

## TVS Diode – SMBJ Series

### Features

- Plastic package, excellent insulation strength.
- Glass passivated chip junction in SMB package.
- Excellent voltage clamping capability.
- Low Zener impedance.
- 600W peak pulse power capability on 10/1000 $\mu$ s waveform.
- Typical leakage current less than 1 $\mu$ A above 13V.
- Very fast response time, typically less than 1.0ps from 0 volt to  $V_{BR}$  minimum.
- High temperature soldering guaranteed: 265 $^{\circ}$ C/10 sec.
- MSL: JEDEC-J-STD-020, Level 1

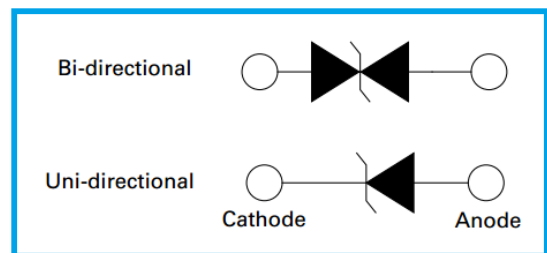


### Applications

- I/O interface,  $V_{CC}$  bus
- Telecom
- Industrial and consumer electronic applications.
- Relay and electromagnetic valve surge absorption.

### Agency Approval

- UL file no.: E474915



### Mechanical and Physical Data

- Case: JEDEC SMB molded plastic.
- Surface mount device, solderable per MIL-STD-750, Method 2026
- Polarity: Color band denoted cathode except bidirectional.

### Maximum Ratings and Thermal Characteristics

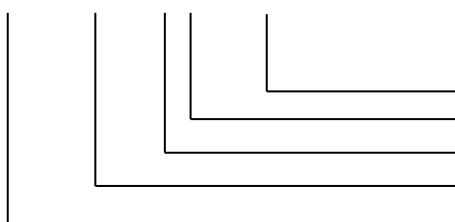
Parameter	Symbol	Value	Unit
Peak Pulse Power Dissipation on 10/1000 $\mu$ s waveform (Note 1, Fig.1).	$P_{PPM}$	Min 600	Watt
Peak Pulse Current of 10/1000 $\mu$ s waveform (Note 1, Fig.3).	$I_{PPM}$	See Table	Amp
Steady State Power Dissipation at $T_L = 75^{\circ}$ C, Lead lengths 0.375", (9.5mm) (Fig.5).	$P_{M(AV)}$	5.0	Watt
Peak Forward Surge Current, 8.3 ms Single Half Sine Wave Superimposed on Rated Load (Note 2, Fig.6).	$I_{FSM}$	100	Amp
Operating Junction and Storage Temperature Range.	$T_J, T_{STG}$	-55~150	$^{\circ}$ C

Note:

1. Non-repetitive current pulse, per Fig.3 and derated above  $T_A = 25^{\circ}$ C per Fig.2.
2. 8.3ms single half sine wave, or equivalent square wave, Duty cycle = 4 pulses per minutes maximum.

### Part Number Code

SMBJ □□□ CA - □□□



- Packaging Code (T13: Tape with 13" Reel; T7: Tape with 7")
- $V_{BR}$  Voltage tolerance (A: 5%; Blank: 10%)
- C: Bi-directional; Blank: Uni-directional
- Reverse Stand-Off Voltage or Typical Breakdown Voltage
- SMBJ Series (600W)

## TVS Diode – SMBJ Series

### I-V Curve Characteristics



$I_{PPM}$  Peak Pulse Power Dissipation – Maximum power dissipation

$V_R$  Stand-off Voltage – Maximum voltage that can be applied to the TVS without operation

$V_{BR}$  Breakdown Voltage – Maximum voltage that flows through the TVS at a specified test current ( $I_T$ )

$V_C$  Clamping Voltage – Peak voltage measured across the TVS at a specified  $I_{PPM}$  (Peak Impulse Current)

