



Part Number: **SMBJ6.5CA**

Technology: **TVS Diodes**

Series: **SMBJ**

**SMBJ Series - 600W Surface Mount TVS Diode**

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

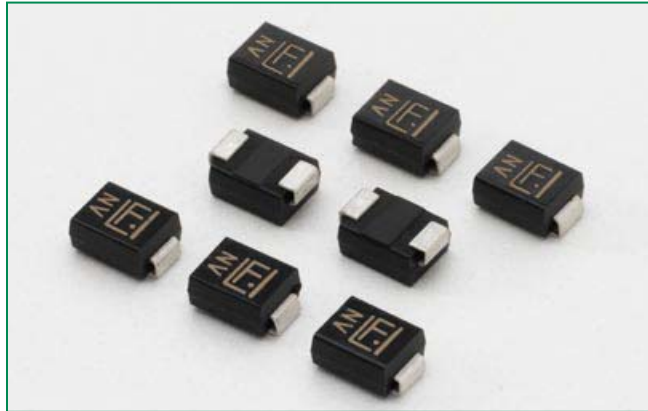
TVS devices are ideal for the protection of I/O Interfaces, VCC bus and other vulnerable circuits used in Telecom, Computer, Industrial and Consumer electronic applications.

**Features:**

- Halogen-Free and RoHS complaint
- For surface mounted applications to optimize board space
- Low profile package
- Built-in strain relief
- Typical maximum temperature coefficient  $\Delta VBR = 0.1\% \times VBR@25^{\circ}C \times \Delta T$
- Glass passivated chip junction
- 600W peak pulse power capability at  $10 \times 1000\mu s$  waveform, repetition rate (duty cycles):0.01%
- Fast response time: typically less than 1.0ps from 0V to BV min
- Excellent clamping capability
- Low incremental surge resistance
- Typical IR less than  $1\mu A$  above 12V
- High Temperature soldering guaranteed:  $260^{\circ}C/40$  seconds at terminals
- Plastic package has Underwriters Laboratory Flammability 94V-O

**Electrical Characteristics**

Property	Value
$I_R$	500
Max Temp ( $^{\circ}C$ )	150
Polarity	Bipolar
Tolerance	5
$V_{SO}$	6.5
Watts	600
$V_R$ (V)	6.5
$V_{BR}$ MIN (V)	7.22
$V_{BR}$ MAX (V)	7.98
$I_T$ (mA)	10
$V_{CL} @ I_{PP}$ ( $\mu A$ )	11.2
$I_{PP}$ 10x1000(A)	53.6
$I_{PP}$ (A)	53.6
$P_{PP}$ 10x1000 $\mu s$ (W)	600



**Agency Approvals**

AGENCY	AGENCY FILE NUMBER
	E128662/E230531

**Maximum Ratings and Thermal Characteristics**  
( $T_A=25^\circ\text{C}$  unless otherwise noted)

Parameter	Symbol	Value	Unit
Peak Pulse Power Dissipation at $T_A=25^\circ\text{C}$ by $10\times 1000\mu\text{s}$ waveform (Fig.1)(Note 1), (Note 2)	$P_{PPM}$	600	W
Power Dissipation on infinite heat sink at $T_A=50^\circ\text{C}$	$P_{M(AV)}$	5.0	W
Peak Forward Surge Current, 8.3ms Single Half Sine Wave (Note 3)	$I_{FSM}$	100	A
Maximum Instantaneous Forward Voltage at 50A for Unidirectional only (Note 4)	$V_F$	3.5V/5.0	V
Operating Junction and Storage Temperature Range	$T_J, T_{STG}$	-65 to 150	$^\circ\text{C}$
Typical Thermal Resistance Junction to Lead	$R_{\theta JL}$	20	$^\circ\text{C/W}$
Typical Thermal Resistance Junction to Ambient	$R_{\theta JA}$	100	$^\circ\text{C/W}$

**Notes:**

1. Non-repetitive current pulse, per Fig. 3 and derated above  $T_A = 25^\circ\text{C}$  per Fig. 2.
2. Mounted on copper pad area of  $0.2\times 0.2"$  ( $5.0 \times 5.0\text{mm}$ ) 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  $V_{BR} \leq 200\text{V}$  and  $V_F < 5.0\text{V}$  for  $V_{BR} \geq 201\text{V}$ .

