



Discrete Semiconductors Selection Guide 2010

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



Introducing new package technology

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

Leadless powerhouse – SOT1061 and SOT1118

Features

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



Products in SOT1061

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



Products in SOT1118

- Small-signal MOSFET P-channel and FET-KYs, page 77

FlatPower – SOD123W and SOD128

Features

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



Products in SOD123W and SOD128

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

Small, strong, perfectly visible – SOD882D

Features

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



Products in SOD882D

- Standard ESD protection devices, page 24

Transfer to halogen-free products

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

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

Discrete Semiconductors Selection Guide 2010

Products for general applications

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

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Support tools

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

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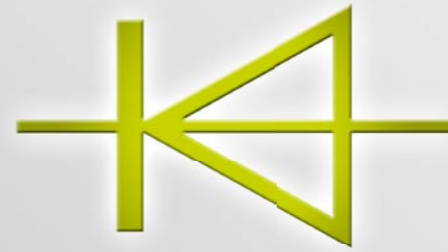
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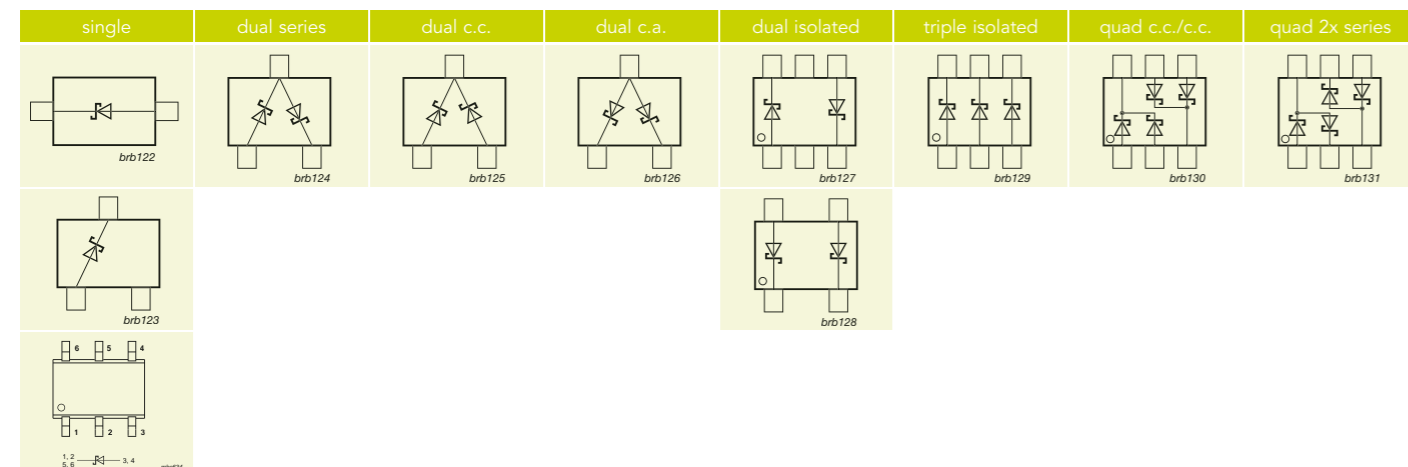
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General purpose Schottky diodes ≤ 250 mA

types in **bold** represent new products

I _F max (mA)	V _F max (V)	V _F max (mV)	@ I _F (mA)	I _R max (μA)	@ V _R (V)	Package	SOD80C (MiniMelf)	SOD68 (DO-34)	SOT23	SOT143B	SOD123F	SOT323 (SC-70)	SOT363 (SC-88)	SOD323F (SC-90)	SOD323 (SC-76)	SOT666	SOT416 (SC-75)	SOD523 (SC-79)	SOD882/ SOT883 (SC-101)					
																								
							Size (mm)	3.5 x 1.5 x 1.5	3.04 x 1.6 x 0.55	2.9 x 1.3 x 1.0	2.9 x 1.3 x 1.0	2.6 x 1.6 x 1.1	2.0 x 1.25 x 0.95	2.0 x 1.25 x 0.95	1.7 x 1.25 x 0.7	1.7 x 1.25 x 0.95	1.6 x 1.2 x 0.55	1.6 x 0.8 x 0.77	1.2 x 0.8 x 0.6	1.0 x 0.6 x 0.5				
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					
120	40	370	1	0.5	30	quad 2x series									BAS70XY									
						single												RB751V40			RB751S40	RB751CS40		
						single			BAS40		BAS40H	BAS40W						1PS76SB40			1PS79SB40	BAS40L		
						dual series			BAS40-04			BAS40-04W												
						dual c.c.			BAS40-05			BAS40-05W									1PS75SB45			
						dual c.a.			BAS40-06			BAS40-06W												
200	30	300	10	30	10	dual isolated				BAS40-07							BAS40-07V							
						quad c.c./c.c.													BAS40-05V					
						quad 2x series											1PS88SB48							
						quad 2x series											BAS40XY							
		340	10	2	25	25	single			BAT754											1PS79SB31			
							single			BAT754S														
							dual series			BAT754C														
							dual c.c.			BAT754A														
		400	10	2	25	25	dual c.a.			BAT754A														
							triple isolated											BAT754L						
							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											
500	200	30	10	10	single														RB521S30					
					single																RB520S30			
600	200	1	10	10	single																			
					single																			
					dual series			BAT721															1PS76SB21	
					dual c.c.			BAT721S																
					dual c.a.			BAT721C																
					dual c.a.			BAT721A																
300	10	15	30	30	single																			
					dual series																			
					dual c.c.																			
					dual c.a.																			
360	10	0.5	25	25	single																			
					dual series																			
					dual c.c.																			
					dual c.a.																			
420	30	0.5	25	25	single																			
					dual series																			
					dual c.c.																			
					dual c.a.																			
50	450	10	5	40	single	BAS86	BAT86																	
					single																			
250	100	950	250	18	75	single				BAT46WH				BAT46WJ										

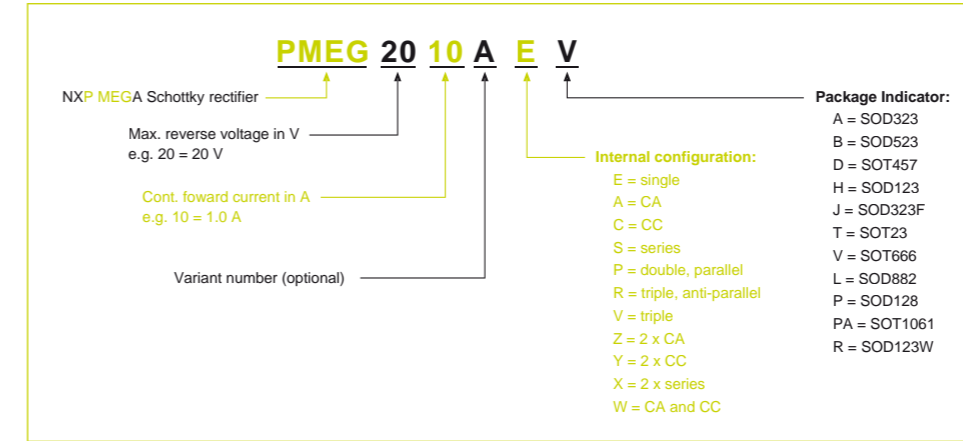


Medium power low V_F Schottky rectifiers dual ≥ 200 mA

types in **bold** represent new products

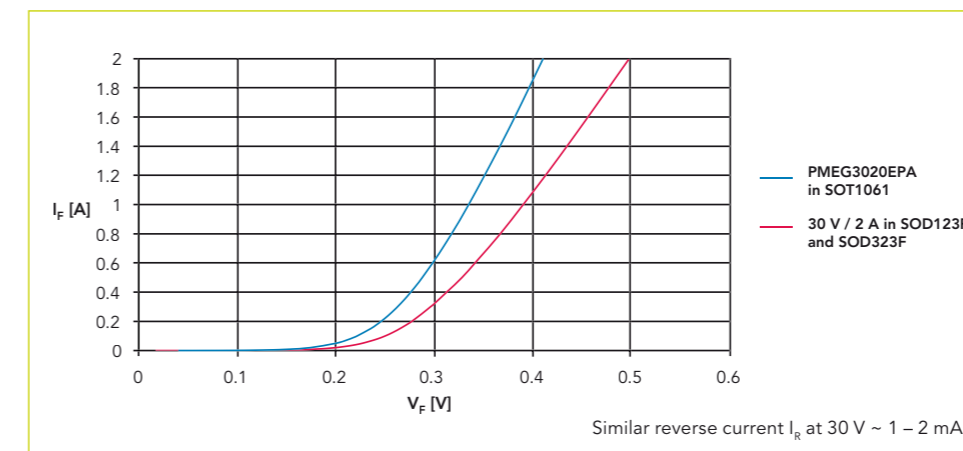
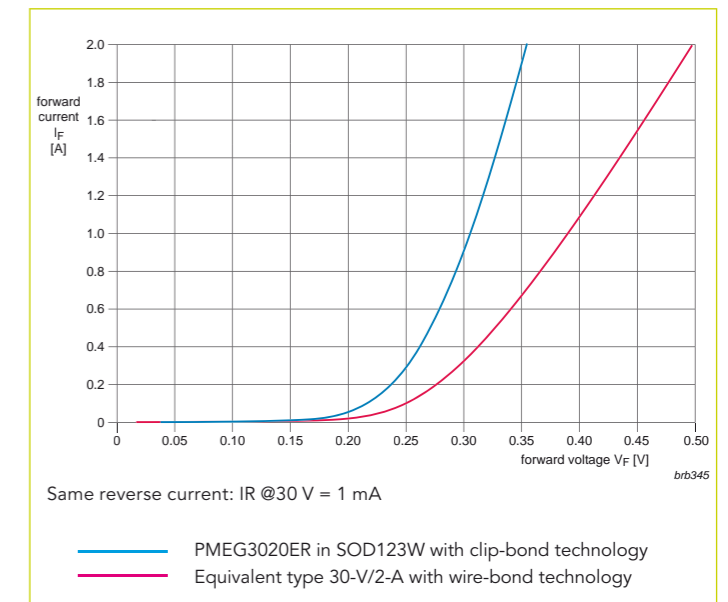
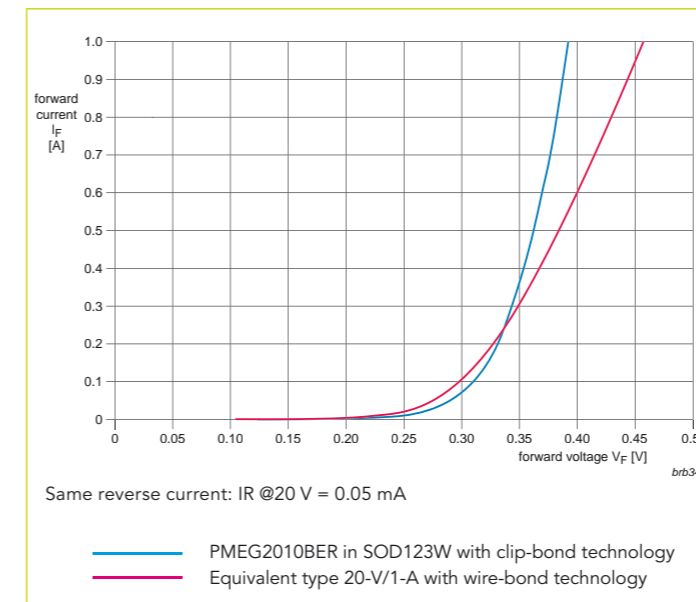
I_F max (A)	V_R max (V)	V_F max (mV) @ I_F max	I_F max (mA) @ V_R max	Optimization	Package	SOT223 (SC-73)	SOT23	SOT1061	SOT666	
						Size (mm)	6.5 x 3.5 x 1.65	2.9 x 1.3 x 1.0	2.0 x 2.0 x 0.65	1.6 x 1.2 x 0.55
						P_{tot} (mW)	1500	250	1000	300
0.2	30	480	0.03	low V_F	dual isolated				PMEG3002TV	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

Nomenclature of low V_F (MEGA) Schottky rectifiers










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

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






Low capacitance Schottky diodes

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






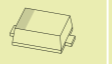






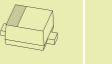
























¹⁾ diodes have matched capacitance

PN rectifiers in SMA, SMB, SMC

types in **bold** represent new products

Package	SOD131 (SMA)				SOD132 (SMB)			SOD133 (SMC)			
											
Size (mm)	4.25 x 2.67 x 2.14				4.32 x 3.62 x 2.29			6.86 x 5.91 x 2.34			
t_r (ns)	30	60	300	2000	30	300	2000	30	60	300	2000
V_R max (V)											
I_F max (A)											
50	1	ES1A	US1A	RS1A	S1A						
	1.5			RS2AA		RS2A	S2A				
	2					ES2A					
100	1	ES1B	US1B	RS1B	S1B						
	1.5			RS2BA		RS2B	S2B				
	2					ES2B					
200	1	ES1D	US1D	RS1D	S1D						
	1.5		US2DA	RS2DA	S2DA		RS2D	S2D			
	2					ES2D					
400	1	ES1G	US1G	RS1G	S1G						
	1.5		US2GA	RS2GA	S2GA		RS2G	S2G			
	2					ES2G					
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 switching diodes ≤ 100V

V _r max (V)	V _f max (V)	I _f (mA)	I _r max (mA)	@ V _r (V)	t _{rr} max (ns)	Package	SOD27 (DO-35)	SOD68 (DO-34)	SOD80C (MiniMelf)	SOT23	SOT143B	SOD123F	SOT323 (SC-70)	SOT363 (SC-88)	SOD323 (SC-76)	SOD323F (SC-90)	SOT666	SOT416 (SC-75)	SOD523 (SC-79)	SOD882	SOT883 (SC-101)						
																											
							4.25 x 1.85 x 0.56	3.04 x 1.6 x 0.55	3.5 x 1.5 x 1.5	2.9 x 1.3 x 1.0	2.9 x 1.3 x 1.0	2.6 x 1.6 x 1.1	2.0 x 1.25 x 0.95	2.0 x 1.25 x 0.95	1.7 x 1.25 x 0.95	1.7 x 1.25 x 0.7	1.6 x 1.2 x 0.55	1.6 x 0.8 x 0.77	1.2 x 0.8 x 0.6	1.0 x 0.6 x 0.5	1.0 x 0.6 x 0.5						
						500	500	500	250	250	830	200	300	400	550	180	170	500	250	250							
50	1	50	100	50	4					BAL74																	
70	1	50	1000	70	4					BAL99																	
75	1	10	25	20	4			1N4531																			
		50	1000	75	4					BAS28																	
		100	5000	75	4				BAS32L																		
90	1	50	500	80	4					BAW56																	
																											
																											
100	1	50	500	80	4		1N4148																				
																											
																											
																											
																											
																											
																											
																											
																											
										BAV70																	
																											
										BAV99																	
																											
																											

General purpose switching diodes > 100V

types in **bold** represent new products

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

Controlled avalanche switching diodes

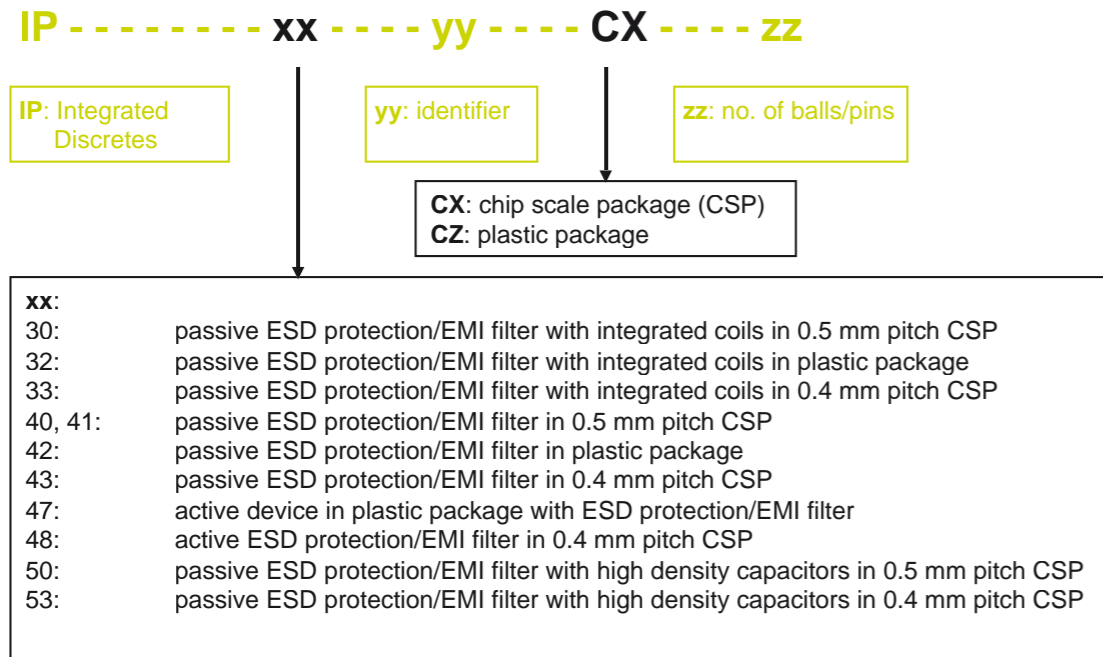
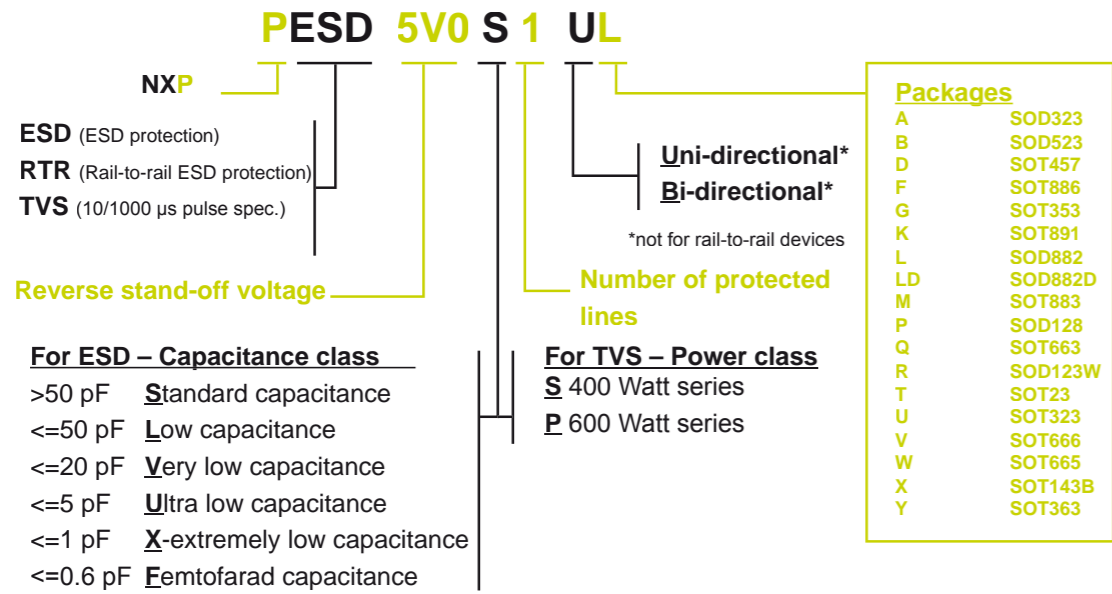
V_R max (V)	V_F max (V)	@ I_F (mA)	I_{RM} max (mA)	I_{FSM} max (A)	I_{FM} max (mA)	C_j max (pF)	t_{rr} max (ns)	Package	SOT23	SOT143B	
									Size (mm)	2.9 x 1.3 x 1.0	2.9 x 1.3 x 1.0
									P_{tot} (mW)	250	250
60	1	200	100	9	600	2.5	6			BAS56	
90	1	200	100	10	600	35	50		BAS29		
									BAS31	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

Low leakage current switching diodes

types in **bold** represent new products

V_R max (V)	V_F max (V)	@ I_F (mA)	I_{RM} max (mA)	I_{FSM} max (A)	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									BAS116H	BAS416		BAS716			
													BAS116			BAS116T			
													BAV199		BAS116				
															BAS116				
															BAV156				
															BAV170				
125	1	100	1	1.5 typ			BAS45AL	BAS45A											

Protection and signal conditioning nomenclature



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_{line} typ (pF)	C_{line} max (pF)	$P_{PP}^{(1)}$ max (W)	ESD rating ^[2] max (kV)	I_R max (μ A) @ V_{RWM}	Configuration	Type	Package	Size (mm)	
Unidirectional	Bidirectional											
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
		3.3	207	300	330	30	2		PESD3V3S1UB	SOD523 (SC-79)	1.2 x 0.8 x 0.6	
		5	152	200	260	30	1		PESD5V0S1UB			
		12	38	75	180	30	0.05		PESD12VS1UB			
		15	32	70	160	30	0.05		PESD15VS1UB			
		24	23	50	160	23	0.05		PESD24VS1UB			
		5	480	530	890	30	4		PESD5V0S1UA			SOD323 (SC-76)
		12	160	180	600	30	0.1		PESD12VS1UA			
		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
			5	35	45	130	30	0.1				

