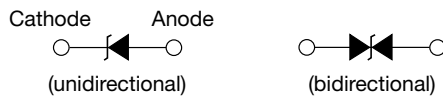


# Surface-Mount TRANSZORB® Transient Voltage Suppressors


**SMA (DO-214AC)**

**LINKS TO ADDITIONAL RESOURCES**


PRIMARY CHARACTERISTICS	
$V_{WM}$ (unidirectional)	5.8 V to 459 V
$V_{WM}$ (bidirectional)	5.8 V to 185 V
$V_{BR}$ (unidirectional)	6.8 V to 540 V
$V_{BR}$ (bidirectional)	6.8 V to 220 V
$P_{PPM}$	400 W, 300 W
$P_D$	3.3 W
$I_{FSM}$ (uni-directional only)	40 A
$T_J$ max.	150 °C
Polarity	Unidirectional, bidirectional
Package	SMA (DO-214AC)

**DEVICES FOR BIDIRECTION APPLICATIONS**

For bidirectional devices use CA suffix (e.g. P4SMA10CA).  
Electrical characteristics apply in both directions.

**FEATURES**

- Low profile package
- Ideal for automated placement
- Glass passivated chip junction
- Available in unidirectional and bidirectional
- 400 W peak pulse power capability with a 10/1000  $\mu$ s waveform, repetitive rate (duty cycle): 0.01 % (300 W above 91 V)
- 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: P/NHE3 or P/NHM3
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)


**TYPICAL APPLICATIONS**

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

**MECHANICAL DATA**

**Case:** SMA (DO-214AC)

Molding compound meets UL 94 V-0 flammability rating  
Base P/N-E3 - RoHS-compliant, commercial grade  
Base P/N-M3 - halogen-free, RoHS-compliant, commercial grade

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

E3, M3, HE3, and HM3 suffix meets JESD 201 class 2 whisker test

**Polarity:** for unidirectional types the band denotes cathode end, no marking on bidirectional types

MAXIMUM RATINGS ( $T_A = 25$ °C unless otherwise noted)			
PARAMETER	SYMBOL	VALUE	UNIT
Peak power dissipation with a 10/1000 $\mu$ s waveform <sup>(1)(2)</sup> (fig. 1)	$P_{PPM}$	400	W
Peak pulse current with a 10/1000 $\mu$ s waveform <sup>(1)</sup> (fig. 3)	$I_{PPM}$	See next table	A
Power dissipation on infinite heatsink at $T_A = 50$ °C	$P_D$	3.3	W
Peak forward surge current 8.3 ms single half sine-wave unidirectional only <sup>(2)</sup>	$I_{FSM}$	40	A
Operating junction and storage temperature range	$T_J, T_{STG}$	-65 to +150	°C

**Notes**

<sup>(1)</sup> Non-repetitive current pulse, per fig. 3 and derated above  $T_A = 25$  °C per fig. 2. Rating is 300 W above 91 V

<sup>(2)</sup> Mounted on 0.2" x 0.2" (5.0 mm x 5.0 mm) copper pads to each terminal



