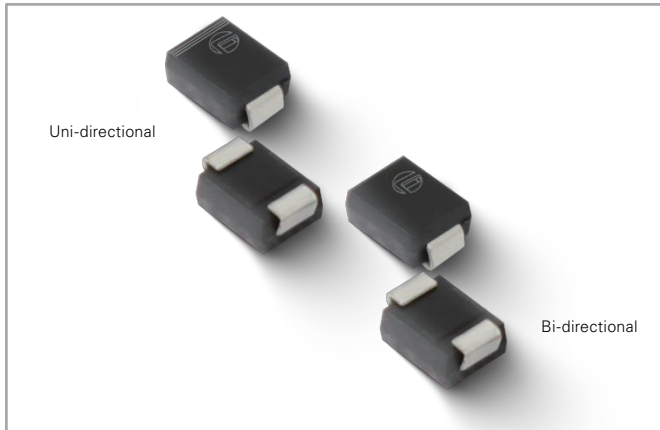


SMBJ Series

Surface Mount – 600W



Additional Information



Resources



Accessories



Samples

Agency Approvals

Agency	Agency File Number
	E528309

Maximum Ratings and Thermal Characteristics

($T_A = 25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Value	Unit
Peak Pulse Power Dissipation by 10/1000 μs Waveform(Fig.1)(Note 1)(Note 2) -Single Die Parts	P_{PPM}	600	W
Power Dissipation on Infinite Heat Sink at $T_L = 50^\circ\text{C}$	P_D	5	W
Peak Forward Surge Current, 8.3ms Single Half Sine Wave (Note 3)	I_{FSM}	60	A
Maximum Instantaneous Forward Voltage at 50A for Unidirectional Only (Note 4)	V_F	3.5/5.0	V
Operating Temperature Range	T_J	-55 to 150	$^\circ\text{C}$
Storage Temperature Range	T_{STG}	-55 to 150	$^\circ\text{C}$
Typical Thermal Resistance Junction to Lead	$R_{\theta JL}$	20	$^\circ\text{C}/\text{W}$
Typical Thermal Resistance Junction to Ambient	$R_{\theta JA}$	100	$^\circ\text{C}/\text{W}$

Notes:

1. Non-repetitive current pulse, per Fig.3 and derated above T_J (initial) $\approx 25^\circ\text{C}$ per Fig.2
2. Mounted on copper pad area of 0.2x0.2" (5.0 x 5.0mm) to each terminal.
3. Measured on 8.3ms single half sine wave or equivalent square wave for unidirectional device only, duty cycle=4 per minute maximum.
4. $V_F < 3.5\text{V}$ for single die parts and $V_F < 5.0\text{V}$ for stacked-die parts.

Description

The SMBJ series is designed specifically to protect sensitive electronic equipment from voltage transients induced by lightning and other transient voltage events.

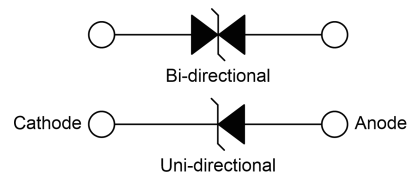
Features

- 600W peak pulse power capability at 10/1000 μs waveform, repetition rate (duty cycles):0.01%
- Excellent clamping capability
- Low incremental surge resistance
- Typical I_R less than 1 μA when $V_B \text{ min} > 12\text{V}$
- Optimized surface mount footprint for minimal PCB space impact
- Low profile package
- Typical failure mode due to exceeding maximum ratings is a short circuit condition
- Whisker test conducted based on Table 4a and 4c of JEDEC JESD201A
- ESD protection of data lines in accordance with IEC 61000-4-2, 30kV(Air), 30kV (Contact)
- EFT protection of data lines in accordance with IEC 61000-4-4
- Built-in strain relief
- Fast response time: typically less than 1.0ps from 0V to $V_B \text{ min}$
- High temperature to reflow soldering guaranteed: 260 $^\circ\text{C}$ /20~40sec.
- $V_B @ T_J = V_B @ 25^\circ\text{C} \times (1 + \alpha T \times (T_J - 25))$ (α T: Temperature Coefficient, typical value is 0.1%)
- UL Recognized compound meeting flammability classification V-0
- Meet MSL level1, per J-STD-020, LF maximum peak of 260 $^\circ\text{C}$
- Matte tin lead-free plated
- Halogen free and RoHS compliant
- Pb-free E3 means 2nd level interconnect is Pb-free and the terminal finish material is tin(Sn) (IPC/JEDEC J-STD 609A.01)
- UL Recognized to ANSI/UL 497B: Protectors for Data Communications and Fire-Alarm Circuits.

