VISHAY

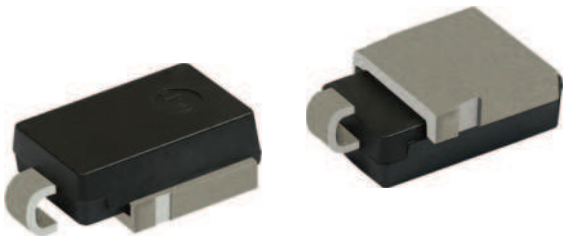
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SM5S10A thru SM5S36A

Vishay General Semiconductor

Surface Mount PAR® Transient Voltage Suppressors

High Temperature Stability and High Reliability Conditions



DO-218AB

Cathode ○—▶|—○ Anode

LINKS TO ADDITIONAL RESOURCES

Related Documents | Packages | Marking

PRIMARY CHARACTERISTICS	
V_{WM}	10 V to 36 V
V_{BR}	11.1 V to 44.2 V
P_{PPM} (10 x 1000 µs)	3600 W
P_{PPM} (10 x 10 000 µs)	2800 W
P_D	5 W
I_{FSM}	500 A
T_J max.	175 °C
Polarity	Unidirectional
Package	DO-218AB

FEATURES

- Junction passivation optimized design passivated anisotropic rectifier technology
- T_J = 175 °C capability suitable for high reliability and automotive requirement
- Available in unidirectional polarity only
- Low leakage current
- Low forward voltage drop
- High surge capability
- Meets ISO7637-2 surge specification (varied by test condition)
- Meets MSL level 1, per J-STD-020, LF maximum peak of 245 °C
- AEC-Q101 qualified
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

Pb RoHS COMPLIANT

TYPICAL APPLICATIONS

Use in sensitive electronics protection against voltage transients induced by inductive load switching and lightning, especially for automotive load dump protection application.

MECHANICAL DATA

Case: DO-218AB

Molding compound meets UL 94 V-0 flammability rating Base P/NHE3_X - RoHS-compliant and AEC-Q101 qualified ("X" denotes revision code e.g. A, B, ...)

Terminals: matte tin plated leads, solderable per J-STD-002 and JESD 22-B102

HE3 suffix meets JESD 201 class 2 whisker test

Polarity: heatsink is anode

MAXIMUM RATINGS (T_A = 25 °C unless otherwise noted)				
PARAMETER		**SYMBOL**	**VALUE**	**UNIT**
Peak pulse power dissipation	with 10/1000 µs waveform	P_{PPM}	3600	W
	with 10/10 000 µs waveform		2800	
Power dissipation on infinite heatsink at T_A = 25 °C (fig. 1)		P_D	5.0	W
Peak pulse current with 10/1000 µs waveform		I_{PPM} (1)	See next table	A
Peak forward surge current 8.3 ms single half sine-wave		I_{FSM}	500	A
Operating junction and storage temperature range		T_J, T_{STG}	-55 to +175	°C

Note

(1) Non-repetitive current pulse at T_A = 25 °C

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ELECTRICAL CHARACTERISTICS (T_A = 25 °C unless otherwise noted)										
DEVICE TYPE	BREAKDOWN VOLTAGE V_{BR} (V)			TEST CURRENT I_T (mA)	STAND-OFF VOLTAGE V_{WM} (V)	MAXIMUM REVERSE LEAKAGE AT V_{WM} I_D (µA)	MAXIMUM REVERSE LEAKAGE AT V_{WM} T_J = 175 °C I_D (µA)	MAX. PEAK PULSE CURRENT AT 10/1000 µs WAVEFORM (A)	MAXIMUM CLAMPING VOLTAGE AT I_{PPM} V_C (V)	TYPICAL TEMP. COEFFICIENT OF V_{BR} [1] αT (%/°C)
	MIN.	NOM.	MAX.							
SM5S10A	11.1	11.7	12.3	5.0	10.0	15	250	212	17.0	0.069
SM5S11A	12.2	12.9	13.5	5.0	11.0	10	150	198	18.2	0.072
SM5S12A	13.3	14.0	14.7	5.0	12.0	10	150	181	19.9	0.074
SM5S13A	14.4	15.2	15.9	5.0	13.0	10	150	167	21.5	0.076
SM5S14A	15.6	16.4	17.2	5.0	14.0	10	150	155	23.2	0.078
SM5S15A	16.7	17.6	18.5	5.0	15.0	10	150	148	24.4	0.080
SM5S16A	17.8	18.8	19.7	5.0	16.0	10	150	138	26.0	0.081
SM5S17A	18.9	19.9	20.9	5.0	17.0	10	150	130	27.6	0.082
SM5S18A	20.0	21.1	22.1	5.0	18.0	10	150	123	29.2	0.083
SM5S20A	22.2	23.4	24.5	5.0	20.0	10	150	111	32.4	0.085
SM5S22A	24.4	25.7	26.9	5.0	22.0	10	150	101	35.5	0.086
SM5S24A	26.7	28.1	29.5	5.0	24.0	10	150	93	38.9	0.087
SM5S26A	28.9	30.4	31.9	5.0	26.0	10	150	86	42.1	0.088
SM5S28A	31.1	32.8	34.4	5.0	28.0	10	150	79	45.4	0.089
SM5S30A	33.3	35.1	36.8	5.0	30.0	10	150	74	48.4	0.090
SM5S33A	36.7	38.7	40.6	5.0	33.0	10	150	68	53.3	0.091
SM5S36A	40.0	42.1	44.2	5.0	36.0	10	150	62	58.1	0.091

