R8-40PS	40	2.8		100	71
	PSMN4R5-40PS	40	4.6		100	35
I ² PAK (SOT226)	PSMN8R0-40PS	40	7.6		77	17
PSMN1R5-40ES	40	1.6		120	136	

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

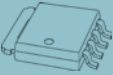


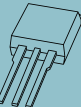
Power-SO8 (LFAK) Design

- ▶ Low thermal resistance
- ▶ Low electrical resistance
- ▶ Low inductance



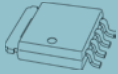


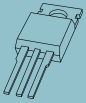

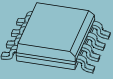
Power MOSFETs 75 - 80 V

types in **bold** represent new products

Package	Type number	V_{DS} [max] (V)	R_{DSon} [max] @ $V_{GS} = 10\text{ V}$ (m Ω)	I_D [max] (A)	$Q_{G(tot)}$ [typ] (nC)
LPAK56; Power-SO8 (SOT669) 	PSMN8R0-80YL	80	8	100	104
	PSMN8R2-80YS	80	8.5	82	55
	PSMN010-80YL	80	10	84	84.7
	PSMN011-80YS	80	11	67	45
	PSMN013-80YS	80	12.9	60	37
	PSMN014-80YL	80	14	62	56.9
	PSMN018-80YS	80	18	45	26
	PSMN025-80YL	80	25	37	34.3
	PSMN026-80YS	80	27.5	34	20
	PSMN041-80YL	80	41	25	21.9
	PSMN045-80YS	80	45	24	12.5
D2PAK (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
	TO-220AB (SOT78) 	PSMN005-75P	75	5	75
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
I2PAK (SOT226) 		PSMN3R3-80ES	80	3.3	120
	PSMN3R5-80ES	80	3.5	120	139
	PSMN4R3-80ES	80	4.3	120	111

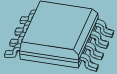
For the most current product information go to www.nxp.com/mosfets (updated daily!)

Power MOSFETs 105 - 150V

Package	Type number	V_{DS} [max] (V)	R_{DSon} [max] @ $V_{GS} = 10$ V (m Ω)	I_D [max] (A)	$Q_{G(tot)}$ [typ] (nC)
LFAK56; Power-SOB (SOT669) 	PSMN059-150Y	150	59	43	27.9
D ² PAK (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
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
	PSMN6R3-120PS	120	6.7	70	207.1
	PSMN7R8-120PS	120	7.9	70	167
	PSMN030-150P	150	30	55.5	98
	PSMN035-150P	150	35	50	79
	PHP30NQ15T	150	63	29	55
	PHP28NQ15T	150	65	28.5	24
	FPAK (SOT226) 	PSMN6R3-120ES	120	6.7	70
PSMN7R8-120ES		120	7.9	70	167
SO8 (SOT96-1) 	PHK5NQ15T	150	75	5	29
	PSMN085-150K	150	85		40

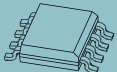
For the most current product information go to www.nxp.com/mosfets (updated daily!)

P-channel

Package	Type number	V_{DS} [max] (V)	R_{DSon} [max] @ $V_{GS} = 10$ V (m Ω)	R_{DSon} [max] @ $V_{GS} = 4.5$ V (m Ω)	I_D [max] (A)	$Q_{G(tot)}$ [typ] (nC)
SO8 (SOT96-1) 	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 current product information go to www.nxp.com/mosfets (updated daily!)

Multi-chip

Package	Type number	Channel type	V_{DS} [max] (V)	R_{DSon} [max] @ $V_{GS} = 10$ V (m Ω)	I_D [max] (A)	$Q_{G(tot)}$ [typ] (nC)
SO8 (SOT96-1) 	PHP225	P	-30	250	-	10
	PHKD6N02LT	N	20	-	10.9	15.3
	PHKD13N03LT	N	30	20	10.4	10.7
	PHN203	N	30	30	6.3	14.6
	PHN210T	N	30	100	3.4	6
	PHC21025	N/P	30	250	-	10
	PHKD3NQ10T	N	100	90	3	21
	PHC2300	N/P	300	6000	-	6.24

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

4 steps to select an automotive MOSFET

1 Select a voltage, e.g. 40 V

2 Select a package, e.g. D²PAK

3 Choose an R_{DSon} from our extensive range

4 Select a 'BUK' type and visit www.nxp.com/automotivemosfets to download datasheets and models, and order samples

Automotive-grade MOSFET product numbering



Segment

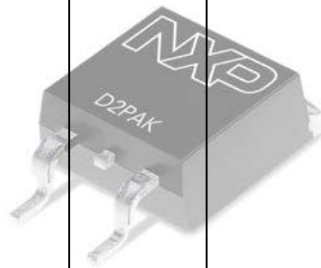
'BUK' for automotive grade

Gate drive

7 = Standard level
6 = Intermediate level
9 = Logic level

Package:

6 = D²PAK
C = D²PAK-7
2 = DPAK
E = I²PAK
5 = TO-220
Y = LFPAK56
K = LFPAK56D



TrenchMOS technology

A = Generation 2
B = Generation 3
C = Generation 4
E = Generation 6

Voltage rating

BV_{DSS} rating

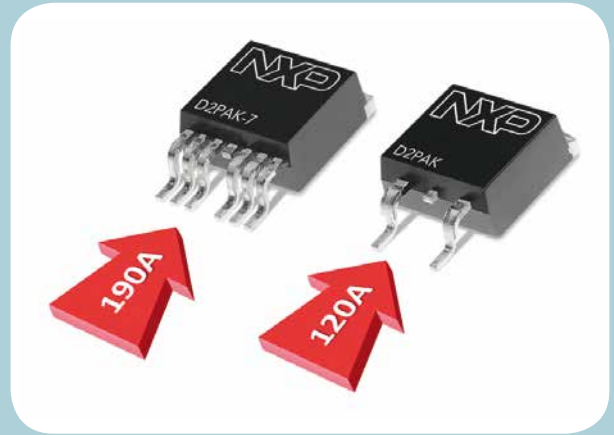
R_{DSon} in $m\Omega$

1R5 means $R_{DSon} < 1.5m\Omega$ max at 25 °C

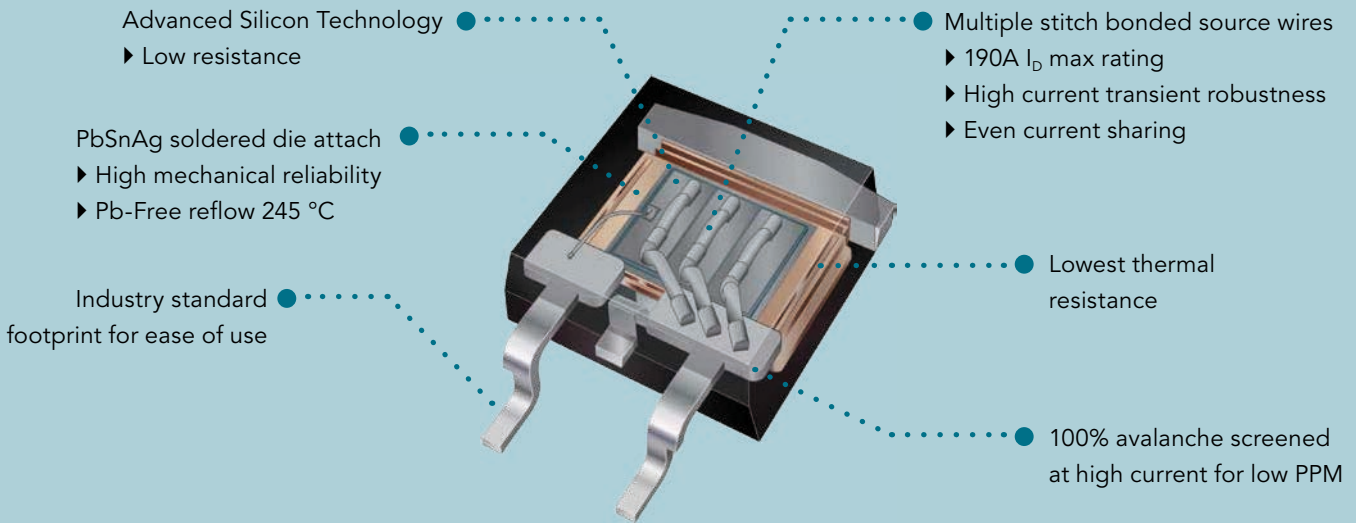
D²PAK Family

D²PAK Family - Premium performance SMD products

The NXP D²PAK portfolio is ideally suited for high power automotive application areas such as powertrain and chassis & safety. Combining advanced TrenchMOS technology with high current packaging enables a product that delivers ultra low on-state resistance and thermal performance within an industry standard footprint. NXP offers the broadest range of automotive grade D²PAK across V_{DS} 30V-100V.



Fully AEC-Q101 qualified to 175 °C



POWERTRAIN

- ▶ Engine Control
- ▶ Gearbox/Clutch
- ▶ Engine Fan
- ▶ Electric Vehicle
- ▶ Micro-Hybrid drive
- ▶ DCDC converters



CHASSIS & SAFETY

- ▶ Electric Power Steering (EPS)
- ▶ Vehicle Stability (ESP)
- ▶ Braking Systems (ABS)
- ▶ Electric Parking Brake (EPB)



BODY & SECURITY

- ▶ Climate control (HVAC)
- ▶ Wiper Systems

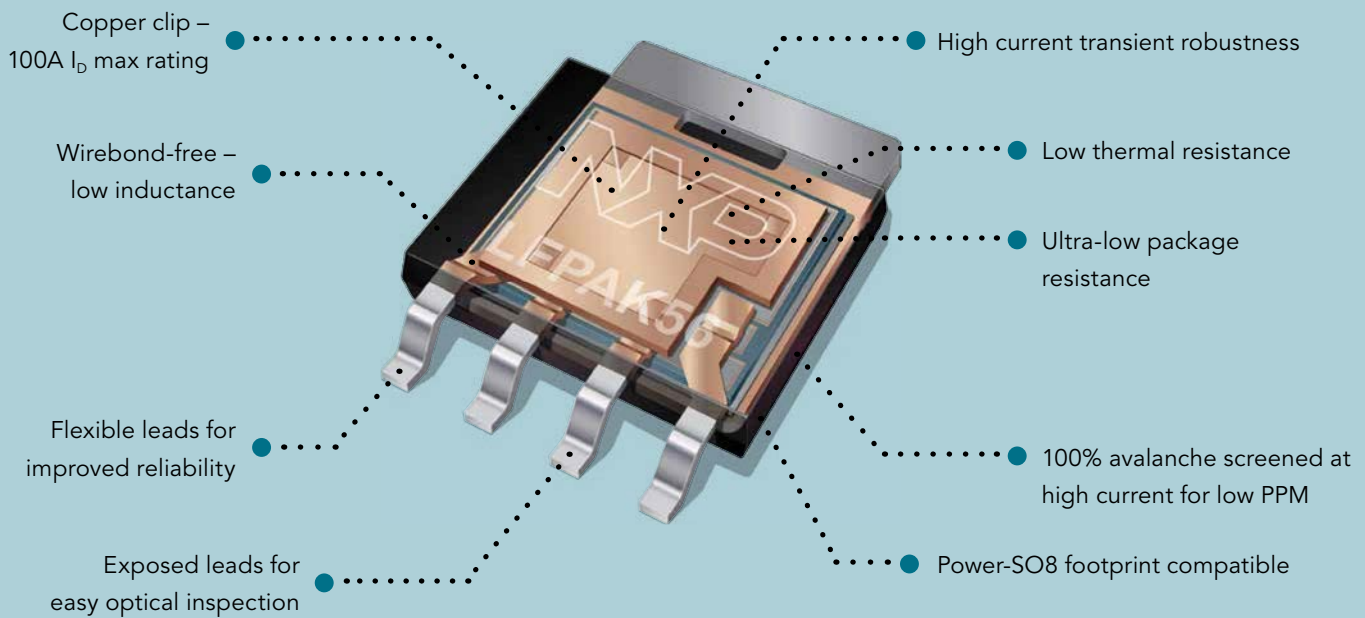
LFAK56

The Power-SO8 that packs a punch

Providing a true alternative to DPAK, NXP's LFAK56 portfolio gives industry-leading performance in a truly innovative, automotive-grade package. Saving a considerable amount of space compared to traditional DPAK solutions, the LFAK56 offers designers flexibility and reliability without compromising thermal performance.