ELECTRICAL CHARACTERISTICS (T <sub>A</sub> = 25 °C unless otherwise noted)										
PART NUMBER	DEVICE MARKING CODE		BREAKDOWN VOLTAGE V <sub>BR</sub> AT I <sub>T</sub> <sup>(1)</sup> (V)		TEST CURRENT I <sub>T</sub> (mA)	STAND-OFF VOLTAGE V <sub>WM</sub> (V)	MAXIMUM REVERSE LEAKAGE AT V <sub>WM</sub> I <sub>D</sub> <sup>(4)</sup> (µA)	MAXIMUM PEAK PULSE CURRENT I <sub>PPM</sub> <sup>(2)</sup> (A)	MAXIMUM CLAMPING VOLTAGE AT I <sub>PPM</sub> V <sub>C</sub> (V)	MAXIMUM TEMPERATURE COEFFICIENT OF V <sub>BR</sub> (%/°C)
	UNI	BI	MIN.	MAX.						
(+)P4SMA6.8A	6V8A	6V8C	6.45	7.14	10	5.80	1000	38.1	10.5	0.057
(+)P4SMA7.5A	7V5A	7V5C	7.13	7.88	10	6.40	500	35.4	11.3	0.061
(+)P4SMA8.2A	8V2A	8V2C	7.79	8.61	10	7.02	200	33.1	12.1	0.065
(+)P4SMA9.1A	9V1A	9V1C	8.65	9.55	1.0	7.78	50	29.9	13.4	0.068
(+)P4SMA10A	10A	10C	9.5	10.5	1.0	8.55	10	27.6	14.5	0.073
(+)P4SMA11A	11A	11C	10.5	11.6	1.0	9.40	5.0	25.6	15.6	0.075
(+)P4SMA12A	12A	12C	11.4	12.6	1.0	10.2	1.0	24.0	16.7	0.078
(+)P4SMA13A	13A	13C	12.4	13.7	1.0	11.1	1.0	22.0	18.2	0.081
(+)P4SMA15A	15A	15C	14.3	15.8	1.0	12.8	1.0	18.9	21.2	0.084
(+)P4SMA16A	16A	16C	15.2	16.8	1.0	13.6	1.0	17.8	22.5	0.086
(+)P4SMA18A	18A	18C	17.1	18.9	1.0	15.3	1.0	15.9	25.2	0.089
(+)P4SMA20A	20A	20C	19.0	21.0	1.0	17.1	1.0	14.4	27.7	0.090
(+)P4SMA22A	22A	22C	20.9	23.1	1.0	18.8	1.0	13.1	30.6	0.092
(+)P4SMA24A	24A	24C	22.8	25.2	1.0	20.5	1.0	12.0	33.2	0.090
(+)P4SMA27A	27A	27C	25.7	28.4	1.0	23.1	1.0	10.7	37.5	0.096
(+)P4SMA30A	30A	30C	28.5	31.5	1.0	25.6	1.0	9.7	41.4	0.097
(+)P4SMA33A	33A	33C	31.4	34.7	1.0	28.2	1.0	8.8	45.7	0.098
(+)P4SMA36A	36A	36C	34.2	37.8	1.0	30.8	1.0	8.0	49.9	0.099
(+)P4SMA39A	39A	39C	37.1	41.0	1.0	33.3	1.0	7.4	53.9	0.100
(+)P4SMA43A	43A	43C	40.9	45.2	1.0	36.8	1.0	6.7	59.3	0.101
(+)P4SMA47A	47A	47C	44.7	49.4	1.0	40.2	1.0	6.2	64.8	0.101
(+)P4SMA51A	51A	51C	48.5	53.6	1.0	43.6	1.0	5.7	70.1	0.102
(+)P4SMA56A	56A	56C	53.2	58.8	1.0	47.8	1.0	5.2	77.0	0.103
(+)P4SMA62A	62A	62C	58.9	65.1	1.0	53.0	1.0	4.7	85.0	0.104
(+)P4SMA68A	68A	68C	64.6	71.4	1.0	58.1	1.0	4.3	92.0	0.104
(+)P4SMA75A	75A	75C	71.3	78.8	1.0	64.1	1.0	3.9	104	0.105
(+)P4SMA82A	82A	82C	77.9	86.1	1.0	70.1	1.0	3.5	113	0.105
(+)P4SMA91A	91A	91C	86.5	95.5	1.0	77.8	1.0	3.2	125	0.106
(+)P4SMA100A	100A	100C	95.0	105	1.0	85.5	1.0	2.2	137	0.106
(+)P4SMA110A	110A	110C	105	116	1.0	94.0	1.0	2.0	152	0.107
(+)P4SMA120A	120A	120C	114	126	1.0	102	1.0	1.8	165	0.107
(+)P4SMA130A	130A	130C	124	137	1.0	111	1.0	1.7	179	0.107
(+)P4SMA150A	150A	150C	143	158	1.0	128	1.0	1.4	207	0.106
(+)P4SMA160A	160A	160C	152	168	1.0	136	1.0	1.4	219	0.108
(+)P4SMA170A	170A	170C	162	179	1.0	145	1.0	1.3	234	0.108
(+)P4SMA180A	180A	180C	171	189	1.0	154	1.0	1.2	246	0.108
(+)P4SMA200A	200A	200C	190	210	1.0	171	1.0	1.1	274	0.108
(+)P4SMA220A	220A	220C	209	231	1.0	185	1.0	0.91	328	0.108
P4SMA250A	250A	-	237	263	1.0	214	1.0	0.87	344	0.110
P4SMA300A	300A	-	285	315	1.0	256	1.0	0.73	414	0.110
P4SMA350A	350A	-	333	368	1.0	300	1.0	0.62	482	0.110
P4SMA400A	400A	-	380	420	1.0	342	1.0	0.55	548	0.110
P4SMA440A	440A	-	418	462	1.0	376	1.0	0.50	602	0.110
P4SMA480A	480A	-	456	504	1.0	408	1.0	0.46	658	0.110
P4SMA510A	510A	-	485	535	1.0	434	1.0	0.43	698	0.110
P4SMA540A	540A	-	513	567	1.0	459	1.0	0.41	740	0.110

