SMAJ-Q1 Series

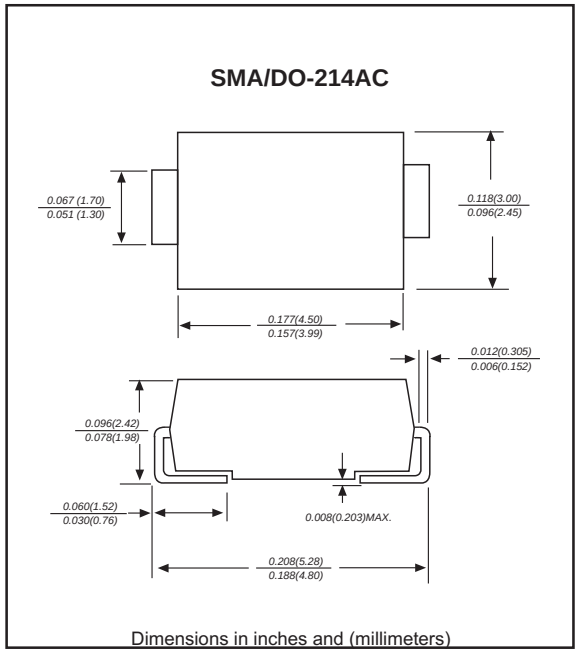
SMD Transient Voltage Suppressor

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

Features

- 400W peak pulse power capability with a 10/1000 μs 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 requirments.
- Compliant to Halogen-free.
- Suffix "-Q1" for AEC-Q101.

Package outline



Dimensions in inches and (millimeters)

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

Maximum ratings (AT T_A=25°C unless otherwise noted)

PARAMETER	CONDITIONS	Symbol	Value	UNIT
Peak Power Dissipation	with a 10/1000 μs waveform, Note 1, 2 & Fig. 1	P_{PPM}	400	W
Peak Pulse current	with a 10/1000 μs waveform	I_{PPM}	See Table 1	A
Steady State Power Dissipation	at T_L=75°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 Instantaneours 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	°C
Storage temperature range		T_{STG}	-55 ~ +150	°C

Note 1. Non-repetitive current pulse, per Fig. 3 and derated above T_A=25°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 < 3.5V for V_{BR} < 200V and V_F< 6.5V for V_{BR} >201V.

