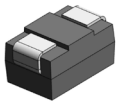
SMAJ

400 W Transient voltage suppressor



Applications

- Consumer electronics
- Telecommunications
- Computing and servers
- Appliances
- Industrial automation
- Mobile and wearables

Product features

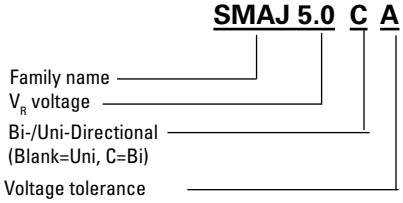
- Low profile SMA package
- Excellent clamping capability
- 400 W peak pulse power capability at 10/1000 µs waveform
- Typical I_R less than 1 µA above 10 V
- Fast response time: typically less than 1.0 ps from 0 V to V_{BR} minimum
- High temperature reflow soldering: +260 °C /40 s at terminal
- Plastic package meets UL 94 V-0 flammability rating
- Meets moisture sensitivity level (MSL) level 1
- Terminal: Solder plated leads, solderable per J-STD-002
- For surface mounted applications in order to optimize board space
- UL 497B recognized. File No. : E198449 Guide QVGQ2

Environmental compliance and general specifications

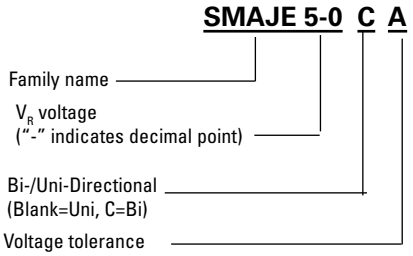
HALOGEN HF FREE

RoHS

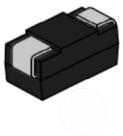
Ordering part number

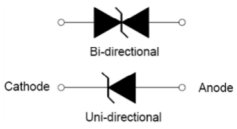


Alternate ordering part number



PIN configuration





Powering Business Worldwide

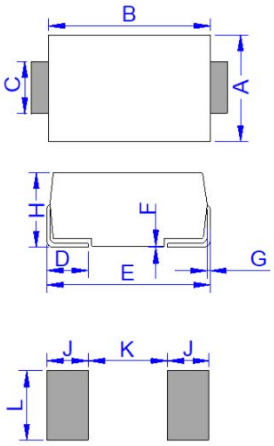
Absolute maximum ratings

(+25 °C, RH=45%-75%, unless otherwise noted)

Parameter	Symbol	Value	Unit
Storage operating junction temperature range	T_{STG}/ T_J	-55 to +150	°C
Steady state power dissipation at T_L= +75 °C	$P_{M(AV)}$	3.3	W
Peak pulse power dissipation on 10/1000 µs waveform	P_{PP}	400	W
Maximum instantaneous forward voltage at 100 A for unidirectional	V_F	5.0	V
Peak forward surge current, 8.3 ms single half sine wave[1]	I_{FSM}	60	A
Typical thermal resistance junction to lead	$R_{\theta JL}$	30	°C/W
Typical thermal resistance junction to ambient	$R_{\theta JA}$	120	°C/W

1. Measured on 8.3 ms single half sine wave or equivalent square wave for unidirectional device only, duty cycle = 4 per minute maximum

Mechanical parameters, pad layout- mm



	Millimeters		Inches	
Dimension	Minimum	Maximum	Minimum	Maximum
A	2.60	3.00	0.102	0.118
B	4.15	4.65	0.163	0.183
C	1.25	1.65	0.049	0.065
D	0.95	1.52	0.037	0.060
E	4.90	5.30	0.193	0.209
F	0.051	0.203	0.002	0.008
G	0.15	0.31	0.006	0.012
H	2.00	2.44	0.079	0.096
J	2.00		0.079	
K		2.30		0.091
L	1.80		0.071	

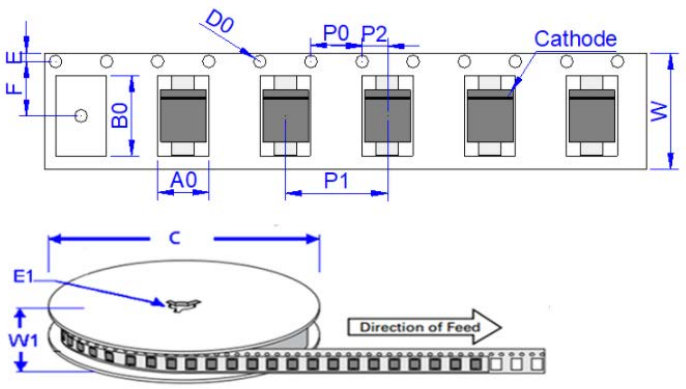
Part marking

Cathode band (uni-polar only)
Part marking: xx = Refer to marking designator listed in Electrical Characteristics table
yyyy- date code

Packaging information (mm)

Drawing not to scale.