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

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



Standard ESD protection devices

Number of protected lines		V_{RWM} (V)	C_{line} typ (pF)	C_{line} max (pF)	$P_{PP}^{(1)}$ max (W)	ESD rating ^[2] max (kV)	I_R max (μ A) @ 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
		5.2	152	200	260	30	1		PESD5V2S2UT			
		12	38	75	180	30	1		PESD12VS2UT			
		15	32	70	160	30	1		PESD15VS2UT			
		24	23	50	160	23	1		PESD24VS2UT			
		36	17	35	160	30	1 (@ 30 V)		PESD36VS2UT			
		3.3	207	300	330	30	2		PESD3V3S2UAT	SOT886 (XSON6)	1.45 x 1.0 x 0.5	
		5	152	200	260	30	1		PESD5V0S2UAT			
		12	38	75	180	30	0.05		PESD12VS2UAT			
	15	32	70	160	30	0.05	PESD15VS2UAT					
	24	23	50	160	23	0.05	PESD24VS2UAT					
	5	85	220	110	30	0.1 (@ 4.3 V)	PESD5V0S4UF					
	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	SOT353 (SC-88A)	2.0 x 1.25 x 0.95
3			200	240	-	8	2	BZA856A				
3			107	125	-	8	1	BZA856AL		SOT457 (SC-74)	2.9 x 1.5 x 1.0	
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	SOT163 (SO20)	12.8 x 7.5 x 2.65			
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					
5	4	12	73	100	200	30	0.015		PESD12VS4UD	SOT163 (SO20)	12.8 x 7.5 x 2.65	
		15	60	90	200	30	0.015		PESD15VS4UD			
		24	40	70	200	23	0.015		PESD24VS4UD			
		3.3	215	300	200	30	0.8		PESD3V3S5UD			
		5	165	220	200	30	0.2		PESD5V0S5UD			
		12	73	100	200	30	0.015		PESD12VS5UD			
		15	60	90	200	30	0.015		PESD15VS5UD			
0	4	5	45	75	-	15	0.1		BZA408B	SOT163 (SO20)	12.8 x 7.5 x 2.65	
		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 μ s 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)	$P_{IP}^{(1)}$ 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		
0	1	3.3	101	-	500	30	2		PESD3V3L1BA	SOD882	1.7 x 1.25 x 0.95
		5	75	-	500	30	1		PESD5V0L1BA		
		12	19	-	200	30	0.05		PESD12VL1BA		
		15	16	-	200	30	0.05		PESD15VL1BA		
		24	11	-	200	23	0.05		PESD24VL1BA		
		5	11	13	45	30	0.01		PESD5V0V1BL		
		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)	$P_{IP}^{(1)}$ 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_{in} typ (pF)	C_{in} max (pF)	$P_{PP}^{[1]}$ max (W)	ESD rating ^[2] max (kV)	I_R max (μA) @ V_{RWM}	Configuration	Type	Package	Size (mm)
Unidirectional	Bidirectional										
0	4	5	2.9	3.5	-	10	0.1		PESD5V0U4BF	SOT886 (XSON6)	1.45 x 1.0 x 0.5
		5	2.9	3.5	-	10	0.1		PESD5V0U4BW	SOT665	1.6 x 1.2 x 0.55
5	4	3.3	22		25	20	1		PESD3V3L5UK	SOT891 (XSON6)	1.0 x 1.0 x 0.5
		5	16		25	20	0.025		PESD5V0L5UK		
		3.3	22	28	25	20	0.3		PESD3V3L5UF	SOT886 (XSON6)	1.45 x 1.0 x 0.5
		5	16	19	25	20	0.025		PESD5V0L5UF		
		3.3	22	28	25	20	0.3		PESD3V3L5UV	SOT666	1.6 x 1.2 x 0.55
		5	16	19	25	20	0.025		PESD5V0L5UV		
		3.3	22	28	25	20	0.3		PESD3V3L5UY	SOT363 (SC-88)	2.0 x 1.25 x 0.95
		5	16	19	25	20	0.025		PESD5V0L5UY		
0	5	5	2.9	3.5	-	10	0.1		PESD5V0U5BF	SOT886 (XSON6)	1.45 x 1.0 x 0.5
		5	2.9	3.5	-	10	0.1		PESD5V0U5BV	SOT666	1.6 x 1.2 x 0.55
6	5	5	16	19	35	20	0.025		PESD5V0L6UAS	SOT505 (TSSOP8)	3.0 x 3.0 x 1.1
		5	16	19	35	20	0.025		PESD5V0L6US	SOT96 (SO8)	4.9 x 3.9 x 1.75
0	7	5	8	10	35	10	0.025		PESD5V0L7BAS	SOT505 (TSSOP8)	3.0 x 3.0 x 1.1
		5	8	10	35	10	0.025		PESD5V0L7BS	SOT96 (SO8)	4.9 x 3.9 x 1.75

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

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

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

types in **bold** represent new products

Number of protected lines		V_{RWM} (V)	C_{in} typ (pF)	C_{in} max (pF)	ESD rating ^[2] max (kV)	I_R max (μA) @ V_{RWM}	Configuration	Type	Package	Size (mm)
Unidirectional	Bidirectional									
1	0	5	0.9	1	8	0.2		PESD5V0X1UB	SOD523 (SC-79)	1.2 x 0.8 x 0.6
		5	1.8	2	15	0.2		PESD5V0X1UAB	SOD882	1.0 x 0.6 x 0.5
		16	0.83	0.95	8	0.1		PESD16VX1UL	SOT23	2.9 x 1.3 x 1.0
0	1	5.5	1	1.5	8	0.1 (@ 3 V)		PRTR5V0U1T	SOT23	2.9 x 1.3 x 1.0
		5.5	1	1.5	8	0.1 (@ 3 V)		PESD5V0F1BL	SOD882	1.0 x 0.6 x 0.5
0	1	16	0.5	0.65	8	0.1		PESD16VX1UL	SOT23	2.9 x 1.3 x 1.0
		3.3	1.3	1.6	9	0.1		PESD3V3X1BL	SOD882	1.0 x 0.6 x 0.5
		5	0.9	1.3	9	0.1		PESD5V0X1BL	SOD882	1.0 x 0.6 x 0.5
		5.5	0.4	0.55	10	0.1		PESD5V0F1BL	SOD882	1.0 x 0.6 x 0.5
1	1	5	0.9	1.3	9	0.1		PESD5V0X1BQ	SOT663	1.6 x 1.2 x 0.55
		5	0.9	1.3	9	0.1		PESD5V0X1BT	SOT23	2.9 x 1.3 x 1.0
		80	0.6	0.75	30	0.1		NUP1301	SOT143B	2.9 x 1.3 x 1.0
		5.5	1	1.5	8	0.1 (@ 3 V)		PRTR5V0U2X	SOT143B	2.9 x 1.3 x 1.0
		5.5	1.8		12	0.1 (@ 3 V)	PRTR5V0U2AX	SOT143B	2.9 x 1.3 x 1.0	
		5.5	1	1.5	8	0.1 (@ 3 V)	PRTR5V0U2K	SOT891 (XSON6)	1.0 x 1.0 x 0.5	
2	0	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 _{int} typ (pF)	C _{int} max (pF)	ESD rating ^[1] max (kV)	I _R max (µA) @ V _{RWM}	Configuration	Type	Package	Size (mm)
Unidirectional	Bidirectional									
2	0	5.5	0.7	-	8	-		IP4282CZ6	SOT886 (XSON6)	1.45 x 1.0 x 0.5
		5.5	1.3	-	15	-		IP4359CX4	CSP	0.76 x 0.76 x 0.61
4	0	5.5	1	-	8	-		IP4220CZ6	SOT457 (SC-74)	2.9 x 1.5 x 1.0
		5.5	1	-	8	-		IP4221CZ6-S	SOT886 (XSON6)	1.45 x 1.0 x 0.5
		5.5	1	-	8	-		IP4221CZ6-XS	SOT891 (XSON6)	1.0 x 1.0 x 0.5
		5.5	1	-	8	-		IP4233CZ6	SOT363 (SC-88)	2.0 x 1.25 x 0.95
		5.5	1	-	8	-		PRTR5V0U4AD	SOT457 (SC-74)	2.9 x 1.5 x 1.0
		5.5	1	-	8	-		PRTR5V0U4D	SOT363 (SC-88)	2.0 x 1.25 x 0.95
		5.5	1	-	8	-		PRTR5V0U4Y	SOT363 (SC-88)	2.0 x 1.25 x 0.95
		5.5	0.7	-	8	-		IP4280CZ10	SOT552 (TSSOP10)	3.0 x 3.0 x 1.1
		5.5	0.7	-	8	-		IP4281CZ10	SOT1059 (XSON10U)	1.0 x 2.5 x 0.5
		5.5	0.6	-	8	-		IP4283CZ10-TB	SOT1059 (XSON10U)	1.0 x 2.5 x 0.5
		5.5	0.6	-	8	-		IP4283CZ10-TT	SOT552 (TSSOP10)	3.0 x 3.0 x 1.1

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

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

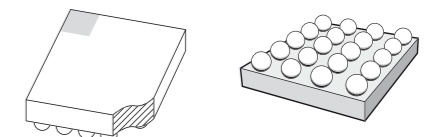
types in **bold** represent new products

Number of protected lines		V _{RWM} (V)	C _{int} typ (pF)	C _{int} 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
		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	6 ball CSP	0.91 x 1.28 x 0.65
		15 Ω	5000	-	Low-ohmic speaker (> ~8 Ω)	IP5311CX5/LF		5 ball CSP
		68 Ω	110	-	Single-ended or differential microphone	IP4049CX5/LF	6 ball CSP	0.91 x 1.28 x 0.65
		470 Ω	35	-	Single-ended or differential microphone	IP4055CX6/LF		1.56 x 1.03 x 0.65
		470 Ω	20	-	Single-ended or differential microphone	IP4355CX6/LF	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 ΣΔ ADC converters	IP5006CX11/LF	11 ball CSP	1.41 x 1.91 x 0.65
		5 Ω / 20 Ω / 1.5 kΩ	550	-	Differential microphone filter with integrated biasing network for ΣΔ including coupling capacitors	IP5020CX16/LF	16 ball CSP	2.01 x 1.91 x 0.65
		0.25 Ω, 3 nH	-	-	Inductive, low-ohmic differential channel LC filter	IP3047CX6	6 ball CSP	1.60 x 1.15 x 0.65
	0.25 Ω, 3 nH	-	-	Inductive, low-ohmic differential channel LC filter	IP3048CX5	5 ball CSP	1.51 x 1.15 x 0.65	
	2.2 kΩ / 1 kΩ / 0.8 kΩ	0.8 nF / 1.6 nF	-	Differential microphone biasing ESD protection / EMI filtering	IP5306CX8	8 ball CSP	1.19 x 1.19 x 0.61	
	4	10 Ω	5000	-	Dual differential speaker	IP5040CX11/LF	11 ball CSP	1.41 x 2.01 x 0.65
	6	15 Ω / 95 Ω	65 / 33	-	Single-ended microphone and high-ohmic speaker (> ~8 Ω) with integrated 2 kohm pull-up resistor	IP4363CX10/LF	10 ball CSP	0.76 x 1.96 x 0.61
40 Ω / 1450 Ω / 10 Ω		50 / 20 / 200	-	Fully integrated audio interface protection for differential microphone and differential speaker, including EMI filtering and pull up resistors	IP4025CX20/LF	20 ball CSP	1.98 x 2.53 x 0.65	
40 Ω / 1450 Ω / 10 Ω		50 / 20 / 200	-	Fully integrated audio interface protection for differential microphone and differential speaker, including EMI filtering and pull up resistors	IP4027CX20/LF		1.91 x 2.52 x 0.65	
50 Ω / 10 Ω		50 / 100 / 1000	-	Fully integrated audio interface protection for differential microphone and differential speaker, including EMI filtering and pull up resistors	IP4125CX20/LF		2.00 x 2.66 x 0.65	
8	0.8 Ω / 30 Ω / 200 Ω	20 / 50 / 150	~20	Fully integrated audio interface protection including EMI filtering for microphone and speaker, and additional 4-channel EMI filter	IP4110CX20/LF		1.91 x 2.47 x 0.65	

Video interfaces


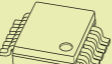



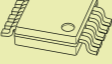

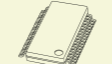
types in **bold** represent new products

Baseband interface	Number of protected lines	Buffer	Level shifter	C _{line} (pF)	Resistor (Ω)	Remark	Type	Package	Size (mm)	
Display port	4	-	-	0.6	-	ESD protection for ultra high speed interfaces	IP4283CZ10-TB	SOT1059 (XSON10U)	1.0 x 2.5 x 0.5	
		-	-	0.6	-	ESD protection for ultra high speed interfaces	IP4283CZ10-TT	SOT552 (TSSOP10)	3.0 x 3.0 x 1.1	
		-	-	0.5	-	ESD protection for ultra high speed interfaces	IP4284CZ10-TB	SOT1059 (XSON10U)	1.0 x 2.5 x 0.5	
		-	-	0.5	-	ESD protection for ultra high speed interfaces	IP4284CZ10-TT	SOT552 (TSSOP10)	3.0 x 3.0 x 1.1	
		-	-	-	-	ESD protection for ultra high speed interfaces	IP4286CZ6-TBF	SOT886 (XSON6)	1.45 x 1.0 x 0.5	
		-	-	0.6	-	ESD protection for ultra high speed interfaces	IP4286CZ6-TTY	SOT363 (SC-88)	2.0 x 1.25 x 0.95	
	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

Protection and signal conditioning







Video interfaces

types in **bold** represent new products

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

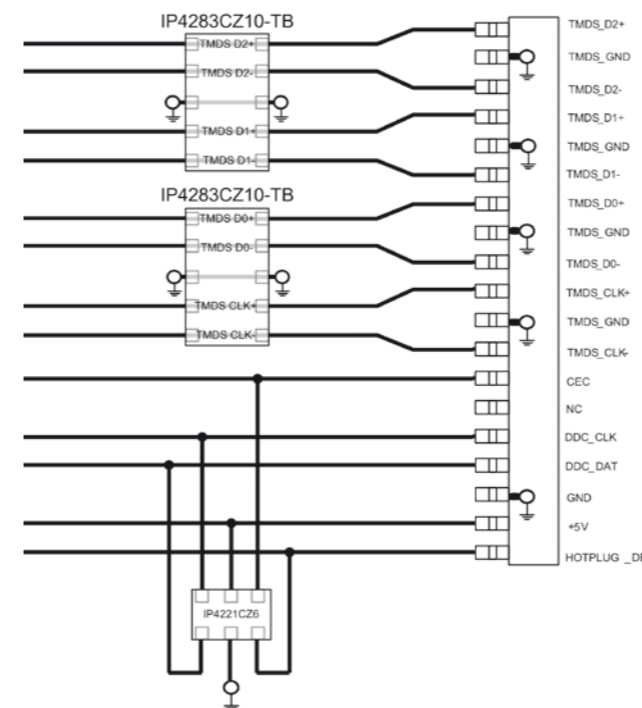
Video interfaces

types in **bold** represent new products

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




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

HDMI ESD protection using IP4283CZ10-TB and IP4221CZ6-S



Multichannel EMI filter, ESD protection for LCD and camera

types in **bold** represent new products

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

Multichannel EMI filter, ESD protection for LCD and camera



types in **bold** represent new products

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

Protection and signal conditioning

SD-, SIM-card and MMC





types in **bold** represent new products

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

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





Battery and charger protection

types in **bold** represent new products

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

USB, LVDS, SATA, LAN









types in **bold** represent new products

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

Protection and signal conditioning











USB, LVDS, SATA, LAN

types in **bold** represent new products

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

USB, LVDS, SATA, LAN









types in **bold** represent new products

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

Protection and signal conditioning




USB, LVDS, SATA, LAN

types in **bold** represent new products

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

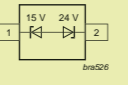
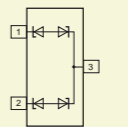

USB, LVDS, SATA, LAN

types in **bold** represent new products

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

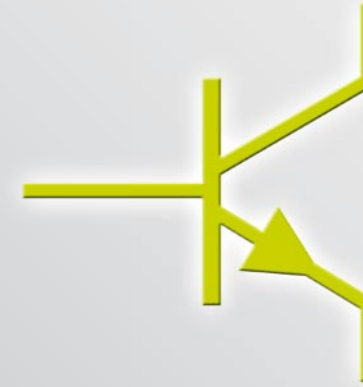
For ultra high speed single line ESD protection please refer to pages 29 - 31

Automotive LIN/CAN/FlexRay

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

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

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



Small-signal transistors

General purpose bipolar transistors

48

Single transistors	48
Double transistors	49
Single and double switching transistors	49
Matched pair transistors	50
High voltage transistors	51
Low noise transistors	51
Darlington transistors	51
Medium frequency transistors	52
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Resistor-equipped transistors (RETs)

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RETs 100 mA single	54
RETs 100 mA double	55
RETs 500 mA	55
Low V_{CEsat} (BISS) RETs	55

Low V_{CEsat} (BISS) transistors

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Low V_{CEsat} (BISS) transistors single NPN	56
Low V_{CEsat} (BISS) transistors single PNP	58
Low V_{CEsat} (BISS) transistors double	60
Low V_{CEsat} (BISS) load switches	61
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Low V_{CEsat} modules - Schottky diode / (BISS) transistor	62
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Medium power transistors

64

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

Single transistors

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

Double transistors

types in **bold** represent new products

Package						SOT457 (SC-74)	SOT363 (SC-88)	SOT666
Size (mm)						2.9 x 1.5 x 1.0	2.0 x 1.25 x 0.95	1.6 x 1.2 x 0.55
P _{tot} (mW)						600	300	300
Polarity	V _{CEO} (V)	I _C (mA)	h _{FE} min	h _{FE} max	f _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					
				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	20			PMBS3904	PMSS3904				
					300	250		PXT2222A						
	15	200	40	120	500	20			PMBT2369	PMST2369				
	40	200	100	300	300	250			MMBT3904					
	30	600	100	300	250	250	250			PMBT3904	PMST3904	PMBT3904YS	PMBT3904VS	PMBT3904M
										PMBT2222	PMST2222			
	40	600	100	300	250	250	PZT4401	PXT4401	PMBT4401	PMST4401				
	40	600	100	300	300	250	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	365	PZT4403	PXT4403	PMBT4403	PMST4403			
										PMBT2907				
	60	600	100	300	200	300	365				PMST2907A			
PZT2907A								PXT2907A	PMBT2907A					
NPN/PNP	40	200	100	300	300/250	250/300				PMBT3946YPN	PMBT3946VFN			

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.
	45	100	200	450	0.9 ¹⁾	2
					0.95	2
					0.98	2
Configuration						
PNP	30	100	100	800	0.7 ¹⁾	n.a.
	45	100	200	450	0.9 ¹⁾	2
					0.95	2
					0.98	2
Configuration						

¹⁾ I_{C1}/I_{E2}

Key features

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

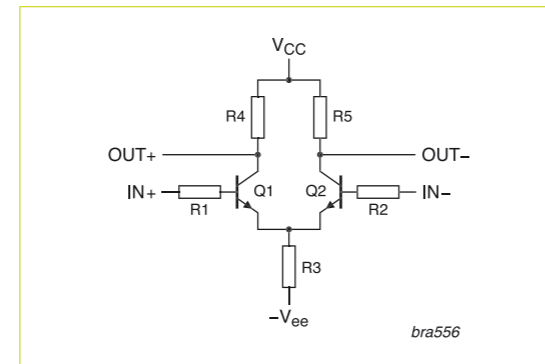
Key benefits

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

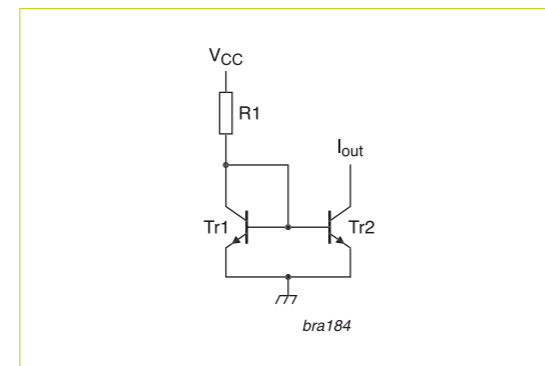
Key applications

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

Differential amplifier



Current mirror



High voltage transistors

Package		SOT223 (SC-73)	SOT89 (SC-62)	SOT457 (SC-74)	SOT23	SOT323 (SC-70)			
Size (mm)		6.5 x 3.5 x 1.65	4.5 x 2.5 x 1.5	2.9 x 1.5 x 1.0	2.9 x 1.3 x 1.0	2.0 x 1.25 x 0.95			
P _{tot} (mW)		1700	1300	600	250	200			
Polarity	V _{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			
	160	300	80	250	100	PMBT5551/BSR19A			
	250	100	50	-	60	BF722			
	300	100	40	-	60	BF622			
						BF720	BF620	BF820	BF820W
						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			
						BF623	BF823		
						BF621	BF821		
300	100	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
	45	100	4	420	800	100
200				450	100	
PNP	30	100	4	220	475	100
				420	800	100
	45	100	4	220	475	100
				420	800	100

Darlington transistors

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

Medium frequency transistors

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

Schmitt trigger

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

Key features

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

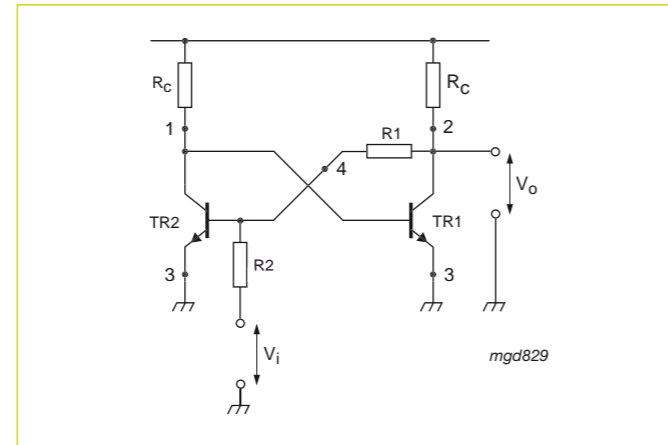
Key benefits

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

Key applications

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

Schmitt trigger



MOSFET driver

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

Key features

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

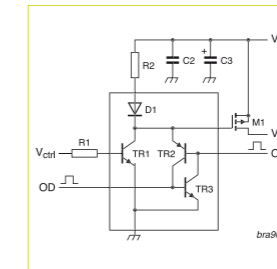
Key benefits

- ▶ Reduced component count
- ▶ Smaller end products

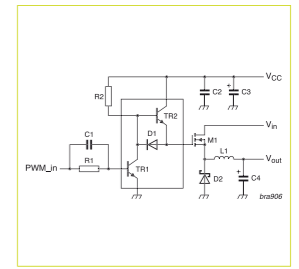
Key applications

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

MOSFET driver with hardware output disable function



High-side MOSFET driver with level shifter function



RETs 100 mA single

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

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

RETs 100 mA double

Package				SOT457 (SC-74)		SOT363 (SC-88)			SOT666				
Size (mm)				2.9 x 1.5 x 1.0		2.0 x 1.25 x 0.95			1.6 x 1.2 x 0.55				
P _{tot} (mW)				600		300			300				
V _{CE0} (V)	I _c (mA)		R1 (kΩ)	R2 (kΩ)	NPN/NPN	NPN/PNP	NPN/NPN	NPN/PNP	PNP/PNP	NPN/NPN	NPN/PNP	PNP/PNP	
50	100	R1 = R2	2.2	2.2			PUMH20	PUMD20	PUMB20	PEMH20	PEMD20	PEMB20	
			4.7	4.7			PUMH15	PUMD15	PUMB15	PEMH15	PEMD15	PEMB15	
			10	10			PUMH11	PUMD3	PUMB11	PEMH11	PEMD3	PEMB11	
			22	22			PUMH1	PUMD2	PUMB1	PEMH1	PEMD2	PEMB1	
			47	47			PUMH2	PUMD12	PUMB2	PEMH2	PEMD12	PEMB2	
			100	100			PUMH24	PUMD24	PUMB24	PEMH24	PEMD24	PEMB24	
			2.2	47			PUMH10	PUMD10	PUMB10	PEMH10	PEMD10	PEMB10	
			4.7	10			PUMH18	PUMD18	PUMB18	PEMH18	PEMD18	PEMB18	
			4.7	47			PUMH13	PUMD13	PUMB13	PEMH13	PEMD13	PEMB13	
		10	47	PIMH9		PUMH9	PUMD9	PUMB9	PEMH9	PEMD9	PEMB9		
		22	47			PUMH16	PUMD16	PUMB16	PEMH16	PEMD16	PEMB16		
		47	22			PUMH17	PUMD17	PUMB17	PEMH17	PEMD17	PEMB17		
		47/2.2	47/47					PUMD48			PEMD48		
		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

