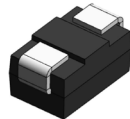


SMAJE

Automotive grade 400 W Transient voltage suppressor



Product features

- Automotive grade (AEC-Q101 qualified)
- Low profile SMA package
- Excellent clamping capability
- High reliability application
- 400 W peak pulse power capability at 10/1000 μ s waveform
- Typical I_R less than 1 μ A above 10 V
- Fast response time: typically less than 1.0 ps from 0 V to V_{BR} minimum
- Plastic package meets UL 94 V-0 flammability rating
- Meets moisture sensitivity level (MSL) level 1
- Terminal: tin plated, solderable per J-STD-002
- UL 497B recognized.
File No. : E198449 Guide QVGQ2

Applications

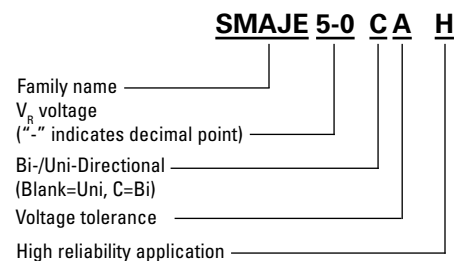
- Automotive chassis and safety systems
- Advanced driver assistance systems (ADAS)
- Communication and infotainment systems
- Network systems and body electronics
- Power Train controls
- xEV and battery systems

Environmental compliance and general specifications

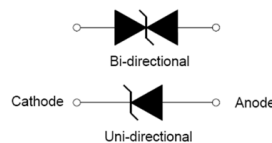
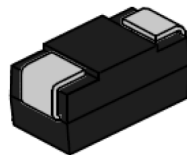
- AEC-Q101 qualified



Ordering part number



PIN configuration



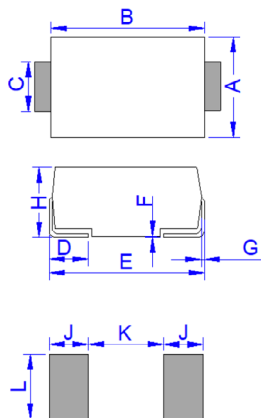
Absolute maximum ratings

(+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 μ s waveform	P_{PP}	400	W
Maximum instantaneous forward voltage at 100 A for unidirectional	V_F	5	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

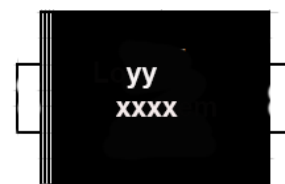
1. Measured on 8.3 ms single half sine wave or equivalent square wave for unidirectional device only, duty cycle = 4 per minute maximum

Mechanical parameters, pad layout- mm/inches



Dimension	Millimeters		Inches	
	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

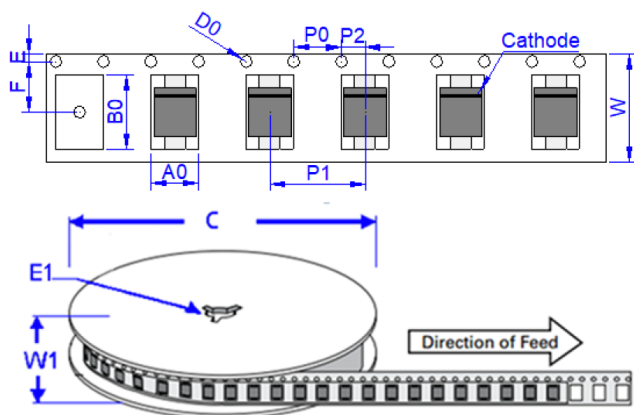


Cathode band (uni-polar only)
Part marking:
xxxx = Date code
yy- Refer to marking designator listed in Electrical characteristics table

Packaging information - mm/inches

Drawing not to scale.