$I_R$  Reverse Leakage Current – Current measured at  $V_R$

$V_F$  Forward Voltage Drop for Uni-directional

### Electrical Characteristics

Part Number		Marking		Reverse Stand Off Voltage $V_R$ (V)	Breakdown Voltage $V_{BR}$ (V) @ $I_T$		Test Current $I_T$ (mA)	Maximum Clamping Voltage $V_C$ (V) @ $I_{PP}$	Maximum Peak Pulse Current $I_{PP}$ (A)	Maximum Reverse Leakage $I_R$ ( $\mu$ A) @ $V_R$
Uni	Bi	Uni	Bi		Min.	Max.				
SMBJ5.0A	SMBJ5.0CA	KE	AE	5.0	6.40	7.00	10	9.2	65.22	800
SMBJ6.0A	SMBJ6.0CA	KG	AG	6.0	6.67	7.37	10	10.3	58.25	800
SMBJ6.5A	SMBJ6.5CA	KK	AK	6.5	7.22	7.98	10	11.2	53.57	500
SMBJ7.0A	SMBJ7.0CA	KM	AM	7.0	7.78	8.60	10	12.0	50.00	200
SMBJ7.5A	SMBJ7.5CA	KP	AP	7.5	8.33	9.21	1	12.9	46.51	100
SMBJ8.0A	SMBJ8.0CA	KR	AR	8.0	8.89	9.83	1	13.6	44.12	50
SMBJ8.5A	SMBJ8.5CA	KT	AT	8.5	9.44	10.4	1	14.4	41.67	20
SMBJ9.0A	SMBJ9.0CA	KV	AV	9.0	10.0	11.1	1	15.4	38.96	10
SMBJ10A	SMBJ10CA	KX	AX	10.0	11.1	12.3	1	17.0	35.29	5
SMBJ11A	SMBJ11CA	KZ	AZ	11.0	12.2	13.5	1	18.2	32.97	1
SMBJ12A	SMBJ12CA	LE	BE	12.0	13.3	14.7	1	19.9	30.15	1
SMBJ13A	SMBJ13CA	LG	BG	13.0	14.4	15.9	1	21.5	27.91	1
SMBJ14A	SMBJ14CA	LK	BK	14.0	15.6	17.2	1	23.2	25.86	1
SMBJ15A	SMBJ15CA	LM	BM	15.0	16.7	18.5	1	24.4	24.59	1
SMBJ16A	SMBJ16CA	LP	BP	16.0	17.8	19.7	1	26.0	23.08	1
SMBJ17A	SMBJ17CA	LR	BR	17.0	18.9	20.9	1	27.6	21.74	1
SMBJ18A	SMBJ18CA	LT	BT	18.0	20.0	22.1	1	29.2	20.55	1

