Surface-Mount PAR® Transient Voltage Suppressors

High Temperature Stability and High Reliability Conditions

SMA (DO-214AC)

Cathode ○—|◀—○ Anode

LINKS TO ADDITIONAL RESOURCES

3D Models

PRIMARY CHARACTERISTICS	
V_{WM}	5.8 V to 36.8 V
V_{BR}	6.8 V to 43 V
P_{PPM}	400 W
P_D	1.0 W
I_{FSM}	40 A
T_J max.	185 °C
Polarity	Unidirectional
Package	SMA (DO-214AC)

TYPICAL APPLICATIONS

Use in sensitive electronics protection against voltage transients induced by inductive load switching and lightning on ICs, MOSFET, signal lines of sensor units for consumer, computer, industrial, automotive, and telecommunication.

FEATURES

AUTOMOTIVE GRADE Available

RoHS COMPLIANT

HALOGEN FREE Available

- Junction passivation optimized design passivated anisotropic rectifier technology
- T_J = 185 °C capability suitable for high reliability and automotive requirement
- Available in uni-directional polarity only
- 400 W peak pulse power capability with a 10/1000 µs waveform, repetitive rate (duty cycle): 0.01 %
- Excellent clamping capability
- Very fast response time
- Low incremental surge resistance
- Meets MSL level 1, per J-STD-020, LF maximum peak of 260 °C
- AEC-Q101 qualified available
  - Automotive ordering code: base P/NHE3 or P/NHM3
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

MECHANICAL DATA

Case: SMA (DO-214AC)
Molding compound meets UL 94 V-0 flammability rating
Base P/NHE3_X - RoHS-compliant and AEC-Q101 qualified
Base P/NHM3_X - halogen-free, 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 and HM3 suffix meets JESD 201 class 2 whisker test

Polarity: color band denotes cathode end

MAXIMUM RATINGS (T_A = 25 °C unless otherwise noted)			
PARAMETER	**SYMBOL**	**VALUE**	**UNIT**
Peak power dissipation with a 10/1000 µs waveform (1)(2) (fig. 3)	P_{PPM}	400	W
Peak power pulse current with a 10/1000 µs waveform (1) (fig. 1)	I_{PPM}	See next table	A
Power dissipation at T_A = 25 °C (4)	P_D	1.0	W
Peak forward surge current 8.3 ms single half sine-wave (3)	I_{FSM}	40	A
Maximum instantaneous forward voltage at 25 A (3)	V_F	3.5	V
Operating junction and storage temperature range	T_J, T_{STG}	-65 to +185	°C

Notes

(1) Non-repetitive current pulse, per fig. 3 and derated above T_A = 25 °C per fig. 2
(2) Mounted on PCB with 0.2" x 0.2" (5.0 mm x 5.0 mm) copper pads attached to each terminal
(3) Measured on 8.3 ms single half sine-wave or equivalent square wave, duty cycle = 4 pulses per minutes maximum
(4) Mounted on minimum recommended pad layout

ELECTRICAL CHARACTERISTICS (T_A = 25 °C unless otherwise noted)

DEVICE TYPE	DEVICE MARKING CODE	BREAKDOWN VOLTAGE V_{BR} (1) AT I_T (V)			TEST CURRENT I_T (mA)	STAND-OFF VOLTAGE V_{WM} (V)	MAXIMUM REVERSE LEAKAGE AT V_{WM} I_R (µA)	T_J = 150 °C MAXIMUM REVERSE LEAKAGE AT V_{WM} I_D (µA)	MAXIMUM PEAK PULSE SURGE CURRENT I_{PPM} (2) (A)	MAXIMUM CLAMPING VOLTAGE AT I_{PPM} V_C (V)	TYPICAL TEMP. COEFFICIENT OF V_{BR} (3) αT (%/°C)
		MIN.	NOM.	MAX.							
TPSMA6.8A	AEP	6.45	6.80	7.14	10	5.80	300	1000	38.1	10.5	0.047
TPSMA7.5A	AGP	7.13	7.50	7.88	10	6.40	150	500	35.4	11.3	0.052
TPSMA8.2A	AKP	7.79	8.20	8.61	10	7.02	50	200	33.1	12.1	0.056
TPSMA9.1A	AMP	8.65	9.10	9.55	1.0	7.78	10	50	29.9	13.0	0.060
TPSMA10A	APP	9.50	10.0	10.50	1.0	8.65	5.0	20	27.6	14.5	0.064
TPSMA11A	ARP	10.50	11.0	11.60	1.0	9.40	1.0	5.0	25.6	15.6	0.067
TPSMA12A	ATP	11.40	12.0	12.60	1.0	10.20	1.0	5.0	24.0	16.7	0.070
TPSMA13A	AVP	12.40	13.0	13.70	1.0	11.10	1.0	5.0	22.0	18.2	0.072
TPSMA15A	AXP	14.30	15.0	15.80	1.0	12.80	1.0	5.0	18.9	21.2	0.076
TPSMA16A	AZP	15.20	16.0	16.80	1.0	13.60	1.0	5.0	17.8	22.0	0.078
TPSMA18A	BEP	17.10	18.0	18.90	1.0	15.30	1.0	5.0	15.9	25.5	0.080
TPSMA20A	BGP	19.00	20.0	21.00	1.0	17.10	1.0	5.0	14.4	27.7	0.082
TPSMA22A	BKP	20.90	22.0	23.10	1.0	18.80	1.0	5.0	13.1	30.6	0.084
TPSMA24A	BMP	22.80	24.0	25.20	1.0	20.50	1.0	5.0	12.0	33.2	0.085
TPSMA27A	BPP	25.70	27.0	28.40	1.0	23.10	1.0	5.0	10.7	37.5	0.087
TPSMA30A	BRP	28.50	30.0	31.50	1.0	25.60	1.0	5.0	9.7	41.4	0.088
TPSMA33A	BTP	31.40	33.0	34.70	1.0	28.20	1.0	5.0	8.8	45.7	0.089
TPSMA36A	BVP	34.20	36.0	37.80	1.0	30.80	1.0	5.0	8.0	49.9	0.090
TPSMA39A	BXP	37.10	39.0	41.00	1.0	33.30	1.0	5.0	7.4	53.9	0.091
TPSMA43A	BZP	40.90	43.0	45.20	1.0	36.80	1.0	5.0	6.7	59.3	0.092