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



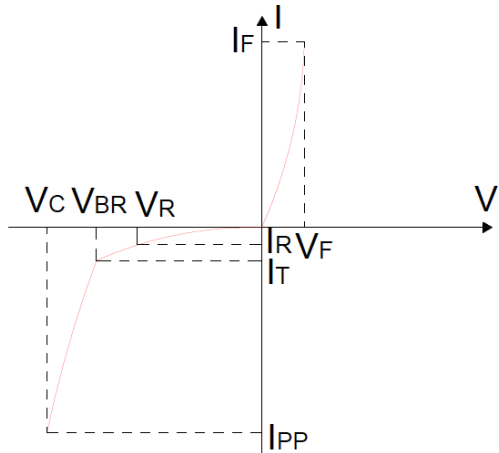
Dimensions	Millimeters	Inches
A0	2.79 ± 0.3	0.110 ± 0.012
B0	5.33 ± 0.3	0.210 ± 0.012
C	330.0	13.0
D0	1.55 ± 0.1	0.061 ± 0.004
E	1.75 ± 0.2	0.069 ± 0.008
E1	13.3 ± 0.3	0.524 ± 0.012
F	5.50 ± 0.2	0.217 ± 0.008
P0	4.00 ± 0.2	0.157 ± 0.008
P1	4.00 ± 0.2	0.157 ± 0.008
P2	2.00 ± 0.2	0.079 ± 0.008
W	12.0 ± 0.2	0.042 ± 0.008
W1	15.7 ± 2.0	0.618 ± 0.079

Electrical specifications (+25 °C)

