

# SMBJE

## 600 W Transient voltage suppressor



### Product features

- Low profile SMB package
- Excellent clamping capability
- 600 W peak pulse power capability at 10/1000  $\mu$ s waveform
- Typical  $I_R$  less than 1  $\mu$ A 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 QVGO2

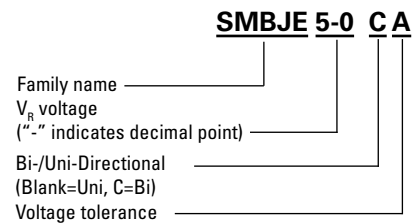
### Applications

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

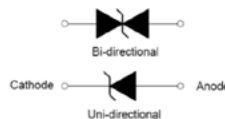
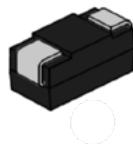
### Environmental compliance and general specifications



### Ordering part number



### PIN configuration



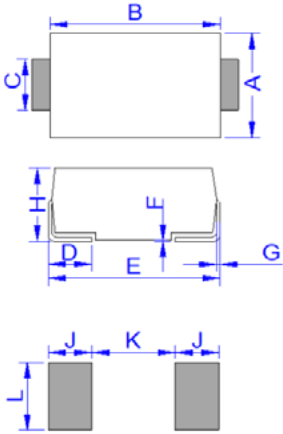
**Absolute maximum ratings**

(+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	$P_{M(AV)}$	5.0	W
Peak pulse power dissipation on 10/1000 $\mu$ s waveform	$P_{PP}$	600	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 <sup>1</sup>	$I_{FSM}$	100	A
Typical thermal resistance junction to lead	$R_{\theta JL}$	20	°C/W
Typical thermal resistance junction to ambient	$R_{\theta JA}$	100	°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**



Dimension	Millimeters		Inches	
	Minimum	Maximum	Minimum	Maximum
A	3.30	3.94	0.130	0.155
B	4.30	4.80	0.169	0.189
C	1.90	2.20	0.075	0.087
D	0.95	1.52	0.037	0.060
E	5.20	5.60	0.205	0.220
F	0.051	0.203	0.002	0.008
G	0.15	0.31	0.006	0.012
H	2.10	2.40	0.083	0.094
J	2.20		0.087	
K		2.60		0.102
L	2.30		0.091	

**Part marking**



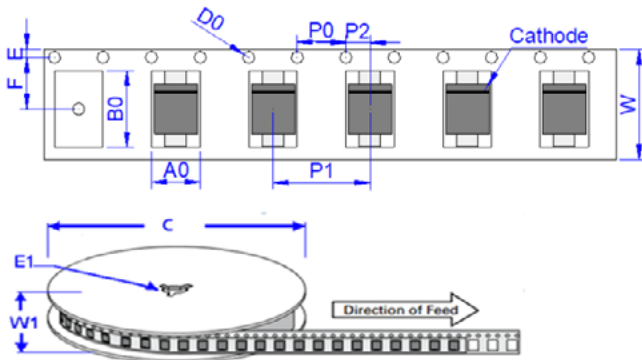
Cathode band (Uni-polar only)

Part marking: xxxx = Date code  
yy- Refer to marking designator listed in Electrical Characteristics table

**Packaging information (mm)**

Drawing not to scale.

Supplied in tape and reel packaging, 3,000 parts per 13" diameter reel (EIA-481 compliant)



Dimension	Millimeters	Inches
A0	3.76 ± 0.3	0.148 ± 0.012
B0	5.69 ± 0.3	0.224 ± 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	8.00 ± 0.2	0.3145 ± 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

**SMBJE**  
600 W Transient voltage suppressor

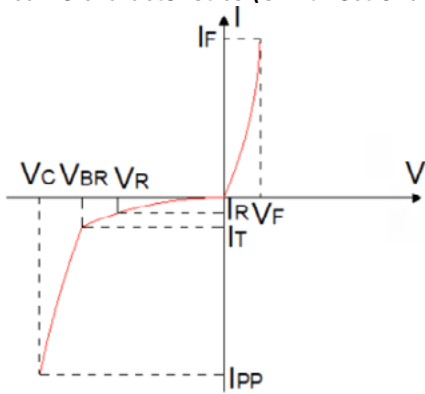
Technical Data 11214  
Effective November 2020