RETs 500 mA

types in **bold** represent new products

Package				SOT457 (SC-74)		SOT23		
Size (mm)				2.9 x 1.5 x 1.0		2.9 x 1.3 x 1.0		
P _{tot} (mW)				600		250		
V _{CE0} (V)	I _c (mA)		R1 (kΩ)	R2 (kΩ)	NPN/NPN	NPN/PNP	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 _{CE0} (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	

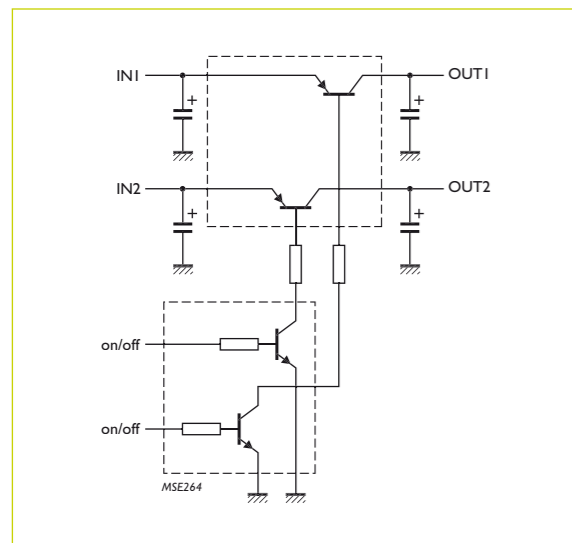
Low V_{CEsat} (BISS) transistors double

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

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

Key features

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

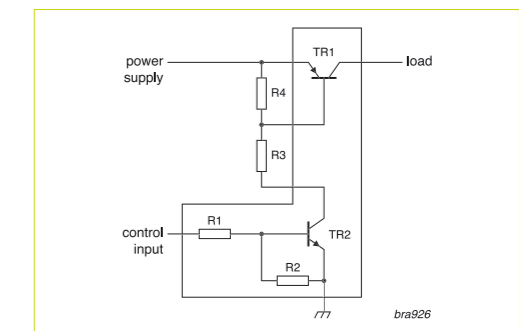
Key benefits

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

Key applications

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

BISS load switch



High voltage low V_{CEsat} (BISS) transistors

types in **bold** represent new products

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

¹⁾ Collector-emitter peak voltage

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

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

Key features

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

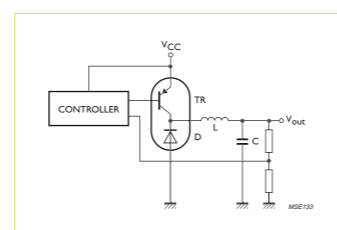
Key benefits

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

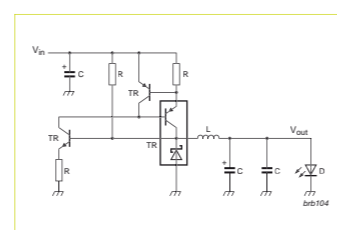
Key applications

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

Step-down DC/DC converter



Power LED driver



Low V_{CEsat} (BISS) RETs

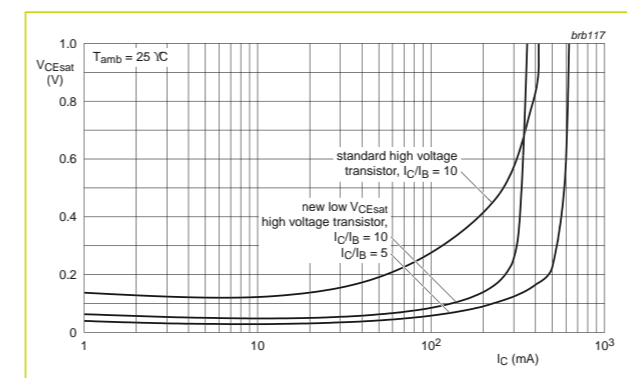
Package						SOT23	
Size (mm)						2.9 x 1.3 x 1.0	
P _{tot} (mW)						250	
V _{CEO} (V)	I _C (mA)	R1 = R2	R1 (kΩ)	R2 (kΩ)	NPN	PNP	
40	600	R1 = R2	1	1	PBRN113ET	PBRP113ET	
			2.2	2.2	PBRN123ET	PBRP123ET	
		R1 ≠ R2	1	10	PBRN113ZT	PBRP113ZT	
			2.2	10	PBRN123YT	PBRP123YT	

Advantages of low V_{CEsat} (BISS) technology

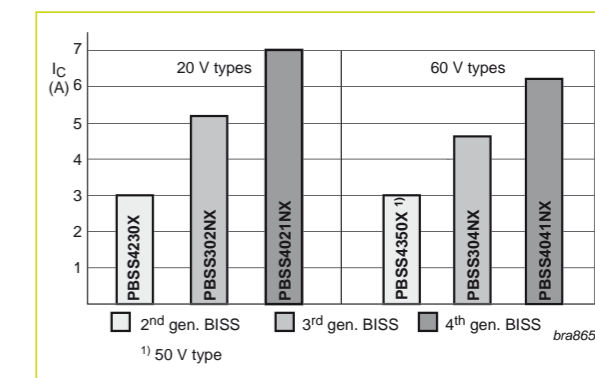
Our BISS (Breakthrough In Small-Signal) transistors show lowest V_{CEsat} values due to an innovative mesh-emitter technology and further technology improvement.

High voltage low V_{CEsat} (BISS)

V_{CEsat} improvement leads to higher I_C capability

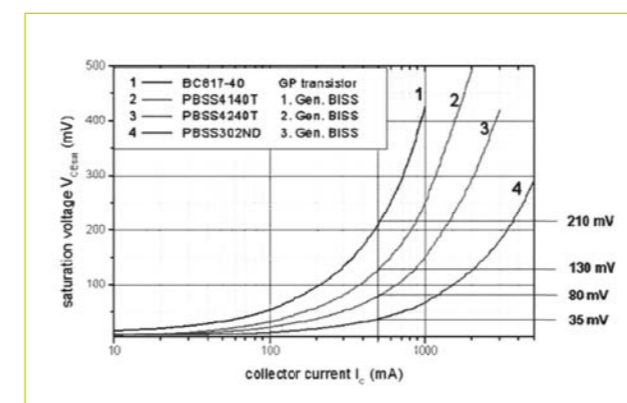


Improved collector current capabilities



Saturation voltage:

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



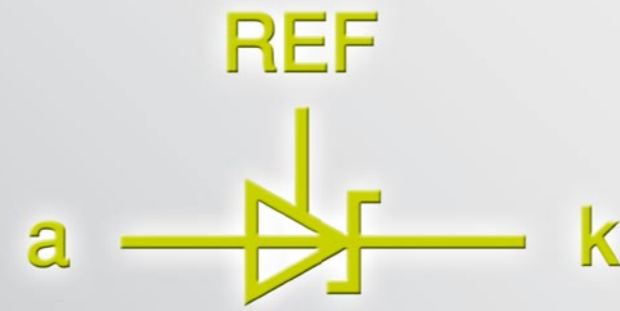
65 % heat reduction by BISS transistors



General purpose transistor T_{case} = 110°C

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

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



Standard linear products

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

Adjustable shunt voltage regulator IC

types in **bold** represent new products

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

¹⁾ optimized for use with dedicated capacitive load

* Normal pinning vs. mirrored pinning

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

Low-dropout adjustable and fixed linear voltage regulator

types in **bold** represent new products

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

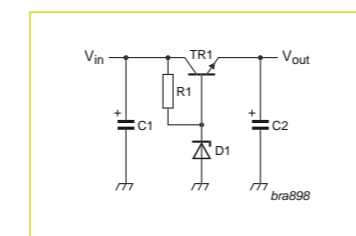
Discrete voltage regulator

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

Key features

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

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



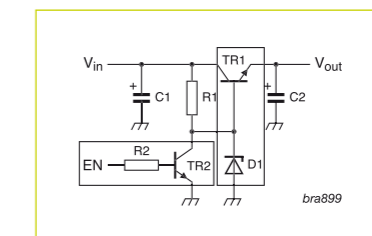
Key benefits

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

Key applications


- ▶ Linear voltage regulation

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



Constant current source

Constant current source

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

Key features

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

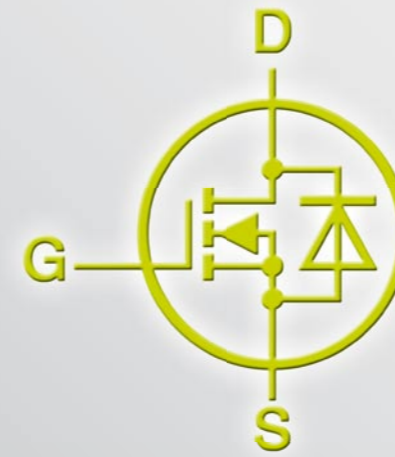
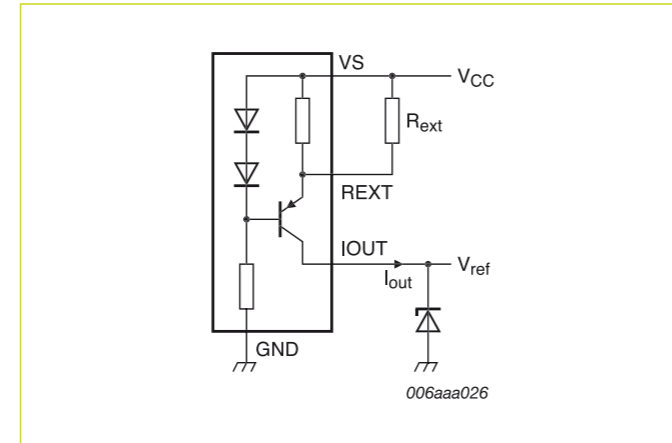
Key benefits

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

Key applications

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

Voltage reference



MOSFETs

Small-signal MOSFETs

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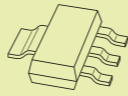
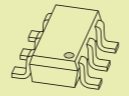





- Small-signal MOSFETs single (N-channel) < 50 V 72
- Small-signal MOSFETs single (N-channel) ≥ 50 V 74
- Small-signal MOSFETs dual (N-channel) 76
- Small-signal MOSFETs single (P-Channel) 76
- Small-signal MOSFET dual (P-channel) and FET-KYs 76

Power MOSFETs

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

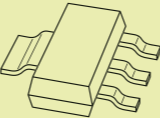
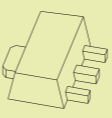





Small-signal MOSFETs single (N-channel) < 50V

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

¹⁾ enhanced thermal capability
²⁾ max values

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



types in **bold** represent new products

													SOT223 (SC-73)		SOT89 (SC-62)	SOT873	SOT23	SOT323 (SC-70)	SOT416 (SC-75)	SOT883 (SC-101)
Package																				
Size (mm)													6.5 x 3.5 x 1.65		4.5 x 2.5 x 1.5	3.3 x 3.3 x 0.85	2.9 x 1.3 x 1.0	2.0 x 1.25 x 0.95	1.6 x 0.8 x 0.77	1.0 x 0.6 x 0.5
P _{tot} (mW)													1700		1300	250	250	200	150	250
V _{DS} (V)	V _{GS} (V)	I _b (A)	V _{GS(th)} min(V)	V _{GS(th)} max(V)	t _{on} typ (ns)	t _{off} typ (ns)	Q _g typ (nC)	ESD protection	R _{Dson} typ (mΩ) @ V _{gs} =											
									10 V	4.5 V	2.5 V	1.8 V								
50	20	0.1	0.4	1.8	2	5	-	-	2800	3800 ³⁾	-	-						BSN20		
55	8	0.3	0.4	1.3	4	11	1	-	-	2300	2400	3100						BSH121		
	10	0.335	0.4	1.3	4	11	1	-	-	2300	2400	3100						BSH111		
	13	4.9	1	2	-	-	-	-	2KV	-	30	-	-	PHT11N06LT						
3.5		1	2	-	-	-	-	2KV	-	65	-	-	PHT8N06LT							
2.5		1	2	-	-	-	-	2KV	-	120	-	-	PHT6N06LT							
2.5		2	4	-	-	-	-	2KV	120	-	-	-	PHT6N06T							
60	15	0.26	1	3.3	3	9	-	1KV	2800	3800	-	-						PMF3800SN		
		0.34	1	-	3	9	-	1KV	2800	3800	-	-						2N7002K		
		0.3	1	-	3	9	-	yes	2800	3800	-	-						BSH112		
		0.3	1	2.5	16	60	1.09	3KV	1100	1300	-	-						2N7002CK		
		0.3	1	2.5	tbd	tbd	tbd	-	-	2000 ²⁾	3000 ²⁾	-	-						2N7002P	
		0.3	1	2.5	tbd	tbd	tbd	2KV	1600 ²⁾	3000 ²⁾	-	-	-						2N7002BK	
		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	
	30	0.25	0.8	3	-	-	-	-	-	2500	-	-	-						PMBF170	
		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	
100	20	0.3	1	2.5	2.5	11	-	-	2800	3800	-	-						2N7002		
		16	3.5	1	2	14	73	-	-	-	200	-	-	PHT4NQ10LT						
		0.19	1	-	3	12	-	-	-	-	5000	-	-						BST82	
		0.52	1	-	3	12	-	-	-	-	5000	-	-	BSP110						
		0.85	2	4	19	13	4.6	-	-	400	-	-	-						BSH114	
		0.15	1	2.8	3	12	-	-	-	3500	-	-	-						BSS123	
	3.5	2	4	21	31	7.4	-	-	200	-	-	-	PHT4NQ10T							
3	2	4	-	-	-	-	-	57	-	-	-	PHT6NQ10T								
200	20	1.9	2	4	10.5	12.5	7	-	213	-	-	-						PMV213SN ¹⁾		
		0.55	0.4	2	10	45	-	-	-	1700	-	3000	-	BSP122						
		0.4	0.8	2.8	6	49	-	-	-	1600	-	-	-						BSS87	
220	20	7.3	2	4	20.8	24.3	13.2	-	320	-	-	-						PML260SN		
240	20	0.375	0.8	2	6	47	-	-	2800	7500 ²⁾	-	-	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

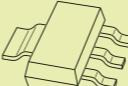
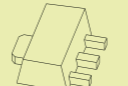


Small-signal MOSFETs dual (N-channel)

types in **bold** represent new products

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

¹⁾ enhanced thermal capability ²⁾ max values


Small-signal MOSFETs single (P-channel)

														SOT223 (SC-73)	SOT89 (SC-62)	TSOP6 SOT457 (SC-74)	SOT23
																	
Package																	
Size (mm)														6.5 x 3.5 x 1.65	4.5 x 2.5 x 1.5	2.9 x 1.5 x 1.0	2.9 x 1.3 x 1.0
P _{tot} (mW)														1700	1300	600	250
V _{DS} (V)	V _{GS} (V)	I _D (A)	V _{GS(th)} min(V)	V _{GS(th)} max(V)	t _{on} typ (ns)	t _{off} typ (ns)	Q _G typ (nC)	ESD protection	R _{DS(on)} typ (mΩ) @ V _{GS} =								
									10 V	4.5 V	2.5 V	1.8 V					
12	8	1.52	0.4	-	6.5	65	-	-	-	80	-	140		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			
50	20	0.52	1	-	6.5	65	-	-	630	890	-	-		BSH202			
		0.13	0.8	2	3	7	-	-	6000	-	-	-		BSS84			
60	20	0.3	1	-	6.5	65	-	-	2100	2700	-	-		BSH201			
200	20	0.225	0.8	2.8	5	20	-	-	10000	-	-	-		BSP220			
240	20	0.2	0.8	2.8	5	20	-	-	10000	-	-	-		BSS192			
250	20	0.225	0.8	2.8	5	10	-	-	10000	-	-	-		BSP225			
300	20	0.21	1.95	2.8	5	15	-	-	17000 ²⁾	-	-	-		BSP230			

¹⁾ enhanced thermal capability ²⁾ max values


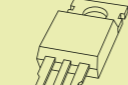




Small-signal MOSFET dual (P-channel) and FET-KYs

types in **bold** represent new products

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

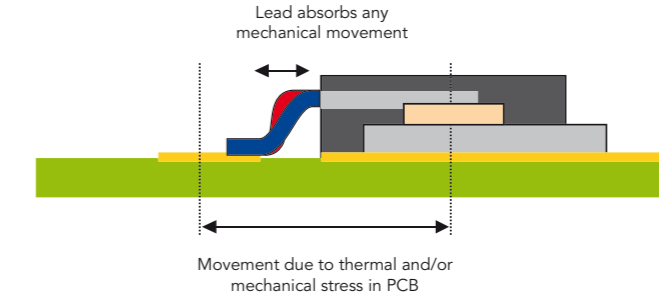
Power MOSFETs single (N-channel)

types in **bold** represent new products

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

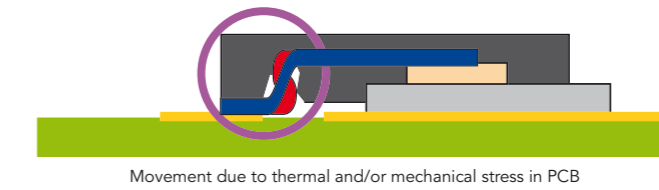
LFPAK for mechanical & thermal ruggedness

NXP LFPAK



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






QFN Based Power-SO8



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





Power MOSFETs single (N-channel)

types in **bold** represent new products





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

Power MOSFETs single (N-channel)

types in **bold** represent new products


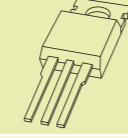
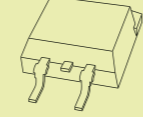

V_{DS} (max) (V)	R_{DSon} (max) (mΩ) @ $V_{gs} = 10\text{ V}$	R_{DSon} (max) (mΩ) @ $V_{gs} = 4.5\text{ V}$	I_D (max) (A) @ 25 °C	TO-220AB (SOT78)	D2PAK (SOT404)	PAK (SOT428)	SO8 (SOT96-1)
							
				15.6 x 10 x 4.4	11 x 10 x 4.3	6 x 6.6 x 2.3	4.9 x 3.9 x 1.75
30	10	-	75			PHD71NQ03LT	
	13	-	68.9		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

types in **bold** represent new products

V_{DS} (max) (V)	R_{DSon} (max) (mΩ) @ $V_{gs} = 10\text{ V}$	R_{DSon} (max) (mΩ) @ $V_{gs} = 4.5\text{ V}$	I_D (max) (A) @ 25 °C	Power-SO8 (LFPAK)	TO-220AB (SOT78)	D2PAK (SOT404)	PAK (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	

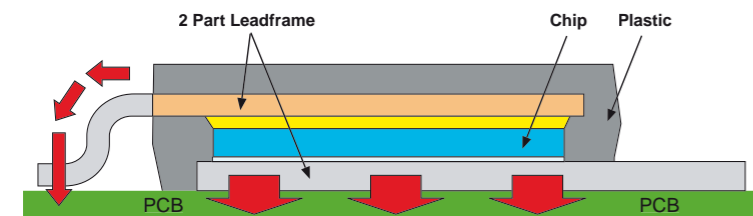
Power MOSFETs single (N-channel)


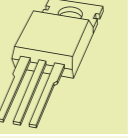
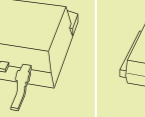
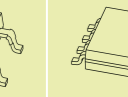

types in **bold** represent new products

V_{DS} (max) (V)	R_{DSon} (max) (mΩ) @ $V_{gs} = 10\text{ V}$	R_{DSon} (max) (mΩ) @ $V_{gs} = 4.5\text{ V}$	I_D (max) (A) @ 25 °C	Power-SO8 (LFAK)	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 (LFAK) Design

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



V_{DS} (max) (V)	R_{DSon} (max) (mΩ) @ $V_{gs} = 10\text{ V}$	R_{DSon} (max) (mΩ) @ $V_{gs} = 4.5\text{ V}$	I_D (max) (A) @ 25 °C	Power-SO8 (LFAK)	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


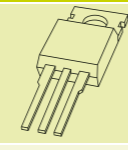
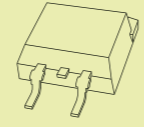
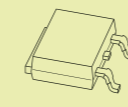
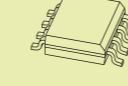

Smaller, faster, cooler

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

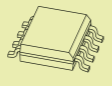
High performance MOSFETs for DC-DC converters, OR-ing and load switching

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

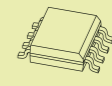
Power MOSFETs single (N-channel)

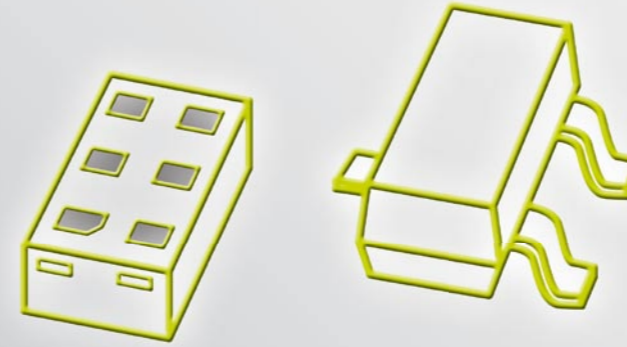
V_{DS} (max) (V)	R_{DSon} (max) (mΩ) @ $V_{gs} = 10\text{ V}$	R_{DSon} (max) (mΩ) @ $V_{gs} = 4.5\text{ V}$	I_D (max) (A) @ 25 °C	Power-SO8 (LFPAK)	TO-220AB (SOT78)	D2PAK (SOT404)	DPAK (SOT428)	SO8 (SOT96-1)	HVSON8 (SOT873-1)
									
