THE DATASHEET OF

SMF6V5A-HE3-08

eSMP® Flat Type Surface-Mount Packages With Space-Saving Footprints

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Asymmetrical Flat Types

Symmetrical Flat Types

RESOURCES

- For technical questions contact Diodes@vishay.com

A WORLD OF SOLUTIONS

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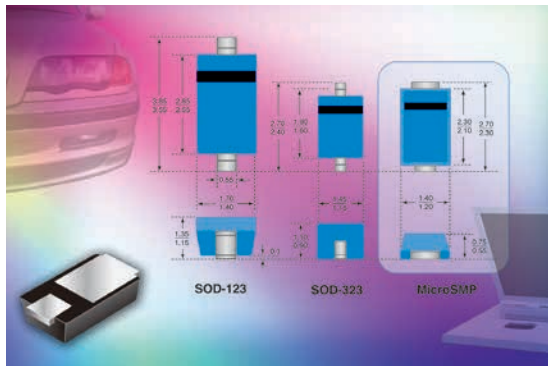
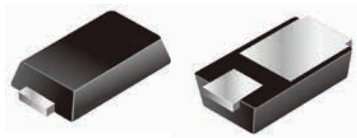
MicroSMP (DO-219AD) Miniature, High Power Density Package for Rectifiers and Transient Voltage Suppressors (TVS)

Features

- High power density rectifiers and TVS in space-saving 2.5 mm by 1.3 mm footprint with a 0.65 mm height
- High forward current up to 1 A for rectifiers and 150 W (10/1000 µs waveform) clamping power capability in TVS
- All the devices offer a high 25 A forward surge current capability for an 8.3 ms pulse for rectifiers
- Up to 175 °C maximum operation junction temperature for rectifiers
- Provide improved reliability and a longer operational life span
- Improve on all previous TVS products in similar package types by combining ESD transient protection with a superior surge clamping capability





eSMP® Series — MicroSMP (DO-219AD)

Applications

- Secondary rectification and freewheeling diode functions for miniature AC/DC and DC/DC converters
- Flywheel and polarity protection for miniature power converters and portable electronic equipment such as digital cameras, MP3 players, navigation systems, GPS, and cellular phones
- Polarity protection of power lines and signal lines for industrial systems
- Power and signal line protection for microprocessors, signal processing ICs, and logic circuits
- High power voltage regulation for non-sensitive input voltage circuits in automotive and industrial electronics

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Schottky Rectifiers

Device	V_{RRM} Range	$I_{F(AV)}$	Max V_F @ I_F		I_{FSM}	T_J Max
	(V)	(A)	(V)	(A)	(A)	(°C)
MSS1P2L, MSS1P3L	20 - 30	1.0	0.50	1.0	25	150
MSS1P3, MSS1P4	30 - 40	1.0	0.55	1.0	25	150
MSS1P5, MSS1P6	50 - 60	1.0	0.68	1.0	25	150
MSS2P2, MSS2P3	20 - 30	2.0	0.6	2.0	30	150
V1PM10	100	1.0	0.77	1.0	25	175

Standard ESD Capability Rectifiers

Device	V_{RRM} Range	$I_{F(AV)}$	Max V_F @ I_F		t_{rr} Typical	I_{FSM}	T_J Max
	(V)	(A)	(V)	(A)	(ns)	(A)	(°C)
MSE07PB thru MSE07PJ	100 - 600	0.7	1.08	0.7	780	20	175
MSE1PB thru MSE1PJ	100 - 600	1.0	1.1	1.0	780	30	175
MSX1PB thru MSX1PJ	100 - 600	1.0	1.1	1.0	960	18	175

TransZorb® TVS

Device	$V_{(BR)}$ Range	V_{WM} Range	P_{PPM} (10 x 1000 µs)	P_{PPM} (8 x 20 µs)	T_J Max
	(V)	(V)	(W)	(W)	(°C)
MSP3V3, MSP5.0A	4.1 - 6.4	3.3 - 5.0	150	1000	150
MSMP6.0A thru MSMP20A	6.67 - 24.5	6.0 - 20	150	1000	150

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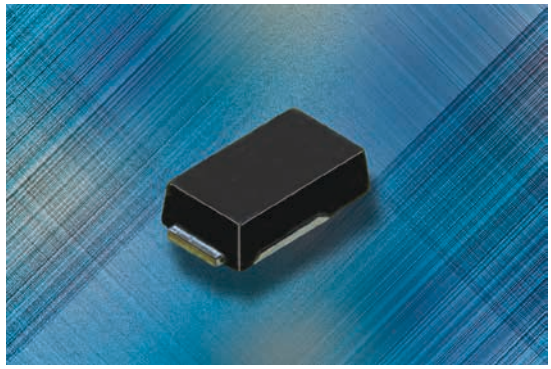
SMP (DO-220AA) Miniature, High Power Density Package for Rectifiers and Transient Voltage Suppressors (TVS)

Features

- High power density rectifiers and TVS in space-saving 3.8 mm by 2 mm footprint with a 1 mm height
- Low forward voltage drop
- Provide space savings with:
  - Rectifiers rated up to 3 A
  - TVS rated up to 400 W (for above 13 V)
- 1 mm device height
- Solder pad compatible with other SMD devices
- Low thermal resistance
- Wide product offering
- Available for TVS and Schottky, Ultrafast, and standard rectifiers



eSMP® Series — SMP (DO-220AA)

Applications

- Secondary rectification of AC/DC and DC/DC converters, freewheeling and polarity protection
- General purpose, polarity protection, and rail to rail protection in automotive applications
- Secondary rectification and freewheeling for ultrafast switching speeds of AC/DC and DC/DC converters in computer and consumer end products and in high-temperature conditions such as automotive applications
- Protection for ICs, drive transistors, signal lines of sensor units, and electronic units in consumer, computer, industrial, and automotive applications

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DIODES

SMP (DO-220AA) Package

Schottky Rectifiers

Device	$I_{F(AV)}$	V_{RRM} Range	Max V_F @ I_F		I_R @ V_{RRM}	I_{FSM}	T_J Max
	(A)	(V)	(V)	(A)	(µA)	(A)	(°C)
SS1P3L, SS1P4L	1.0	30 - 40	0.45, 0.48	1.0	150	50	150
SS1P3, SS1P4	1.0	30 - 40	0.53	1.0	150	30	150
SS1P5L, SS1P6L	1.0	50 - 60	0.59	1.0	100	50	150
SS2P2, SS2P3, SS2P4	2.0	20 - 40	0.55	2.0	150	50	150
SS2P2L, SS2P3L	2.0	20 - 30	0.50	2.0	200	50	150
SS2P5, SS2P6	2.0	50 - 60	0.70	2.0	100	50	150
SS2PH9, SS2PH10	2.0	90 - 100	0.80	2.0	1.0	50	150
SS3P3	3.0	30	0.58	3.0	200	50	150
SS3P4	3.0	40	0.60	3.0	150	50	150
SS3P5, SS3P6	3.0	50 - 60	0.78	3.0	100	50	150
SS2PH5, SS2PH6	2.0	50 - 60	0.80	2.0	2	50	175