Applications

TVS devices are ideal for the protection of I/O Interfaces, V_{CC} bus and other vulnerable circuits used in Telecom, Computer, Industrial and Consumer electronic applications.

Functional Diagram



SMBJ Series

Surface Mount – 600W

Electrical Characteristics (T_A=25 °C unless otherwise noted)

Part Number		Device Marking Code		Reverse Stand-Off Voltage	Breakdown Voltage @ I _T		Test Current	Maximum Clamping Voltage @ I _{PP}	Peak Pulse Current	Reverse Leakage @ V _R	Agency Approvals
Uni.	Bi.	Uni.	Bi.	V _R (V)	V _{B Min.} (V)	V _{B Max.} (V)	I _T (mA)	V _C (V)	I _{PP} (A)	I _R (μA)	
SMBJ5.0A	SMBJ5.0CA	KE	AE	5.0	6.40	7.00	10	9.2	65.3	800	✓
SMBJ6.0A	SMBJ6.0CA	KG	AG	6.0	6.67	7.37	10	10.3	58.3	800	✓
SMBJ6.5A	SMBJ6.5CA	KK	AK	6.5	7.22	7.98	10	11.2	53.6	500	✓
SMBJ7.0A	SMBJ7.0CA	KM	AM	7.0	7.78	8.60	10	12.0	50.0	200	✓
SMBJ7.5A	SMBJ7.5CA	KP	AP	7.5	8.33	9.21	1	12.9	46.6	100	✓
SMBJ8.0A	SMBJ8.0CA	KR	AR	8.0	8.89	9.83	1	13.6	44.2	50	✓
SMBJ8.5A	SMBJ8.5CA	KT	AT	8.5	9.44	10.40	1	14.4	41.7	20	✓
SMBJ9.0A	SMBJ9.0CA	KV	AV	9.0	10.00	11.10	1	15.4	39.0	10	✓
SMBJ10A	SMBJ10CA	KX	AX	10.0	11.10	12.30	1	17.0	35.3	5	✓
SMBJ11A	SMBJ11CA	KZ	AZ	11.0	12.20	13.50	1	18.2	33.0	1	✓
SMBJ12A	SMBJ12CA	LE	BE	12.0	13.30	14.70	1	19.9	30.2	1	✓
SMBJ13A	SMBJ13CA	LG	BG	13.0	14.40	15.90	1	21.5	28.0	1	✓
SMBJ14A	SMBJ14CA	LK	BK	14.0	15.60	17.20	1	23.2	25.9	1	✓
SMBJ15A	SMBJ15CA	LM	BM	15.0	16.70	18.50	1	24.4	24.6	1	✓
SMBJ16A	SMBJ16CA	LP	BP	16.0	17.80	19.70	1	26.0	23.1	1	✓
SMBJ17A	SMBJ17CA	LR	BR	17.0	18.90	20.90	1	27.6	21.8	1	✓
SMBJ18A	SMBJ18CA	LT	BT	18.0	20.00	22.10	1	29.2	20.6	1	✓
SMBJ20A	SMBJ20CA	LV	BV	20.0	22.20	24.50	1	32.4	18.6	1	✓
SMBJ22A	SMBJ22CA	LX	BX	22.0	24.40	26.90	1	35.5	16.9	1	✓
SMBJ24A	SMBJ24CA	LZ	BZ	24.0	26.70	29.50	1	38.9	15.5	1	✓
SMBJ26A	SMBJ26CA	ME	CE	26.0	28.90	31.90	1	42.1	14.3	1	✓
SMBJ28A	SMBJ28CA	MG	CG	28.0	31.10	34.40	1	45.4	13.3	1	✓
SMBJ30A	SMBJ30CA	MK	CK	30.0	33.30	36.80	1	48.4	12.4	1	✓