Supplied in tape and reel packaging, 5,000 parts per 13" diameter reel (EIA-481 compliant)



Dimension	Millimeters	Inches
A0	2.79 ± 0.3	0.110 ± 0.012
B0	5.33 ± 0.3	0.210 ± 0.012
C	330.0	13.0
D0	1.55 ± 0.1	0.061 ± 0.004
E	1.75 ± 0.2	0.069 ± 0.008
E1	13.3 ± 0.3	0.524 ± 0.012
F	5.50 ± 0.2	0.217 ± 0.008
P0	4.00 ± 0.2	0.157 ± 0.008
P1	4.00 ± 0.2	0.157 ± 0.008
P2	2.00 ± 0.2	0.079 ± 0.008
W	12.0 ± 0.2	0.472 ± 0.008
W1	15.7 ± 2.0	0.618 ± 0.079

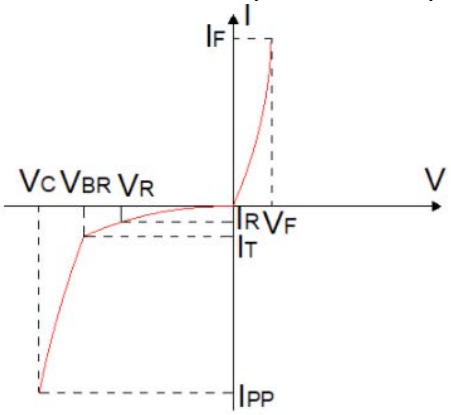
Electrical characteristics (+25 °C)

Part number Uni-polar	Bi-polar	Marking Uni	Bi	V_R (V)	I_R @ V_R (µA)	V_{BR} @ I_T min (V)	max (V)	I_T (mA)	V_C @ I_{PP} max (V)	I_{PP} (A)
SMAJ5.0A	SMAJ5.0CA	HE	TE	5	120	6.4	7	10	9.2	43.5
SMAJ6.0A	SMAJ6.0CA	HG	TG	6	120	6.67	7.37	10	10.3	38.8
SMAJ6.5A	SMAJ6.5CA	HK	TK	6.5	80	7.22	7.98	10	11.2	35.7
SMAJ7.0A	SMAJ7.0CA	HM	TM	7	50	7.78	8.6	10	12	33.3
SMAJ7.5A	SMAJ7.5CA	HP	TP	7.5	50	8.33	9.21	1	12.9	31
SMAJ8.0A	SMAJ8.0CA	HR	TR	8	20	8.89	9.83	1	13.6	29.4
SMAJ8.5A	SMAJ8.5CA	HT	TT	8.5	10	9.44	10.4	1	14.4	27.8
SMAJ9.0A	SMAJ9.0CA	HV	TV	9	5	10	11.1	1	15.4	26
SMAJ10A	SMAJ10CA	HX	TX	10	2	11.1	12.3	1	17	23.5
SMAJ11A	SMAJ11CA	HZ	TZ	11	1	12.2	13.5	1	18.2	22
SMAJ12A	SMAJ12CA	IE	UE	12	1	13.3	14.7	1	19.9	20.1
SMAJ13A	SMAJ13CA	IG	UG	13	1	14.4	15.9	1	21.5	18.6
SMAJ14A	SMAJ14CA	IK	UK	14	1	15.6	17.2	1	23.2	17.3
SMAJ15A	SMAJ15CA	IM	UM	15	1	16.7	18.5	1	24.4	16.4
SMAJ16A	SMAJ16CA	IP	UP	16	1	17.8	19.7	1	26	15.4
SMAJ17A	SMAJ17CA	IR	UR	17	1	18.9	20.9	1	27.6	14.5
SMAJ18A	SMAJ18CA	IT	UT	18	1	20	22.1	1	29.2	13.7
SMAJ20A	SMAJ20CA	IV	UV	20	1	22.2	24.5	1	32.4	12.4
SMAJ22A	SMAJ22CA	IX	UX	22	1	24.4	26.9	1	35.5	11.3
SMAJ24A	SMAJ24CA	IZ	UZ	24	1	26.7	29.5	1	38.9	10.3
SMAJ26A	SMAJ26CA	JE	VE	26	1	28.9	31.9	1	42.1	9.5
SMAJ28A	SMAJ28CA	JG	VG	28	1	31.1	34.4	1	45.4	8.8
SMAJ30A	SMAJ30CA	JK	VK	30	1	33.3	36.8	1	48.4	8.3
SMAJ33A	SMAJ33CA	JM	VM	33	1	36.7	40.6	1	53.3	7.5
SMAJ36A	SMAJ36CA	JP	VP	36	1	40	44.2	1	58.1	6.9
SMAJ40A	SMAJ40CA	JR	VR	40	1	44.4	49.1	1	64.5	6.2
SMAJ43A	SMAJ43CA	JT	VT	43	1	47.8	52.8	1	69.4	5.8
SMAJ45A	SMAJ45CA	JV	VV	45	1	50	55.3	1	72.7	5.5
SMAJ48A	SMAJ48CA	JX	VX	48	1	53.3	58.9	1	77.4	5.2
SMAJ51A	SMAJ51CA	JZ	VZ	51	1	56.7	62.7	1	82.4	4.9
SMAJ54A	SMAJ54CA	RE	WE	54	1	60	66.3	1	87.1	4.6
SMAJ58A	SMAJ58CA	RG	WG	58	1	64.4	71.2	1	93.6	4.3
SMAJ60A	SMAJ60CA	RK	WK	60	1	66.7	73.7	1	96.8	4.1
SMAJ64A	SMAJ64CA	RM	WM	64	1	71.1	78.6	1	103	3.9
SMAJ70A	SMAJ70CA	RP	WP	70	1	77.8	86	1	113	3.6
SMAJ75A	SMAJ75CA	RR	WR	75	1	83.3	92.1	1	121	3.3
SMAJ78A	SMAJ78CA	RT	WT	78	1	86.7	95.8	1	126	3.2
SMAJ85A	SMAJ85CA	RV	WV	85	1	94.4	104	1	137	2.9
SMAJ90A	SMAJ90CA	RX	WX	90	1	100	111	1	146	2.8
SMAJ100A	SMAJ100CA	RZ	WZ	100	1	111	123	1	162	2.5
SMAJ110A	SMAJ110CA	SE	XE	110	1	122	135	1	177	2.3
SMAJ120A	SMAJ120CA	SG	XG	120	1	133	147	1	193	2.1
SMAJ130A	SMAJ130CA	SK	XK	130	1	144	159	1	209	1.9
SMAJ150A	SMAJ150CA	SM	XM	150	1	167	185	1	243	1.7
SMAJ160A	SMAJ160CA	SP	XP	160	1	178	197	1	259	1.6
SMAJ170A	SMAJ170CA	SR	XR	170	1	189	209	1	275	1.5
SMAJ180A	SMAJ180CA	ST	XT	180	1	201	222	1	292	1.4
SMAJ200A	SMAJ200CA	SX	XX	200	1	224	247	1	324	1.3
SMAJ220A	SMAJ220CA	ZE	YE	220	1	246	272	1	356	1.1
SMAJ250A	SMAJ250CA	ZG	YG	250	1	279	309	1	405	1
SMAJ300A	SMAJ300CA	ZK	YK	300	1	335	371	1	486	0.8
SMAJ350A	SMAJ350CA	ZM	YM	350	1	391	432	1	567	0.7
SMAJ400A	SMAJ400CA	ZP	YP	400	1	447	494	1	648	0.6
SMAJ440A	SMAJ440CA	ZR	YR	440	1	492	543	1	713	0.6