				3.95 x 4.9 x 1.1	15.6 x 10 x 4.4	11 x 10 x 4.3	6 x 6.6 x 2.3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

Power MOSFETs single (P-channel)

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

Power MOSFETs dual (N- and P-channel)

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



Packages

Package cross reference	88
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Minimized outline drawings and reflow soldering footprint	96
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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

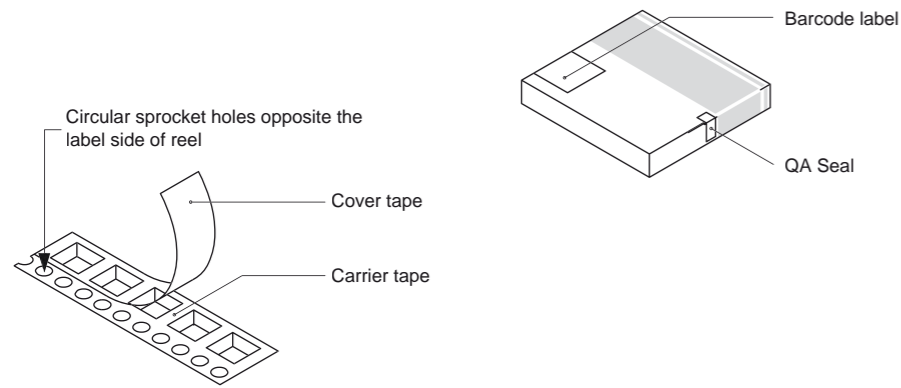
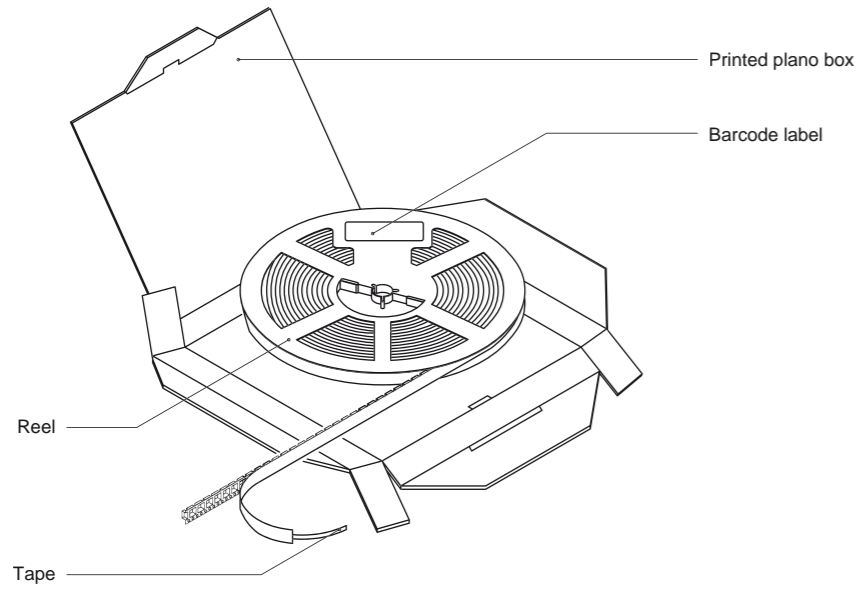
types in **bold** represent new products

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

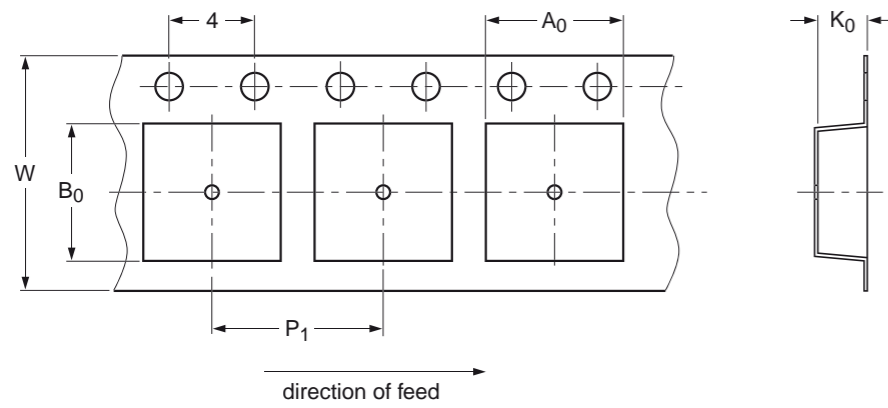
types in **bold** represent new products

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

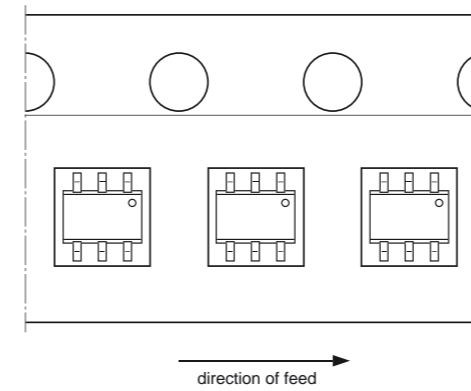


P1 = pitch (see table packing methods)
W = tape width (see table packing methods)

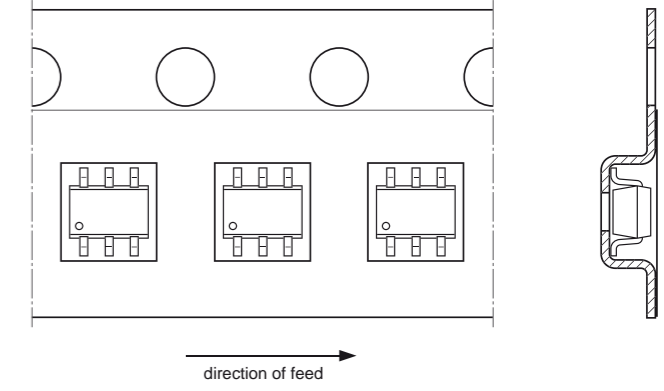
Compartment width (A_0), length (B_0) and depth (K_0) depending on package

Product orientation (tape and reel pack) T1-T4

T1 taping

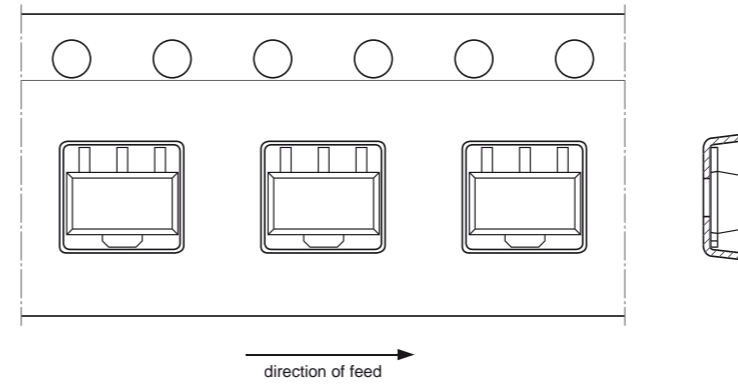


T2 taping

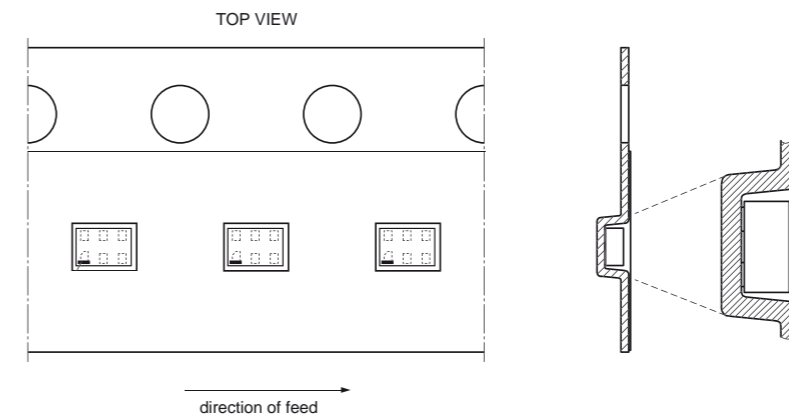


T3 taping

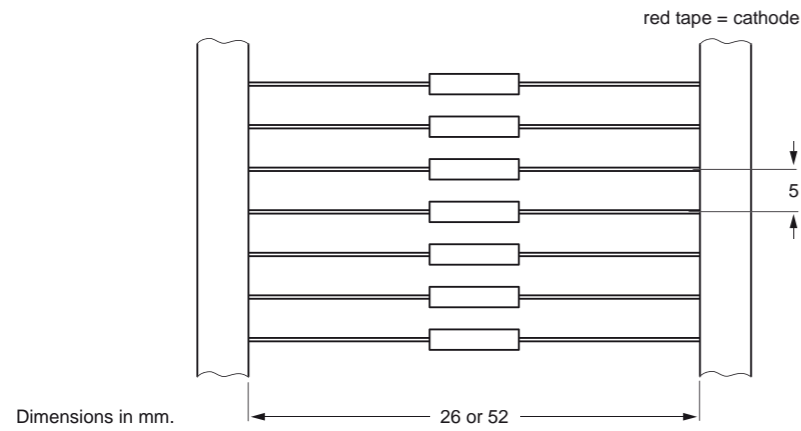
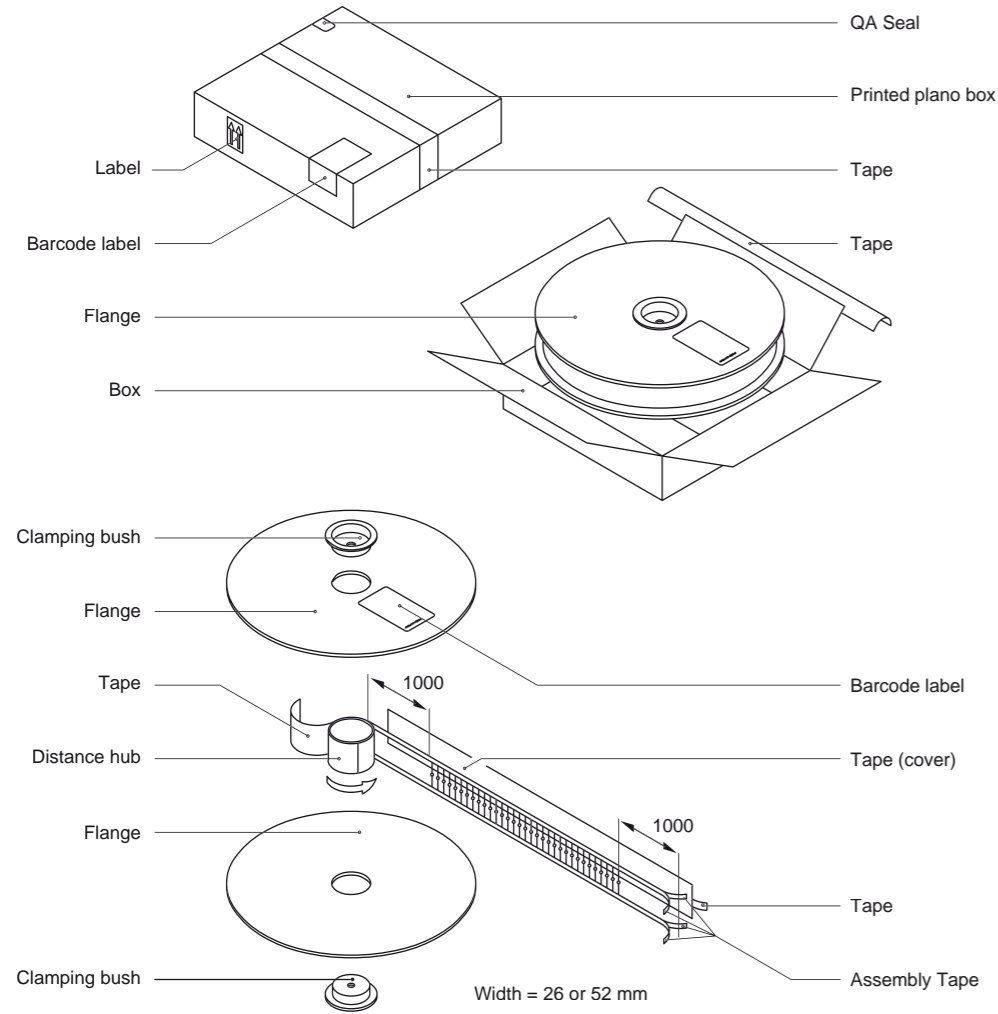
Standard product orientation SOT89 (T3)



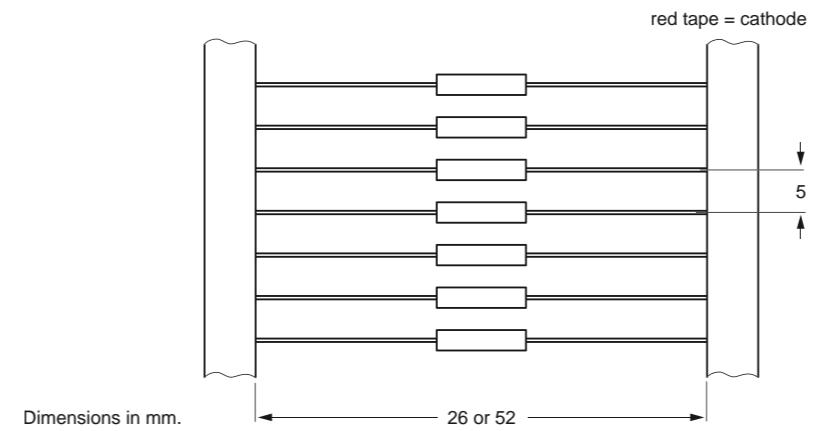
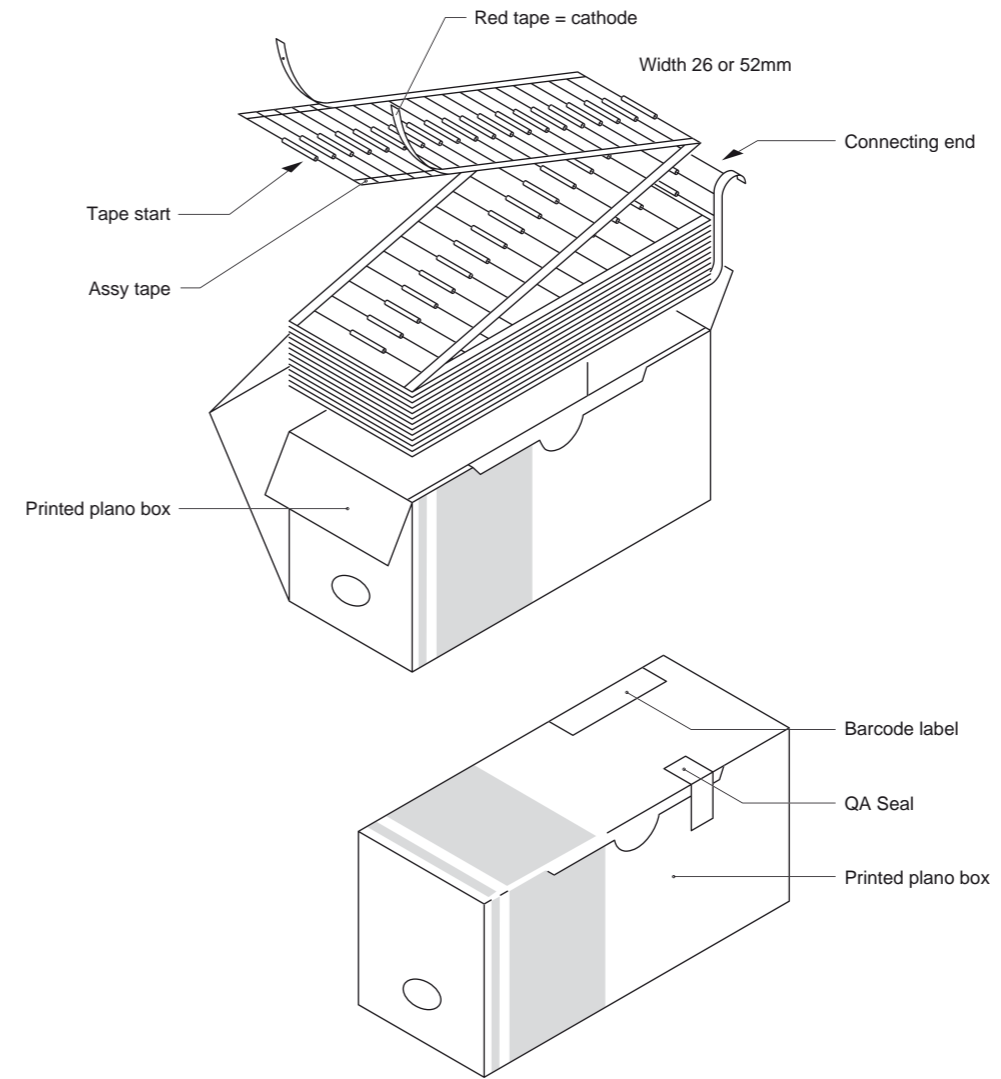
T4 taping