Electrical characteristics (at T_A=25°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}	$V_{BR\ Min}$	$V_{BR\ Max}$	I_T	V_C	I_{PP}	I_R@V_{RWM}		
		Volts	Volts	Volts	mA	Volts	A	μA	UNI	BI
SMAJ5.0A-Q1	SMAJ5.0CA-Q1	5.0	6.40	7.00	10	9.2	43.5	800	AE	WE
SMAJ6.0A-Q1	SMAJ6.0CA-Q1	6.0	6.67	7.37	10	10.3	38.0	800	AG	WG
SMAJ6.5A-Q1	SMAJ6.5CA-Q1	6.5	7.22	7.98	10	11.2	35.7	500	AK	WK
SMAJ7.0A-Q1	SMAJ7.0CA-Q1	7.0	7.78	8.60	10	12.0	33.3	200	AM	WM
SMAJ7.5A-Q1	SMAJ7.5CA-Q1	7.5	8.33	9.21	1.0	12.9	31.0	100	AP	WP
SMAJ8.0A-Q1	SMAJ8.0CA-Q1	8.0	8.89	9.83	1.0	13.6	29.4	50	AR	WR
SMAJ8.5A-Q1	SMAJ8.5CA-Q1	8.5	9.44	10.4	1.0	14.4	27.7	20	AT	WT
SMAJ9.0A-Q1	SMAJ9.0CA-Q1	9.0	10.0	11.1	1.0	15.4	26.0	10	AV	WV
SMAJ10A-Q1	SMAJ10CA-Q1	10	11.1	12.3	1.0	17.0	23.5	5	AX	WX
SMAJ11A-Q1	SMAJ11CA-Q1	11	12.2	13.5	1.0	18.2	22.0	5	AZ	WZ
SMAJ12A-Q1	SMAJ12CA-Q1	12	13.3	14.7	1.0	19.9	20.1	5	BE	XE
SMAJ13A-Q1	SMAJ13CA-Q1	13	14.4	15.9	1.0	21.5	18.6	5	BG	XG
SMAJ14A-Q1	SMAJ14CA-Q1	14	15.6	17.2	1.0	23.2	17.2	5	BK	XK
SMAJ15A-Q1	SMAJ15CA-Q1	15	16.7	18.5	1.0	24.4	16.4	5	BM	XM
SMAJ16A-Q1	SMAJ16CA-Q1	16	17.8	19.7	1.0	26.0	15.4	5	BP	XP
SMAJ17A-Q1	SMAJ17CA-Q1	17	18.9	20.9	1.0	27.6	14.5	5	BR	XR
SMAJ18A-Q1	SMAJ18CA-Q1	18	20.0	22.1	1.0	29.2	13.7	5	BT	XT
SMAJ20A-Q1	SMAJ20CA-Q1	20	22.2	24.5	1.0	32.4	12.3	5	BV	XV
SMAJ22A-Q1	SMAJ22CA-Q1	22	24.4	26.9	1.0	35.5	11.2	5	BX	XX
SMAJ24A-Q1	SMAJ24CA-Q1	24	26.7	29.5	1.0	38.9	10.3	5	BZ	XZ
SMAJ26A-Q1	SMAJ26CA-Q1	26	28.9	31.9	1.0	42.1	9.5	5	CE	YE
SMAJ28A-Q1	SMAJ28CA-Q1	28	31.1	34.4	1.0	45.4	8.8	5	CG	YG
SMAJ30A-Q1	SMAJ30CA-Q1	30	33.3	36.8	1.0	48.4	8.3	5	CK	YK
SMAJ33A-Q1	SMAJ33CA-Q1	33	36.7	40.6	1.0	53.3	7.5	5	CM	YM
SMAJ36A-Q1	SMAJ36CA-Q1	36	40.0	44.2	1.0	58.1	6.9	5	CP	YP
SMAJ40A-Q1	SMAJ40CA-Q1	40	44.4	49.1	1.0	64.5	6.2	5	CR	YR
SMAJ43A-Q1	SMAJ43CA-Q1	43	47.8	52.8	1.0	69.4	5.8	5	CT	YT
SMAJ45A-Q1	SMAJ45CA-Q1	45	50.0	55.3	1.0	72.7	5.5	5	CV	YV
SMAJ48A-Q1	SMAJ48CA-Q1	48	53.3	58.9	1.0	77.4	5.2	5	CX	YX
SMAJ51A-Q1	SMAJ51CA-Q1	51	56.7	62.7	1.0	82.4	4.9	5	CZ	YZ
SMAJ54A-Q1	SMAJ54CA-Q1	54	60.0	66.3	1.0	87.1	4.6	5	RE	ZE
SMAJ58A-Q1	SMAJ58CA-Q1	58	64.4	71.2	1.0	93.6	4.3	5	RG	ZG
SMAJ60A-Q1	SMAJ60CA-Q1	60	66.7	73.7	1.0	96.8	4.1	5	RK	ZK
SMAJ64A-Q1	SMAJ64CA-Q1	64	71.1	78.6	1.0	103.0	3.9	5	RM	ZM
SMAJ70A-Q1	SMAJ70CA-Q1	70	77.8	86.0	1.0	113.0	3.5	5	RP	ZP
SMAJ75A-Q1	SMAJ75CA-Q1	75	83.3	92.1	1.0	121.0	3.3	5	RR	ZR
SMAJ78A-Q1	SMAJ78CA-Q1	78	86.7	95.8	1.0	126.0	3.2	5	RT	ZT
SMAJ85A-Q1	SMAJ85CA-Q1	85	94.4	104	1.0	137.0	2.9	5	RV	ZV