Fully AEC-Q101 qualified to 175 °C



POWERTRAIN

- ▶ Engine management
- ▶ Gearbox / clutch
- ▶ Engine fan
- ▶ Fuel / water pump
- ▶ Auxiliary valves



CHASSIS & SAFETY

- ▶ Vertical stability (ESP)
- ▶ Braking systems (ABS)
- ▶ Airbag
- ▶ Electric Parking Brake (EPB)



BODY & SECURITY

- ▶ Body control module
- ▶ Climate control (HVAC)
- ▶ Wiper systems
- ▶ Electric windows
- ▶ Electric mirrors
- ▶ Electric seats
- ▶ Sunroof
- ▶ Lighting

Automotive-compliant small-signal MOSFETs

Package																	
Size (mm)																	
P _{tot} (mW)																	
Polarity	Configuration	V _{DS} (V)	V _{GS} (V)	I _D (A)	V _{GS(th)}	V _{GS(th)}	t _{on} typ (ns)	t _{off} typ (ns)	Q _G typ (nC)	ESD protection (kV)	R _{DSon} typ (mΩ) @ V _{GS} =						
					min (V)	max (V)					10 V	4.5 V	2.5 V	1.8 V			
N-channel	single	20	8	4.7	0.45	1	8.2	39.5	6.2	2	-	24	29	40			
			12	6.3	0.75	1.25	16	44	9.9	2	-	16	24	-			
		30	8	0.4	0.6	1.1	26	88	0.52	2	-	1000	1400	2000			
			12	3.1	0.75	1.25	9	19	2.9	2	-	55	72	-			
			20	5.5	1	2.5	8	33	12.6	2	17	22	-	-			
		3.9		1	2.5	6.3	14.1	6	2	30	39	-	-				
		3		1	2.5	6	11	3.6	2	54	70	-	-				
		40	20	3.1	1	2.5	-	-	-	1	65	88	-	-			
				2.5	1	2.5	14	14	2.4	1	95	120	-	-			
		60	20	4	1.3	2.7	4.5	13.5	7.5	1	42	48	-	-			
				3.1	1.3	2.7	9	33	12.7	2	46	52	-	-			
				4	1.3	2.7	4	10.5	6.2	2.7	72	85	-	-			
				2.1	1.3	2.7	6.4	15.9	5.9	2	96	108	-	-			
				1.5	1.3	2.7	6.3	13	3.9	2	176	196	-	-			
				0.8	1.3	2.7	5.3	10.2	2.4	2	300	332	-	-			
				0.36	0.9	1.5	5	13	0.72	-	900	1000	-	-			
				0.36	0.48	1.6	10	58	0.6	1.5	1000	1100	1400	-			
				0.3	1	2.5	11	19	0.5	2	1000	1300	-	-			
				0.3	1	2.5	16	60	1.09	3	1100	1300	-	-			
		80	20	0.2	0.8	1.5	5	36	0.39	yes	2700	3000	4000	-			
				1.9	1.3	2.7	3.5	9.5	4.8	2	175	195	-	-			
				2.8	1.3	2.7	5	15	9.9	2.8	80	92	-	-			
		100	20	1.1	1.3	2.7	2	9	3	2	345	390	-	-			
				1.5	1.3	2.7	4.8	9.3	4.5	1	285	300	-	-			
				1.1	1.3	2.7	5.7	10.2	2.9	1	527	555	-	-			
		dual	20	8	0.8	0.5	0.95	10	117	0.45	2	-	380	620	1100		
				30	8	0.4	0.6	1.1	26	88	0.52	2	-	1000	1400	2000	
				60	20	0.3	1	2.5	11	19	0.5	2	1000	1300	-	-	
0.36	0.48					1.6	10	58	0.6	1.5	1000	1100	1400	-			
0.36	0.9					1.5	5	13	0.72	-	900	1000	-	-			
0.3	1					2.5	11	19	0.5	2	1000	1300	-	-			
P-channel	single	8	8	6	0.45	0.95	8	50	15.6	4	-	37	45	59			
			2	0.5	1.1	7	50	6	-	-	100	155	210				
		20	12	4.5	0.45	0.95	11	83	14.7	2	-	27	38	50			
				5.7	0.75	1.25	15	37	15	2	-	27	39	-			
				5.7	0.75	1.25	17	33	11.5	2	-	41	56	-			
				4.5	0.75	1.25	7.9	59	11	2	-	28	42	-			
				3.5	0.75	1.25	11	61	8.5	-	-	48	71	-			
				4.1	0.75	1.25	15	51	8.7	-	-	48	72	-			
				2.8	0.75	1.25	7	36	5	2	-	67	99	-			
				4.1	0.75	1.25	7	40	5.2	2	-	70	101	-			
		30	20	2.3	0.7	1.3	5.3	36	3.4	2	-	100	155	-			
				0.23	0.6	1.1	49	103	0.55	2	-	2800	5300	-			
				4.2	1	3	6.1	3.7	12.8	2	35	47	-	-			
				1.5	1	2.5	4	26	4.7	1	180	220	-	-			
				0.2	1.1	2.1	24	73	0.26	1	5300	6000	-	-			
				2.2	1	3	-	-	-	2	99	110	-	-			
		60	20	0.9	1	3	-	-	-	2	217	241	-	-			
				2.3	1	3	-	-	-	2	156	177	-	-			
				dual	20	8	0.55	0.5	1.3	48	152	0.76	2	-	670	1200	1800
						30	8	0.2	0.6	1.1	49	103	0.55	2	-	2800	5300
		Compl	20	8	0.73	0.5	0.95	10	117	0.45	2	-	290	420	600		
				8	0.5	0.5	1.3	48	152	0.76	2	-	670	1200	1800		

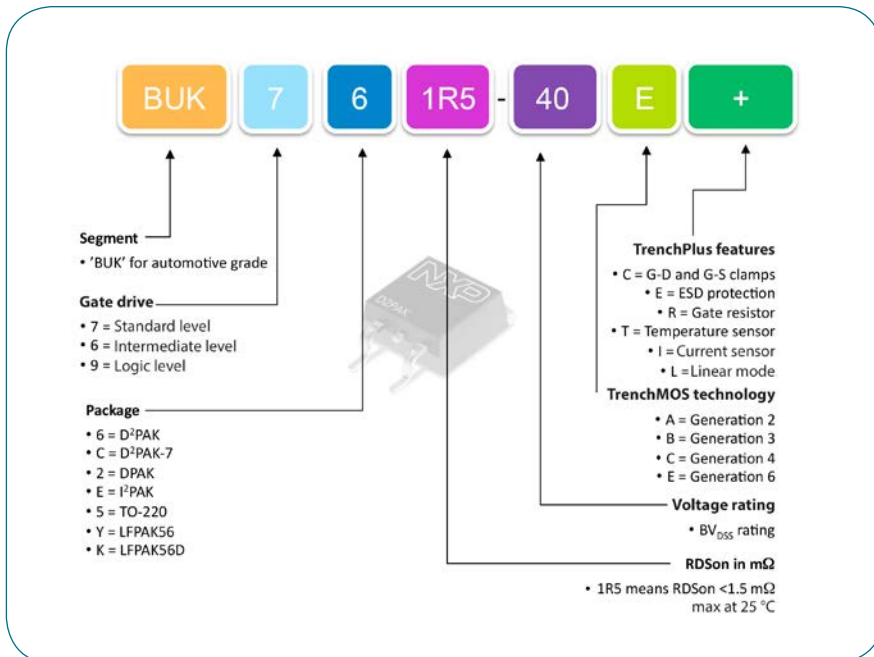
30V N-channel automotive TrenchMOS

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]
LFPAK56; Power-SO8 (SOT669)	BUK9Y07-30B	30	6	7	75	1.42
	BUK7Y07-30B	30	7		75	1.42
	BUK9Y11-30B	30	9	11	59	2
	BUK7Y10-30B	30	10		67	1.76
	BUK9Y22-30B	30	19	22	37.7	2.53
	BUK7Y20-30B	30	20		39.5	2.53
LFPAK56D (SOT1205)	BUK7K5R1-30E	30	5.1		40	2.21
	BUK7K5R6-30E	30	5.6		40	2.36
	BUK9K5R1-30E	30	4.4	5.3	40	2.21
	BUK9K5R6-30E	30	4.7	5.8	40	2.36
D ² PAK (SOT404)	BUK962R8-30B	30	2.4	2.8	75	0.5
	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
	BUK7607-30B	30	7		75	0.95
DPAK (SOT428)	BUK9214-30A	30	12	14	63	1.4
	BUK6213-30A	30	13		55	1.4
TO-220AB (SOT78A)	BUK952R8-30B	30	2.4	2.8	75	0.5
	BUK9507-30B	30	5	7	75	0.95
	BUK7507-30B	30	7		75	0.95

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

Automotive TrenchMOS part numbering






40V N-channel automotive TrenchMOS – Part 2

Package name	Type number	V_{DS} [max] [V]	R_{DSon} [max] @ 10 V [m Ω]	R_{DSon} [max] @ 5 V [m Ω]	I_D [max] @ 25 °C [A]	$R_{th(j-mb)}$ [max] [K/W]
D ² PAK (SOT404) 	BUK764R0-40E	40	4		75	0.82
	BUK965R4-40E	40	4.4	5.4	75	1.09
	BUK7604-40A	40	4.5		75	0.5
	BUK765R3-40E	40	4.9		75	1.09
	BUK9606-40B	40	5	6.4	75	0.74
	BUK765R2-40B	40	5.2		75	0.74
	BUK9609-40B	40	7	9	75	0.95
	BUK768R1-40E	40	7.2		75	1.56
	BUK7608-40B	40	8		75	0.95
	BUK761R6-40E	40	1.57		120	0.43
	BUK761R7-40E	40	1.6		120	0.46
DPAK (SOT428) 	BUK9209-40B	40	7	9	75	0.95
	BUK7208-40B	40	8		75	0.95
TO-220AB (SOT78A) 	BUK751R8-40E	40	1.8		120	0.43
	BUK752R3-40E	40	2.3		120	0.51
	BUK953R2-40B	40	2.8	3.2	100	0.5
	BUK753R1-40E	40	3.1		100	0.64
	BUK9504-40A	40	4	4.4	75	0.5
	BUK954R4-40B	40	4	4.4	75	0.59
	BUK9506-40B	40	5	6.4	75	0.74
	BUK755R2-40B	40	5.2		75	0.74
	BUK9509-40B	40	7	9	75	0.95
	BUK758R3-40E	40	7.4		75	1.56
	BUK7508-40B	40	8		75	0.95
FPAK (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
	BUK9E04-40A	40	4	4.4	75	0.5
	BUK7E04-40A	40	4.5		75	0.5
	BUK7E8R3-40E	40	7.4		75	1.56

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

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

Package name	Type number	V_{DS} [max] [V]	R_{DSon} [max] @ 10 V [m Ω]	R_{DSon} [max] @ 5 V [m Ω]	I_D [max] @ 25 °C [A]	$R_{th(j-mb)}$ [max] [K/W]	
D ² PAK (SOT404)		BUK7608-55A	55	8		75	0.59
		BUK9612-55B	55	10	12	75	0.95
		BUK7610-55AL	55	10		75	0.5
		BUK7611-55A	55	11		75	0.9
		BUK7611-55B	55	11		75	0.95
		BUK9614-55A	55	13	14	73	1
		BUK9616-55A	55	15	16	66	
		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	
		BUK9628-55A	55	25	28	42	1.5
		BUK7628-55A	55	28		42	
		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
		BUK964R2-60E	60	3.9	4.2	100	0.57
		BUK763R9-60E	60	3.9		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		
D ² PAK-7 (SOT427)		BUK9C10-55BIT	55	9	10	75	0.78
DPAK (SOT428)		BUK9212-55B	55	10	12	75	0.95
		BUK7210-55B	55	10		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

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





75 - 80 V N-channel automotive TrenchMOS

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]
LFPAK56; Power-SO8 (SOT669)	BUK9Y19-75B	75	18	19	48.2	1.42
	BUK7Y18-75B	75	18		49	1.42
	BUK9Y30-75B	75	28	30	34	1.8
	BUK7Y28-75B	75	28		35.5	1.76
	BUK9Y58-75B	75	53	58	20.73	2.53
	BUK7Y7R8-80E	80	7.8		100	0.63
	BUK9Y8R5-80E	80	8	8.5	100	0.63
	BUK7Y9R9-80E	80	9.9		89	0.77
	BUK9Y11-80E	80	10	11	84	0.77
	BUK9Y14-80E	80	14	15	62	1.02
	BUK7Y14-80E	80	14		65	1.02
	BUK9Y25-80E	80	25	27	37	1.58
	BUK7Y25-80E	80	25		39	1.58
	BUK9Y41-80E	80	41	45	24	2.33
	BUK7Y41-80E	80	41		25	2.31
	BUK9Y72-80E	80	72	78	15	3.33
	BUK7Y72-80E	80	72		16	3.33
	BUK9Y107-80E	80	98	107	11.8	4.03
BUK7Y98-80E	80	98		12.3	4.03	
D ² PAK (SOT404)	BUK9606-75B	75	5.5	6.1	75	0.5
	BUK7606-75B	75	5.6		75	0.5
	BUK9609-75A	75	8.5	9	75	0.65
	BUK7609-75A	75	9		75	0.65
	BUK7613-75B	75	13		75	0.95
	BUK9616-75B	75	14	16.4	67	0.95
	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
DPAK (SOT428)	BUK7214-75B	75	14		69	0.95
	BUK9217-75B	75	15	17	64	0.95
	BUK9226-75A	75	24.6	26	45	1.3
	BUK7226-75A	75	26		45	1
TO-220AB (SOT78A)	BUK9506-75B	75	5.5	6.1	75	0.5
	BUK7509-75A	75	9		75	0.65
	BUK7513-75B	75	13		75	0.95
	BUK753R8-80E	80	4		120	0.43

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

100 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) 	BUK7620-100A	100	20		63	0.75
	BUK7626-100B	100	26		49	0.95
	BUK9628-100A	100	27	28	49	0.9
	BUK9629-100B	100	27	29	46	0.95
	BUK7628-100A	100	28		47	0.9
	BUK7631-100E	100	31		34	1.56
	BUK7635-100A	100	35		41	1
	BUK9637-100E	100	36	37	31	1.56
	BUK9640-100A	100	39	40	39	0.95
	BUK7640-100A	100	40		37	1.1
	BUK9660-100A	100	58	60	26	1.4
	BUK7660-100A	100	60		26	1.4
	BUK9675-100A	100	72	75	23	1.5
	BUK7675-100A	100	75		23	1.5
	BUK96180-100A	100	173	180	11	2.8
DPAK (SOT428) 	BUK7227-100B	100	27		48	0.95
	BUK9230-100B	100	28	30	47	0.95
	BUK9240-100A	100	38.6	40	33	1.3
	BUK7240-100A	100	40		34	1.3
	BUK9275-100A	100	72	75	21.7	1.7
	BUK7275-100A	100	75		21.7	1.7
TO-220AB (SOT78A) 	BUK755R4-100E	100	5.2		120	0.43
	BUK9510-100B	100	9.7	10	75	0.5
	BUK7510-100B	100	10		75	0.5
	BUK9515-100A	100	14.4	15	75	0.65
	BUK7515-100A	100	15		75	0.5
	BUK9520-100B	100	18.5	20	63	0.75
	BUK9520-100A	100	19	20	63	0.75
	BUK7520-100A	100	20		63	0.75
	BUK7526-100B	100	26		49	0.95
	BUK9529-100B	100	27	29	46	0.95
	BUK7528-100A	100	28		47	0.9
	BUK9535-100A	100	34	35	41	1
	BUK7535-100A	100	35		41	1
	BUK9575-100A	100	72	75	23	1.5
BUK7575-100A	100	75		23	1.5	
FPAK (SOT226) 	BUK7E5R2-100E	100	5.2		120	0.43

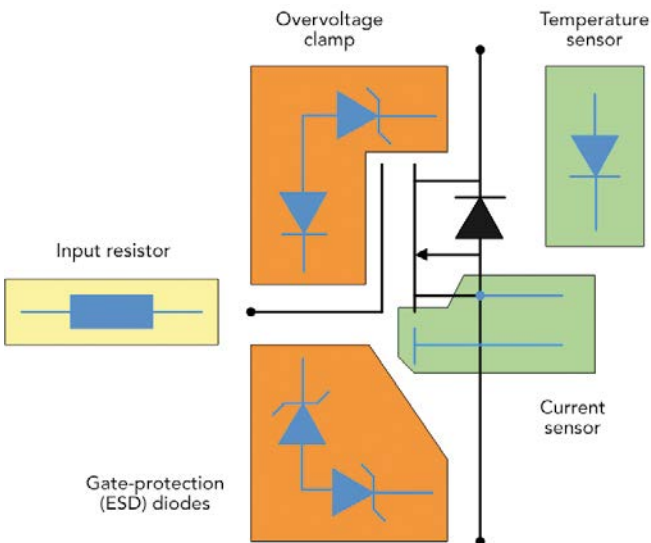
For the most current product information go to www.nxp.com/mosfets (updated daily!)