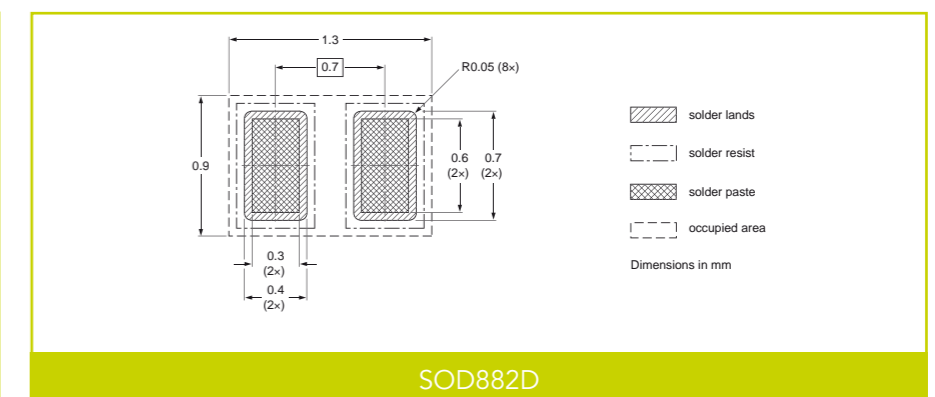
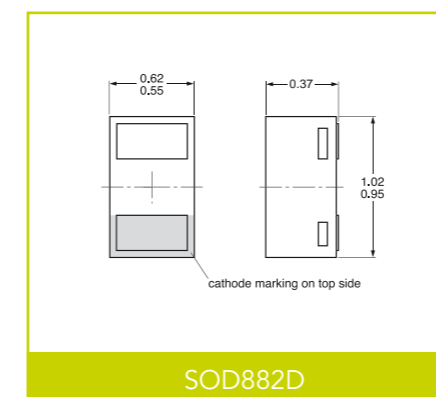
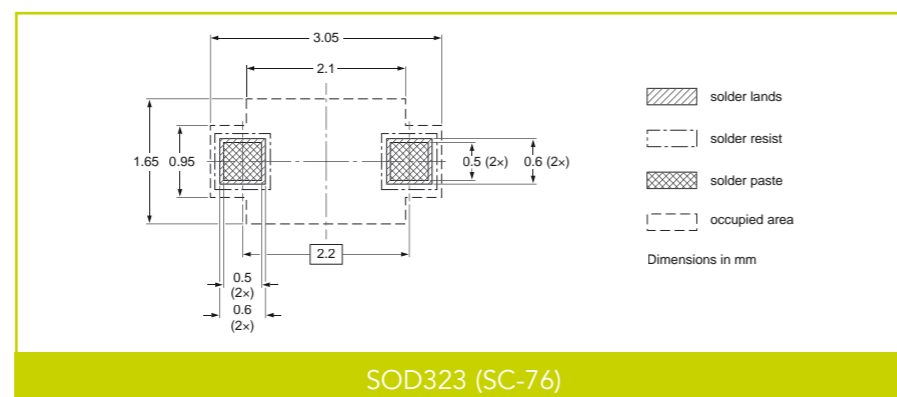
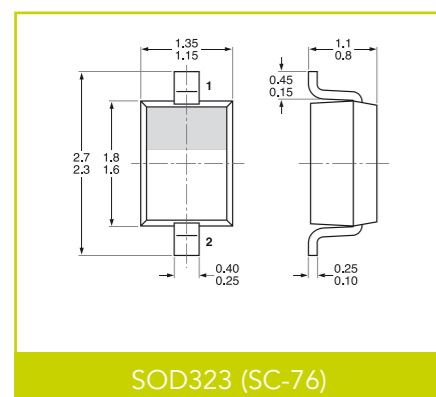
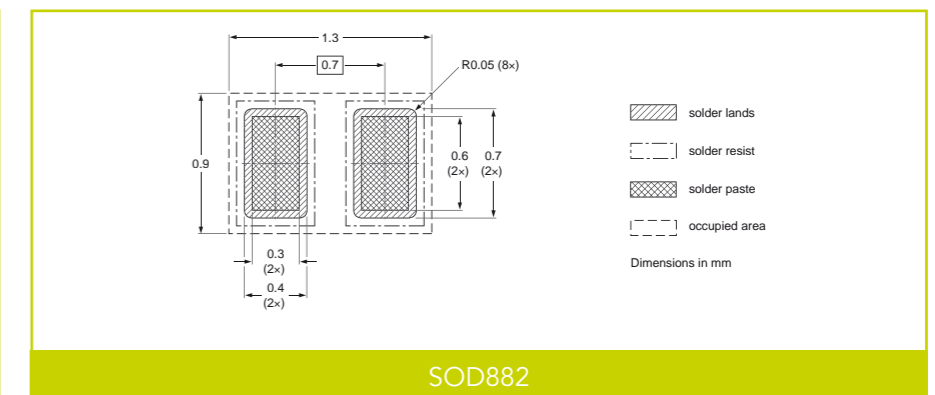
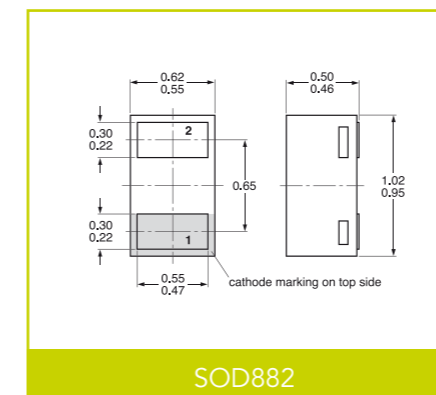
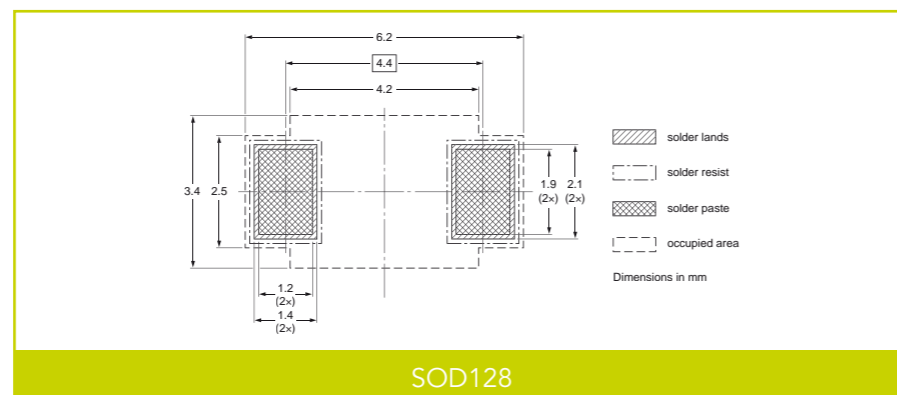
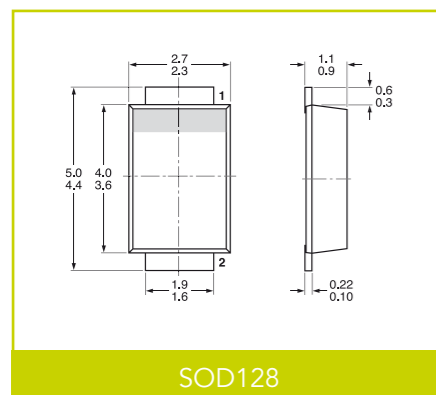
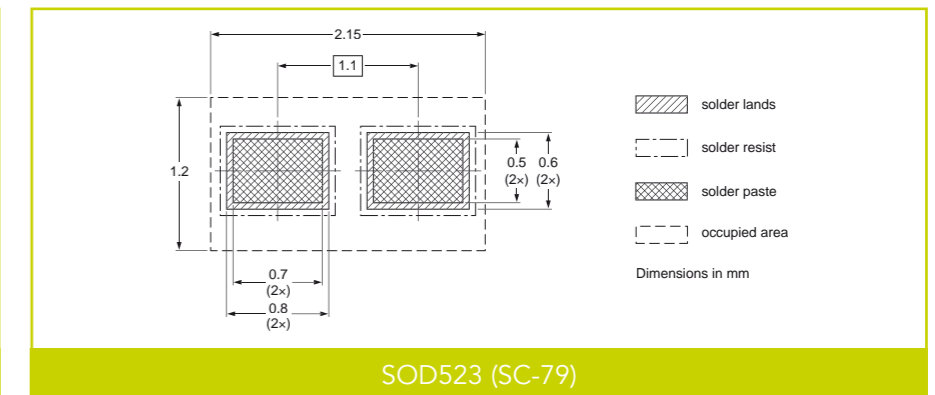
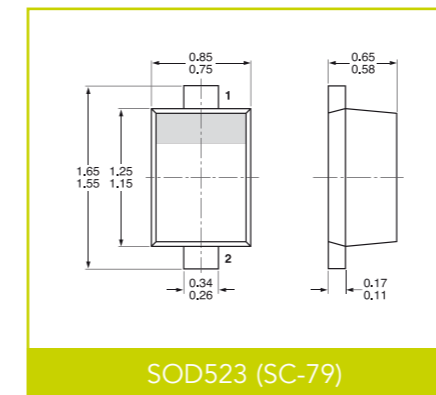
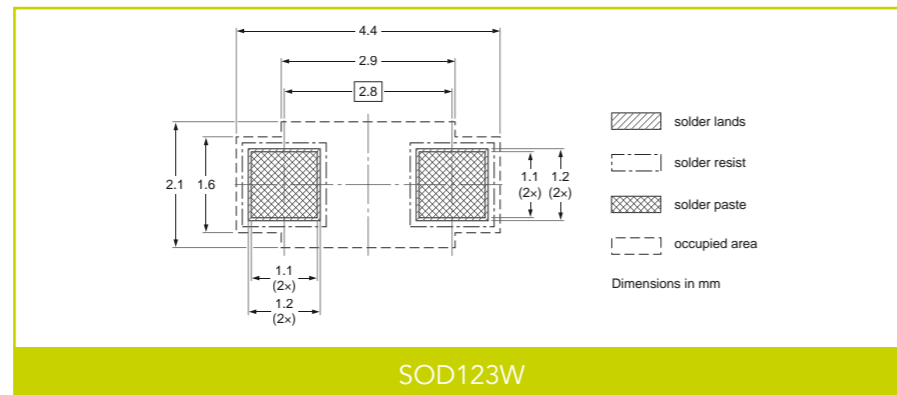
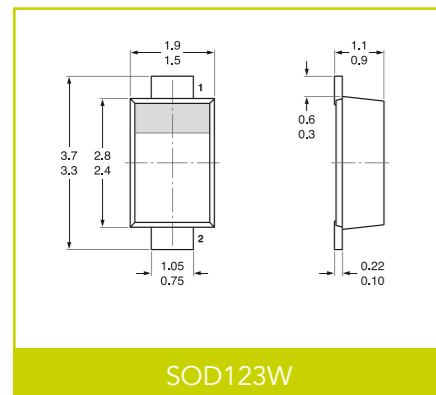
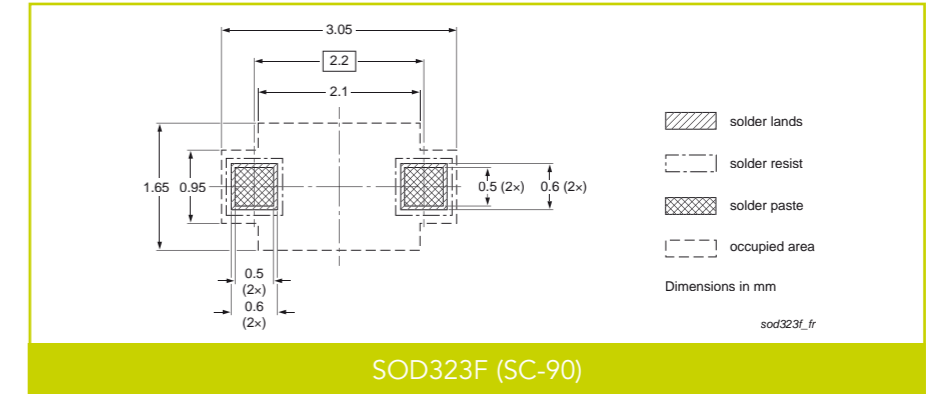
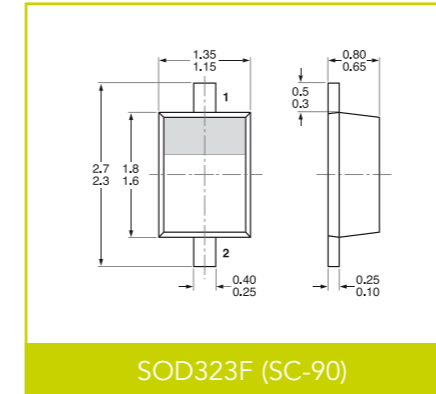
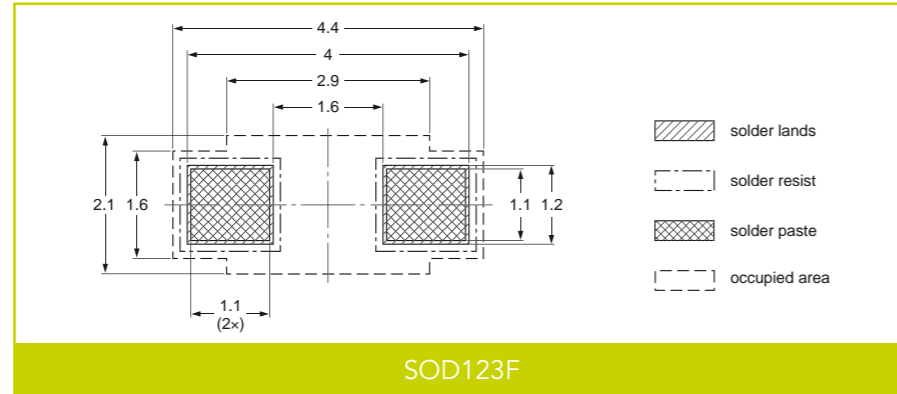
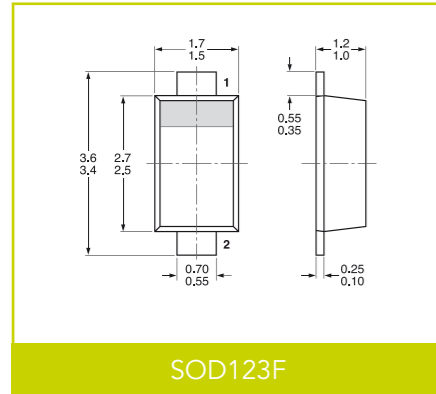
Reel pack axial tape for glass diodes



Ammo pack axial tape for glass diodes

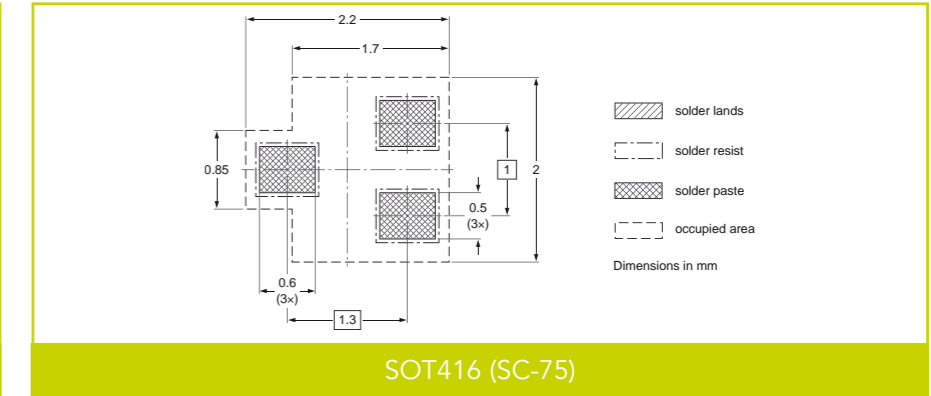
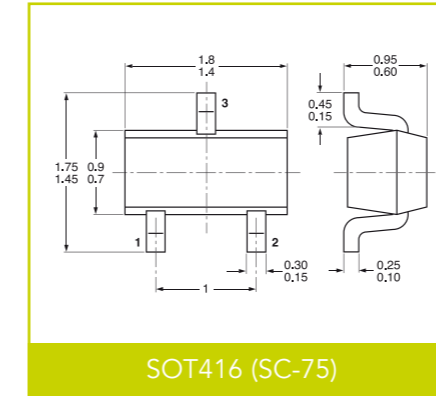
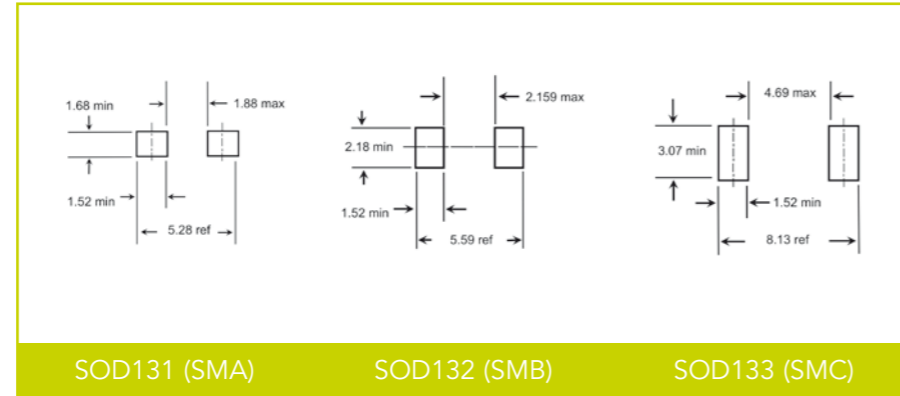
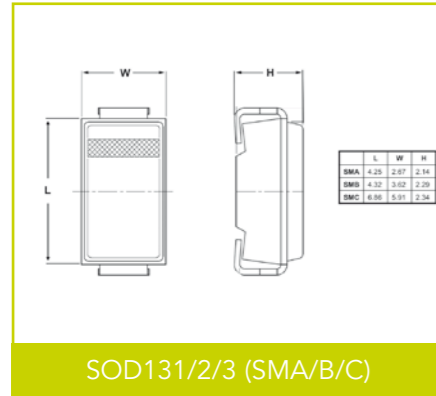


2-Pin SMD Packages

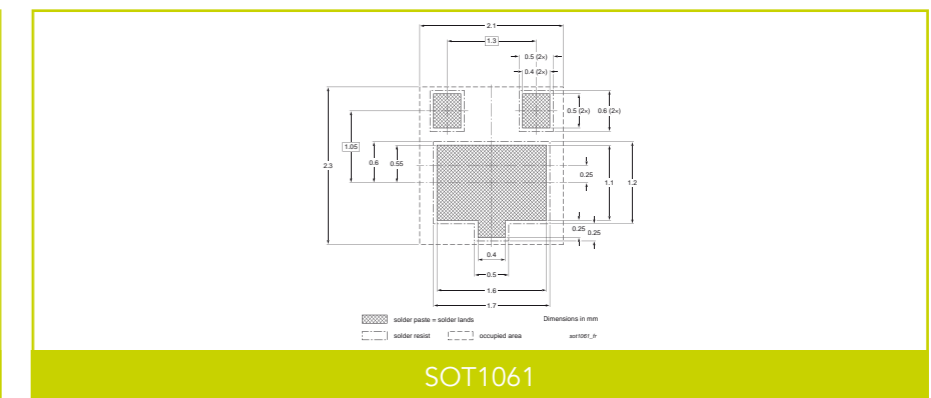
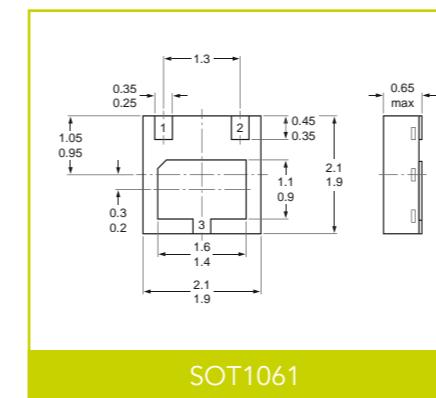
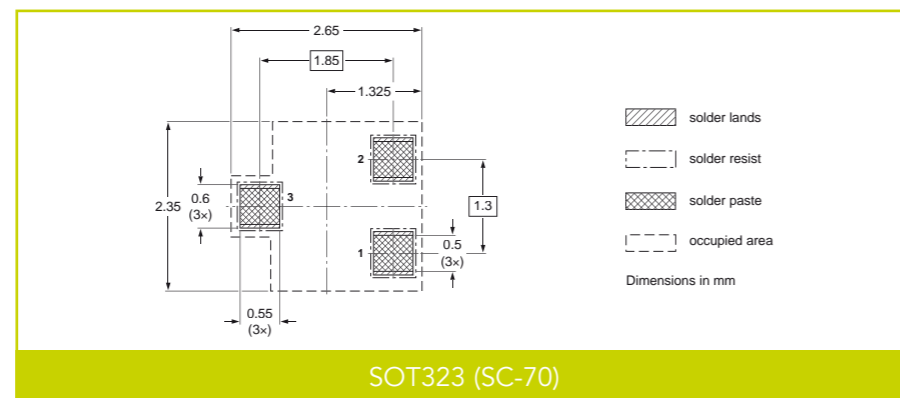
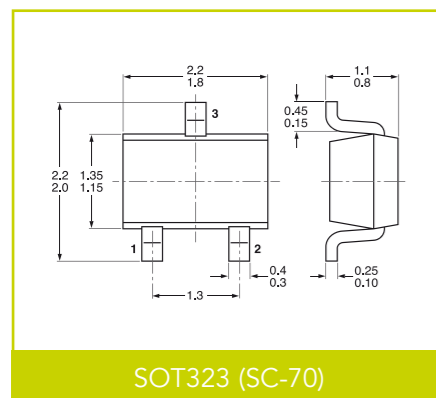
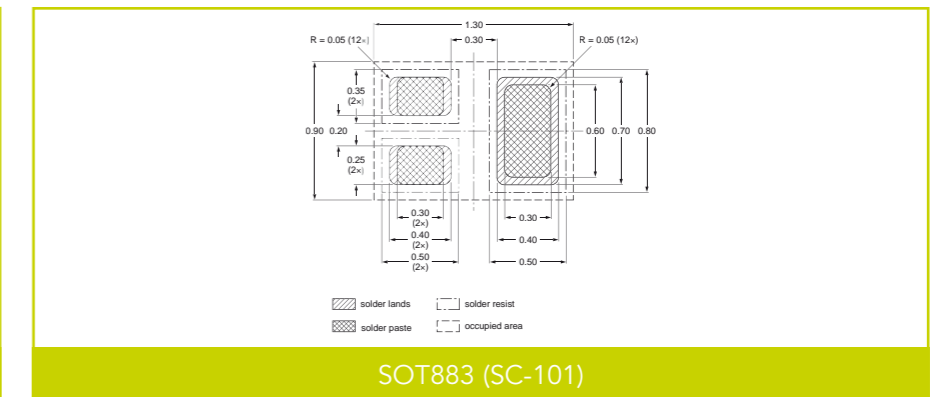
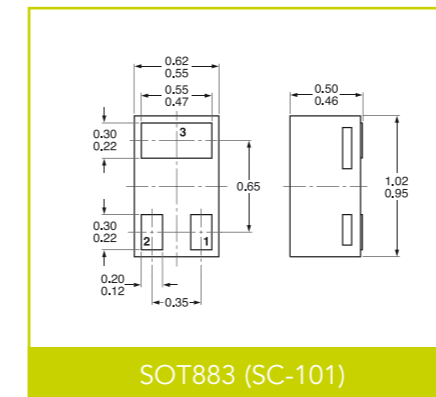
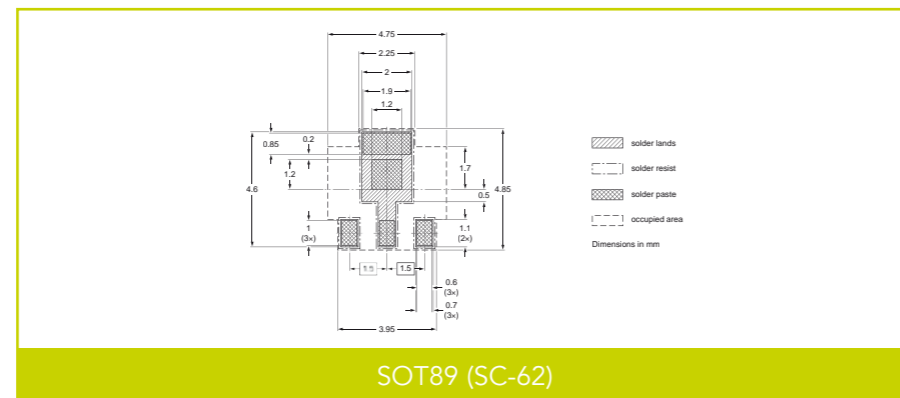
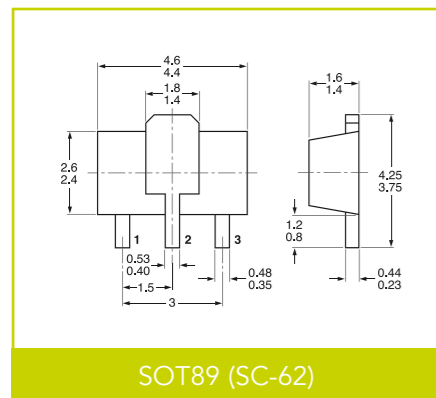
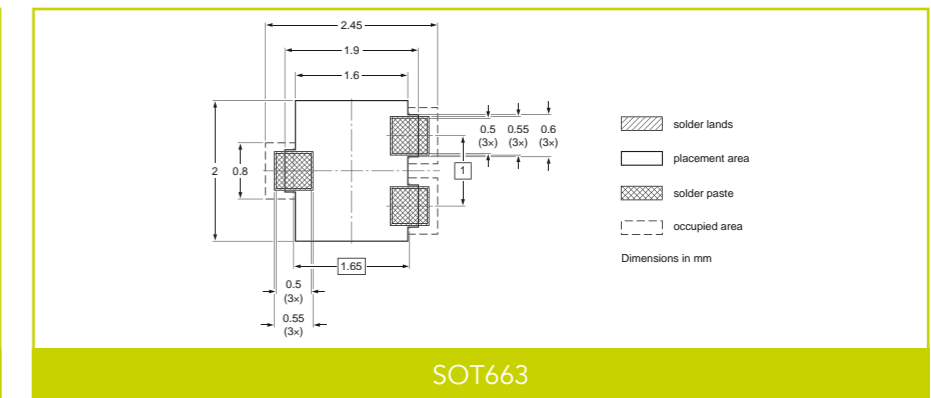
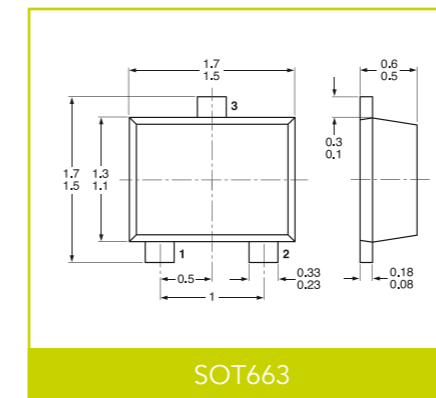
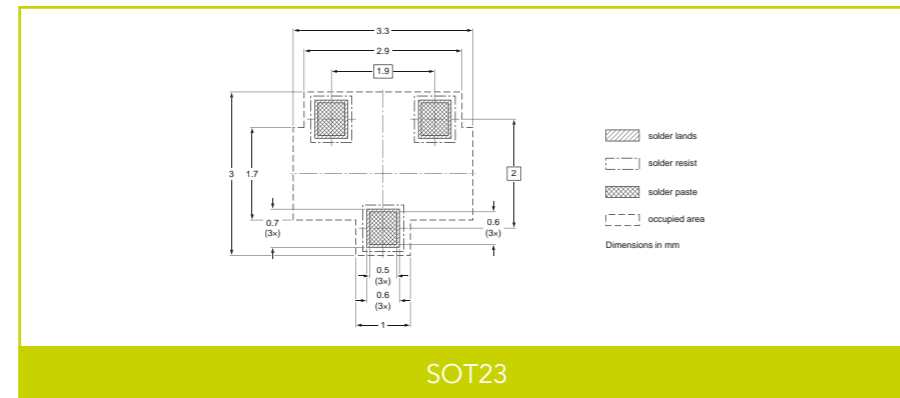
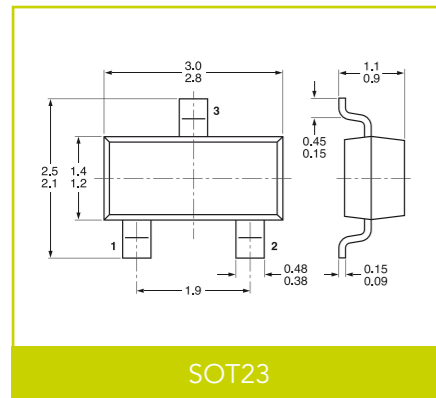