Notes

- For all types maximum V_F = 2.0 V at I_F = 100 A measured on 300 µs square pulse width

[1] To calculate V_{BR} vs. junction temperature, use the following formula: V_{BR} at T_J = V_{BR} at 25 °C x (1 + αT x (T_J - 25))

THERMAL CHARACTERISTICS (T_A = 25 °C unless otherwise noted)			
PARAMETER	SYMBOL	VALUE	UNIT
Typical thermal resistance	$R_{\theta JA}$ [1]	55	°C/W
	$R_{\theta JM}$ [2]	0.45	°C/W

Notes

[1] Thermal resistance junction-to-ambient to follow JEDEC®51-2A, device mounted on FR4 PCB, 2 oz. standard footprint

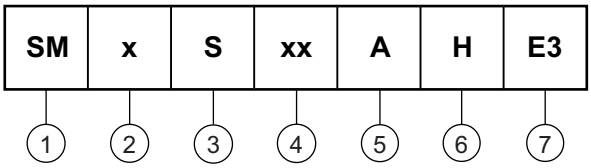
[2] Thermal resistance junction-to-mount to follow JEDEC®51-14 using Transient Dual Interface Test Method (TDIM)

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ORDERING INFORMATION TABLE

Device code



1 - Surface mount

2 - Power dissipation P_D (5 = 5 W, 6 = 6 W, 8 = 8 W)

3 - Standard V_F type

4 - Stand-off voltage

5 - Breakdown voltage tolerance and polarity (A ± 5 %, unidirectional)

6 - Quality grade (H = AEC-Q101 qualified, otherwise = industry grade)

7 - Material / Environment category (E3 = non halogen-free, RoHS-compliant, and termination lead (Pb)-free

ORDERING INFORMATION (Example)				
PREFERRED P/N	**UNIT WEIGHT (g)**	**PREFERRED PACKAGE CODE**	**BASE QUANTITY**	**DELIVERY MODE**
SM5S10AHE3_A/I [1]	2.505	I	750	13" diameter plastic tape and reel, anode towards the sprocket hole

Note

[1] AEC-Q101 qualified

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RATINGS AND CHARACTERISTICS CURVES (T_A = 25 °C unless otherwise noted)

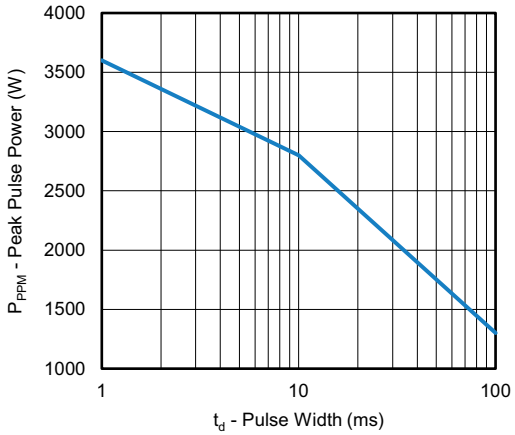


Fig. 1 - Peak Pulse Power Derating Curve

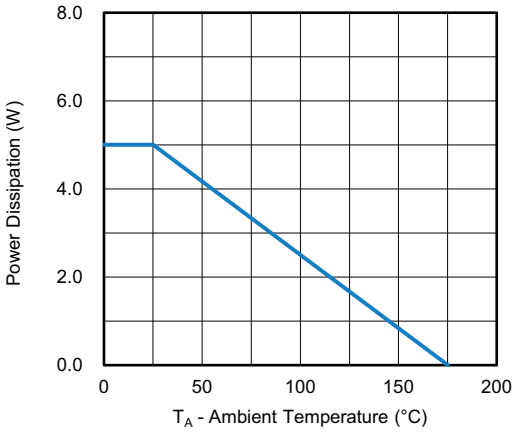


Fig. 2 - Power Derating Curve

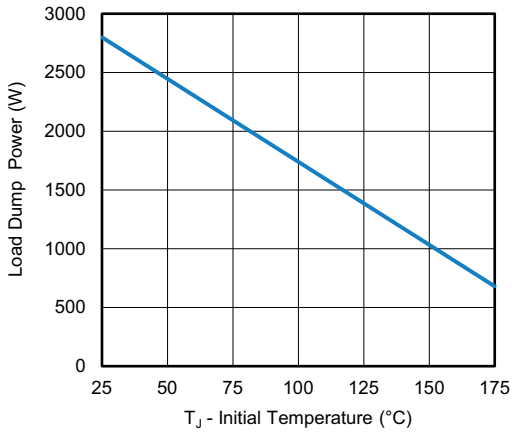


Fig. 3 - Load Dump Power Characteristics
(10 ms Exponential Waveform)