**Electrical characteristics** (+25 °C)

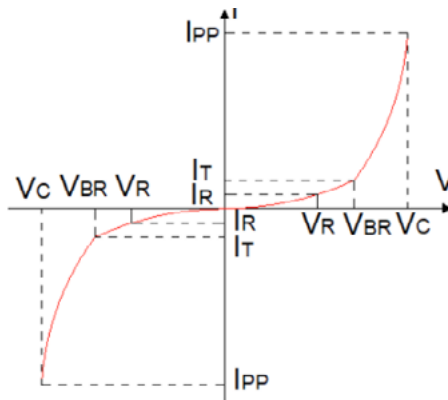
Part number	Bi-polar	Marking		$V_R$ (V)	$I_R @ V_R$ ( $\mu$ A)	$V_{BR} @ I_T$ min (V)	max (V)	$I_T$ (mA)	$V_C @ I_{PP}$ max (V)	$I_{PP}$ (A)
		Uni	Bi							
SMBJE5-0A	SMBJE5-0CA	KE	AE	5	120	6.4	7	10	9.2	65.2
SMBJE6-0A	SMBJE6-0CA	KG	AG	6	120	6.67	7.37	10	10.3	58.3
SMBJE6-5A	SMBJE6-5CA	KK	AK	6.5	120	7.22	7.98	10	11.2	53.6
SMBJE7-0A	SMBJE7-0CA	KM	AM	7	50	7.78	8.6	10	12	50
SMBJE7-5A	SMBJE7-5CA	KP	AP	7.5	50	8.33	9.21	1	12.9	46.5
SMBJE8-0A	SMBJE8-0CA	KR	AR	8	20	8.89	9.83	1	13.6	44.1
SMBJE8-5A	SMBJE8-5CA	KT	AT	8.5	10	9.44	10.4	1	14.4	41.7
SMBJE9-0A	SMBJE9-0CA	KV	AV	9	5	10	11.1	1	15.4	39
SMBJE10A	SMBJE10CA	KX	AX	10	2	11.1	12.3	1	17	35.3
SMBJE11A	SMBJE11CA	KZ	AZ	11	1	12.2	13.5	1	18.2	33
SMBJE12A	SMBJE12CA	LE	BE	12	1	13.3	14.7	1	19.9	30.2
SMBJE13A	SMBJE13CA	LG	BG	13	1	14.4	15.9	1	21.5	27.9
SMBJE14A	SMBJE14CA	LK	BK	14	1	15.6	17.2	1	23.2	25.9
SMBJE15A	SMBJE15CA	LM	BM	15	1	16.7	18.5	1	24.4	24.6
SMBJE16A	SMBJE16CA	LP	BP	16	1	17.8	19.7	1	26	23.1
SMBJE17A	SMBJE17CA	LR	BR	17	1	18.9	20.9	1	27.6	21.8
SMBJE18A	SMBJE18CA	LT	BT	18	1	20	22.1	1	29.2	20.6
SMBJE20A	SMBJE20CA	LV	BV	20	1	22.2	24.5	1	32.4	18.6
SMBJE22A	SMBJE22CA	LX	BX	22	1	24.4	26.9	1	35.5	16.9
SMBJE24A	SMBJE24CA	LZ	BZ	24	1	26.7	29.5	1	38.9	15.4
SMBJE26A	SMBJE26CA	ME	CE	26	1	28.9	31.9	1	42.1	14.3
SMBJE28A	SMBJE28CA	MG	CG	28	1	31.1	34.4	1	45.4	13.2
SMBJE30A	SMBJE30CA	MK	CK	30	1	33.3	36.8	1	48.4	12.4
SMBJE33A	SMBJE33CA	MM	CM	33	1	36.7	40.6	1	53.3	11.3
SMBJE36A	SMBJE36CA	MP	CP	36	1	40	44.2	1	58.1	10.4
