Discrete Semiconductors Selection Guide 2010

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

Introducing new package technology

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

Leadless powerhouse – SOT1061 and SOT1118

Features

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

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

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

FlatPower – SOD123W and SOD128

Features

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

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

Small, strong, perfectly visible – SOD882D

Features

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

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

Transfer to halogen-free products

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

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

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Products for general applications

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

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Support tools

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

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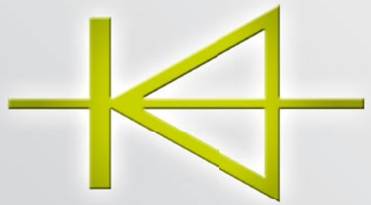

Diodes

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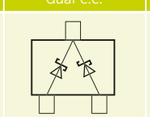
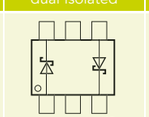
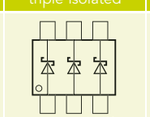
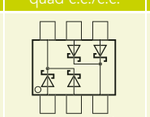
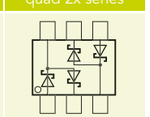
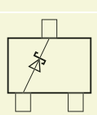
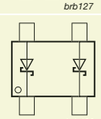
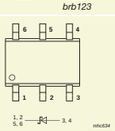
Schottky barrier diodes and rectifiers

General purpose Schottky diodes ≤ 250 mA

types in **bold** represent new products

I_F max (mA)	V_R max (V)	V_F max (mV)	@ I_F (mA)	I_R max (µA)	@ V_R (V)	Package	SOD80C (MiniMelf)	SOD68 (DO-34)	SOT23	SOT143B		SOD123F	SOT323 (SC-70)	SOT363 (SC-88)	SOD323F (SC-90)	SOD323 (SC-76)	SOT666	SOT416 (SC-75)	SOD523 (SC-79)	SOD882/ SOT883 (SC-101)
						Size (mm)	3.5 x 1.5 x 1.5	3.04 x 1.6 x 0.55	2.9 x 1.3 x 1.0	2.9 x 1.3 x 1.0		2.6 x 1.6 x 1.1	2.0 x 1.25 x 0.95	2.0 x 1.25 x 0.95	1.7 x 1.25 x 0.7	1.7 x 1.25 x 0.95	1.6 x 1.2 x 0.55	1.6 x 0.8 x 0.77	1.2 x 0.8 x 0.6	1.0 x 0.6 x 0.5
						P_{tot} (mW)	300	500	250	250		830	250	300	550	400	300	150	500	250
70	70	750	10	0.1	50	single			BAS70			BAS70H	BAS70W			1PS76SB70			1PS79SB70	BAS70L
						dual series			BAS70-04				BAS70-04W							
						dual c.c.			BAS70-05				BAS70-05W							
						dual c.a.			BAS70-06				BAS70-06W							
						dual isolated				BAS70-07				BAS70-07S			BAS70-07V			
						triple isolated											BAS70VV			
						quad 2x series								BAS70XY						
120	40	370	1	0.5	30	single										RB751V40			RB751S40	RB751CS40
		500	10	1	30	single			BAS40			BAS40H	BAS40W			1PS76SB40			1PS79SB40	BAS40L
						dual series			BAS40-04				BAS40-04W							
						dual c.c.			BAS40-05				BAS40-05W					1PS75SB45		
						dual c.a.			BAS40-06				BAS40-06W							
						dual isolated				BAS40-07							BAS40-07V			
						quad c.c./c.c.								1PS88SB48			BAS40-05V			
						quad 2x series								BAS40XY						
200	30	300	10	30	10	single													1PS79SB31	
		340	10	2	25	single			BAT754											
						dual series			BAT754S											
						dual c.c.			BAT754C											
						dual c.a.			BAT754A											
						triple isolated								BAT754L						
		400	10	2	25	single	BAS85	BAT85	BAT54			BAT54H	BAT54W		BAT54J	1PS76SB10		**BAT54T**	1PS79SB10	BAT54L
						dual series			BAT54S				BAT54SW							
						dual c.c.			BAT54C				BAT54CW							BAT54CM
						dual c.a.			BAT54A				BAT54AW							
						dual isolated				BAT74				BAT74S			BAT74V			
						triple isolated											BAT54VV			
						quad c.c./c.c.											BAT54CV			
						quad 2x series								BAT54XY						
		500	200	30	10	single													**RB521S30**	
		600	200	1	10	single													**RB520S30**	
	40	300	10	15	30	single			BAT721							1PS76SB21				
						dual series			BAT721S											
						dual c.c.			BAT721C											
						dual c.a.			BAT721A											
		360	10	0.5	25	single													1PS79SB30	
		420	30	0.5	25	single							BAT854W							
						dual series							BAT854SW							
						dual c.c.							BAT854CW							
						dual c.a.							BAT854AW							
	50	450	10	5	40	single	BAS86	BAT86												
250	100	950	250	18	75	single						BAT46WH			BAT46WJ					

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

Schottky barrier diodes and rectifiers

Medium power low V_F Schottky rectifiers single ≥ 200 mA

types in **bold** represent new products

I_F max (A)	V_R max (V)	V_F max (mV) @ I_F max	I_R max (nA) @ V_R max	Package	SOD128	SOD87 (Melf)	SOT457 (SC-74)	SOT23	SOD123W		SOD123F	SOT1061	SOT323 (SC-70)	SOD323 (SC-76)	SOD323F (SC-90)	SOT666	SOD523 (SC-79)	SOD882
				Size (mm)	3.8 x 2.5 x 1.0	3.5 x 2.05 x 2.05	2.9 x 1.5 x 1.0	2.9 x 1.3 x 1.0	2.6 x 1.7 x 1.0		2.6 x 1.6 x 1.1	2.0 x 2.0 x 0.65	2.0 x 1.25 x 0.95	1.7 x 1.25 x 0.95	1.7 x 1.25 x 0.7	1.6 x 1.2 x 0.55	1.2 x 0.8 x 0.6	1.0 x 0.6 x 0.5
				P_{tot} (mW) @ 1 cm²	1050	1000	540	420	950		830	1000	250	570	830	570	450	250
				Optimization														
0.2	30	480	0.04	low V_F											PMEG3002EJ		PMEG3002AEB	PMEG3002AEL
	40	600	0.01	low I_R											PMEG4002EJ		PMEG4002EB	PMEG4002EL
	60	600	0.1	low V_F											PMEG6002EJ		PMEG6002EB	
0.5	20	390	0.2	low V_F				PMEG2005ET			PMEG2005EH			PMEG2005AEA	PMEG2005EJ	PMEG2005AEV		
		440	1.5	low V_F														PMEG2005AEL
		480	0.01	low I_R													PMEG2005EB	
		500	0.03	low I_R														PMEG2005EL
	30	430	0.15	low V_F				PMEG3005ET			PMEG3005EH			PMEG3005AEA	PMEG3005EJ	PMEG3005AEV		
		500	0.5	low V_F													PMEG3005EB	PMEG3005EL
	40	470	0.1	low V_F				PMEG4005ET			PMEG4005EH			PMEG4005AEA	PMEG4005EJ	PMEG4005AEV		
		550	0.1	low V_F				BAT720					1PS70SB20					
1.0	20	340	1	low V_F					PMEG2010ER									
		375	1.9	low V_F								**PMEG2010EPA**						
		430	0.2	low V_F				PMEG2010AET			PMEG2010AEH							
		450	0.05	low I_R					PMEG2010BER									
			1.0	low V_F		PRLL5817												
		500	0.2	low V_F				PMEG2010ET			PMEG2010EH			PMEG2010BEA	PMEG2010EJ	PMEG2010BEV		
		550	0.07	low I_R										PMEG2010EA BAT760	PMEG2010AEJ	PMEG2010EV BAT960		
		620	1.5	low V_F													PMEG2010AEB	
	30	450	1.0	low V_F			1PS74SB23											
		360	1.5	low V_F	PMEG3010EP				PMEG3010ER									
		450	0.05	low I_R	PMEG3010BEP				PMEG3010BER									
		520	0.05	low I_R							PMEG3010CEH				PMEG3010CEJ			
		550	1	low V_F		PRLL5818												
		560	0.15	low V_F				PMEG3010ET			PMEG3010EH			PMEG3010BEA	PMEG3010EJ	PMEG3010BEV		
		680	0.5	low V_F													PMEG3010EB	
	40	490	0.05	low V_F	PMEG4010EP				PMEG4010ER									
		600	1.0	low V_F		PRLL5819												
		640	0.1	low V_F				PMEG4010ET			PMEG4010EH			PMEG4010BEA	PMEG4010EJ	PMEG4010BEV		
		570	0.05	low I_R							PMEG4010CEH				PMEG4010CEJ			
	60	530	0.06	low V_F	**PMEG6010EP**				**PMEG6010ER**									
		650	0.35	low V_F			PMEG6010AED											
		660	0.05	low I_R							PMEG6010CEH				PMEG6010CEJ			
1.5	20	660	0.07	low I_R							PMEG2015EH			PMEG2015EA	PMEG2015EJ	PMEG2015EV		
	30	550	1.0	low V_F							PMEG3015EH				PMEG3015EJ	PMEG3015EV		
2.0	10	460	3.0	low V_F							PMEG1020EH			PMEG1020EA	PMEG1020EJ	PMEG1020EV		
	20	420	1.9	low V_F								**PMEG2020EPA**						
		525	0.2	low V_F							PMEG2020EH			PMEG2020AEA	PMEG2020EJ			
	30	360	3.0	low V_F	**PMEG3020EP**													
		420	1.5	low V_F	**PMEG3020CEP**				**PMEG3020ER**									
		450	0.1	low I_R	**PMEG3020BEP**													
		470	2.5	low V_F								**PMEG3020EPA**						
		520	0.05	low I_R	**PMEG3020DEP**				**PMEG3020BER**									
		620	1.0	low V_F							PMEG3020EH				PMEG3020EJ			
	40	490	0.1	low V_F	**PMEG4020EP**				**PMEG4020ER**									
		535	0.1	low V_F								**PMEG4020EPA**						
	60	530	0.15	low V_F	**PMEG6020EP**				**PMEG6020ER**									
		575	0.25	low V_F								**PMEG6020EPA**						
3.0	10	530	3.0	low V_F							PMEG1030EH				PMEG1030EJ			
	30	360	5.0	low V_F	**PMEG3030EP**													
		450	0.15	low I_R	**PMEG3030BEP**													
	40	490	0.2	low V_F	**PMEG4030EP**													
		540	0.1	low I_R					**PMEG4030ER**									
	60	530	0.2	low V_F	**PMEG6030EP**													
5.0	30	360	8.0	low V_F	**PMEG3050EP**													
		450	0.25	low I_R	**PMEG3050BEP**													
	40	490	0.3	low V_F	**PMEG4050EP**													

Medium power low V_F Schottky rectifiers dual ≥ 200 mA

types in **bold** represent new products

I_F max (A)	V_R max (V)	V_F max (mV) @ I_F max	I_R max (mA) @ V_R max	Optimization	Package	SOT223 (SC-73)	SOT23	SOT1061	SOT666
					Size (mm)	6.5 x 3.5 x 1.65	2.9 x 1.3 x 1.0	2.0 x 2.0 x 0.65	1.6 x 1.2 x 0.55
					P_{tot} (mW)	1500	250	1000	300
0.2	30	480	0.03	low V_F	dual isolated				PMEG3002TV
	60	600	0.1	low V_F					PMEG6002TV
0.5	20	390	0.2	low V_F	dual c.c.		PMEG2005CT		
	30	430	0.15	low V_F			PMEG3005CT		
	40	470	0.1	low V_F			PMEG4005CT		
1.0	25	450	1.0	low V_F	dual series	BAT120S			
				low V_F	dual c.c.	BAT120C			
				low V_F	dual c.a.	BAT120A			
	40	500	0.05	low V_F	dual c.c.			**PMEG4010CPA**	
	60	540	0.06	low V_F	dual c.c.			**PMEG6010CPA**	
		650	0.35	low V_F	dual series	BAT160S			
				low V_F	dual c.c.	BAT160C			
				low V_F	dual c.a.	BAT160A			
2.0	20	420	1.0	low V_F	dual c.c.			**PMEG2020CPA**	
	30	440	2.0	low V_F	dual c.c.			**PMEG3020CPA**	

Nomenclature of low V_F (MEGA) Schottky rectifiers

PMEG 20 10 A E V

NXP MEGA Schottky rectifier

Max. reverse voltage in V
e.g. 20 = 20 V

Cont. foward current in A
e.g. 10 = 1.0 A

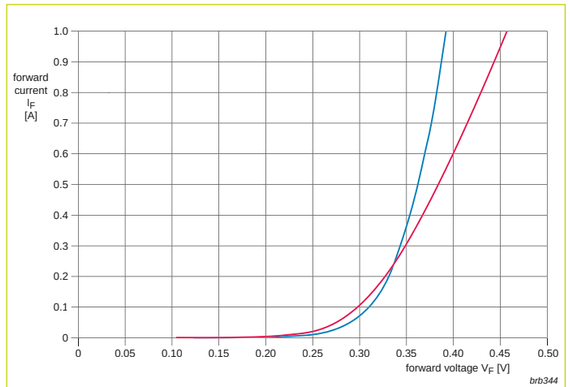
Variant number (optional)

Internal configuration:
E = single
A = CA
C = CC
S = series
P = double, parallel
R = triple, anti-parallel
V = triple
Z = 2 x CA
Y = 2 x CC
X = 2 x series
W = CA and CC

Package Indicator:
A = SOD323
B = SOD523
D = SOT457
H = SOD123
J = SOD323F
T = SOT23
V = SOT666
L = SOD882
P = SOD128
PA = SOT1061
R = SOD123W

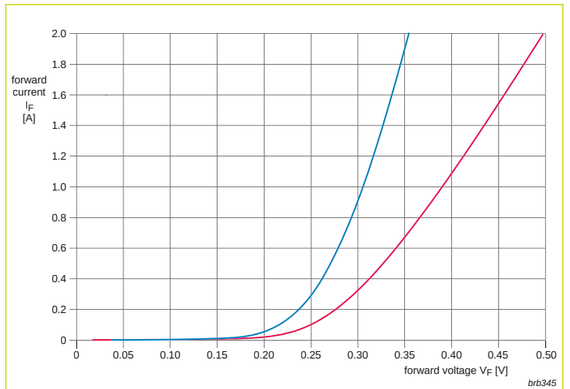
Improved forward characteristics of (MEGA) Schottky rectifiers in new packages

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



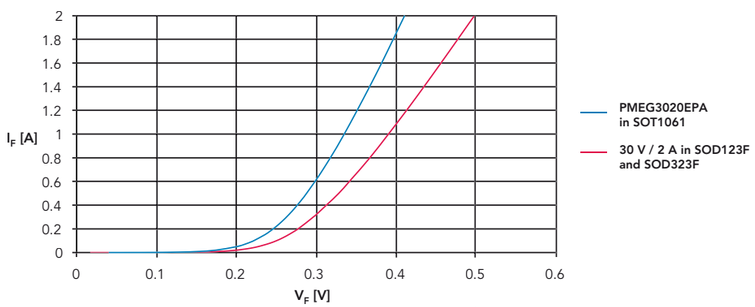
Same reverse current: IR @20 V = 0.05 mA

PMEG2010BER in SOD123W with clip-bond technology
Equivalent type 20-V/1-A with wire-bond technology



Same reverse current: IR @30 V = 1 mA

PMEG3020ER in SOD123W with clip-bond technology
Equivalent type 30-V/2-A with wire-bond technology



Similar reverse current I_R at 30 V ~ 1 – 2 mA

Low capacitance Schottky diodes

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

[1] diodes have matched capacitance

PN rectifiers in SMA, SMB, SMC

types in **bold** represent new products

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

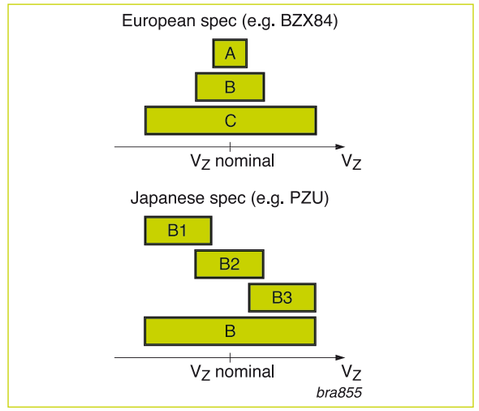
General purpose Zener diodes

types in **bold** represent new products

I_F max (mA)	P_{ZSM} (W)	V_Z nom (V)	V_Z tolerance	Note	Configuration	Series	Package	Size (mm)	P_{tot} (mW)
500	-	3.3~24	C	Eur	single	1N47xxA series	SOD66 (DO-41)	4.8 x 2.6 x 0.81	1000
	60	3.6~75				BZV85 series			
250	-	2.4~36	about 2 %	special	single	NZX series	SOD27 (DO-35)	4.25 x 1.85 x 0.56	400
	40	2.4~75	B, C	Eur		BZX79 series			
400	40	2.4~75	C	Eur	single	BZV90 series	SOT223 (SC-73)	6.5 x 3.5 x 1.65	1500
250	40	2.4~75	C	Eur	single	BZV49 series	SOT89 (SC-62)	4.5 x 2.5 x 1.5	1000
250	40	2.4~75	B, C	Eur	single	BZV55 series	SOD80C (MiniMelf)	3.5 x 1.5 x 1.5	300
200	40	2.4~75	B, C	Eur	dual c.a.	BZB84 series	SOT23	2.9 x 1.3 x 1.0	250
			A, B, C		single	BZX84 series			
250	30	5~6.8	0.2 V	Ave		PLVA600A series			
			0.2 V	Ave	dual c.a.	PLVA2600A series			
250	-	3.0~30	about 2.5 %	special	single	**NZH series**	SOD123F	2.6 x 1.6 x 1.1	830
	40	2.4~75	C	Eur		BZT52H series			
200	40	2.7~24	B2	Jap	dual isolated	PZUxDB2 series	SOT353 (SC-88A)	2.0 x 1.25 x 0.95	300
200	40	2.4~15	C	Eur	dual c.a.	BZB784 series	SOT323 (SC-70)	2.0 x 1.25 x 0.95	350
200	30	100	C	Eur	back-to-back	BZB100A	SOD323 (SC-76)	1.7 x 1.25 x 0.95	300
	40	2.4~36	B2	Jap	single	PDZ-B series			
250	40	2.4~75	B, C	Eur		BZX384 series			
200	40	2.4~36	B, B1, B2, B3	Jap		PZUxBA series			
200	60	100	C	Eur	single	BZX100A	SOD323F (SC-90)	1.7 x 1.25 x 0.7	550
200	40	2.4~36	B, B1, B2, B3	Jap		PZUxB series			
250	40	2.4~75	B, C	Eur		BZX84J series			
200	40	2.4~15	C	Eur	dual c.a.	BZB984 series	SOT663	1.6 x 1.2 x 0.55	350
200	40	2.4~75	B, C	Eur	single	BZX585 series	SOD523 (SC-79)	1.2 x 0.8 x 0.6	300
200	40	2.4~75	B, C	Eur	single	BZX884 series	SOD882	1.0 x 0.6 x 0.5	250
		2.4~36	B, B2	Jap		PZUxBL series			

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

Differences in Zener specification



PZU-series in SOD323F, Japanese spec

y =	B-series	B1-series	B2-series	B3-series
	± 5 %	± 2 %	± 2 %	± 2 %
	V_z (V)	V_z (V)	V_z (V)	V_z (V)
PZU2.4y	2.3 - 2.6	-	-	-
PZU2.7y	2.5 - 2.9	2.5 - 2.75	2.65 - 2.9	-
PZU3.0y	2.8 - 3.2	2.8 - 3.05	2.95 - 3.2	-
PZU3.3y	3.1 - 3.5	3.1 - 3.35	3.25 - 3.5	-
PZU3.6y	3.4 - 3.8	3.4 - 3.65	3.55 - 3.8	-
PZU3.9y	3.7 - 4.1	3.7 - 3.97	3.87 - 4.1	-
PZU4.3y	4.01 - 4.48	4.01 - 4.21	4.15 - 4.34	4.28 - 4.48
PZU4.7y	4.42 - 4.9	4.42 - 4.61	4.55 - 4.75	4.69 - 4.9
PZU5.1y	4.84 - 5.37	4.84 - 5.04	4.98 - 5.2	5.14 - 5.37
PZU5.6y	5.31 - 5.92	5.31 - 5.55	5.49 - 5.73	5.67 - 5.92
PZU6.2y	5.86 - 6.53	5.86 - 6.12	6.06 - 6.33	6.26 - 6.53
PZU6.8y	6.47 - 7.14	6.47 - 6.73	6.65 - 6.93	6.86 - 7.14
PZU7.5y	7.06 - 7.84	7.06 - 7.36	7.28 - 7.6	7.52 - 7.84
PZU8.2y	7.76 - 8.64	7.76 - 8.1	8.02 - 8.36	8.28 - 8.64
PZU9.1y	8.56 - 9.55	8.56 - 8.93	8.85 - 9.23	9.15 - 9.55
PZU10y	9.45 - 10.55	9.45 - 9.87	9.77 - 10.21	10.11 - 10.55
PZU11y	10.44 - 11.56	10.44 - 10.88	10.76 - 11.22	11.1 - 11.56
PZU12y	11.42 - 12.6	11.42 - 11.9	11.74 - 12.24	12.08 - 12.6
PZU13y	12.47 - 13.96	12.47 - 13.03	12.91 - 13.49	13.37 - 13.96
PZU14y	-	-	13.7 - 14.3	-
PZU15y	13.84 - 15.52	13.84 - 14.46	14.34 - 14.98	14.85 - 15.52
PZU16y	15.37 - 17.09	15.37 - 16.01	15.85 - 16.51	16.35 - 17.09
PZU18y	16.94 - 19.03	16.94 - 17.7	17.56 - 18.35	18.21 - 19.03
PZU20y	18.86 - 21.08	18.86 - 19.7	19.52 - 20.39	20.21 - 21.08
PZU22y	20.88 - 23.17	20.88 - 21.77	21.54 - 22.47	22.23 - 23.17
PZU24y	22.93 - 25.57	22.93 - 23.96	23.72 - 24.78	24.54 - 25.57
PZU27y	25.1 - 28.9	-	-	-
PZU30y	28 - 32	-	-	-
PZU33y	31 - 35	-	-	-
PZU36y	34 - 38	-	-	-

BZX-series, European spec

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

NZX-series in SOD27

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

Switching diodes

General purpose switching diodes ≤ 100 V

V_R max (V)	V_F max (V)	@ I_F (mA)	I_R max (nA)	@ V_R (V)	t_{rr} max (ns)	Package	SOD27 (DO-35)	SOD68 (DO-34)	SOD80C (MiniMelf)	SOT23		SOT143B	SOD123F	SOT323 (SC-70)	SOT363 (SC-88)	SOD323 (SC-76)	SOD323F (SC-90)	SOT666	SOT416 (SC-75)	SOD523 (SC-79)	SOD882	SOT883 (SC-101)
						Size (mm)	4.25 x 1.85 x 0.56	3.04 x 1.6 x 0.55	3.5 x 1.5 x 1.5	2.9 x 1.3 x 1.0		2.9 x 1.3 x 1.0	2.6 x 1.6 x 1.1	2.0 x 1.25 x 0.95	2.0 x 1.25 x 0.95	1.7 x 1.25 x 0.95	1.7 x 1.25 x 0.7	1.6 x 1.2 x 0.55	1.6 x 0.8 x 0.77	1.2 x 0.8 x 0.6	1.0 x 0.6 x 0.5	1.0 x 0.6 x 0.5
						P_{tot} (mW)	500	500	500	250		250	830	200	300	400	550	180	170	500	250	250
50	1	50	100	50	4					BAL74												
70	1	50	1000	70	4					BAL99												
75	1	10	25	20	4			1N4531														
		50	1000	75	4							BAS28										
		100	5000	75	4				BAS32L													
90	1	50	500	80	4					BAW56				BAW56W					BAW56T			BAW56M
															BAW56S							
															BAV756S							
100	1	10	25	20	4		1N4148															
		50	500	80	4								BAS16H			BAS316	BAS16J					
										BAS16				BAS16W					BAS16T			
																				BAS516	BAS16L	
															BAS16VY			BAS16VV				
										BAV70				BAV70W					BAV70T			BAV70M
															BAV70S							
										BAV99				BAV99W								
															BAV99S							

General purpose switching diodes > 100 V

types in **bold** represent new products

V_R max (V)	V_F max (V)	@ I_F (mA)	I_R max (nA)	@ V_R (V)	t_{rr} max (ns)	Package	SOD27 (DO-35)	SOD80C (MiniMelf)	SOT457 (SC-74)	SOT23	SOT143B	SOD123F	SOT323 (SC-70)	SOT363 (SC-88)	SOD323 (SC-76)	SOD323F (SC-90)	SOD523 (SC-79)
						Size (mm)	4.25 x 1.85 x 0.56	3.5 x 1.5 x 1.5	2.9 x 1.5 x 1.0	2.9 x 1.3 x 1.0	2.9 x 1.3 x 1.0	2.6 x 1.6 x 1.1	2.0 x 1.25 x 0.95	2.0 x 1.25 x 0.95	1.7 x 1.25 x 0.95	1.7 x 1.25 x 0.7	1.2 x 0.8 x 0.6
						P_{tot} (mW)	500	300	500	250	250	830	350	300	400	550	500
150	1	100	100	150	50	bra036	BAV20										
≥200	1	100	100	150	50	bra036	BAV21	BAV103				BAS21H			BAS321		
				200	50	bra048				BAS21			**BAS21W**				
						bra047					BAV23						
						bra037				BAV23A			**BAS21AW**				
						bra038				BAV23C							
						bra039				BAV23S			**BAS21SW**				
						bra039			BAS21VD								
300	1.1	100	150	250	50	bra036										BAS21J	BAS521
						bra048				BAS101							
						bra041				BAS101S							
						bra047					BAW101						
						bra143								BAW101S			

Controlled avalanche switching diodes

V_R max (V)	V_F max (V)	@ I_F (mA)	I_R max (nA) @ V_R max	I_{FSM} max (A)	I_{FRM} max (mA)	C_d max (pF)	t_{rr} max (ns)	Package	SOT23	SOT143B
								Size (mm)	2.9 x 1.3 x 1.0	2.9 x 1.3 x 1.0
								P_{tot} (mW)	250	250
60	1	200	100	9	600	2.5	6	bra047		BAS56
90	1	200	100	10	600	35	50	bra048	BAS29	
								bra041	BAS31	
								bra042	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 (ns)	Package	SOD80C (MiniMelf)	SOD68 (DO-34)	SOT23	SOD123F	SOT323 (SC-70)	SOD323 (SC-76)	SOT416 (SC-75)	SOD523 (SC-79)
					Size (mm)	3.5 x 1.5 x 1.5	3.04 x 1.6 x 0.55	2.9 x 1.3 x 1.0	2.6 x 1.6 x 1.1	2.0 x 1.25 x 0.95	1.7 x 1.25 x 0.95	1.6 x 0.8 x 0.77	1.2 x 0.8 x 0.6
					P_{tot} (mW)	300	500	250	830	250	400	170	500
75	1	10	5	3	bra036				BAS116H		BAS416		BAS716
					bra048			BAS116				**BAS116T**	
					bra041			BAV199		BAV199W			
					bra143			BAW156					
					bra046			BAV170					
125	1	100	1	1.5 typ	bra036	BAS45AL	BAS45A						

Protection and signal conditioning nomenclature

PESD 5V0 S 1 UL

NXP

ESD (ESD protection)
RTR (Rail-to-rail ESD protection)
TVS (10/1000 µs pulse spec.)

