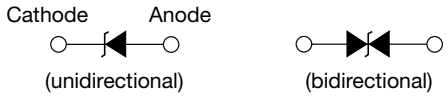
THE DATASHEET OF

SMAJ24A-E3/61

Surface-Mount TRANSZORB® Transient Voltage Suppressors



SMA (DO-214AC)



LINKS TO ADDITIONAL RESOURCES

3D Models

PRIMARY CHARACTERISTICS	
V_{BR} uni-directional	6.40 V to 231 V
V_{BR} bi-directional	6.40 V to 231 V
V_{WM}	5.0 V to 188 V
P_{PPM}	400 W, 300 W
P_D	3.3 W
I_{FSM}	40 A
T_J max.	150 °C
Polarity	Unidirectional, bidirectional
Package	SMA (DO-214AC)

DEVICES FOR BIDIRECTION APPLICATIONS

For bidirectional use CA suffix (e.g. SMAJ10CA). Electrical characteristics apply in both directions.

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, automotive, and telecommunication.

FEATURES

AUTOMOTIVE GRADE Available

RoHS COMPLIANT HALOGEN FREE Available

- 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 µs waveform, repetitive rate (duty cycle): 0.01 % (300 W above 78 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: 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/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 pulse power dissipation with a 10/1000 µs waveform (1)(2) (fig. 1)	P_{PPM}	400	W
Peak pulse current with a waveform (1)	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 (2)	I_{FSM}	40	A
Operating junction and storage temperature range	T_J, T_{STG}	-55 to +150	°C

Notes

(1) Non-repetitive current pulse, per fig. 3 and derated above T_A = 25 °C per fig. 2. Rating is 300 W above 78 V