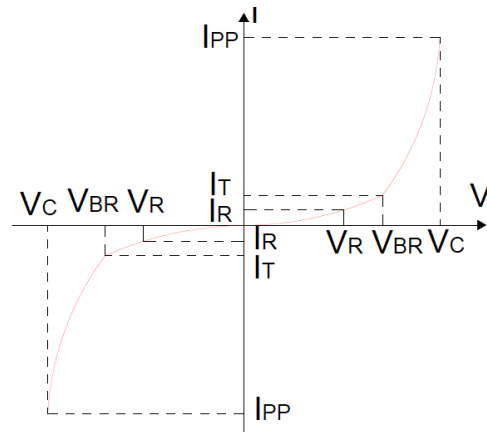
Part number		Marking		V_R	$I_R @ V_R$	$V_{BR} @ I_T$		I_T	$V_C @ I_{PP}$	I_{PP}
Uni-polar	Bi-polar	Uni	Bi	(V)	(μ A)	min (V)	max (V)	(mA)	max (V)	(A)
SMAJE5-0AH	SMAJE5-0CAH	HE	TE	5	120	6.4	7	10	9.2	43.5
SMAJE6-0AH	SMAJE6-0CAH	HG	TG	6	120	6.67	7.37	10	10.3	38.8
SMAJE6-5AH	SMAJE6-5CAH	HK	TK	6.5	80	7.22	7.98	10	11.2	35.7
SMAJE7-0AH	SMAJE7-0CAH	HM	TM	7	50	7.78	8.6	10	12	33.3
SMAJE7-5AH	SMAJE7-5CAH	HP	TP	7.5	50	8.33	9.21	1	12.9	31
SMAJE8-0AH	SMAJE8-0CAH	HR	TR	8	20	8.89	9.83	1	13.6	29.4
SMAJE8-5AH	SMAJE8-5CAH	HT	TT	8.5	10	9.44	10.4	1	14.4	27.8
SMAJE9-0AH	SMAJE9-0CAH	HV	TV	9	5	10	11.1	1	15.4	26
SMAJE10AH	SMAJE10CAH	HX	TX	10	2	11.1	12.3	1	17	23.5
SMAJE11AH	SMAJE11CAH	HZ	TZ	11	1	12.2	13.5	1	18.2	22
SMAJE12AH	SMAJE12CAH	IE	UE	12	1	13.3	14.7	1	19.9	20.1
SMAJE13AH	SMAJE13CAH	IG	UG	13	1	14.4	15.9	1	21.5	18.6
SMAJE14AH	SMAJE14CAH	IK	UK	14	1	15.6	17.2	1	23.2	17.3
SMAJE15AH	SMAJE15CAH	IM	UM	15	1	16.7	18.5	1	24.4	16.4
SMAJE16AH	SMAJE16CAH	IP	UP	16	1	17.8	19.7	1	26	15.4
SMAJE17AH	SMAJE17CAH	IR	UR	17	1	18.9	20.9	1	27.6	14.5
SMAJE18AH	SMAJE18CAH	IT	UT	18	1	20	22.1	1	29.2	13.7
SMAJE20AH	SMAJE20CAH	IV	UV	20	1	22.2	24.5	1	32.4	12.4
SMAJE22AH	SMAJE22CAH	IX	UX	22	1	24.4	26.9	1	35.5	11.3
SMAJE24AH	SMAJE24CAH	IZ	UZ	24	1	26.7	29.5	1	38.9	10.3
SMAJE26AH	SMAJE26CAH	JE	VE	26	1	28.9	31.9	1	42.1	9.5
SMAJE28AH	SMAJE28CAH	JG	VG	28	1	31.1	34.4	1	45.4	8.8
SMAJE30AH	SMAJE30CAH	JK	VK	30	1	33.3	36.8	1	48.4	8.3
SMAJE33AH	SMAJE33CAH	JM	VM	33	1	36.7	40.6	1	53.3	7.5
SMAJE36AH	SMAJE36CAH	JP	VP	36	1	40	44.2	1	58.1	6.9
SMAJE40AH	SMAJE40CAH	JR	VR	40	1	44.4	49.1	1	64.5	6.2
SMAJE43AH	SMAJE43CAH	JT	VT	43	1	47.8	52.8	1	69.4	5.8
SMAJE45AH	SMAJE45CAH	JV	VV	45	1	50	55.3	1	72.7	5.5
SMAJE48AH	SMAJE48CAH	JX	VX	48	1	53.3	58.9	1	77.4	5.2
SMAJE51AH	SMAJE51CAH	JZ	VZ	51	1	56.7	62.7	1	82.4	4.9
SMAJE54AH	SMAJE54CAH	RE	WE	54	1	60	66.3	1	87.1	4.6
SMAJE58AH	SMAJE58CAH	RG	WG	58	1	64.4	71.2	1	93.6	4.3
SMAJE60AH	SMAJE60CAH	RK	WK	60	1	66.7	73.7	1	96.8	4.1
SMAJE64AH	SMAJE64CAH	RM	WM	64	1	71.1	78.6	1	103	3.9
SMAJE70AH	SMAJE70CAH	RP	WP	70	1	77.8	86	1	113	3.6
SMAJE75AH	SMAJE75CAH	RR	WR	75	1	83.3	92.1	1	121	3.3
SMAJE78AH	SMAJE78CAH	RT	WT	78	1	86.7	95.8	1	126	3.2
SMAJE85AH	SMAJE85CAH	RV	VV	85	1	94.4	104	1	137	2.9
SMAJE90AH	SMAJE90CAH	RX	WX	90	1	100	111	1	146	2.8
SMAJE100AH	SMAJE100CAH	RZ	WZ	100	1	111	123	1	162	2.5
SMAJE110AH	SMAJE110CAH	SE	XE	110	1	122	135	1	177	2.3
SMAJE120AH	SMAJE120CAH	SG	XG	120	1	133	147	1	193	2.1
SMAJE130AH	SMAJE130CAH	SK	XK	130	1	144	159	1	209	1.9
SMAJE150AH	SMAJE150CAH	SM	XM	150	1	167	185	1	243	1.7
SMAJE160AH	SMAJE160CAH	SP	XP	160	1	178	197	1	259	1.6
SMAJE170AH	SMAJE170CAH	SR	XR	170	1	189	209	1	275	1.5
SMAJE180AH	SMAJE180CAH	ST	XT	180	1	201	222	1	292	1.4
SMAJE200AH	SMAJE200CAH	SX	XX	200	1	224	247	1	324	1.3
SMAJE220AH	SMAJE220CAH	ZE	YE	220	1	246	272	1	356	1.1
SMAJE250AH	SMAJE250CAH	ZG	YG	250	1	279	309	1	405	1
SMAJE300AH	SMAJE300CAH	ZK	YK	300	1	335	371	1	486	0.8
SMAJE350AH	SMAJE350CAH	ZM	YM	350	1	391	432	1	567	0.7
SMAJE400AH	SMAJE400CAH	ZP	YP	400	1	447	494	1	648	0.6
SMAJE440AH	SMAJE440CAH	ZR	YR	440	1	492	543	1	713	0.6