**Description**

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


**Features**

- Halogen-Free
- RoHS compliant
- For surface mounted applications to optimize board space
- Low profile package
- Built-in strain relief
- Typical maximum temperature coefficient  $\Delta V_{BR} = 0.1\% \times V_{BR}@25^\circ\text{C} \times \Delta T$
- Glass passivated chip junction
- 600W peak pulse power capability at  $10\times 1000\mu\text{s}$  waveform, repetition rate (duty cycles):0.01 %
- Fast response time: typically less than 1.0ps from 0V to BV min
- Excellent clamping capability
- Low incremental surge resistance
- Typical  $I_R$  less than  $1\mu\text{A}$  above 12V
- High Temperature soldering guaranteed:  $260^\circ\text{C}/40$  seconds at terminals
- Plastic package has Underwriters Laboratory Flammability 94V-0
- Matte Tin Lead-free Plated

**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.

### Electrical Characteristics

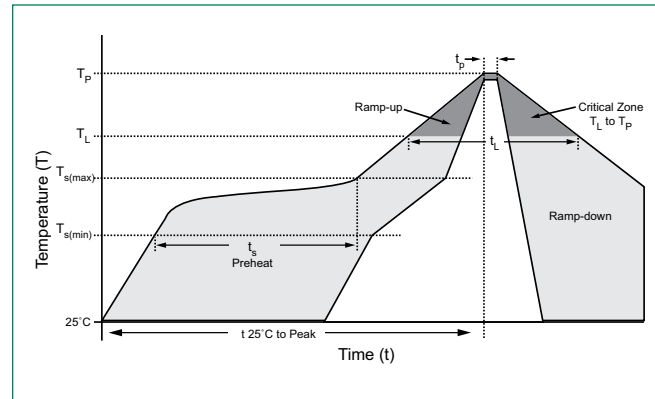
Part Number (Uni)	Part Number (Bi)	Marking		Reverse Stand off Voltage $V_R$ (Volts)	Breakdown Voltage $V_{BR}$ (Volts) @ $I_T$		Test Current $I_T$ (mA)	Maximum Clamping Voltage $V_C$ @ $I_{PP}$ (V)	Maximum Peak Pulse Current $I_{PP}$ (A)	Maximum Reverse Leakage $I_R$ @ $V_R$ ( $\mu$ A)	Agency Approval 
		UNI	BI		MIN	MAX					
SMBJ5.0A	SMBJ5.0CA	KE	AE	5.0	6.40	7.00	10	9.2	65.3	800	X
SMBJ6.0A	SMBJ6.0CA	KG	AG	6.0	6.67	7.37	10	10.3	58.3	800	X
SMBJ6.5A	SMBJ6.5CA	KK	AK	6.5	7.22	7.98	10	11.2	53.6	500	X
SMBJ7.0A	SMBJ7.0CA	KM	AM	7.0	7.78	8.60	10	12.0	50.0	200	X
SMBJ7.5A	SMBJ7.5CA	KP	AP	7.5	8.33	9.21	1	12.9	46.6	100	X
SMBJ8.0A	SMBJ8.0CA	KR	AR	8.0	8.89	9.83	1	13.6	44.2	50	X
SMBJ8.5A	SMBJ8.5CA	KT	AT	8.5	9.44	10.40	1	14.4	41.7	20	X
SMBJ9.0A	SMBJ9.0CA	KV	AV	9.0	10.00	11.10	1	15.4	39.0	10	X
SMBJ10A	SMBJ10CA	KX	AX	10.0	11.10	12.30	1	17.0	35.3	5	X
SMBJ11A	SMBJ11CA	KZ	AZ	11.0	12.20	13.50	1	18.2	33.0	1	X
