



## SMBJ Series 600W Transient Voltage Suppressor

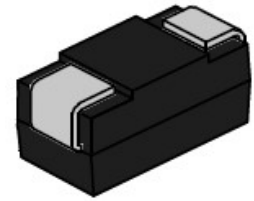
Rev.4.3

### DESCRIPTION:

TVS diodes can be used in a wide range of applications which like consumer electronic products, automotive industries, munitions, telecommunications, aerospace industries, and intelligent control systems.

### FEATURES:

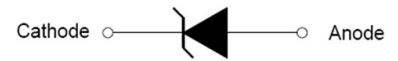
- ✧ Low profile package.
- ✧ Low inductance.
- ✧ Excellent clamping capability.
- ✧ 600W peak pulse power capability at 10/1000μs waveform.
- ✧ Typical  $I_R$  less than 1μA above 10V.
- ✧ Fast response time: typically less than 1.0ps from 0V to  $V_{BR}$  min.
- ✧ High temperature to reflow soldering: 260°C/40s at terminals.
- ✧ Plastic package has underwriters laboratory flammability 94V-0.
- ✧ Meets MSL level 1, per J-STD-020, LF maximum peak of 260°C.
- ✧ Terminal: solder plated, solderable per J-STD-002.
- ✧ For surface mounted applications in order to optimize board space.
- ✧ UL 497B item recognized. (File No.:E480698).
- ✧ IEC61000-4-2 (ESD) ±30kV (air), ±30kV (contact).



SMB



Bi-directional



Uni-directional

Symbol

### ABSOLUTE MAXIMUM RATINGS ( $T_A=25^\circ\text{C}$ , RH=45%-75%, unless otherwise noted)

Parameter	Symbol	Value	Unit
Operating junction and storage temperature range	$T_J/T_{STG}$	-55 to +150	°C
Peak pulse power dissipation at 10/1000μs waveform	$P_{PP}$	600	W
Steady state power dissipation at $T_L=75^\circ\text{C}$	$P_{M(AV)}$	5.0	W
Maximum instantaneous forward voltage at 50A for unidirectional	$V_F$	5.0	V
Peak forward surge current, 8.3ms single half sine wave(Note 1)	$I_{FSM}$	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

### Notes:

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

## MARKING



AE: Device Marking Code  
1409: In ninth week, 2014

ELECTRICAL CHARACTERISTICS (T<sub>A</sub>=25°C)

Part Number		Marking		V <sub>R</sub>	I <sub>R</sub> @V <sub>R</sub>	V <sub>BR</sub> @I <sub>T</sub>		I <sub>T</sub>	V <sub>C</sub> @I <sub>PP</sub>	I <sub>PP</sub> <sup>①</sup>
Uni-Polar	Bi-Polar	Uni	Bi	V	max(μA)	min(V)	max(V)	mA	max(V)	A
SMBJ5.0A	SMBJ5.0CA	KE	AE	5.0	120	6.40	7.00	10	9.2	65.2
SMBJ6.0A	SMBJ6.0CA	KG	AG	6.0	120	6.67	7.37	10	10.3	58.3
SMBJ6.5A	SMBJ6.5CA	KK	AK	6.5	120	7.22	7.98	10	11.2	53.6
SMBJ7.0A	SMBJ7.0CA	KM	AM	7.0	50	7.78	8.60	10	12.0	50.0
SMBJ7.5A	SMBJ7.5CA	KP	AP	7.5	50	8.33	9.21	1	12.9	46.5
SMBJ8.0A	SMBJ8.0CA	KR	AR	8.0	20	8.89	9.83	1	13.6	44.1
SMBJ8.5A	SMBJ8.5CA	KT	AT	8.5	10	9.44	10.40	1	14.4	41.7
SMBJ9.0A	SMBJ9.0CA	KV	AV	9.0	5	10.00	11.10	1	15.4	39.0
SMBJ10A	SMBJ10CA	KX	AX	10	2	11.10	12.30	1	17.0	35.3
SMBJ11A	SMBJ11CA	KZ	AZ	11	1	12.20	13.50	1	18.2	33.0
SMBJ12A	SMBJ12CA	LE	BE	12	1	13.30	14.70	1	19.9	30.2
SMBJ13A	SMBJ13CA	LG	BG	13	1	14.40	15.90	1	21.5	27.9
SMBJ14A	SMBJ14CA	LK	BK	14	1	15.60	17.20	1	23.2	25.9
SMBJ15A	SMBJ15CA	LM	BM	15	1	16.70	18.50	1	24.4	24.6
SMBJ16A	SMBJ16CA	LP	BP	16	1	17.80	19.70	1	26.0	23.1
SMBJ17A	SMBJ17CA	LR	BR	17	1	18.90	20.90	1	27.6	21.8
SMBJ18A	SMBJ18CA	LT	BT	18	1	20.00	22.10	1	29.2	20.6
SMBJ20A	SMBJ20CA	LV	BV	20	1	22.20	24.50	1	32.4	18.6
SMBJ22A	SMBJ22CA	LX	BX	22	1	24.40	26.90	1	35.5	16.9
SMBJ24A	SMBJ24CA	LZ	BZ	24	1	26.70	29.50	1	38.9	15.4
SMBJ26A	SMBJ26CA	ME	CE	26	1	28.90	31.90	1	42.1	14.3
SMBJ28A	SMBJ28CA	MG	CG	28	1	31.10	34.40	1	45.4	13.2
SMBJ30A	SMBJ30CA	MK	CK	30	1	33.30	36.80	1	48.4	12.4