(2) Mounted on 0.2" x 0.2" (5.0 mm x 5.0 mm) copper pads to each terminal

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

DEVICE TYPE	DEVICE MARKING CODE		BREAKDOWN VOLTAGE V_{BR} AT I_T (1) (V)		TEST CURRENT I_T (mA)	STAND-OFF VOLTAGE V_{WM} (V)	MAXIMUM REVERSE LEAKAGE AT V_{WM} I_D (µA) (3)	MAXIMUM PEAK PULSE SURGE CURRENT I_{PPM} (A) (2)	MAXIMUM CLAMPING VOLTAGE AT I_{PPM} V_C (V)	MAXIMUM TEMPERATURE COEFFICIENT OF V_{BR} (%/°C)
	UNI	BI	MIN.	MAX.						
(+)SMAJ5.0A (5)	AE	WE	6.40	7.07	10	5.0	800	43.5	9.2	0.057
(+)SMAJ6.0A	AG	WG	6.67	7.37	10	6.0	800	38.8	10.3	0.059
(+)SMAJ6.5A	AK	WK	7.22	7.98	10	6.5	500	35.7	11.2	0.061
(+)SMAJ7.0A	AM	WM	7.78	8.60	10	7.0	200	33.3	12.0	0.065
(+)SMAJ7.5A	AP	WP	8.33	9.21	1.0	7.5	100	31.0	12.9	0.067
(+)SMAJ8.0A	AR	WR	8.89	9.83	1.0	8.0	50	29.4	13.6	0.069
(+)SMAJ8.5A	AT	WT	9.44	10.4	1.0	8.5	10	27.8	14.4	0.073
(+)SMAJ9.0A	AV	WV	10.0	11.1	1.0	9.0	5.0	26.0	15.4	0.074
(+)SMAJ10A	AX	WX	11.1	12.3	1.0	10	1.0	23.5	17.0	0.078
(+)SMAJ11A	AZ	WZ	12.2	13.5	1.0	11	1.0	22.0	18.2	0.080
(+)SMAJ12A	BE	XE	13.3	14.7	1.0	12	1.0	20.1	19.9	0.083
(+)SMAJ13A	BG	XG	14.4	15.9	1.0	13	1.0	18.6	21.5	0.084
(+)SMAJ14A	BK	XK	15.6	17.2	1.0	14	1.0	17.2	23.2	0.087
(+)SMAJ15A	BM	XM	16.7	18.5	1.0	15	1.0	16.4	24.4	0.088
(+)SMAJ16A	BP	XP	17.8	19.7	1.0	16	1.0	15.4	26.0	0.089
(+)SMAJ17A	BR	XR	18.9	20.9	1.0	17	1.0	14.5	27.6	0.090
(+)SMAJ18A	BT	XT	20.0	22.1	1.0	18	1.0	13.7	29.2	0.092
(+)SMAJ20A	BV	XV	22.2	24.5	1.0	20	1.0	12.3	32.4	0.094
(+)SMAJ22A	BX	XX	24.4	26.9	1.0	22	1.0	11.3	35.5	0.096
(+)SMAJ24A	BZ	XZ	26.7	29.5	1.0	24	1.0	10.3	38.9	0.096
(+)SMAJ26A	CE	YE	28.9	31.9	1.0	26	1.0	9.5	42.1	0.097
(+)SMAJ28A	CG	YG	31.1	34.4	1.0	28	1.0	8.8	45.4	0.098
(+)SMAJ30A	CK	YK	33.3	36.8	1.0	30	1.0	8.3	48.4	0.099
(+)SMAJ33A	CM	YM	36.7	40.6	1.0	33	1.0	7.5	53.3	0.100
(+)SMAJ36A	CP	YP	40.0	44.2	1.0	36	1.0	6.9	58.1	0.100
(+)SMAJ40A	CR	YR	44.4	49.1	1.0	40	1.0	6.2	64.5	0.101
(+)SMAJ43A	CT	YT	47.8	52.8	1.0	43	1.0	5.8	69.4	0.102
(+)SMAJ45A	CV	YV	50.0	55.3	1.0	45	1.0	5.5	72.7	0.102
(+)SMAJ48A	CX	YX	53.3	58.9	1.0	48	1.0	5.2	77.4	0.103
(+)SMAJ51A	CZ	YZ	56.7	62.7	1.0	51	1.0	4.9	82.4	0.104
(+)SMAJ54A	RE	ZE	60.0	66.3	1.0	54	1.0	4.6	87.1	0.104
(+)SMAJ58A	RG	ZG	64.4	71.2	1.0	58	1.0	4.3	93.6	0.104
(+)SMAJ60A	RK	ZK	66.7	73.7	1.0	60	1.0	4.1	96.8	0.105
(+)SMAJ64A	RM	ZM	71.1	78.6	1.0	64	1.0	3.9	103	0.105
(+)SMAJ70A	RP	ZP	77.8	86.0	1.0	70	1.0	3.5	113	0.105
(+)SMAJ75A	RR	ZR	83.3	92.1	1.0	75	1.0	3.3	121	0.106
(+)SMAJ78A	RT	ZT	86.7	95.8	1.0	78	1.0	3.2	126	0.106
(+)SMAJ85A	RV	ZV	94.4	104	1.0	85	1.0	2.2	137	0.106
(+)SMAJ90A	RX	ZX	100	111	1.0	90	1.0	2.1	146	0.106
(+)SMAJ100A	RZ	ZZ	111	123	1.0	100	1.0	1.9	162	0.107
(+)SMAJ110A	SE	VE	122	135	1.0	110	1.0	1.7	177	0.107
(+)SMAJ120A	VG	VG	133	147	1.0	120	1.0	1.6	193	0.108
(+)SMAJ130A	VK	VK	144	159	1.0	130	1.0	1.4	209	0.108
(+)SMAJ150A	VM	VM	167	185	1.0	150	1.0	1.2	243	0.108
(+)SMAJ160A	SP	VP	178	197	1.0	160	1.0	1.2	259	0.108
(+)SMAJ170A	SR	VR	189	209	1.0	170	1.0	1.09	275	0.108
(+)SMAJ188A	SS	VS	209	231	1.0	188	1.0	0.91	328	0.108

Notes

(1) Pulse test: $t_p \leq 50$ ms
(2) Surge current waveform per fig. 3 and derate per fig. 2
(3) For bidirectional types having V_{WM} of 10 V and less, the I_D limit is doubled
(4) All terms and symbols are consistent with ANSI/IEEE C62.35
(5) For the bi-directional SMAJ5.0CA, the maximum V_{BR} is 7.25 V
(6) V_F = 3.5 V at I_F = 25 A (unidirectional only)
(+) Underwriters Laboratory Recognition for the classification of protectors (QVGQ2) under the UL standard for safety 497B and file number E136766 for both unidirectional and bidirectional device