SMBJ33A	SMBJ33CA	MM	CM	33.0	36.70	40.60	1	53.3	11.3	1	✓
SMBJ36A	SMBJ36CA	MP	CP	36.0	40.00	44.20	1	58.1	10.4	1	✓
SMBJ40A	SMBJ40CA	MR	CR	40.0	44.40	49.10	1	64.5	9.3	1	✓
SMBJ43A	SMBJ43CA	MT	CT	43.0	47.80	52.80	1	69.4	8.7	1	✓
SMBJ45A	SMBJ45CA	MV	CV	45.0	50.00	55.30	1	72.7	8.3	1	✓
SMBJ48A	SMBJ48CA	MX	CX	48.0	53.30	58.90	1	77.4	7.8	1	✓
SMBJ51A	SMBJ51CA	MZ	CZ	51.0	56.70	62.70	1	82.4	7.3	1	✓
SMBJ54A	SMBJ54CA	NE	DE	54.0	60.00	66.30	1	87.1	6.9	1	✓
SMBJ58A	SMBJ58CA	NG	DG	58.0	64.40	71.20	1	93.6	6.5	1	✓
SMBJ60A	SMBJ60CA	NK	DK	60.0	66.70	73.70	1	96.8	6.2	1	✓
SMBJ64A	SMBJ64CA	NM	DM	64.0	71.10	78.60	1	103.0	5.9	1	✓
SMBJ70A	SMBJ70CA	NP	DP	70.0	77.80	86.00	1	113.0	5.3	1	✓
SMBJ75A	SMBJ75CA	NR	DR	75.0	83.30	92.10	1	121.0	5.0	1	✓
SMBJ78A	SMBJ78CA	NT	DT	78.0	86.70	95.80	1	126.0	4.8	1	✓
SMBJ85A	SMBJ85CA	NV	DV	85.0	94.40	104.00	1	137.0	4.4	1	✓
SMBJ90A	SMBJ90CA	NX	DX	90.0	100.00	111.00	1	146.0	4.1	1	✓
SMBJ100A	SMBJ100CA	NZ	DZ	100.0	111.00	123.00	1	162.0	3.7	1	✓
SMBJ110A	SMBJ110CA	PE	EE	110.0	122.00	135.00	1	177.0	3.4	1	
SMBJ120A	SMBJ120CA	PG	EG	120.0	133.00	147.00	1	193.0	3.1	1	
SMBJ130A	SMBJ130CA	PK	EK	130.0	144.00	159.00	1	209.0	2.9	1	
SMBJ150A	SMBJ150CA	PM	EM	150.0	167.00	185.00	1	243.0	2.5	1	
SMBJ160A	SMBJ160CA	PP	EP	160.0	178.00	197.00	1	259.0	2.3	1	
SMBJ170A	SMBJ170CA	PR	ER	170.0	189.00	209.00	1	275.0	2.2	1	
SMBJ180A	SMBJ180CA	PT	ET	180.0	201.00	222.00	1	292.0	2.1	1	
SMBJ190A	SMBJ190CA	PA	EC	190.0	211.00	233.00	1	308.0	2.0	1	
SMBJ200A	SMBJ200CA	PV	EV	200.0	224.00	247.00	1	324.0	1.9	1	
SMBJ210A	SMBJ210CA	PB	ED	210.0	237.00	263.00	1	340.0	1.8	1	
SMBJ220A	SMBJ220CA	PX	EX	220.0	246.00	272.00	1	356.0	1.7	1	
SMBJ250A	SMBJ250CA	PZ	EZ	250.0	279.00	309.00	1	405.0	1.5	1	
SMBJ300A	SMBJ300CA	QE	FE	300.0	335.00	371.00	1	486.0	1.3	1	
SMBJ350A	SMBJ350CA	QG	FG	350.0	391.00	432.00	1	567.0	1.5	1	
SMBJ400A	SMBJ400CA	QK	FK	400.0	447.00	494.00	1	648.0	1.3	1	
SMBJ440A	SMBJ440CA	QM	FM	440.0	492.00	543.00	1	713.0	1.1	1	