ELECTRICAL CHARACTERISTICS (T<sub>A</sub>=25°C, continued)

Part Number		Marking		V <sub>R</sub>	I <sub>R</sub> @V <sub>R</sub>	V <sub>BR</sub> @I <sub>T</sub>		I <sub>T</sub>	V <sub>C</sub> @I <sub>PP</sub>	I <sub>PP</sub> <sup>①</sup>
Uni-Polar	Bi-Polar	Uni	Bi	V	max(μA)	min(V)	max(V)	mA	max(V)	A
SMBJ33A	SMBJ33CA	MM	CM	33	1	36.70	40.60	1	53.3	11.3
SMBJ36A	SMBJ36CA	MP	CP	36	1	40.00	44.20	1	58.1	10.4
SMBJ40A	SMBJ40CA	MR	CR	40	1	44.40	49.10	1	64.5	9.3
SMBJ43A	SMBJ43CA	MT	CT	43	1	47.80	52.80	1	69.4	8.7
SMBJ45A	SMBJ45CA	MV	CV	45	1	50.00	55.30	1	72.7	8.3
SMBJ48A	SMBJ48CA	MX	CX	48	1	53.30	58.90	1	77.4	7.8
SMBJ51A	SMBJ51CA	MZ	CZ	51	1	56.70	62.70	1	82.4	7.3
SMBJ54A	SMBJ54CA	NE	DE	54	1	60.00	66.30	1	87.1	6.9
SMBJ58A	SMBJ58CA	NG	DG	58	1	64.40	71.20	1	93.6	6.4
SMBJ60A	SMBJ60CA	NK	DK	60	1	66.70	73.70	1	96.8	6.2
SMBJ64A	SMBJ64CA	NM	DM	64	1	71.10	78.60	1	103.0	5.8
SMBJ70A	SMBJ70CA	NP	DP	70	1	77.80	86.00	1	113.0	5.3
SMBJ75A	SMBJ75CA	NR	DR	75	1	83.30	92.10	1	121.0	5.0
SMBJ78A	SMBJ78CA	NT	DT	78	1	86.70	95.80	1	126.0	4.8
SMBJ85A	SMBJ85CA	NV	DV	85	1	94.40	104.0	1	137.0	4.4
SMBJ90A	SMBJ90CA	NX	DX	90	1	100.0	111.0	1	146.0	4.1
SMBJ100A	SMBJ100CA	NZ	DZ	100	1	111.0	123.0	1	162.0	3.7
SMBJ110A	SMBJ110CA	PE	EE	110	1	122.0	135.0	1	177.0	3.4
SMBJ120A	SMBJ120CA	PG	EG	120	1	133.0	147.0	1	193.0	3.1
SMBJ130A	SMBJ130CA	PK	EK	130	1	144.0	159.0	1	209.0	2.9
SMBJ150A	SMBJ150CA	PM	EM	150	1	167.0	185.0	1	243.0	2.5
SMBJ160A	SMBJ160CA	PP	EP	160	1	178.0	197.0	1	259.0	2.3
SMBJ170A	SMBJ170CA	PR	ER	170	1	189.0	209.0	1	275.0	2.2
SMBJ180A	SMBJ180CA	PT	ET	180	1	201.0	222.0	1	292.0	2.1
SMBJ190A	SMBJ190CA	PV	EV	190	1	211.0	234.0	1	307.0	2.0
SMBJ200A	SMBJ200CA	PX	EX	200	1	224.0	247.0	1	324.0	1.9
SMBJ210A	SMBJ210CA	PZ	EZ	210	1	233.0	258.0	1	337.0	1.8
SMBJ220A	SMBJ220CA	QE	FE	220	1	246.0	272.0	1	356.0	1.7
SMBJ250A	SMBJ250CA	QG	FG	250	1	279.0	309.0	1	405.0	1.5
SMBJ300A	SMBJ300CA	QK	FK	300	1	335.0	371.0	1	486.0	1.3