TMBS® (Trench MOS Barrier Schottky) Rectifiers

Device	$I_{F(AV)}$	V_{BR} Range	Max V_F @ I_F		I_R @ V_{RRM}	I_{FSM}	T_J Max
	(A)	(V)	(V)	(A)	(µA)	(A)	(°C)
V3P6	3	60	0.63	3.0	900	60	150

Ultrafast Recovery Rectifiers

Device	$I_{F(AV)}$	V_{RRM} Range	Max V_F @ I_F		I_R @ V_{RRM}	I_{FSM}	t_{rr} Max	T_J Max
	(A)	(V)	(V)	(A)	(µA)	(A)	(ns)	(°C)
ES1PB, ES1PC, ES1PD	1.0	100 - 200	0.865 / 0.92	0.6 / 1.0	5	30	15	150
ESH1PB, ESH1PC, ESH1PD	1.0	100 - 200	0.86 / 0.90	0.7 / 1.0	1	50	25	175
ESH2PB, ESH2PC, ESH2PD	2.0	100 - 200	0.98	2.0	1	50	25	175

Standard Recovery Rectifiers

Device	$I_{F(AV)}$	V_{RRM} Range	Max V_F @ I_F		I_R @ V_{RRM}	t_{rr} Typ	I_{FSM}	T_J Max
	(A)	(V)	(V)	(A)	(µA)	(ns)	(A)	(°C)
S1PB thru S1PM	1.0	100 - 1000	1.1	1.0	1	1800	30	150

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DIODES

SMP (DO-220AA) Package

Standard ESD Capability Rectifiers

Device	$I_{F(AV)}$	V_{RRM} Range	Max V_F @ I_F		I_R @ V_{RRM}	t_{rr} Typ	I_{FSM}	T_J Max
	(A)	(V)	(V)	(A)	(µA)	(ns)	(A)	(°C)
SE07PB thru SE07PJ	0.7	100 - 600	1.05	0.7	5		20	175
SE10PB thru SE10PJ	1.0	100 - 600	1.05	1.0	5	780	25	175
SE15PB thru SE15PJ	1.5	100 - 600	1.05	1.5	5	900	30	175
SE20PB thru SE20PJ	2.0	100 - 600	1.05	2.0	5	1200	32	175

Avalanche Rectifiers

Device	$I_{F(AV)}$	V_{RRM} Range	Max V_F @ I_F		I_R @ V_{RRM}	E_R	t_{rr} Max	I_{FSM}	T_J Max
	(A)	(V)	(V)	(A)	(µA)	(mJ)	(ns)	(A)	(°C)
AS1PD thru AS1PM	1.5	200 - 1000	1.15	1.5	5	20	1500	30	175
AR1PD, AR1PG, AR1PJ	1	200 - 600	1.25	1	1	20	140	20	175
AR1PK, AR1PM	1	800 - 1000	1.6	1	1	20	120	20	175
AU1PD, AU1PG, AU1PJ	1	200 - 600	1.5	1	1	20	75	100	175
AU1PK, AU1PM	1	800 - 1000	1.85	1	1	20	75	100	175

Fast Switching Rectifiers

Device	$I_{F(AV)}$	V_{RRM} Range	Max V_F @ I_F		I_R @ V_{RRM}	E_R	t_{rr} Max	I_{FSM}	T_J Max
	(A)	(V)	(V)	(A)	(µA)	(mJ)	(ns)	(A)	(°C)
RS1PB thru RS1PG	1	100 - 400	1.3	1	1	N/A	150	30	150
RS1PJ	1	600	1.3	1	1	N/A	250	30	150

PAR® TVS

Device	P_{PPM} (10 x 1000 µs)	$V_{(BR)}$ Range	V_{WM} Range	T_J Max
	(W)	(V)	(V)	(°C)
TPSMP6.8(A)	250	6.8	5.8	185
TPSMP7.5 thru TPSMP12(A)	300	7.5 - 12	6.40 - 10.2	185
TPSMP13 thru TPSMP43(A)	400	13 - 43	11.1 - 36.8	185

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TransZorb® TVS

Device	P_{PPM} (10 x 1000 µs)	$V_{(BR)}$ Range	V_{WM} Range	T_J Max
	(W)	(V)	(V)	(°C)
SMP3V3 thru SMP36A	400	4.10 - 44.2	3.3 - 36	150

Power Voltage-Regulating Diodes

Device	P_D	Vz Range	T_J Max
	(mW)	(V)	(°C)
PTV3.9B thru PTV36B	1500	3.9 - 36	150
SMPZ3919B thru SMPZ3940B	1500	5.6 - 43	150

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TMBS® Trench MOS Barrier Schottky and Standard Rectifiers in Low Profile SMPA (DO-221BC) Package

eSMP® Series — SMPA (DO-221BC)

Common Features

- Low profile SMPA (DO-221BC) package
- Typical height of 0.95 mm
- Ideal for automated placement
- Meets MSL moisture sensitivity level of 1, per J-STD-020, LF maximum peak of 260 °C
- Compliant to RoHS Directive 2011/65/EU
- Halogen-free according to JEDEC JS709A standards
- Maximum operation junction temperature of 175 °C
- AEC-Q101 qualified (50 V TMBS devices not yet qualified)

Features for TMBS Rectifiers

- Current ratings from 3 A to 8 A
- Low forward voltage drop down to 0.37 V at 3 A
- Low power losses and high efficiency
- Trench MOS Schottky technology

Features for Standard Rectifiers

- Current ratings from 2 A to 5 A
- Low forward voltage drop
- Low leakage current
- Oxide planar chip technology
- ESD capability

Applications

- Low voltage, high frequency DC/DC converters, switching power supplies, freewheeling diodes, and polarity protection in automotive applications and mobile device chargers
- General purpose, power line polarity protection in automotive applications

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TMBS® (Trench MOS Barrier Schottky) Rectifiers

Device	$I_{F(AV)}$	V_{RRM} Range	Max V_F @ I_F		I_R @ V_{RRM}	I_{FSM}	T_J Max
	(A)	(V)	(V)	(A)	(µA)	(A)	(°C)
V3PAL45	3	45	0.54	3.0	450	80	150
V3PAN50	3	50	0.54	3.0	600	80	150
V4PAL45	4	45	0.57	4.0	450	80	150
V4PAN50	4	50	0.59	4.0	600	80	150
V8PA10	8	100	0.76	8.0	800	100	150
V8PA12	8	120	0.87	8.0	600	100	150
V8PA15	8	150	1.20	8.0	500	100	150
V8PA6	8	60	0.63	8.0	600	100	150
V8PAL45	8	45	0.57	8.0	1850	120	150
V8PAL50	8	50	0.57	8.0	400	120	150
V8PAM10	8	100	0.78	8.0	200	100	175
V8PAM12	8	120	0.88	8.0	500	100	175
V8PAN50	8	50	0.57	8.0	400	120	150