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_{DS} (V)	$R_{DS(on)}$ (max) @ 10 V (m Ω)	$R_{DS(on)}$ (max) @ 5 V (m Ω)	I_b (max) @ 25 °C (A)	Temperature sensing	Current sensing	Gate source clamps	Gate drain clamps	Gate resistor	Surface-mount package		Leaded package	
									7-pin D ² PAK (SOT427)	5-pin D ² PAK (SOT426)	TO220AB (SOT78C)	5-pin TO220 (SOT263B-01)
												
									10.0 x 15.0 x 4.5	10.0 x 15.0 x 4.5	15.0 x 10.0 x 4.5	10.0 x 19.0 x 4.5
34	6		75			•	•	•			BUK7L06-34ARC	
34	11		75			•	•	•			BUK7L11-34ARC	
40	4.1		75	•						BUK714R1-40BT		
40	5		75		•	•				BUK7105-40AIE		BUK7905-40AIE
40	5		75	•		•				BUK7105-40ATE		BUK7905-40ATE
40	5		75									BUK7905-40AI
40	6		75	•	•	•			BUK7C06-40AITE			



The next generation of packaging

DFN / DSN packages – high performance on a smaller footprint

100% solderable side pads

- ▶ Improved electro-thermal behaviour
- ▶ For visual solder inspection

Heat sink at die pad

- ▶ For high power on a small footprint
- ▶ Enabling smaller designs

Smallest packages

- ▶ Outline down to 0.4 x 0.2 mm
- ▶ Height down to 0.12 mm
- ▶ For ultra-compact and slim designs

True power packages for smart efficiency – with solid wireless-clip design

The miniaturization of power

- ▶ Only 1 mm in height
- ▶ Excellent electro-thermal behavior
- ▶ For high-temperature use (175 °C)

FlatPower: CFP15 (SOT1289) / CFP5 (SOD128) / CFP3 (SOD123W)

- ▶ Same performance as SMA / SMB on a much smaller footprint


















LFPAK56/56D (SOT669 / SOT1205)

- ▶ Same performance as DPAK, on a much smaller footprint








Package details and packing methods SMD – Part I

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)	Packing quantity and ordering code (12NC ending)																							
							500	800	1000	1400	1500	2000	2500	3000	4000	4500	5000	6000	8000	9000	10000									
2	DSN0402-2 (SOD992)	0.4 x 0.2 x 0.12	0.25		2 mm pitch, 8 mm tape and reel	180 x 8																					-315			
	DSN1006-2 (SOD993)	1.0 x 0.6 x 0.3	0.65		2 mm pitch, 8 mm tape and reel	180 x 8																						-315		
	DSN1006U-2 (SOD995)	1.0 x 0.6 x 0.3	0.55		2 mm pitch, 8 mm tape and reel	180 x 8																						-315		
	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 (SOD 1608)	1.6 x 0.8 x 0.37	0.94		2 mm pitch, 8 mm tape and reel	180 x 8																						-315		
	DSN1608-2 (SOD964)	1.6 x 0.8 x 0.37	0.94		2 mm pitch, 8 mm tape and reel	180 x 8																						-315		
	DFN1608-2 (SOD963)	1.6 x 0.8 x 0.25	0.885		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																							
	SOD123F	2.6 x 1.6 x 1.1				4 mm pitch, 8 mm tape and reel	180 x 8																							
	CFP3 (SOD123W)	2.6 x 1.7 x 1.0				4 mm pitch, 8 mm tape and reel	180 x 8																							
	CFP5 (SOD128)	3.8 x 2.5 x 1.0				4 mm pitch, 12 mm tape and reel	180 x 12																							
	SOD323 (SC-76)	1.7 x 1.25 x 0.95				4 mm pitch, 8 mm tape and reel	180 x 8																							
						4 mm pitch, 8 mm tape and reel	286 x 8																							
	SOD323F (SC-90)	1.7 x 1.25 x 0.7				4 mm pitch, 8 mm tape and reel	180 x 8																							
						4 mm pitch, 8 mm tape and reel	286 x 8																							
	SOD523 (SC-79)	1.2 x 0.8 x 0.6				2 mm pitch, 8 mm tape and reel	180 x 8																							
						4 mm pitch, 8 mm tape and reel	180 x 8																							
						4 mm pitch, 8 mm tape and reel	286 x 8																							
CFP15 (SOT1289)	5.8 x 4.3 x 0.78	2.13			8 mm pitch, 12 mm tape and reel	330 x 12																								
D2PAK (SOT404)	10 x 9.6 x 4.3	5.08			16 mm pitch, 24 mm tape and reel	330 x 24								118																
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																					-315			
	DFN1010D-3 (SOT1215)	1.1 x 1.0 x 0.37	0.75		4 mm pitch, 8 mm tape and reel	180 x 8																					-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			
	DFN2020D-3 (SOT1061D)	2.0 x 2.0 x 0.62	1.3		4 mm pitch, 8 mm tape and reel	180 x 8																					-115			
	DPAK (SOT428)	6.6 x 6.1 x 2.3	4.57		8 mm pitch, 16 mm tape and reel	330 x 16																					-118			
	SOT23	2.9 x 1.3 x 1.0	0.95			4 mm pitch, 8 mm tape and reel	180 x 8																							
						4 mm pitch, 8 mm tape and reel	286 x 8																							
	SOT89 (SC-62)	4.5 x 2.5 x 1.5	1.5			8 mm pitch, 12 mm tape and reel	180 x 12																							
						8 mm pitch, 12 mm tape and reel	330 x 12																							
8 mm pitch, 12 mm tape and reel						180 x 12																								
8 mm pitch, 12 mm tape and reel						180 x 12																								

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)	Packing quantity and ordering code (12NC ending)																								
							500	800	1000	1400	1500	2000	2500	3000	4000	4500	5000	6000	8000	9000	10000										
8	LFPK33 (SOT1210)	3.3 x 3.3 x 0.85	-		8 mm pitch, 12 mm tape and reel	180 x 12																									
	DFN1714-8 (SOT1166)	1.7 x 1.35 x 0.52	0.4		4 mm pitch, 8 mm tape and reel	180 x 8																									
					4 mm pitch, 8 mm tape and reel	180 x 8																									
	DFN1714U-8 (SOT983)	1.7 x 1.35 x 0.48	0.4		4 mm pitch, 8 mm tape and reel	180 x 8																									
	SOT96 (S08)	4.9 x 3.9 x 1.75	1.27		8 mm pitch, 12 mm tape and reel	180 x 12																									
					8 mm pitch, 12 mm tape and reel	330 x 12																									
					8 mm pitch, 12 mm tape and reel	331 x 12																									
	LFPK56D (SOT1205)	4.9 x 4.45 x 1.0	1.27		8 mm pitch, 12 mm tape and reel	180 x 12																									
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																									
	DFN2520-9 (SOT1333)	2.5 x 2.0 x 0.48	0.5		4 mm pitch, 8 mm tape and reel	-																									
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																									
	DFN2510A-10 (SOT1176)	2.5 x 1.0 x 0.48	0.5		4 mm pitch, 8 mm tape and reel	180 x 8																									
12	DFN2514-12 (SOT1167)	2.5 x 1.35 x 0.53	0.4		4 mm pitch, 8 mm tape and reel	180 x 8																									
	DFN2521-12 (SOT 1156)	2.5 x 2.1 x 0.48	0.4		4 mm pitch, 8 mm tape and reel	180 x 8																									
14	DFN4020-14 (SOT1334)	4.0 x 2.0 x 0.48	0.5		4 mm pitch, 12 mm tape and reel	180 x 12																									
	DFN3312-16 (SOT 1159)	3.3 x 1.2 x 0.48	0.4		4 mm pitch, 12 mm tape and reel	180 x 12																									
	DFN3314-16 (SOT1168)	3.3 x 1.35 x 0.53	0.4		4 mm pitch, 8 mm tape and reel	180 x 8																									
	SOT519 (SSOP16)	4.9 x 3.9 x 1.73	0.635		8 mm pitch, 12 mm tape and reel	330 x 12																									
20	SOT360 (TSSOP20)	6.5 x 4.4 x 1.1	0.65		12 mm pitch, 16 mm tape and reel	330 x 16																									
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																									
					8 mm pitch, 12 mm tape and reel	330 x 12																									

Packing details 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
	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
		52 mm tape ammo pack, axial		-133	10000 pcs
	3	SOT78 (TO-220)	Rail packing, 50 pcs/tube, tube length = 520 mm		-127
SOT186A (TO-220F)		Rail packing, 50 pcs/tube, tube length = 520 mm		-127	20 tubes x 50 pcs
I2PAK (SOT226)		Rail packing, 50 pcs/tube, tube length = 520 mm		-127	20 tubes x 50 pcs
5	SOT263B-1	Rail packing		-127	20 tubes x 50 pcs

Package cross reference list – Part 2

Type	Competitor	NXP	Pins/Leads
PowerPAK SC706L	Vishay	DFN2020-3 (SOT1061)	3
PowerPak SC-70-6L	Vishay	DFN2020-6 (SOT1118)	6
PowerPAK SC-75*	Vishay	DFN2020MD-6 (SOT1220)	6
PowerPak SC-75-6L*	Vishay	DFN2020MD-6 (SOT1220)	6
PowerPAK SO-8	Vishay	LFPAK (SOT669)	5
PW-Mini	Toshiba	SOT89	3
S08	Vishay	SOT96	8
SC2	Toshiba	DSN0603-2 (SOD962)	2
SC59	Diodes Inc.	SOT23	3
SC70	ON Semi	SOT323	3
SC-70	ON Semi	SOT323	3
SC-70, 3 leads	Vishay	SOT323	3
SC70-3	Vishay	SOT323	3
SC70-3	AOS	SOT323	3
SC70-5L	Semtech	SOT353	5
SC70-6	Vishay	SOT363	6
SC70-6	AOS	SOT363	6
SC70-6	Fairchild	SOT363	6
SC70-6L	Semtech	SOT363	6
SC74 TSOP6	Infineon	SOT457	6
SC-74 TSOP-6	ON Semi	SOT457	6
SC75	Infineon	DFN1006-3 (SOT883)	3
SC75	ON Semi	DFN1006-3 (SOT883)	3
SC-75	ON Semi	DFN1006-3 (SOT883)	3
SC-75	Semtech	DFN1006-3 (SOT883)	3
SC75A	Vishay	DFN1006-3 (SOT883)	3
SC-75A	Vishay	DFN1006-3 (SOT883)	3
SC79	Infineon	SOD523	2
SC-88	ON Semi	SOT363	6
SC88/SC 7 0-6/SOT 363 6 LEAD	ON Semi	SOT363	6
SC-88A	ON Semi	SOT353	5
SC89	Fairchild	SOT666	6
SC-89	Semtech	SOT666	6
SC89-3	Vishay	DFN1006-3 (SOT883)	3
SC89-3	ON Semi	DFN1006-3 (SOT883)	3
SC89-3	Fairchild	DFN1006-3 (SOT883)	3
SC89-6	Vishay	SOT666	6
SC89-6	AOS	SOT666	6
SC89-6	Fairchild	SOT666	6
SC89-6lead	Vishay	SOT666	6
S-Flat	Toshiba	SOD123F	2
S-Flat	Toshiba	SOD123W	2
SLP0402P2X3	Semtech	DSN0402-2 (SOD992)	2
SLP1006P2	Semtech	DFN1006-2 (SOD882)	2
SLP1006P2T	Semtech	DFN1006D-2 (SOD882D)	2
SLP1006P3	Semtech	DFN1006-3 (SOT883)	3
SLP1006P3T	Semtech	DFN1006B-3 (SOT883B)	3
SLP1510N6	Semtech	DFN1410-6 (SOT886)	6