Reverse stand-off voltage

Number of protected lines

Uni-directional*
Bi-directional*

*not for rail-to-rail devices

For ESD – Capacitance class

>50 pF	Standard capacitance
<=50 pF	Low capacitance
<=20 pF	Very low capacitance
<=5 pF	Ultra low capacitance
<=1 pF	X-extremely low capacitance
<=0.6 pF	Femtofarad capacitance

For TVS – Power class

S 400 Watt series
P 600 Watt series

Packages

A	SOD323
B	SOD523
D	SOT457
F	SOT886
G	SOT353
K	SOT891
L	SOD882
LD	SOD882D
M	SOT883
P	SOD128
Q	SOT663
R	SOD123W
T	SOT23
U	SOT323
V	SOT666
W	SOT665
X	SOT143B
Y	SOT363

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

IP: Integrated Discretes

yy: identifier

zz: no. of balls/pins

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

xx:

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

Protection and signal conditioning

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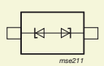
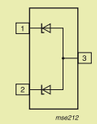
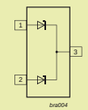
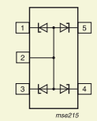
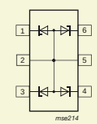
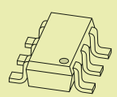
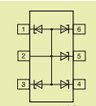
Standard ESD protection devices

types in **bold** represent new products

Number of protected lines		V_{RWM} (V)	C_{int} typ (pF)	C_{line} max (pF)	P_{PP} [1] max (W)	ESD rating [2] max (kV)	I_R max (µA) @ V_{RWM}	Configuration	Type	Package	Size (mm)
Unidirectional	Bidirectional										
1	0	3.3	207	300	150	30	2		PESD3V3S1UL	SOD882	1.0 x 0.6 x 0.5
		5	152	200	150	30	1		PESD5V0S1UL		
		12	38	75	150	30	0.05		PESD12VS1UL		
		15	32	70	150	30	0.05		PESD15VS1UL		
		24	23	50	150	23	0.05		PESD24VS1UL		
		5	152	200	150	30	1		**PESD5V0S1ULD**	SOD882D	1.0 x 0.6 x 0.37
		3.3	207	300	330	30	2		PESD3V3S1UB	SOD523 (SC-79)	1.2 x 0.8 x 0.6
		5	152	200	260	30	1		PESD5V0S1UB		
		12	38	75	180	30	0.05		PESD12VS1UB		
		15	32	70	160	30	0.05		PESD15VS1UB		
		24	23	50	160	23	0.05		PESD24VS1UB		
		5	480	530	890	30	4		PESD5V0S1UA	SOD323 (SC-76)	1.7 x 1.25 x 0.95
		5	480	530	890	30	4		PESD5V0S1UJ	SOD323F (SC-90)	1.7 x 1.25 x 0.7
		12	160	180	600	30	0.1		PESD12VS1UJ		
		2.5	229	300	260	30	6		PESD5Z2.5	SOD523 (SC-79)	1.2 x 0.8 x 0.6
		3.3	172	200	260	30	0.05		PESD5Z3.3		
		5	89	150	180	30	0.05		PESD5Z5.0		
		6	78	150	180	30	0.01		PESD5Z6.0		
		7	69	150	180	30	0.01		PESD5Z7.0		
		12	35	75	200	30	0.01		PESD5Z12		
0	1	5	35	45	130	30	0.1		PESD5V0S1BL	SOD882	1.0 x 0.6 x 0.5
		5	35	45	130	30	0.1		**PESD5V0S1BLD**	SOD882D	1.0 x 0.6 x 0.37
		5	35	45	130	30	0.1		PESD5V0S1BB	SOD523 (SC-79)	1.2 x 0.8 x 0.6
		5	35	45	130	30	0.1		PESD5V0S1BA	SOD323 (SC-76)	1.7 x 1.25 x 0.95

[1] 8/20 µs surge pulse acc. to IEC 61000-4-5 [2] acc. to IEC 61000-4-2 (contact discharge)

Standard ESD protection devices

Number of protected lines		V_{RWM} (V)	C_{int} typ (pF)	C_{line} max (pF)	P_{PP} [1] max (W)	ESD rating [2] max (kV)	I_R max (µA) @ V_{RWM}	Configuration	Type	Package	Size (mm)
Unidirectional	Bidirectional										
2	1	3.3	200	275	150	23	3		PESD3V3S2UQ	SOT663	1.6 x 1.2 x 0.55
		5	150	215	150	30	0.3		PESD5V0S2UQ		
		12	38	100	150	30	0.03		PESD12VS2UQ		
		15	32	70	150	30	0.05		PESD15VS2UQ		
		24	23	50	150	23	0.05		PESD24VS2UQ		
		3.3	207	300	330	30	2		PESD3V3S2UT	SOT23	2.9 x 1.3 x 1.0
		5.2	152	200	260	30	1		PESD5V2S2UT		
		12	38	75	180	30	1		PESD12VS2UT		
		15	32	70	160	30	1		PESD15VS2UT		
		24	23	50	160	23	1		PESD24VS2UT		
		36	17	35	160	30	1 (@ 30 V)		PESD36VS2UT		
		3.3	207	300	330	30	2		PESD3V3S2UAT		
		5	152	200	260	30	1		PESD5V0S2UAT		
		12	38	75	180	30	0.05		PESD12VS2UAT		
		15	32	70	160	30	0.05		PESD15VS2UAT		
		24	23	50	160	23	0.05		PESD24VS2UAT		
4	3	3.3	110	300	110	30	1 (@ 3 V)		PESD3V3S4UF	SOT886 (XSON6)	1.45 x 1.0 x 0.5
		5	85	220	110	30	0.1 (@ 4.3 V)		PESD5V0S4UF		
		3	107	125	-	8	1		BZA956A	SOT665	1.6 x 1.2 x 0.55
		4	90	105	-	8	0.5		BZA962A		
		4.3	78	90	-	8	0.1		BZA968A		
		3	200	240	-	8	2		BZA856A	SOT353 (SC-88A)	2.0 x 1.25 x 0.95
		3	107	125	-	8	1		BZA856AL		
		4	165	200	-	8	0.7		BZA862A		
		4	90	105	-	8	0.5		BZA862AL		
		4.3	145	180	-	8	0.2		BZA868A		
		4.3	78	90	-	8	0.1		BZA868AL		
		15	37	50	-	8	0.1		BZA820A		
		3	200	240	-	8	2		BZA456A	SOT457 (SC-74) 	2.9 x 1.5 x 1.0
		4	165	200	-	15	0.7		BZA462A		
		14	37	48	-	8	0.075		BZA418A		
		15	37	48	-	8	0.1		BZA420A		
		3.3	215	300	200	30	0.8		PESD3V3S4UD		
		5	165	220	200	30	0.2		PESD5V0S4UD		
		12	73	100	200	30	0.015		PESD12VS4UD		
		15	60	90	200	30	0.015		PESD15VS4UD		
		24	40	70	200	23	0.015		PESD24VS4UD		
5	4	3.3	215	300	200	30	0.8		PESD3V3S5UD		
		5	165	220	200	30	0.2		PESD5V0S5UD		
		12	73	100	200	30	0.015		PESD12VS5UD		
		15	60	90	200	30	0.015		PESD15VS5UD		
		24	45	70	200	23	0.015		PESD24VS5UD		
0	4	5	45	75	-	15	0.1		BZA408B		
18	17	5.2	100	120	-	8	2		BZA100	SOT163 (SO20)	12.8 x 7.5 x 2.65

[1] 8/20 µs surge pulse acc. to IEC 61000-4-5 [2] acc. to IEC 61000-4-2 (contact discharge)

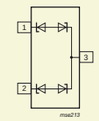
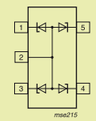
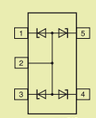
Low capacitance ESD protection devices

Number of protected lines		V_{RWM} (V)	C_{line} typ (pF)	C_{line} max (pF)	P_{PP} [1] max (W)	ESD rating [2] max (kV)	I_R max (µA) @ V_{RWM}	Configuration	Type	Package	Size (mm)
Unidirectional	Bidirectional										
1	0	3.3	34	40	45	30	0.3		PESD3V3L1UL	SOD882	1.0 x 0.6 x 0.5
		5	25	30	42	26	0.1		PESD5V0L1UL		
		3.3	34	40	45	30	0.3		PESD3V3L1UB	SOD523 (SC-79)	1.2 x 0.8 x 0.6
		5	25	30	42	26	0.1		PESD5V0L1UB		
		3.3	34	40	45	30	0.3		PESD3V3L1UA	SOD323 (SC-76)	1.7 x 1.25 x 0.95
		5	25	30	42	26	0.1		PESD5V0L1UA		
		3.3	2.6	3.1	-	9	0.1 (@ 3 V)		PESD3V3U1UL	SOD882	1.0 x 0.6 x 0.5
		5	2	2.6	-	9	0.1		PESD5V0U1UL		
		3.3	2.6	3.1	-	9	0.1 (@ 3 V)		PESD3V3U1UB	SOD523 (SC-79)	1.2 x 0.8 x 0.6
		5	2	2.6	-	9	0.1		PESD5V0U1UB		
		3.3	2.6	3.1	-	9	0.1 (@ 3 V)		PESD3V3U1UA	SOD323 (SC-76)	1.7 x 1.25 x 0.95
		5	2	2.6	-	9	0.1		PESD5V0U1UA		
		3.3	101	-	500	30	2		PESD3V3L1BA		
		5	75	-	500	30	1		PESD5V0L1BA		
		12	19	-	200	30	0.05		PESD12VL1BA		
		15	16	-	200	30	0.05		PESD15VL1BA		
		24	11	-	200	23	0.05		PESD24VL1BA		
		5	11	13	45	30	0.01		PESD5V0V1BL	SOD882	1.0 x 0.6 x 0.5
		5	11	13	45	30	0.01		PESD5V0V1BB	SOD523 (SC-79)	1.2 x 0.8 x 0.6
		5	11	13	45	30	0.01		PESD5V0V1BA	SOD323 (SC-76)	1.7 x 1.25 x 0.95
		5	2.9	3.5	-	10	0.1		PESD5V0U1BL	SOD882	1.0 x 0.6 x 0.5
		5	2.9	3.5	-	10	0.1		PESD5V0U1BB	SOD523 (SC-79)	1.2 x 0.8 x 0.6
		5	2.9	3.5	-	10	0.1		PESD5V0U1BA	SOD323 (SC-76)	1.7 x 1.25 x 0.95

[1] 8/20 µs surge pulse acc. to IEC 61000-4-5 [2] acc. to IEC 61000-4-2 (contact discharge)

Low capacitance ESD protection devices

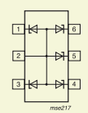
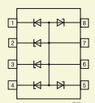
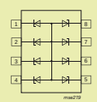
types in **bold** represent new products

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

[1] 8/20 µs surge pulse acc. to IEC 61000-4-5 [2] acc. to IEC 61000-4-2 (contact discharge)

Low capacitance ESD protection devices

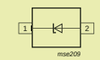
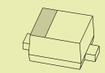
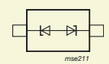
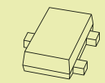
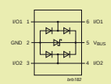
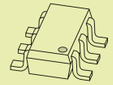
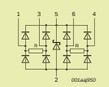
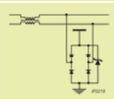
types in **bold** represent new products

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

[1] 8/20 µs surge pulse acc. to IEC 61000-4-5 [2] acc. to IEC 61000-4-2 (contact discharge)

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

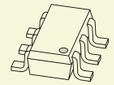
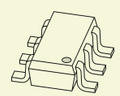
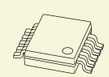
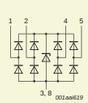
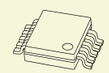
types in **bold** represent new products

Number of protected lines		V_{RWM} (V)	C_{line} typ (pF)	C_{line} max (pF)	ESD rating [2] max (kV)	I_R max (µA) @ V_{RWM}	Configuration	Type	Package	Size (mm)
Unidirectional	Bidirectional									
1	0	5	0.9	1	8	0.2		**PESD5V0X1UB**	SOD523 (SC-79) 	1.2 x 0.8 x 0.6
		5	1.8	2	15	0.2		**PESD5V0X1UAB**		
		16	0.83	0.95	8	0.1		**PESD16VX1UL**	SOD882	1.0 x 0.6 x 0.5
		5.5	1	1.5	8	0.1 (@ 3 V)		PRTR5V0U1T	SOT23	2.9 x 1.3 x 1.0
0	1	5.5	0.4	0.55	10	0.1		**PESD5V0F1BL**	SOD882	1.0 x 0.6 x 0.5
		16	0.5	0.65	8	0.1		**PESD16VF1BL**		
		3.3	1.3	1.6	9	0.1		PESD3V3X1BL		
		5	0.9	1.3	9	0.1		PESD5V0X1BL		
2	1	5	0.9	1.3	9	0.1		PESD5V0X1BQ	SOT663 	1.6 x 1.2 x 0.55
		5	0.9	1.3	9	0.1		PESD5V0X1BT	SOT23	2.9 x 1.3 x 1.0
		80	0.6	0.75	30	0.1		**NUP1301**		
	0	5.5	1	1.5	8	0.1 (@ 3 V)		PRTR5V0U2X	SOT143B	
		5.5	1.8		12	0.1 (@ 3 V)		PRTR5V0U2AX		
		5.5	1	1.5	8	0.1 (@ 3 V)		PRTR5V0U2K	SOT891 (XSON6)	1.0 x 1.0 x 0.5
		5.5	1	1.5	8	0.1 (@ 3 V)		PRTR5V0U2D	SOT457 (SC-74) 	2.9 x 1.5 x 1.0
		5.5	1	1.5	8	0.1 (@ 3 V)		PRTR5V0U2F	SOT886 (XSON6)	1.45 x 1.0 x 0.5
		5.5	2	-	15	-		**IP4234CZ6**	SOT457 (SC-74)	2.9 x 1.5 x 1.0
		5.5	1.5	-	8	-		**IP3219CZ6**	SOT1082-1 (VSON6U)	2.3 x 3.5 x 0.85

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

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

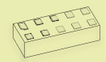
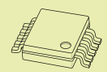
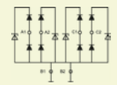
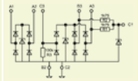
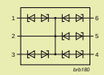
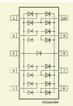
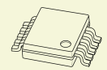
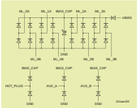
types in **bold** represent new products

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

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

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

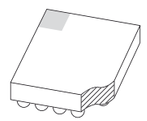
types in **bold** represent new products

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

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

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

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



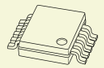
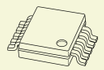
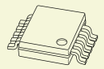
Audio interfaces

types in **bold** represent new products

Baseband interface	Number of protected lines	Line small-signal equivalents		Digital interface clock speed (MHz)	Remark	Type	Package	Size (mm)
		R_{line}	C_{line} (pF)					
Audio	2	0.9 Ω	290	-	Low-ohmic speaker (< ~8 Ω)	IP4047CX6/LF	6 ball CSP	1.56 x 1.01 x 0.65
		10 Ω	200	-	Low-ohmic speaker (> ~8 Ω)	IP4048CX5/LF	5 ball CSP	0.91 x 1.28 x 0.65
		15 Ω	5000	-	Low-ohmic speaker (> ~8 Ω)	IP5311CX5/LF		0.80 x 1.16 x 0.61
		68 Ω	110	-	Single-ended or differential microphone	IP4049CX5/LF		0.91 x 1.28 x 0.65
		470 Ω	35	-	Single-ended or differential microphone	IP4055CX6/LF	6 ball CSP	1.56 x 1.03 x 0.65
		470 Ω	20	-	Single-ended or differential microphone	IP4355CX6/LF		1.16 x 0.76 x 0.65
		50 Ω / 2.2 kΩ	2000	-	Single-ended to quasi-differential microphone channel with integrated biasing network	IP5002CX8/LF	8 ball CSP	1.67 x 1.67 x 0.65
		2.25 kΩ	4000	-	Differential microphone filter with integrated biasing network for ∑Δ ADC converters	IP5006CX11/LF	11 ball CSP	1.41 x 1.91 x 0.65
		5 Ω / 20 Ω / 1.5 kΩ	550	-	Differential microphone filter with integrated biasing network for ∑Δ including coupling capacitors	IP5020CX16/LF	16 ball CSP	2.01 x 1.91 x 0.65
		0.25 Ω, 3 nH	-	-	Inductive, low-ohmic differntial channel LC filter	**IP3047CX6**	6 ball CSP	1.60 x 1.15 x 0.65
		0.25 Ω, 3 nH	-	-	Inductive, low-ohmic differntial channel LC filter	**IP3048CX5**	5 ball CSP	1.51 x 1.15 x 0.65
		2.2 kΩ / 1 kΩ / 0.8 kΩ	0.8 nF / 1.6 nF	-	Differential microphone biasing ESD protection / EMI filtering	IP5306CX8	8 ball CSP	1.19 x 1.19 x 0.61
	4	10 Ω	5000	-	Dual differential speaker	IP5040CX11/LF	11 ball CSP	1.41 x 2.01 x 0.65
	6	15 Ω / 95 Ω	65 / 33	-	Single-ended microphone and high-ohmic speaker (> ~8 Ω) with integrated 2 kohm pull-up resistor	IP4363CX10/LF	10 ball CSP	0.76 x 1.96 x 0.61
		40 Ω / 1450 Ω / 10 Ω	50 / 20 / 200	-	Fully integrated audio interface protection for differential microphone and differential speaker, including EMI filtering and pull up resistors	IP4025CX20/LF	20 ball CSP	1.98 x 2.53 x 0.65
		40 Ω / 1450 Ω / 10 Ω	50 / 20 / 200	-	Fully integrated audio interface protection for differential microphone and differential speaker, including EMI filtering and pull up resistors	IP4027CX20/LF		1.91 x 2.52 x 0.65
		50 Ω / 10 Ω	50 / 100 / 1000	-	Fully integrated audio interface protection for differential microphone and differential speaker, including EMI filtering and pull up resistors	IP4125CX20/LF		2.00 x 2.66 x 0.65
	8	0.8 Ω / 30 Ω / 200 Ω	20 / 50 / 150	~20	Fully integrated audio interface protection including EMI filtering for microphone and speaker, and additional 4-channel EMI filter	IP4110CX20/LF		1.91 x 2.47 x 0.65

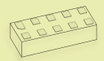
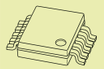
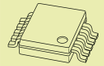
Video interfaces

types in **bold** represent new products

Baseband interface	Number of protected lines	Buffer	Level shifter	C_{line} (pF)	Resistor (Ω)	Remark	Type	Package	Size (mm)
Display port	4	-	-	0.6	-	ESD protection for ultra high speed interfaces	**IP4283CZ10-TB**	SOT1059 (XSON10U)	1.0 x 2.5 x 0.5
		-	-	0.6	-	ESD protection for ultra high speed interfaces	**IP4283CZ10-TT**	SOT552 (TSSOP10) 	3.0 x 3.0 x 1.1
		-	-	0.5	-	ESD protection for ultra high speed interfaces	**IP4284CZ10-TB**	SOT1059 (XSON10U)	1.0 x 2.5 x 0.5
		-	-	0.5	-	ESD protection for ultra high speed interfaces	**IP4284CZ10-TT**	SOT552 (TSSOP10) 	3.0 x 3.0 x 1.1
		-	-	0.6	-	ESD protection for ultra high speed interfaces	**IP4286CZ6-TBF**	SOT886 (XSON6)	1.45 x 1.0 x 0.5
						ESD protection for ultra high speed interfaces	**IP4286CZ6-TTY**	SOT363 (SC-88)	2.0 x 1.25 x 0.95
	11	-	-	0.7	-	ESD protection for display port	IP4790CZ38	SOT510 (TSSOP38)	9.7 x 4.4 x 1.1
LVDS	10	-	-	5	100	100 Ω termination	IP4263CZ14	SOT108 (SO14)	8.65 x 3.9 x 1.75
HDMI	2	-	-	0.7	-	ESD protection for ultra high speed interfaces	**IP4282CZ6**	SOT886 (XSON6)	1.45 x 1.0 x 0.5
	4	-	-	0.7	-	ESD protection for ultra high speed interfaces	IP4280CZ10	SOT552 (TSSOP10) 	3.0 x 3.0 x 1.1
		-	-	0.7	-	ESD protection for ultra high speed interfaces	IP4281CZ10	SOT1059 (XSON10U)	1.0 x 2.5 x 0.5

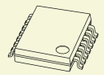
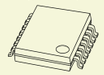
Video interfaces

types in **bold** represent new products

Baseband interface	Number of protected lines	Buffer	Level shifter	C_{line} (pF)	Resistor (Ω)	Remark	Type	Package	Size (mm)
HDMI	4	-	-	0.6	-	ESD protection for ultra high speed interfaces	**IP4283CZ10-TB**	SOT1059 (XSON10U) 	1.0 x 2.5 x 0.5
		-	-	0.6	-	ESD protection for ultra high speed interfaces	**IP4283CZ10-TT**	SOT552 (TSSOP10) 	3.0 x 3.0 x 1.1
		-	-	0.6	-	ESD protection for ultra high speed interfaces	**IP4286CZ6-TBF**	SOT886 (XSON6)	1.45 x 1.0 x 0.5
							IP4286CZ6-TTY	SOT363 SC-88)	2.0 x 1.25 x 0.95
		-	-	0.5	-	ESD protection for ultra high speed interfaces	**IP4284CZ10-TB**	SOT1059 (XSON10U)	1.0 x 2.5 x 0.5
		-	-	0.5	-	ESD protection for ultra high speed interfaces	**IP4284CZ10-TT**	SOT552 (TSSOP10) 	3.0 x 3.0 x 1.1
	5	-	-	0.5	-	ESD protection for up to 5 ultra high speed datalines	**PESD5V0F5BK**	SOT891 (XSON6)	1.0 x 1.0 x 0.5
		-	-	10	1.75 k, 100 k	HDMI, DDC, CEC, hotplug ESD protection and biasing	**IP4310CX8**	8 ball CSP	1.16 x 1.16 x 0.61
	8	-	-	1.3	-	HDMI, TMDS line ESD protection	**IP4309CX9**	9 ball CSP	1.16 x 1.16 x 0.61
	12	-	yes	0.7	-	ESD protection and level shifting for a complete HDMI port	IP4776CZ38	SOT510 (TSSOP38)	9.7 x 4.4 x 1.1
		yes	yes	0.7	-	ESD protection, DDC buffering, noise reduction and Hot Plug application for a complete HDMI source port	IP4777CZ38		
		yes	yes	0.7	-	ESD protection, DDC buffering, noise reduction and Hot Plug application for a complete HDMI sink port	IP4778CZ38		

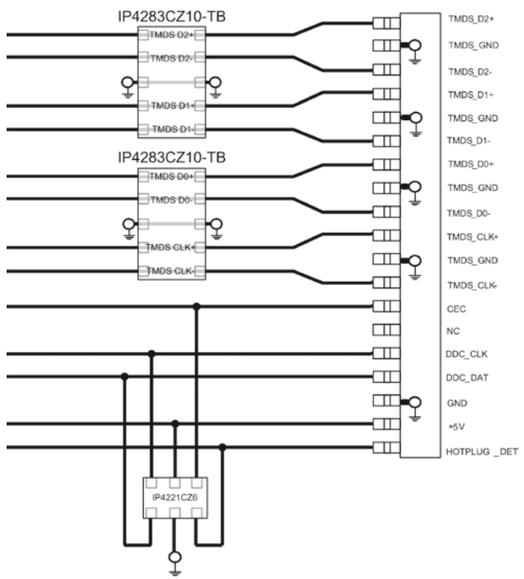
Video interfaces

types in **bold** represent new products

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

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

HDMI ESD protection using IP4283CZ10-TB and IP4221CZ6-S



Multichannel EMI filter, ESD protection for LCD and camera

types in **bold** represent new products

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

Multichannel EMI filter, ESD protection for LCD and camera

types in **bold** represent new products

Baseband interface	Number of protected lines	Line small-signal equivalents		Digital interface clock speed (MHz)	Remark	Type	Package	Size (mm)
		R_{line}	C_{line} (pF)					
Generic ESD protection	1	-	10	~40	1x back-to-back diode with one common ground, extremely small size	IP4302CX2/LF	2 ball CSP	0.49 x 0.67 x 0.38
	2	-	10	~40	2x back-to-back diode with one common ground, extremely small size	IP4303CX4/LF	4 ball CSP	0.76 x 0.76 x 0.61
		-	0.6	-	16 V ultra low capacitance ESD protection in 4 mm pitch	**IP4361CX4/LF**		0.76 x 0.76 x 0.61
	4	-	30	~30	4x single diode with one common ground	IP4042CX5/LF	5 ball CSP	0.91 x 1.28 x 0.65
		-	14	~40	4x single diode with one common ground	IP4142CX5/LF		0.91 x 1.28 x 0.65
		-	15	Breakdown: min. 5.5 V	Quad diode array with ESD protection	IP4332CX5/LF		0.76 x 1.06 x 0.61
		-	30	Breakdown: min. 5.5 V	Quad diode array with ESD protection	IP4342CX5/LF		0.76 x 1.06 x 0.61
		-	16	~40	4x back-to-back diode with one common ground	IP4043CX5/LF		1.12 x 1.12 x 0.65
		-	16	~40	4x back-to-back diode with one common ground, extremely small size	IP4343CX5/LF		0.93 x 0.93 x 0.61
Special diode	1	-	65	Breakdown: min. 20 V Forward: 0.25 - 0.5 V	Schottky power diode in WLCSP	IP4306CX2/LF	2 ball CSP	0.49 x 0.67 x 0.38
	2	-	19	Breakdown: min. 15 V Forward: 0.25 - 0.45 V	1x back-to-back diode with integrated dual Schottky diode array incl. ESD protection	IP4305CX4/LF	4 ball CSP	0.96 x 0.96 x 0.61

SD-, SIM-card and MMC

types in **bold** represent new products

Baseband interface	Number of protected lines	Line small-signal equivalents		Digital interface clock speed (MHz)	Remark	Type	Package	Size (mm)
		R_{line}	C_{line} (pF)					
SIM card	3 + 2	47 Ω / 100 Ω	10	~20	Integrated low capacitance SIM-card passive filter array & USB ESD protection	**IP4365CX11**	11 ball CSP	1.16 x 1.56 x 0.61
	3	47 Ω / 100 Ω	40	~12	Integrated SIM-card EMI filter and ESD protection	IP4044CX8/LF	8 ball CSP	1.46 x 1.49 x 0.65
		47 Ω / 100 Ω	20	~20	Integrated SIM-card EMI filter and ESD protection	IP4064CX8/LF/S		1.41 x 1.41 x 0.65
		47 Ω / 100 Ω	20	~20	Smaller size, integrated SIM-card EMI filter and ESD protection	IP4364CX8/LF		1.16 x 1.16 x 0.61
		47 Ω / 100 Ω	10	~20	Smaller size, low capacitance integrated SIM-card EMI filter and ESD protection	**IP4366CX8/LF**		1.16 x 1.16 x 0.61
		47 Ω / 100 Ω	40	~12	Integrated SIM-card EMI filter and ESD protection	IP4264CZ8-40	SOT983 (8 pin QFN)	1.7 x 1.35 x 0.5
		47 Ω / 100 Ω	20	~20	Integrated SIM-card EMI filter and ESD protection	IP4264CZ8-20		1.7 x 1.35 x 0.5
		-	1	~240	Quad channel low capacitance ESD protection	IP4221CZ6-S	SOT886 (XSON6)	1.45 x 1.0 x 0.5
SD-card / MMC	4	47 Ω / 13 k Ω / 56 kΩ	25	~30	MMC ESD protection, pull-up resistors	IP4051CX11/LF	11 ball CSP	1.44 x 1.96 x 0.65
		50 Ω / 75 kΩ / 7 kΩ	18	~50	High-speed MMC ESD protection, pull-up resistors	IP4060CX16/LF	16 ball CSP	1.96 x 1.97 x 0.65
	7	40 Ω / 50 kΩ / 25 kΩ	18	~20	(Mini) SD/trans flash card ESD protection, EMI filter, pull-up resistors	IP4052CX20/LF	20 ball CSP	2.54 x 1.96 x 0.65
		-	5	~24	Memory stick PRO ESD protection	IP4067CX9/LF	9 ball CSP	1.46 x 1.52 x 0.65
	6 (+3)	15 Ω / 50 kΩ / 15 kΩ	8	> 52	Very low capacitance, low channel resistance (mini) SD card/trans flash ESD protection EMI filter, pull-up resistor	IP4350CX24/LF	24 ball CSP	1.95 x 2.11 x 0.61
		40 Ω / 50 kΩ / 15 kΩ	20	> 52	(Mini) SD card/trans flash ESD protection, EMI filter, pull-up resistor	IP4352CX24/LF		2.02 x 2.01 x 0.61
		-	-	> 52	(Mini) SD/SDIO memory card level shifter, can be combined with IP4352CX24/LF	IP4852CX25/LF	25 ball CSP	2.01 x 2.01 x 0.61
		40 Ω / 50 kΩ / 15 kΩ	-	> 52	(Mini) SD/SDIO memory card level shifter, and voltage regular, incl. ESD and EMI filter	**IP4853CX24/LF**	24 ball CSP	2.01 x 2.01 x 0.61