Standard Recovery Rectifiers

Device	$I_{F(AV)}$	V_{RRM} Range	Max V_F @ I_F		I_R @ V_{RRM}	t_{rr} Typ	I_{FSM}	T_J Max
	(A)	(V)	(V)	(A)	(µA)	(ns)	(A)	(°C)
SE20PAB thru SE20PAJ	2.0	100 - 600	1.1	2.0	5	1300	32	175
SE30PAB thru SE30PAJ	3.0	100 - 600	1.16	3.0	5	1300	32	175
SE50PAB thru SE50PAJ	5.0	100 - 600	1.16	5.0	10	2000	42	175

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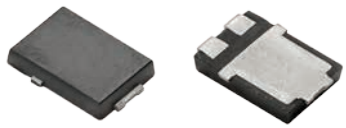
SMPC (TO-277A) Miniature, High Power Density Package for Rectifiers and Transient Voltage Suppressors (TVS)



eSMP® Series — SMPC (TO-277A)

Features

- Enable higher current density power supply designs
- Very small 1.1 mm height and 4.8 mm by 6.7 mm footprint saves space
- Provide more power in a smaller package
  - TMBS® rectifiers rated up to 15 A
  - Planar Schottky rectifiers rated up to 15 A
- Industry-standard SMPC (TO-277A) package outline for easy outline compatibility
- Low forward voltage drops and special wide-bottom plate designs provide greater heat dissipation than other packages of similar sizes
- Ideal for automated placement
- Single- or dual-chip, surface-mount SMPC (TO-277A) package features solder pads that are compatible with other SMD devices

Applications

- Secondary rectifiers and freewheeling circuitry for AC/DC and DC/DC converters
- Output rectification for small and medium power adapters
- Switchmode power supplies in consumer electronics such as computers, LCD monitors, and cell phones
- Flywheel and polarity protection for solenoid drive circuits in automotive and industry systems
- OR-ing diodes for telecommunication and industrial systems

Schottky Rectifiers

Device	$I_{F(AV)}$	V_{RRM} Range	Max V_F @ I_F		I_R @ V_{RRM}	I_{FSM}	T_J Max
	(A)	(V)	(V)	(A)	(µA)	(A)	(°C)
SS3P3L, SS3P4L	3.0	30 - 40	0.47	3.0	250	150	150
SS3P5L, SS3P6L	3.0	50 - 60	0.60	3.0	150	150	150
SS5P3, SS5P4	5.0	50 - 60	0.52	5.0	250	150	150
SS5P5, SS5P6	5.0	50 - 60	0.69	5.0	150	150	150
SS5P9, SS5P10	5.0	90 - 100	0.88	5.0	15	150	150
SS6P4C	6.0	40	0.65	3.0	200	70	150
SS8P2L, SS8P3L	8.0	20 - 30	0.57	8.0	200	150	150
SS8PH9, SS8PH10	8.0	90 - 100	0.9	8.0	2	150	175
SS8P2CL, SS8P3CL	8.0	20 - 30	0.54	4.0	300	120	150
SS8P3C, SS8P4C	8.0	30 - 40	0.58	4.0	300	120	150
SS8P5C, SS8P6C	8.0	50 - 60	0.70	4.0	50	120	150
SS10P2CL, SS10P3CL	10	20 - 30	0.52	5.0	850	200	150
SS10P3C, SS10P4C	10	30 - 40	0.53	5	550	200	150
SS10P3, SS10P4	10	30 - 40	0.56	10	800	280	150
SS10P5, SS10P6	10	50 - 60	0.67	10	150	280	150
SS10PH45	10	45	0.72	10	80	200	175
SS10PH9, SS10PH10	10	90 - 100	0.88	10	10	200	175
SS12P2L , SS12P3L	12	20 - 30	0.56	12	1000	280	150
SS12P4C	12	40	0.52	6	500	150	150
SS12P4S	12	40	0.60	12	800	280	150
SS15P3S	15	30	0.57	15	1000	280	150

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TMBS® (Trench MOS Barrier Schottky) Rectifiers

Device	$I_{F(AV)}$	V_{RRM} Range	Max V_F @ I_F		I_R @ V_{RRM}	I_{FSM}	T_J Max
	(A)	(V)	(V)	(A)	(µA)	(A)	(°C)
V10P10	10	100	0.68	10	150	180	150
V10P12	10	120	0.82	10	400	160	150
V10P15	10	150	1.08	10	200	180	150
V10P20	10	200	1.34	10	400	180	150
V10P45	10	45	0.57	10	800	180	150
V10P45S	10	45	0.57	10	800	180	150
V10P6	10	60	0.59	10	1600	180	150
V10P8	10	80	0.68	10	800	180	150
V10PL45	10	45	0.52	10	5000	200	150
V10PM10	10	100	0.75	10	120	180	150
V10PM12	10	120	0.83	10	400	160	150
V10PN50	10	50	0.55	10	150	180	150
V12P10	12	100	0.70	12	250	200	150
V12P12	12	120	0.80	12	500	150	150
V12P15	12	150	1.08	12	250	200	150
V12P45	12	45	0.58	12	1000	200	150
V12P6	12	60	0.61	12	2900	200	150
V12P8	12	80	0.66	12	1000	200	150
V12PM10	12	100	0.75	12	200	200	150
V12PM12	12	120	0.80	12	500	160	150
V15P10	15	100	0.71	15	500	220	150
V15P12	15	120	0.81	15	1000	220	150
V15P15	15	150	1.08	15	300	220	150
V15P45	15	45	0.58	15	1500	210	150
V15P45S	15	45	0.58	15	1500	210	150
V15P6	15	60	0.62	15	3600	220	150
V15P8	15	80	0.66	15	1200	220	150
V15PL50	15	50	0.58	15	1500	200	150
V15PM10	15	100	0.75	15	400	220	150
V15PM12	15	120	0.84	15	800	220	150
V15PN50	15	50	0.56	15	3000	200	150
V20PL50	20	50	0.59	20	3000	240	150
V20PL60	20	60	0.59	20	4000	240	150
V25PL60	25	60	0.59	25	4000	240	150
V25PN60	25	60	0.59	25	6000	300	150
V8P10	8	100	0.68	8.0	70	150	150
V8P12	8	120	0.84	8.0	300	140	150
V8P15	8	150	1.08	8.0	150	140	150
V8P45	8	45	0.58	8.0	600	140	150
V8P6	8	60	0.61	8.0	600	140	150
V8P8	8	80	0.66	8.0	700	140	150
V8PL6	8	60	0.58	8.0	2400	140	150
V8PM10	8	100	0.75	8.0	60	140	150
V8PM12	8	120	0.84	8.0	300	140	150
V8P20	8	200	1.40	8.0	250	150	150

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DIODES

SMPC (TO-277A) Package

Standard ESD Capability Rectifiers

Device	$I_{F(AV)}$	V_{RRM} Range	Max V_F @ I_F		I_R @ V_{RRM}	t_{rr} Max	I_{FSM}	T_J Max
	(A)	(V)	(V)	(A)	(µA)	(ns)	(A)	(°C)
SE40PB thru SE40PJ	4.0	100 - 600	1.1	4.0	10	2200	60	175
SE70PB thru SE70PJ	7.0	100 - 600	1.05	7.0	20	2600	120	175