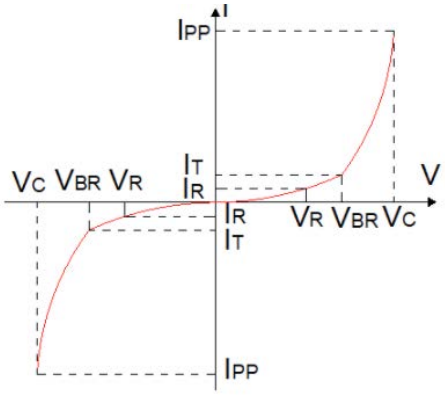
Note: Standard part numbers listed Alternate part numbers have the addition of an E and a "-" for the "." where applicable. Example standard part number SMAJ5.0A, Alternate part number SMAJE5-0A

Ratings and V-I characteristic curves (+25 °C unless otherwise noted)

V- I curve characteristics (Uni-directional)



V- I curve characteristics (Bi-directional)



Surge waveform: 10/1000 µs

V_R: Stand-off voltage – Maximum voltage that can be applied

V_{BR}: Breakdown voltage

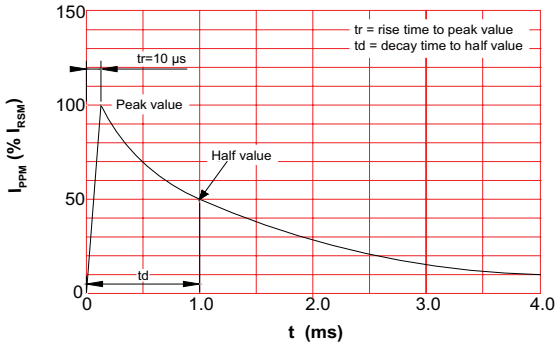
V_C: Clamping voltage – Peak voltage measured across the suppressor at a specified I_{PP}