Notes

- (1) Pulse test: t<sub>p</sub> ≤ 50 ms
- (2) Surge current waveform per fig. 3 and derate per fig. 2
- (3) All terms and symbols are consistent with ANSI/IEEE CA62.35
- (4) For bidirectional types with V<sub>R</sub> of 10 V and less, the I<sub>D</sub> limit is doubled
- (5) V<sub>F</sub> = 3.5 V at I<sub>F</sub> = 25 A (unidirectional only)
- (+) Underwriters Laboratory Recognition for the classification of protectors (QVGG2) under the UL standard for safety 497B and file number E136766 for both unidirectional and bidirectional device

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

PARAMETER	SYMBOL	VALUE	UNIT
Typical thermal resistance, junction to ambient air <sup>(1)</sup>	$R_{\theta JA}$	120	°C/ W
Typical thermal resistance, junction to lead	$R_{\theta JL}$	30	

**Note**

<sup>(1)</sup> Mounted on minimum recommended pad layout

**ORDERING INFORMATION** (Example)

PREFERRED P/N	UNIT WEIGHT (g)	VOLTAGE RANGE (V)		PACKAGE CODE	BASE QUANTITY	DELIVERY MODE
		UNI -	BI -			
P4SMA6.8A-E3/61	0.064	6.8 to 220	6.8 to 220	61	1800	7" diameter plastic tape and reel
P4SMA6.8A-M3/61	0.064	6.8 to 540	6.8 to 220	61	1800	7" diameter plastic tape and reel
P4SMA6.8A-E3/5A	0.064	6.8 to 220	6.8 to 220	5A	7500	13" diameter plastic tape and reel
P4SMA6.8A-M3/5A	0.064	6.8 to 540	6.8 to 220	5A	7500	13" diameter plastic tape and reel
P4SMA6.8AHE3_A/H <sup>(1)</sup>	0.064	6.8 to 220	6.8 to 220	H	1800	7" diameter plastic tape and reel
P4SMA6.8AHM3_A/H <sup>(1)</sup>						
P4SMA6.8AHE3_A/I <sup>(1)</sup>	0.064	6.8 to 220	6.8 to 220	I	7500	13" diameter plastic tape and reel
P4SMA6.8AHM3_A/I <sup>(1)</sup>						
P4SMA250AHM3_B/H <sup>(2)</sup>	0.064	250 to 540	-	H	1800	7" diameter plastic tape and reel
P4SMA250AHM3_B/I <sup>(2)</sup>	0.064	250 to 540	-	I	7500	13" diameter plastic tape and reel

**Notes**

<sup>(1)</sup> \_A is available for P4SMA6.8(C)A to P4SMA220(C)A, AEC-Q101 qualified