Standard Recovery Rectifiers

Device	$I_{F(AV)}$	V_{RRM} Range	Max V_F @ I_F		I_R @ V_{RRM}	t_{rr} Max	I_{FSM}	T_J Max
	(A)	(V)	(V)	(A)	(µA)	(ns)	(A)	(°C)
S4PB thru S4PM	4.0	100 - 1000	1.10	4.0	10	2500	100	150
S5PMS	5.0	1000	1.15	5.0	10	2500	100	150

Fred Pt® Ultrafast Rectifiers

Device	$I_{F(AV)}$	V_{RRM} Range	Max V_F @ I_F		I_R @ V_{RRM}	I_{FSM}	t_{rr} Max	T_J Max
	(A)	(V)	(V)	(A)	(µA)	(A)	(ns)	(°C)
VS-4CSH01HM3	4.0	100	0.95	2.0	2	16	90	175
VS-4CSH01-M3	4.0	100	0.95	2.0	2	16	90	175
VS-4CSH02HM3	4.0	200	0.95	2.0	2	16	90	175
VS-4CSH02-M3	4.0	200	0.95	2.0	2	16	90	175
VS-4ESH01HM3	4.0	100	0.93	4.0	2	20	130	175
VS-4ESH01-M3	4.0	100	0.93	4.0	2	20	130	175
VS-4ESH02HM3	4.0	200	0.93	4.0	2	20	130	175
VS-4ESH02-M3	4.0	200	0.93	4.0	2	20	130	175
VS-6ESH01HM3	6.0	100	0.94	6.0	2	22	150	175
VS-6ESH01-M3	6.0	100	0.94	6.0	2	22	150	175
VS-6ESH02HM3	6.0	200	0.94	6.0	2	22	150	175
VS-6ESH02-M3	6.0	200	0.94	6.0	2	22	150	175
VS-6CSH01HM3	6.0	100	0.94	3.0	2	20	150	175
VS-6CSH01-M3	6.0	100	0.94	3.0	2	20	150	175
VS-6CSH02HM3	6.0	200	0.94	3.0	2	20	150	175
VS-6CSH02-M3	6.0	200	0.94	3.0	2	20	150	175
VS-8CSH01HM3	8.0	100	0.95	4.0	2	18	130	175
VS-8CSH01-M3	8.0	100	0.95	4.0	2	18	130	175
VS-8CSH02HM3	8.0	200	0.95	4.0	2	18	130	175
VS-8CSH02-M3	8.0	200	0.95	4.0	2	18	130	175
VS-10CSH01HM3	10	100	0.98	5.0	2	18	130	175
VS-10CSH01-M3	10	100	0.98	5.0	2	18	130	175
VS-10CSH02HM3	10	200	0.98	5.0	2	18	130	175
VS-10CSH02-M3	10	200	0.98	5.0	2	18	130	175
VS-6ESU06HM3	6.0	600	1.3	6.0	5	58	120	175
VS-6ESU06-M3	6.0	600	1.3	6.0	5	58	120	175
VS-6ESH06HM3	6.0	600	1.8	6.0	5	40	90	175
VS-6ESH06-M3	6.0	600	1.8	6.0	5	40	90	175

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DIODES

SMPC (TO-277A) Package

Avalanche Rectifiers

Device	$I_{F(AV)}$	V_{RRM} Range	Max V_F @ I_F		I_R @ V_{RRM}	E_R	t_{rr}	I_{FSM}	T_J Max
	(A)	(V)	(V)	(A)	(µA)	(mJ)	(ns)	(A)	(°C)
AS3PD thru AS3PM	1.5	100 - 1000	1.1	3	10	20	1200	70	175
AS4PD thru AS4PM	1	100 - 1000	1.1	4	10	20	1800	100	175
AR3PD, AR3PG, AR3PJ	3	100, 400, 600	1.6	3	10	20	140	50	175
AR3PK, AR3PM	3	800, 1000	1.9	3	10	20	120	50	175
AR4PD, AR4PG, AR4PJ	4	100, 400, 600	1.6	4	10	20	140	65	175
AR4PK, AR4PM	4	800, 1000	1.9	4	10	20	120	65	175
AU2PD, AU2PG, AU2PJ	2	100, 400, 600	1.9	2	10	20	75	30	175
AU2PK, AU2PM	2	800, 1000	2.5	2	10	20	75	30	175
AU3PD, AU3PG, AU3PJ	3	100, 400, 600	1.9	3	10	20	75	45	175
AU3PK, AU3PM	3	800, 1000	2.5	3	10	20	75	45	175

PAR® TVS

Device	P_{PPM} (10 x 1000 µs)	$V_{(BR)}$ Range	V_{WM} Range	T_J Max
	(W)	(V)	(V)	(°C)
TPC6.8(A) thru TPC51(A)	1500	6.8 - 51	5.5 - 43.6	185
TPC11CA thru TPC36CA	1500	10.5 - 37.8	9.4 - 30.8	185

TRANSZORB® TVS

Device	P_{PPM} (10 x 1000 µs)	$V_{(BR)}$ Range	V_{WM} Range	T_J Max
	(W)	(V)	(V)	(°C)
SMPC5.0A thru SMP36A	1500	6.4 - 40.0	5.0 - 36	150
SMPC22AN thru SMP85AN	1500	24.4 - 104	22 - 85	150

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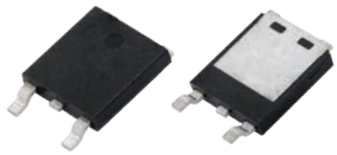
TMBS® Trench MOS Barrier Schottky and Standard Rectifiers in SlimDPAK (TO-252AE) Package

Features for TMBS Rectifiers

- Very low profile: typical height of 1.3 mm
- Trench MOS Schottky technology
- Ideal for automated placement
- Low forward voltage drop, low power losses
- High efficiency operation
- Meets MSL level 1, per J-STD-020, LF maximum peak of 260 °C
- AEC-Q101 qualified available

Features for Standard Rectifiers

- Very low profile: typical height of 1.3 mm
- Ideal for automated placement
- Oxide planar chip junction
- Low forward voltage drop
- ESD capability
- Meets MSL level 1, per J-STD-020, LF maximum peak of 260 °C
- AEC-Q101 qualified available



eSMP® Series — SlimDPAK (TO-252AE)

Applications

- For use in low voltage, high frequency DC/DC converters,freewheeling diodes, and polarity protection applications
- General purpose, power line polarity protection in both industry and automotive applications

TMBS (Trench MOS Barrier Schottky) Rectifiers

Device	$I_{F(AV)}$	V_{RRM} Range	Max V_F @ I_F		I_R @ V_{RRM}	I_{FSM}	T_J Max
	(A)	(V)	(V)	(A)	(µA)	(A)	(°C)
V20PW10	20	100	0.86	20.0	500	200	150
V20PW10C	20	100	0.79	10.0	300	150	150
V20PW12	20	120	1.02	20.0	800	200	150
V20PW12C	20	120	0.92	10.0	700	150	150
V20PW15	20	150	1.47	20.0	250	200	150
V20PW15C	20	150	1.24	10.0	150	150	150
V20PW45	20	45	0.61	20.0	1500	200	150
V20PW45C	20	45	0.60	10.0	1000	150	150
V20PW60	20	60	0.66	20.0	3600	200	150
V20PW60C	20	60	0.64	10.0	1500	150	150
V20PWM10	20	100	0.90	20.0	200	200	175
V20PWM10C	20	100	0.82	10.0	150	150	175
V20PWM12	20	120	1.02	20.0	500	200	175
V20PWM12C	20	120	0.92	10.0	300	150	175

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TMBS® (Trench MOS Barrier Schottky) Rectifiers (cont.)