I_R: Reverse leakage current

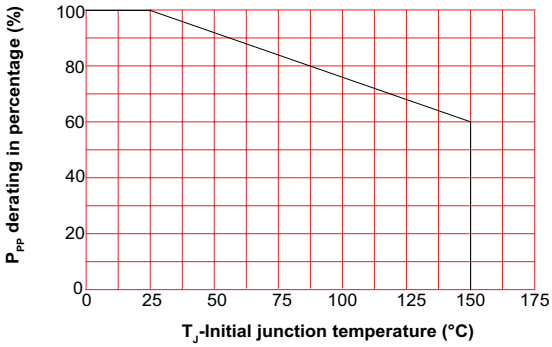
I_T: Test current

V_F: Forward voltage drop for Uni-directional TVS diode

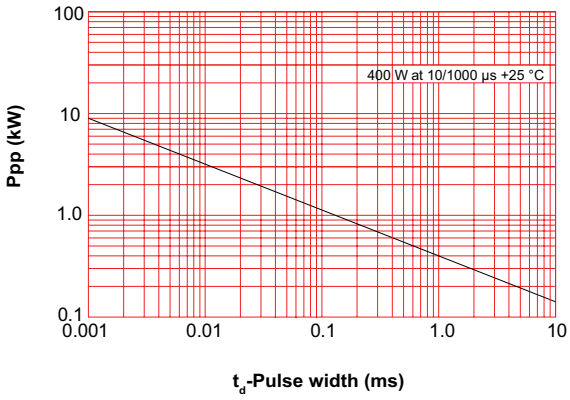
Pulse waveform



Pulse derating curve



Peak pulse power dissipation vs. pulse width



Solder reflow profile

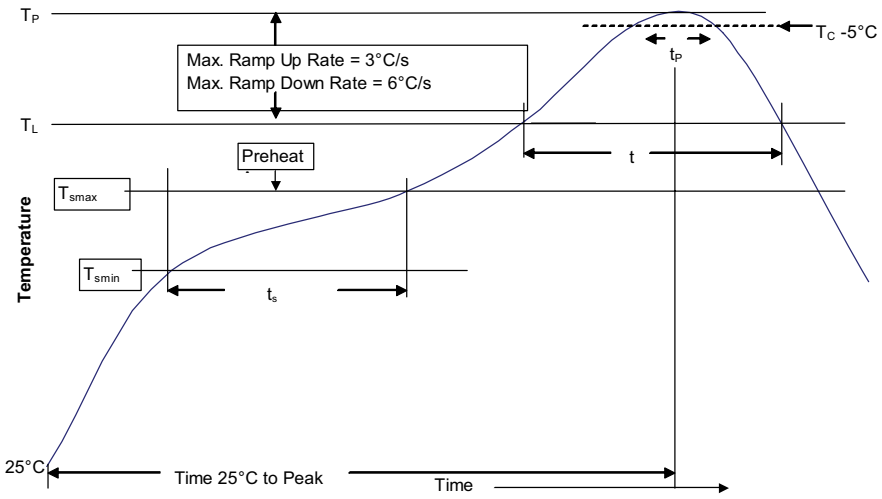


Table 1 - Standard SnPb solder (T_C)

Package thickness	Volume mm3 <350	Volume mm3 ≥350
<2.5 mm	235 °C	220 °C
≥2.5 mm	220 °C	220 °C

Table 2 - Lead (Pb) free solder (T_C)

Package thickness	Volume mm³ <350	Volume mm³ 350 - 2000	Volume mm³ >2000
<1.6 mm	260 °C	260 °C	260 °C
1.6 – 2.5 mm	260 °C	250 °C	245 °C
>2.5 mm	250 °C	245 °C	245 °C

Reference J-STD-020

Profile feature		Standard SnPb solder	Lead (Pb) free solder
Preheat and soak	• Temperature min. (T_{smin})	100 °C	150 °C
	• Temperature max. (T_{smax})	150 °C	200 °C
	• Time (T_{smin} to T_{smax}) (t_s)	60-120 seconds	60-180 seconds
Ramp up rate T_L to T_p		3 °C/ second max.	3 °C/ second max.
Liquidous temperature (T_L) Time (t_L) maintained above T_L		183 °C 60-150 seconds	217 °C 60-150 seconds
Peak package body temperature (T_P)*		Table 1	Table 2
Time (t_p)* within 5 °C of the specified classification temperature (T_C)		20 seconds*	40 seconds*
Ramp-down rate (T_p to T_L)		6 °C/ second max.	6 °C/ second max.
Time 25 °C to peak temperature		6 minutes max.	8 minutes max.

* Tolerance for peak profile temperature (T_p) is defined as a supplier minimum and a user maximum.

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