**ELECTRICAL CHARACTERISTICS** ( $T_A=25^{\circ}\text{C}$ , continued)

Part Number		Marking		$V_R$	$I_R@V_R$	$V_{BR}@I_T$		$I_T$	$V_C@I_{PP}$	$I_{PP}^{①}$
Uni-Polar	Bi-Polar	Uni	Bi	V	max( $\mu\text{A}$ )	min(V)	max(V)	mA	max(V)	A
SMBJ350A	SMBJ350CA	QM	FM	350	1	391.0	432.0	1	567.0	1.1
SMBJ400A	SMBJ400CA	QP	FP	400	1	447.0	494.0	1	648.0	0.9
SMBJ440A	SMBJ440CA	QR	FR	440	1	492.0	543.0	1	713.0	0.8

① Surge waveform: 10/1000 $\mu\text{s}$

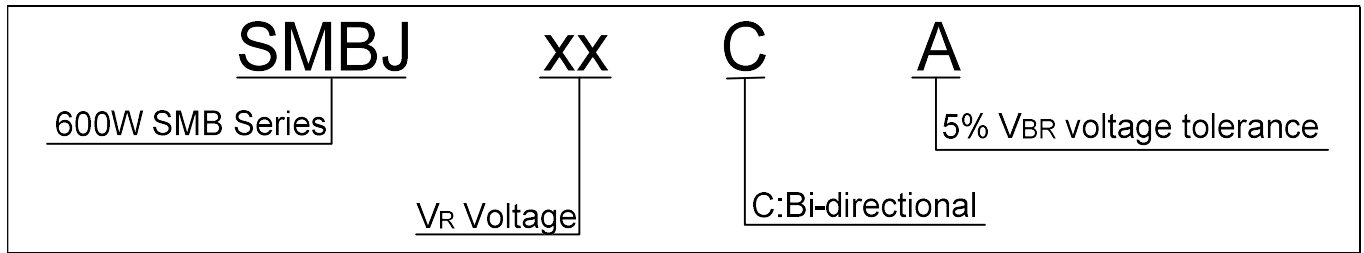
$V_R$ : Stand-off voltage -- Maximum voltage that can be applied