Device	$I_{F(AV)}$	V_{RRM} Range	Max V_F @ I_F		I_R @ V_{RRM}	I_{FSM}	T_J Max
	(A)	(V)	(V)	(A)	(µA)	(A)	(°C)
V20PWM15	20	150	1.47	20.0	250	200	175
V20PWM15C	20	150	1.24	10.0	150	150	175
V20PWM45	20	45	0.66	20.0	700	200	175
V20PWM45C	20	45	0.62	10.0	200	150	175
V20PWM60	20	60	0.70	20.0	1200	200	175
V20PWM60C	20	60	0.66	10.0	600	150	175
V35PW10	35	100	0.88	35.0	1000	260	150
V35PW12	35	120	1.05	35.0	1000	260	150
V35PW15	35	150	1.40	35.0	250	260	150
V35PW45	35	45	0.62	35.0	2500	260	150
V35PW60	35	60	0.72	35.0	5000	260	150
V35PWM10	35	100	0.90	35.0	800	260	175
V35PWM12	35	120	1.05	35.0	1200	260	175
V35PWM15	35	150	1.40	35.0	500	260	175
V35PWM45	35	45	0.67	35.0	1100	260	175
V35PWM60	35	60	0.77	35.0	2100	260	175
V40PW10C	40	100	0.89	20.0	500	240	150
V40PW12C	40	120	1.03	20.0	750	240	150
V40PW15C	40	150	1.45	20.0	500	240	150
V40PW45C	40	45	0.64	20.0	1200	240	150
V40PW60C	40	60	0.68	20.0	2400	240	150
V40PWM10C	40	100	0.89	20.0	400	240	175
V40PWM12C	40	120	1.00	20.0	500	240	175
V40PWM15C	40	150	1.45	20.0	500	240	175
V40PWM45C	40	45	0.67	20.0	400	240	175
V40PWM60C	40	60	0.72	20.0	1400	240	175

Standard ESD Capability Rectifiers

Device	$I_{F(AV)}$	V_{RRM} Range	Max V_F @ I_F		I_R @ V_{RRM}	t_{rr} Max	I_{FSM}	T_J Max
	(A)	(V)	(V)	(A)	(µA)	(ns)	(A)	(°C)
SE80PWB thru SE80PWJ	8	100 - 600	1.12	8	15	2400	110	175
SE100PWB thru SE100PWJ	10	100 - 600	1.14	10	20	2600	110	175

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TMBS® Trench MOS Barrier Schottky and Standard Rectifiers in SMPD (TO-263AC) Package

Common Features

- Low profile (< 1.7 mm height) SMPD (TO-263AC) package is footprint compatible with D2PAK (TO-263AB) package
- Ideal for automated placement
- Meets MSL moisture sensitivity level of 1, per J-STD-020, LF maximum peak of 260 °C
- Compliant to RoHS Directive 2011/65/EU
- Halogen-free according to JEDEC JS709A standards

eSMP® Series — SMPD (TO-263AC)

Features for TMBS Rectifiers

- Current ratings from 10 A to 60 A
- Low forward voltage drop down to 0.40 V at 15 A
- Low power losses and high efficiency
- Trench MOS Schottky technology
- Maximum operation junction temperature of 150 °C

Features for Standard Rectifiers

- Oxide planar chip technology
- Current ratings range from 10 A to 20 A
- Low forward voltage drop down to 0.75 V typical with fast recovery time down to 25 ns
- ESD capability
- High operating temperature up to 175 °C
- Soft recovery behavior over a temperature range of -40 °C to 175 °C at any di / dt
- Available in AEC-Q101 qualified and standard versions

Features for FRED Pt® Rectifiers

- High operating temperature up to 175 °C
- Low forward voltage drop down to 0.75 V typical with fast recovery time down to 25 ns
- Soft recovery behavior over a temperature range of -40 °C to 175 °C at any di / dt
- Available in AEC-Q101 qualified and standard versions

Applications

- For use in high frequency DC/DC converters, switching power supplies, freewheeling diodes, OR-ing diodes, and reverse battery protection
- General purpose, power line polarity protection in automotive applications
- Automotive
  - EV / HEV battery charging systems
  - Power supply PFC
- Industrial
  - APD in inverters for motor drives, UPS, and LED and HID lighting systems

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TMBS® (Trench MOS Barrier Schottky) Rectifiers

Device	$I_{F(AV)}$	V_{RRM} Range	Max V_F @ I_F		I_R @ V_{RRM}	I_{FSM}	T_J Max
	(A)	(V)	(V)	(A)	(µA)	(A)	(°C)
V10D100C	10	100	0.75	5.0	500	100	150
V10D120C	10	120	0.94	5.0	500	100	150
V10D202C	10	200	0.90	5.0	50	100	175
V10D45C	10	45	0.58	5.0	500	100	150
V10D60C	10	60	0.70	5.0	700	100	150
V20D202C	20	200	0.90	10.0	150	150	175
V20DL45	20	45	0.64	20	2500	160	150
V20DL45BP	20	45	0.64	20	2500	160	150
V20DM120	20	120	1.1	20.0	800	150	175
V20DM120C	20	120	0.93	10	600	120	150
V30D202C	30	200	0.88	15.0	200	260	175
V30D45C	30	45	0.57	15	1500	200	150
V30D60C	30	60	0.70	15	1200	170	150
V30D60CL	30	60	0.61	15	4000	200	150
V30DL45	30	45	0.65	30	3000	200	150
V30DL45BP	30	45	0.65	30	3000	200	150
V30DL50C	30	50	0.57	15	1800	300	150
V30DM120	30	120	1.06	30.0	1000	250	175
V30DM120C	30	120	0.93	15	800	150	150
V35DM120	30	120	1.05	35.0	1200	320	175
V40D100C	40	100	0.75	20.0	1000	250	175
V40D120C	40	120	0.89	20.0	500	250	175
V40DL45	40	45	0.66	40	5000	240	150
V40DL45BP	40	45	0.66	40	5000	240	150
V40DM120C	40	120	0.89	20	500	250	150
V60D100C	60	100	0.81	30	1000	320	150
V60D120C	60	120	0.96	30	800	320	150
V60D45C	60	45	0.64	30	2500	320	150
V60DM120C	60	120	0.97	30.0	700	320	175

Standard ESD Capability Rectifiers

Device	$I_{F(AV)}$	V_{RRM} Range	Max V_F @ I_F		I_R @ V_{RRM}	trr Typ	I_{FSM}	T_J Max
	(A)	(V)	(V)	(A)	(µA)	(ns)	(A)	(°C)
SE10DB thru SE10DJ	10	100 - 600	1.15	10	15	3000	110	175
SE12DB thru SE12DJ	12	100 - 600	1.15	12	20	3000	125	175
SE20DB thru SE20DJ	20	100 - 600	1.20	20	25	3000	150	175