<sup>(2)</sup> \_B is available for P4SMA250A to P4SMA540A, AEC-Q101 qualified

## RATINGS AND CHARACTERISTICS CURVES ( $T_A = 25^\circ\text{C}$ unless otherwise noted)

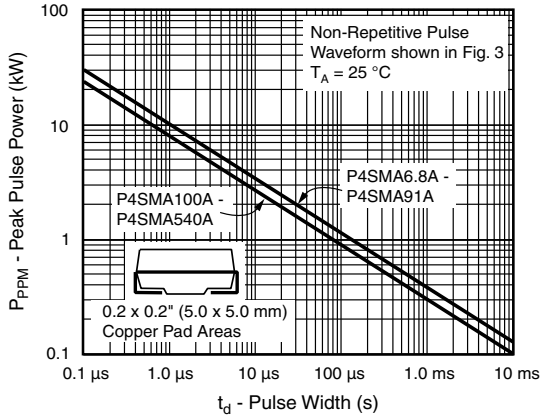


Fig. 1 - Peak Pulse Power Rating Curve

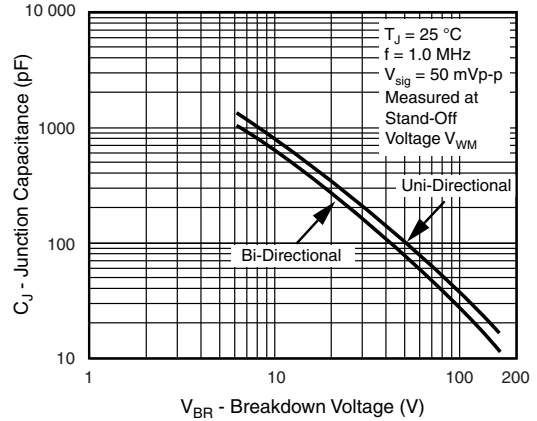


Fig. 4 - Typical Junction Capacitance

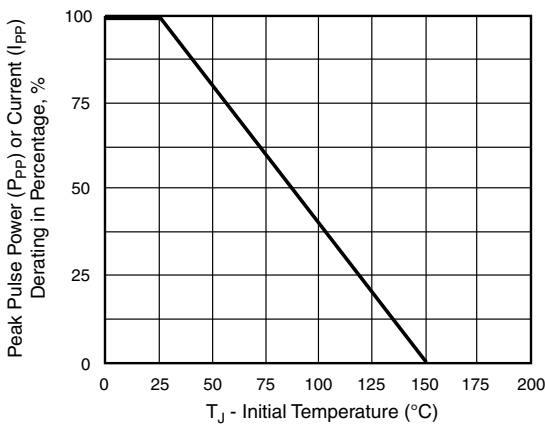


Fig. 2 - Pulse Power or Current vs. Initial Junction Temperature

