

### 400W Surface Mount Transient Voltage Suppressors- 5.0V- 440V

#### Features

- 400W peak pulse power capability with a 10/1000  $\mu$ s waveform, repetition rate (duty cycle): 0.01%.
- Low profile surface mounted application in order to optimize board space.
- Excellent clamping capability.
- Low incremental surge resistance.
- Fast response time from 0V to VBR, typically less than 1 ps for uni-directional & 5 ns for bi-directional types.
- Glass passivated chip junction.
- Lead-free parts meet RoHS requirements.
- Compliant to Halogen-free

#### Mechanical data

- Epoxy:UL94-V0 rated flame retardant
- Case : Molded plastic, DO-214AC / SMA
- Terminals : Solder plated, solderable per MIL-STD-750, Method 2026
- Polarity : Indicated by cathode band
- Mounting Position : Any
- Weight : Approximated 0.05 gram

#### Package outline



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

PARAMETER	CONDITIONS	Symbol	Value	UNIT
Peak Power Dissipation	with a 10/1000 $\mu$ s waveform, Note 1, 2 & Fig. 1	$P_{PPM}$	400	W
Peak Pulse current	with a 10/1000 $\mu$ s waveform	$I_{PPM}$	See Table 1	A
Steady State Power Dissipation	at $T_J=75^\circ\text{C}$ , Note 2	$P_{M(AV)}$	1.0	W
Peak Forward Surge Current	8.3ms Single Half Sine-Wave, Note 3	$I_{FSM}$	40	A
Maximum Instantaneous Forward Voltage	at 25A For Uni-Directional Types Only, Note 4	$V_F$	3.5/6.5	V
Operating temperature range		$T_J$	-55 ~ +150	$^\circ\text{C}$
Storage temperature range		$T_{STG}$	-55 ~ +150	$^\circ\text{C}$

Note 1. Non-repetitive current pulse, per Fig. 3 and derated above  $T_A=25^\circ\text{C}$  per Fig. 2

2. Mounted on copper pad area of 0.2"x0.2" (5.0x5.0 mm) per Fig 5

3. Measured on 8.3 ms single half sine-wave or equivalent square wave, duty cycle=4 pulses per minute maximum

4.  $V_F < 3.5\text{V}$  for  $V_{BR} < 200\text{V}$  and  $V_F < 6.5\text{V}$  for  $V_{BR} > 201\text{V}$ .