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FRED Pt® Ultrafast Recovery Rectifiers

Device	$I_{F(AV)}$	V_{RRM} Range	Max V_F @ I_F		I_R @ V_{RRM}	trr Typ	I_{FSM}	T_J Max
	(A)	(V)	(V)	(A)	(µA)	(ns)	(A)	(°C)
VS-16CDH02-M3/I	16	200	0.77	8	2	27	190	175
VS-16CDH02HM3/I	16	200	0.77	8	2	27	190	175
VS-16EDH02-M3/I	16	200	0.75	16	15	32	250	175
VS-16EDH02HM3/I	16	200	0.75	16	15	32	250	175
VS-20CDH02-M3/I	20	200	0.77	10	2	25	210	175
VS-20CDH02HM3/I	20	200	0.77	10	2	25	210	175
VS-10CDH06-M3/I	10	600	1	5	3	35	110	175
VS-10CDH06HM3/I	10	600	1	5	3	35	110	175
VS-12CDU06-M3/I	12	600	0.89	6	5	45	200	175
VS-12CDU06HM3/I	12	600	0.89	6	5	45	200	175
VS-16CDU06-M3/I	16	600	0.94	8	5	45	200	175
VS-16CDU06HM3/I	16	600	0.94	8	5	45	200	175
VS-16EDU06-M3/I	16	600	0.91	16	15	55	160	175
VS-16EDU06HM3/I	16	600	0.91	16	15	55	160	175
VS-30CDU06-M3/I	30	600	0.9	15	15	55	300	175
VS-30CDU06HM3/I	30	600	0.9	15	15	55	300	175

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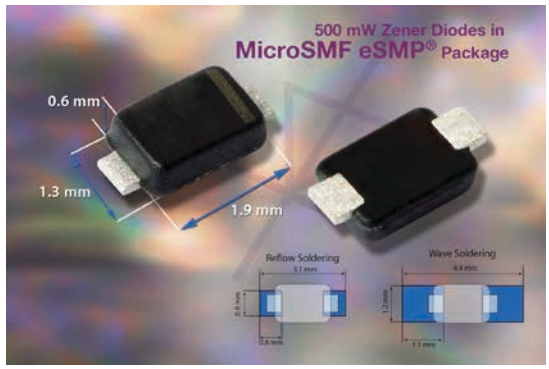
PLZ Series 500 mW Zener Diodes in New Low Profile MicroSMF (DO-219AC) eSMP® Series Package



Features

- New MicroSMF package (JEDEC registration: DO-219AC)
- SOD-323FL package size
- Cu wire bonded
- 500 mW power dissipation
- Excellent thermal characteristics: RthJA 130 K/W
- Very tight Zener voltage tolerances: ± 2.5 % in six inch Planar technology
- Surge current and ESD rated
- Excellent stability, low leakage, and low noise current
- RoHS-compliant, halogen-free, and Vishay Green
- Symmetrical leads
- Wave and reflow solderable
- Visual solder quality inspection possible (no x-ray needed)
- Whisker Level 2 qualified according to JESD 201
- AEC-Q101 qualified

eSMP Series — MicroSMF (DO-219AC)

Device	T_J Max	V_F @ 0.01 A	P_{tot}	V_Z
	(°C)	(V)	(W)	(V)
PLZ Series	150	0.9	0.5	2.0 to 39

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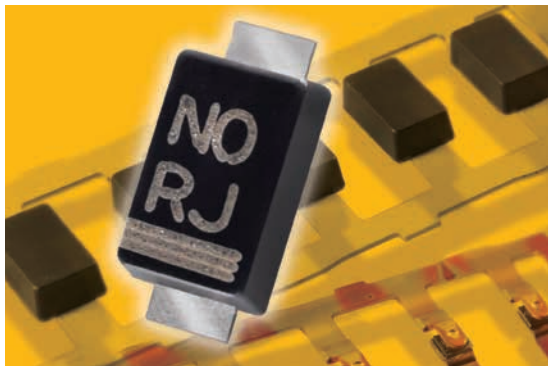
Diodes in SMF (DO-219AB) Package: Improved Performance in a Smaller Footprint

Introduction

Vishay provides innovative SMD solutions in a wide range of new devices in the SMF (DO-219AB) package. The SMF package meets the demand for smaller and thinner diodes that enable small and light portable products, such as cellular phones, notebook PCs, and portable consumer products, as well as space-constrained automotive modules. With its exceptionally low height profile of 0.98 mm, the SMF package reduces space requirements and improves circuit board density. Vishay Semiconductors diode products offered in the SMF package address all industry segments and include switching, fast switching, ultrafast switching, Schottky diodes, TVS and ESD protection, zener diodes, and rectifiers.



Features

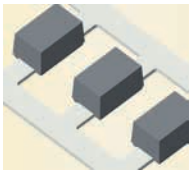
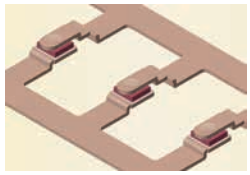
- SOD-123 footpad size
- 0.98 mm package height
- 0.8 W power dissipation
- Broad product range
- Excellent stability
- Best in class reliability
- Flat terminal allows stable mounting on PCB
- High reliability due to planar structure of the die
- High surge current capability due to soldered construction
- High power rating despite small package size
- Ultra low stress epoxy molding compound
- AEC-Q101 qualified
- Reflow and wave solderable
- Symmetrical leads allow visual inspection after soldering
- Reverse voltage up to 1000 V
- Halogen-free versions available
- Package dimensions are common industry standard

Applications

- Fast and superfast diodes
  - Portable products
  - Reverse current protection
  - DC/DC converters
  - Lighting
- General purpose and rectifiers
  - Rectification
  - Reverse polarity protection
  - Free wheeling
  - Automotive
- Zener, TVS, and ESD protection diodes
  - Voltage stabilization
  - Gate protection for MOSFETs
  - ESD protection
  - Lighting

eSMP® Series — SMF (DO-219AB)

Patented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DIODES

SMF (DO-219AB) Package

ESD Protection Diodes

Device	T_J Max	V_F	P_{PPM} @ 10/1000 µs	P_{PPM} @ 8/20 µs	$V_{(BR)}$	ESD Protection Air / Contact
	(°C)	(V)	(W)	(W)	(V)	(kV)
VTVS5V0ASMF to VTVS63GSMF	175	1.8 @ 50 A	400	–	6.4 to 78.2	30/30
SMF5V0A to SMF85A	175	2.5 @ 50 A	200	1000	6.4 to 64.4	30/30
BZD27C Series	175	1.2 @ 0.2 A	150	–	7.0 to 188	30/8
BZD27B Series	175	1.2 @ 0.2 A	150	–	7.35 to 196	30/8

Zener Diodes

Device	T_J Max	V_F @ 0.2 A	P_{tot}	V_z
	(°C)	(V)	(W)	(V)
BZD27C3V6P - BZD27C200P	175	1.2	0.8	3.6 to 200
BZD27B3V6P - BZD27B200P	175	1.2	0.8	3.6 to 200