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

Battery and charger protection

types in **bold** represent new products

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

USB, LVDS, SATA, LAN

types in **bold** represent new products

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

USB, LVDS, SATA, LAN

types in **bold** represent new products

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

USB, LVDS, SATA, LAN

types in **bold** represent new products

Baseband interface	Number of protected lines	R_{line}	C_{line} (pF)	Digital interface clock speed (MHz)	Remark	Type	Package	Size (mm)
USB3.0 SuperSpeed USB / USB2.0	4	-	0.6	-	ESD protection for ultra high speed interfaces	**IP4283CZ10-TB**	SOT1059 (XSON10U)	1.0 x 2.5 x 0.5
		-	0.6	-	ESD protection for ultra high speed interfaces	**IP4283CZ10-TT**	SOT552 (TSSOP10)	3.0 x 3.0 x 1.1
		-	0.5	-	ESD protection for ultra high speed interfaces	**IP4284CZ10-TB**	SOT1059 (XSON10U)	1.0 x 2.5 x 0.5
		-	0.5	-	ESD protection for ultra high speed interfaces	**IP4284CZ10-TT**	SOT552 (TSSOP10)	3.0 x 3.0 x 1.1
	5	-	0.5	-	ESD protection for up to 5 ultra high speed datalines	**PESD5V0F5BK**	SOT891 (XSON6)	1.0 x 1.0 x 0.5
Display port	4	0.6	0.6	-	ESD protection for ultra high speed interfaces	**IP4283CZ10-TB**	SOT1059 (XSON10U)	1.0 x 2.5 x 0.5
		-	0.6	-	ESD protection for ultra high speed interfaces	**IP4283CZ10-TT**	SOT552 (TSSOP10)	3.0 x 3.0 x 1.1
		-	0.5	-	ESD protection for ultra high speed interfaces	**IP4284CZ10-TB**	SOT1059 (XSON10U)	1.0 x 2.5 x 0.5
		-	0.5	-	ESD protection for ultra high speed interfaces	**IP4284CZ10-TT**	SOT552 (TSSOP10)	3.0 x 3.0 x 1.1
		-	0.6	-	ESD protection for high speed interfaces	**IP4286CZ6-TBF**	SOT886 (XSON6)	1.45 x 1.0 x 0.5

USB, LVDS, SATA, LAN

types in **bold** represent new products

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

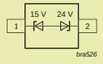
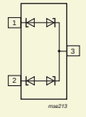
USB, LVDS, SATA, LAN

types in **bold** represent new products

Baseband interface	Number of protected lines	R_{line}	C_{line} (pF)	Digital interface clock speed (MHz)	Remark	Type	Package	Size (mm)
LAN	1	-	0.6	-	Ethernet ESD protection V_{RWM}=3.3 V	PESD3V3U1UT	SOT23	2.9 x 1.3 x 1.0
		-	0.6	-	Ethernet ESD protection V_{RWM}=5.0 V	PESD5V0U1UT		
		-	0.6	-	Ethernet ESD protection V_{RWM}=12 V	PESD12VU1UT		
		-	0.6	-	Ethernet ESD protection V_{RWM}=15 V	PESD15VU1UT		
		-	0.6	-	Ethernet ESD protection V_{RWM}=24 V	PESD24VU1UT		
	4	-	1	-	Ethernet ESD protection	IP4220CZ6	SOT457 (SC-74)	2.9 x 1.5 x 1.0
		-	1	-	Ethernet line surge ESD protection	**IP4233CZ6**	SOT363 (SC-88)	2.0 x 1.25 x 0.95

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

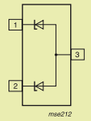
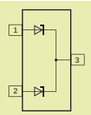
Automotive LIN/CAN/FlexRay

Number of protected lines bidirectional	V_{RWM} (V)	C_{line} typ (pF)	C_{line} max (pF)	P_{PP} [1] max (W)	ESD rating [2] max (kV)	I_r max [µA] @ V_{RWM}	Configuration	Type	Package	Size (mm)
1	15 (diode 1) 24 (diode 2)	13	17	160	23	0.05		PESD1LIN	SOD323 (SC-76)	1.7 x 1.25 x 0.95
2	24	11	17	200	23	0.05		PESD1CAN	SOT23	2.9 x 1.3 x 1.0
		25	30	230	30	0.01		PESD2CAN		2.9 x 1.3 x 1.0
		11	17	200	23	0.05		PESD1FLEX		2.9 x 1.3 x 1.0

[1] 8/20 µs surge pulse acc. to IEC 61000-4-5 [2] acc. to IEC 61000-4-2 (contact discharge)

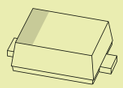
TVS diodes, 24 W / 40 W

types in **bold** represent new products

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

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

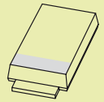
TVS diodes, 400 W

Power (W) (10/1000 µs waveform) [1]	V_{RWM} (V)	V_{BR} min (V) @ I_R	V_{BR} typ (V) @ I_R	V_{BR} max (V) @ I_R	I_R (mA)	V_{CL} max (V) @ I_{PP}	I_{PP} (A)	I_{RM} max (µA) @ V_{RWM}	I_{RM} max (µA) @ V_{RWM}	Type	Package	Size (mm)
350	3.5	5.20	5.60	6.00	10	8.0	43.8	5	600	PTVS3V3S1UR	SOD123W 	2.6 x 1.7 x 1.0
400	5.0	6.40	6.70	7.00	10	9.2	43.5	5	400	PTVS5V0S1UR		
	6.0	6.67	7.02	7.37	10	10.3	38.8	5	400	PTVS6V0S1UR		
	6.5	7.22	7.60	7.98	10	11.2	35.7	5	250	PTVS6V5S1UR		
	7.0	7.78	8.20	8.60	10	12.0	33.3	3	100	PTVS7V0S1UR		
	7.5	8.33	8.77	9.21	1	12.9	31.0	0.2	50	PTVS7V5S1UR		
	8.0	8.89	9.36	9.83	1	13.6	29.4	0.03	25	PTVS8V0S1UR		
	8.5	9.44	9.92	10.40	1	14.4	27.8	0.01	10	PTVS8V5S1UR		
	9.0	10.00	10.55	11.10	1	15.4	26.0	0.005	5	PTVS9V0S1UR		
	10	11.10	11.70	12.30	1	17.0	23.5	0.005	2.5	PTVS10VS1UR		
	11	12.20	12.85	13.50	1	18.2	22.0	0.005	2.5	PTVS11VS1UR		
	12	13.30	14.00	14.70	1	19.9	20.1	0.005	2.5	PTVS12VS1UR		
	13	14.40	15.15	15.90	1	21.5	18.6	0.001	0.1	PTVS13VS1UR		
	14	15.60	16.40	17.20	1	23.2	17.2	0.001	0.1	PTVS14VS1UR		
	15	16.70	17.60	18.50	1	24.4	16.4	0.001	0.1	PTVS15VS1UR		
	16	17.80	18.75	19.70	1	26.0	15.4	0.001	0.1	PTVS16VS1UR		
	17	18.90	19.90	20.90	1	27.6	14.5	0.001	0.1	PTVS17VS1UR		
	18	20.00	21.00	22.10	1	29.2	13.7	0.001	0.1	PTVS18VS1UR		
	20	22.20	23.35	24.50	1	32.4	12.3	0.001	0.1	PTVS20VS1UR		
	22	24.40	25.60	26.90	1	35.5	11.3	0.001	0.1	PTVS22VS1UR		
	24	26.70	28.10	29.50	1	38.9	10.3	0.001	0.1	PTVS24VS1UR		
	26	28.90	30.40	31.90	1	42.1	9.5	0.001	0.1	PTVS26VS1UR		
	28	31.10	32.80	34.40	1	45.4	8.8	0.001	0.1	PTVS28VS1UR		
	30	33.30	35.10	36.80	1	48.4	8.3	0.001	0.1	PTVS30VS1UR		
	33	36.70	38.70	40.60	1	53.3	7.5	0.001	0.1	PTVS33VS1UR		
	36	40.00	42.10	44.20	1	58.1	6.9	0.001	0.1	PTVS36VS1UR		
	40	44.40	46.80	49.10	1	64.5	6.2	0.001	0.1	PTVS40VS1UR		
	43	47.80	50.30	52.80	1	69.4	5.8	0.001	0.1	PTVS43VS1UR		
	45	50.00	52.65	55.30	1	72.7	5.5	0.001	0.1	PTVS45VS1UR		
	48	53.30	56.10	58.90	1	77.4	5.2	0.001	0.1	PTVS48VS1UR		
	51	56.70	59.70	62.70	1	82.4	4.9	0.001	0.1	PTVS51VS1UR		
	54	60.00	63.15	66.30	1	87.1	4.6	0.001	0.1	PTVS54VS1UR		
	58	64.40	67.80	71.20	1	93.6	4.3	0.001	0.1	PTVS58VS1UR		
	60	66.70	70.20	73.70	1	96.8	4.1	0.001	0.1	PTVS60VS1UR		
	64	71.10	74.85	78.60	1	103.0	3.9	0.001	0.1	PTVS64VS1UR		

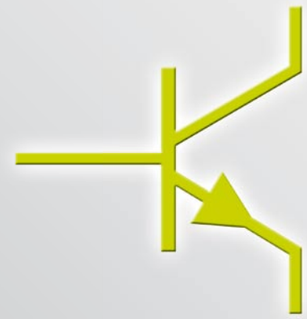
[1] 10/1000 µs acc. to IEC 61643-321

TVS diodes, 600 W

types in **bold** represent new products

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

[1] 10/1000 µs acc. to IEC 61643-321



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Single transistors

Package						SOT23	SOT323 (SC-70)	SOT416 (SC-75)	SOT883 (SC-101)
Size (mm)						2.9 x 1.3 x 1.0	2.0 x 1.25 x 0.95	1.6 x 0.8 x 0.77	1.0 x 0.6 x 0.5
P_{tot} (mW)						250	200	150	250
Polarity	V_{CEO} (V)	I_C (mA)	h_{FE} min	h_{FE} max	$f_T$min (MHz)				
NPN	25	100	450	1200	100		PMST5089		
	30	100	110 - 200	450 - 800	100	BC848B	BC848W		
			350	900	100		PMST5088		
	32	100	110 - 420	220 - 800	100	BCW31 / 32 / 33			
			180 - 380	310 - 630	250	BCW60B / C / D			
	40	100	120 - 270	270 - 560	100				2PC4617QM / RM
	45	100	110 - 420	220 - 800	100	BC847 / A / B / C	BC847W / AW / BW / CW	BC847T / AT / BT / CT	BC847AM / BM / CM
			120 - 380	220 - 630	100	BCX70G / H / J / K			
			110 - 200	220 - 450	100	BCW71 / 72			
			500	1250	100	PMBT6429	PMST6429		
	50	100	210 - 290	340 - 460	100 - 150	2PD601ART 2PD601ARL 2PD601ASL	2PD601ARW / SW		
			250	650	100	PMBT6428	PMST6428		
	60	100	110 - 200	220 - 450	100	BCV71 / 72			
	65	100	110 - 200	220 - 450	100	BC846 / A / B	BC846W / AW / BW	BC846T / AT / BT	
	80	100	20	80	60	BSS64			
	50	150	120 - 270	270 - 560	100		2PC4081Q / R / S	2PC4617Q / R	
	45	500	100 - 250	250 - 600	100	BC817 / -16 / -25 / -40	BC817W / -16W / -25W / -40W		
			100	600	100	BCX19			
	50	500	85 - 170	170 - 340	140 - 180	2PD602AQL 2PD602ARL 2PD602ASL	2PD1820AR / S		
	60	500	50	-	100		PMSTA05		
	80	500	100	-	100	PMBTA06	PMSTA06		
PNP	30	100	125 - 220	500 - 800	100	BC858B	BC858W		
	32	100	120 - 215	260 - 500	100	BCW29 / 30			
			180 - 380	310 - 630	100	BCW61B / C / D			
	40	100	120 - 270	270 - 560	100				2PA1774QM / RM / SM
	45	100	210 - 290	340 - 460	70 - 80	2PB709ART 2PB709ARL 2PB709ASL	2PB709ARW / SW		
			180 - 380	310 - 630	100	BCX71H / J / K			
			120 - 215	260 - 500	100	BCW69 / 70			
			125 - 420	250 - 800	100	BC857 / A / B / C	BC857W / AW / BW / CW	BC857T / AT / BT / CT	BC857AM / BM / CM
	60	100	120	260	150	BCW89			
	65	100	125 - 200	250 - 475	100	BC856 / A / B	BC856W / AW / BW	BC856T / AT / BT	
	100	100	30	-	50	BSS63			
	50	150	120 - 270	270 - 560	100		2PA1576Q / R / S	2PA1774Q / R / S	
	25	500	100	600	80	BCX18			
	45	500	100 - 250	250 - 600	80	BC807 / -16 / -25 / -40	BC807W / -16W / -25W / -40W		
			100	600	80	BCX17			
	50	500	85 - 170	170 - 340	100 - 140	2PB710ARL 2PB710ASL	2PB1219AQ / R / S		
	60	500	100	-	50		PMSTA55		
	80	500	100	-	50	PMBTA56	PMSTA56		

Double transistors

types in **bold** represent new products

Package						SOT457 (SC-74)	SOT363 (SC-88)	SOT666
Size (mm)						2.9 x 1.5 x 1.0	2.0 x 1.25 x 0.95	1.6 x 1.2 x 0.55
P_{tot} (mW)						600	300	300
Polarity	V_{CEO} (V)	I_C (mA)	h_{FE} min	h_{FE} max	f_T min (MHz)			
NPN	40	100	120	450	100		PUMX1	PEMX1
	45	100	200	450	100	**BC847DS**	BC847BS	BC847BV
	65	100	110	-	100		BC846S	
			200	450	100	**BC846DS**	**BC846BS**	
	50	150	120	560	100		PUMX2	
	45	500	160	400	80	BC817DS		
PNP	40	100	120	450	100	PIMT1	PUMT1	PEMT1
	45	100	200	450	100		BC857BS	BC857BV
	65	100	110	-	100		BC856S	
			200	450	100		**BC856BS**	
	45	500	160	400	80	BC807DS		
NPN/PNP	40	100	120	450	100		PUMZ1	PEMZ1
	45	100	200	450	100		BC847BPN	BC847BVN
	50	100	120	560	100	PIMZ2	PUMZ2	
	65	100	200	450	100		**BC846BPN**	
	12	500	200	-	250/100			PEMZ7
	45	500	160	400	100/80	BC817DPN		

Small-signal transistors

Single and double switching transistors

Package							SOT223 (SC-73)	SOT89 (SC-62)	SOT23	SOT323 (SC-70)	SOT363 (SC-88)	SOT666	SOT883 (SC-101)
Size (mm)							6.5 x 3.5 x 1.65	4.5 x 2.5 x 1.5	2.9 x 1.3 x 1.0	2.0 x 1.25 x 0.95	2.0 x 1.25 x 0.95	1.6 x 1.2 x 0.55	1.0 x 0.6 x 0.5
P_{tot} (mW)							1700	1300	250	200	300	300	250
Configuration							single	single	single	single	double	double	single
Polarity	V_{CEO} (V)	I_C (mA)	h_{FE} min	h_{FE} max	$f_T$min (MHz)	t_{off} (ns)							
NPN	12	100	40	120	400	20			BSV52				
	40	100	100	300	180	1200			PMBS3904	PMSS3904			
					300	250		PXT2222A					
	15	200	40	120	500	20			PMBT2369	PMST2369			
	40	200	100	300	300	250			MMBT3904				
									PMBT3904	PMST3904	PMBT3904YS	PMBT3904VS	PMBT3904M
	30	600	100	300	250	250			PMBT2222	PMST2222			
	40	600	100	300	250	250	PZT4401	PXT4401	PMBT4401	PMST4401			
					300	250			MMBT2222A				
							PZT2222A		PMBT2222A	PMST2222A			
	40	800	100	300	300	250			BSR14				
PNP	40	100	100	300	150	700			PMBS3906	PMSS3906			
	40	200	100	300	250	300			MMBT3906				
									PMBT3906	PMST3906	PMBT3906YS	PMBT3906VS	PMBT3906M
	40	600	100	300	200	350	PZT4403	PXT4403	PMBT4403	PMST4403			
						365			PMBT2907				
	60	600	100	300	200	300				PMST2907A			
						365			BSR16				
							PZT2907A	PXT2907A	PMBT2907A				
NPN/PNP	40	200	100	300	300/250	250/300					PMBT3946YPN	PMBT3946VPN	

Matched pair transistors

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

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

Key features

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

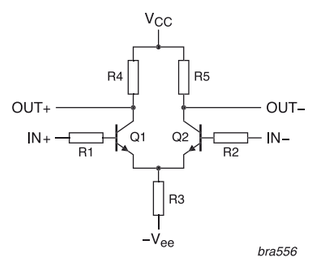
Key benefits

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

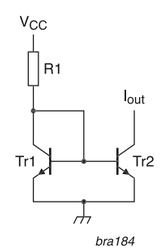
Key applications

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

Differential amplifier



Current mirror



High voltage transistors

Package						SOT223 (SC-73)	SOT89 (SC-62)	SOT457 (SC-74)	SOT23	SOT323 (SC-70)
Size (mm)						6.5 x 3.5 x 1.65	4.5 x 2.5 x 1.5	2.9 x 1.5 x 1.0	2.9 x 1.3 x 1.0	2.0 x 1.25 x 0.95
P_{tot} (mW)						1700	1300	600	250	200
Polarity	V_{CEO} (V)	I_C (mA)	h_{FE} min	h_{FE} max	f_T min (MHz)					
NPN	80	100	20	-	60				BSS64	
	140	100	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 pages 56 - 64.

Low noise transistors

Package							SOT23	SOT323 (SC-70)
Size (mm)							2.9 x 1.3 x 1.0	2.0 x 1.25 x 0.95
P_{tot} (mW)							250	200
Polarity	V_{CEO} (V)	I_C (mA)	NF 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

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 typ (MHz)			
NPN	30	500	10000	125			PMBTA13
			20000	125	PZTA14	PXTA14	PMBTA14
				220		BCV29	BCV27
	45	1000	2000	200	BSP50	BST50	
	60	500	10000	220		BCV49	BCV47
		1000	2000	200	BSP51	BST51	
	80	1000	2000	200	BSP52	BST52	
PNP	30	500	20000	125			PMBTA64
				220		BCV28	BCV26
	45	1000	2000	200	BSP60	BST60	
	60	500	10000	220		BCV48	BCV46
		1000	2000	200	BSP61	BST61	
	80	1000	2000	200	BSP62	BST62	

Medium frequency transistors

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

Schmitt trigger

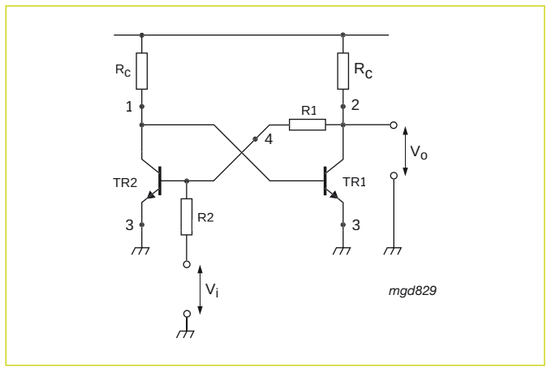
Package							SOT143B
Size (mm)							2.9 x 1.3 x 1.0
P_{tot} (mW)							250
Polarity	V_{CEO} (V) TR1	V_{CEO} (V) TR2	I_C (mA)	h_{FE} min	h_{FE} max	V_{CEsat} typ (mV)	
NPN	30	6	100	110	800	250	BCV63 / B
PNP	30	6	100	220	475	250	BCV64B

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

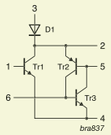
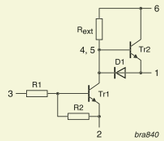
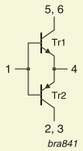
Key benefits
- Reduced component count and pick-and-place costs
- Smaller designs

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

Schmitt trigger



MOSFET driver

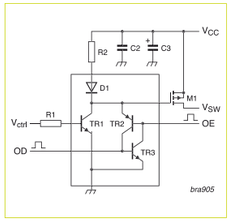
Package			SOT457 (SC-74)			
Size (mm)			2.9 x 1.5 x 1.0			
P_{tot} (mW)			400	400		580
Configuration						
Contains	I_C (A)	I_{CM} (A)		R1 = R2 (kΩ)		
General purpose transistors	0.1	0.2	PMD9050D	-	PMD9010D	BCV65 (SOT143B)
				2.2	PMD9001D	
				4.7	PMD9002D	
				10	PMD9003D	
Switching transistors - reduced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

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

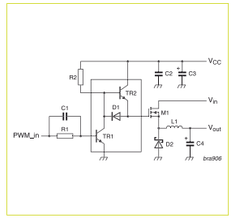
Key benefits
- Reduced component count
- Smaller end products

Key applications
- MOSFET driver
- Bipolar power transistor driver
- Push-pull driver

MOSFET driver with hardware output disable function

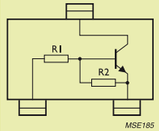
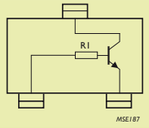


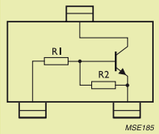
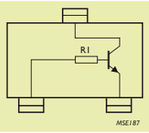
High-side MOSFET driver with level shifter function



Small-signal transistors

RETs 100 mA single

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

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

RETs 100 mA double

Package					SOT457 (SC-74)		SOT363 (SC-88)			SOT666		
Size (mm)					2.9 x 1.5 x 1.0		2.0 x 1.25 x 0.95			1.6 x 1.2 x 0.55		
P_{tot} (mW)					600		300			300		
V_{CEO} (V)	I_C (mA)		R1 (kΩ)	R2 (kΩ)	NPN/NPN	NPN/PNP	NPN/NPN	NPN/PNP	PNP/PNP	NPN/NPN	NPN/PNP	PNP/PNP
50	100	R1 = R2	2.2	2.2			PUMH20	PUMD20	PUMB20	PEMH20	PEMD20	PEMB20
			4.7	4.7			PUMH15	PUMD15	PUMB15	PEMH15	PEMD15	PEMB15
			10	10		PIMD3	PUMH11	PUMD3	PUMB11	PEMH11	PEMD3	PEMB11
			22	22		PIMD2	PUMH1	PUMD2	PUMB1	PEMH1	PEMD2	PEMB1
			47	47			PUMH2	PUMD12	PUMB2	PEMH2	PEMD12	PEMB2
			100	100			PUMH24	PUMD24	PUMB24	PEMH24	PEMD24	PEMB24
		R1 ≠ R2	2.2	47			PUMH10	PUMD10	PUMB10	PEMH10	PEMD10	PEMB10
			4.7	10			PUMH18	PUMD18	PUMB18	PEMH18	PEMD18	PEMB18
			4.7	47			PUMH13	PUMD13	PUMB13	PEMH13	PEMD13	PEMB13
			10	47	PIMH9		PUMH9	PUMD9	PUMB9	PEMH9	PEMD9	PEMB9
			22	47			PUMH16	PUMD16	PUMB16	PEMH16	PEMD16	PEMB16
			47	22			PUMH17	PUMD17	PUMB17	PEMH17	PEMD17	PEMB17
			47/2.2	47/47				PUMD48			PEMD48	
		Only R1	2.2	-			PUMH30	PUMD30	PUMB30	PEMH30	PEMD30	PEMB30
			4.7	-			PUMH7	PUMD6	PUMB3	PEMH7	PEMD6	PEMB3
			10	-			PUMH4	PUMD4	PUMB4	PEMH4	PEMD4	PEMB4
			22	-			PUMH19	PUMD19	PUMB19	PEMH19	PEMD19	PEMB19
			47	-			PUMH14	PUMD14	PUMB14	PEMH14	PEMD14	PEMB14

Small-signal transistors

RETs 500 mA

types in **bold** represent new products

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

Low V_{CEsat} (BISS) RETs

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

Low V_{CEsat} (BISS) transistors

Low V_{CEsat} (BISS) transistors single NPN

types in **bold** represent new products

Package											SOT223 (SC-73)	SOT89 (SC-62)	SOT457 (SC-74)		SOT23	SOT1061	SOT323 (SC-70)	SOT363 (SC-88)	SOT416 (SC-75)	SOT666	SOT883 (SC-101)
Size (mm)											6.5 x 3.5 x 1.65	4.5 x 2.5 x 1.5	2.9 x 1.5 x 1.0		2.9 x 1.3 x 1.0	2.0 x 2.0 x 0.65	2.0 x 1.25 x 0.95	2.0 x 1.25 x 0.95	1.6 x 0.8 x 0.77	1.6 x 1.2 x 0.55	1.0 x 0.6 x 0.5
P_{tot} (mW)											1700	1650	750		480	1400	350	430	250	500	250
V_{CEO} (V)	I_C (A)	I_{CM} (A)	h_{FE} min/typ	@ I_C (A)	@ V_{CE} (V)	R_{CEsat} typ (mΩ); I_C/I_B = 10	V_{CEsat} typ (mV); I_C = 0.5 A; I_B = 0.05 A	V_{CEsat} max (mV)	@ I_C (A)	@ I_B (A)											
12	5.3	10.6	300/530	0.5	2	27 [1]	18	200	5.3	0.265		PBSS301NX									
	5.8	11.6	300/530	0.5	2	29 [1]	18	235	5.8	0.29	PBSS301NZ										
	6.0	7.0	280/440	0.5	2	33 [1]	20	275	6	0.3						**PBSS4612PA**					
15	0.5	1.0	200/325	0.01	2	360	-	250	0.5	0.05											PBSS2515M
			200/425	0.01	2	300	200	250	0.5	0.05									PBSS2515E		
20	1.0	3.0	350/470	0.1	2	220	110 [2]	250	1	0.05					PBSS4120T						
	2.0	4.0	220/410	0.5	2	140	70	350	2	0.2										PBSS4220V	
		5.0	220/330	0.1	2	80	45	310	3	0.3					PBSS4320T						
	3.0	5.0	220/390	0.5	2	85	40	310	3	0.3		PBSS4320X									
	4.0	15.0	300/450	0.5	2	50	30	280	4	0.4			PBSS301ND								
	4.3	8.0	300/550	0.5	2	36	21	220	4	0.2					**PBSS4021NT**						
	5.0	10.0	300/450	0.5	2	32	35	220	5	0.5		PBSS4520X									
	5.3	10.6	300/570	0.5	2	27 [1]	20	200	5.3	0.265		PBSS302NX									
	5.8	10.2	300/570	0.5	2	30 [1]	20	250	5.8	0.29	PBSS302NZ										
	6.0	7.0	280/440	0.5	2	33 [1]	20	275	6	0.3						**PBSS4620PA**					
	7.0	15.0	300/550	0.5	2	19	12	210	7	0.35		**PBSS4021NX**									
	8.0	20.0	300/550	0.5	2	14	9	170	8	0.4	**PBSS4021NZ**										
30	1.0	3.0	300/450	0.5	2	240	120 [2]	270	1	0.05					PBSS4130T						
	2.0	3.0	300/450	0.5	2	120	70	320	2	0.2					PBSS4230T						
	2.6	5.0	300/500	0.5	2	76	80	320	3	0.3					**PBSS4032NT** [3]						
	3.0	5.0	300/490	0.5	2	80	45	300	3	0.3		PBSS4330X				**PBSS4330PA**					
	3.5	6.0	300/500	0.5	2	50	70	300	4	0.4			**PBSS4032ND** [3]								
	4.7	10.0	300/500	0.5	2	45	57	250	4	0.4		**PBSS4032NX** [3]									
	5.1	10.2	300/480	0.5	2	30 [1]	20	220	5.1	0.255		PBSS303NX									
	5.4	10.0	300/500	0.5	2	45	57	340	5.4	0.27	**PBSS4032NZ** [3]										
	5.5	11.0	300/480	0.5	2	31 [1]	20	240	5.5	0.275	PBSS303NZ										
	6.0	7.0	280/450	0.5	2	35 [1]	21	275	6	0.3						**PBSS4630PA**					
40	0.5	1.0	200/550	0.01	2	380	200 [2]	250	0.5	0.05											PBSS2540M
			200/350	0.01	2	380	190	250	0.5	0.05									PBSS2540E		
	1.0	3.0	300/ -	0.5	5	150	70	440	2	0.2										PBSS4140V	
		2.0	300/440	0.5	5	240	130	500	1	0.1							PBSS4140U				
			300/510	0.5	5	230	120	500	1	0.1					PMMT491A						
			300/420	0.5	5	150	130	500	1	0.1					PBSS4140T						
	2.0	3.0	300/400	0.5	5	150	70	400	2	0.2										PBSS4240V	
			350/470	0.1	2	120	70	320	2	0.2								PBSS4240Y			
			300/450	0.5	2	120	70	320	2	0.2					PBSS4240T						
	4.0	15.0	300/520	0.5	2	55	35	300	4	0.4			PBSS302ND								
		10.0	300/500	0.5	2	40	21	355	5	0.5		PBSS4540X									
	5.0	10.0	300/500	0.5	2	42	25	355	5	0.5	PBSS4540Z										
50	2.0	5.0	300/495	0.5	2	100	60	260	2	0.2					PBSS4350T						
			300/ -	0.5	2	160	90 [2]	320	2	0.2		PBSS4250X									
	3.0	5.0	200/280	0.5	2	110	65	290	2	0.2			PBSS4350D								
			300/460	0.5	2	75	50	370	3	0.3		PBSS4350X									
			200/280	0.5	2	110	60 [1]	290	2	0.2	PBSS4350Z										
60	1.0	2.0	200/400	0.5	5	200	110	250	1	0.1										PBSS4160V	
			200/420	0.5	5	230	120	280	1	0.1							PBSS4160U				
			200/350	0.5	5	200	110	250	1	0.1					PBSS4160T						
	3.0	6.0	345/570	0.5	2	65	40	260	3	0.3			PBSS303ND								
	3.8	8.0	300/500	0.5	2	46	29	200	3	0.3					**PBSS4041NT**						
	4.7	9.4	300/520	0.5	2	37 [1]	25	245	4.7	0.235		PBSS304NX									
	5.2	10.4	300/520	0.5	2	39 [1]	25	280	5.2	0.26	PBSS304NZ										
	6.0	7.0	280/440	0.5	2	34 [1]	22	290	6	0.3						**PBSS4560PA**					
	6.2	15.0	300/500	0.5	2	25	17	230	6	0.3		**PBSS4041NX**									
	7.0	15.0	300/500	0.5	2	17.5	13	195	7	0.35	**PBSS4041NZ**										
80	3.0	6.0	240/360	0.5	2	67	40	255	3	0.3			PBSS304ND								
	4.0	10.0	250/400	0.5	2	43 [1]	25	230	4	0.2		PBSS4480X									
	4.6	9.2	300/470	0.5	2	37 [1]	25	240	4.6	0.23		PBSS305NX									
	5.1	10.2	300/470	0.5	2	38 [1]	25	270	5.1	0.255	PBSS305NZ										
	5.6	7.0	270/425	0.5	2	40 [1]	25	320	5.6	0.28						**PBSS4580PA**					
100	1.0	3.0	150/400	0.25	10	160	80	200	1	0.1								PBSS8110Y			
			150/300	0.25	10	165	70	200	1	0.1					PBSS8110T						
			150/290	0.25	10	160	75	200	1	0.1			PBSS8110D								
			150/290	0.25	10	165	73	200	1	0.1		PBSS8110X									
			150/290	0.25	10	160	73	200	1	0.1	PBSS8110Z										
	3.0	4.0	170/275	0.5	2	72	45	360	4	0.4			PBSS305ND								
	4.5	9.0	200/330	0.5	2	38 [1]	27	245	4.5	0.225		PBSS306NX									
	5.1	10.2	200/330	0.5	2	43 [1]	27	300	5.1	0.255	PBSS306NZ										
	5.2	6.0	180/285	0.5	2	48 [1]	30	340	5.2	0.26						**PBSS8510PA**					