Notes:

For bidirectional type having V_R of 10 volts and less, the I_B limit is double.

SMBJ Series

Surface Mount – 600W

Ratings and Characteristic Curves ($T_A=25^\circ\text{C}$ unless otherwise noted) (Continued)

Figure 1:
Peak Pulse Power Rating Curve

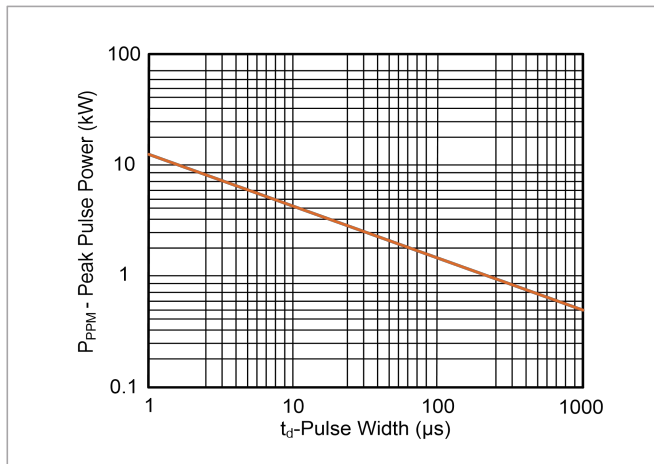


Figure 2:
Pulse Derating Curve