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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}	$V_{BR\ Min}$	$V_{BR\ Max}$	I_T	V_c	I_{PP}	I_R@V_{RWM}		
		Volts	Volts	Volts	mA	Volts	A	μA	UNI	BI
SMAJ90A-Q1	SMAJ90CA-Q1	90	100	111	1.0	146.0	2.7	5	RX	ZX
SMAJ100A-Q1	SMAJ100CA-Q1	100	111	123	1.0	162.0	2.5	5	RZ	ZZ
SMAJ110A-Q1	SMAJ110CA-Q1	110	122	135	1.0	177.0	2.3	5	SE	VE
SMAJ120A-Q1	SMAJ120CA-Q1	120	133	147	1.0	193.0	2.1	5	SG	VG
SMAJ130A-Q1	SMAJ130CA-Q1	130	144	159	1.0	209.0	1.9	5	SK	VK
SMAJ150A-Q1	SMAJ150CA-Q1	150	167	185	1.0	243.0	1.6	5	SM	VM
SMAJ160A-Q1	SMAJ160CA-Q1	160	178	197	1.0	259.0	1.5	5	SP	VP
SMAJ170A-Q1	SMAJ170CA-Q1	170	189	209	1.0	275.0	1.5	5	SR	VR
SMAJ180A-Q1	SMAJ180CA-Q1	180	201	222	1.0	292.0	1.4	5	ST	VT
SMAJ200A-Q1	SMAJ200CA-Q1	200	224	247	1.0	324.0	1.2	5	SV	VV
SMAJ220A-Q1	SMAJ220CA-Q1	220	246	272	1.0	356.0	1.1	5	SX	VX
SMAJ250A-Q1	SMAJ250CA-Q1	250	279	309	1.0	405.0	1.0	5	SZ	VZ
SMAJ300A-Q1	SMAJ300CA-Q1	300	335	371	1.0	486.0	0.8	5	TE	UE
SMAJ350A-Q1	SMAJ350CA-Q1	350	391	432	1.0	567.0	0.7	5	TG	UG
SMAJ400A-Q1	SMAJ400CA-Q1	400	447	494	1.0	648.0	0.6	5	TK	UK
SMAJ440A-Q1	SMAJ440CA-Q1	440	492	543	1.0	713.0	0.6	5	TM	UM

Note 1. V_{BR} measured after I_T applied for 300us, 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_R 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

Fig.1 - Pealk Pulse Power Rating Curve

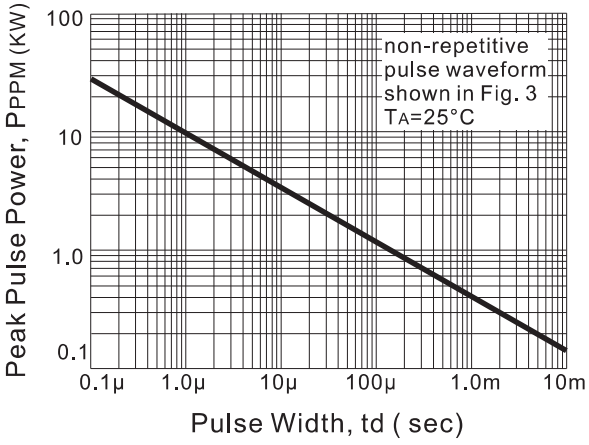
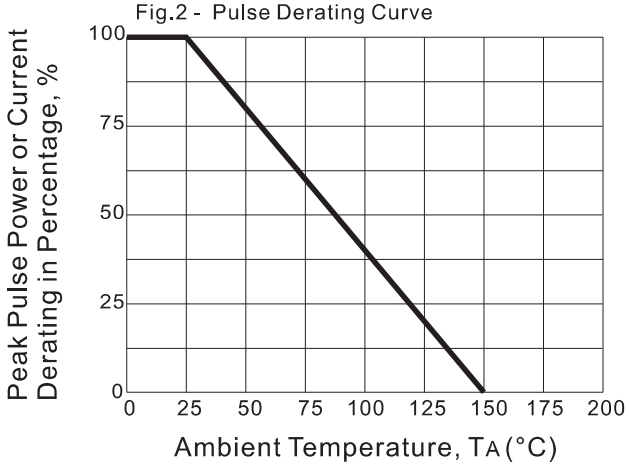