## TVS Diode – SMBJ Series

Part Number		Marking		Reverse Stand Off Voltage $V_R$ (V)	Breakdown Voltage $V_{BR}$ (V) @ $I_T$		Test Current $I_T$ (mA)	Maximum Clamping Voltage $V_C$ (V) @ $I_{PP}$	Maximum Peak Pulse Current $I_{PP}$ (A)	Maximum Reverse Leakage $I_R$ ( $\mu$ A) @ $V_R$
Uni	Bi	Uni	Bi		Min.	Max.				
SMBJ20A	SMBJ20CA	LV	BV	20.0	22.2	24.5	1	32.4	18.52	1
SMBJ22A	SMBJ22CA	LX	BX	22.0	24.4	26.9	1	35.5	16.90	1
SMBJ24A	SMBJ24CA	LZ	BZ	24.0	26.7	29.5	1	38.9	15.42	1
SMBJ26A	SMBJ26CA	ME	CE	26.0	28.9	31.9	1	42.1	14.25	1
SMBJ28A	SMBJ28CA	MG	CG	28.0	31.1	34.4	1	45.4	13.22	1
SMBJ30A	SMBJ30CA	MK	CK	30.0	33.3	36.8	1	48.4	12.40	1
SMBJ33A	SMBJ33CA	MM	CM	33.0	36.7	40.6	1	53.3	11.26	1
SMBJ36A	SMBJ36CA	MP	CP	36.0	40.0	44.2	1	58.1	10.33	1
SMBJ40A	SMBJ40CA	MR	CR	40.0	44.4	49.1	1	64.5	9.30	1
SMBJ43A	SMBJ43CA	MT	CT	43.0	47.8	52.8	1	69.4	8.65	1
SMBJ45A	SMBJ45CA	MV	CV	45.0	50.0	55.3	1	72.7	8.25	1
SMBJ48A	SMBJ48CA	MX	CX	48.0	53.3	58.9	1	77.4	7.75	1
SMBJ51A	SMBJ51CA	MZ	CZ	51.0	56.7	62.7	1	82.4	7.28	1
SMBJ54A	SMBJ54CA	NE	DE	54.0	60.0	66.3	1	87.1	6.89	1
SMBJ58A	SMBJ58CA	NG	DG	58.0	64.4	71.2	1	93.6	6.41	1
SMBJ60A	SMBJ60CA	NK	DK	60.0	66.7	73.7	1	96.8	6.20	1
SMBJ64A	SMBJ64CA	NM	DM	64.0	71.1	78.6	1	103.0	5.83	1
SMBJ70A	SMBJ70CA	NP	DP	70.0	77.8	86.0	1	113.0	5.31	1
SMBJ75A	SMBJ75CA	NR	DR	75.0	83.3	92.1	1	121.0	4.96	1
SMBJ78A	SMBJ78CA	NT	DT	78.0	86.7	95.8	1	126.0	4.76	1
SMBJ85A	SMBJ85CA	NV	DV	85.0	94.4	104.0	1	137.0	4.38	1
SMBJ90A	SMBJ90CA	NX	DX	90.0	100.0	111.0	1	146.0	4.11	1
SMBJ100A	SMBJ100CA	NZ	DZ	100.0	111.0	123.0	1	162.0	3.70	1
SMBJ110A	SMBJ110CA	PE	EE	110.0	122.0	135.0	1	177.0	3.39	1
SMBJ120A	SMBJ120CA	PG	EG	120.0	133.0	147.0	1	193.0	3.11	1
SMBJ130A	SMBJ130CA	PK	EK	130.0	144.0	159.0	1	209.0	2.87	1
SMBJ150A	SMBJ150CA	PM	EM	150.0	167.0	185.0	1	243.0	2.47	1
SMBJ160A	SMBJ160CA	PP	EP	160.0	178.0	197.0	1	259.0	2.32	1
SMBJ170A	SMBJ170CA	PR	ER	170.0	189.0	209.0	1	275.0	2.18	1
SMBJ180A	SMBJ180CA	PT	ET	180.0	201.0	222.0	1	292.0	2.06	1
SMBJ190A	SMBJ190CA	PA	EC	190.0	209.0	243.0	1	308.0	1.95	1
SMBJ200A	SMBJ200CA	PV	EV	200.0	224.0	247.0	1	324.0	1.85	1
SMBJ220A	SMBJ220CA	PX	EX	220.0	246.0	272.0	1	356.0	1.69	1
SMBJ250A	SMBJ250CA	PZ	EZ	250.0	279.0	309.0	1	405.0	1.48	1
SMBJ300A	SMBJ300CA	QE	FE	300.0	335.0	371.0	1	486.0	1.23	1
SMBJ350A	SMBJ350CA	QG	FG	350.0	391.0	432.0	1	567.0	1.06	1
SMBJ400A	SMBJ400CA	QK	FK	400.0	447.0	494.0	1	648.0	0.93	1
SMBJ440A	SMBJ440CA	QM	FM	440.0	492.0	543.0	1	713.0	0.84	1

Note:

1. For bi-directional type having  $V_R$  of 10 volts and less, the  $I_R$  limit is double.

## TVS Diode – SMBJ Series

### Ratings and Characteristic Curves

Fig 1 - Peak Pulse Power Rating Curve

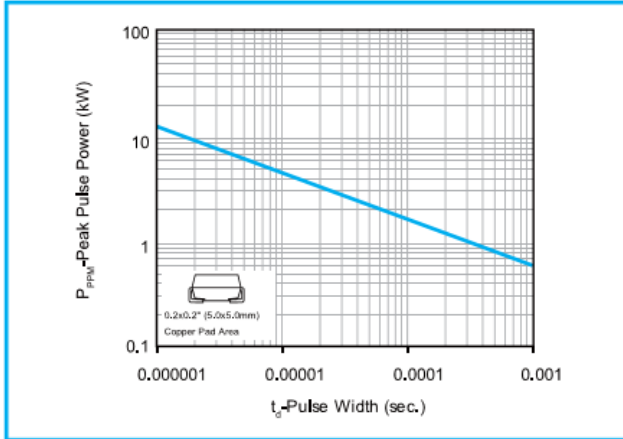


Fig 2 - Pulse Derating Curve

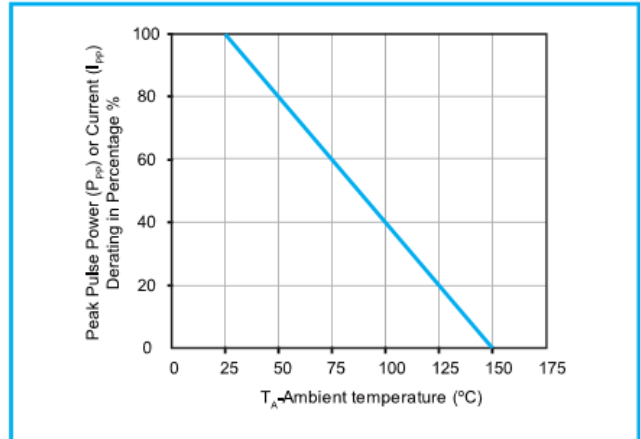


Fig 3 - Pulse Waveform

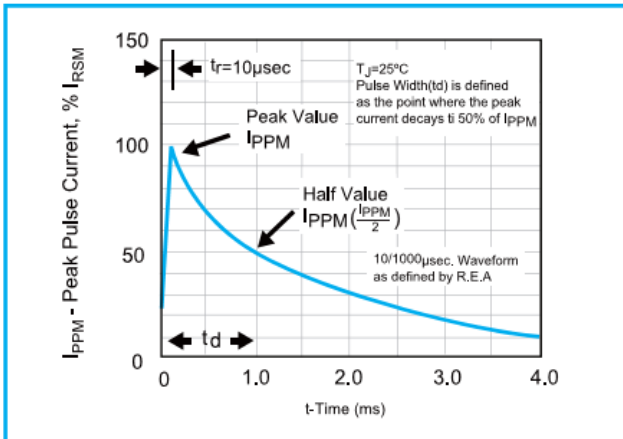


Fig 4 - Typical Junction Capacitance

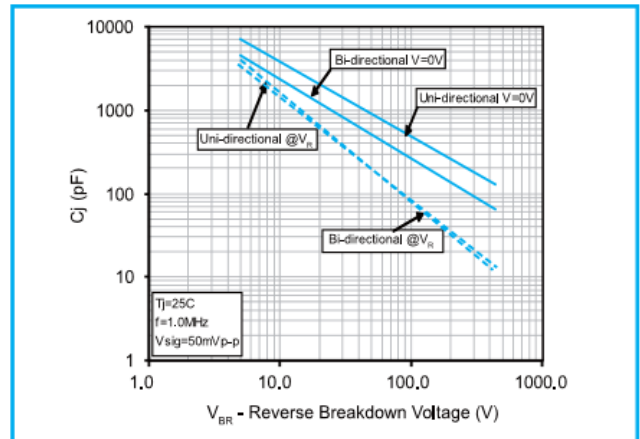


Fig 5 - Steady State Power Dissipation Derating Curve

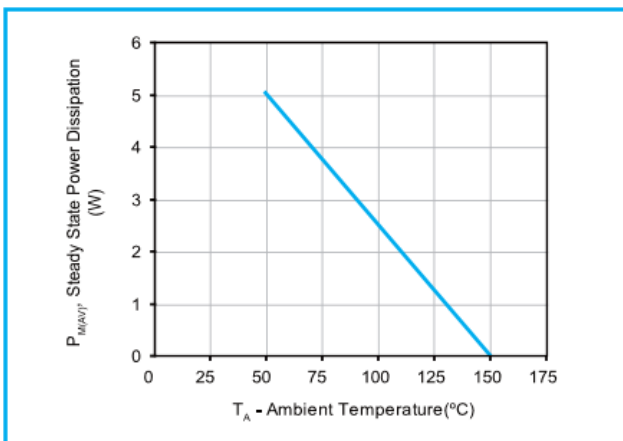
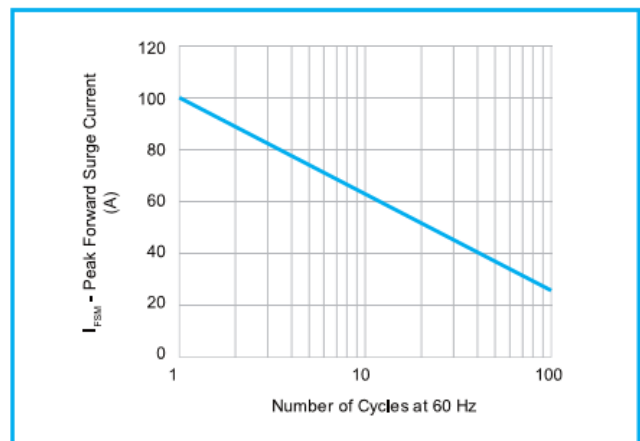
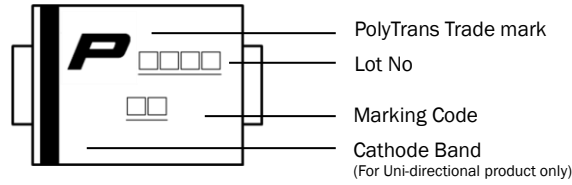