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THERMAL CHARACTERISTICS (T_A = 25 °C unless otherwise noted)			
PARAMETER	**SYMBOL**	**VALUE**	**UNIT**
Typical thermal resistance, junction to ambient (1)	$R_{\theta JA}$	120	°C/W
Typical thermal resistance, junction to lead	$R_{\theta JL}$	30	°C/W

Note
(1) Mounted on minimum recommended pad layout

ORDERING INFORMATION (Example)				
PREFERRED P/N	**UNIT WEIGHT (g)**	**PREFERRED PACKAGE CODE**	**BASE QUANTITY**	**DELIVERY MODE**
SMAJ5.0A-E3/61	0.064	61	1800	7" diameter plastic tape and reel
SMAJ5.0A-M3/61				
SMAJ5.0A-E3/5A	0.064	5A	7500	13" diameter plastic tape and reel
SMAJ5.0A-M3/5A				
SMAJ5.0AHE3_A/H (1)	0.064	H	1800	7" diameter plastic tape and reel
SMAJ5.0AHM3_A/H (1)				
SMAJ5.0AHE3_A/I (1)	0.064	I	7500	13" diameter plastic tape and reel
SMAJ5.0AHM3_A/I (1)				

Note
(1) AEC-Q101 qualified

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

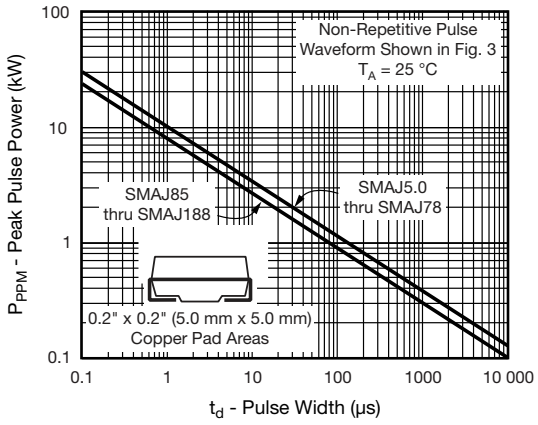


Fig. 1 - Peak Pulse Power Rating Curve

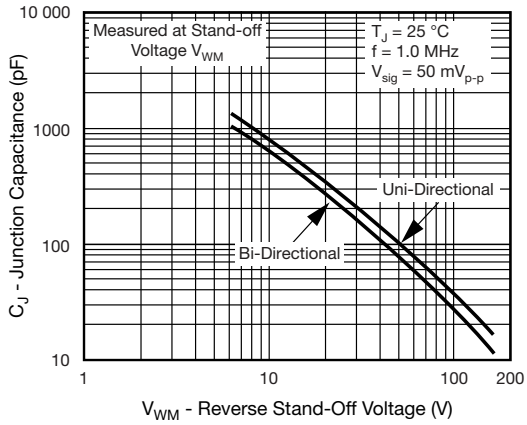


Fig. 4 - Typical Junction Capacitance

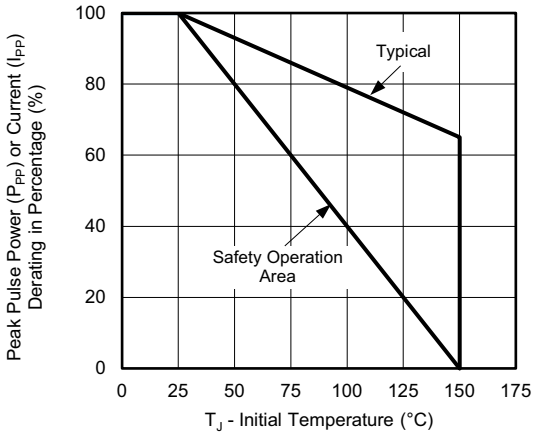


Fig. 2 - Pulse Power or Current vs. Initial Junction Temperature

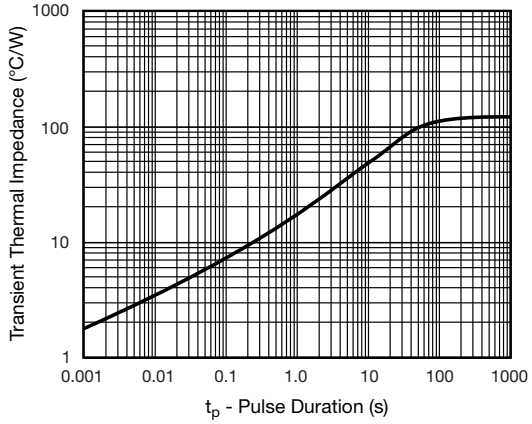


Fig. 5 - Typical Transient Thermal Impedance

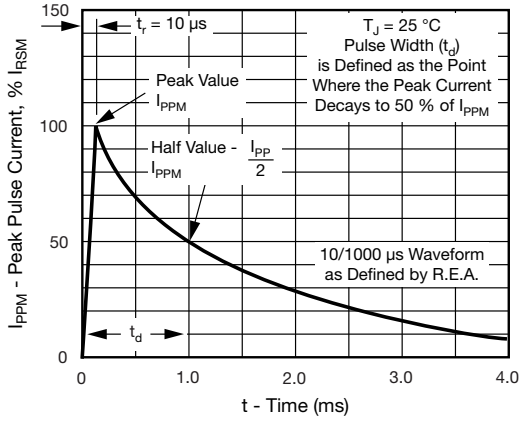


Fig. 3 - Pulse Waveform

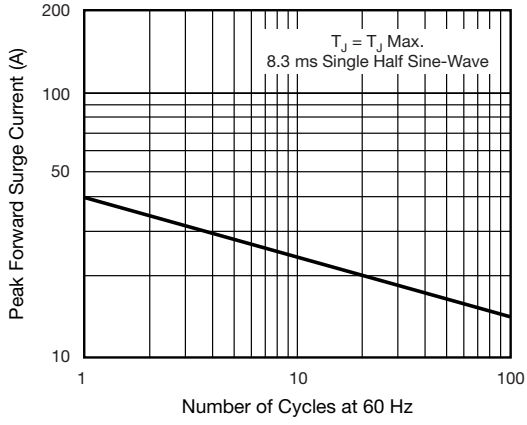


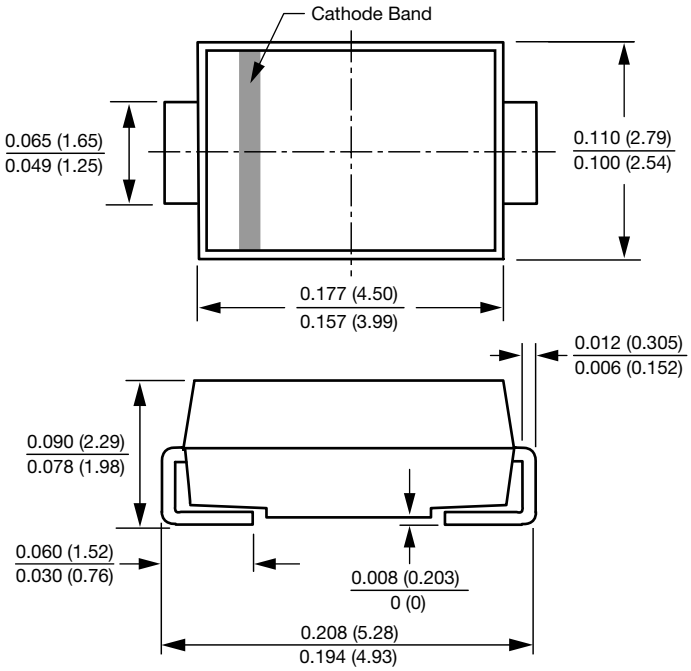
Fig. 6 - Maximum Non-Repetitive Forward Surge Current
Unidirectional Only

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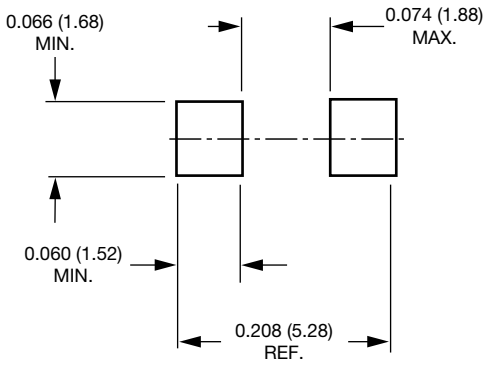
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PACKAGE OUTLINE DIMENSIONS in inches (millimeters)

SMA (DO-214AC)



Mounting Pad Layout



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