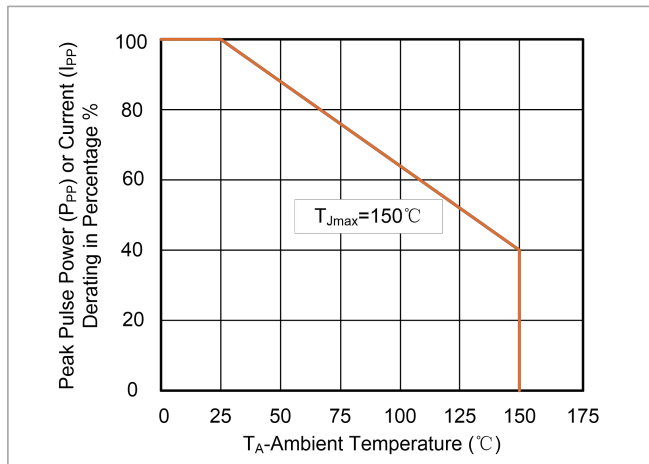


Figure 3:
Pulse Waveform

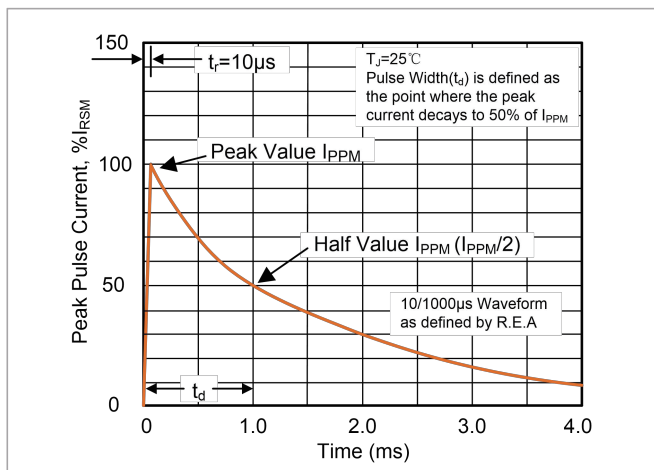


Figure 4:
Typical Junction Capacitance

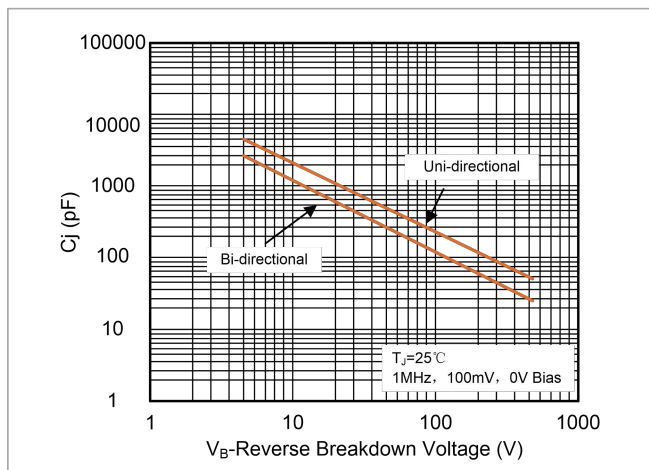


Figure 5:
Steady State Power Dissipation Derating Curve

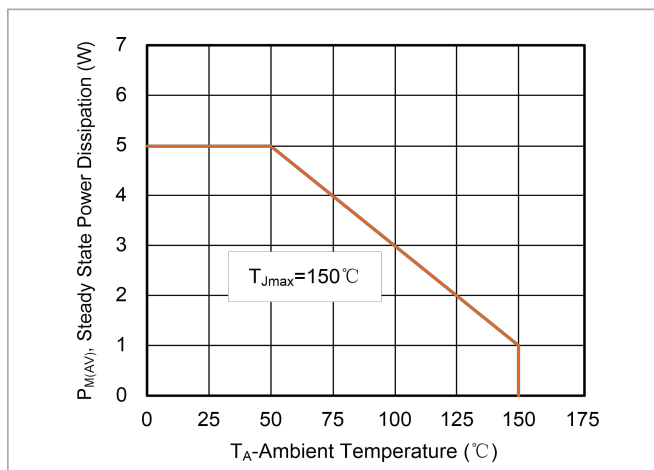
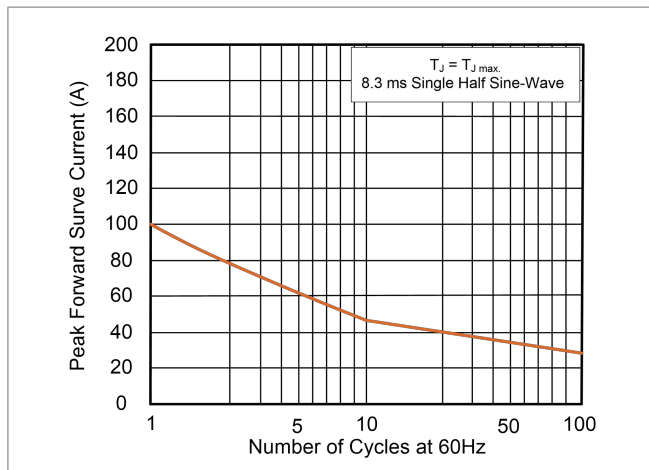


