



**THE DATASHEET OF  
SM5S33A-E3/2D**



# Surface Mount PAR<sup>®</sup> Transient Voltage Suppressors

High Temperature Stability and High Reliability Conditions



DO-218AB

PRIMARY CHARACTERISTICS	
$V_{WM}$	10 V to 36 V
$P_{PPM}$ (10 x 1000 $\mu$ s)	3600 W
$P_{PPM}$ (10 x 10 000 $\mu$ s)	2800 W
$P_D$	5 W
$I_{FSM}$	500 A
$T_J$ max.	175 °C

## FEATURES

- Junction passivation optimized design passivated anisotropic rectifier technology
- $T_J = 175$  °C capability suitable for high reliability and automotive requirement
- Available in uni-directional 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
- Compliant to RoHS Directive 2002/95/EC and in accordance to WEEE 2002/96/EC



**RoHS**  
COMPLIANT

## TYPICAL APPLICATIONS

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

## MECHANICAL DATA

**Case:** DO-218AB

Molding compound meets UL 94 V-0 flammability rating  
Base P/NHE3 - RoHS compliant, AEC-Q101 qualified

**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	$P_{PPM}$	with 10/1000 $\mu$ s waveform	3600
		with 10/10 000 $\mu$ s waveform	2800
Power dissipation on infinite heatsink at $T_C = 25$ °C (fig. 1)	$P_D$	5.0	W
Peak pulse current with 10/1000 $\mu$ s 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

<sup>(1)</sup> Non-repetitive current pulse at  $T_A = 25$  °C



<b>ELECTRICAL CHARACTERISTICS</b> ( $T_A = 25\text{ }^\circ\text{C}$ 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 $V_{WM}$ $I_D$ ( $\mu\text{A}$ )	MAXIMUM REVERSE LEAKAGE AT $V_{WM}$ $T_J = 175\text{ }^\circ\text{C}$ $I_D$ ( $\mu\text{A}$ )	MAX. PEAK PULSE CURRENT AT 10/1000 $\mu\text{s}$ WAVEFORM (A)	MAXIMUM CLAMPING VOLTAGE AT $I_{PPM}$ $V_C$ (V)
	MIN.	MAX.						
SM5S10	11.1	13.6	5.0	10.0	15	250	191	18.8
SM5S10A	11.1	12.3	5.0	10.0	15	250	212	17.0
SM5S11	12.2	14.9	5.0	11.0	10	150	179	20.1
SM5S11A	12.2	13.5	5.0	11.0	10	150	198	18.2
SM5S12	13.3	16.3	5.0	12.0	10	150	164	22.0
SM5S12A	13.3	14.7	5.0	12.0	10	150	181	19.9
SM5S13	14.4	17.6	5.0	13.0	10	150	151	23.8
SM5S13A	14.4	15.9	5.0	13.0	10	150	167	21.5
SM5S14	15.6	19.1	5.0	14.0	10	150	140	25.8
SM5S14A	15.6	17.2	5.0	14.0	10	150	155	23.2
SM5S15	16.7	20.4	5.0	15.0	10	150	134	26.9
SM5S15A	16.7	18.5	5.0	15.0	10	150	148	24.4
SM5S16	17.8	21.8	5.0	16.0	10	150	125	28.8
SM5S16A	17.8	19.7	5.0	16.0	10	150	138	26.0
SM5S17	18.9	23.1	5.0	17.0	10	150	118	30.5
SM5S17A	18.9	20.9	5.0	17.0	10	150	130	27.6
SM5S18	20.0	24.4	5.0	18.0	10	150	112	32.2
SM5S18A	20.0	22.1	5.0	18.0	10	150	123	29.2
SM5S20	22.2	27.1	5.0	20.0	10	150	101	35.8
SM5S20A	22.2	24.5	5.0	20.0	10	150	111	32.4
SM5S22	24.4	29.8	5.0	22.0	10	150	91	39.4
SM5S22A	24.4	26.9	5.0	22.0	10	150	101	35.5
SM5S24	26.7	32.6	5.0	24.0	10	150	84	43.0
SM5S24A	26.7	29.5	5.0	24.0	10	150	93	38.9
SM5S26	28.9	35.3	5.0	26.0	10	150	77	46.6
SM5S26A	28.9	31.9	5.0	26.0	10	150	86	42.1
SM5S28	31.1	38.0	5.0	28.0	10	150	72	50.1
SM5S28A	31.1	34.4	5.0	28.0	10	150	79	45.4
SM5S30	33.3	40.7	5.0	30.0	10	150	67	53.5
SM5S30A	33.3	36.8	5.0	30.0	10	150	74	48.4
SM5S33	36.7	44.9	5.0	33.0	10	150	61	59.0
SM5S33A	36.7	40.6	5.0	33.0	10	150	68	53.3
SM5S36	40.0	48.9	5.0	36.0	10	150	56	64.3
SM5S36A	40.0	44.2	5.0	36.0	10	150	62	58.1

**Note**

- For all types maximum  $V_F = 2.0\text{ V}$  at  $I_F = 100\text{ A}$  measured on 8.3 ms single half sine-wave or equivalent square wave, duty cycle = 4 pulses per minute maximum