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

Small-signal transistors

Low V_{CEsat} (BISS) transistors

Low V_{CEsat} (BISS) transistors single PNP

types in **bold** represent new products

Package											SOT223 (SC-73)	SOT89 (SC-62)	SOT457 (SC-74)		SOT23	SOT1061	SOT323 (SC-70)	SOT363 (SC-88)	SOT416 (SC-75)	SOT666	SOT883 (SC-101)
Size (mm)											6.5 x 3.5 x 1.65	4.5 x 2.5 x 1.5	2.9 x 1.5 x 1.0		2.9 x 1.3 x 1.0	2.0 x 2.0 x 0.65	2.0 x 1.25 x 0.95	2.0 x 1.25 x 0.95	1.6 x 0.8 x 0.77	1.6 x 1.2 x 0.55	1.0 x 0.6 x 0.5
P_{tot} (mW)											1700	1650	750		480	1400	350	430	250	500	250
V_{CEO} (V)	I_C (A)	I_{CM} (A)	h_{FE} min/typ	@ I_C (V)	@ V_{CE} (V)	R_{CEsat} typ (mΩ); I_C/I_B = 10	V_{CEsat} typ (mV); I_C = 0.5 A; I_B = 0.05 A	V_{CEsat} max (mV)	@ I_C (A)	@ I_B (A)											
12	5.3	10.6	250/400	0.5	2	28 [1]	20	210	5.3	0.265		PBSS301PX									
	5.7	11.4	250/400	0.5	2	30 [1]	20	245	5.7	0.285	PBSS301PZ										
	6.0	7.0	220/335	0.5	2	33 [1]	20	300	6	0.3						**PBSS5612PA**					
15	0.5	1.0	200/260	0.01	2	300	150	250	0.5	0.05											PBSS3515M
			200/325	0.01	2	300	150	250	0.5	0.05									PBSS3515E		
20	1.0	2.0	300/450	0.1	2	250	125 [2]	250	1	0.05					PBSS5120T						
	2.0	4.0	220/440	0.1	2	140	75	390	2	0.2										PBSS5220V	
		3.0	225/ -	0.5	2	115	80 [2]	225	2	0.2					PBSS5220T						
		5.0	220/420	0.5	2	75	50	210	2	0.2					PBSS5320T						
	3.0	5.0	200/ -	0.5	2	85	80 [2]	400	3	0.3			PBSS5320D								
			220/450	0.5	2	90	50	300	3	0.3		PBSS5320X									
	3.5	8.0	250/400	0.5	2	55	35	375	4	0.2					**PBSS4021PT**						
	4.0	15.0	250/400	0.5	2	50	35	280	4	0.4			PBSS301PD								
	5.0	10.0	300/430	0.5	2	34	45	270	5	0.5		PBSS5520X									
	5.1	10.2	250/370	0.5	2	32 [1]	25	230	5.1	0.255		PBSS302PX									
	5.5	11.0	250/370	0.5	2	34 [1]	25	265	5.5	0.275	PBSS302PZ										
	6.0	7.0	230/345	0.5	2	39 [1]	25	350	6	0.3						**PBSS5620PA**					
	6.2	15.0	250/400	0.5	2	25	18	240	6	0.3		**PBSS4021PX**									
	6.6	20.0	250/400	0.5	2	22	16	240	7	0.35	**PBSS4021PZ**										
30	1.0	3.0	260/350	0.5	2	220	110	225	1	0.05					PBSS5130T						
	2.0	3.0	300/450	0.1	2	160	70	350	2	0.2					PBSS5230T						
	2.4	5.0	200/320	0.5	2	110	95	330	2	0.2					**PBSS4032PT** [3]						
	2.7	5.0	200/350	0.5	2	88	87	395	3	0.3			**PBSS4032PD** [3]								
	3.0	5.0	200/380	0.5	2	80	50	320	3	0.3		PBSS5330X				**PBSS5330PA**					
	4.2	10.0	200/350	0.5	2	58	70	345	4	0.4		**PBSS4032PX** [3]									
	4.4	10.0	200/350	0.5	2	58	70	400	4	0.2	**PBSS4032PZ** [3]										
	5.1	10.2	250/400	0.5	2	32 [1]	25	230	5.1	0.255		PBSS303PX									
	5.3	10.6	250/400	0.5	2	35 [1]	25	265	5.3	0.265	PBSS303PZ										
	6.0	7.0	200/335	0.5	2	39 [1]	25	350	6	0.3						**PBSS5630PA**					
40	0.5	1.0	200/380	0.01	2	440	220	350	0.5	0.05											PBSS3540M
			200/380	0.01	2	440	230	350	0.5	0.05									PBSS3540E		
	1.0	2.0	300/ -	0.1	5	200	120	310	1	0.1										PBSS5140V	
			300/520	0.1	5	230	130	500	1	0.1							PBSS5140U				
			300/800	0.1	5	250	130	500	1	0.1					PMMT591A						
			300/510	0.1	5	230	130	500	1	0.1					PBSS5140T						
	1.8	3.0	300/450	0.1	5	185	100	530	2	0.2										PBSS5240V	
	2.0	3.0	300/ -	0.1	2	200	110 [2]	350	2	0.2								PBSS5240Y			
			300/450	0.1	2	150	70	350	2	0.2					PBSS5240T						
	4.0	15.0	200/310	0.5	2	55	46	300	4	0.4			PBSS302PD								
		10.0	250/370	0.5	2	45	33	375	5	0.5		PBSS5540X									
	5.0	10.0	250/350	0.5	2	55	40 [1]	160	2	0.2	PBSS5540Z										
50	2.0	3.0	200/ -	0.5	2	150	90 [2]	300	2	0.1					PBSS5250T						
		5.0	200/360	0.5	2	90	55	270	2	0.2					PBSS5350T						
			200/ -	0.5	2	160	90 [2]	320	2	0.2		PBSS5250X									
	3.0	5.0	200/300	0.5	2	120	70	300	2	0.2			PBSS5350D								
			200/375	0.5	2	120	70	390	3	0.3		PBSS5350X									
			200/300	0.5	2	120	70	300	2	0.2	PBSS5350Z										
60	1.0	2.0	150/250	0.5	5	220	120	330	1	0.1										PBSS5160V	
			150/250	0.5	5	255	135	340	1	0.1							PBSS5160U				
			150/250	0.5	5	220	120	330	1	0.1					PBSS5160T						
	2.7	8.0	200/300	0.5	2	80	49	360	3	0.3					**PBSS4041PT**						
	3.0	6.0	180/265	0.5	2	70	55	290	3	0.3			PBSS303PD								
	4.2	8.4	200/295	0.5	2	53 [1]	35	310	4.2	0.21		PBSS304PX									
	4.5	9.0	200/295	0.5	2	59 [1]	35	375	4.5	0.225	PBSS304PZ										
	5.0	6.0	170/260	0.5	2	35 [1]	55	450	5	0.25						**PBSS5560PA**					
		15.0	200/300	0.5	2	40	30	300	5	0.5		**PBSS4041PX**									
	5.7	15.0	200/300	0.5	2	29	22	285	6	0.3	**PBSS4041PZ**										
80	3.0	5.0	155/225	0.5	2	71	55	290	3	0.3			PBSS304PD								
	4.0	5.0	180/265	0.5	2	65 [1]	40	420	4	0.2						**PBSS5580PA**					
		10.0	200/300	0.5	2	50	35	380	5	0.5		PBSS5480X									
		8.0	200/280	0.5	2	43	36	240	4	0.4		PBSS305PX									
	4.5	9.0	200/280	0.5	2	69 [1]	36	450	4.5	0.225	PBSS305PZ										
100	1.0	3.0	150/ -	0.25	5	170	93	320	1	0.1								PBSS9110Y			
			150/350	0.5	5	170	95	320	1	0.1					PBSS9110T						
			150/350	0.5	5	170	100	320	1	0.1			PBSS9110D								
			150/350	0.5	5	170	90	320	1	0.1		PBSS9110X									
			150/ -	0.5	5	170	90	320	1	0.1	PBSS9110Z										
	2.0	3.0	175/275	0.5	2	88	65	250	2	0.2			PBSS305PD								
	2.7	4.0	180/295	0.5	2	110 [1]	45	450	2.7	0.135						**PBSS9410PA**					
	3.7	7.4	200/300	0.5	2	52	45	300	4	0.4		PBSS306PX									
	4.1	8.2	200/300	0.5	5	57	45	325	4.1	0.41	PBSS306PZ										

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

Small-signal transistors

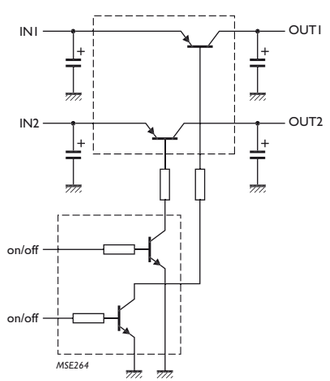
Low V_{CEsat} (BISS) transistors double

types in **bold** represent new products

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

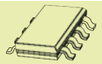
[1] I_c/I_b=20
[2] Device mounted on a ceramic PCB, Al2O3, standard footprint.
[3] Optimized for high speed switching

Dual load switch using double RETs and double BISS transistors



Low V_{CEsat} (BISS) load switches

types in **bold** represent new products

Package				SOT96 (SO8)	SOT457 (SC-74)		SOT363 (SC-88)	SOT666
								
Size (mm)				4.9 x 3.9 x 1.75	2.9 x 1.5 x 1.0		2.0 x 1.25 x 0.95	1.6 x 1.2 x 0.55
P_{tot} (mW)				1500 [1]	750 [1]	600 [1]	300 [2]	300 [2]
V_{CEO} (V)	I_C (A)	V_{CEsat} max (mV); I_c = 0.5A; I_B = 0.05A	R1, R2 (kΩ)					
15	0.5	250	2.2				PBLS1501Y	PBLS1501V
			4.7				PBLS1502Y	PBLS1502V
			10				PBLS1503Y	PBLS1503V
			22				PBLS1504Y	PBLS1504V
20	1	150	2.2			PBLS2001D		
			4.7			PBLS2002D		
			10			PBLS2003D		
			22			PBLS2004D		
	1.8	70	2.2		**PBLS2021D**			
			4.7		**PBLS2022D**			
			10		**PBLS2023D**			
			22		**PBLS2024D**			
	3	75	2.2	PBLS2001S				
			4.7	PBLS2002S				
			10	PBLS2003S				
40	0.5	350	2.2				PBLS4001Y	PBLS4001V
			4.7				PBLS4002Y	PBLS4002V
			10				PBLS4003Y	PBLS4003V
			22				PBLS4004Y	PBLS4004V
			47				PBLS4005Y	PBLS4005V
	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, Al_2O_3, standard footprint
[2] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint

Key features

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

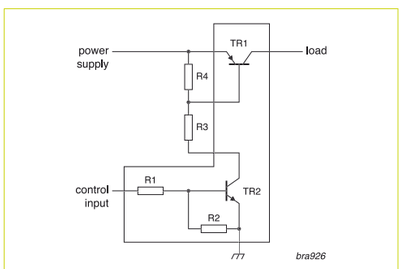
Key benefits

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

Key applications

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

BISS load switch



Small-signal transistors

High voltage low V_{CEsat} (BISS) transistors

types in **bold** represent new products

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

[1] Collector-emitter peak voltage

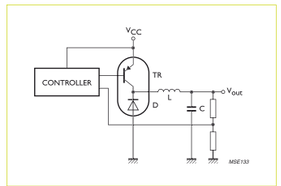
Low V_{CEsat} modules – Schottky diode / (BISS) transistor

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

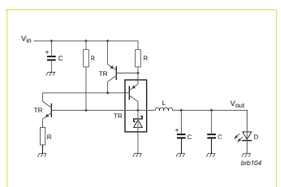
Key features
- Combination of low V_F (MEGA) Schottky rectifier and low V_{CEsat} (BISS) transistor in one package
- High forward current capability
- Low power dissipation

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

Step-down DC/DC converter



Power LED driver



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

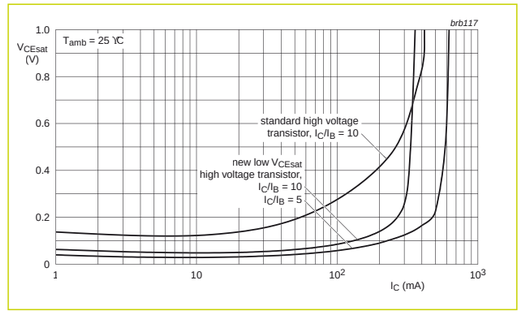
Low V_{CEsat} (BISS) RETs

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

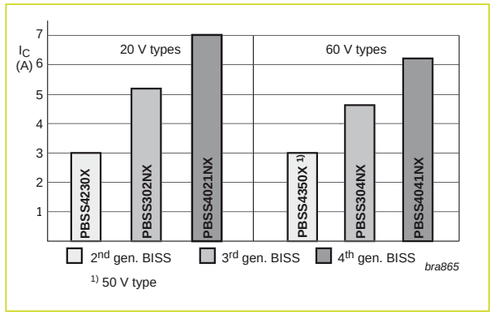
Advantages of low V_{CEsat} (BISS) technology

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

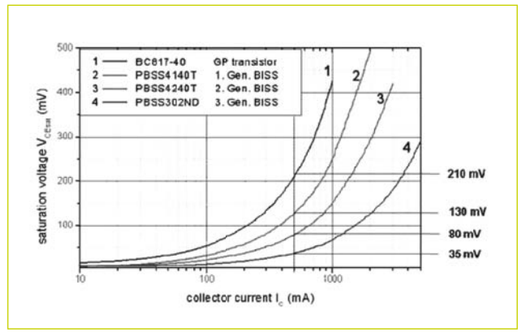
High voltage low V_{CEsat} (BISS)
V_{CEsat} improvement leads to higher I_C capability



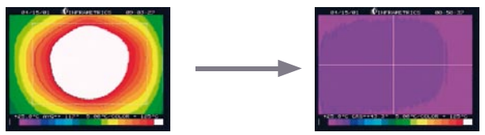
Improved collector current capabilities



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



65 % heat reduction by BISS transistors



General purpose transistor T_{case} = 110°C

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

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

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

types in **bold** represent new products

Package												SOT223 (SC-73)	SOT89 (SC-62)	SOT457 (SC-74)	SOT1061
Size (mm)												6.5 x 3.5 x 1.65	4.5 x 2.5 x 1.5	2.9 x 1.5 x 1.0	2.0 x 2.0 x 0.65
P_{tot} (mW)												1700	1650	750	1400
Polarity	V_{CEO} (V)	I_C (A)	I_{CM} (A)	h_{FE} min/typ	@ I_C (A)	@ V_{CE} (V)	R_{CEsat} typ (mΩ); I_C/I_B = 10	V_{CEsat} typ (mV); I_C = 0.5A; I_B = 0.05A	V_{CEsat} max (mV)	@ I_C (A)	@ I_B (A)				
NPN	12	5.3	10.6	300/530	0.5	2	27 [1]	18	200	5.3	0.265		PBSS301NX		
		5.8	11.6	300/530	0.5	2	29 [1]	18	235	5.8	0.29	PBSS301NZ			
		6.0	7.0	280/440	0.5	2	33 [1]	20	275	6	0.3				**PBSS4612PA**
	20	3.0	5.0	220/390	0.5	2	85	40	310	3	0.3		PBSS4320X		
		4.0	15.0	300/450	0.5	2	50	30	280	4	0.4			PBSS301ND	
		5.0	10.0	300/450	0.5	2	32	35	220	5	0.5		PBSS4520X		
		5.3	10.6	300/570	0.5	2	27 [1]	20	200	5.3	0.265		PBSS302NX		
		5.8	10.2	300/570	0.5	2	30 [1]	20	250	5.8	0.29	PBSS302NZ			
		6.0	7.0	280/440	0.5	2	33 [1]	20	275	6	0.3				**PBSS4620PA**
		7.0	15.0	300/550	0.5	2	19	12	210	7	0.35		**PBSS4021NX**		
		8.0	20.0	300/550	0.5	2	14	9	170	8	0.4	**PBSS4021NZ**			
	30	3.0	5.0	300/490	0.5	2	80	45	300	3	0.3		PBSS4330X		**PBSS4330PA**
		3.5	6.0	300/500	0.5	2	50	70	300	4	0.4			**PBSS4032ND** [3]	
		4.7	10.0	300/500	0.5	2	45	57	250	4	0.4		**PBSS4032NX** [3]		
		5.1	10.2	300/480	0.5	2	30 [1]	20	220	5.1	0.255		PBSS303NX		
		5.4	10.0	300/500	0.5	2	45	57	340	5.4	0.27	**PBSS4032NZ** [3]			
		5.5	11.0	300/480	0.5	2	31 [1]	20	240	5.5	0.275	PBSS303NZ			
		6.0	7.0	280/450	0.5	2	35	21	275	6	0.3				**PBSS4630PA**
	40	4.0	15.0	300/520	0.5	2	55	35	300	4	0.4			PBSS302ND	
			10.0	300/500	0.5	2	40	21	355	5	0.5		PBSS4540X		
		5.0	10.0	300/500	0.5	2	42	25	355	5	0.5	PBSS4540Z			
	50	2.0	5.0	300/495	0.5	2	100	60	260	2	0.2				
				300/ -	0.5	2	160	90 [2]	320	2	0.2		PBSS4250X		
		3.0	5.0	200/280	0.5	2	110	65	290	2	0.2			PBSS4350D	
				300/460	0.5	2	75	50	370	3	0.3		PBSS4350X		
				200/280	0.5	2	110	60 [1]	290	2	0.2	PBSS4350Z			
	60	3.0	6.0	345/570	0.5	2	65	40	260	3	0.3			PBSS303ND	
		4.7	9.4	300/520	0.5	2	37 [1]	25	245	4.7	0.235		PBSS304NX		
		5.2	10.4	300/520	0.5	2	39 [1]	25	280	5.2	0.26	PBSS304NZ			
		6.0	7.0	280/440	0.5	2	34 [1]	22	290	6	0.3				**PBSS4560PA**
		6.2	15.0	300/500	0.5	2	25	17	230	6	0.3		**PBSS4041NX**		
		7.0	15.0	300/500	0.5	2	17.5	13	195	7	0.35	**PBSS4041NZ**			
	80	3.0	6.0	240/360	0.5	2	67	40	255	3	0.3			PBSS304ND	
		4.0	10.0	250/400	0.5	2	43 [1]	25	230	4	0.2		PBSS4480X		
		4.6	9.2	300/470	0.5	2	37 [1]	25	240	4.6	0.23		PBSS305NX		
		5.1	10.2	300/470	0.5	2	38 [1]	25	270	5.1	0.255	PBSS305NZ			
		5.6	7.0	270/425	0.5	2	40 [1]	25	320	5.6	0.28				**PBSS4580PA**
	100	1.0	3.0	150/290	0.25	10	160	75	200	1	0.1			PBSS8110D	
				150/290	0.25	10	165	73	200	1	0.1		PBSS8110X		
				150/290	0.25	10	160	73	200	1	0.1	PBSS8110Z			
		3.0	4.0	170/275	0.5	2	72	45	360	4	0.4			PBSS305ND	
		4.5	9.0	200/330	0.5	2	38 [1]	27	245	4.5	0.225		PBSS306NX		
		5.1	10.2	200/330	0.5	2	43 [1]	27	300	5.1	0.255	PBSS306NZ			
		5.2	6.0	180/285	0.5	2	48 [1]	30	340	5.2	0.26				**PBSS8510PA**

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

Medium power low V_{CEsat} (BISS) transistors PNP

types in **bold** represent new products

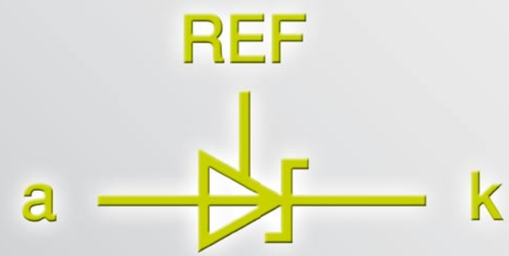
Package												SOT223 (SC-73)	SOT89 (SC-62)	SOT457 (SC-74)	SOT1061
Size (mm)												6.5 x 3.5 x 1.65	4.5 x 2.5 x 1.5	2.9 x 1.5 x 1.0	2.0 x 2.0 x 0.65
P_{tot} (mW)												1700	1650	750	1400
Polarity	V_{CEO} (V)	I_C (A)	I_{CM} (A)	h_{FE} min/typ	@ I_C (V)	@ V_{CE} (V)	R_{CEsat} typ (mΩ); I_C/I_B = 10	V_{CEsat} typ (mV); I_C = 0.5A; I_B = 0.05A	V_{CEsat} max (mV)	@ I_C (A)	@ I_B (A)				
PNP	12	5.3	10.6	250/400	0.5	2	28 [1]	20	210	5.3	0.265		PBSS301PX		
		5.7	11.4	250/400	0.5	2	30 [1]	20	245	5.7	0.285	PBSS301PZ			
		6.0	7.0	220/335	0.5	2	33 [1]	20	300	6	0.3				**PBSS5612PA**
	20	3.0	5.0	200/ -	0.5	2	85	80 [2]	400	3	0.3			PBSS5320D	
				220/450	0.5	2	90	50	300	3	0.3		PBSS5320X		
		4.0	15.0	250/400	0.5	2	50	35	280	4	0.4			PBSS301PD	
		5.0	10.0	300/430	0.5	2	34	45	270	5	0.5		PBSS5520X		
		5.1	10.2	250/370	0.5	2	32 [1]	25	230	5.1	0.255		PBSS302PX		
		5.5	11.0	250/370	0.5	2	34 [1]	25	265	5.5	0.275	PBSS302PZ			
		6.0	7.0	230/345	0.5	2	39 [1]	25	350	6	0.3				**PBSS5620PA**
		6.2	15.0	250/400	0.5	2	25	18	240	6	0.3		**PBSS4021PX**		
		6.6	20.0	250/400	0.5	2	22	16	240	7	0.35	**PBSS4021PZ**			
	30	2.7	5.0	200/350	0.5	2	88	87	395	3	0.3			**PBSS4032PD** [3]	
		3.0	5.0	200/380	0.5	2	80	50	320	3	0.3		PBSS5330X		**PBSS5330PA**
		4.2	10.0	200/350	0.5	2	58	70	345	4	0.4		**PBSS4032PX** [3]		
		4.4	10.0	200/350	0.5	2	58	70	400	4	0.2	**PBSS4032PZ** [3]			
		5.1	10.2	250/400	0.5	2	32 [1]	25	230	5.1	0.255		PBSS303PX		
		5.3	10.6	250/400	0.5	2	35 [1]	25	265	5.3	0.265	PBSS303PZ			
		6.0	7.0	230/345	0.5	2	39 [1]	25	350	6	0.3				**PBSS5630PA**
	40	4.0	15.0	200/310	0.5	2	55	46	300	4	0.4			PBSS302PD	
			10.0	250/370	0.5	2	45	33	375	5	0.5		PBSS5540X		
		5.0	10.0	250/350	0.5	2	55	40 [1]	160	2	0.2	PBSS5540Z			
	50	2.0	5.0	200/ -	0.5	2	160	90 [2]	320	2	0.2		PBSS5250X		
		3.0	5.0	200/300	0.5	2	120	70	300	2	0.2			PBSS5350D	
				200/375	0.5	2	120	70	390	3	0.3		PBSS5350X		
				200/300	0.5	2	120	70	300	2	0.2	PBSS5350Z			
		3.0	6.0	180/265	0.5	2	70	55	290	3	0.3			PBSS303PD	
	60	4.2	8.4	200/295	0.5	2	53 [1]	35	310	4.2	0.21		PBSS304PX		
		4.5	9.0	200/295	0.5	2	59 [1]	35	375	4.5	0.225	PBSS304PZ			
		5.0	6.0	180/265	0.5	2	35 [1]	55	450	5	0.25				**PBSS5560PA**
			15.0	200/300	0.5	2	40	30	300	5	0.5		**PBSS4041PX**		
		5.7	15.0	200/300	0.5	2	29	22	285	6	0.3	**PBSS4041PZ**			
	80	3.0	5.0	155/225	0.5	2	71	55	290	3	0.3			PBSS304PD	
		4.0	5.0	180/265	0.5	2	65 [1]	40	420	4	0.2				**PBSS5580PA**
		4.5	9.0	200/280	0.5	2	69 [1]	36	450	4.5	0.225	PBSS305PZ			
		5.7	15.0	200/300	0.5	2	29	22	285	6	0.3	PBSS4041PZ			
	100	1.0	3.0	150/350	0.5	5	170	100	320	1	0.1			PBSS9110D	
				150/350	0.5	5	170	90	320	1	0.1		PBSS9110X		
				150/ -	0.5	5	170	90	320	1	0.1	PBSS9110Z			
		2.0	3.0	175/275	0.5	2	88	65	250	2	0.2			PBSS305PD	
		2.7	4.0	180/295	0.5	2	110 [1]	45	450	2.7	0.135				**PBSS9410PA**
		3.7	7.4	200/300	0.5	2	52	45	300	4	0.4		PBSS306PX		
		4.1	8.2	200/300	0.5	5	57	45	325	4.1	0.41	PBSS306PZ			

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

Medium power general purpose transistors

Package						SOT223 (SC-73)	SOT89 (SC-62)
Size (mm)						6.5 x 3.5 x 1.65	4.5 x 2.5 x 1.5
P_{tot} (mW)						1700	1300
Polarity	V_{CEO} (V)	I_C (mA)	h_{FE} min	h_{FE} max	f_T min (MHz)		
NPN	20	1000	85 - 160	375	40	BCP68 / -25	BC868 / -25
	45	1000	63 - 100	160 - 250	100	BCP54 / -10 / -16	BCX54 / -10 / -16
	60	1000	63 - 100	160 - 250	100	BCP55 / -10 / -16	BCX55 / -10 / -16
			100	300	100	BSP41	BSR41
	80	1000	63 - 100	160 - 250	100	BCP56 / -10 / -16	BCX56 / -10 / -16
			40 - 100	120 - 300	100	BSP43	BSR42 / 43
PNP	20	1000	85 - 160	250 - 375	40	BCP69 / -16 / -25	BC869 / -16 / -25
	45	1000	63 - 100	160 - 250	115 [1] - 145 [1]	BCP51 / -10 / -16	BCX51 / -10 / -16
	60	1000	63 - 100	160 - 250	100	BCP52 / -10 / -16	BCX52 / -10 / -16
			40 - 100	120 - 300	100	BSP31	BSR30 / 31
	80	1000	63 - 100	160 - 250	115 [1] - 145 [1]	BCP53 / -10 / -16	BCX53 / -10 / -16
			40 - 100	120 - 300	100	BSP32 / 33	BSR33