$V_{BR}$ : Breakdown voltage

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

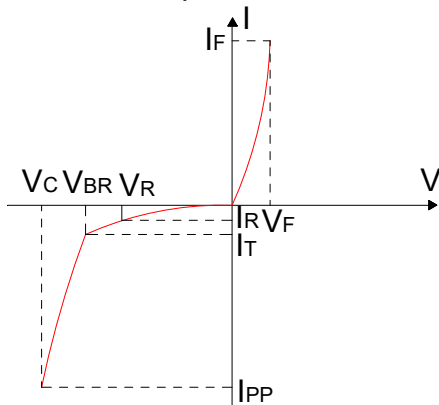
$I_R$ : Reverse leakage current

**ORDERING INFORMATION**



**RATINGS AND V-I CHARACTERISTICS CURVES** ( $T_A=25^{\circ}\text{C}$ , unless otherwise noted)

**FIG.1:V- I curve characteristics (Uni-directional)**



**FIG.2:V- I curve characteristics (Bi-directional)**

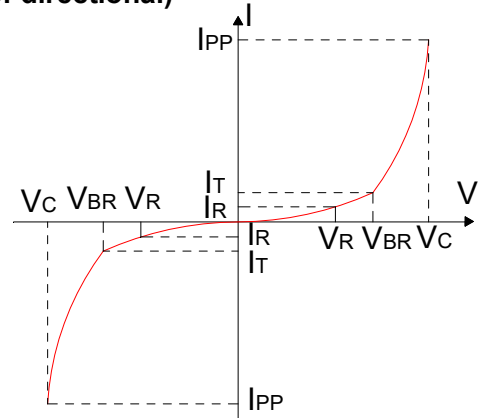


FIG.3: Pulse waveform

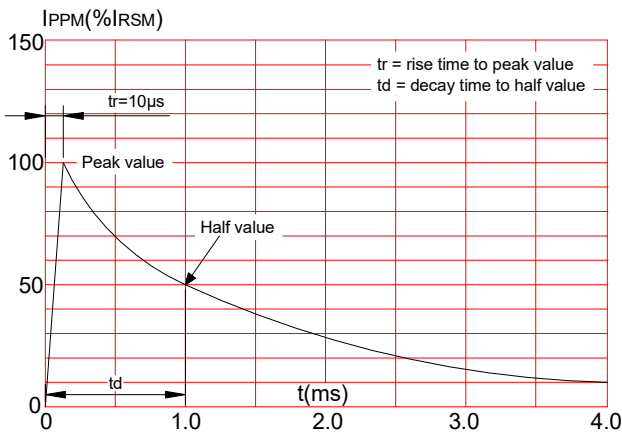


FIG.4: Pulse derating curve

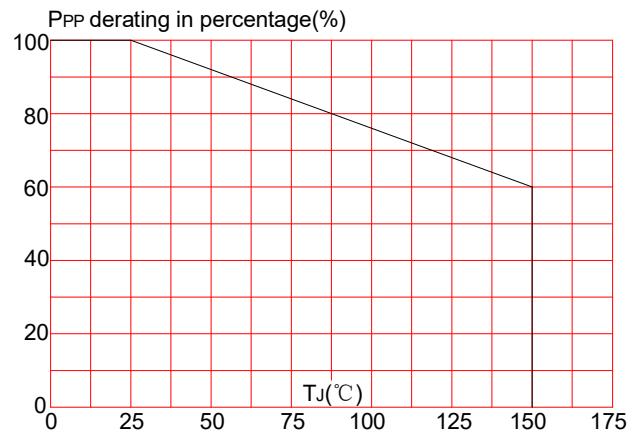
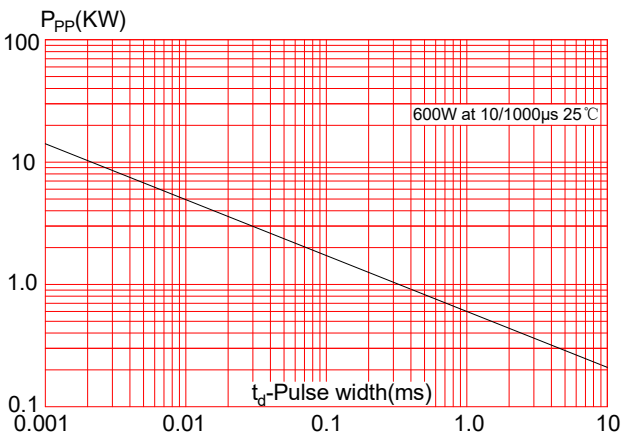
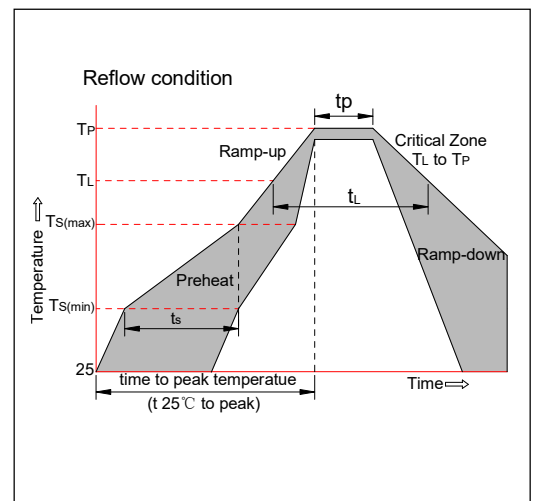