Type	Competitor	NXP	Pins/Leads
SLP1610N2	Semtech	DFN1608D-2 (SOD1608)	2
SLP1610P4	Semtech	DFN2510A-10 (SOT1176)	10
SLP1610P4	Semtech	DFN2520-9 (SOT1333)	9
SLP1616P6	Semtech	DFN1616-6 (SOT1189)	6
SLP1713P8	Semtech	DFN1714-8 (SOT1166)	8
SLP1713P8	Semtech	DFN1714U-8 (SOT983)	8
SLP2010P8T	Semtech	DFN2110-9 (SOT1178)	9
SLP2513P12	Semtech	DFN2514-12 (SOT1167)	12
SLP3313P16	Semtech	DFN3314-16 (SOT1168)	16
SM6 VS-6	Toshiba	SOT457	6
SMA flat	ST	SOD128	2
SMD TO-263	Renesas	D ² PAK (SOT404)	3
SMD0402	Rohm	DSN0402-2 (SOD992)	2
SMD6/SMT6	Rohm	SOT457	6
SMD6/SMZ6	Rohm	SOT457	6
SMFPAK-6	Renesas	SOT666	6
S-Mini	Toshiba	SOT23	3
S-Mini TSM	Toshiba	SOT23	3
SMPAK	Renesas	DFN1006-3 (SOT883)	3
SMPC TO-277A	Vishay	CFP15 (SOT1289)	3
SMT3	Rohm	SOT23	3
SMT5*	Rohm	SOT457	6
SMT6	Rohm	SOT457	6
SMZ6/SMD6	Rohm	SOT457	6
SO-8 FL	ON Semi	LFPAK (SOT669)	5
SOD-123	ST	SOD123F	2
SOD-123-FL	ON Semi	SOD123F	2
SOD-123-FL	ON Semi	SOD123W	2
SOD323	Infineon	SOD323	2
SOD323	Vishay	SOD323	2
SOD323	Semtech	SOD323	2
SOD-323	ON Semi	SOD323	2
SOD-323	Diodes Inc.	SOD323	2
SOD-323	ST	SOD323	2
SOD523	Diodes Inc.	SOD523	2
SOD523	Vishay	SOD523	2
SOD523	Semtech	SOD523	2
SOD-523	ON Semi	SOD523	2
SOD-523	ST	SOD523	2
SOD882	ST	DFN1006-2 (SOD882)	2
SOD882T	ST	DFN1006D-2 (SOD882D)	2
SOD923-2*	ON Semi	DFN1006-2 (SOD882)	2
SOIC-8 NB	ON Semi	SOT96	8
SON 2x2	Texas Instruments	DFN2020MD-6 (SOT1220)	6
SON 3x3*	Texas Instruments	DFN2020MD-6 (SOT1220)	6
SOP8	Rohm	SOT96	8
SOP-8	Renesas	SOT96	8
SOPH	Rohm	SOT 108	14
SOT 143	Infineon	SOT143B	4

Types with * show footprint compatibility only

























Package cross reference list – Part 4

Type	Competitor	NXP	Pins/Leads
TSSOP20	Toshiba	SOT360	20
TSSOP20	Renesas	SOT360	20
TSST8*	Rohm	DFN2020MD-6 (SOT1220)	6
TUMT3	Rohm	SOT323	3
TUMT5*	Rohm	DFN2020-6 (SOT1118)	6
TUMT6*	Rohm	DFN2020-6 (SOT1118)	6
UDFN 1.6 x 1.6	ON Semi	DFN1616-6 (SOT1189)	6
UDFN 1.7 x 1.35, 0.4P	ON Semi	DFN1714U-8 (SOT983)	8
UDFN 10 2.5 x 1, 0.5P	ON Semi	DFN2520-9 (SOT1333)	9
UDFN 10 2.5 x 2	ON Semi	DFN2520-9 (SOT1333)	9
UDFN10 2.5 x 1, 0.5P	ON Semi	DFN2510A-10 (SOT1176)	10
UDFN12, 2.5 x 1.35, 0.4P	ON Semi	DFN2514-12 (SOT1167)	12
U-DFN2020-3 Type B 2.0 x 2.0 x 0.6	Diodes Inc.	DFN2020-3 (SOT1061)	3
U-DFN2020-6	Diodes Inc.	DFN2020MD-6 (SOT1220)	6
UDFN2020-6 Type B	Diodes Inc.	DFN2020-6 (SOT1118)	6
UDFN2020-6 Type E	Diodes Inc.	DFN2020MD-6 (SOT1220)	6
U-DFN2523-6*	Diodes Inc.	DFN2020MD-6 (SOT1220)	6
UDFN6	Toshiba	DFN2020-6 (SOT1118)	6
UDFN6	ON Semi	DFN2020MD-6 (SOT1220)	6
UDFN-6 WDFN6	ON Semi	DFN2020MD-6 (SOT1220)	6
UDFN6B	Toshiba	DFN2020MD-6 (SOT1220)	6
UDRN 16 4 x 2	ON Semi	DFN4020-14 (SOT1334)	14
UF6	Toshiba	SOT363	6
UF6/ USV/ US6	Toshiba	SOT363	6
UFP	Renesas	SOD523	2
UMD2	Rohm	SOD323F	2
UMD3/UMT3	Rohm	SOT323	3
UMD5/UMT5	Rohm	SOT353	5
UMD6/ UMT6	Rohm	SOT363	6
UMLP 1.6 x 1.6*	Fairchild	DFN2020MD-6 (SOT1220)	6
UMT3	Rohm	SOT323	3
UMT3F*	Rohm	SOT323	3
UMT5/ UMD5	Rohm	SOT353	5
UMT6	Rohm	SOT363	6
UMT6/ UMD6	Rohm	SOT363	6
UPAK (SOT89)	Renesas	SOT89	3
URP	Renesas	SOD323	2
US6	Toshiba	SOT363	6
US6/ UF6/ USV	Toshiba	SOT363	6
use	Toshiba	SOD323	2
US-Flat	Toshiba	SOD323F	2
USM	Toshiba	SOT323	3
USV	Toshiba	SOT353	5
USV	Toshiba	SOT363	6
USV/ US6/ UF6/	Toshiba	SOT363	6
VESM*	Toshiba	DFN1010D-3 (SOT1215)	3
VML0806*	Rohm	DFN1006B-3 (SOT883B)	3
VML1006	Rohm	DFN1006-3 (SOT883)	3

Type	Competitor	NXP	Pins/Leads
VMN2*	Rohm	DFN1006-2 (SOD882)	2
VMN2*	Rohm	DFN1006D-2 (SOD882D)	2
VMN3*	Rohm	DFN1006-3 (SOT883)	3
VMT3*	Rohm	DFN1010D-3 (SOT1215)	3
VMT6*	Rohm	DFN101 OB-6 (SOT1216)	6
VS6	Toshiba	SOT457	6
VSON-5	Renesas	SOT665	5
WDFN 10 2.5 x 2	ON Semi	DFN2520-9 (SOT1333)	9
WDFN 16 4 x 2	ON Semi	DFN4020-14 (SOT1334)	14
WDFN3	ON Semi	DFN2020-3 (SOT1061)	3
W-DFN3020-8*	Diodes Inc.	DFN2020-6 (SOT1118)	6
WDFN6	ON Semi	DFN2020-6 (SOT1118)	6
WDFN6	ON Semi	DFN2020MD-6 (SOT1220)	6
WEMT6	Rohm	SOT666	6
WEMT6/ EMT6/ EMD6	Rohm	SOT666	6
WLCSP 1 x 1*	Fairchild	WLCSP4	3
WLCSP1.6 x 1.6*	AOS	WLCSP6	6
WLCSP2	ON Semi	DSN0603-2 (SOD962)	2
WLCSP-4*	Fairchild	WLCSP4	3
WLCSP-4*	ON Semi	WLCSP4	3
WLL-2-2	Infineon	DSN0402-2 (SOD992)	2
WLP1.5x 1.5*	Texas Instruments	DFN2020MD-6 (SOT1220)	6
WLP1.Ox 1.0*	Texas Instruments	DFN1010D-3 (SOT1215)	3
WLP1.Ox 1.5*	Texas Instruments	DFN2020MD-6 (SOT1220)	6
X1 -DFN 1006-3	Diodes Inc.	DFN1006-3 (SOT883)	3
X1-DFN1212-3*	Diodes Inc.	DFN1010D-3 (SOT1215)	3
X1-DFN1616-6*	Diodes Inc.	DFN2020MD-6 (SOT1220)	6
X2-DFN0806-3	Diodes Inc.	DFN1006-3 (SOT883)	3
X2-DFN1006-2	Diodes Inc.	DFN1006D-2 (SOD882D)	2
X2-DFN1006-3	Diodes Inc.	DFN1006B-3 (SOT883B)	3
X2-DFN1010-3	Diodes Inc.	DFN1010D-3 (SOT1215)	3
X2-DFN1310-6*	Diodes Inc.	DFN1010B-6 (SOT1216)	6
X2-DFN2015-3*	Diodes Inc.	DFN2020MD-6 (SOT1220)	6
X2-DFN2020-6	Diodes Inc.	DFN2020MD-6 (SOT1220)	6
X3-DFN0603-2	Diodes Inc.	DSN0603-2 (SOD962)	2
X3DFN-2	ON Semi	DSN0603-2 (SOD962)	2
XDFN3	ON Semi	DFN1006-3 (SOT883)	3
XI-DFN1006-2	Diodes Inc.	DFN1006-2 (SOD882)	2

Types with * show footprint compatibility only

Package cross reference matrix – Part 2

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	ST	Vishay	Semtech	
4	LFPAK56 (SOT669)	Power-S08	4.9 x 4.45 x 1.0	3000				SO-8 FL	LFPAK	PG-TD-SON-8	Power-Di5060-8	PowerFLAT (6x5)	PowerPAK SO-8		
	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		SOT223		
5	SOT353	SC-88 A	2.0 x 1.25 x 0.95	300		UMD5/ UMT5	USV	SC-88 A	CMPAK-5C0		SOT353		SOT353	SC70-5L	
	SOT665		1.6 x 1.2 x 0.55	300		EMD5/ EMT5	ESV	SOT-553	VSON-5						
6	DFN1010-6 (SOT891)	x SON6	1.0 x 1.0 x 0.48					CS6	SOT963						
	DFN1010B-6 (SOT1216)		1.1 x 1.0 x 0.37	350		(VMT6)	(FS6)	(SOT063)			(SOT963)				
	DFN1410-6 (SOT886)	x SON6	1.45 x 1.0 x 0.48	250										SLP1510N6	
	DFN1616-6 (SOT1189)	H x SON6	1.6 x 1.6 x 0.48					UDFN 1.6 x 1.6					LLP75-/L	SLP1616P6	
	DFN2020-6 (SOT1118)		2.0 x 2.0 x 0.62	1300		HU- ML2020L8 (Dual)	UDFN6	6 Lead DFN WDFN6			UDFN2020-6 Type B		PowerPAK SC-70 Thin PowerPAK SC-70		
	DFN2020D-6 (SOT1118D)		2.0 x 2.0 x 0.62	1300		HU- ML2020L8 (Dual)	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	1250		HU- ML2020L8 (Single)	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			SC70-6	SC70-6L
	SOT457	SC-74	2.9 x 1.5 x 1.0	750		SMD6/ SMT6	SM6 VS-6	SC-74 TSOP-6	TSOP-6	SC74 TSOP6	SOT23-6 SOT26		TSOP6 TSOP-6	SOT23-6L	
	SOT666		1.6 x 1.2 x 0.55	300		EMD6/ EMT6 WEMT6	ES6 ESV	SOT-563	SMFPAK-6	SOT666	SOT563		SC89-6lead	SC-89	
8	LFPAK56D (SOT1205)		4.9 x 4.45 x 1.0	3000								PowerFLAT (6x5)			
	SOT96	S08	4.9 x 3.9 x 1.75	1500			SOP8	FM8	SOIC-8 NB	SOP-8			S08		
	DFN1714-8 (SOT 1166)	HUSON8	1.7 x 1.35 x 0.52											SLP1713P8	
	DFN1714U-8 (SOT983)	H x SON8	1.7 x 1.35 x 0.48					UDFN 1.7 x 1.35, 0.4P						SLP1713P8	
9	DFN2110-9 (SOT1178)	x SON9	2.1 x 1.0 x 0.48											SLP2010P8T	
	DFN2520-9 (SOT1333)							WDFN 10 2.5 x 2 UDFN10 2.5 x 2							
10	DFN2510-10 (SOT 1165)	x SON10	2.5 x 1.0 x 0.48					UDFN10 2.5 x 1, 0.5P		TSLP-9-1		pQFN-10L		SLP1610P4	
	DFN2510A-10 (SOT1176)	x SON10	2.5 x 1.0 x 0.48					UDFN10 2.5 x 1, 0.5P		TSLP-9-1		pQFN-10L		SLP1610P4	
	DFN2626-10 (SOT 1197)		2.6 x 2.6 x 0.48					UDFN10 2.6 x 2.6, 0.5P						SLP2626P10	

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

Product orientation (tape and reel pack)

Product orientation (tape and reel pack)

2 pin packages	Orientation in tape	Package	Packing 12NC ending
		DFN1006-2 (SOD882)	315
		DFN1006D-2 (SOD882D)	315
		DFN1608D-2 (SOD1608)	315
		DSN0603-2 (SOD962)	315
		DSN0402-2 (SOD992)	315
		DSN1006-2 (SOD993)	315
		DSN1006U-2 (SOD995)	315
		DSN1608-2 (SOD963, SOD964)	315
		SOD80	115, 135
		SOD123F	115
		CFP3 (SOD123W)	115
		CFP5 (SOD128)	115
		SOD323	115, 135
SOD323F	115		
SOD523	115, 135, 315, 335		

3 pin packages	Orientation in tape	Package	Packing 12NC ending		Orientation in tape	Package	Packing 12NC ending	
		SOT89	146				DFN1010D-3 (SOT1215)	147
							DFN2020-3 (SOT1061)	115, 135
							DFN2020D-3 (SOT1061D)	115, 135
							SOT89	115, 135
							SOT663	115
							CFP15 (SOT1289)	139, 146
							DPAK (SOT428)	118
							D2PAK (SOT404)	118
Orientation in tape	Package	Packing 12NC ending	Orientation in tape	Package	Packing 12NC ending			
	DFN1006-3 (SOT883)	315			SOT89	147		
	DFN1006B-3 (SOT883B)	315						
	SOT23	185, 215, 235						
	SOT323	115, 135						