[1] typical value



Standard linear products

Adjustable shunt voltage regulator IC 68

Low-dropout adjustable and fixed linear voltage regulator 69

Discrete voltage regulator 69

Constant current source 70

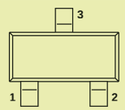
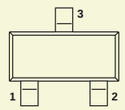
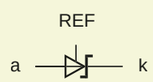
Adjustable shunt voltage regulator IC

types in **bold** represent new products

Package					SOT23	
Size (mm)					2.9 x 1.3 x 1.0	
P_{tot} (mW)					580	
Pinning configuration					normal pinning [7]	mirrored pinning [7]
V_{KA} (V)	I_K (mA)	V_{ref}		T_{amb} (°C)		
20	80	1.24 V	1.5%	0 to 70	**TLVH431CDBZR**	
				-40 to 85	**TLVH431IDBZR**	
				-40 to 125	**TLVH431QDBZR**	**TLVH431MQDBZR**
			1%	0 to 70	**TLVH431ACDBZR**	
				-40 to 85	**TLVH431AIDBZR**	
				-40 to 125	**TLVH431AQDBZR**	**TLVH431AMQDBZR**
			0.5%	0 to 70	**TLVH431BCDBZR**	
				-40 to 85	**TLVH431BIDBZR**	
				-40 to 125	**TLVH431BQDBZR**	**TLVH431BMQDBZR**
36	100	2.495 V	2%	0 to 70	TL431CDBZR	
				-40 to 85	TL431IDBZR	
				-40 to 125	TL431QDBZR	
					TL431SDT [1]	TL431MSDT [1]
			1%	0 to 70	TL431ACDBZR	
				-40 to 85	TL431AIDBZR	
				-40 to 125	TL431AQDBZR	
					TL431ASDT [1]	TL431AMSDT [1]
			0.5%	0 to 70	TL431BCDBZR	
				-40 to 85	TL431BIDBZR	
				-40 to 125	TL431BQDBZR	
					TL431BSDT [1]	**TL431BMSDT [1]**

[1] optimized for use with dedicated capacitive load

* Normal pinning vs. mirrored pinning

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

Low-dropout adjustable and fixed linear voltage regulator

types in **bold** represent new products

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

Discrete voltage regulator

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

Key features

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

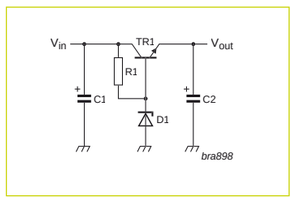
Key benefits

- Component count reduction
- Board space reduction
- Improved reliability

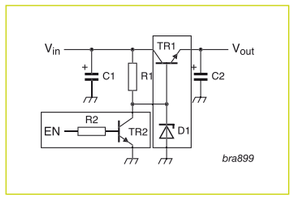
Key applications

- Linear voltage regulation

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



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



Constant current source

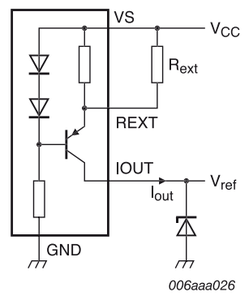
Package	SOT353 (SC-88A)						
Size (mm)	2.0 x 1.25 x 0.95						
P_{tot} (mW)	335						
Type	PSSI2021SAY						
Description	maximum supply voltage	maximum supply current	typical stabilized output current	minimum stabilized output current	maximum stabilized output current	typical load stability of stabilized output current	typical output current change over ambient temperature
Parameter	V_s max (V)	I_s max (mA)	I_{out} typ (µA)	I_{out} min (mA)	I_{out} max (mA)	$\Delta I_{out}/I_{out}$ typ (%)	$\Delta I_{out}/(I_{out} * \Delta T_{amb})$ typ (%/K)
Condition		@ V_s = 12 V; I_{out} = 15 µA; V_{out} = 1 V to 10 V	@ V_s = 12 V; V_{out} = 1 V to 10 V; R_{ext} = open			@ V_s = 12 V; V_{out} = 1 V to 10 V	@ V_s = 12 V; V_{out} = 1 V; T_{amb} = -55 °C to 150 °C
Value	75>	2.2	15	0.015	50	0.5	0.15

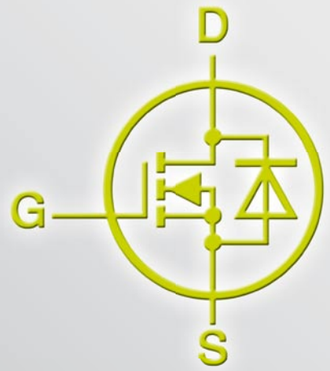
Key features
- Single-chip constant current source
- Output current set by an external resistor
- Very small footprint package

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

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

Voltage reference



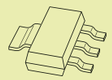


MOSFETs

Small-signal MOSFETs	**72**
Small-signal MOSFETs single (N-channel) < 50 V	72
Small-signal MOSFETs single (N-channel) ≥ 50 V	74
Small-signal MOSFETs dual (N-channel)	76
Small-signal MOSFETs single (P-Channel)	76
Small-signal MOSFET dual (P-channel) and FET-KYs	76
Power MOSFETs	**78**
Power MOSFETs single (N-channel)	78
Power MOSFETs single (P-channel)	84
Power MOSFETs dual (N- and P-channel)	85

Small-signal MOSFETs

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

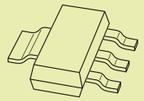
Package													SOT223 (SC-73)		TSOP6 SOT457 (SC-74)	SOT23	SOT363 (SC-88)	SOT323 (SC-70)	SOT416 (SC-75)	SOT883 (SC-101)
																				
Size (mm)													6.5 x 3.5 x 1.65		2.9 x 1.5 x 1.0	2.9 x 1.3 x 1.0	2.0 x 1.25 x 0.95	2.0 x 1.25 x 0.95	1.6 x 0.8 x 0.77	1.0 x 0.6 x 0.5
P_{tot} (mW)		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

[1] enhanced thermal capability
[2] max values

Small-signal MOSFETs

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

types in **bold** represent new products

Package													SOT223 (SC-73)		SOT89 (SC-62)	SOT873	SOT23	SOT323 (SC-70)	SOT416 (SC-75)	SOT883 (SC-101)
																				
Size (mm)													6.5 x 3.5 x 1.65		4.5 x 2.5 x 1.5	3.3 x 3.3 x 0.85	2.9 x 1.3 x 1.0	2.0 x 1.25 x 0.95	1.6 x 0.8 x 0.77	1.0 x 0.6 x 0.5
P_{tot} (mW)													1700		1300	250	250	200	150	250
V_{DS} (V)	V_{GS} (V)	I_D (A)	V_{GS}(th) min(V)	V_{GS}(th) max(V)	t_{on} typ (ns)	t_{off} typ (ns)	Q_G typ (nC)	ESD protection	R_{DSon} typ (mΩ) @ V_{gs} = 10 V	4.5 V	2.5 V	1.8 V								
50	20	0.1	0.4	1.8	2	5	-	-	2800	3800 [3]	-	-					BSN20			
55	8	0.3	0.4	1.3	4	11	1	-	-	2300	2400	3100						BSH121		
	10	0.335	0.4	1.3	4	11	1	-	-	2300	2400	3100					BSH111			
	13	4.9	1	2	-	-	-	2KV	-	30	-	-	PHT11N06LT							
		3.5	1	2	-	-	-	2KV	-	65	-	-	PHT8N06LT							
		2.5	1	2	-	-	-	2KV	-	120	-	-	PHT6N06LT							
		2.5	2	4	-	-	-	2KV	120	-	-	-	PHT6N06T							
60	15	0.26	1	3.3	3	9	-	1KV	2800	3800	-	-						PMF3800SN		
		0.34	1	-	3	9	-	1KV	2800	3800	-	-					2N7002K			
		0.3	1	-	3	9	-	yes	2800	3800	-	-					BSH112			
		0.3	1	2.5	16	60	1.09	3KV	1100	1300	-	-					**2N7002CK**			
		0.3	1	2.5	tbd	tbd	tbd	-	2000 [2]	3000 [2]	-	-					**2N7002P**	**2N7002PW**	**2N7002PT**	**2N7002PM**
		0.3	1	2.5	tbd	tbd	tbd	2KV	1600 [2]	3000 [2]	-	-					**2N7002BK**	**2N7002BKW**	**2N7002BKT**	**2N7002BKM**
		0.57	1	-	6	7.2	-	-	780	1100	-	-						PMF780SN		
		0.55	1	3	6	7.2	1.05	-	780	1100	-	-							PMR780SN	
		1.22	1	3	6	7.2	1.05	-	760	1100	-	-								PMZ760SN
		0.25	0.8	3	-	-	-	-	2500	-	-	-					PMBF170			
	30	0.385	1	2.5	2.5	11	0.69	-	780	1200	-	-					2N7002E			
		0.475	1	2.5	2.5	11	0.69	-	780	1200	-	-					2N7002F			
		0.3	1	2.5	2.5	11	-	-	2800	3800	-	-					2N7002			
100	16	3.5	1	2	14	73	-	-	-	200	-	-	PHT4NQ10LT							
	20	0.19	1	-	3	12	-	-	-	5000	-	-					BST82			
		0.52	1	-	3	12	-	-	-	5000	-	-	BSP110							
		0.85	2	4	19	13	4.6	-	400	-	-	-					BSH114			
		0.15	1	2.8	3	12	-	-	3500	-	-	-					BSS123			
		3.5	2	4	21	31	7.4	-	200	-	-	-	PHT4NQ10T							
		3	2	4	-	-	-	-	57	-	-	-	PHT6NQ10T							
	30	1.9	2	4	10.5	12.5	7	-	213	-	-	-					PMV213SN [1]			
200	20	0.55	0.4	2	10	45	-	-	1700	-	3000	-	BSP122							
		0.4	0.8	2.8	6	49	-	-	1600	-	-	-			BSS87					
		8.8	2	4	18	26	13.3	-	250	-	-	-				PML260SN				
220	20	7.3	2	4	20.8	24.3	13.2	-	320	-	-	-				PML340SN				
240	20	0.375	0.8	2	6	47	-	-	2800	7500 [2]	-	-	BSP89							
250	20	0.35	0.8	2	6	47	-	-	2800	-	-	-	BSP126							
300	20	0.35	0.8	2	6	46	-	-	3700	-	4800	-	BSP130							

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

Small-signal MOSFETs

Small-signal MOSFETs dual (N-channel)

types in **bold** represent new products

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

[1] enhanced thermal capability [2] max values

Small-signal MOSFETs single (P-channel)

Package													SOT223 (SC-73)	SOT89 (SC-62)	TSOP6 SOT457 (SC-74)	SOT23
Size (mm)													6.5 x 3.5 x 1.65	4.5 x 2.5 x 1.5	2.9 x 1.5 x 1.0	2.9 x 1.3 x 1.0
P_{tot} (mW)													1700	1300	600	250
V_{DS} (V)	V_{GS} (V)	I_D (A)	V_{GS}(th) min(V)	V_{GS}(th) max(V)	t_{on} typ (ns)	t_{off} typ (ns)	Q_G typ (nC)	ESD protection	R_{DSon} typ (mΩ) @ V_{gs} = 10 V	4.5 V	2.5 V	1.8 V				
12	8	1.52	0.4	-	6.5	65	-	-	-	80	-	140			BSH207	
		0.75	0.4	-	6.5	65	-	-	-	180	-	420				BSH205 [1]
20	12	4.8	0.55	0.95	16	117	10	-	-	48	65	-			PMN50XP	
		3.9	0.55	0.95	28	101	7.6	-	-	65	90	-				PMV65XP [1]
30	8	0.47	0.4	-	6.5	65	-	-	-	660	-	1100				BSH203
	20	3	1	2.8	20	50	-	-	220	330	-	-	BSP250			
		0.52	1	-	6.5	65	-	-	630	890	-	-				BSH202
50	20	0.13	0.8	2	3	7	-	-	6000	-	-	-				BSS84
60	20	0.3	1	-	6.5	65	-	-	2100	2700	-	-				BSH201
200	20	0.225	0.8	2.8	5	20	-	-	10000	-	-	-	BSP220			
240	20	0.2	0.8	2.8	5	20	-	-	10000	-	-	-		BSS192		
250	20	0.225	0.8	2.8	5	10	-	-	10000	-	-	-	BSP225			
300	20	0.21	1.95	2.8	5	15	-	-	17000 [2]	-	-	-	BSP230			

[1] enhanced thermal capability [2] max values

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

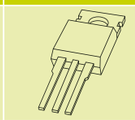
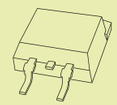
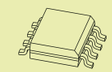
types in **bold** represent new products

Package																SOT1118
Size (mm)																2.0 x 2.0 x 0.65
P_{tot} (mW)																>500
Configuration	V_{DS} (V)	V_{GS} (V)	I_D (A)	V_{GS}(th) min(V)	V_{GS}(th) max(V)	t_{on} typ (ns)	t_{off} typ (ns)	Q_G typ (nC)	ESD protection	I_F (A)	V_R (V)	V_F typ. (mA)	R_{DSon} typ (mΩ) @ V_{gs} = 4.5 V	2.5 V	1.8 V	
dual	20	8	3.3	0.5	1.5	tbd	tbd	tbd	800 V	-	-	-	65	95	130	**PMDPB65UP**
single + schottky	20	8	3.3	0.5	1.5	tbd	tbd	tbd	800 V	2	30	455	65	95	130	**PMFPB6545UP**
			3.3	0.5	1.5	tbd	tbd	tbd	800 V	2.2	30	325	65	95	130	**PMFPB6532UP**

Power MOSFETs

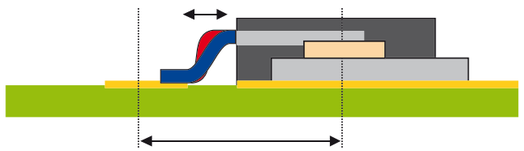
Power MOSFETs single (N-channel)

types in **bold** represent new products

V_{DS} (max) (V)	R_{DSon} (max) (mΩ) @ V_{gs} = 10 V	R_{DSon} (max) (mΩ) @ V_{gs} = 4.5 V	I_D (max) (A) @ 25 °C	Power-SO8 (LFPAK)	TO-220AB (SOT78)	D2PAK (SOT404)	DPAK (SOT428)		SO8 (SOT96-1)	IPAK (SOT533)
										
				3.95 x 4.9 x 1.1	15.6 x 10 x 4.4	11 x 10 x 4.3	6 x 6.6 x 2.3		4.9 x 3.9 x 1.75	6 x 6.6 x 2.3
20	2.65	3.7	100	PH3120L						
	-	2.7	100	PH2520U						
	-	5	32						PSMN006-20K	
	-	16 @ 5 V	44.7				PHD38N02LT			
	-	20 @ 5 V	10.9						PHKD6N02LT	
25	1.2	1.85	100	**PSMN1R2-25YL**						
	1.5	2.2	100	**PSMN1R5-25YL**						
	2.5	3.9	100	PH2525L						
	2.8	4.1	100	PH2625L						
	4	-	99	PH4025L						
	4.95	-	75				PHD96NQ03LT			
	5.5	8.2	81.7	PH5525L						
	5.8	-	75				PSMN005-25D			
	6	-	75				PHD108NQ03LT			
	6.3	9.5	78.7	PH6325L						
	6.3	10.6	75				PHD97NQ03LT			
	6.6	-	75							PHU97NQ03LT
	9	13	66	PH9025L						
	9	-	66.4				PHD78NQ03LT			PHU78NQ03LT
	9	-	61		PHP78NQ03LT					
	9.5	-	75				PHD77NQ03T			PHU77NQ03T
	10.5	-	66			PHB66NQ03LT	PHD66NQ03LT			
	-	3	100	PH2925U						

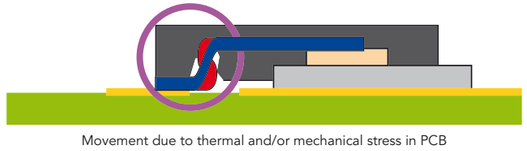
LFPAK for mechanical & thermal ruggedness

NXP LFPAK



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

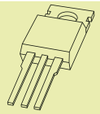
QFN Based Power-S08



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

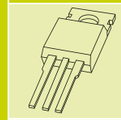
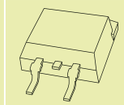
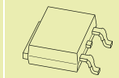
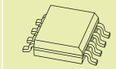
Power MOSFETs single (N-channel)

types in **bold** represent new products

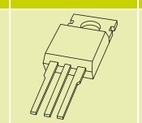
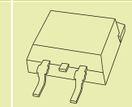
V_{DS} (max) (V)	R_{DSon} (max) (mΩ) @ V_{gs} = 10 V	R_{DSon} (max) (mΩ) @ V_{gs} = 4.5 V	I_D (max) (A) @ 25 °C	Power-SO8 (LFPAK)	TO-220AB (SOT78)	DPAK (SOT428)	SO8 (SOT96-1)	IPAK (SOT533)
								
				3.95 x 4.9 x 1.1	15.6 x 10 x 4.4	6 x 6.6 x 2.3	4.9 x 3.9 x 1.75	6 x 6.6 x 2.3
30	1.3	1.95	100	**PSMN1R3-30YL**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

Power MOSFETs single (N-channel)

types in **bold** represent new products

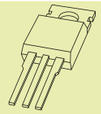
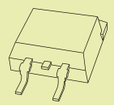
V_{DS} (max) (V)	R_{DSon} (max) (mΩ) @ V_{gs} = 10 V	R_{DSon} (max) (mΩ) @ V_{gs} = 4.5 V	I_D (max) (A) @ 25 °C	TO-220AB (SOT78)	D2PAK (SOT404)	DPAK (SOT428)	SO8 (SOT96-1)
							
				15.6 x 10 x 4.4	11 x 10 x 4.3	6 x 6.6 x 2.3	4.9 x 3.9 x 1.75
30	10	-	75			PHD71NQ03LT	
	13	-	68.9			PHD63NQ03LT	
	13.5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

types in **bold** represent new products

V_{DS} (max) (V)	R_{DSon} (max) (mΩ) @ V_{gs} = 10 V	R_{DSon} (max) (mΩ) @ V_{gs} = 4.5 V	I_D (max) (A) @ 25 °C	Power-SO8 (LFPAK)	TO-220AB (SOT78)	D2PAK (SOT404)	DPAK (SOT428)
							
				3.95 x 4.9 x 1.1	15.6 x 10 x 4.4	11 x 10 x 4.3	6 x 6.6 x 2.3
40	2	-	-	**PSMN2R0-40YS**			
	2.1	-	100		**PSMN2R2-40PS**		
	2.8	-	-		**PSMN2R8-40PS**		
	2.8	-	100	**PSMN2R6-40YS**			
	3.3	-	-	**PSMN3R3-40YS**			
	4.1	-	94.5	PH4840S			
	4.2	-	100	**PSMN4R0-40YS**			
	4.3	-	75		PHP176NQ04T		
	4.6	-	100		**PSMN4R5-40PS**		
	5.2	-	75		PHP143NQ04T		
	5.7	-	-	**PSMN5R8-40YS**			
	7.6	-	77		**PSMN8R0-40PS**		
	8	-	75		PHP101NQ04T	PHB101NQ04T	
	8.6	-	70	**PSMN8R3-40YS**			
	14	-	-	**PSMN014-40YS**			
55	3.7	-	75		PHP191NQ06LT	PHB191NQ06LT	
	5.8	-	75		PSMN005-55P	PSMN005-55B	
	7	-	75		PHP110NQ06LT	PHB110NQ06LT	
	7.1	-	75		PHP119NQ06T	PHB119NQ06T	
	8.3	9.9	62.5	PH955L			
	10.5	-	75				PSMN010-55D
	17.3	21	40	PH1955L			
	20	-	54		PHP54N06T		
	36	45	24	PH3855L			
	70	-	19		PHP21N06LT	PHB21N06LT	PHD21N06LT
	75	-	21		PHP21N06T		
	75	-	20.3		PHP20N06T	PHB20N06T	
	77	-	18				PHD20N06T

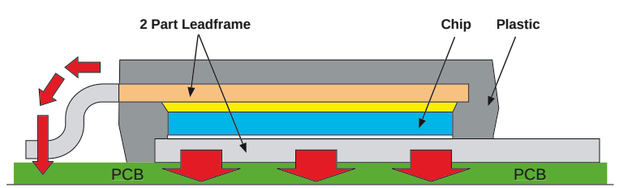
Power MOSFETs single (N-channel)

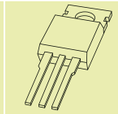
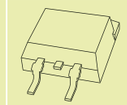
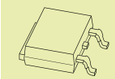
types in **bold** represent new products

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

Power-SO8 (LFPAK) Design

- Low Thermal resistance
- Low Electrical resistance
- Low Inductance



V_{DS} (max) (V)	R_{DSon} (max) (mΩ) @ V_{gs} = 10 V	R_{DSon} (max) (mΩ) @ V_{gs} = 4.5 V	I_D (max) (A) @ 25 °C	Power-SO8 (LFPAK)	TO-220AB (SOT78)	D2PAK (SOT404)	DPAK (SOT428)	SO8 (SOT96-1)
								
				3.95 x 4.9 x 1.1	15.6 x 10 x 4.4	11 x 10 x 4.3	6 x 6.6 x 2.3	4.9 x 3.9 x 1.75
100	8.8	-	75		PSMN009-100P	PSMN009-100B		
	15	-	75		PSMN015-100P	PSMN015-100B		
	23	-	34.3	PH20100S				
	25	-	47		PHP45NQ10T	PHB45NQ10T		
	25	-	47		PHP45NQ10TA			
	25	-	47				PSMN025-100D	
	28	-	47			PHB47NQ10T		
	28	-	11.6					PHK12NQ10T
	38	-	6.3 @ 80 °C					PSMN038-100K
	40	-	35				PHD34NQ10T	
	50	-	28			PHB27NQ10T		
	90	-	18		PHP18NQ10T	PHB18NQ10T	PHD18NQ10T	
	90	-	3					
	90	-	3					PHKD3NQ10T
105	25	-	47		PHP45NQ11T			
110	15	-	75		PSMN015-110P			
	40	-	35		PHP34NQ11T			
	50	-	27.6		PHP27NQ11T			
	70	-	23		PHP23NQ11T			
	90	-	18		PHP18NQ11T			

NXP Power solutions make your PC Energy Efficient

MOSFETs for high efficiency power management

Smaller, faster, cooler

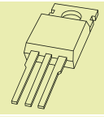
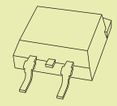
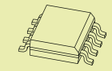
- Class leading LFPAK package with state of the art Trench 6 silicon technology
  - **Smaller:** Power-SO8 form factor LFPAK
  - **Faster:** Best in class switching performance
  - **Cooler:** Higher efficiency equals lower temperatures
  - **Easier:** easier to use in development and production than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

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

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

Power MOSFETs

Power MOSFETs single (N-channel)

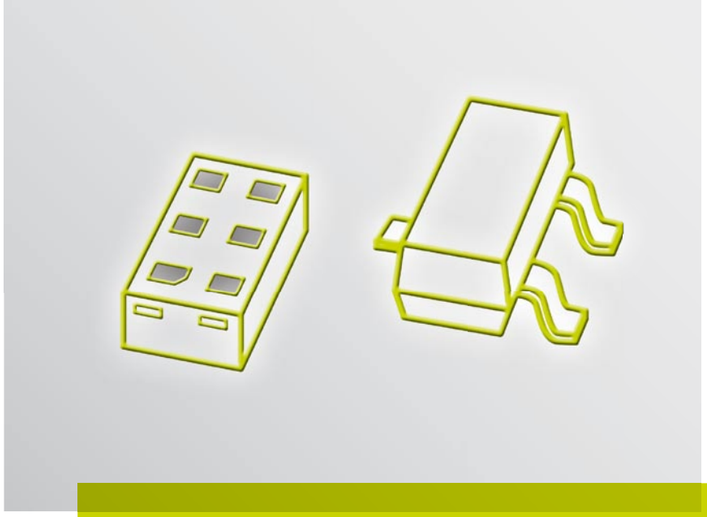
V_{DS} (max) (V)	R_{DSon} (max) (mΩ) @ V_{gs} = 10 V	R_{DSon} (max) (mΩ) @ V_{gs} = 4.5 V	I_D (max) (A) @ 25 °C	Power-SO8 (LFPAK)	TO-220AB (SOT78)	D2PAK (SOT404)	DPAK (SOT428)		SO8 (SOT96-1)	HVSON8 (SOT873-1)
										
				3.95 x 4.9 x 1.1	15.6 x 10 x 4.4	11 x 10 x 4.3	6 x 6.6 x 2.3		4.9 x 3.9 x 1.75	3.3 x 3.3 x 0.85
150	30	-	55.5		PSMN030-150P	PSMN030-150B				
	35	-	50		PSMN035-150P	PSMN035-150B				
	42	-	45.1			PHB45NQ15T				
	59	-	43	PSMN059-150Y						
	63	-	29		PHP30NQ15T		PSMN063-150D			
	65	-	28.5		PHP28NQ15T					
	75	-	5						PHK5NQ15T	
	85	-	3.5 @ 80 °C						PSMN085-150K	
200	57	-	39		PSMN057-200P	PSMN057-200B				
	70	-	35		PSMN070-200P	PSMN070-200B				
	77	-	32.7		PHP33NQ20T	PHB33NQ20T				
	102	-	21.5	PSMN102-200Y						
	130	-	20		PHP20NQ20T	PHB20NQ20T	PSMN130-200D			
	165	-	2.9 @ 80 °C						PSMN165-200K	
	294	-	8.8							PML260SN
	400	-	8.7		PHP9NQ20T		PHD9NQ20T			
220	386	-	7.3							PML340SN

Power MOSFETs single (P-channel)

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

Power MOSFETs dual (N- and P-channel)

V_{DS} (max) (V)	R_{DSon} (max) (mΩ) @ V_{gs} = 10 V	R_{DSon} (max) (mΩ) @ V_{gs} = 4.5 V	I_D (max) (A) @ 25 °C	Configuration	SO8 (SOT96-1)
					4.9 x 3.9 x 1.75
20	-	20 @ 5 V	10.9	dual N-channel	PHKD6N02LT
30	20	26	10.4	dual N-channel	PHKD13N03LT
30	30	-	6.3	dual N-channel	PHN203
30	100	200	3.4	dual N-channel	PHN210 PHN210T
30, -30	100, 250	-	3.5, -2.3 @ 80 °C	complementary pair	PHC21025
-30	250	-	-2.3 @ 80 °C	dual P-channel	PHP225
100	90	-	3	dual N-channel	PHKD3NQ10T
300, -300	6000, 17000	-	0.34, -0.235 @ 80 °C	complementary pair	PHC2300



Packages

Package cross reference 88

Packing methods 90

Minimized outline drawings and reflow soldering footprint 96

Package overview 107

Package cross reference

types in **bold** represent new products

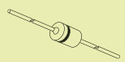
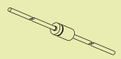
NXP	Industry standard names	Size (l x w x h)	Pins / leads	P_{tot} (mW)	Package	Competitor synonyms							
						Rohm	Toshiba	ON Semi	Renesas	Infineon	Diodes Inc	KEC	Vishay
SOD27	DO-35	4.25 x 1.85 x 0.56	2	500		GSD			DO-35		DO-35		DO-204AH
SOD66	DO-41	4.8 x 2.6 x 0.81	2	1300		GSR	DO-41				DO-41		DO-204AL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

types in **bold** represent new products

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

Packing methods

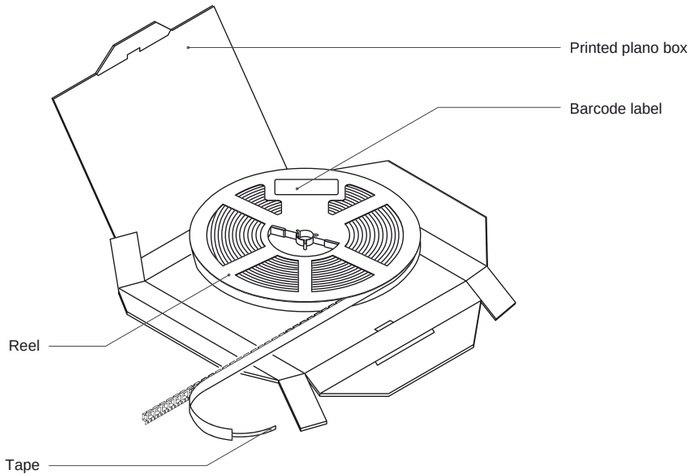
types in **bold** represent new products