SMBJE40A	SMBJE40CA	MR	CR	40	1	44.4	49.1	1	64.5	9.3
SMBJE43A	SMBJE43CA	MT	CT	43	1	47.8	52.8	1	69.4	8.7
SMBJE45A	SMBJE45CA	MV	CV	45	1	50	55.3	1	72.7	8.3
SMBJE48A	SMBJE48CA	MX	CX	48	1	53.3	58.9	1	77.4	7.8
SMBJE51A	SMBJE51CA	MZ	CZ	51	1	56.7	62.7	1	82.4	7.3
SMBJE54A	SMBJE54CA	NE	DE	54	1	60	66.3	1	87.1	6.9
SMBJE58A	SMBJE58CA	NG	DG	58	1	64.4	71.2	1	93.6	6.4
SMBJE60A	SMBJE60CA	NK	DK	60	1	66.7	73.7	1	96.8	6.2
SMBJE64A	SMBJE64CA	NM	DM	64	1	71.1	78.6	1	103	5.8
SMBJE70A	SMBJE70CA	NP	DP	70	1	77.8	86	1	113	5.3
SMBJE75A	SMBJE75CA	NR	DR	75	1	83.3	92.1	1	121	5
SMBJE78A	SMBJE78CA	NT	DT	78	1	86.7	95.8	1	126	4.8
SMBJE85A	SMBJE85CA	NV	DV	85	1	94.4	104	1	137	4.4
SMBJE90A	SMBJE90CA	NX	DX	90	1	100	111	1	146	4.1
SMBJE100A	SMBJE100CA	NZ	DZ	100	1	111	123	1	162	3.7
SMBJE110A	SMBJE110CA	PE	EE	110	1	122	135	1	177	3.4
SMBJE120A	SMBJE120CA	PG	EG	120	1	133	147	1	193	3.1
SMBJE130A	SMBJE130CA	PK	EK	130	1	144	159	1	209	2.9
SMBJE150A	SMBJE150CA	PM	EM	150	1	167	185	1	243	2.5
SMBJE160A	SMBJE160CA	PP	EP	160	1	178	197	1	259	2.3
SMBJE170A	SMBJE170CA	PR	ER	170	1	189	209	1	275	2.2
SMBJE180A	SMBJE180CA	PT	ET	180	1	201	222	1	292	2.1
SMBJE190A	SMBJE190CA	PV	EV	190	1	211	234	1	307	2
SMBJE200A	SMBJE200CA	PX	EX	200	1	224	247	1	324	1.9
SMBJE210A	SMBJE210CA	PZ	EZ	210	1	233	258	1	337	1.8
SMBJE220A	SMBJE220CA	QE	FE	220	1	246	272	1	356	1.7
SMBJE250A	SMBJE250CA	QG	FG	250	1	279	309	1	405	1.5
SMBJE300A	SMBJE300CA	QK	FK	300	1	335	371	1	486	1.3
SMBJE350A	SMBJE350CA	QM	FM	350	1	391	432	1	567	1.1
SMBJE400A	SMBJE400CA	QP	FP	400	1	447	494	1	648	0.9
SMBJE440A	SMBJE440CA	QR	FR	440	1	492	543	1	713	0.8