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

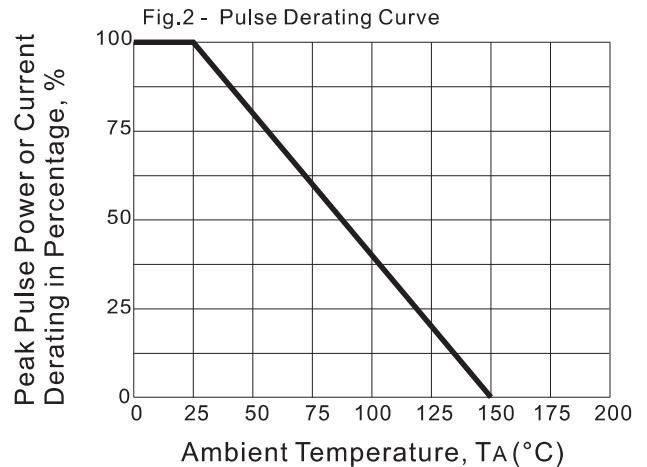
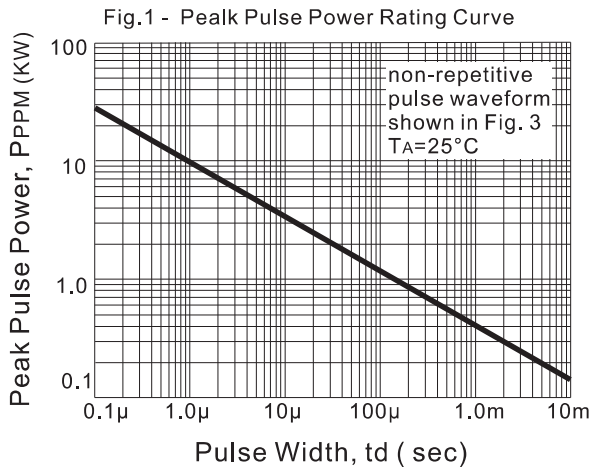
Part No. (Uni)	Part No. (Bi)	Reverse Stand-off Voltage	Breakdown Voltage @ $I_T$		Test Current	Maximum Clamping Voltage @ $I_{PP}$		Maximum Reverse Leakage Current	Marking Code	
		$V_{RWM}$	$V_{BR\text{Min}}$	$V_{BR\text{Max}}$	$I_T$	$V_c$	$I_{PP}$	$I_R@V_{RWM}$	UNI	BI
		Volts	Volts	Volts	mA	Volts	A	$\mu\text{A}$		
SMAJ5.0A	SMAJ5.0CA	5.0	6.40	7.00	10	9.2	43.5	800	AE	WE
SMAJ6.0A	SMAJ6.0CA	6.0	6.67	7.37	10	10.3	38.0	800	AG	WG
SMAJ6.5A	SMAJ6.5CA	6.5	7.22	7.98	10	11.2	35.7	500	AK	WK
SMAJ7.0A	SMAJ7.0CA	7.0	7.78	8.60	10	12.0	33.3	200	AM	WM
SMAJ7.5A	SMAJ7.5CA	7.5	8.33	9.21	1.0	12.9	31.0	100	AP	WP
SMAJ8.0A	SMAJ8.0CA	8.0	8.89	9.83	1.0	13.6	29.4	50	AR	WR
SMAJ8.5A	SMAJ8.5CA	8.5	9.44	10.4	1.0	14.4	27.7	20	AT	WT
SMAJ9.0A	SMAJ9.0CA	9.0	10.0	11.1	1.0	15.4	26.0	10	AV	WV
SMAJ10A	SMAJ10CA	10	11.1	12.3	1.0	17.0	23.5	5	AX	WX
SMAJ11A	SMAJ11CA	11	12.2	13.5	1.0	18.2	22.0	5	AZ	WZ
SMAJ12A	SMAJ12CA	12	13.3	14.7	1.0	19.9	20.1	5	BE	XE
SMAJ13A	SMAJ13CA	13	14.4	15.9	1.0	21.5	18.6	5	BG	XG
SMAJ14A	SMAJ14CA	14	15.6	17.2	1.0	23.2	17.2	5	BK	XK
SMAJ15A	SMAJ15CA	15	16.7	18.5	1.0	24.4	16.4	5	BM	XM
SMAJ16A	SMAJ16CA	16	17.8	19.7	1.0	26.0	15.4	5	BP	XP
SMAJ17A	SMAJ17CA	17	18.9	20.9	1.0	27.6	14.5	5	BR	XR
SMAJ18A	SMAJ18CA	18	20.0	22.1	1.0	29.2	13.7	5	BT	XT
SMAJ20A	SMAJ20CA	20	22.2	24.5	1.0	32.4	12.3	5	BV	XV
SMAJ22A	SMAJ22CA	22	24.4	26.9	1.0	35.5	11.2	5	BX	XX
SMAJ24A	SMAJ24CA	24	26.7	29.5	1.0	38.9	10.3	5	BZ	XZ
SMAJ26A	SMAJ26CA	26	28.9	31.9	1.0	42.1	9.5	5	CE	YE
SMAJ28A	SMAJ28CA	28	31.1	34.4	1.0	45.4	8.8	5	CG	YG
SMAJ30A	SMAJ30CA	30	33.3	36.8	1.0	48.4	8.3	5	CK	YK
SMAJ33A	SMAJ33CA	33	36.7	40.6	1.0	53.3	7.5	5	CM	YM
SMAJ36A	SMAJ36CA	36	40.0	44.2	1.0	58.1	6.9	5	CP	YP
SMAJ40A	SMAJ40CA	40	44.4	49.1	1.0	64.5	6.2	5	CR	YR
SMAJ43A	SMAJ43CA	43	47.8	52.8	1.0	69.4	5.8	5	CT	YT
SMAJ45A	SMAJ45CA	45	50.0	55.3	1.0	72.7	5.5	5	CV	YV
SMAJ48A	SMAJ48CA	48	53.3	58.9	1.0	77.4	5.2	5	CX	YX
SMAJ51A	SMAJ51CA	51	56.7	62.7	1.0	82.4	4.9	5	CZ	YZ
SMAJ54A	SMAJ54CA	54	60.0	66.3	1.0	87.1	4.6	5	RE	ZE
SMAJ58A	SMAJ58CA	58	64.4	71.2	1.0	93.6	4.3	5	RG	ZG
SMAJ60A	SMAJ60CA	60	66.7	73.7	1.0	96.8	4.1	5	RK	ZK
SMAJ64A	SMAJ64CA	64	71.1	78.6	1.0	103.0	3.9	5	RM	ZM
SMAJ70A	SMAJ70CA	70	77.8	86.0	1.0	113.0	3.5	5	RP	ZP
SMAJ75A	SMAJ75CA	75	83.3	92.1	1.0	121.0	3.3	5	RR	ZR
SMAJ78A	SMAJ78CA	78	86.7	95.8	1.0	126.0	3.2	5	RT	ZT
SMAJ85A	SMAJ85CA	85	94.4	104	1.0	137.0	2.9	5	RV	ZV