Schottky Diodes

Device	T_J Max	I_{FSM}	$I_{F(AV)}$	V_{RRM}	V_F @ 0.5 A	V_F @ 1.1 A	I_R @ 25 °C	I_R @ 100 °C
	(°C)	(A)	(A)	(V)	(V)	(V)	(µA)	(mA)
SL02	125	40	1.1	20	0.36	0.42	250	8
SL03	125	40	1.1	30	0.395	0.45	130	6
SL04	175	40	1.1	40	0.41	0.48	20	2.6

Schottky Rectifiers

Device	T_J Max	I_{FSM}	$I_{F(AV)}$	V_{RRM}	Max V_F @ I_F	I_R @ 25 °C
	(°C)	(A)	(A)	(V)		(µA)
SS1F4	150	40	1	40	0.52	150
SS1FH10	175	40	1	100	0.80	5
SS1FH6	175	40	1	60	0.70	3
SS1FL3	150	40	1	30	0.48	200
SS1FL4	150	40	1	40	0.5	200
SS1FN6	150	40	1	60	0.53	800
SS2FH10	175	50	2	100	0.86	5
SS2FH6	175	40	2	60	0.78	3
SS2FL3	150	50	2	30	0.54	200
SS2FL4	150	50	2	40	0.58	220
SS2FN6	150	50	2	60	0.6	900

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DIODES

SMF (DO-219AB) Package

Standard Rectifiers

Device	T_J Max	I_{FSM}	$I_{F(AV)}$	V_{RRM}	Max V_F @ I_F	I_R @ 25 °C	I_R @ 125 °C	t_{rr}
	(°C)	(A)	(A)	(V)		(µA)	(µA)	(µs)
SE10FD thru SE10FJ	175	25	1	200 - 600	1.05	5	50	780
SE15FD thru SE15FJ	175	30	1.5	200 - 600	1.05	5	50	900
SE20FD thru SE20FJ	175	35	2	200 - 600	1.10	5	100	920

Switching Diodes

Device	T_J Max	I_{FSM}	$I_{F(AV)}$	V_{RRM}	V_F @ 1.0 A	I_R @ 25 °C	I_R @ 125 °C	t_{rr}
	(°C)	(A)	(A)	(V)	(V)	(µA)	(µA)	(µs)
S07B	175	25	1.5	100	1.1	10	50	1.8
S07D	175	25	1.5	200	1.1	10	50	1.8
S07G	175	25	1.5	400	1.1	10	50	1.8
S07J	175	25	1.5	600	1.1	10	50	1.8
S07M	175	25	1.5	1000	1.1	10	50	1.8

Fast Switching Diodes

Device	T_J Max	I_{FSM}	$I_{F(AV)}$	V_{RRM}	V_F @ 0.7 A	I_R @ 25 °C	I_R @ 125 °C	t_{rr}
	(°C)	(A)	(A)	(V)	(V)	(µA)	(µA)	(ns)
RS07B	150	30	1.4	100	1.15	10	50	150
RS07D	150	30	1.4	200	1.15	10	50	150
RS07G	150	30	1.4	400	1.15	10	50	150
RS07J	150	30	1.4	600	1.15	10	50	250
RS07K	150	30	1.4	800	1.3 @ 1 A	2	150	300

Ultrafast Switching Diodes

Device	T_J Max	I_{FSM}	$I_{F(AV)}$	V_{RRM}	V_F @ 1.0 A	I_R @ 25 °C	I_R @ 100 °C	t_{rr}
	(°C)	(A)	(A)	(V)	(V)	(µA)	(µA)	(ns)
ES07B	150	30	1.2	100	0.98	10	50	25
ES07D	150	30	1.2	200	0.98	10	50	25

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FRED Pt® Ultrafast Recovery Rectifiers

Device	$I_{F(AV)}$	V_{RRM} Range	Max V_F @ I_F		I_R @V_{RRM}	t_{rr} Typ	I_{FSM}	T_J Max
	(A)	(V)	(V)	(A)	(µA)	(V)	(µA)	(°C)
VS-1EFH01-M3/I	1	100	0.74	1	2	25	35	175
VS-1EFH01HM3/I	1	100	0.74	1	2	25	35	175
VS-1EFH02-M3/I	1	200	0.74	1	2	25	35	175
VS-1EFH02HM3/I	1	200	0.74	1	2	25	35	175
VS-1EFU06-M3/I	1	600	0.83	1	3	55	30	175
VS-1EFU06HM3/I	1	600	0.83	1	3	55	30	175
VS-2EFH01-M3/I	2	100	0.75	2	2	25	50	175
VS-2EFH01HM3/I	2	100	0.75	2	2	25	50	175
VS-2EFH02-M3/I	2	200	0.75	2	2	25	50	175
VS-2EFH02HM3/I	2	200	0.75	2	2	25	50	175
VS-2EFU06-M3/I	2	600	0.95	2	3	55	30	175
VS-2EFU06HM3/I	2	600	0.95	2	3	55	30	175

Compatible With Common Industry-Standard Packages

Package	SMF Mounting Pad Compatibility	SMF Package Height Comparison	SMF Mounting Pad Area Comparison
SMA	-	120 %	110 %
M1F	Yes	40 %	5 %
SOD-123W	Yes	2 %	5 %
SMF Competition	Yes	0%	19 %
PMDU	Yes	8%	17 %
SubSMA	Yes	36 %	0 %
SOD-123FL	Yes	0 %	5 %
S-Flat	Yes	0 %	93 %
Mini2-F3-B	Yes	18 %	14 %
SOD-123F	Yes	0 %	5 %
SOD-123FA	Yes	6 %	1 %

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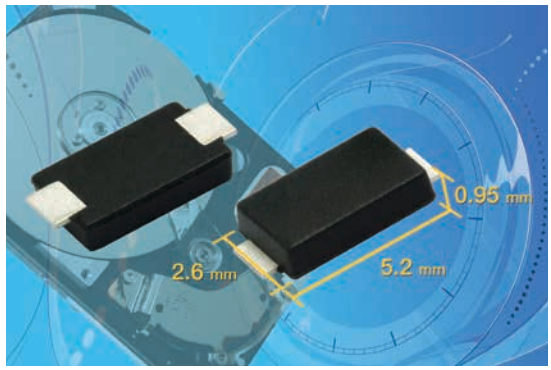
Low Profile SlimSMA (DO-221AC) Package for Rectifiers and Transient Voltage Suppressors (TVS)

Features

- Very low profile - typical height of 0.95 mm
- Ideal for automated placement
- AEC-Q101 qualified
- Halogen-free, RoHS-compliant
- Meet the MSL Level 1 standard, per J-STD-020, LF maximum peak of 260 °C

Applications

- Consumer
- Computer
- Telecommunication
- Industrial
- Automotive



eSMP® Series — SlimSMA (DO-221AC)