4 pin packages	Orientation in tape	Package	Packing 12NC ending		Orientation in tape	Package	Packing 12NC ending		
		LFPAK56 (SOT669)	115						
		WLCSP4	084						
Orientation in tape	Package	Packing 12NC ending	Orientation in tape	Package	Packing 12NC ending				
	SOT143B	215, 235							
	SOT223	115, 135							

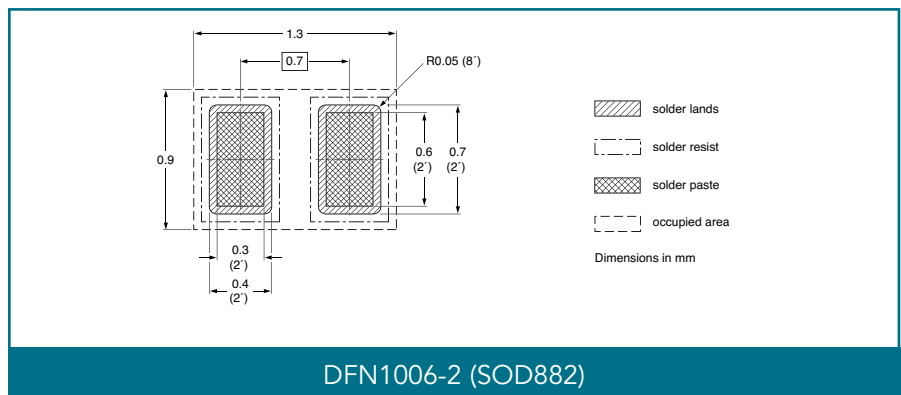
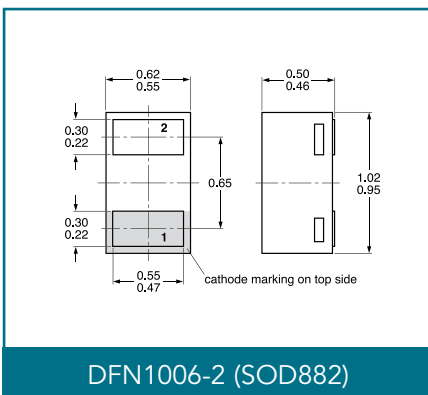
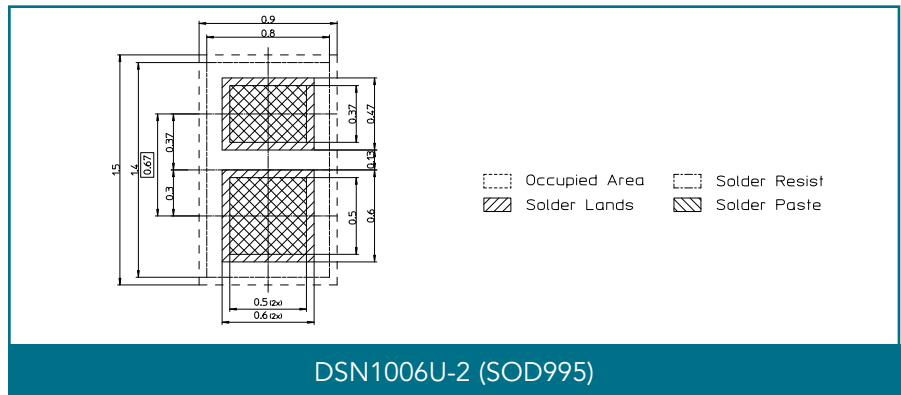
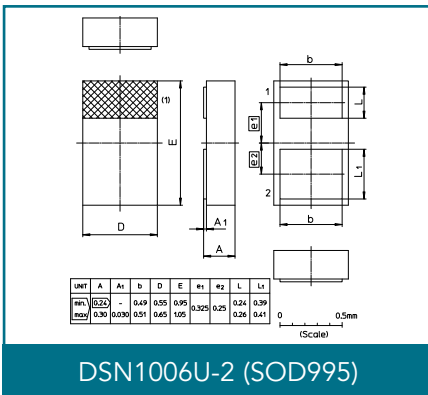
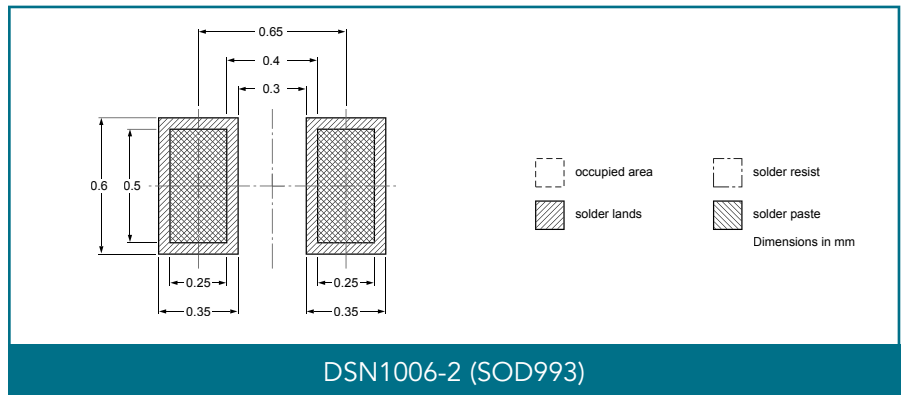
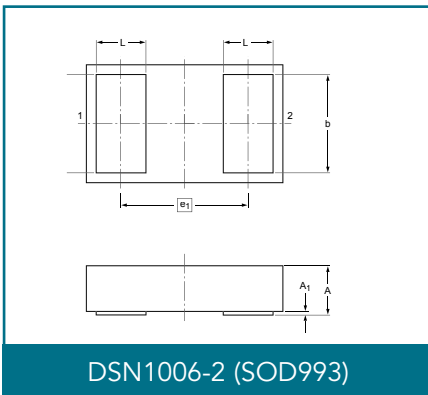
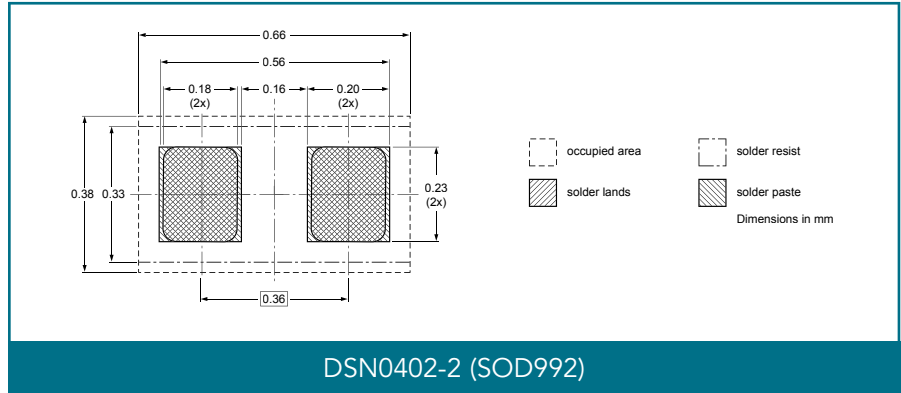
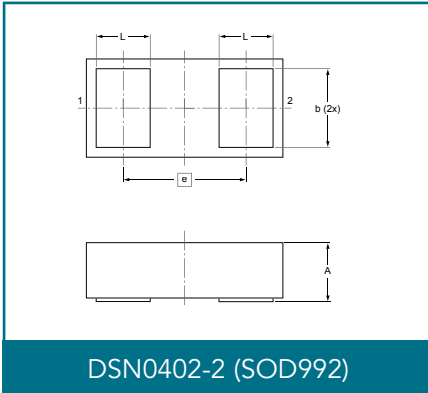
5 pin packages	Orientation in tape	Package	Packing 12NC ending		Orientation in tape	Package	Packing 12NC ending		
		WLCSP5	087				SOT353	115, 135	
							SOT665	115	
Orientation in tape	Package	Packing 12NC ending	Orientation in tape	Package	Packing 12NC ending				

> 6 pin packages	Orientation in tape	Package	Packing 12NC ending		Orientation in tape	Package	Packing 12NC ending	
		DFN1410-6 (SOT886)	115				DFN2020-6 (SOT1118)	115
		DFN1616-6 (SOT1189)	115				DFN2020D-6 (SOT1118D)	115
		DFN2020MD-6 (SOT1220)	184				DFN2020MD-6 (SOT1220)	115
		LFPAK33 (SOT1210)	115				DFN1010B-6 (SOT1216)	147
		LFPAK56D (SOT1205)	115				SOT363	115, 135
		WLCSP6	023				SOT457	115, 135
							SOT666	115, 315
Orientation in tape	Package	Packing 12NC ending	Orientation in tape	Package	Packing 12NC ending			
	DFN1010-6 (SOT891)	132						
	DFN1410-6 (SOT886)	132						
	DFN2020MD-6 (SOT1220)	125						
	SOT363	125, 165						
SOT457	125, 165							

Outline and footprint drawings

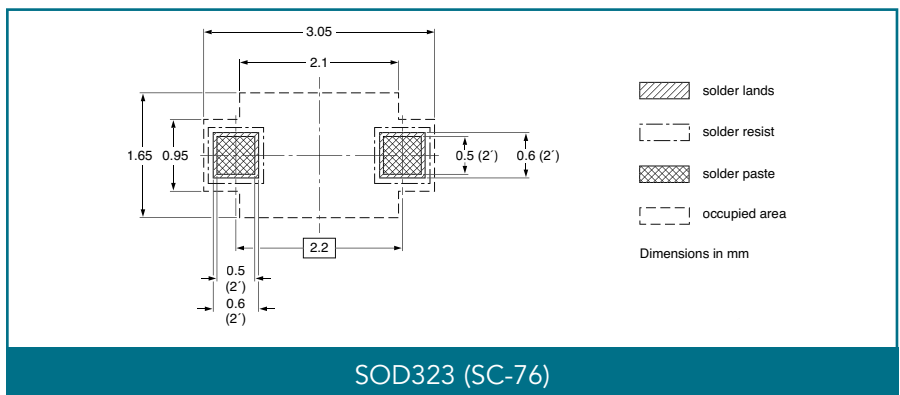
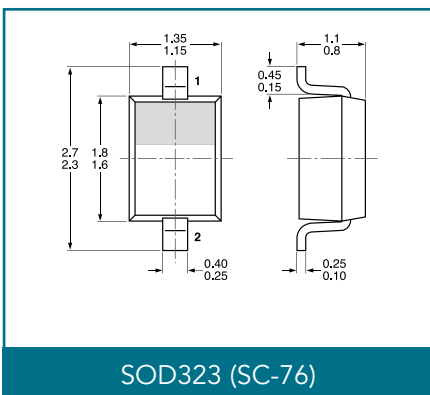
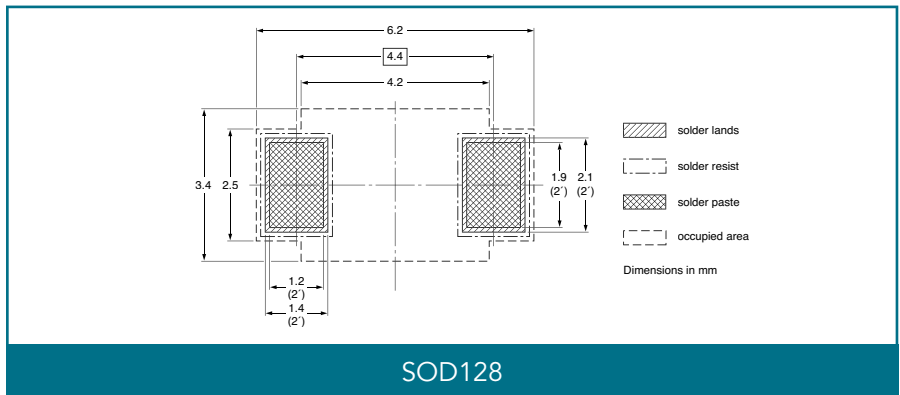
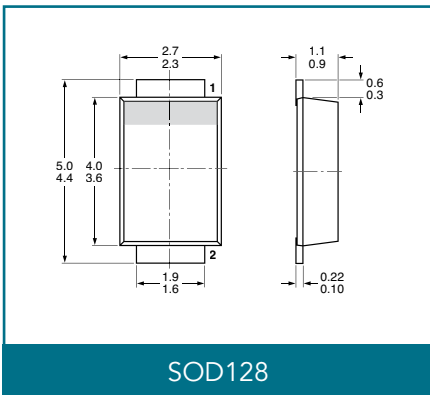
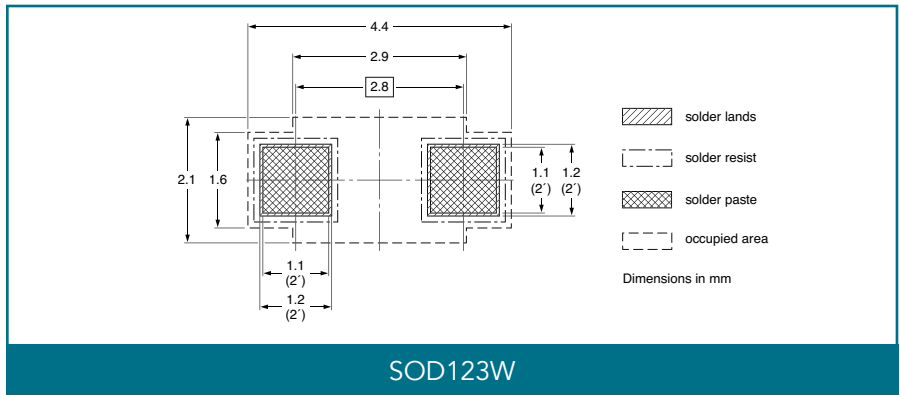
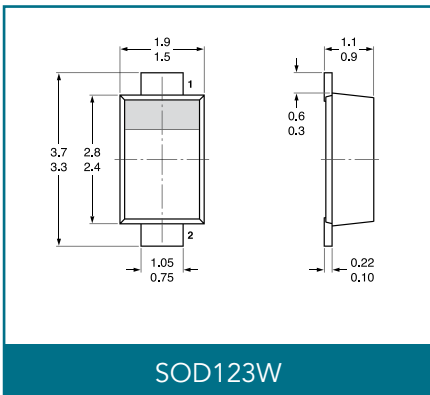
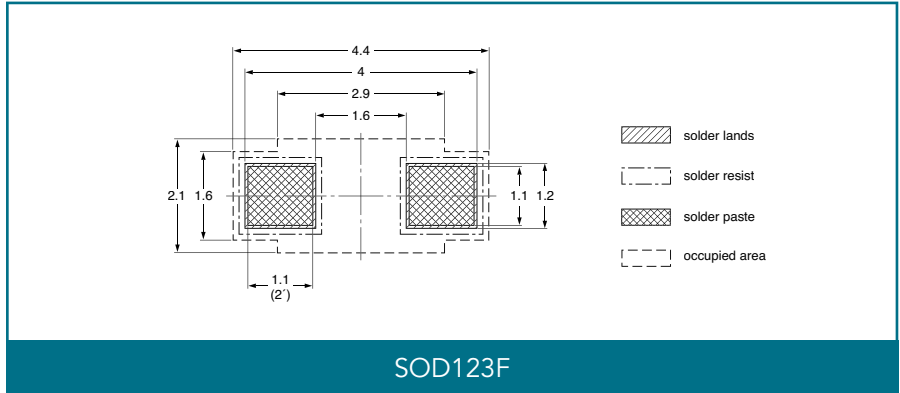
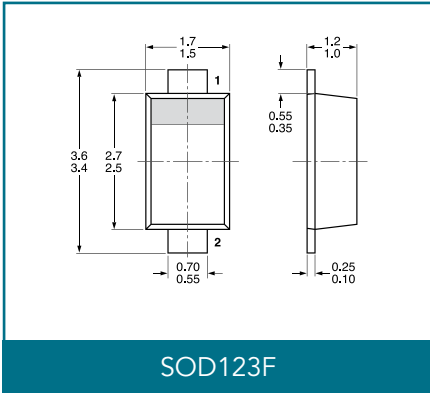
2-pin SMD packages	148
DSN0402-2 (SOD992)	148
DSN1006-2 (SOD993)	148
DSN1006U-2 (SOD995)	148
DFN1006-2 (SOD882)	148
DFN1006D-2 (SOD882D)	149
DFN1608D-2 (SOD1608)	149
DSN0603-2 (SOD962)	149
SOD80C	149
SOD123F	150
SOD123W	150
SOD128	150
SOD323 (SC-76)	150
SOD323F (SC-90)	151
SOD523 (SC-79)	151
3-pin SMD packages	151
CFP15 (SOT1289)	151
DFN1006-3 (SOT883)	151
DFN1006B-3 (SOT883B)	152
DFN1010D-3 (SOT1215)	152
DFN2020-3 (SOT1061)	152
DFN2020D-3 (SOT1061D)	152
DPAK (SOT428)	153
D ² PAK (SOT404)	153
SOT23	153
SOT89 (SC-62)	153
SOT323 (SC-70)	154
SOT663	154
4-pin SMD packages	154
LFPAK56 (SOT669)	154
SOT143B	154
SOT223 (SC-73)	155
5-pin SMD packages	155
SOT353 (SC-88A)	155
SOT665	155
6-pin SMD packages	155
DFN1010-6 (SOT891)	155
DFN1010B-6 (SOT1216)	156
DFN1410-6 (SOT886)	156
DFN1616-6 (SOT1189)	156
DFN2020-6 (SOT1118)	156
DFN2020D-6 (SOT1118D)	157
DFN2020MD-6 (SOT1220)	157
SOT363 (SC-88)	157
SOT457 (SC-74)	157
SOT666	158
7-pin SMD Packages	158
DFN2111-7 (SOT1358)	158
D2PAK-7 (SOT428)	158