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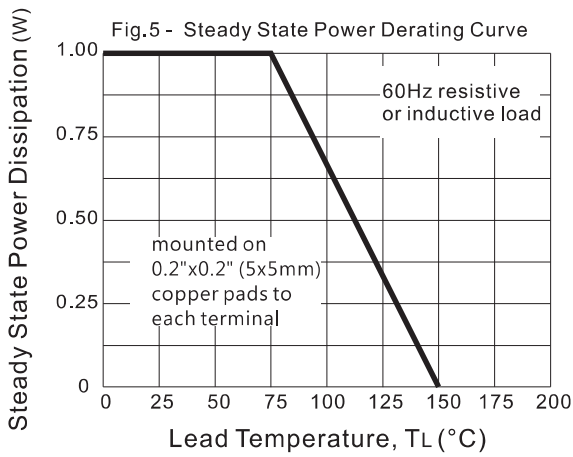
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		$V_{RWM}$	$V_{BR\ Min}$	$V_{BR\ Max}$	$I_T$	$V_C$	$I_{PP}$	$I_R@V_{RWM}$		
		Volts	Volts	Volts	mA	Volts	A	$\mu\text{A}$	UNI	BI
SMAJ90A	SMAJ90CA	90	100	111	1.0	146.0	2.7	5	RX	ZX
SMAJ100A	SMAJ100CA	100	111	123	1.0	162.0	2.5	5	RZ	ZZ
SMAJ110A	SMAJ110CA	110	122	135	1.0	177.0	2.3	5	SE	VE
SMAJ120A	SMAJ120CA	120	133	147	1.0	193.0	2.1	5	SG	VG
SMAJ130A	SMAJ130CA	130	144	159	1.0	209.0	1.9	5	SK	VK
SMAJ150A	SMAJ150CA	150	167	185	1.0	243.0	1.6	5	SM	VM
SMAJ160A	SMAJ160CA	160	178	197	1.0	259.0	1.5	5	SP	VP
SMAJ170A	SMAJ170CA	170	189	209	1.0	275.0	1.5	5	SR	VR
SMAJ180A	SMAJ180CA	180	201	222	1.0	292.0	1.4	5	ST	VT
SMAJ200A	SMAJ200CA	200	224	247	1.0	324.0	1.2	5	SV	VV
SMAJ220A	SMAJ220CA	220	246	272	1.0	356.0	1.1	5	SX	VX
SMAJ250A	SMAJ250CA	250	279	309	1.0	405.0	1.0	5	SZ	VZ
SMAJ300A	SMAJ300CA	300	335	371	1.0	486.0	0.8	5	TE	UE
SMAJ350A	SMAJ350CA	350	391	432	1.0	567.0	0.7	5	TG	UG
SMAJ400A	SMAJ400CA	400	447	494	1.0	648.0	0.6	5	TK	UK
SMAJ440A	SMAJ440CA	440	492	543	1.0	713.0	0.6	5	TM	UM

- Note 1.  $V_{BR}$  measured after  $I_T$  applied for 300 $\mu\text{s}$ ,  $I_T$ =square wave pulse or equivalent  
 2. Surge current waveform per Fig. 3 and derated per Fig. 2  
 3. For bi-directional types having  $V_{RWM}$  of 10 volts and less, the  $I_T$  limit is doubled  
 4. Suffix 'C' denotes bi-directional devices. Suffix 'A' denotes 5% tolerance devices, no suffix denotes 10% tolerance devices.  
 5. All terms and symbols are consistent with ANS/IEEE C62.35  
 6. Transient Voltage Suppressors (TVS) are devices used to protect vulnerable circuits from electrical overstress such as that caused by electrostatic discharge, inductive load switching and induced lightning. Within the TVS, damaging voltage spikes are limited by clamping or avalanche action of a rugged silicon pn junction which reduces the amplitude of the transient to a nondestructive level. See Fig. 7 & Fig. 8

### Rating and characteristic curves



## Rating and characteristic curves







**Fig. 7 - Transients of several thousand volts can be clamped to a safe level by the TVS**



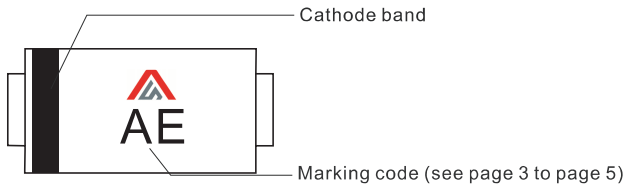
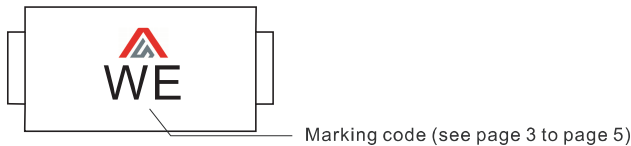
**Fig. 8 - Transient current is diverted to ground thru TVS; the voltage seen by the protected load is limited to the clamping voltage level**



### Pinning information

Pin	Simplified outline	Symbol
Uni-Directional Pin1 cathode Pin2 anode		
Bi-Directional		

### Marking

Type number	Example
Uni-Directional	 <p>Cathode band</p> <p>Marking code (see page 3 to page 5)</p>
Bi-Directional	 <p>Marking code (see page 3 to page 5)</p>

### Suggested solder pad layout



Dimensions in inches and (millimeters)

PACKAGE	A	B	C
SMA	0.063 (1.60)	0.059 (1.50)	0.110 (2.80)

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