**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  $\mu$ s

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

$V_{BR}$ : Breakdown voltage

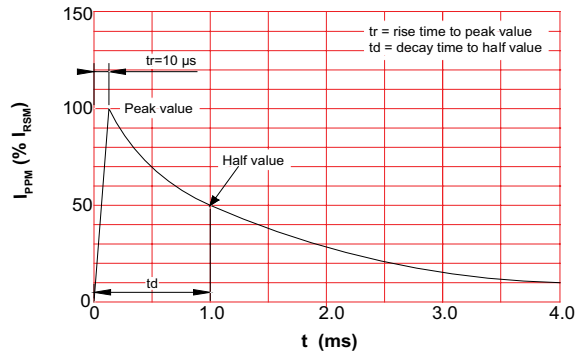
$V_C$ : Clamping voltage – Peak voltage measured across the suppressor at a specified  $I_{PP}$

$I_R$ : Reverse leakage current

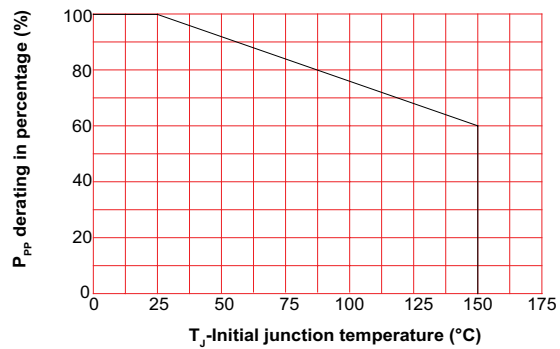
$I_T$ : Test current

$V_F$ : Forward voltage drop for Uni-directional TVS diode

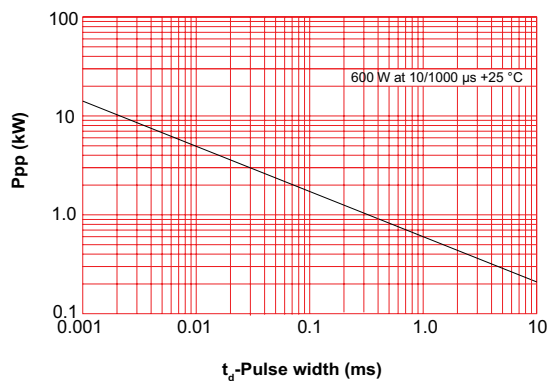
**Pulse waveform**



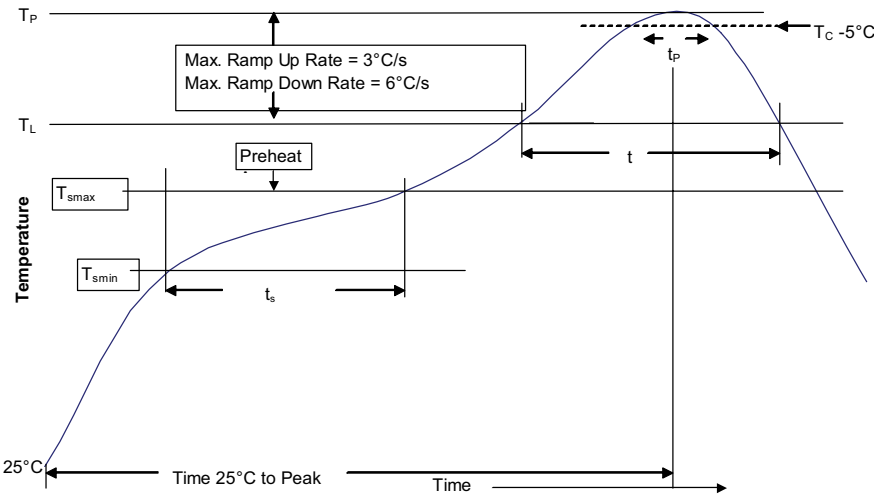
**Pulse derating curve**



**Peak pulse power dissipation vs. pulse width**



**Solder reflow profile**



**Table 1 - Standard SnPb solder ( $T_C$ )**

Package thickness	Volume $\text{mm}^3$ <350	Volume $\text{mm}^3$ $\geq$ 350
<2.5 mm	235 °C	220 °C
$\geq$ 2.5 mm	220 °C	220 °C

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

Package thickness	Volume $\text{mm}^3$ <350	Volume $\text{mm}^3$ 350 - 2000	Volume $\text{mm}^3$ >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	<ul style="list-style-type: none"> <li>Temperature min. (<math>T_{smin}</math>)</li> <li>Temperature max. (<math>T_{smax}</math>)</li> <li>Time (<math>T_{smin}</math> to <math>T_{smax}</math>) (<math>t_s</math>)</li> </ul>	<ul style="list-style-type: none"> <li>100 °C</li> <li>150 °C</li> <li>60-120 seconds</li> </ul>
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 $T_L$	<ul style="list-style-type: none"> <li>183 °C</li> <li>60-150 seconds</li> </ul>	<ul style="list-style-type: none"> <li>217 °C</li> <li>60-150 seconds</li> </ul>
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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