2-pin SMD packages



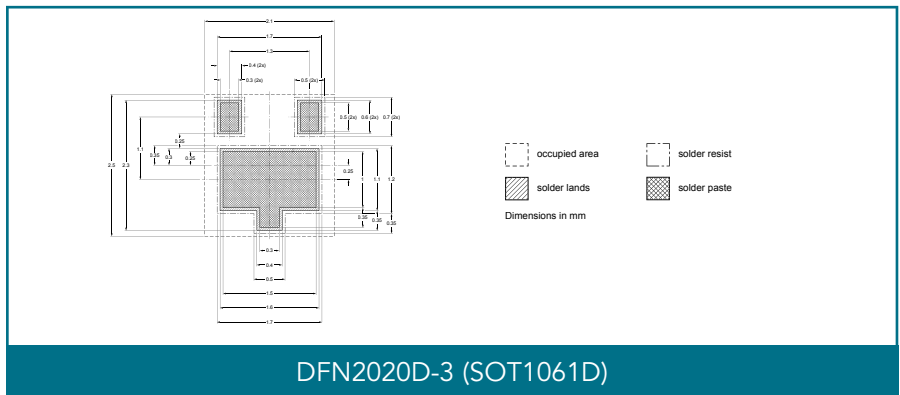
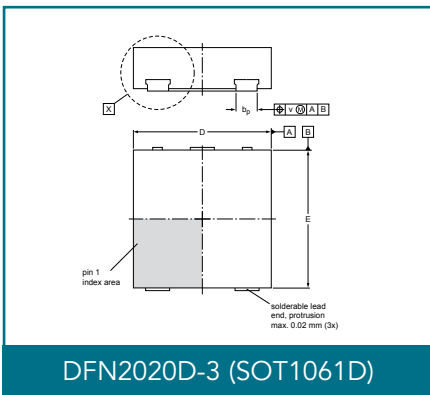
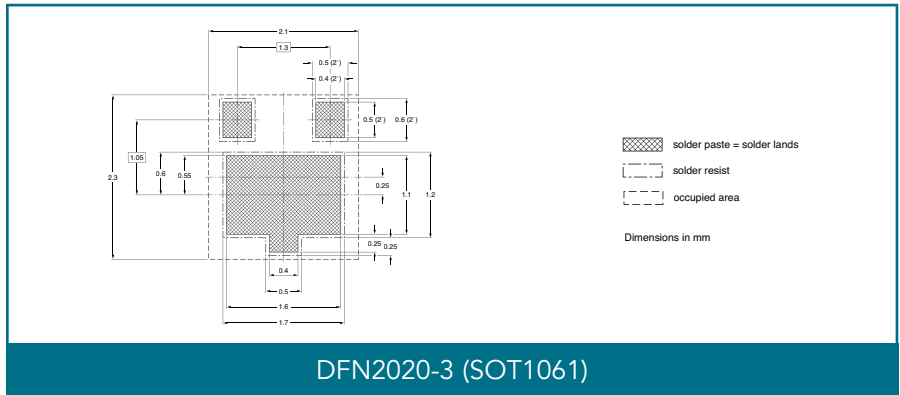
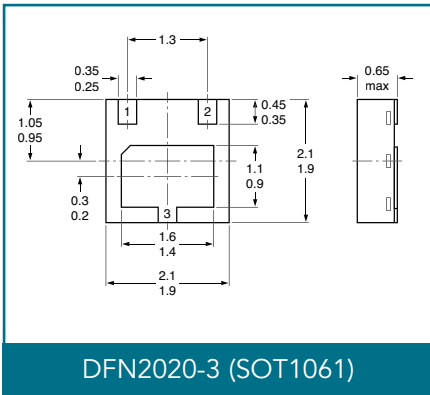
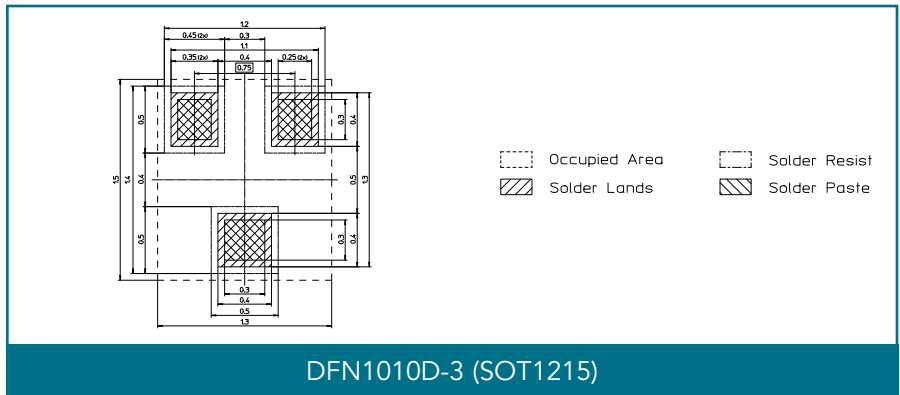
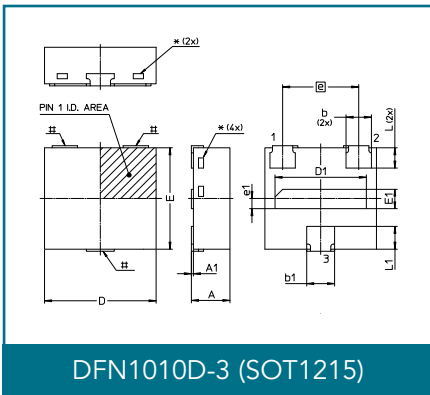
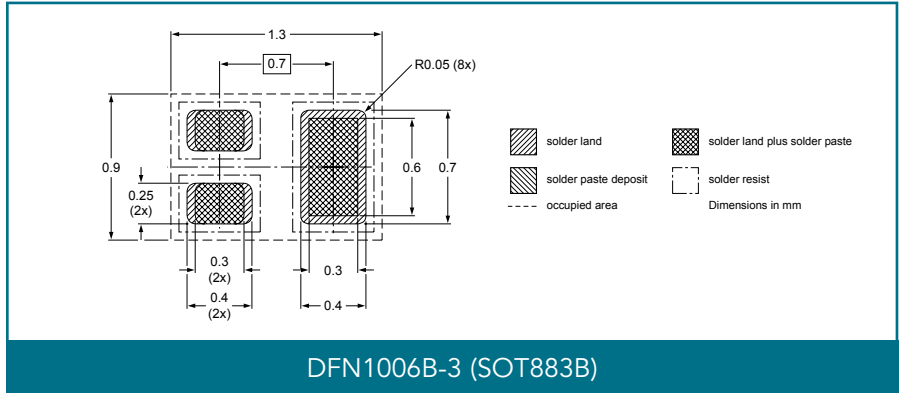
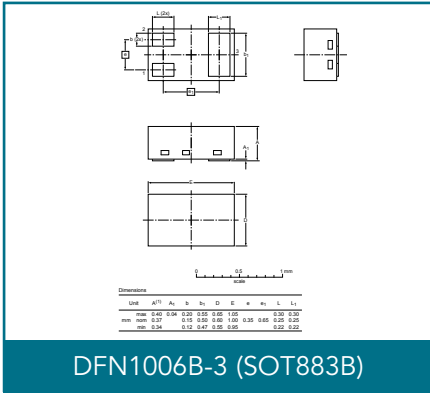
Dimensions in mm

2-pin SMD packages



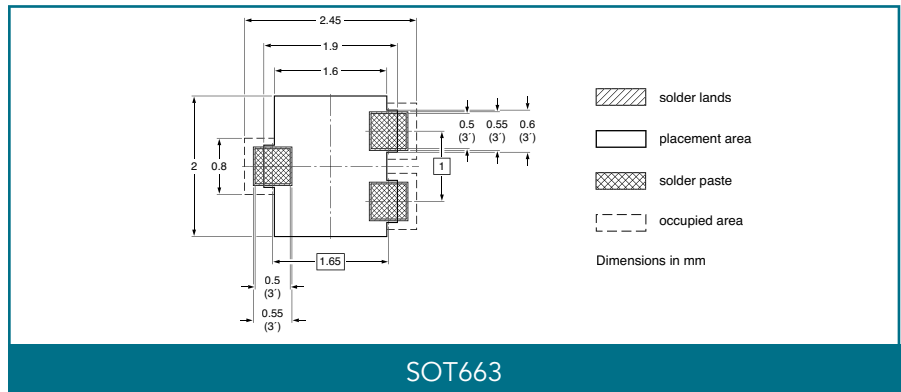
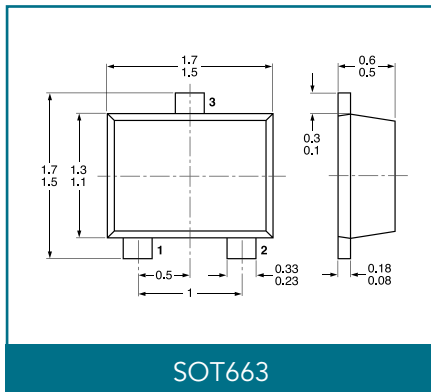
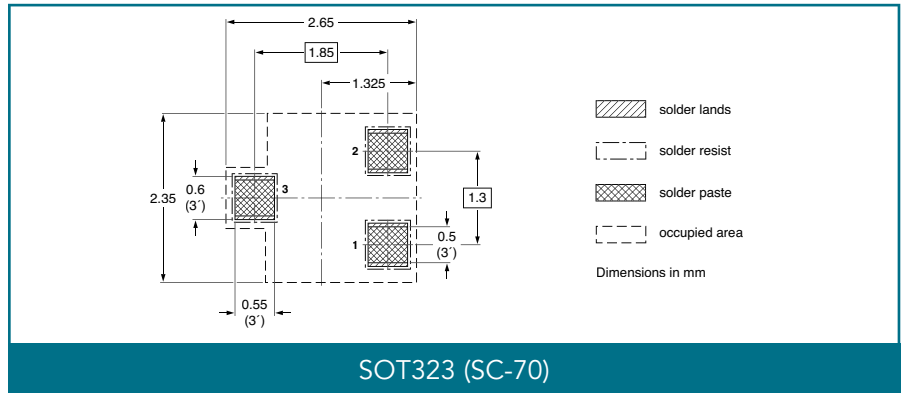
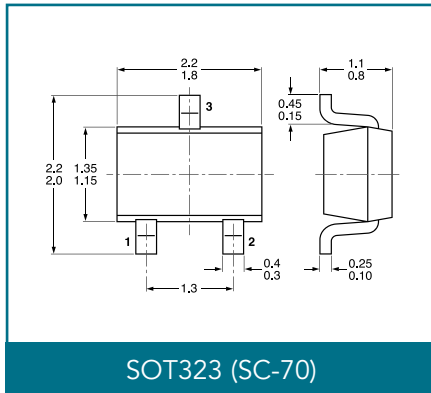
Dimensions in mm