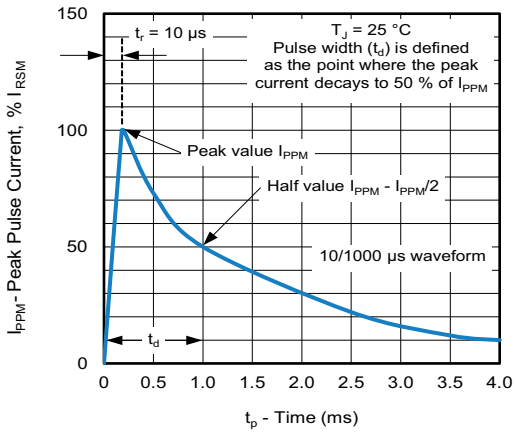


Fig. 4 - Pulse waveform

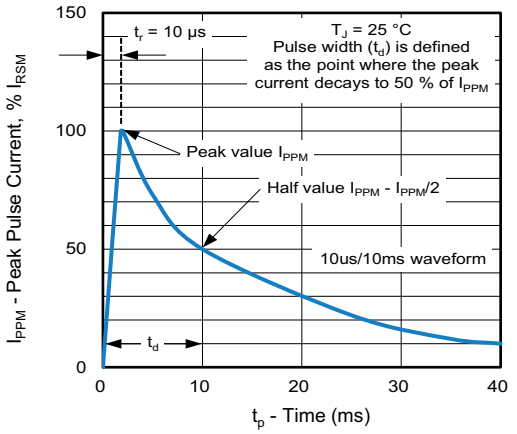


Fig. 5 - Pulse Waveform

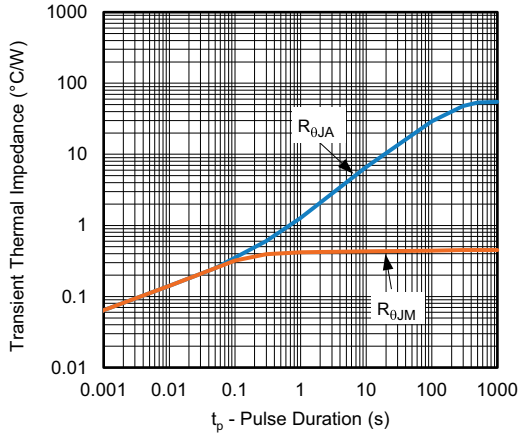
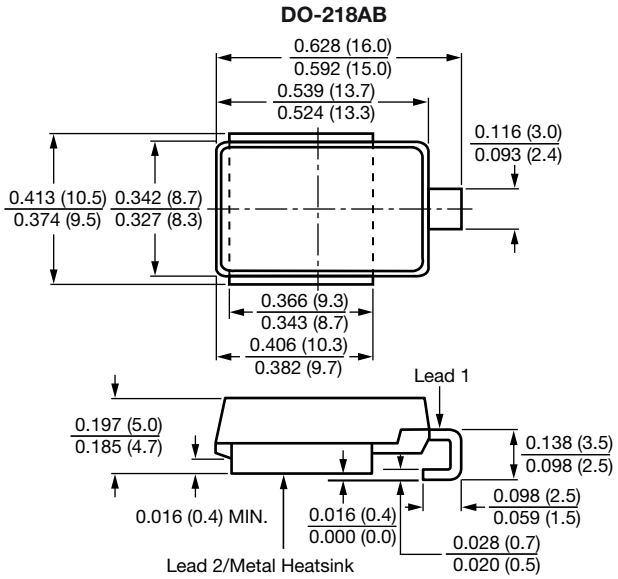


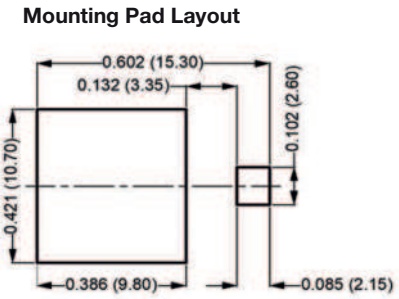
Fig. 6 - Typical Transient Thermal Impedance

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PACKAGE OUTLINE DIMENSIONS in inches (millimeters)





Note

- Footprint in accordance with IPC 7351 standard

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