Dimensions in mm

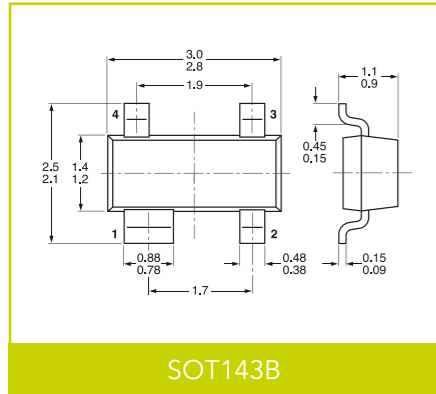
Dimensions in mm



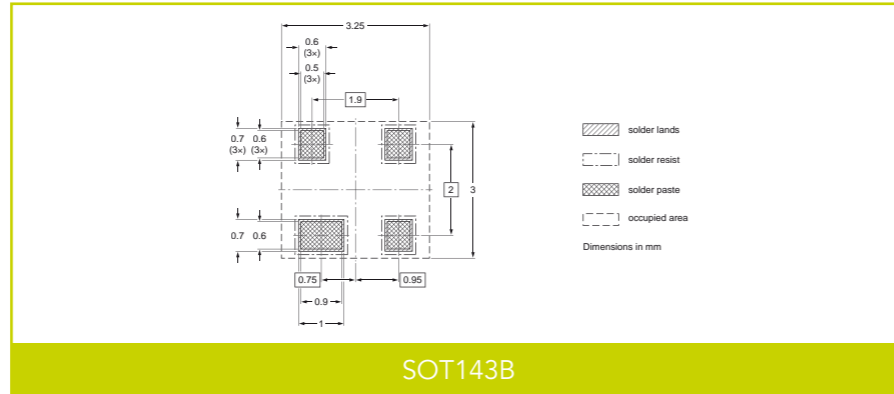
3-Pin SMD Packages



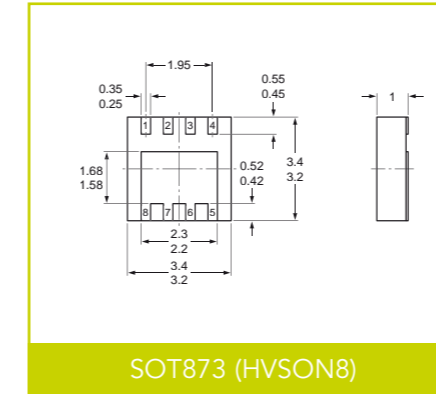
4-/5-Pin SMD Packages



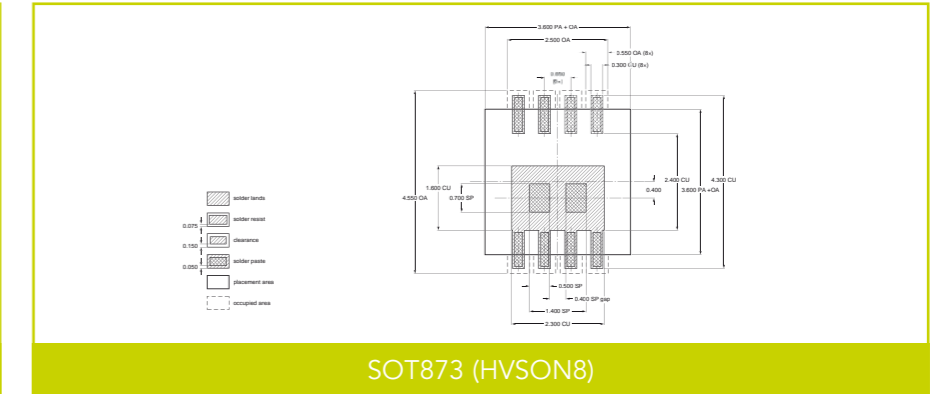
SOT143B



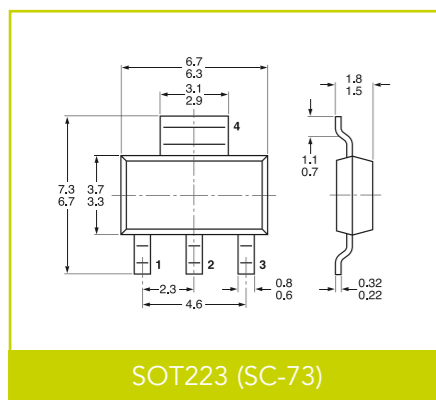
SOT143B



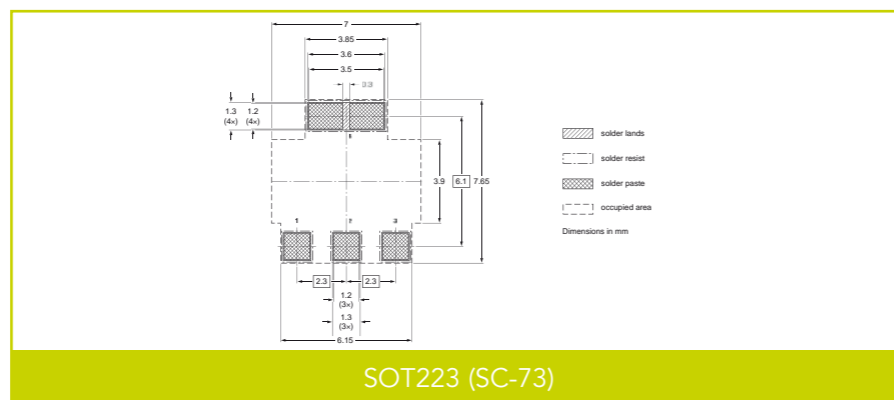
SOT873 (HVSON8)



SOT873 (HVSON8)

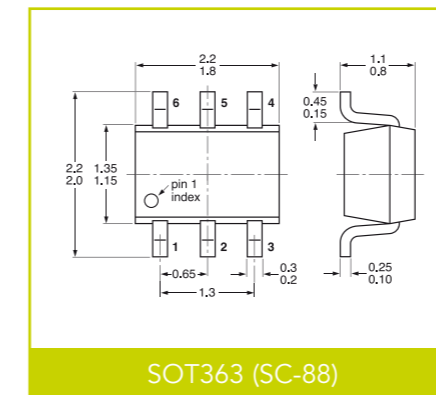


SOT223 (SC-73)

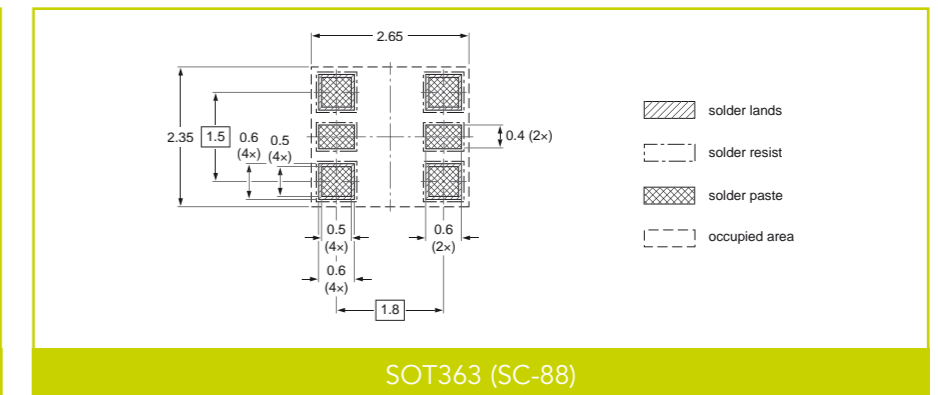


SOT223 (SC-73)

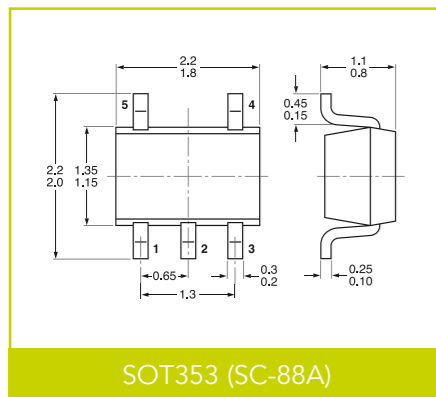
6-Pin SMD Packages



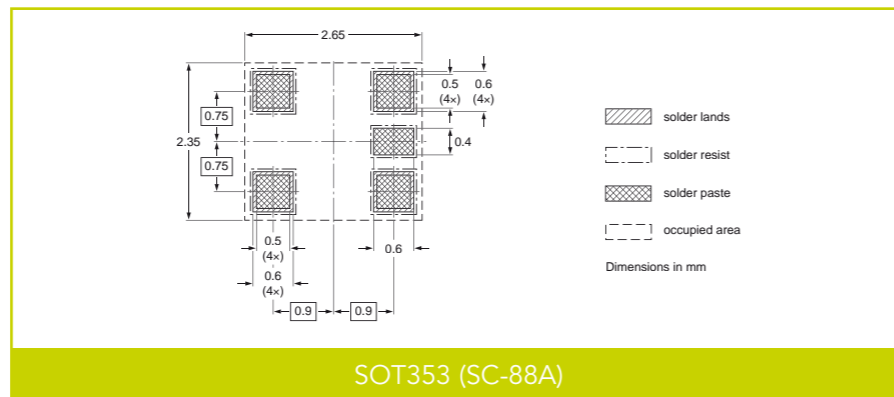
SOT363 (SC-88)



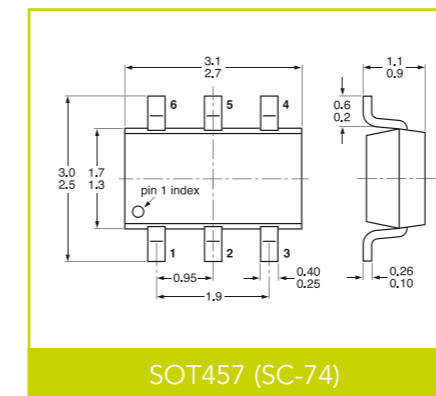
SOT363 (SC-88)



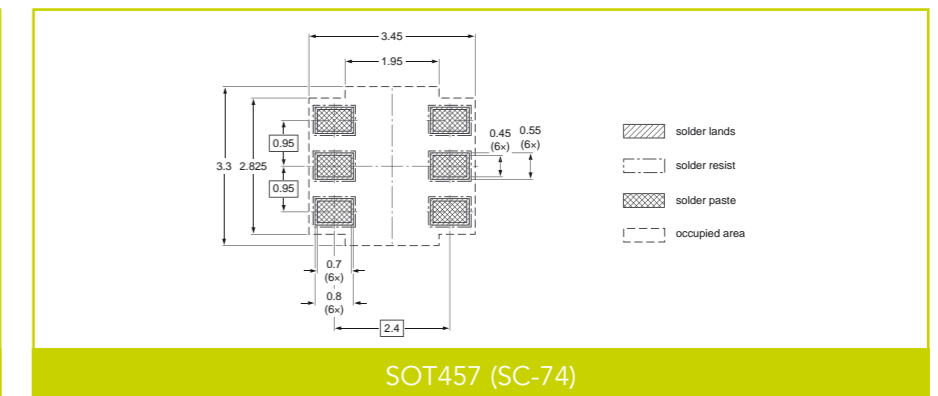
SOT353 (SC-88A)



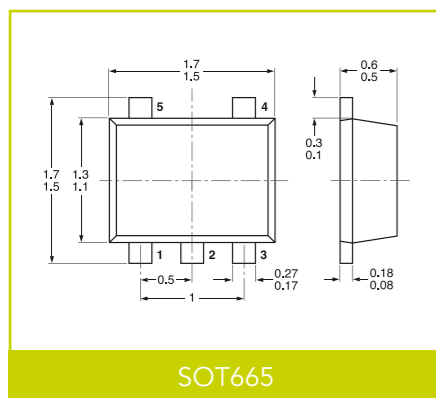
SOT353 (SC-88A)



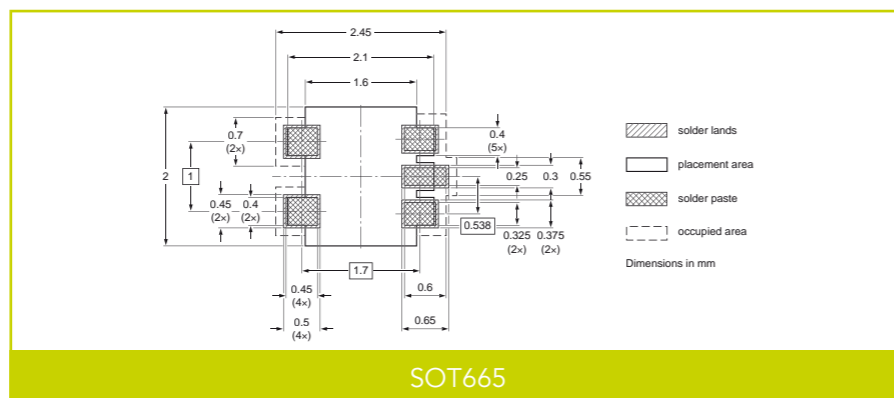
SOT457 (SC-74)



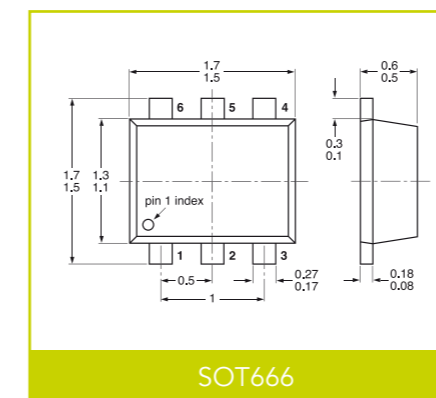
SOT457 (SC-74)



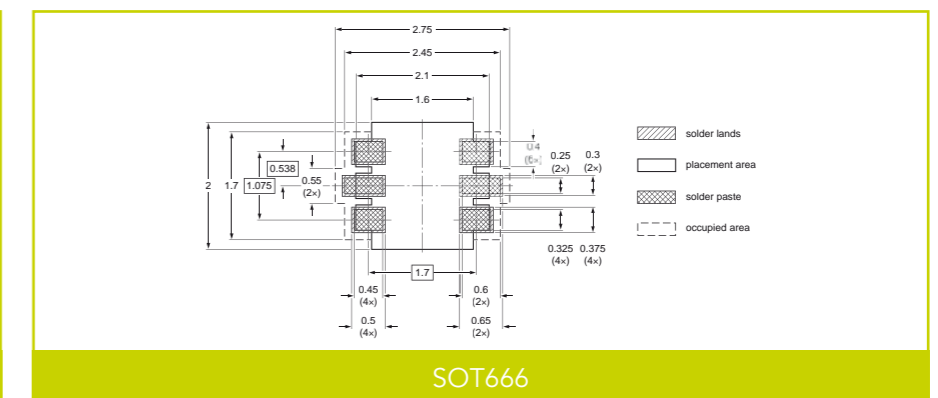
SOT665



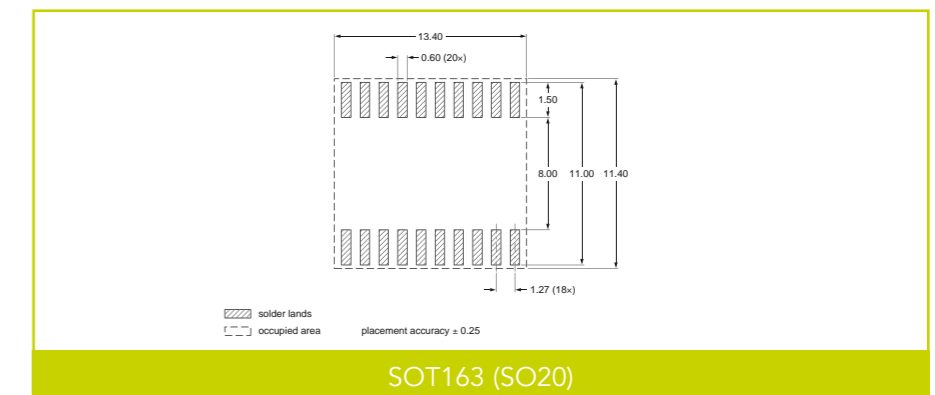
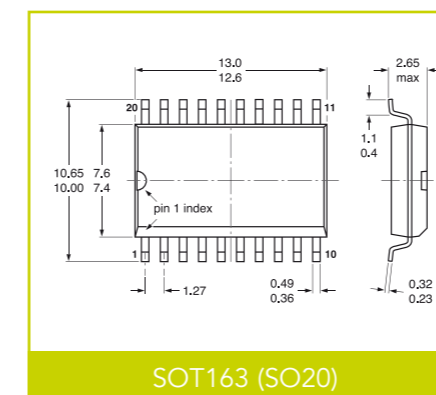
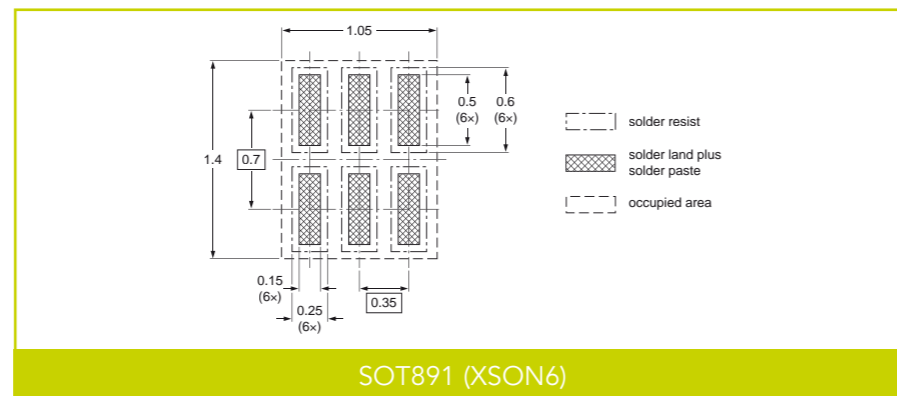
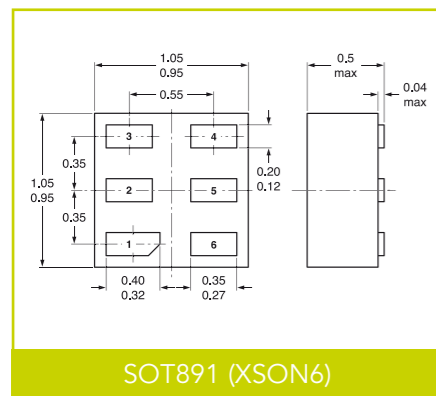
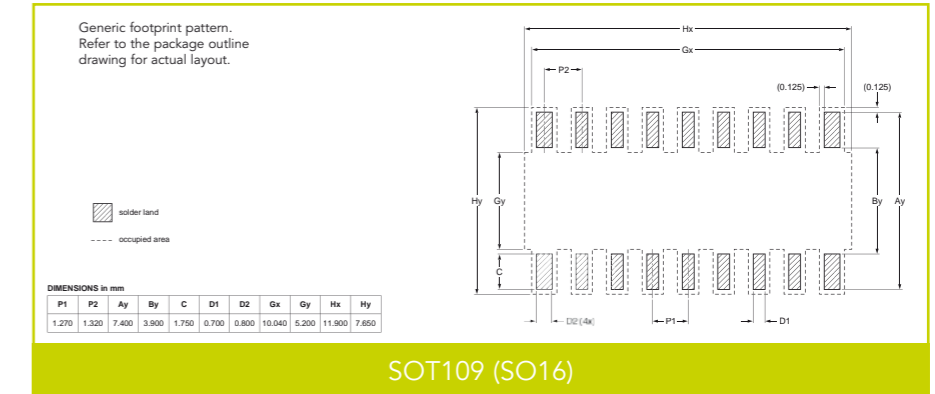
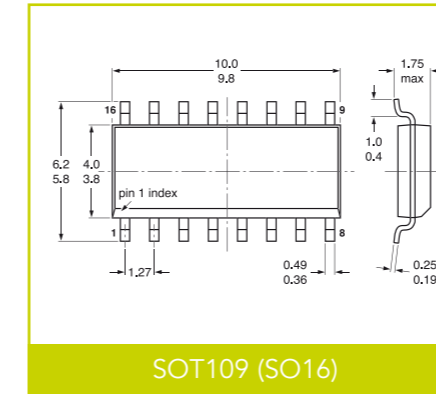
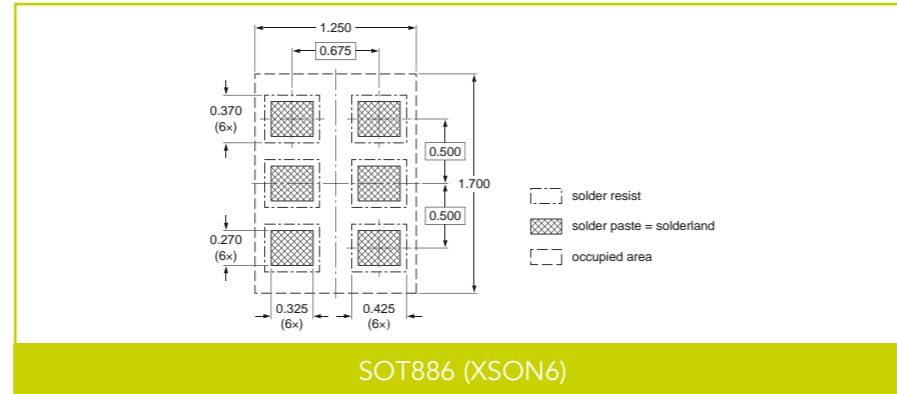
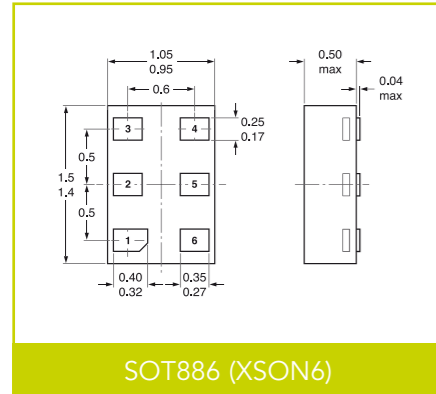
SOT665