Fig 6 - Maximum Non-Repetitive Forward Surge Current (Uni-directional Only)

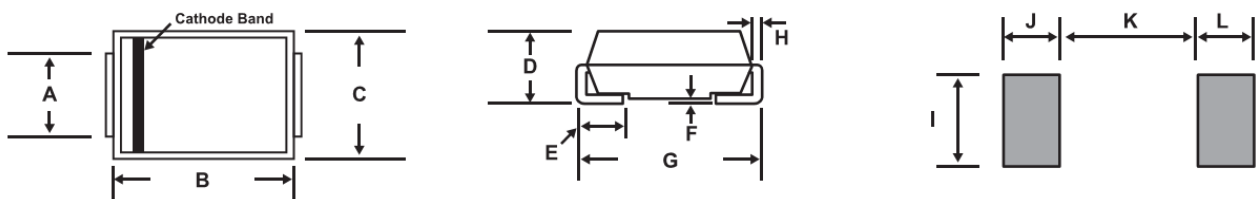


## TVS Diode – SMBJ Series

### Marking Definitions



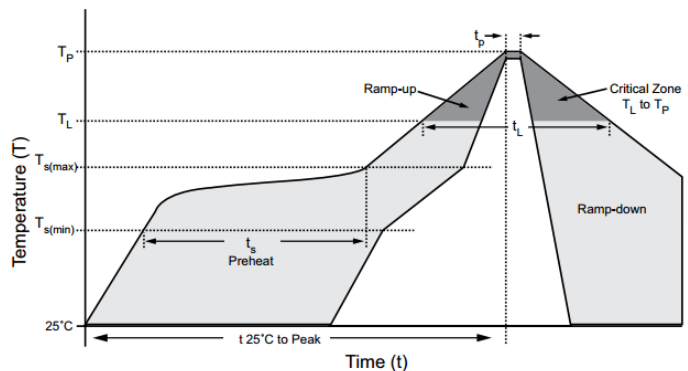
### Physical Dimensions



Dimension	Millimeters		Inches	
	Min	Max	Min	Max
A	1.90	2.20	0.077	0.086
B	4.06	4.85	0.160	0.191
C	3.30	3.94	0.130	0.155
D	1.95	2.44	0.084	0.096
E	0.76	1.52	0.030	0.060
F	-	0.20	-	0.008
G	5.21	5.59	0.205	0.220
H	0.15	0.31	0.006	0.012
I	2.26	-	0.089	-
J	2.16	-	0.085	-
K	-	2.74	-	0.107
L	2.16	-	0.085	-

### Lead Free Reflow Soldering Recommendations

Preheat	
- Temperature Min ( $T_{s\_min}$ )	150°C
- Temperature Max ( $T_{s\_max}$ )	200°C
- Time ( $T_{s\_min}$ to $T_{s\_max}$ )	60-180 seconds
- Average Ramp-Up Rate	1~3°C/second
Peak Temperature	260°C max.
Time within 5°C of actual Peak Temperature ( $t_p$ )	40 seconds max.
Ramp-Down Rate	6 °C /second max.



**Note:** If the soldering temperatures exceed the recommended profile, devices may not meet the performance requirements.

## TVS Diode – SMBJ Series

### Packaging Information

Part Number	Packaging Code	Component Package	Quantity	Packaging Option	Packaging Specification
SMBJ Series	T13	DO-214AA	3000	Tape & Reel - 12mm tape/13" reel	EIA STD RS-481
SMBJ Series	T7	DO-214AA	500	Tape & Reel - 12mm tape/7" reel	EIA STD RS-481

### Tape and Reel Specifications