Figure 6:
Maximum Non-Repetitive Forward Surge Current Uni-Directional

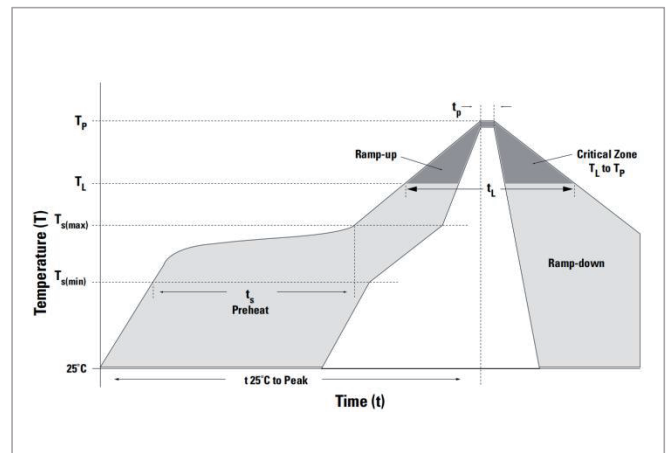


SMBJ Series

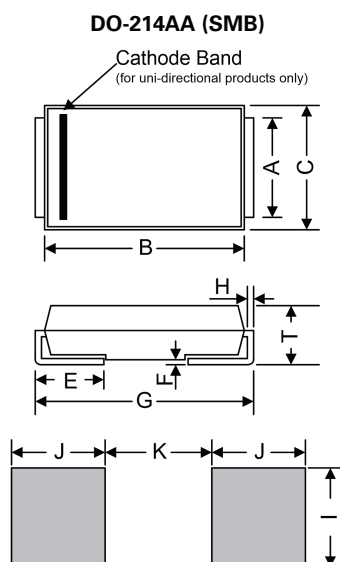
Surface Mount – 600W

Soldering Parameters

Reflow Condition		Lead-free assembly
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/second max.
$T_{S\ max}$ to T_L-Ramp-up Rate		3°C/second max.
Reflow	-Temperature (T_L) (Liquidus)	217°C
	-Time (min to max) (t_L)	60-150 seconds
Peak Temperature (T_P)		260°C
Time within 5°C of actual Peak Temperature (t_P)		20-40 seconds
Ramp-down Rate		6°C/second max.
Time 25°C to Peak Temperature		8 minutes max.
Do not exceed		260°C

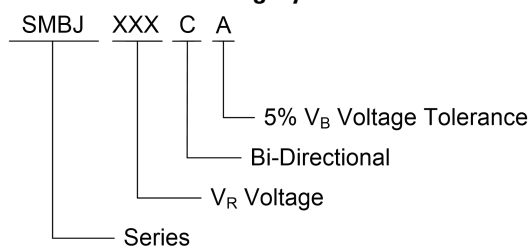


Dimensions

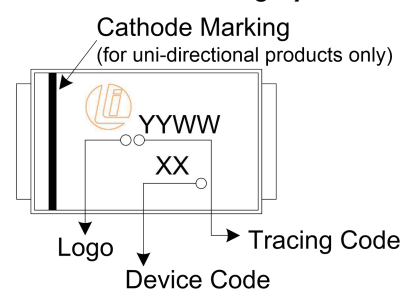


Symbol	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	1.930	2.200	0.076	0.086
B	4.060	4.570	0.160	0.180
C	3.300	3.940	0.130	0.155
E	0.760	1.520	0.030	0.060
F	-	0.203	-	0.008
G	5.100	5.480	0.201	0.216
H	0.152	0.305	0.006	0.012
T	2.160	2.440	0.085	0.096
I	2.260	-	0.089	-
J	2.160	-	0.085	-
K	-	2.740	-	0.107

Part Numbering System



Part Marking System



SMBJ Series

Surface Mount – 600W

Packaging Options

Part number	Component Package	Quantity	Packaging Option	Packaging Specification
SMBJxxxXX	DO-214AA	3000	Tape & Reel - 12mm tape/13" reel	EIA STD RS-481

Tape and Reel Specification