FIG.5: Peak pulse power dissipation vs. pulse width

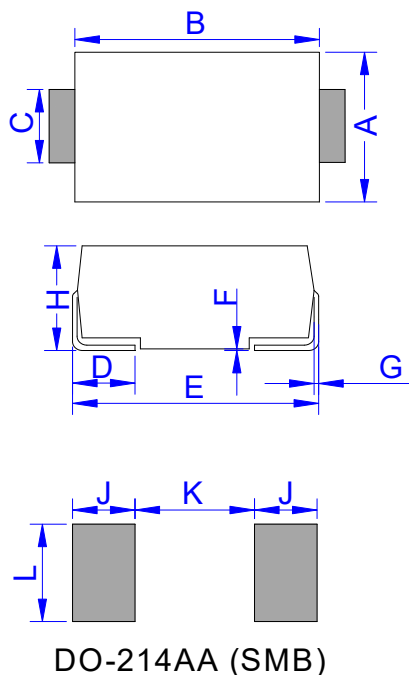


SOLDERING PARAMETERS

Reflow Condition		Pb-Free assembly (see figure at right)
Pre Heat	-Temperature Min ( $T_{s(min)}$ )	+150°C
	-Temperature Max( $T_{s(max)}$ )	+200°C
	-Time (Min to Max) ( $t_s$ )	60-180 secs.
Average ramp up rate (Liquidus Temp ( $T_L$ ) to peak)		3°C/sec. Max
$T_{s(max)}$ to $T_L$ - Ramp-up Rate		3°C/sec. Max
Reflow	-Temperature( $T_L$ )(Liquidus)	+217°C
	-Temperature( $t_L$ )	60-150 secs.
Peak Temp ( $T_p$ )		+260(+0/-5)°C
Time within 5°C of actual Peak Temp ( $t_p$ )		20-40secs.
Ramp-down Rate		6°C/sec. Max
Time 25°C to Peak Temp ( $T_p$ )		8 min. Max
Do not exceed		+260°C

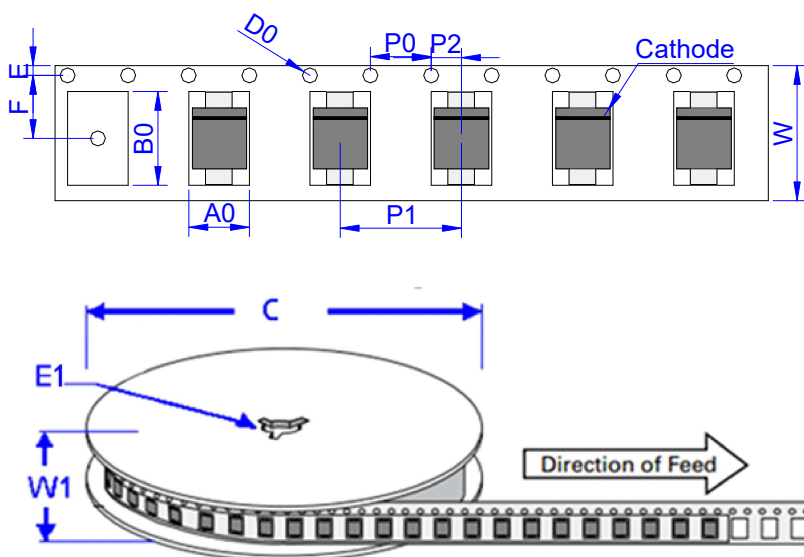


PACKAGE MECHANICAL DATA



Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
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	

TAPE AND REEL SPECIFICATION-SMB



Ref.	Dimensions	
	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	5.5 ± 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

PART No.	UNIT WEIGHT (g/PCS) typ.	REEL (PCS)	PER CARTON (PCS)	DESCRIPTION
SMBJxxA/CA	0.098	3,000	48,000	13 inch reel pack

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