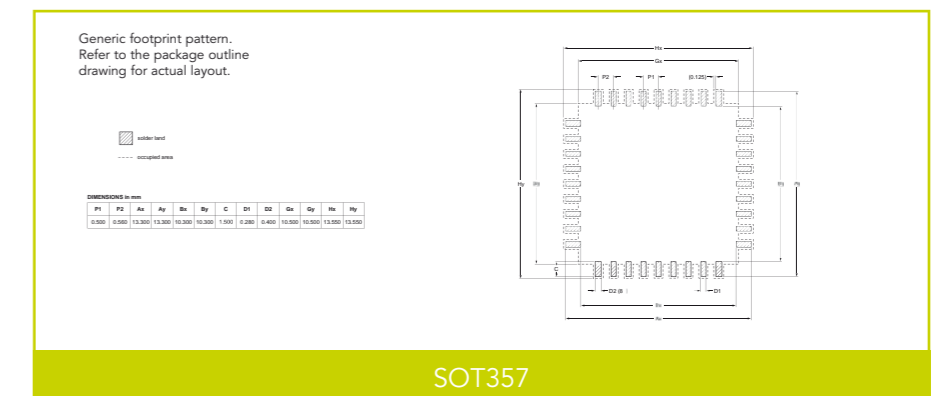
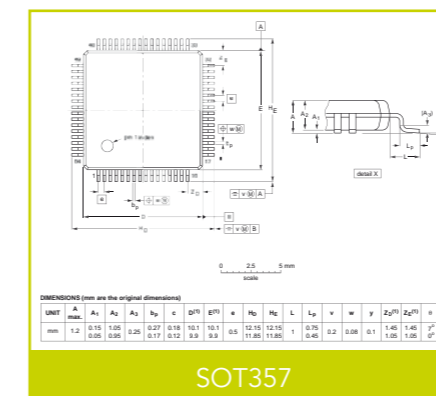
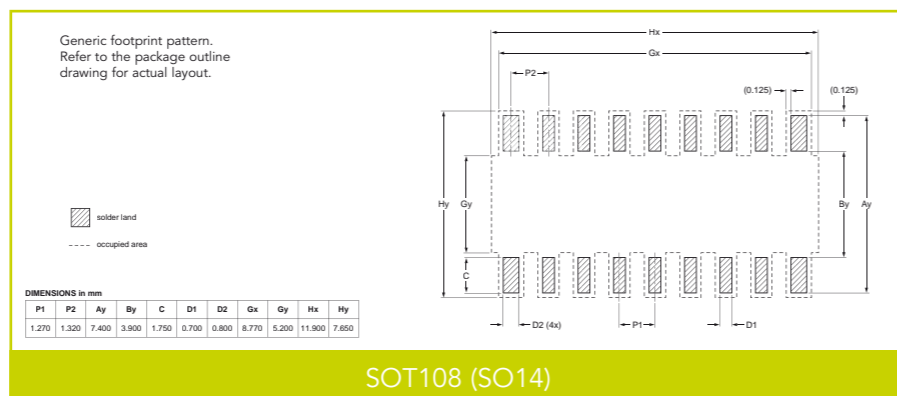
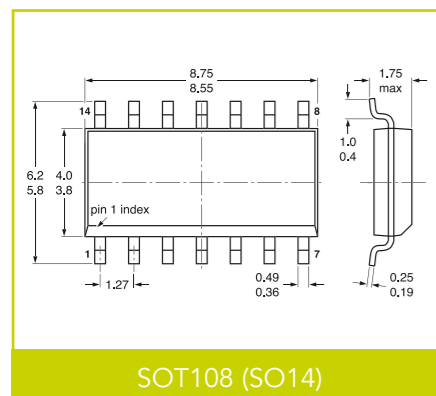
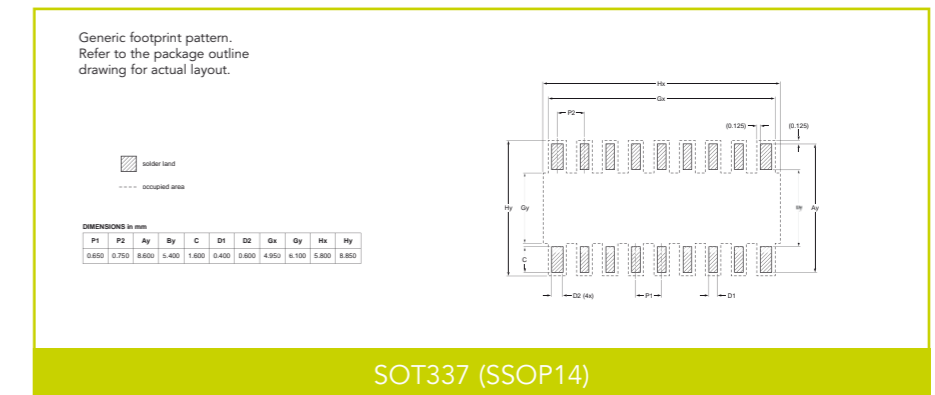
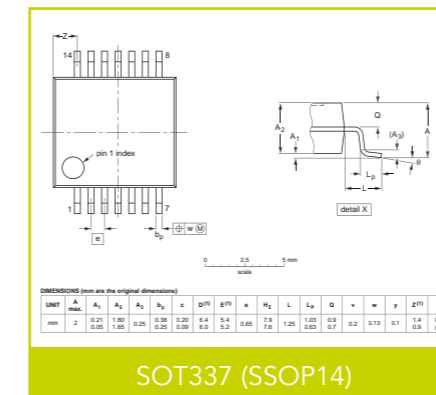
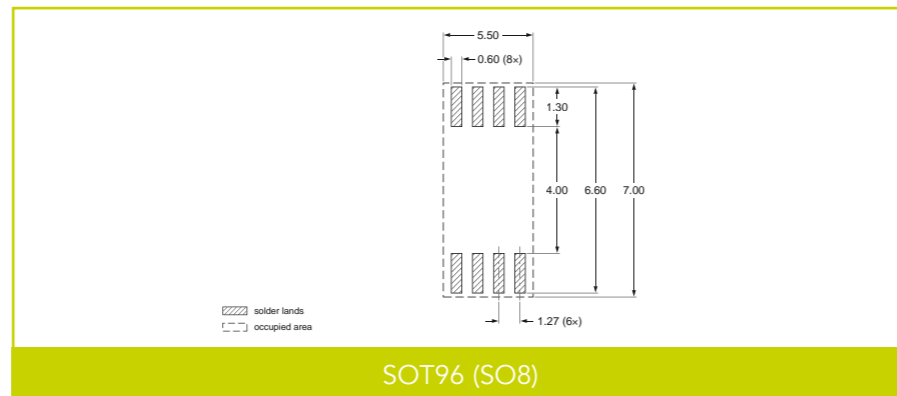
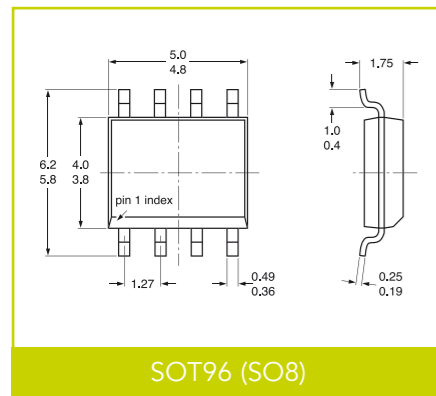
SOT666

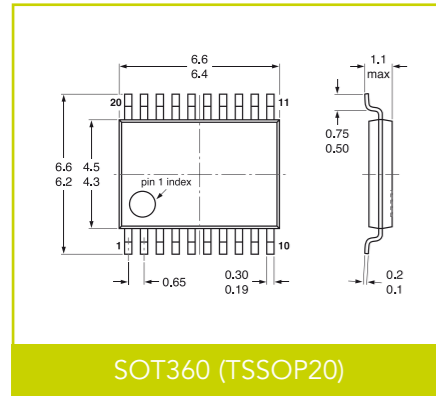


SOT666

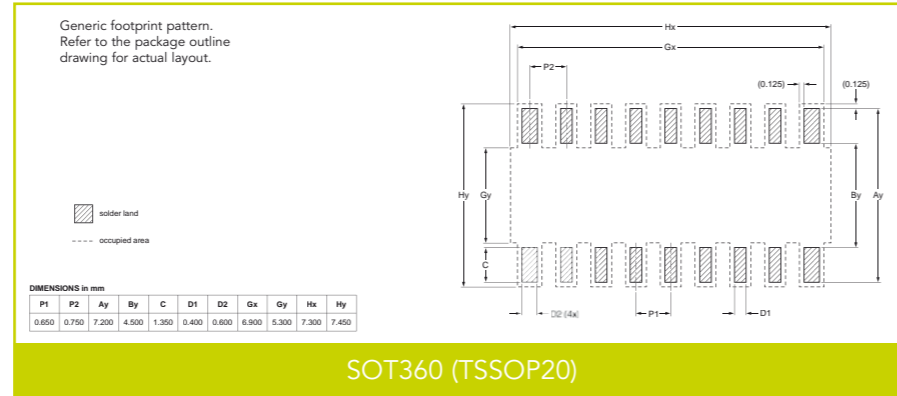


Multi-Pin SMD Packages

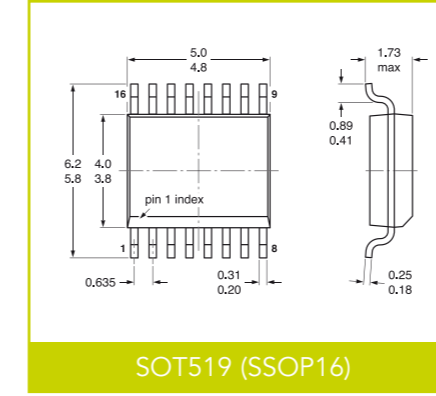




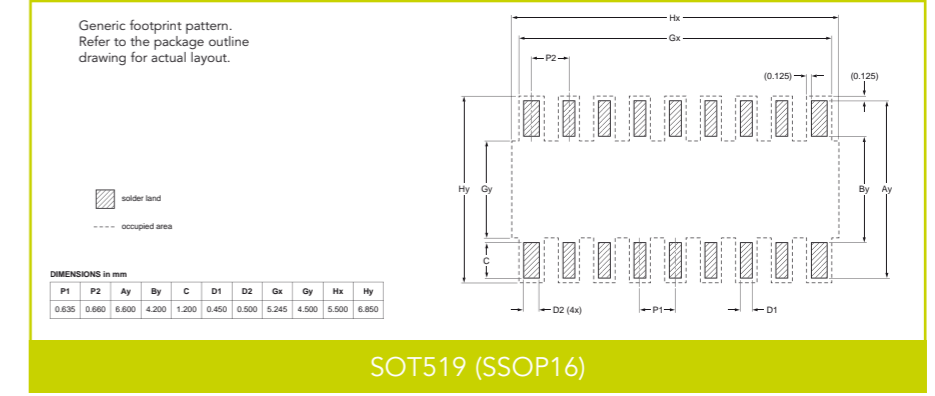
SOT360 (TSSOP20)



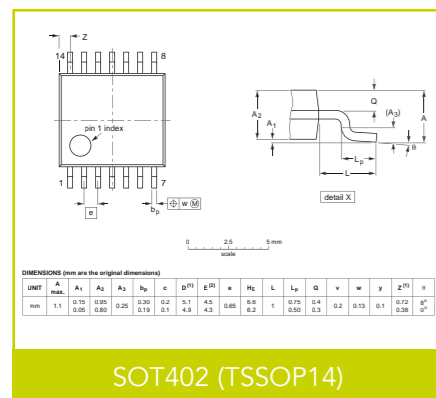
SOT360 (TSSOP20)



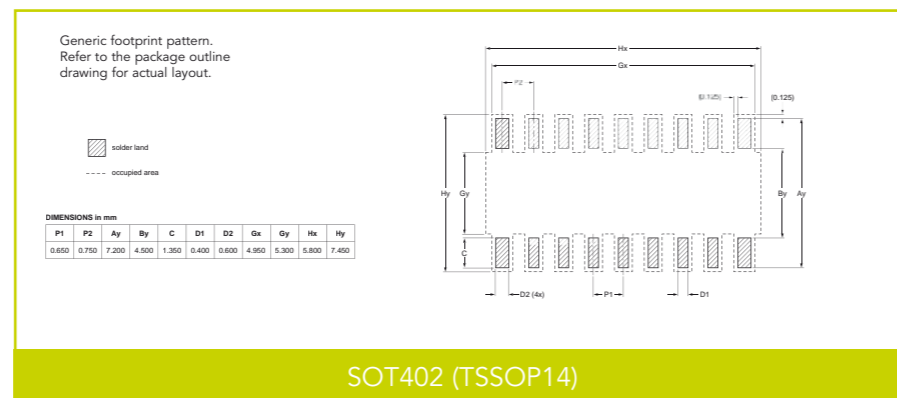
SOT519 (SSOP16)



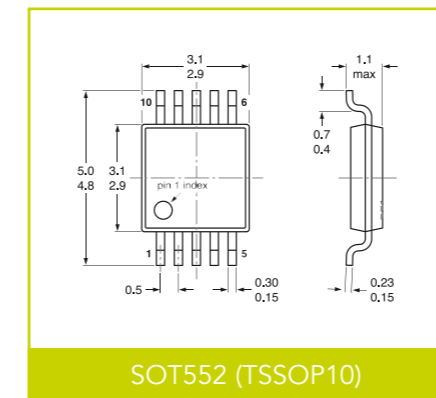
SOT519 (SSOP16)



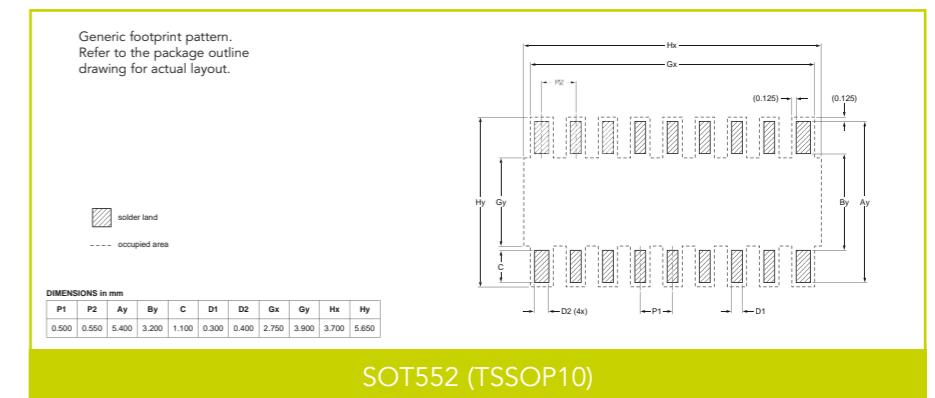
SOT402 (TSSOP14)



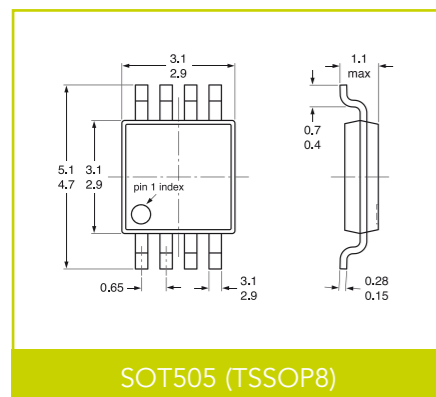
SOT402 (TSSOP14)



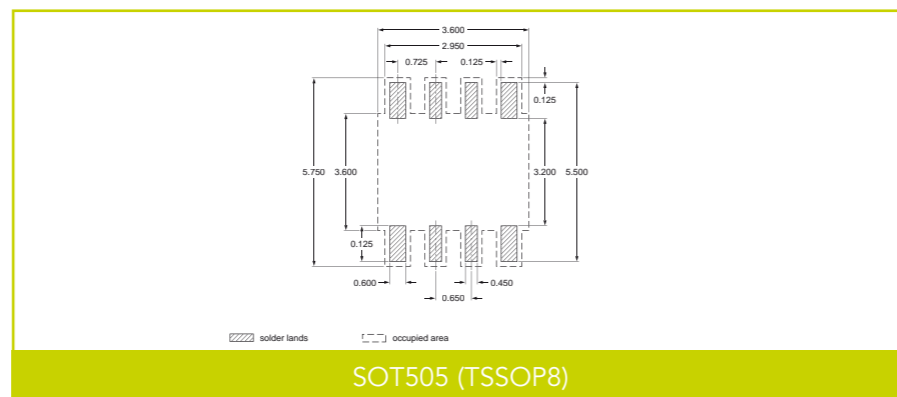
SOT552 (TSSOP10)



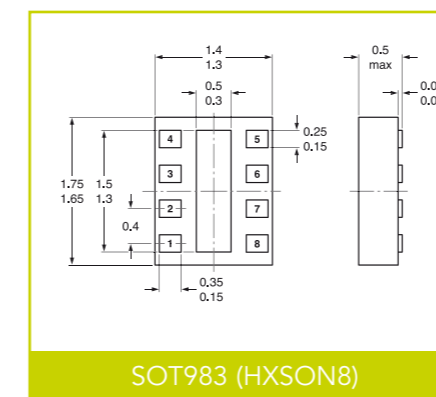
SOT552 (TSSOP10)



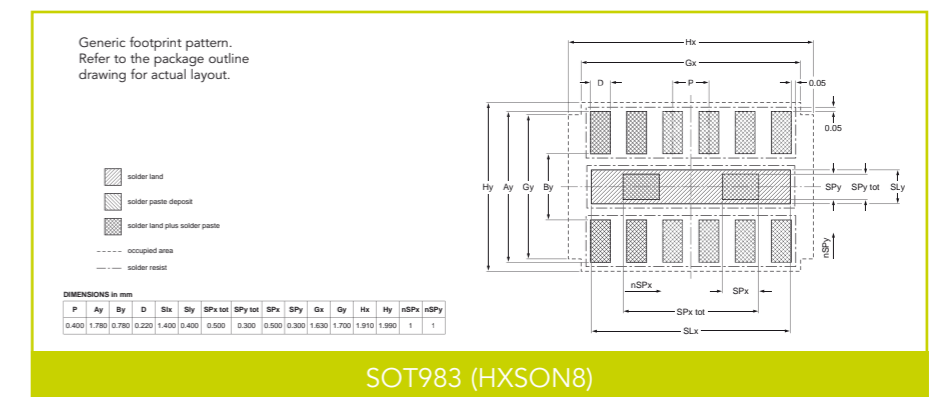
SOT505 (TSSOP8)



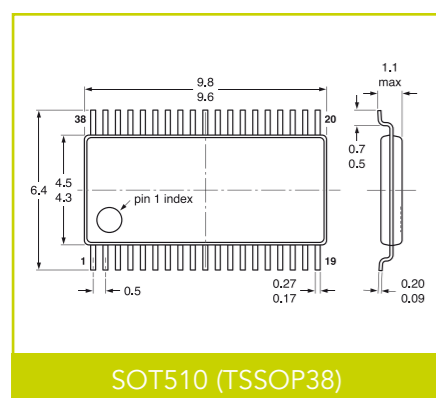
SOT505 (TSSOP8)



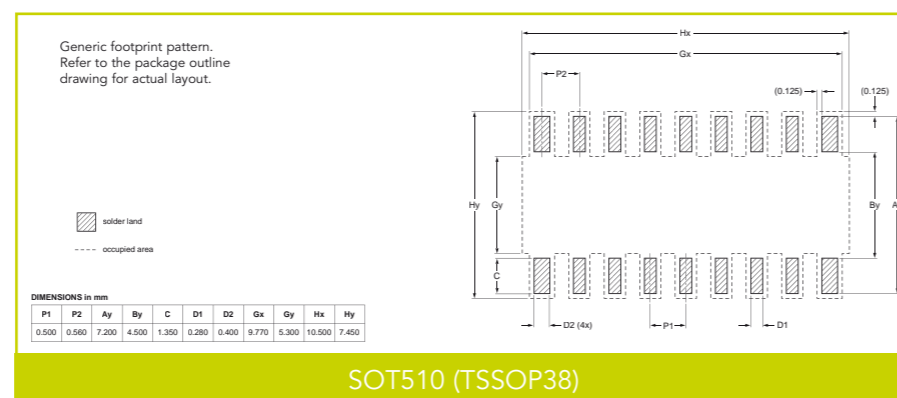
SOT983 (HXSON8)



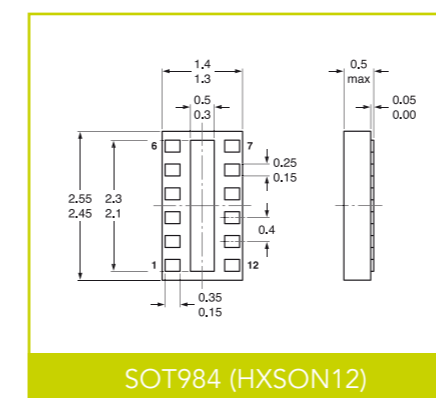
SOT983 (HXSON8)