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 μ s

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

V_{BR} : Breakdown voltage

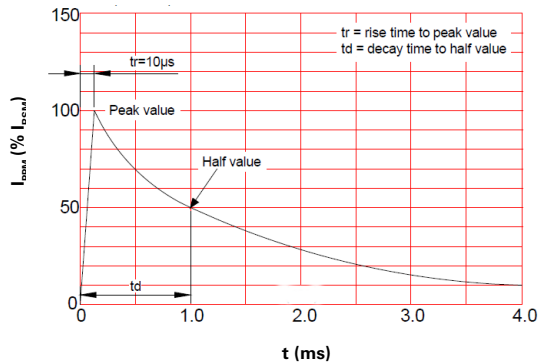
V_C : Clamping voltage – Peak voltage measured across the suppressor at a specified I_{PP}

I_R : Reverse leakage current

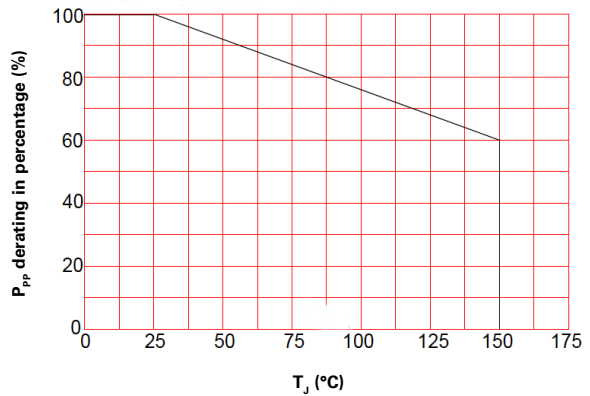
I_T : Test current

V_F : Forward voltage drop for Uni-directional

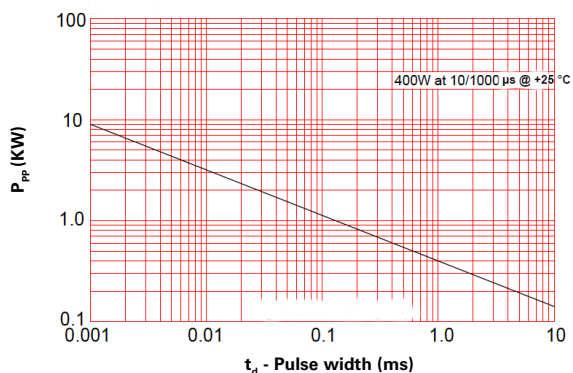
Pulse waveform



Pulse derating curve



Peak pulse power dissipation curve



Solder reflow profile

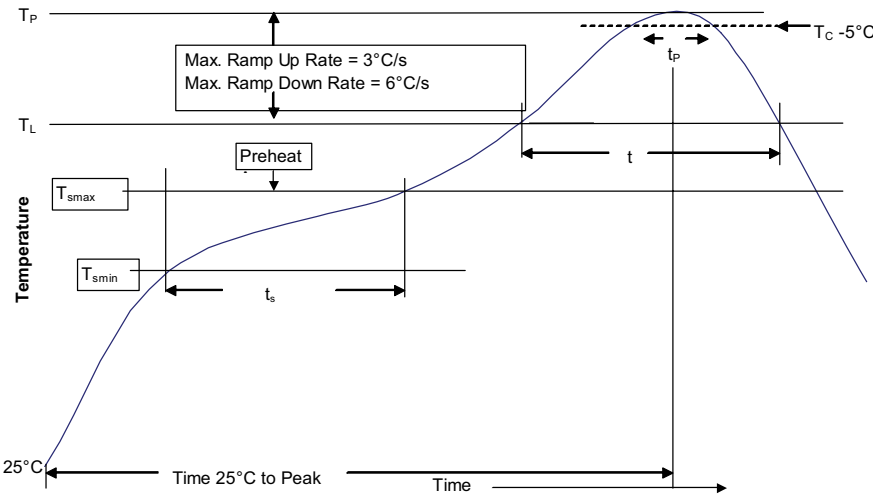


Table 1 - Standard SnPb solder (T_C)

Package thickness	Volume mm ³ <350	Volume mm ³ ≥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 mm ³ <350	Volume mm ³ 350 - 2000	Volume mm ³ >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)	183 °C	217 °C
Time (t_L) maintained above T_L	60-150 seconds	60-150 seconds
Peak package body temperature (T_p)*	Table 1	Table 2 (+0, -5 °C)
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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Eaton
Electronics Division
1000 Eaton Boulevard
Cleveland, OH 44122
United States
Eaton.com/electronics

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