<b>THERMAL CHARACTERISTICS</b> ( $T_A = 25\text{ }^\circ\text{C}$ unless otherwise noted)			
PARAMETER	SYMBOL	VALUE	UNIT
Typical thermal resistance, junction to case	$R_{\theta JC}$	1.0	$^\circ\text{C/W}$

<b>ORDERING INFORMATION</b> (Example)				
PREFERRED P/N	UNIT WEIGHT (g)	PREFERRED PACKAGE CODE	BASE QUANTITY	DELIVERY MODE
SM5S10AHE3/2D <sup>(1)</sup>	2.505	2D	750	13" diameter plastic tape and reel, anode towards the sprocket hole

**Note**

<sup>(1)</sup> AEC-Q101 qualified

**RATINGS AND CHARACTERISTICS CURVES**

( $T_A = 25\text{ }^\circ\text{C}$  unless otherwise noted)

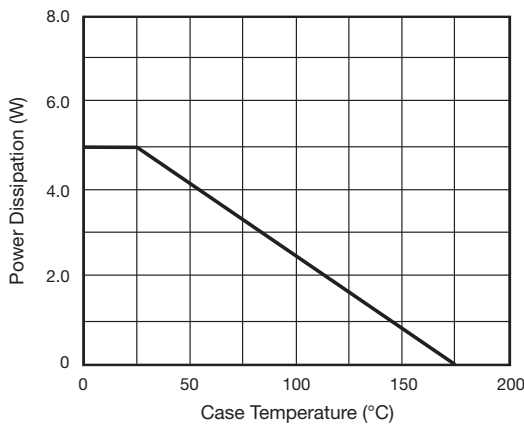


Fig. 1 - Power Derating Curve

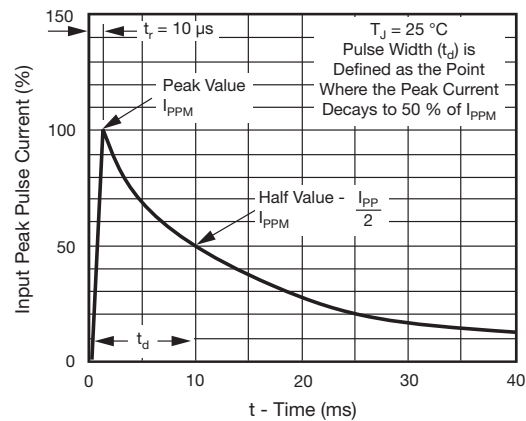


Fig. 3 - Pulse Waveform

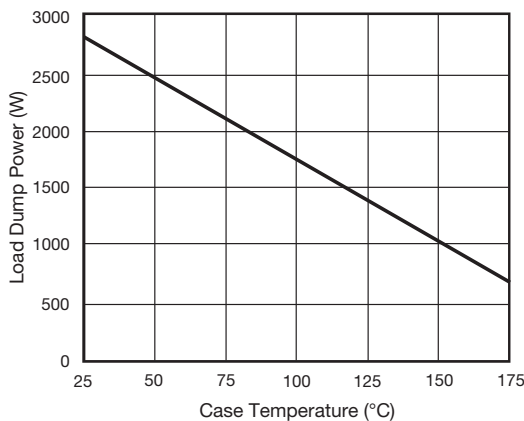


Fig. 2 - Load Dump Power Characteristics (10 ms Exponential Waveform)

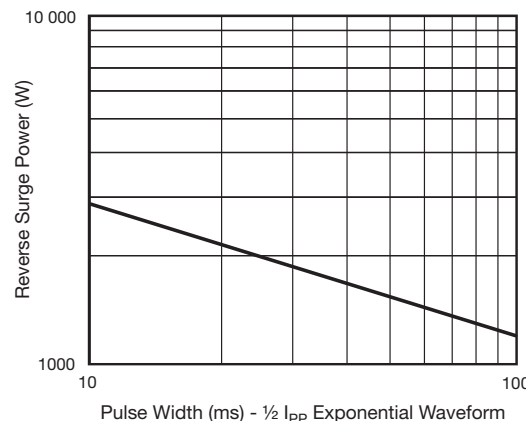


Fig. 4 - Reverse Power Capability

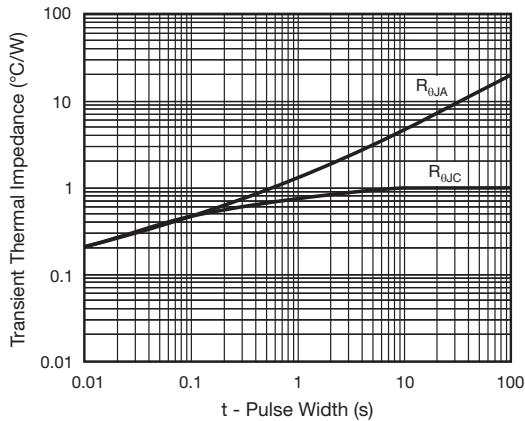


Fig. 5 - Typical Transient Thermal Impedance

**PACKAGE OUTLINE DIMENSIONS** in inches (millimeters)





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