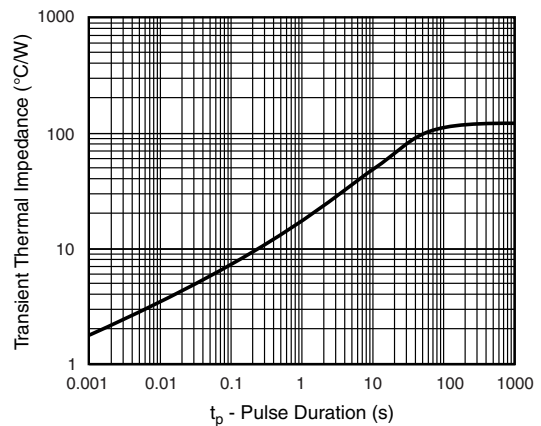


Fig. 5 - Typical Transient Thermal Impedance

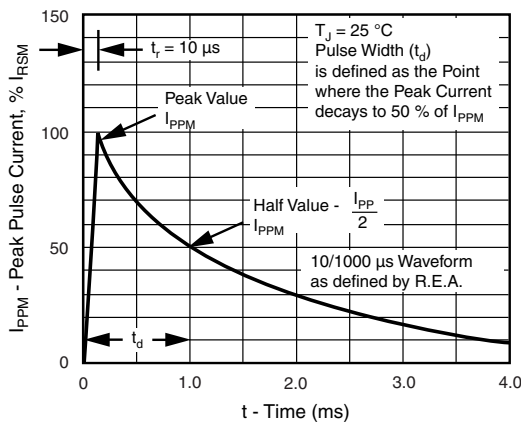


Fig. 3 - Pulse Waveform

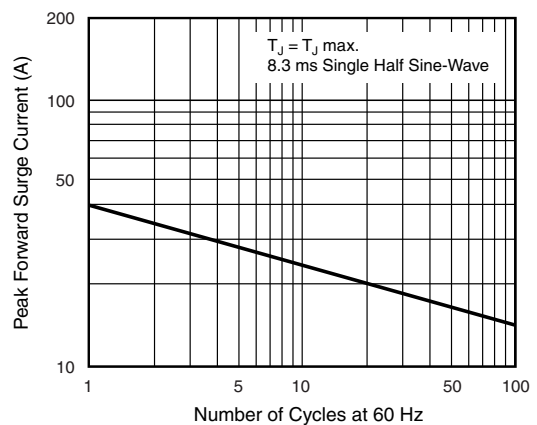
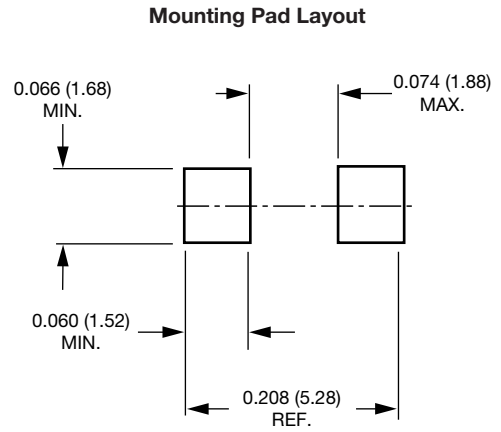
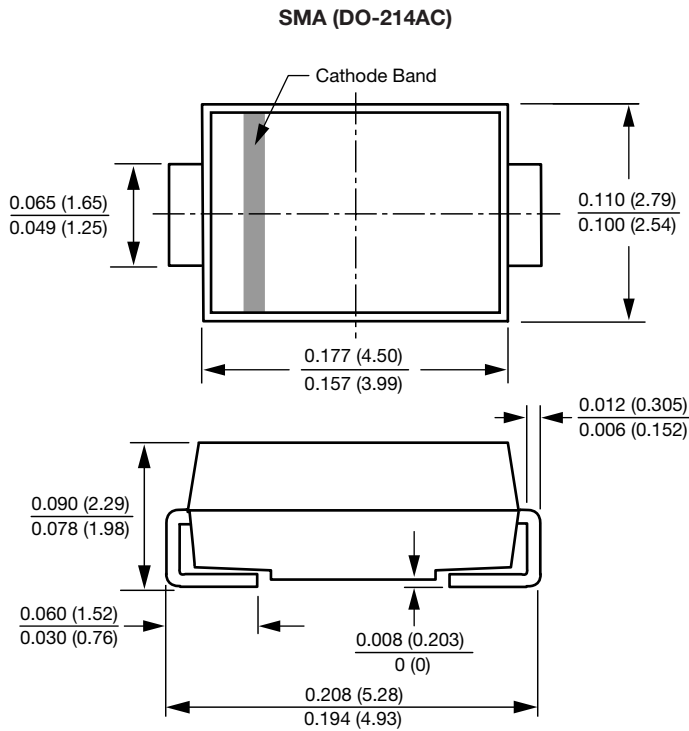


Fig. 6 - Maximum Non-Repetitive Forward Surge Current Uni-Directional Use Only



## PACKAGE OUTLINE DIMENSIONS in inches (millimeters)





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