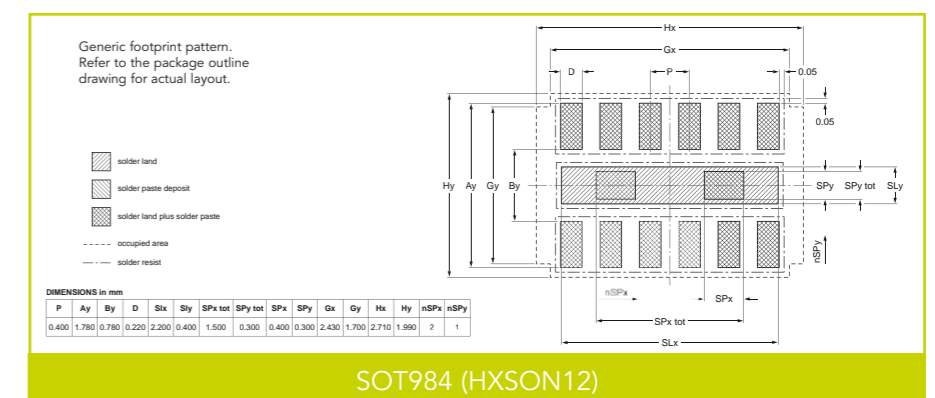
SOT510 (TSSOP38)



SOT510 (TSSOP38)

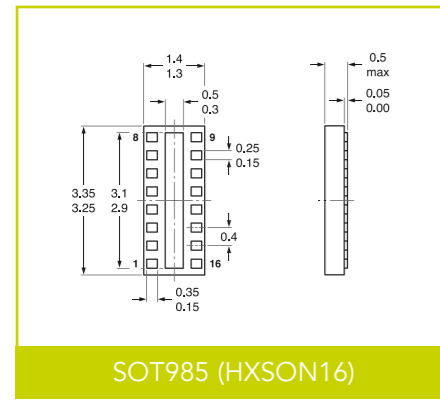


SOT984 (HXSON12)

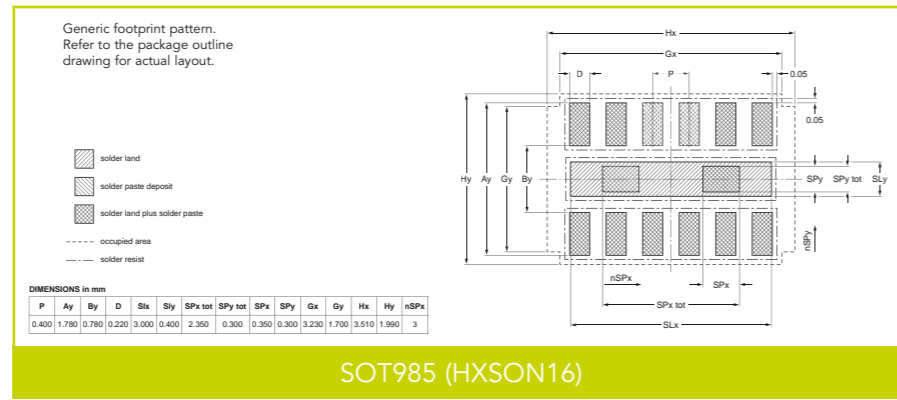


SOT984 (HXSON12)

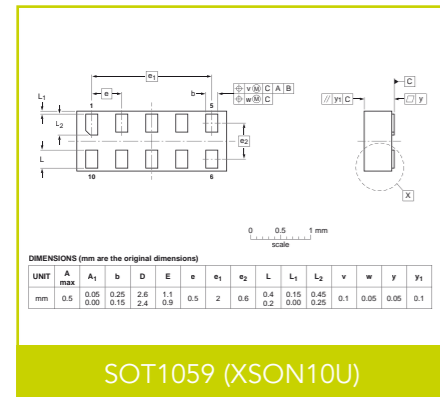
Minimized outline drawings and reflow soldering footprint



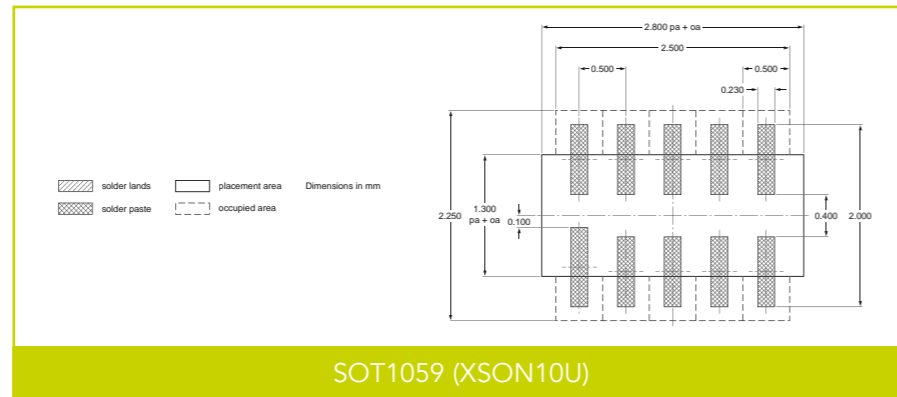
SOT985 (HXSON16)



SOT985 (HXSON16)

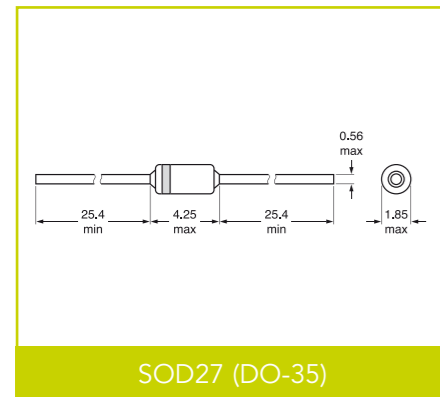


SOT1059 (XSON10U)

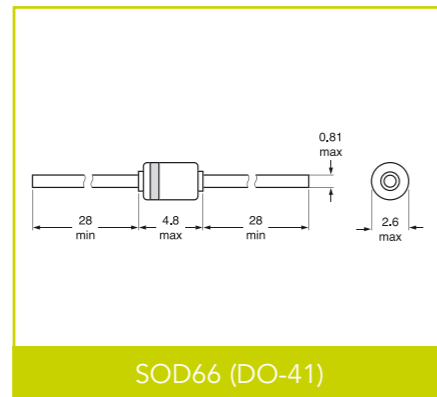


SOT1059 (XSON10U)

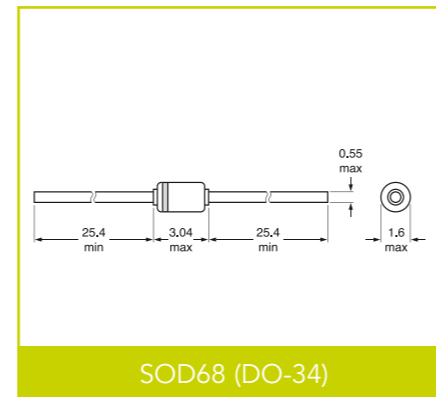
Glass diodes



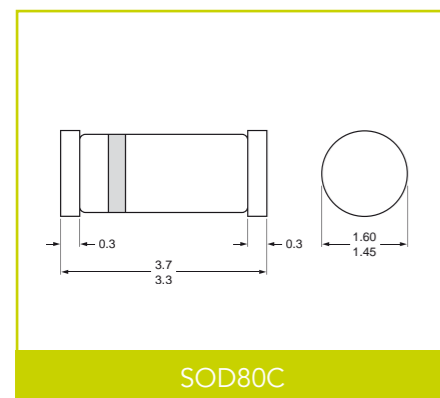
SOD27 (DO-35)



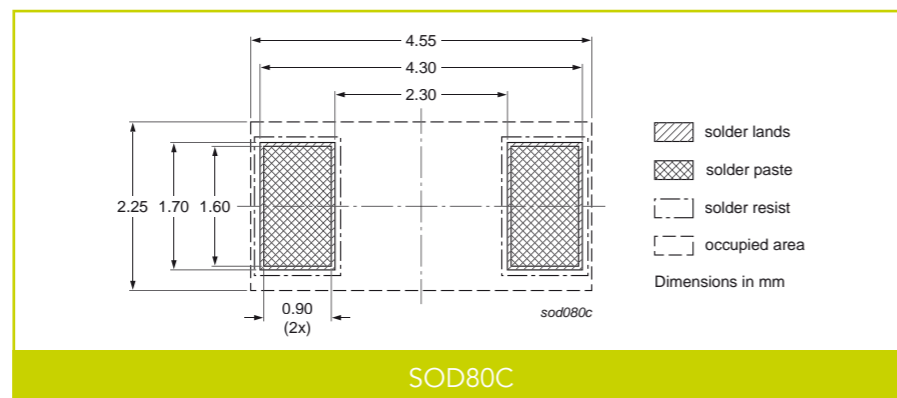
SOD66 (DO-41)



SOD68 (DO-34)



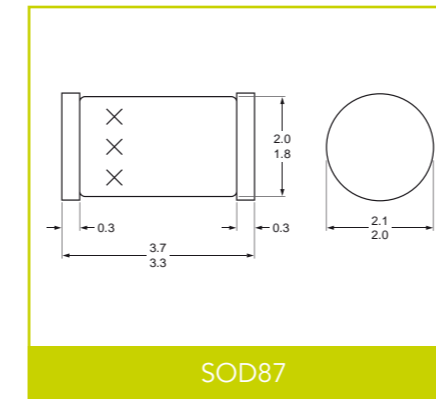
SOD80C



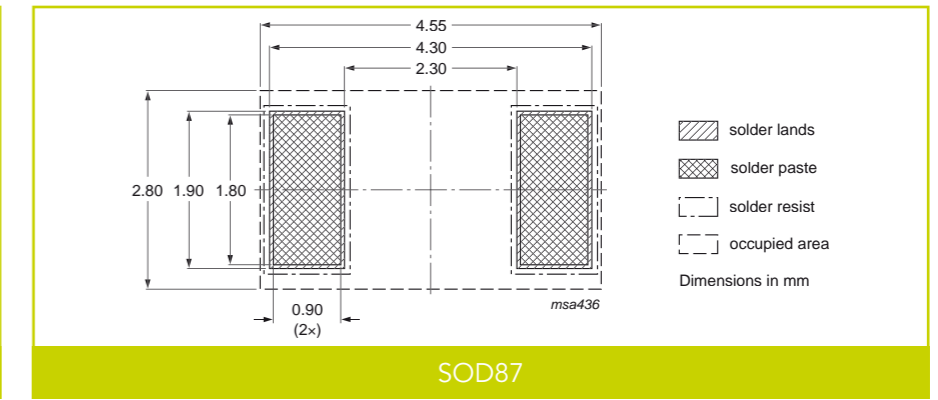
SOD80C

Dimensions in mm

Minimized outline drawings and reflow soldering footprint



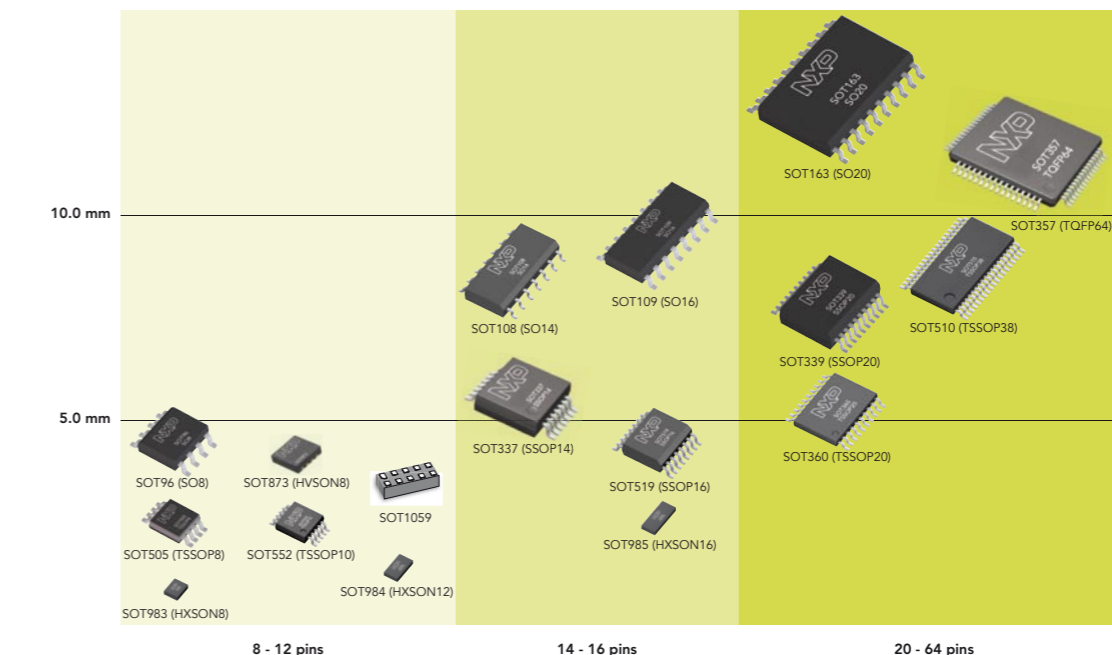
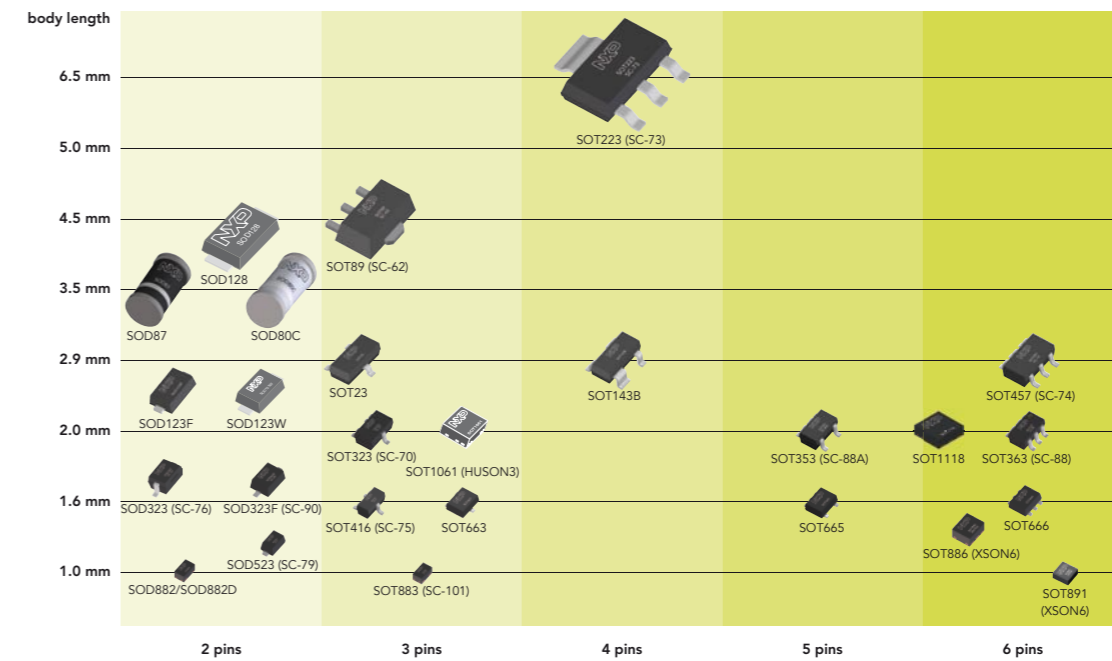
SOD87



SOD87

Dimensions in mm

Package overview



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PSMN025-100D	85	PTVS12VP1UP	45	PTVS7V5S1UR	44	PUMT1	49	PZU9.1y	17
PSMN026-80YS	84	PTVS12VS1UR	44	PTVS8V0P1UP	45	PUMX1	49	PZUxB series	16
PSMN030-150B	86	PTVS13VP1UP	45	PTVS8V0S1UR	44	PUMX2	49	PZUxBA series	16
PSMN030-150P	86	PTVS13VS1UR	44	PTVS8V5P1UP	45	PUMZ1	49	PZUxBL series	16
PSMN035-150B	86	PTVS14VP1UP	45	PTVS8V5S1UR	44	PUMZ2	49	PZUxDB2 series	16
PSMN035-150P	86	PTVS14VS1UR	44	PTVS9V0P1UP	45	PVR100AD-B12V	69	RB520S30	9
PSMN038-100K	85	PTVS15VP1UP	45	PTVS9V0S1UR	44	PVR100AD-B2V5	69	RB521S30	9
PSMN045-80YS	84	PTVS15VS1UR	44	PUMB1	55	PVR100AD-B3V0	69	RB751CS40	9
PSMN050-80PS	84	PTVS16VP1UP	45	PUMB10	55	PVR100AD-B3V3	69	RB751S40	9
PSMN057-200B	86	PTVS16VS1UR	44	PUMB11	55	PVR100AD-B5V0	69	RB751V40	9
PSMN057-200P	86	PTVS17VP1UP	45	PUMB13	55	PVR100AZ-B12V	69	RS1A	15
PSMN059-150Y	86	PTVS17VS1UR	44	PUMB14	55	PVR100AZ-B2V5	69	RS1B	15
PSMN063-150D	86	PTVS18VP1UP	45	PUMB15	55	PVR100AZ-B3V0	69	RS1D	15
PSMN070-200B	86	PTVS18VS1UR	44	PUMB16	55	PVR100AZ-B3V3	69	RS1G	15
PSMN070-200P	86	PTVS20VP1UP	45	PUMB17	55	PVR100AZ-B5V0	69	RS1J	15
PSMN085-150K	87	PTVS20VS1UR	44	PUMB18	55	PXT2222A	49	RS1K	15
PSMN102-200Y	86	PTVS22VP1UP	45	PUMB19	55	PXT2907A	49	RS1M	15
PSMN130-200D	86	PTVS22VS1UR	44	PUMB2	55	PXT4401	49	RS2A	15
PSMN165-200K	87	PTVS24VP1UP	45	PUMB20	55	PXT4403	49	RS2AA	15
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PSMN1R3-30YL	82	PTVS26VP1UP	45	PUMB3	55	PXTA42	51	RS2BA	15
PSMN1R5-25YL	80	PTVS26VS1UR	44	PUMB30	55	PXTA92	51	RS2D	15
PSMN1R6-30PL	82	PTVS28VP1UP	45	PUMB4	55	PZT2222A	49	RS2DA	15
PSMN1R7-30YL	82	PTVS28VS1UR	44	PUMB9	55	PZT2907A	49	RS2G	15
PSMN1R8-30PL	82	PTVS30VP1UP	45	PUMD10	55	PZT4401	49	RS2GA	15
PSMN2R0-30PL	82	PTVS30VS1UR	44	PUMD12	55	PZT4403	49	RS2J	15
PSMN2R0-30YL	82	PTVS33VP1UP	45	PUMD13	55	PZTA14	51	RS2JA	15
PSMN2R0-40YS	83	PTVS33VS1UR	44	PUMD14	55	PZTA42	51	RS2K	15
PSMN2R2-40PS	83	PTVS36VP1UP	45	PUMD15	55	PZTA44	51	RS2KA	15
PSMN2R5-30YL	82	PTVS36VS1UR	44	PUMD16	55	PZTA92	51	RS2M	15
PSMN2R6-40YS	83	PTVS3V3P1UP	45	PUMD17	55	PZU10y	17	RS2MA	15
PSMN2R7-30PL	82	PTVS3V3S1UR	44	PUMD18	55	PZU11y	17	RS3A	15
PSMN2R8-40PS	83	PTVS40VP1UP	45	PUMD19	55	PZU12y	17	RS3B	15
PSMN3R0-30YL	82	PTVS40VS1UR	44	PUMD2	55	PZU13y	17	RS3D	15
PSMN3R3-40YS	83	PTVS43VP1UP	45	PUMD20	55	PZU14y	17	RS3G	15
PSMN3R4-30PL	82	PTVS43VS1UR	44	PUMD24	55	PZU15y	17	RS3J	15
PSMN3R5-30YL	82	PTVS45VP1UP	45	PUMD3	55	PZU16y	17	RS3K	15
PSMN4R0-30YL	82	PTVS45VS1UR	44	PUMD30	55	PZU18y	17	RS3M	15
PSMN4R0-40YS	83	PTVS48VP1UP	45	PUMD4	55	PZU2.4y	17	S1A	15
PSMN4R3-30PL	82	PTVS48VS1UR	44	PUMD48	55	PZU2.7y	17	S1B	15
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PSMN4R5-40PS	83	PTVS51VS1UR	44	PUMD9	55	PZU22y	17	S1G	15
PSMN5R0-30YL	82	PTVS54VP1UP	45	PUMH1	55	PZU24y	17	S1J	15
PSMN5R0-80PS	84	PTVS54VS1UR	44	PUMH10	55	PZU27y	17	S1K	15
PSMN5R8-40YS	83	PTVS58VP1UP	45	PUMH11	55	PZU3.0y	17	S1M	15
PSMN6R0-30YL	82	PTVS58VS1UR	44	PUMH13	55	PZU3.3y	17	S2A	15
PSMN6R0-80YS	84	PTVS5V0P1UP	45	PUMH14	55	PZU3.6y	17	S2B	15
PSMN6R5-80PS	84	PTVS5V0S1UR	44	PUMH15	55	PZU3.9y	17	S2D	15
PSMN7R0-30YL	82	PTVS60VP1UP	45	PUMH16	55	PZU30y	17	S2DA	15
PSMN8R0-40PS	83	PTVS60VS1UR	44	PUMH17	55	PZU33y	17	S2G	15
PSMN8R2-80YS	84	PTVS64VP1UP	45	PUMH18	55	PZU36y	17	S2GA	15
PSMN8R3-40YS	83	PTVS64VS1UR	44	PUMH19	55	PZU4.3y	17	S2J	15
PSMN8R7-80PS	84	PTVS6V0P1UP	45	PUMH2	55	PZU4.7y	17	S2JA	15
PSMN9R0-30YL	82	PTVS6V0S1UR	44	PUMH20	55	PZU5.1y	17	S2K	15
PSSI2021SAY	70	PTVS6V5P1UP	45	PUMH24	55	PZU5.6y	17	S2KA	15
PTVS10VP1UP	45	PTVS6V5S1UR	44	PUMH30	55	PZU6.2y	17	S2M	15
PTVS10VS1UR	44	PTVS7V0P1UP	45	PUMH4	55	PZU6.8y	17	S2MA	15
PTVS11VP1UP	45	PTVS7V0S1UR	44	PUMH7	55	PZU7.5y	17	S3A	15
PTVS11VS1UR	44	PTVS7V5P1UP	45	PUMH9	55	PZU8.2y	17	S3B	15

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TL431AIDBZR	68	TL431MSDT	68	TLVH431CDBZR	68	US2DA	15		
TL431AMSDT	68	TL431QDBZR	68	TLVH431IDBZR	68	US2GA	15		

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