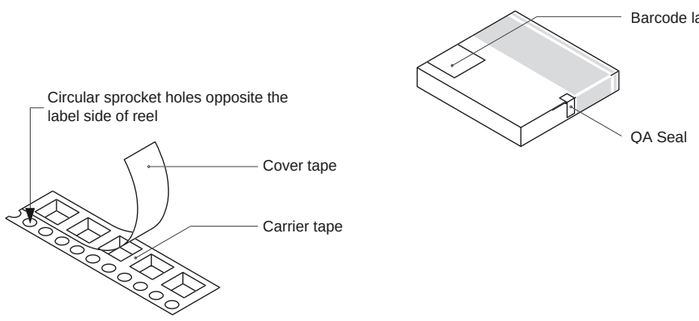
Package	Packing method and tape dimension	Reel dimension (d x w)	Package	Packing quantity						
				2000	2500	3000	4000	5000	8000	10000
SOD27	26 mm tape ammo pack, axial			-	-	-	-	-143	-	-
	52 mm tape ammo pack, axial			-	-	-	-	-	-	-133
	52 mm reel pack, axial			-	-	-	-	-	-	-113
SOD66	52 mm tape ammo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

types in **bold** represent new products

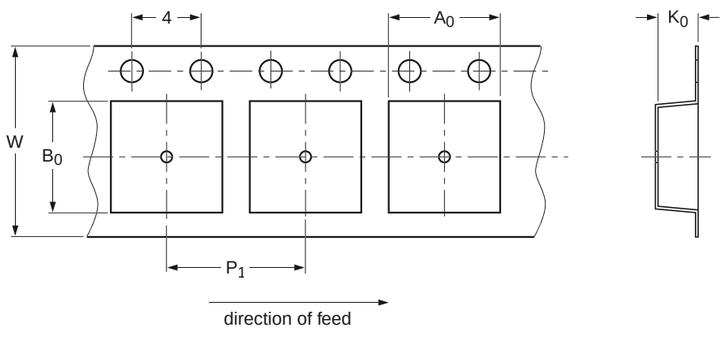
Package	Packing method and tape dimension	Reel dimension (d x w)	Taping	Package	Packing quantity							
					1000	1400	2500	3000	4000	5000	8000	10000
SOT89	8 mm pitch, 12 mm tape and reel	180 x 12 mm	T1		-115	-	-	-	-	-	-	-
	8 mm pitch, 12 mm tape and reel	330 x 12 mm	T1		-	-	-	-	-135	-	-	-
	8 mm pitch, 12 mm tape and reel	180 x 12 mm	T3		-146	-	-	-	-	-	-	-
	8 mm pitch, 12 mm tape and reel	180 x 12 mm	T4		-147	-	-	-	-	-	-	-
SOT143B	4 mm pitch, 8 mm tape and reel	180 x 8 mm			-	-	-	-215	-	-	-	-
	4 mm pitch, 8 mm tape and reel	286 x 8 mm			-	-	-	-	-	-	-	-235
SOT223	8 mm pitch, 12 mm tape and reel	180 x 12 mm			-115	-	-	-	-	-	-	-
	8 mm pitch, 12 mm tape and reel	330 x 12 mm			-	-	-	-	-135	-	-	-
SOT353	4 mm pitch, 8 mm tape and reel	180 x 8 mm	T1		-	-	-	-115	-	-	-	-
	4 mm pitch, 8 mm tape and reel	286 x 8 mm	T1		-	-	-	-	-	-	-	-135
	4 mm pitch, 8 mm tape and reel	180 x 8 mm	T2		-	-	-	-125	-	-	-	-
	4 mm pitch, 8 mm tape and reel	286 x 8 mm	T2		-	-	-	-	-	-	-	-165
SOT665	2 mm pitch, 8 mm tape and reel	180 x 8 mm			-	-	-	-	-	-	-315	-
	4 mm pitch, 8 mm tape and reel	180 x 8 mm			-	-	-	-	-115	-	-	-
SOT363	4 mm pitch, 8 mm tape and reel	180 x 8 mm	T1		-	-	-	-115	-	-	-	-
	4 mm pitch, 8 mm tape and reel	286 x 8 mm	T1		-	-	-	-	-	-	-	-135
	4 mm pitch, 8 mm tape and reel	180 x 8 mm	T2		-	-	-	-125	-	-	-	-
	4 mm pitch, 8 mm tape and reel	286 x 8 mm	T2		-	-	-	-	-	-	-	-165
SOT457	4 mm pitch, 8 mm tape and reel	180 x 8 mm	T1		-	-	-	-115	-	-	-	-
	4 mm pitch, 8 mm tape and reel	286 x 8 mm	T1		-	-	-	-	-	-	-	-135
	4 mm pitch, 8 mm tape and reel	180 x 8 mm	T2		-	-	-	-125	-	-	-	-
	4 mm pitch, 8 mm tape and reel	286 x 8 mm	T2		-	-	-	-	-	-	-	-165
SOT666	2 mm pitch, 8 mm tape and reel	180 x 8 mm			-	-	-	-	-	-	-315	-
	4 mm pitch, 8 mm tape and reel	180 x 8 mm			-	-	-	-	-115	-	-	-
SOT1118	4 mm pitch, 8 mm tape and reel	180 x 8 mm			-	-	-	-115	-	-	-	-
SOT886	4 mm pitch, 8 mm tape and reel	180 x 8 mm	T1		-	-	-	-	-	-115	-	-
	4 mm pitch, 8 mm tape and reel	180 x 8 mm	T4		-	-	-	-	-	-132	-	-
SOT891	4 mm pitch, 8 mm tape and reel	180 x 8 mm	T4		-	-	-	-	-	-132	-	-
SOT505	8 mm pitch, 12 mm tape and reel	330 x 12 mm			-	-	-118	-	-	-	-	-
SOT873	8 mm pitch, 12 mm tape and reel	180 x 12 mm			-	-118	-	-	-	-	-	-
SOT96	8 mm pitch, 12 mm tape and reel	180 x 12 mm			-115	-	-	-	-	-	-	-
	8 mm pitch, 12 mm tape and reel	330 x 12 mm			-	-	-118	-	-	-	-	-

Tape and reel pack for SMD packages





Carrier tape - tape and reel

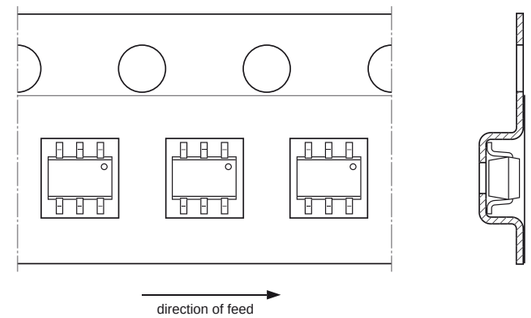


P1 = pitch (see table packing methods)
W = tape width (see table packing methods)

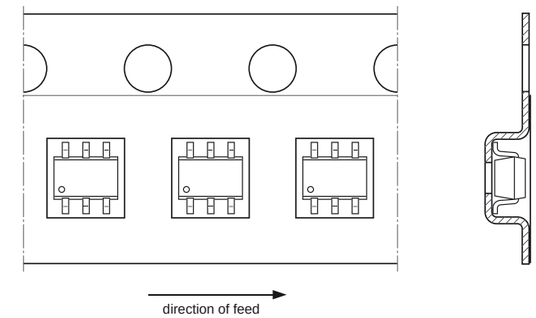
Compartment width (A_0), length (B_0) and depth (K_0) depending on package

Product orientation (tape and reel pack) T1-T4

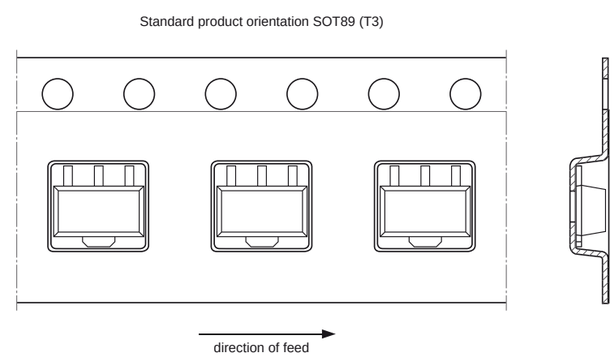
T1 taping



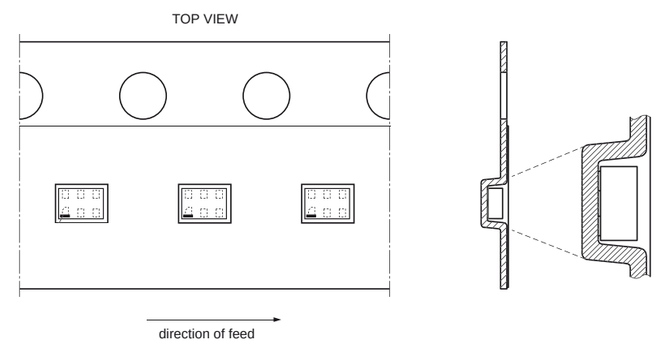
T2 taping



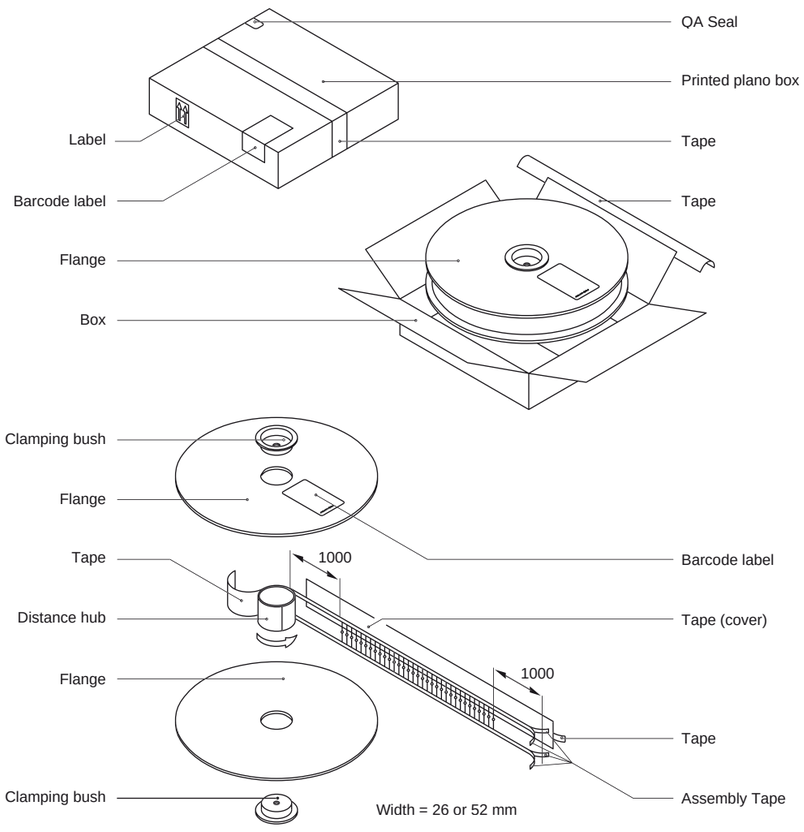
T3 taping

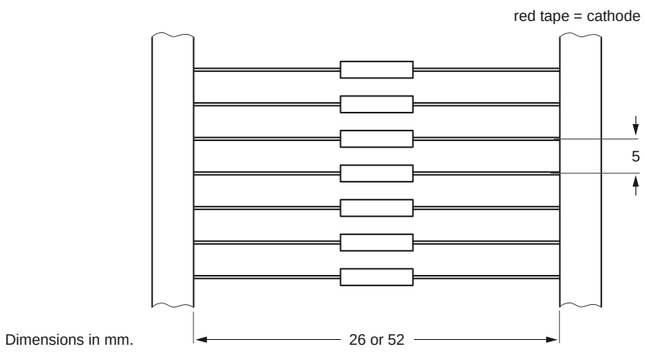


T4 taping

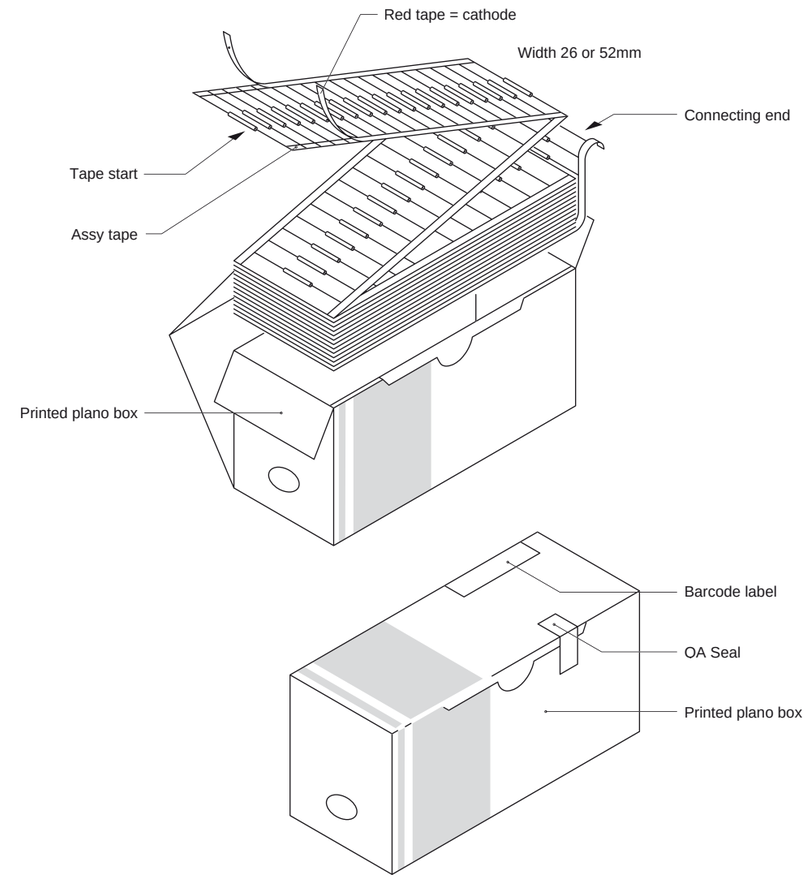


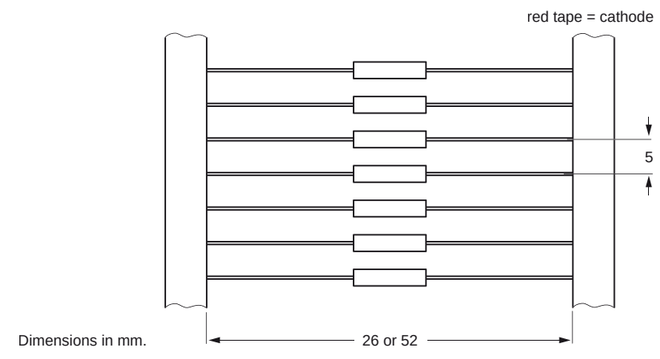
Reel pack axial tape for glass diodes



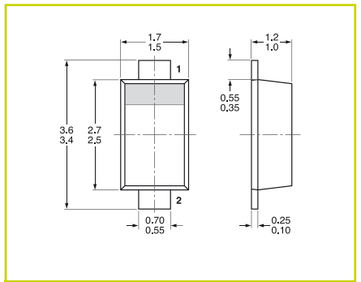


Ammo pack axial tape for glass diodes

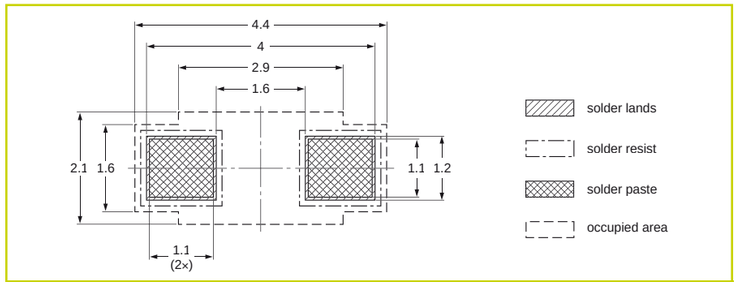




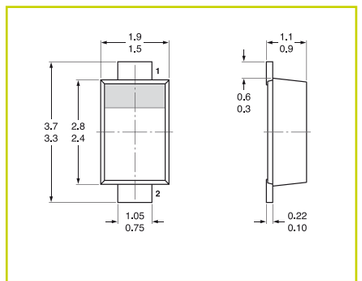
2-Pin SMD Packages



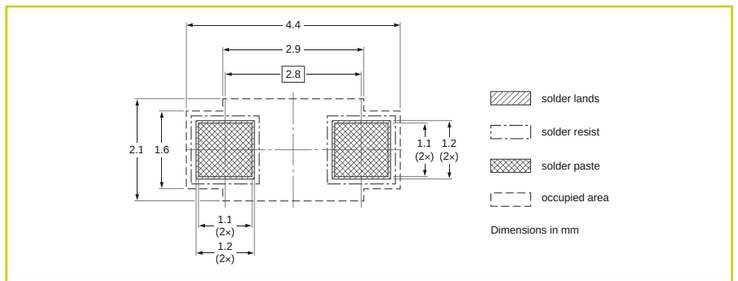
SOD123F



SOD123F



SOD123W



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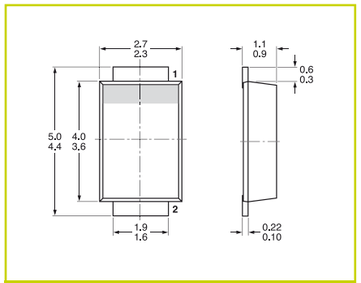
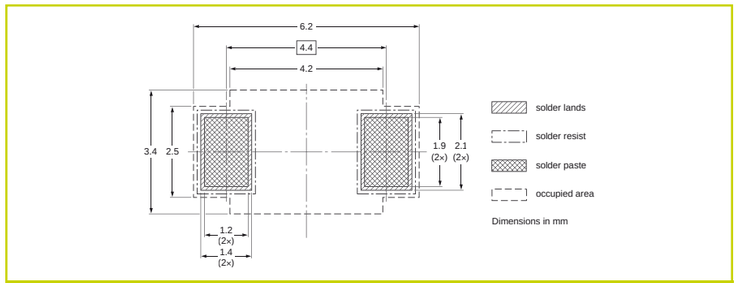
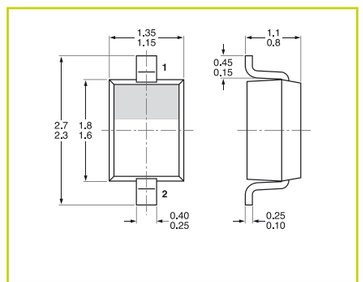


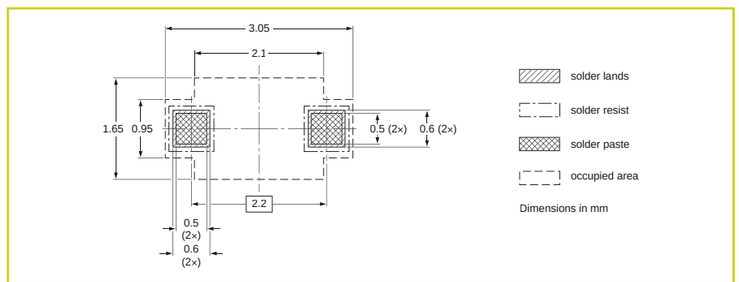
SOD128



SOD128

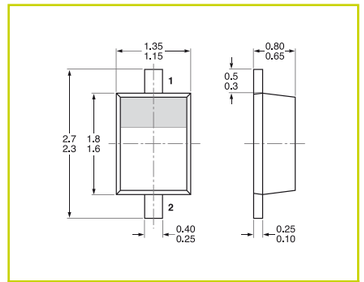


SOD323 (SC-76)

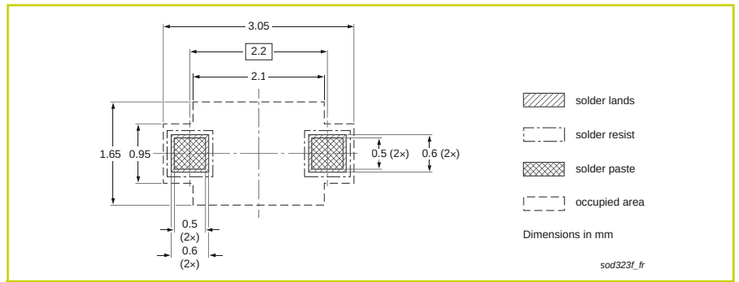


SOD323 (SC-76)

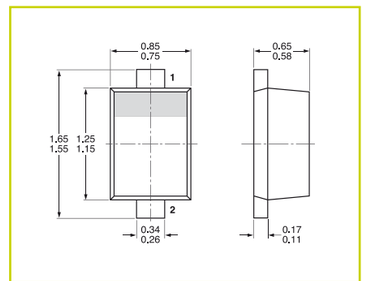
Dimensions in mm



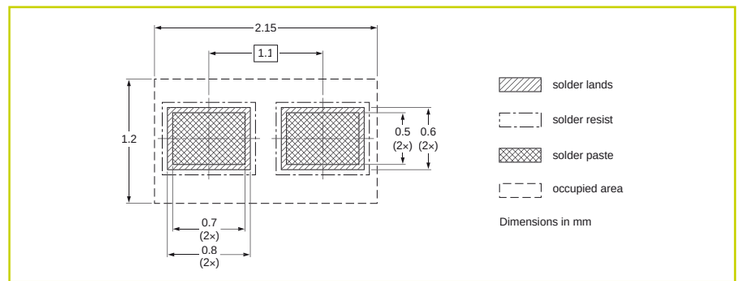
SOD323F (SC-90)



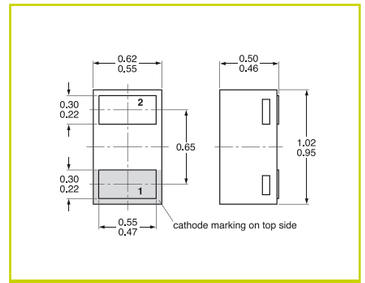
SOD323F (SC-90)



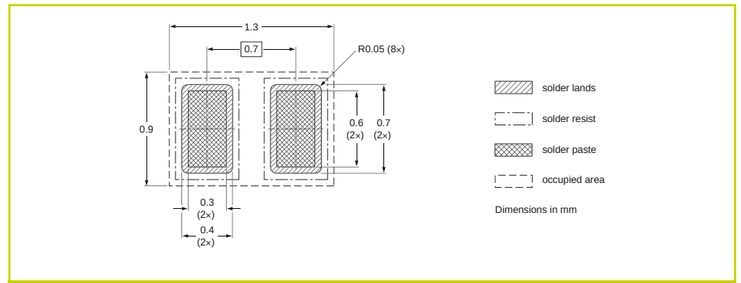
SOD523 (SC-79)



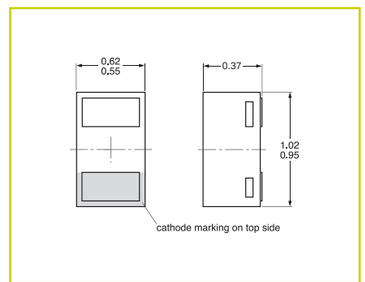
SOD523 (SC-79)



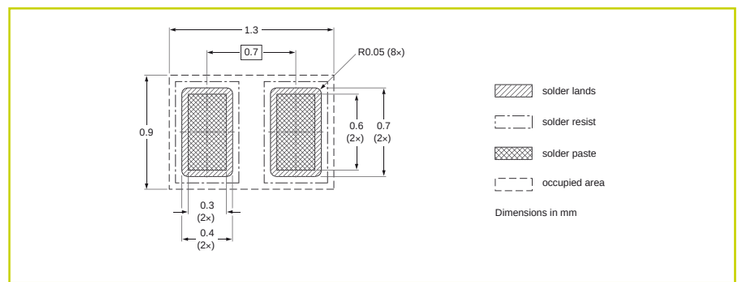
SOD882



SOD882

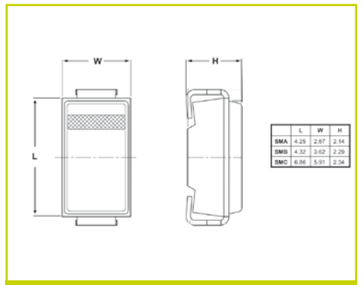


SOD882D

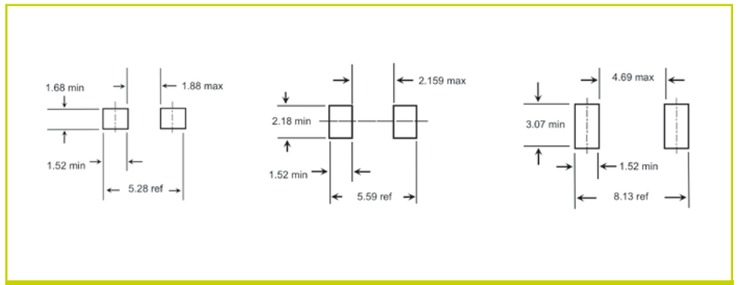


SOD882D

Dimensions in mm

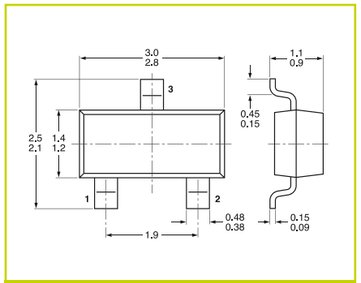


SOD131/2/3 (SMA/B/C)

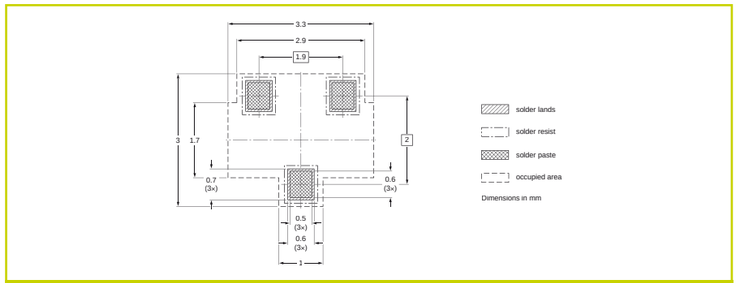


SOD131 (SMA) SOD132 (SMB) SOD133 (SMC)

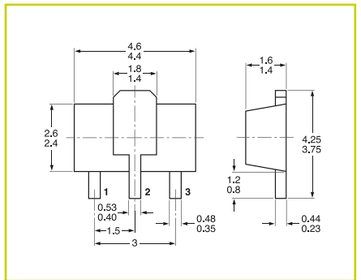
3-Pin SMD Packages



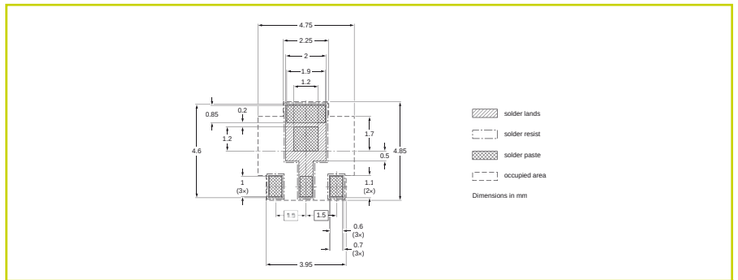
SOT23



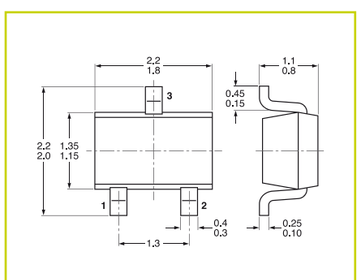
SOT23



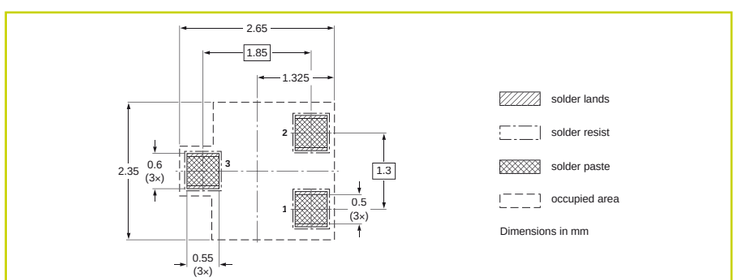
SOT89 (SC-62)



SOT89 (SC-62)

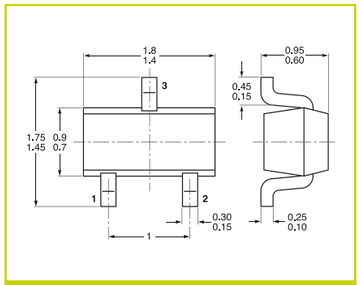


SOT323 (SC-70)