Notes

(1) V_{BR} measured after I_T applied for 300 µs, I_T = square wave pulse or equivalent
(2) Surge current waveform per fig. 3 and derated per fig. 2
(3) 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))
(4) All terms and symbols are consistent with ANSI/IEEE C62.35

ORDERING INFORMATION (Example)

PREFERRED P/N	UNIT WEIGHT (g)	PREFERRED PACKAGE CODE	BASE QUANTITY	DELIVERY MODE
TPSMA6.8AHE3_B/H (1)	0.064	H	1800	7" diameter plastic tape and reel
TPSMA6.8AHE3_B/I (1)	0.064	I	7500	13" diameter plastic tape and reel
TPSMA6.8AHM3_B/H (1)	0.064	H	1800	7" diameter plastic tape and reel
TPSMA6.8AHM3_B/I (1)	0.064	I	7500	13" diameter plastic tape and reel

Note

(1) AEC-Q101 qualified

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

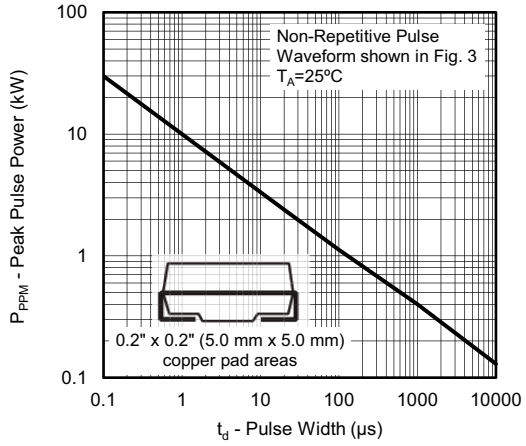


Fig. 1 - Peak Pulse Power Rating Curve

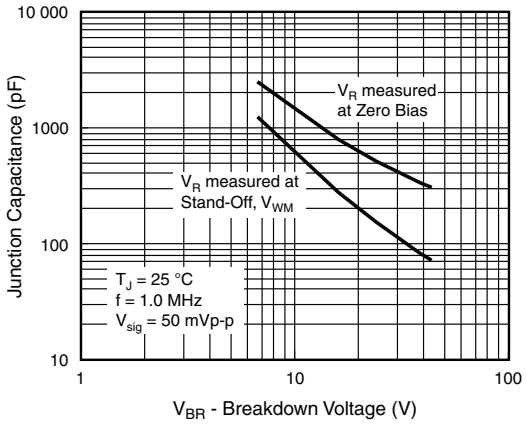


Fig. 4 - Typical Junction Capacitance

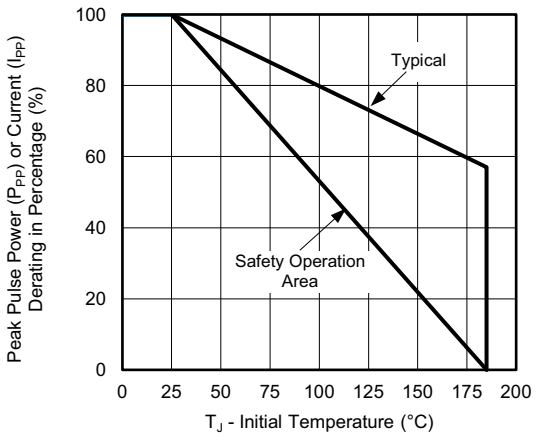


Fig. 2 - Pulse Power or Current vs. Initial Junction Temperature

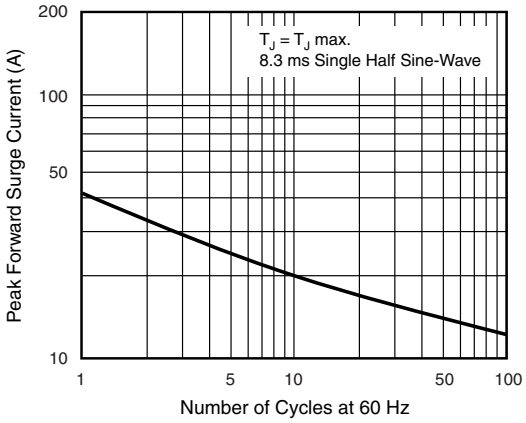


Fig. 5 - Maximum Non-Repetitive Peak Forward Surge Current

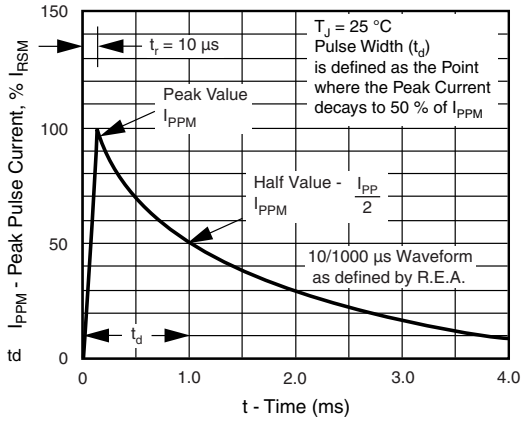
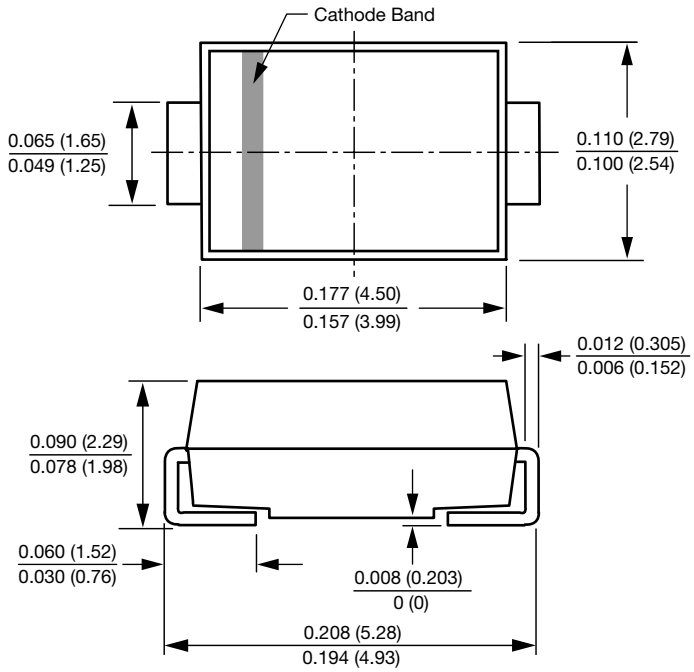


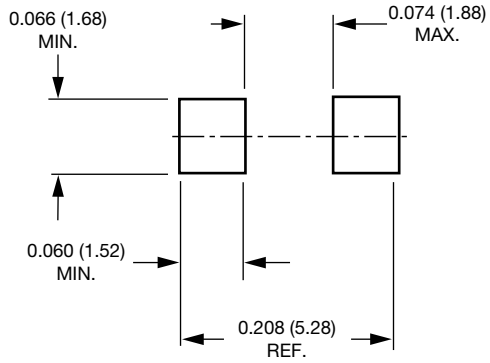
Fig. 3 - Pulse Waveform

PACKAGE OUTLINE DIMENSIONS in inches (millimeters)

SMA (DO-214AC)



Mounting Pad Layout



Disclaimer

ALL PRODUCT, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, “Vishay”), disclaim any and all liability for any errors, inaccuracies or incompleteness contained in any datasheet or in any other disclosure relating to any product.

Vishay makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, Vishay disclaims (i) any and all liability arising out of the application or use of any product, (ii) any and all liability, including without limitation special, consequential or incidental damages, and (iii) any and all implied warranties, including warranties of fitness for particular purpose, non-infringement and merchantability.

Statements regarding the suitability of products for certain types of applications are based on Vishay's knowledge of typical requirements that are often placed on Vishay products in generic applications. Such statements are not binding statements about the suitability of products for a particular application. It is the customer's responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Parameters provided in datasheets and / or specifications may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated for each customer application by the customer's technical experts. Product specifications do not expand or otherwise modify Vishay's terms and conditions of purchase, including but not limited to the warranty expressed therein.

Hyperlinks included in this datasheet may direct users to third-party websites. These links are provided as a convenience and for informational purposes only. Inclusion of these hyperlinks does not constitute an endorsement or an approval by Vishay of any of the products, services or opinions of the corporation, organization or individual associated with the third-party website. Vishay disclaims any and all liability and bears no responsibility for the accuracy, legality or content of the third-party website or for that of subsequent links.

Vishay products are not designed for use in life-saving or life-sustaining applications or any application in which the failure of the Vishay product could result in personal injury or death unless specifically qualified in writing by Vishay. Customers using or selling Vishay products not expressly indicated for use in such applications do so at their own risk. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay. Product names and markings noted herein may be trademarks of their respective owners.