TMBS® (Trench MOS Barrier Schottky) Rectifiers

Device	$I_{F(AV)}$	V_{RRM} Range	Max V_F @ I_F		I_R @V_{RRM}	I_{FSM}	T_J Max
	(A)	(V)	(V)	(A)	(µA)	(µA)	(°C)
VSSAF3L45	3	45	0.54	3.0	450	80	150
VSSAF3M10	3	100	0.72	3.0	200	80	175
VSSAF3M6	3	60	0.62	3.0	300	80	175
VSSAF3N50	3	50	0.54	3.0	1000	80	150
VSSAF510	5	100	0.75	5.0	500	100	150
VSSAF512	5	120	0.88	5.0	400	100	150
VSSAF515	5	150	1.1	5.0	200	100	150
VSSAF56	5	60	0.62	5.0	400	100	150
VSSAF5L45	5	45	0.56	5.0	650	100	150
VSSAF5M10	5	100	0.79	5.0	400	100	175
VSSAF5M12	5	120	0.89	5.0	350	100	175
VSSAF5M15	5	150	1.15	5.0	180	100	175
VSSAF5M6	5	60	0.66	5.0	350	100	175
VSSAF5N50	5	50	0.56	5.0	1400	1000	150

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Standard Recovery Rectifiers

Device	$I_{F(AV)}$	V_{RRM} Range	Max V_F @ I_F		I_R @V_{RRM}	t_{rr} Typ	I_{FSM}	T_J Max
	(A)	(V)	(V)	(A)	(µA)	(ns)	(µA)	(°C)
S1AFG thru S1AFM	1.0	400 - 1000	1.1	1.0	5	1470	35	150
SE20AFB thru SE20AFJ	2.0	100 - 600	1.1	2.0	5	1200	35	175
SE30AFB thru SE30AFJ	3.0	100 - 600	1.1	2.0	10	1500	40	175

FRED Pt® Ultrafast Recovery Rectifiers

Device	$I_{F(AV)}$	V_{RRM} Range	Max V_F @ I_F		I_R @V_{RRM}	t_{rr} Typ	I_{FSM}	T_J Max
	(A)	(V)	(V)	(A)	(µA)	(ns)	(µA)	(°C)
VS-2EJH01-M3	2	100	0.72	2	2	25	65	175
VS-2EJH01HM3	2	100	0.72	2	2	25	65	175
VS-2EJH02-M3	2	200	0.72	2	2	25	65	175
VS-2EJH02HM3	2	200	0.72	2	2	25	65	175
VS-3EJH01-M3	3	100	0.74	3	2	30	85	175
VS-3EJH01HM3	3	100	0.74	3	2	30	85	175
VS-3EJH02-M3	3	200	0.74	3	2	30	85	175
VS-3EJH02HM3	3	200	0.74	3	2	30	85	175
VS-3EJU06-M3	3	600	1.35	3	3	45	50	175
VS-3EJU06HM3	3	600	1.35	3	3	45	50	175

PAR® TVS

Device	P_{PPM} (10 x 1000 µs)	$V_{(BR)}$ Range	V_{WM} Range	T_J Max
	(A)	(V)	(µA)	(°C)
TA6F6.8A thru TA6F51A	600	6.45 - 53.6	5.8 - 43.6	185

TransZorb® TVS

Device	P_{PPM} (10 x 1000 µs)	$V_{(BR)}$ Range	V_{WM} Range	T_J Max
	(A)	(V)	(µA)	(°C)
SMA6F5.0A thru SMA6F20A	600	6.4 - 24.5	5.0 - 20	175

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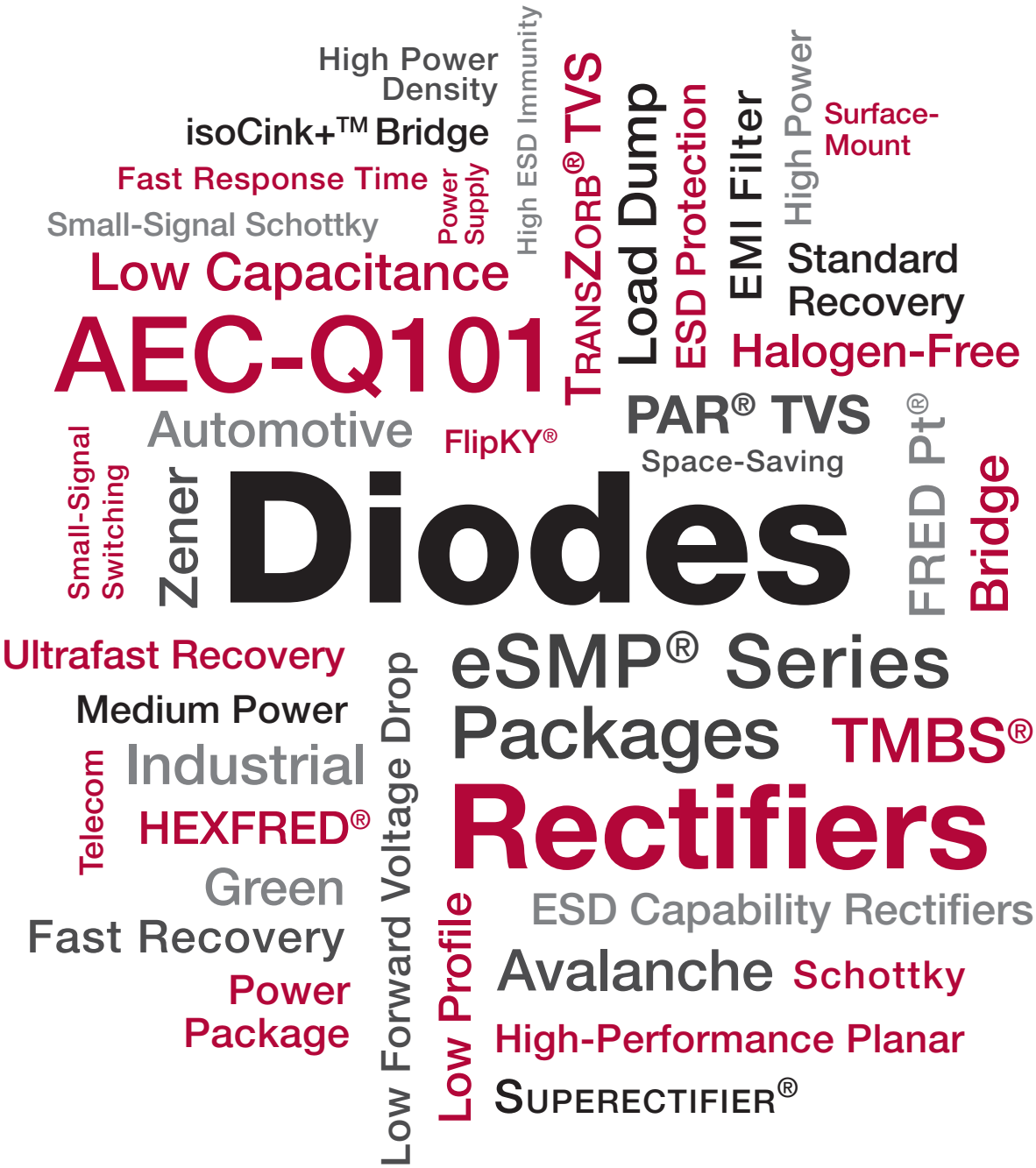
DIODES



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