3-pin SMD packages

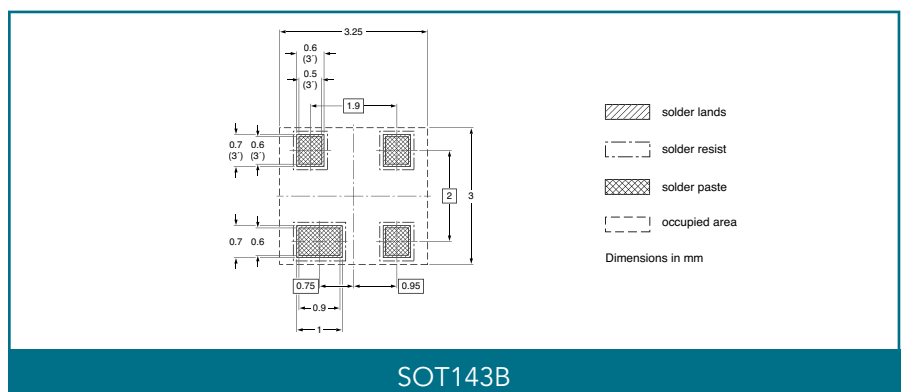
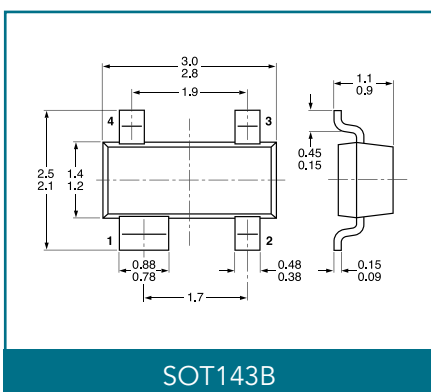
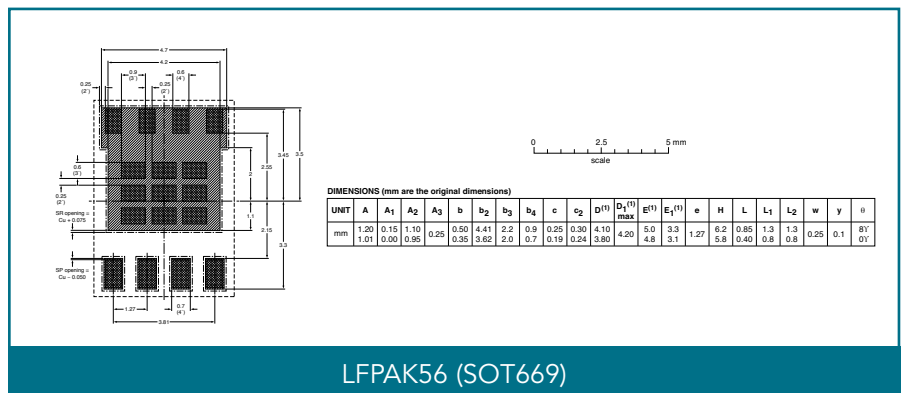
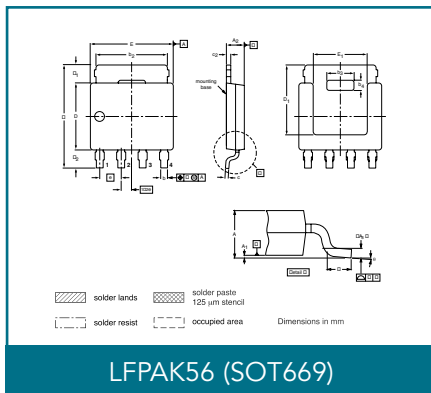


Dimensions in mm

3-pin SMD packages

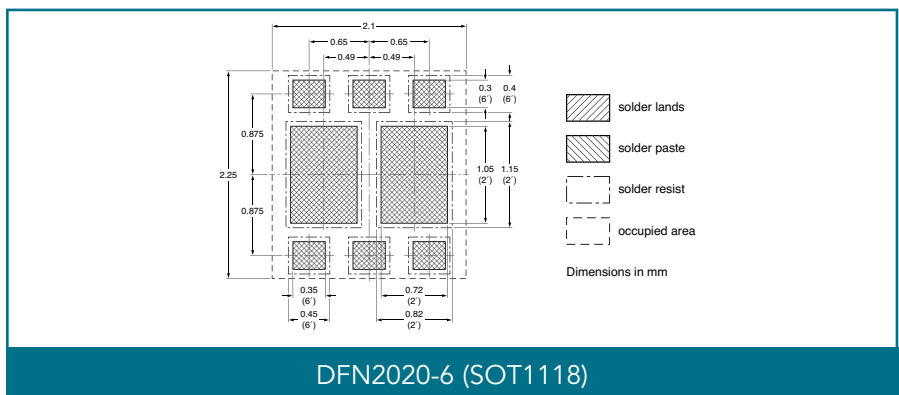
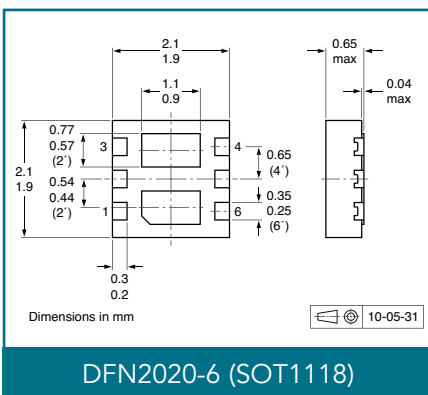
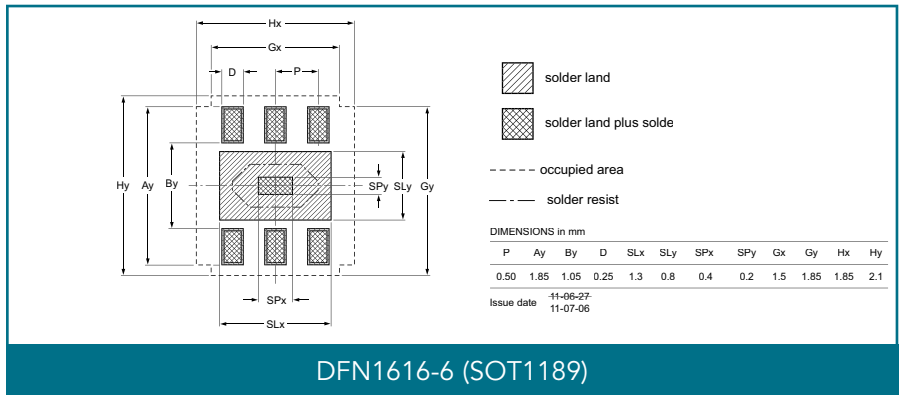
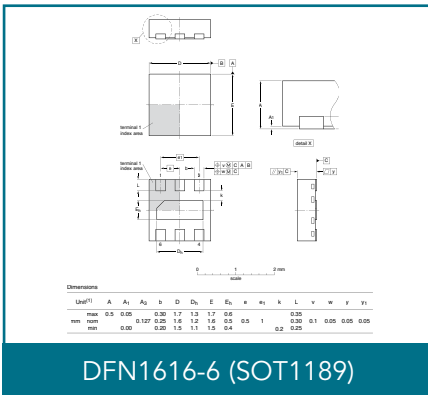
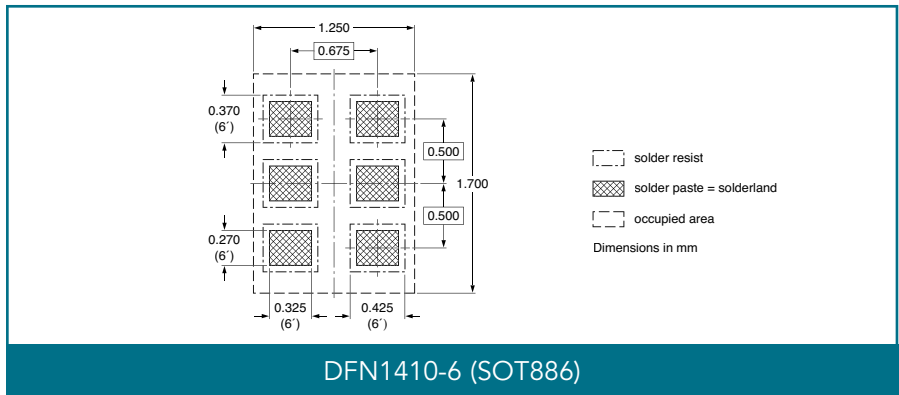
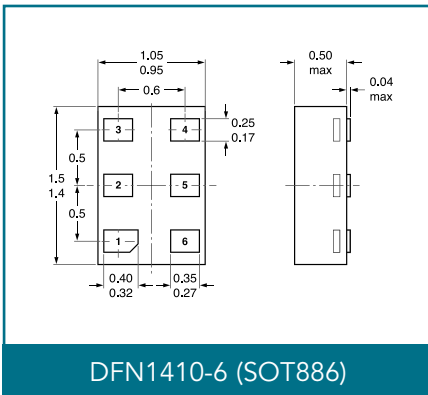
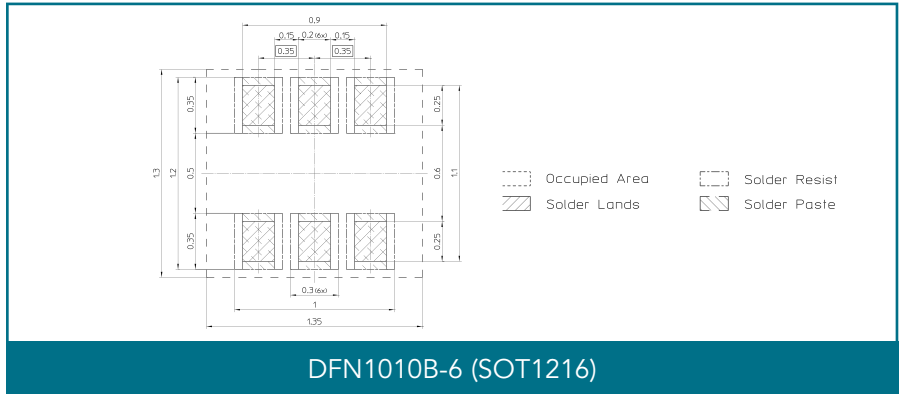
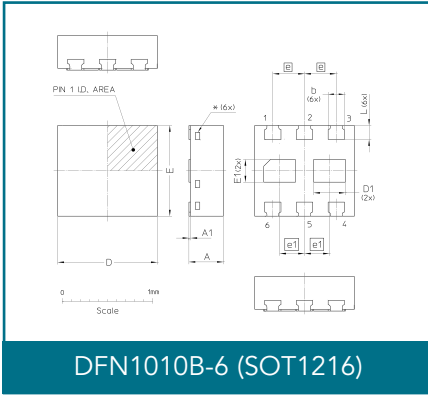


4-pin SMD packages

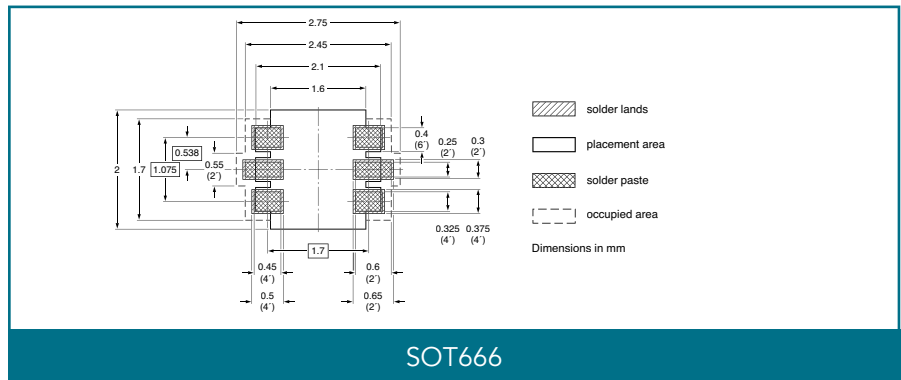
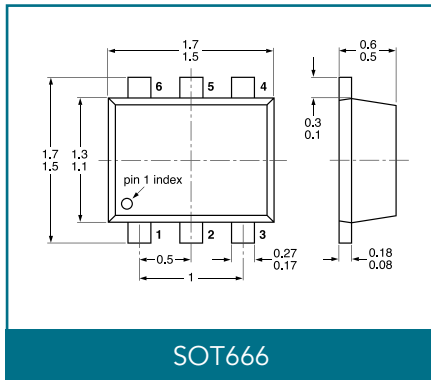