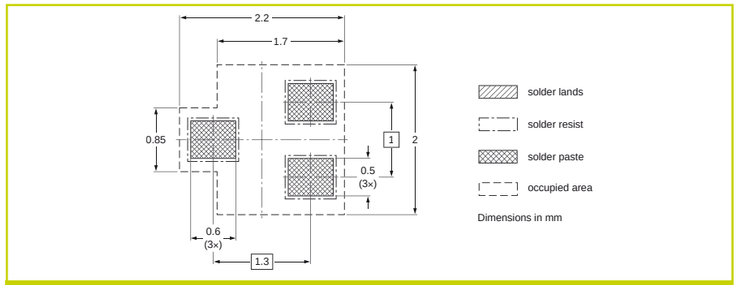


SOT323 (SC-70)

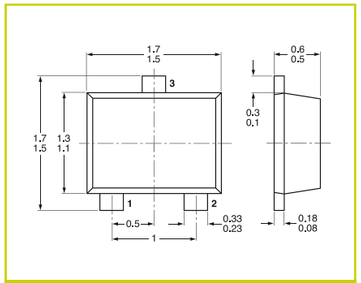
Dimensions in mm



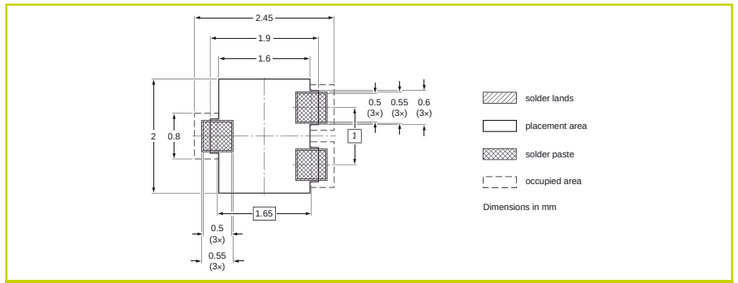
SOT416 (SC-75)



SOT416 (SC-75)



SOT663



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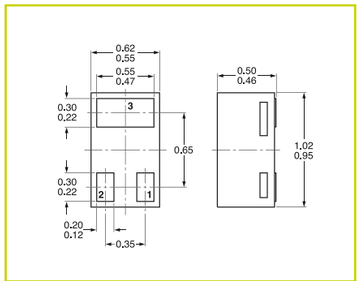
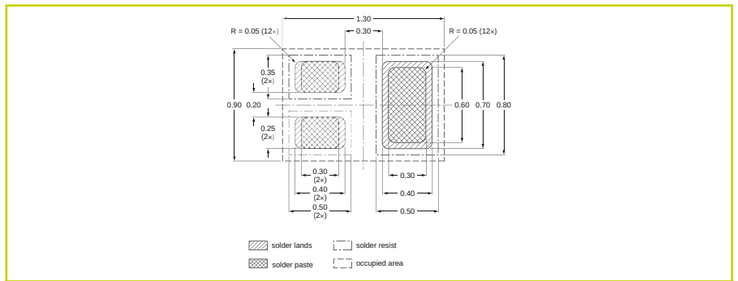
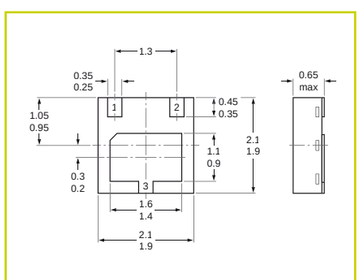


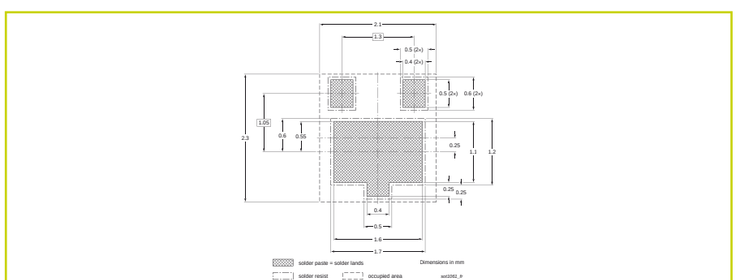
SOT883 (SC-101)



SOT883 (SC-101)



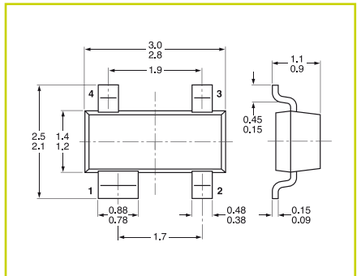
SOT1061



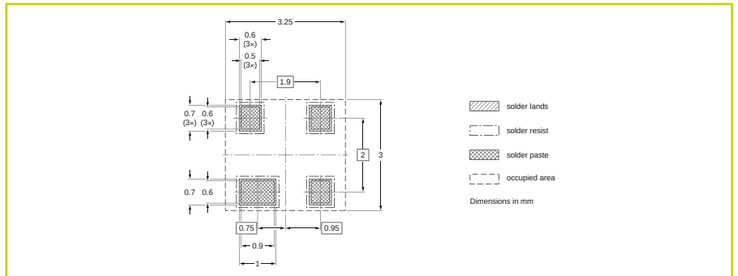
SOT1061

Dimensions in mm

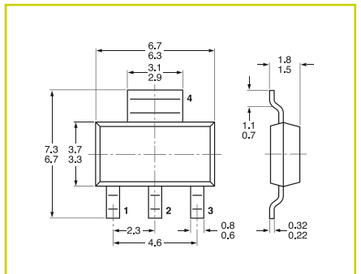
4-/5-Pin SMD Packages



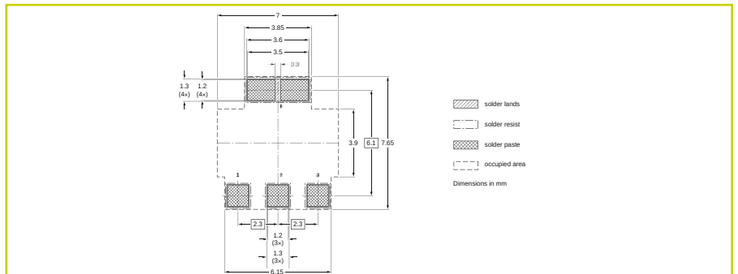
SOT143B



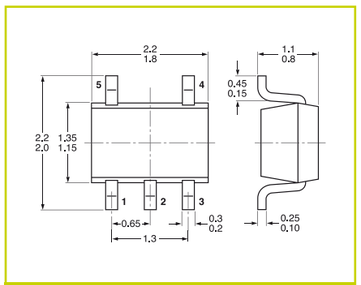
SOT143B



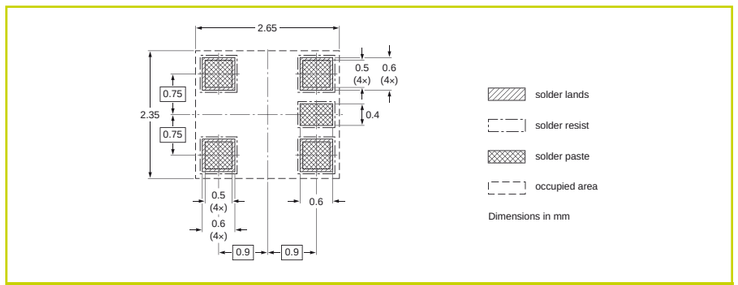
SOT223 (SC-73)



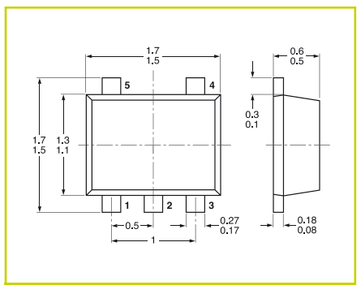
SOT223 (SC-73)



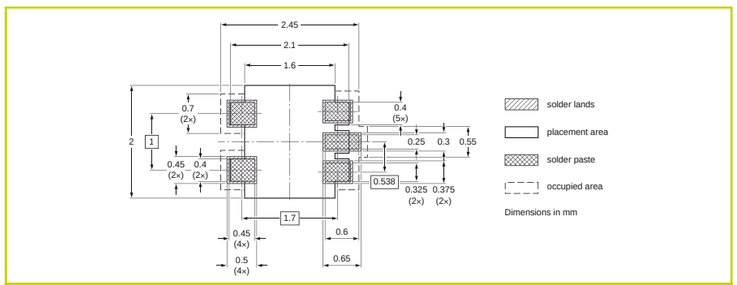
SOT353 (SC-88A)



SOT353 (SC-88A)

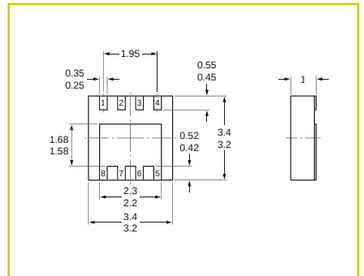


SOT665

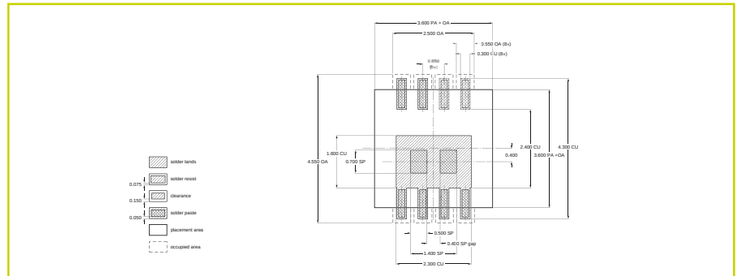


SOT665

Dimensions in mm

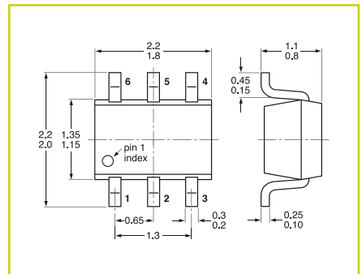


SOT873 (HVSON8)

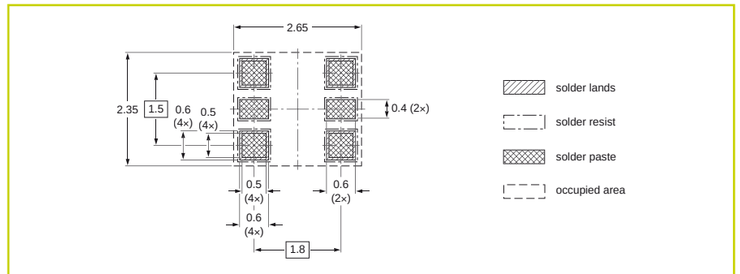


SOT873 (HVSON8)

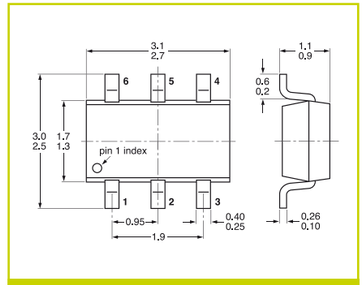
6-Pin SMD Packages



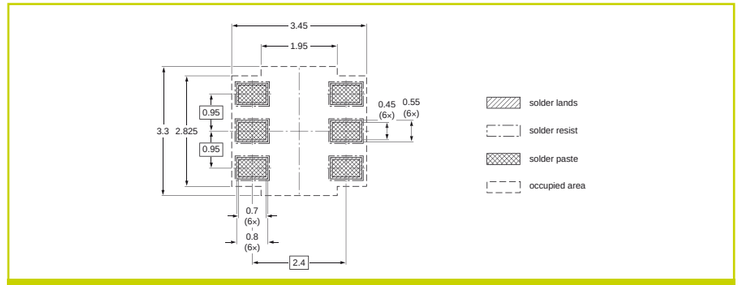
SOT363 (SC-88)



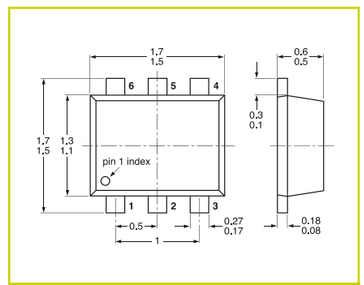
SOT363 (SC-88)



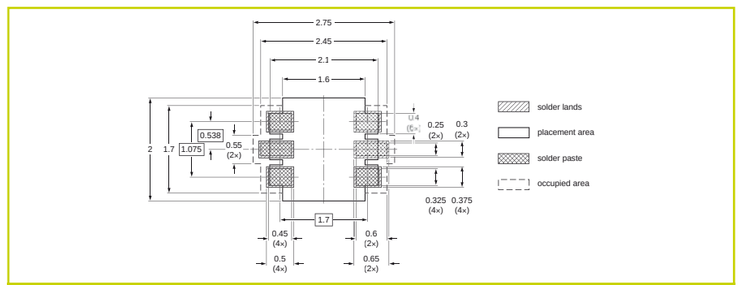
SOT457 (SC-74)



SOT457 (SC-74)

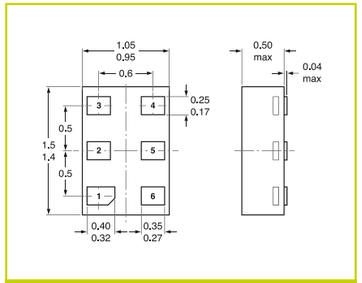


SOT666

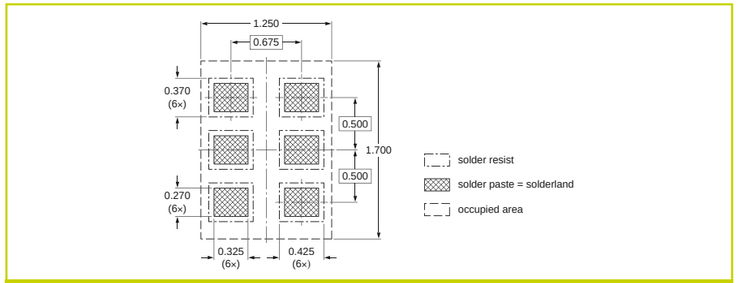


SOT666

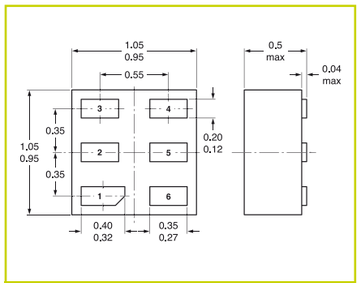
Dimensions in mm



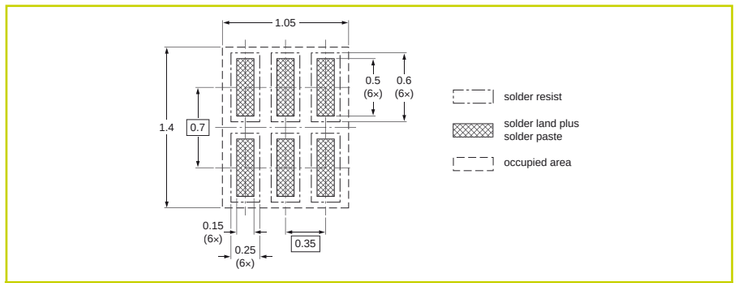
SOT886 (XSON6)



SOT886 (XSON6)

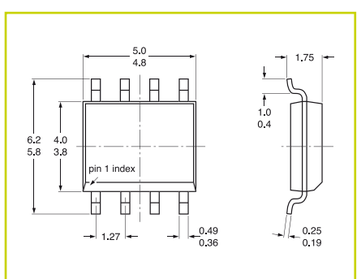


SOT891 (XSON6)

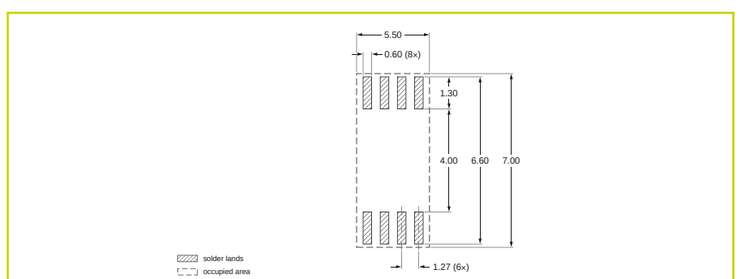


SOT891 (XSON6)

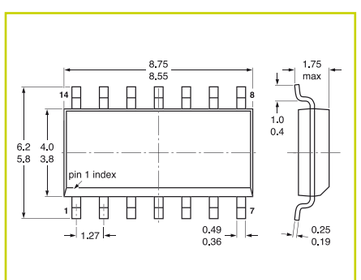
Multi-Pin SMD Packages



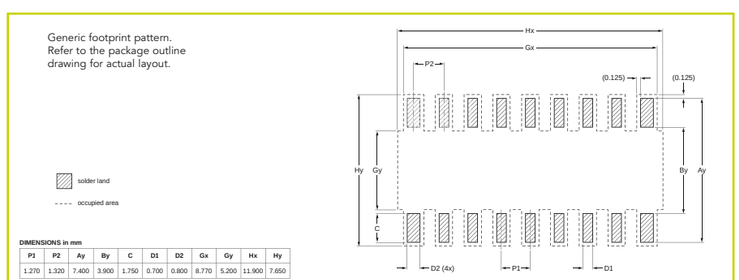
SOT96 (SO8)



SOT96 (SO8)

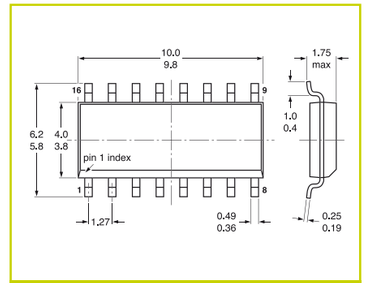


SOT108 (SO14)

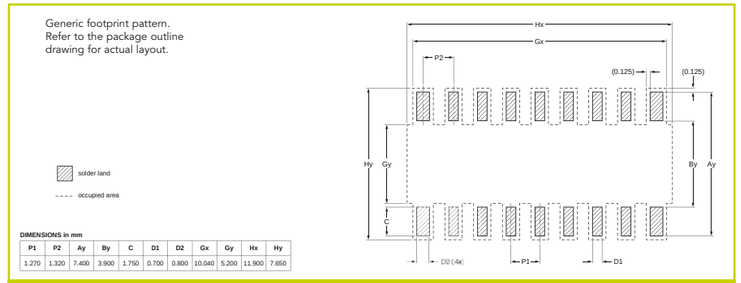


SOT108 (SO14)

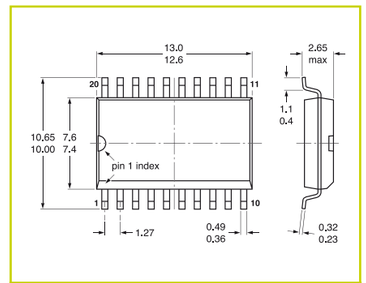
Dimensions in mm



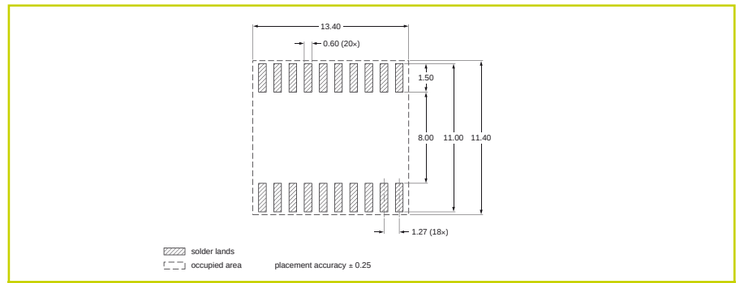
SOT109 (SO16)



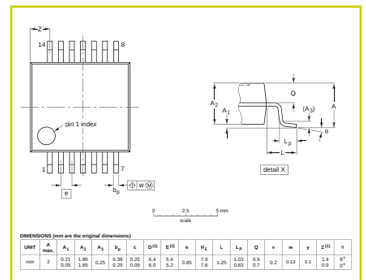
SOT109 (SO16)



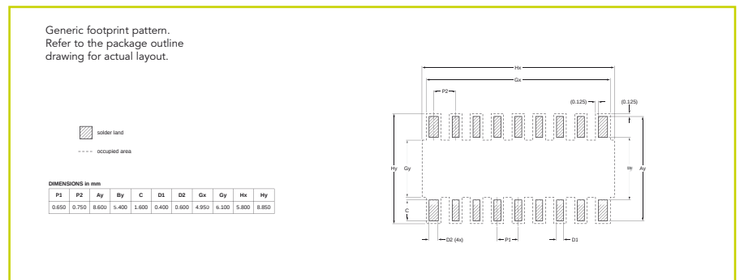
SOT163 (SO20)



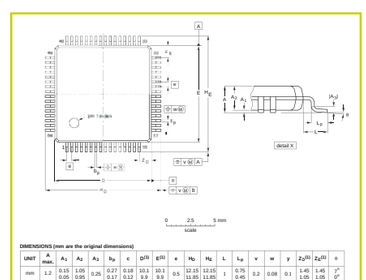
SOT163 (SO20)



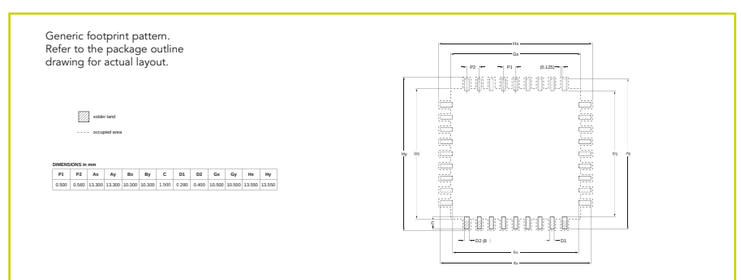
SOT337 (SSOP14)



SOT337 (SSOP14)



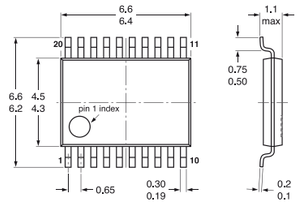
SOT357



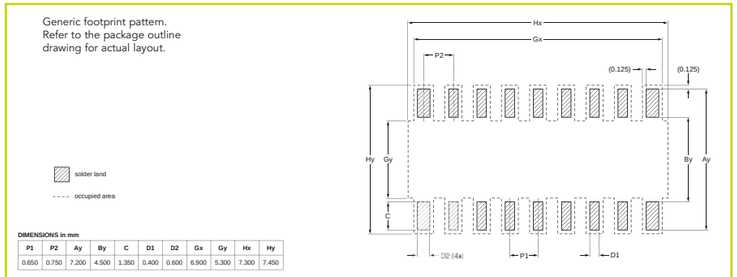
SOT357

Dimensions in mm

Packages



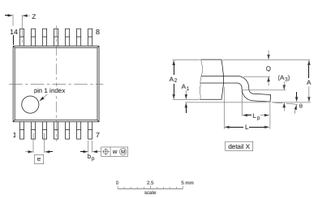
SOT360 (TSSOP20)



DIMENSIONS in mm

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

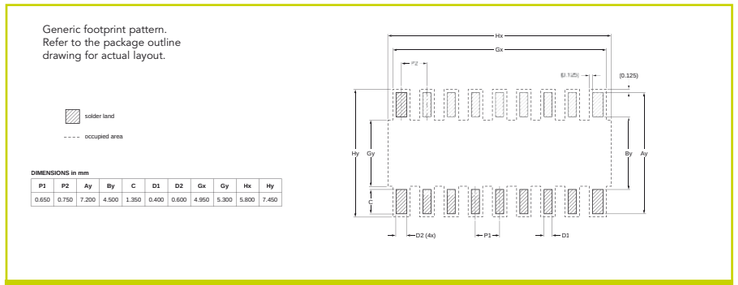
SOT360 (TSSOP20)



DIMENSIONS (mm are the original dimensions)

UNIT	A max.	A_1	A_2	A_3	b_p	c	D(1)	E(1)	e	H_E	L	L_p	Q	v	w	y	Z(1)	θ
mm	1.1	0.15 0.05	0.95 0.80	0.25	–	0.30 0.19	0.2 0.1	5.1 4.9	4.5 4.3	0.65	6.6 6.2	1	0.75 0.50	0.4 0.3	0.2	0.13	0.1	0.72 0.38	8° 0°

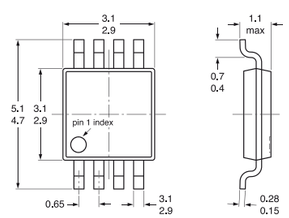
SOT402 (TSSOP14)



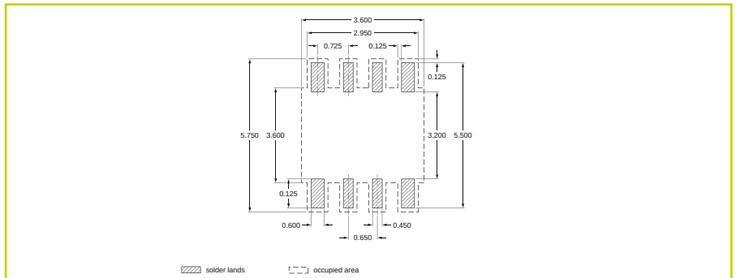
DIMENSIONS in mm

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

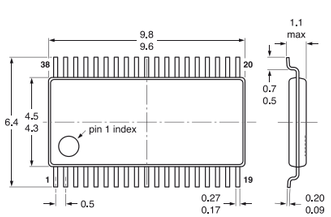
SOT402 (TSSOP14)



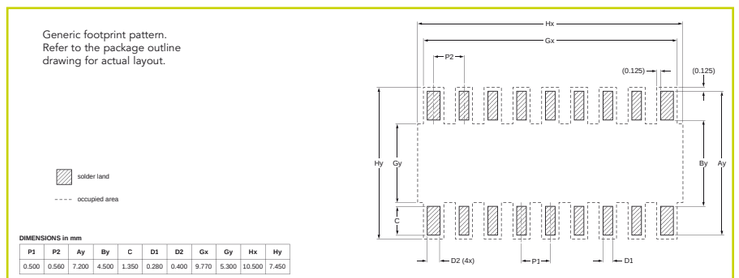
SOT505 (TSSOP8)



SOT505 (TSSOP8)



SOT510 (TSSOP38)

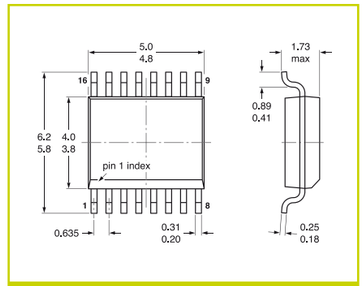


DIMENSIONS in mm

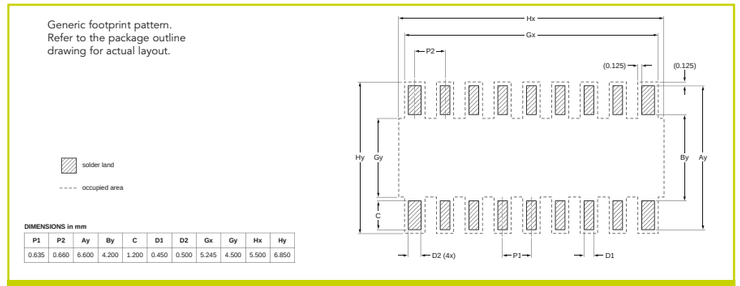
P1	P2	Ay	By	C	D1	D2	Gx	Gy	Hx	Hy
0.500	0.560	7.200	4.500	1.350	0.280	0.400	9.770	5.300	10.500	7.450

SOT510 (TSSOP38)

Dimensions in mm



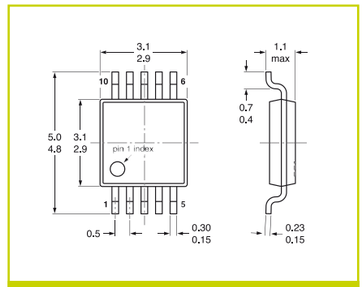
SOT519 (SSOP16)



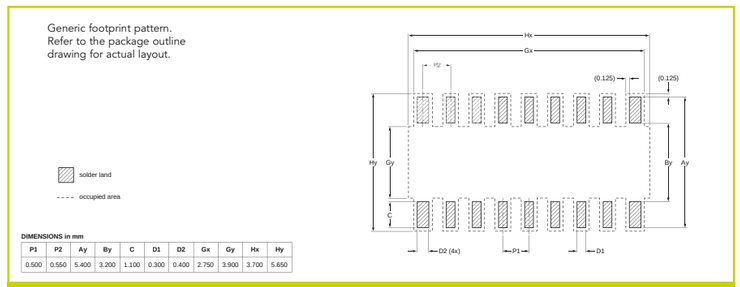
DIMENSIONS in mm

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

SOT519 (SSOP16)