Fig.2 - Pulse Derating Curve



Rating and characteristic curves

Fig.3 - Pulse Waveform

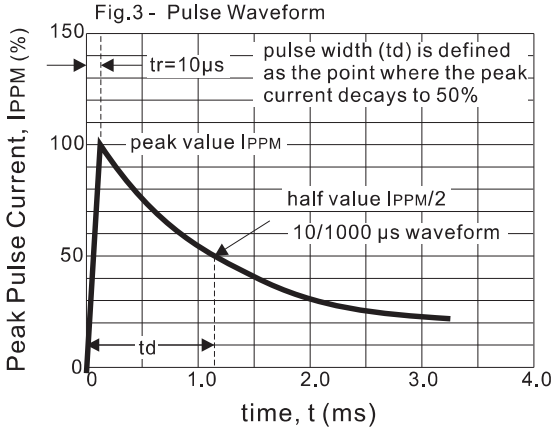


Fig.4 - Typical Junction Capacitance

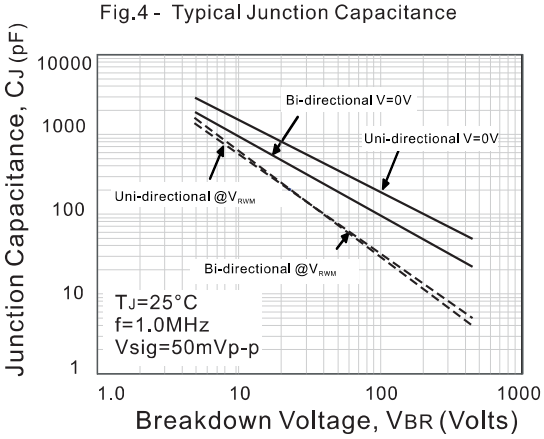


Fig.5 - Steady State Power Derating Curve

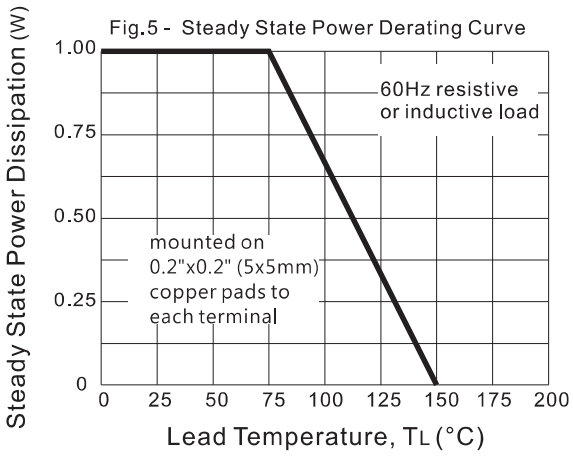


Fig.6 - Maximum Non-Repetitive Forward Surge Current

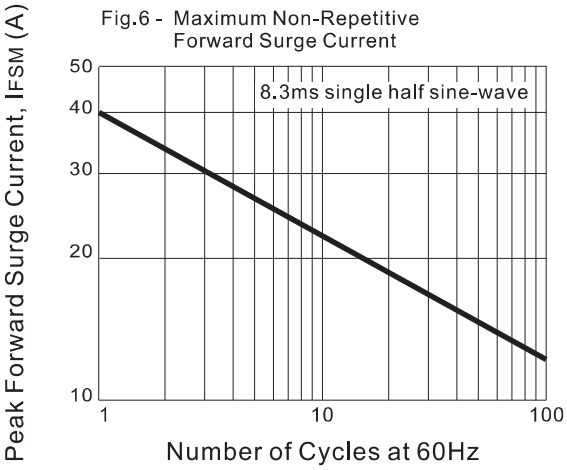


Fig. 7 - Transients of several thousand volts can be clamped to a safe level by the TVS