Dimensions in mm

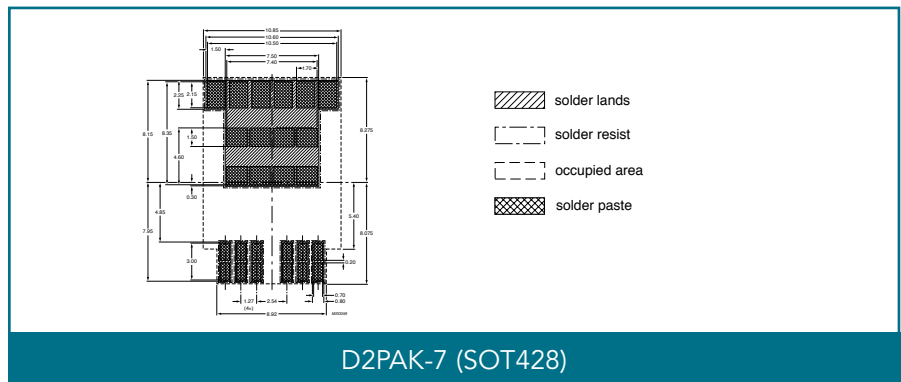
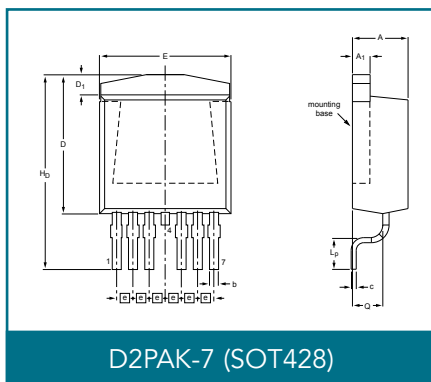
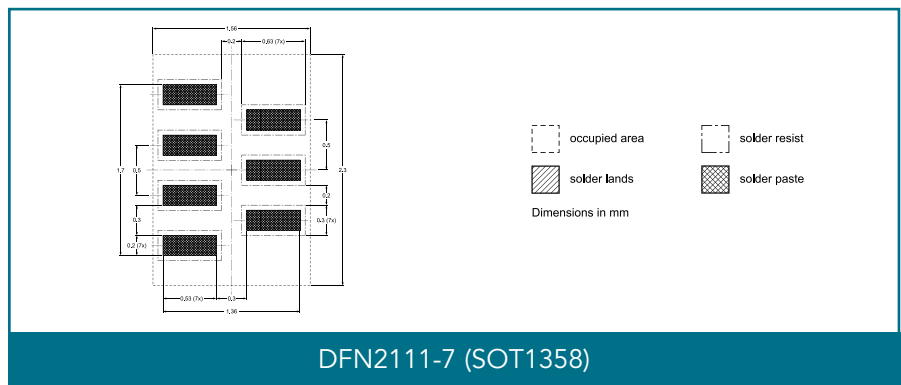
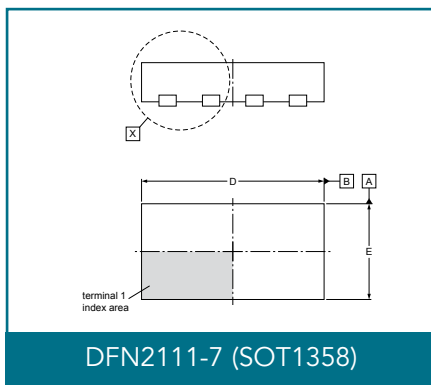
6-pin SMD packages



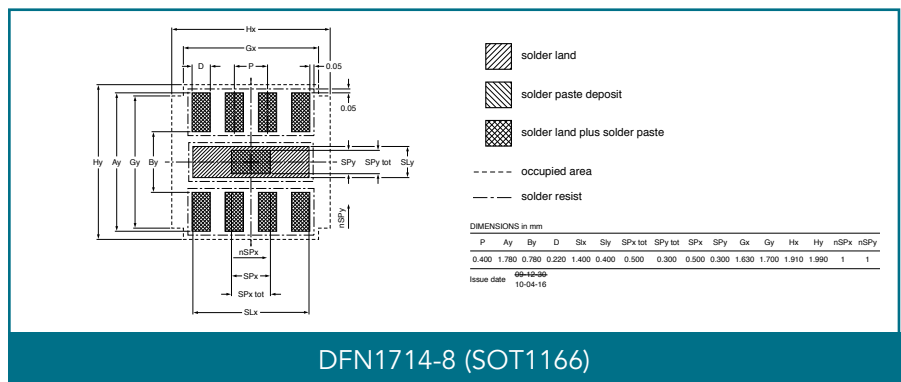
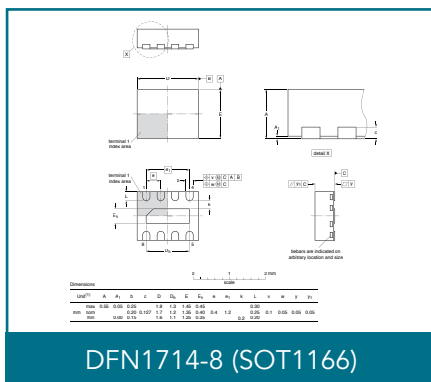
6-pin SMD packages



7-pin SMD packages



8-pin SMD packages



Dimensions in mm

More than 8-pin SMD packages

DFN2110-9 (SOT1178)

Dimensions	A	A ₁	B	C	D	E	A ₂	A ₃	L	V	Y	Z
mm	0.5	0.5	0.25	2.1	1.2	0.4	1.6	0.2	0.2	0.1	0.05	0.05
mm	0.05	0.05	0.15	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1

DFN2110-9 (SOT1178)

- solder land
- solder paste deposit
- solder land plus solder paste
- occupied area
- solder resist

DIMENSIONS in mm						
P	A _y	B _y	C	D	H _x	H _y
0.4	1.35	0.25	0.85	0.22	2.05	1.6

Issue date: 11-07-06

DFN2510-10 (SOT1165)

Dimensions	A	A ₁	B	C	D	E	A ₂	A ₃	L	V	Y	Z
mm	0.5	0.5	0.25	2.1	1.2	0.4	1.6	0.2	0.2	0.1	0.05	0.05
mm	0.05	0.05	0.15	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1

DFN2510-10 (SOT1165)

- solder land
- solder paste deposit
- solder land plus solder paste
- occupied area
- solder resist

Dimensions in mm							
P	A _y	B _y	C	D	D ₁	H _x	H _y
0.500	1.3	0.25	0.525	0.20	0.40	2.45	1.6

DFN2510A-10 (SOT1176)

Dimensions	A	A ₁	B	C	D	E	A ₂	A ₃	L	V	Y	Z
mm	0.5	0.5	0.25	2.1	1.2	0.4	1.6	0.2	0.2	0.1	0.05	0.05
mm	0.05	0.05	0.15	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1

DFN2510A-10 (SOT1176)

- solder land
- solder paste deposit
- solder land plus solder paste
- occupied area
- solder resist

Dimensions in mm						
P	A _y	B _y	C	D	H _x	H _y
0.5	1.25	0.3	0.475	0.2	2.45	1.5

DFN2514-12 (SOT1167)

Dimensions	A	A ₁	B	C	D	E	A ₂	A ₃	L	V	Y	Z
mm	0.5	0.5	0.25	2.1	1.2	0.4	1.6	0.2	0.2	0.1	0.05	0.05
mm	0.05	0.05	0.15	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1

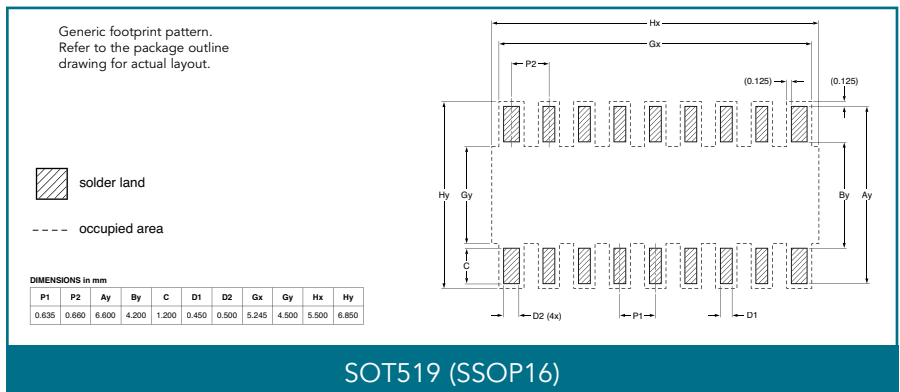
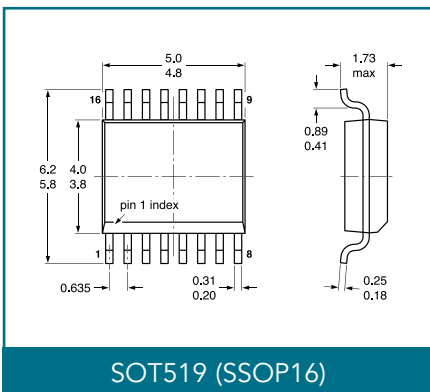
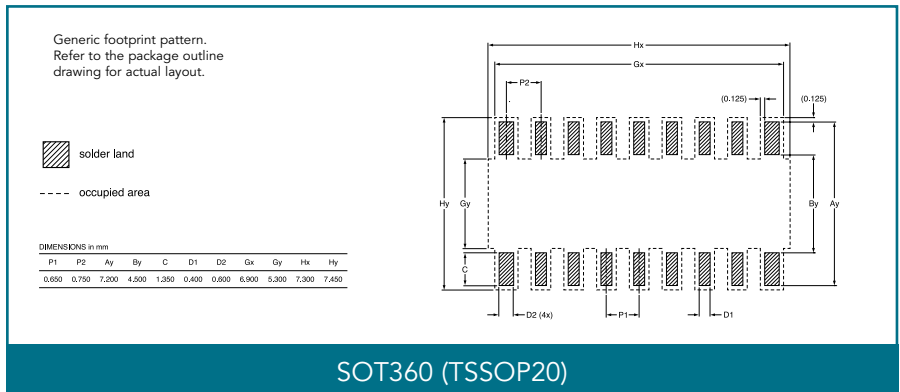
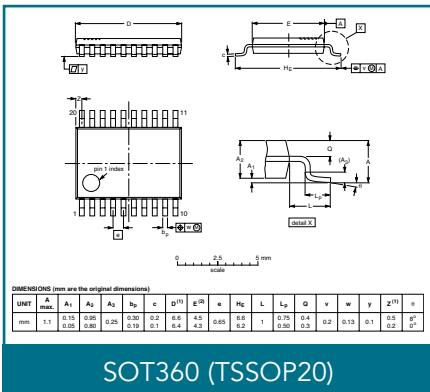
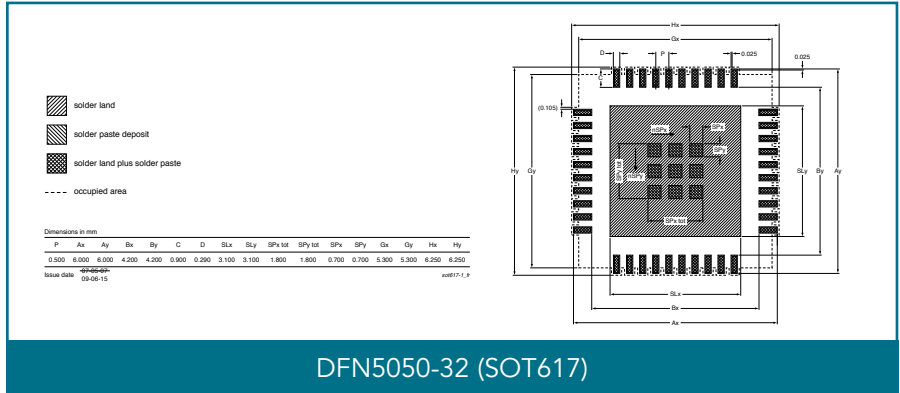
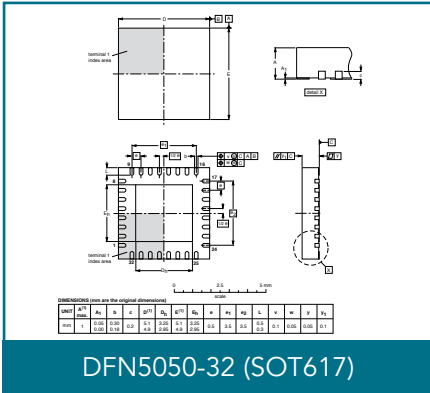
DFN2514-12 (SOT1167)

- solder land
- solder paste deposit
- solder land plus solder paste
- occupied area

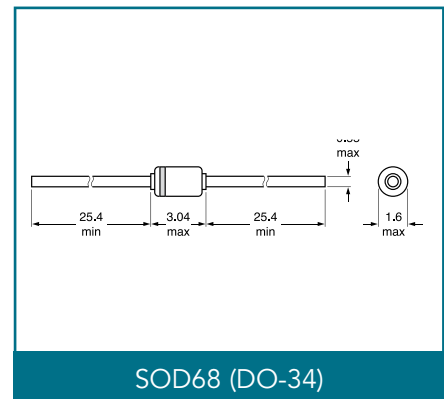
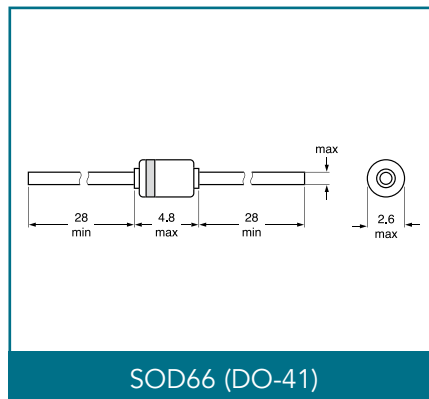
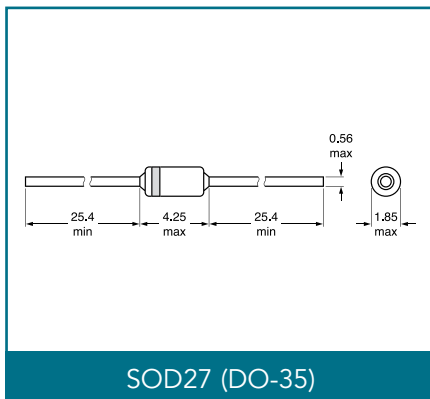
DIMENSIONS in mm												
P	A _y	B _y	D	S _{ix}	S _{ix} tot	S _{Py} tot	S _{Py}	S _{Py}	G _x	G _y	H _x	H _y
0.400	1.700	0.700	0.200	2.200	0.400	1.900	0.300	0.400	0.200	2.430	1.700	2.710
											1.900	2

Dimensions in mm

More than 8-pin SMD packages



Glass diodes



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