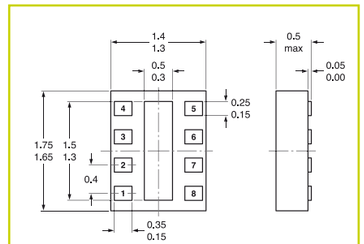
SOT552 (TSSOP10)



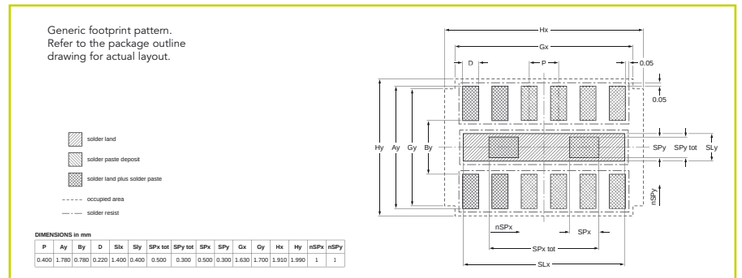
DIMENSIONS in mm

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

SOT552 (TSSOP10)



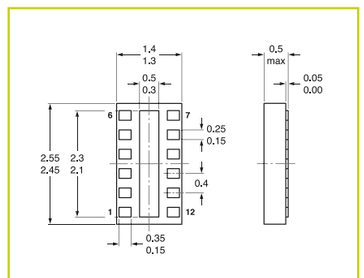
SOT983 (HXSON8)



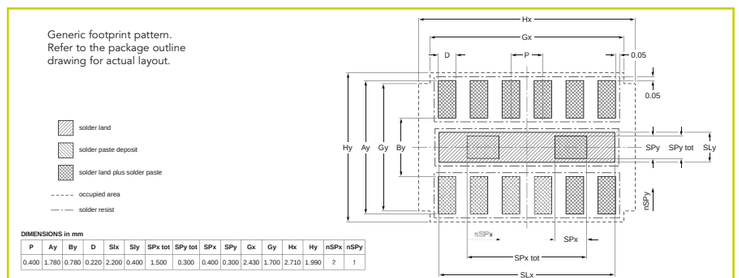
DIMENSIONS in mm

P	Ay	By	D	SIx	SIy	SPx tot	SPy tot	SPx	SPy	Gx	Gy	Hx	Hy	nSPx	nSPy
0.400	1.780	0.780	0.220	1.400	0.400	0.500	0.300	0.500	0.300	1.630	1.700	1.910	1.990	1	1

SOT983 (HXSON8)



SOT984 (HXSON12)

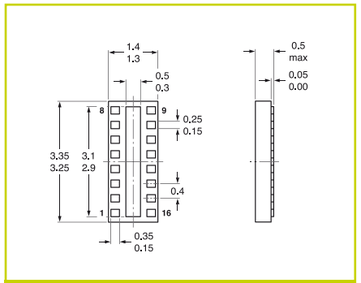


DIMENSIONS in mm

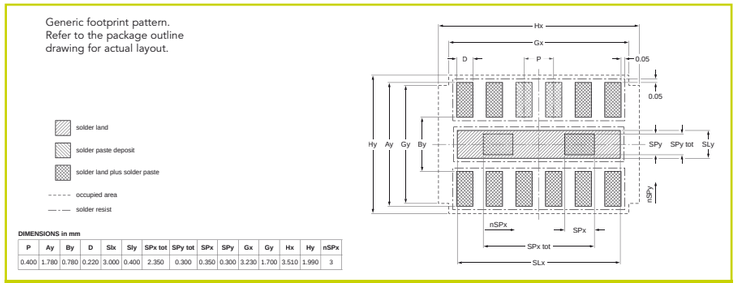
P	Ay	By	D	SIx	SIy	SPx tot	SPy tot	SPx	SPy	Gx	Gy	Hx	Hy	nSPx	nSPy
0.400	1.780	0.780	0.220	2.200	0.400	1.500	0.300	0.400	0.300	2.430	1.700	2.710	1.990	2	1

SOT984 (HXSON12)

Dimensions in mm

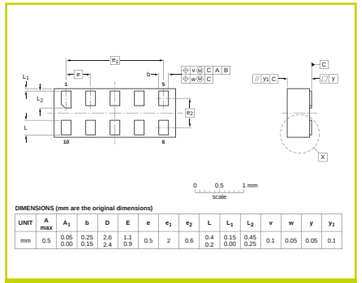


SOT985 (HXSON16)

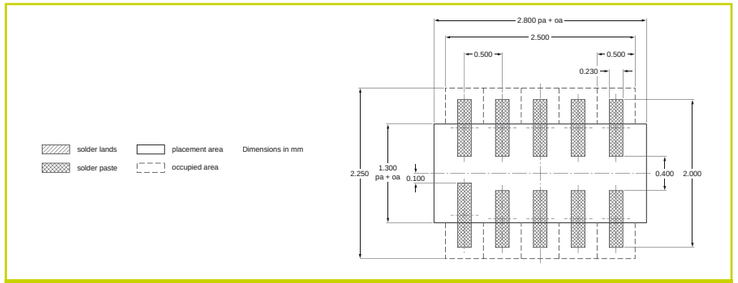


P	Ay	By	D	Slx	Sly	SPx tot	SPy tot	SPx	SPy	Gx	Gy	Hx	Hy	nSPx
0.400	1.780	0.780	0.220	3.000	0.400	2.350	0.300	0.350	0.300	3.230	1.700	3.510	1.990	3

SOT985 (HXSON16)

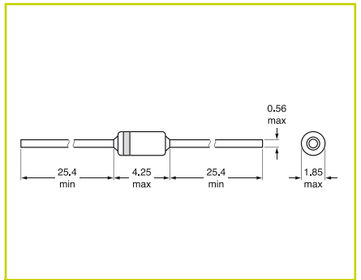


SOT1059 (XSON10U)

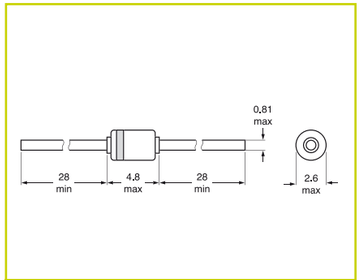


SOT1059 (XSON10U)

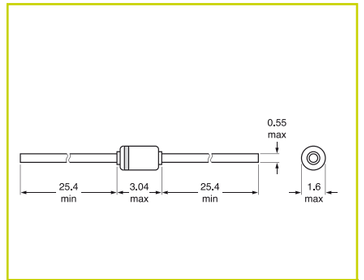
Glass diodes



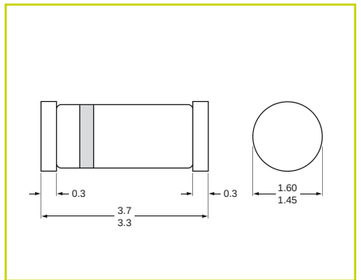
SOD27 (DO-35)



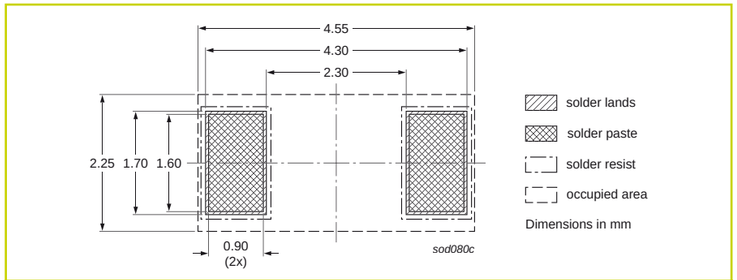
SOD66 (DO-41)



SOD68 (DO-34)



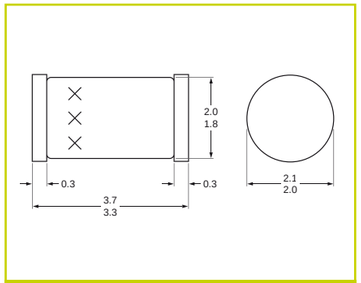
SOD80C



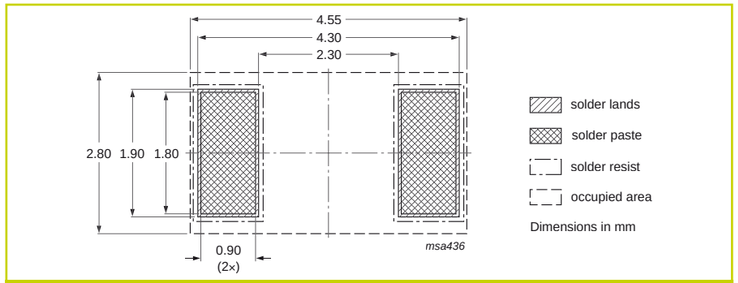
SOD80C

Dimensions in mm

Minimized outline drawings and reflow soldering footprint



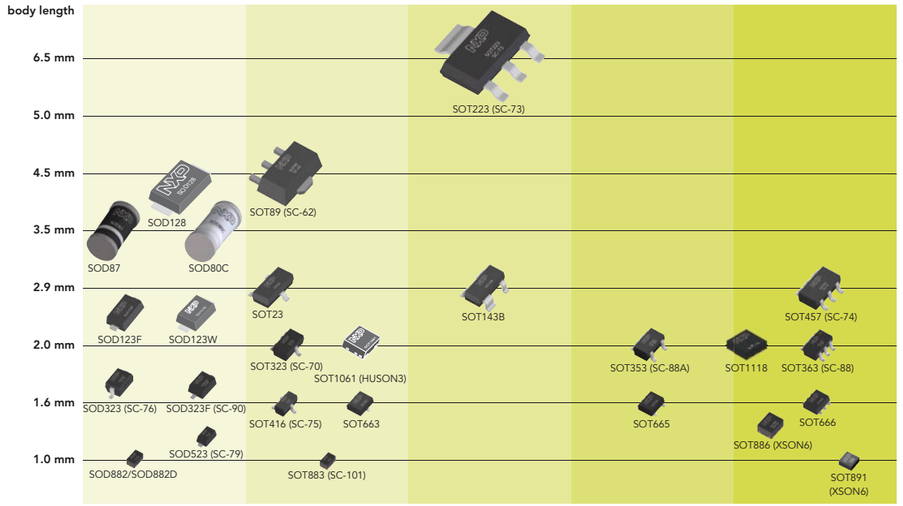
SOD87

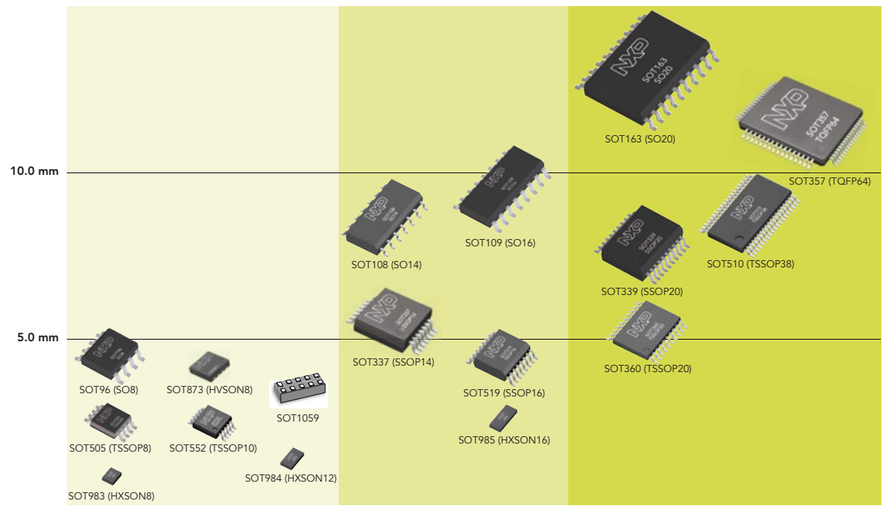


SOD87

Dimensions in mm

Package overview





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

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BCW69 / 70	48	BSP41	65	BZX84 series	16	IP3254CZ16	36	IP4264CZ8-20	38
BCW71 / 72	48	BSP43	65	BZX84J series	16	IP3254CZ8	36	IP4264CZ8-40	38
BCW89	48	BSP50	51	BZX84-y10	17	IP3337CX18/LF	36	IP4280CZ10	30
BCX17	48	BSP51	51	BZX84-y11	17	IP3338CX24/LF	36	IP4281CZ10	30
BCX18	48	BSP52	51	BZX84-y12	17	IP4025CX20/LF	32	IP4282CZ6	33
BCX19	48	BSP60	51	BZX84-y13	17	IP4027CX20/LF	32	IP4282CZ6	30
BCX51 / -10 / -16	65	BSP61	51	BZX84-y15	17	IP4041CX25/LF	36	IP4283CZ10-TB	30
BCX52 / -10 / -16	65	BSP62	51	BZX84-y16	17	IP4042CX5/LF	37	IP4283CZ10-TT	30
BCX53 / -10 / -16	65	BSP89	76	BZX84-y18	17	IP4043CX5/LF	37	IP4284CZ10-TB	31
BCX54 / -10 / -16	65	BSR14	49	BZX84-y20	17	IP4044CX8/LF	38	IP4284CZ10-TT	31
BCX55 / -10 / -16	65	BSR16	49	BZX84-y22	17	IP4047CX6/LF	32	IP4286CZ6-TBF	31
BCX56 / -10 / -16	65	BSR30 / 31	65	BZX84-y24	17	IP4048CX5/LF	32	IP4286CZ6-TTY	31
BCX70G / H / J / K	48	BSR33	65	BZX84-y27	17	IP4049CX5/LF	32	IP4302CX2/LF	37
BCX71H / J / K	48	BSR41	65	BZX84-y2V4	17	IP4051CX11/LF	38	IP4303CX4/LF	37
BF550	52	BSR42 / 43	65	BZX84-y2V7	17	IP4052CX20/LF	38	IP4305CX4/LF	37
BF570	52	BSS123	77	BZX84-y30	17	IP4053CX15/LF	36	IP4306CX2/LF	37
BF620	51	BSS192	79	BZX84-y33	17	IP4054CX15/LF	36	IP4307CX4/LF	36
BF621	51	BSS63	48	BZX84-y36	17	IP4055CX6/LF	32	IP4309CX9	31
BF622	51	BSS64	48	BZX84-y39	17	IP4056CX8	39	IP4310CX8	31
BF623	51	BSS84	79	BZX84-y3V0	17	IP4057CX10	39	IP4332CX5/LF	37
BF720	51	BSS87	77	BZX84-y3V3	17	IP4058CX8	39	IP4337CX18/LF/E	36
BF722	51	BST39	51	BZX84-y3V6	17	IP4059CX5	39	IP4338CX24/LF	36
BF723	51	BST50	51	BZX84-y3V9	17	IP4060CX16/LF	38	IP4342CX5/LF	37
BF820	51	BST51	51	BZX84-y43	17	IP4064CX8/LF/S	38	IP4343CX5/LF	37
BF820W	51	BST52	51	BZX84-y47	17	IP4065CX11	39	IP4350CX24/LF	38
BF821	51	BST60	51	BZX84-y4V3	17	IP4067CX9/LF	38	IP4352CX24/LF	38
BF822	51	BST61	51	BZX84-y4V7	17	IP4078CX6	39	IP4353CX15/LF	36
BF823	51	BST62	51	BZX84-y51	17	IP4085CX4	38	IP4355CX6/LF	32
BF824	52	BST82	77	BZX84-y56	17	IP4088CX20/LF	36	IP4358CX6	31
BF824W	52	BSV52	49	BZX84-y5V1	17	IP4110CX20/LF	32	IP4359CX4	30
BF840	52	BZA100	25	BZX84-y5V6	17	IP4125CX20/LF	32	IP4359CX4	39
BFS19	52	BZA408B	25	BZX84-y62	17	IP4142CX5/LF	37	IP4361CX4/LF	37
BFS20	52	BZA418A	25	BZX84-y68	17	IP4153CX15/LF	36	IP4363CX10/LF	32
BFS20W	52	BZA420A	25	BZX84-y6V2	17	IP4158CX8	39	IP4364CX8/LF	38
BSH103	75	BZA456A	25	BZX84-y6V8	17	IP4220CZ6	43	IP4365CX11	38
BSH105	75	BZA462A	25	BZX84-y75	17	IP4220CZ6	40	IP4366CX8/LF	38
BSH108	75	BZA820A	25	BZX84-y7V5	17	IP4220CZ6	30	IP4385CX4	38
BSH111	77	BZA856A	25	BZX84-y8V2	17	IP4221CZ6-S	30	IP4386CX4	38
BSH112	77	BZA856AL	25	BZX84-y9V1	17	IP4221CZ6-XS	30	IP4387CX4	38
BSH114	77	BZA862A	25	BZX884 series	16	IP4224CZ6	42	IP4769CZ14	35
BSH121	77	BZA862AL	25	ES1A	15	IP4225CZ10	40	IP4770CZ16	35
BSH201	79	BZA868A	25	ES1B	15	IP4233CZ6	30	IP4771CZ16	35
BSH202	79	BZA868AL	25	ES1D	15	IP4234CZ6	29	IP4772CZ16	35
BSH203	79	BZA956A	25	ES1G	15	IP4251CZ12-6	36	IP4773CZ14	35
BSH205	79	BZA962A	25	ES2A	15	IP4251CZ16-8	36	IP4774CZ14	35
BSH207	79	BZA968A	25	ES2B	15	IP4251CZ8-4	36	IP4776CZ38	34
BSN20	77	BZB100A	16	ES2D	15	IP4252CZ12-6	36	IP4777CZ38	34
BSP030	74	BZB784 series	16	ES2G	15	IP4252CZ16-8	36	IP4778CZ38	34
BSP100	74	BZB84 series	16	ES3A	15	IP4252CZ8-4	36	IP4790CZ38	31
BSP122	76	BZB984 series	16	ES3B	15	IP4253CZ12-6	36	IP4852CX25/LF	38
BSP126	76	BZT52H series	16	ES3D	15	IP4253CZ16-8	36	IP4853CX24/LF	38
BSP130	76	BZV49 series	16	ES3G	15	IP4253CZ8-4	36	IP5002CX8/LF	32
BSP19	51	BZV55 series	16	IP3047CX6	32	IP4254CZ12-6	36	IP5006CX11/LF	32
BSP220	79	BZV85 series	16	IP3048CX5	32	IP4254CZ16-8	36	IP5020CX16/LF	32
BSP225	79	BZV90 series	16	IP3219CZ6	29	IP4254CZ8-4	36	IP5040CX11/LF	32
BSP230	79	BZX100A	16	IP3253CZ12	36	IP4256CZ3-M	36	IP5306CX8	32
BSP250	79	BZX384 series	16	IP3253CZ16	36	IP4256CZ5-W	36	IP5311CX5/LF	32
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MMBZ12VAL	44	NZX14C	17	NZX4V7C	17	PBLS2002S	61	PBSS303NX	56
MMBZ12VDL	44	NZX15A	17	NZX4V7D	17	PBLS2003D	61	PBSS303NZ	56
MMBZ15VAL	44	NZX15B	17	NZX5V1A	17	PBLS2003S	61	PBSS303PD	58
MMBZ15VDL	44	NZX15C	17	NZX5V1B	17	PBLS2004D	61	PBSS303PX	58
MMBZ18VAL	44	NZX15X	17	NZX5V1C	17	PBLS2021D	61	PBSS303PZ	58
MMBZ18VCL	44	NZX16A	17	NZX5V1D	17	PBLS2022D	61	PBSS304ND	56
MMBZ20VAL	44	NZX16B	17	NZX5V6A	17	PBLS2023D	61	PBSS304NX	56
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MMBZ33VAL	44	NZX18C	17	NZX5V6E	17	PBLS4001Y	61	PBSS304PZ	58
MMBZ33VCL	44	NZX20A	17	NZX6V2A	17	PBLS4002D	61	PBSS305ND	56
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MMBZ6V2AL	44	NZX20C	17	NZX6V2C	17	PBLS4002Y	61	PBSS305NZ	56
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NX1117C12Z	69	NZX24B	17	NZX6V8C	17	PBLS4004V	61	PBSS306NZ	56
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NX1117C50Z	69	NZX2V4B	17	NZX8V2B	17	PBLS6004D	61	PBSS4021NT	57
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NX1117I12Z	69	NZX2V7C	17	NZX9V1A	17	PBLS6022D	61	PBSS4021PT	59
NX1117I15Z	69	NZX30A	17	NZX9V1B	17	PBLS6023D	61	PBSS4021PX	58
NX1117I18Z	69	NZX30B	17	NZX9V1C	17	PBLS6024D	61	PBSS4021PZ	58
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NX1117I25Z	69	NZX33A	17	PBHV8115T	62	PBRN123ET	55	PBSS4021SPN	60
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NZX11C	17	NZX3V6A	17	PBHV9115Z	62	PBSS301NX	56	PBSS4032SPN	60
NZX11D	17	NZX3V6B	17	PBHV9215Z	62	PBSS301NZ	56	PBSS4041NT	57
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PBSS4130T	57	PBSS5350SS	60	PDTA123JT	54	PDTC114ET	54	PDTC143ZM	54
PBSS4140DPN	60	PBSS5350T	59	PDTA123JU	54	PDTC114EU	54	PDTC143ZT	54
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PBSS4480X	56	PDTA113ET	54	PDTA143TM	54	PDTC123TM	54	PEMB11	55
PBSS4520X	56	PDTA113EU	54	PDTA143TT	54	PDTC123TT	54	PEMB13	55
PBSS4540X	56	PDTA113ZE	54	PDTA143TU	54	PDTC123TU	54	PEMB14	55
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PBSS5120T	59	PDTA114EU	54	PDTA143ZT	54	PDTC124ET	54	PEMB20	55
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PBSS5140U	59	PDTA114TT	54	PDTA144EM	54	PDTC124TM	54	PEMB30	55
PBSS5140V	59	PDTA114TU	54	PDTA144ET	54	PDTC124TT	54	PEMB4	55
PBSS5160DS	60	PDTA114YE	54	PDTA144EU	54	PDTC124TU	54	PEMB9	55
PBSS5160T	59	PDTA114YM	54	PDTA144TE	54	PDTC124XE	54	PEMD10	55
PBSS5160U	59	PDTA114YT	54	PDTA144TM	54	PDTC124XM	54	PEMD12	55
PBSS5160V	59	PDTA114YU	54	PDTA144TT	54	PDTC124XT	54	PEMD13	55
PBSS5220T	59	PDTA115EE	54	PDTA144TU	54	PDTC124XU	54	PEMD14	55
PBSS5220V	59	PDTA115EM	54	PDTA144VE	54	PDTC143EE	54	PEMD15	55
PBSS5230T	59	PDTA115ET	54	PDTA144VM	54	PDTC143EM	54	PEMD16	55
PBSS5240T	59	PDTA115EU	54	PDTA144VT	54	PDTC143ET	54	PEMD17	55
PBSS5240V	59	PDTA115TE	54	PDTA144VU	54	PDTC143EU	54	PEMD18	55
PBSS5240Y	59	PDTA115TM	54	PDTA144WE	54	PDTC143TE	54	PEMD19	55
PBSS5250T	59	PDTA115TT	54	PDTA144WU	54	PDTC143TM	54	PEMD2	55
PBSS5250X	58	PDTA115TU	54	PDTB113ET	55	PDTC143TT	54	PEMD20	55
PBSS5320D	58	PDTA123EE	54	PDTB113ZT	55	PDTC143TU	54	PEMD24	55
PBSS5320T	59	PDTA123EM	54	PDTB123ET	55	PDTC143XE	54	PEMD3	55
PBSS5320X	58	PDTA123ET	54	PDTB123TT	55	PDTC143XM	54	PEMD30	55
PBSS5330PA	59	PDTA123EU	54	PDTB123YT	55	PDTC143XT	54	PEMD4	55

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PEMH1	55	PESD36VS2UT	25	PESD5V0S1ULD	24	PH5525L	80	PHN210	83
PEMH10	55	PESD3V3L1BA	26	PESD5V0S2BT	27	PH6030L	82	PHN210T	83
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PEMH14	55	PESD3V3L1UL	26	PESD5V0S4UD	25	PH8030L	82	PHP110NQ06LT	83
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PEMH17	55	PESD3V3L4UF	27	PESD5V0U1BA	26	PH9030L	82	PHP143NQ04T	83
PEMH18	55	PESD3V3L4UG	27	PESD5V0U1BB	26	PH955L	83	PHP160NQ08T	84
PEMH19	55	PESD3V3L4UW	27	PESD5V0U1BL	26	PH9930L	82	PHP165NQ08T	84
PEMH2	55	PESD3V3L5UF	28	PESD5V0U1UA	26	PHB101NQ04T	83	PHP176NQ04T	83
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PEMZ1	49	PESD3V3S4UD	25	PESD5V0U5BV	28	PHB21N06LT	83	PHP23NQ11T	85
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PESD12VL1BA	26	PESD3V3S5UD	25	PESD5V0V1BB	26	PHB29N08T	84	PHP28NQ15T	86
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PESD12VS1UL	24	PESD3V3V4UF	27	PESD5V0V4UW	27	PHB47NQ10T	85	PHP33NQ20T	86
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PESD12VS4UD	25	PESD3V3X1BL	29	PESD5V0X1UAB	29	PHD101NQ03LT	82	PHP45NQ10TA	85
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PMBD354	14	PMEG2010AEH	11	PMEG3030BEP	10	PMGD280UN	79	PMSTA42	51
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PMBT2907A	49	PMEG2010EJ	11	PMEG4005AEV	11	PMK50XP	86	PMV40UN	75
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PMBT3904M	49	PMEG2010ER	10	PMEG4005EH	11	PML340SN	77	PMV56XN	75
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PMBT3906M	49	PMEG2015EH	11	PMEG4010BEV	11	PMN27UN	75	PMZ270XN	75
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PMBT3906YS	49	PMEG2015EV	11	PMEG4010CEJ	11	PMN34LN	75	PMZ390UN	75
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PMBT4401	49	PMEG2020EH	11	PMEG4010EJ	11	PMN40LN	75	PRLL5818	10
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PMD9001D	53	PMEG3010BEV	11	PMEG6010ER	10	PMR290XN	75	PSMN005-55P	83
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PSMN6R0-80YS	84	PTVS5V0P1UP	45	PUMH14	55	PZU3.6y	17	S2B	15
PSMN6R5-80PS	84	PTVS5V0S1UR	44	PUMH15	55	PZU3.9y	17	S2D	15
PSMN7R0-30YL	82	PTVS60VP1UP	45	PUMH16	55	PZU30y	17	S2DA	15
PSMN8R0-40PS	83	PTVS60VS1UR	44	PUMH17	55	PZU33y	17	S2G	15
PSMN8R2-80YS	84	PTVS64VP1UP	45	PUMH18	55	PZU36y	17	S2GA	15
PSMN8R3-40YS	83	PTVS64VS1UR	44	PUMH19	55	PZU4.3y	17	S2J	15
PSMN8R7-80PS	84	PTVS6V0P1UP	45	PUMH2	55	PZU4.7y	17	S2JA	15
PSMN9R0-30YL	82	PTVS6V0S1UR	44	PUMH20	55	PZU5.1y	17	S2K	15
PSSI2021SAY	70	PTVS6V5P1UP	45	PUMH24	55	PZU5.6y	17	S2KA	15
PTVS10VP1UP	45	PTVS6V5S1UR	44	PUMH30	55	PZU6.2y	17	S2M	15
PTVS10VS1UR	44	PTVS7V0P1UP	45	PUMH4	55	PZU6.8y	17	S2MA	15
PTVS11VP1UP	45	PTVS7V0S1UR	44	PUMH7	55	PZU7.5y	17	S3A	15
PTVS11VS1UR	44	PTVS7V5P1UP	45	PUMH9	55	PZU8.2y	17	S3B	15

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S3G	15	TL431ASDT	68	TLVH431ACDBZR	68	TLVH431QDBZR	68	US3A	15
S3J	15	TL431BCDBZR	68	TLVH431AIDBZR	68	US1A	15	US3B	15
S3K	15	TL431BIDBZR	68	TLVH431AMQDBZR	68	US1B	15	US3D	15
S3M	15	TL431BMSDT	68	TLVH431AQDBZR	68	US1D	15	US3G	15
SI2302DS	75	TL431BQDBZR	68	TLVH431BCDBZR	68	US1G	15	US3J	15
SI2304DS	75	TL431BSDT	68	TLVH431BIDBZR	68	US1J	15	US3K	15
SI4410DY	83	TL431CDBZR	68	TLVH431BMQDBZR	68	US1K	15	US3M	15
TL431ACDBZR	68	TL431IDBZR	68	TLVH431BQDBZR	68	US1M	15		
TL431AIDBZR	68	TL431MSDT	68	TLVH431CDBZR	68	US2DA	15		
TL431AMSDT	68	TL431QDBZR	68	TLVH431IDBZR	68	US2GA	15		

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