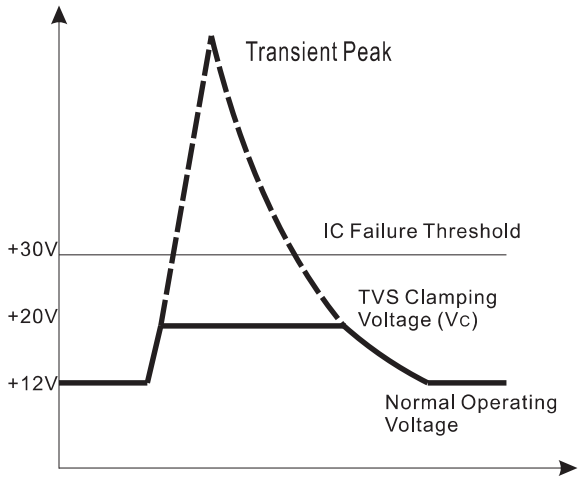
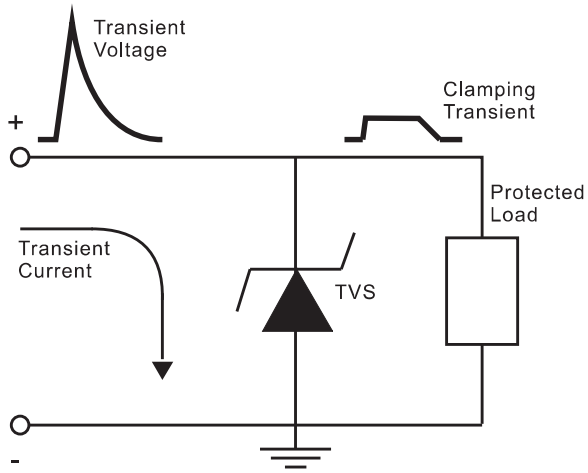


Fig. 8 - Transient current is divered to ground thru TVS; the voltage seen by the protected load is limited to the clamping voltage level



SMAJ-Q1 Series

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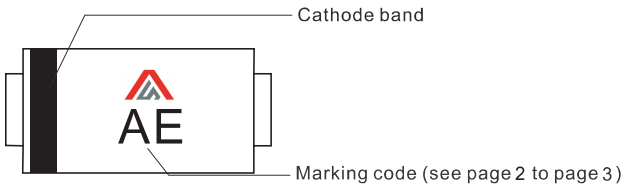
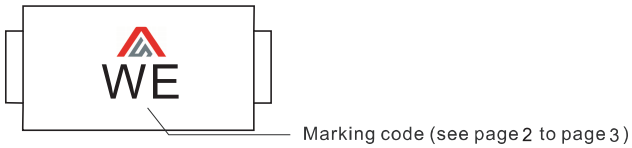
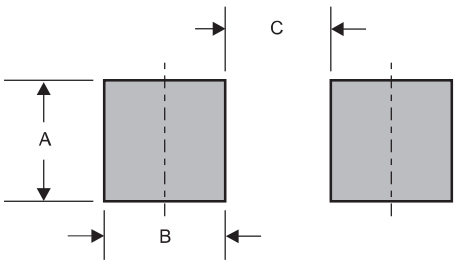
Pinning information

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

Marking

Type number	Example
Uni-Directional	
Bi-Directional	

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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