SMBJ12A	SMBJ12CA	LE	BE	12.0	13.30	14.70	1	19.9	30.2	1	X
SMBJ13A	SMBJ13CA	LG	BG	13.0	14.40	15.90	1	21.5	28.0	1	X
SMBJ14A	SMBJ14CA	LK	BK	14.0	15.60	17.20	1	23.2	25.9	1	X
SMBJ15A	SMBJ15CA	LM	BM	15.0	16.70	18.50	1	24.4	24.6	1	X
SMBJ16A	SMBJ16CA	LP	BP	16.0	17.80	19.70	1	26.0	23.1	1	X
SMBJ17A	SMBJ17CA	LR	BR	17.0	18.90	20.90	1	27.6	21.8	1	X
SMBJ18A	SMBJ18CA	LT	BT	18.0	20.00	22.10	1	29.2	20.6	1	X
SMBJ20A	SMBJ20CA	LV	BV	20.0	22.20	24.50	1	32.4	18.6	1	X
SMBJ22A	SMBJ22CA	LX	BX	22.0	24.40	26.90	1	35.5	16.9	1	X
SMBJ24A	SMBJ24CA	LZ	BZ	24.0	26.70	29.50	1	38.9	15.5	1	X
SMBJ26A	SMBJ26CA	ME	CE	26.0	28.90	31.90	1	42.1	14.3	1	X
SMBJ28A	SMBJ28CA	MG	CG	28.0	31.10	34.40	1	45.4	13.3	1	X
SMBJ30A	SMBJ30CA	MK	CK	30.0	33.30	36.80	1	48.4	12.4	1	X
SMBJ33A	SMBJ33CA	MM	CM	33.0	36.70	40.60	1	53.3	11.3	1	X
SMBJ36A	SMBJ36CA	MP	CP	36.0	40.00	44.20	1	58.1	10.4	1	X
SMBJ40A	SMBJ40CA	MR	CR	40.0	44.40	49.10	1	64.5	9.3	1	X
SMBJ43A	SMBJ43CA	MT	CT	43.0	47.80	52.80	1	69.4	8.7	1	X
SMBJ45A	SMBJ45CA	MV	CV	45.0	50.00	55.30	1	72.7	8.3	1	X
SMBJ48A	SMBJ48CA	MX	CX	48.0	53.30	58.90	1	77.4	7.8	1	X
SMBJ51A	SMBJ51CA	MZ	CZ	51.0	56.70	62.70	1	82.4	7.3	1	X
SMBJ54A	SMBJ54CA	NE	DE	54.0	60.00	66.30	1	87.1	6.9	1	X
SMBJ58A	SMBJ58CA	NG	DG	58.0	64.40	71.20	1	93.6	6.5	1	X
SMBJ60A	SMBJ60CA	NK	DK	60.0	66.70	73.70	1	96.8	6.2	1	X
SMBJ64A	SMBJ64CA	NM	DM	64.0	71.10	78.60	1	103.0	5.9	1	X
SMBJ70A	SMBJ70CA	NP	DP	70.0	77.80	86.00	1	113.0	5.3	1	X
SMBJ75A	SMBJ75CA	NR	DR	75.0	83.30	92.10	1	121.0	5.0	1	X
SMBJ78A	SMBJ78CA	NT	DT	78.0	86.70	95.80	1	126.0	4.8	1	X
SMBJ85A	SMBJ85CA	NV	DV	85.0	94.40	104.00	1	137.0	4.4	1	X
SMBJ90A	SMBJ90CA	NX	DX	90.0	100.00	111.00	1	146.0	4.1	1	X
SMBJ100A	SMBJ100CA	NZ	DZ	100.0	111.00	123.00	1	162.0	3.7	1	X
SMBJ110A	SMBJ110CA	PE	EE	110.0	122.00	135.00	1	177.0	3.4	1	X
SMBJ120A	SMBJ120CA	PG	EG	120.0	133.00	147.00	1	193.0	3.1	1	X
SMBJ130A	SMBJ130CA	PK	EK	130.0	144.00	159.00	1	209.0	2.9	1	X
SMBJ150A	SMBJ150CA	PM	EM	150.0	167.00	185.00	1	243.0	2.5	1	X
SMBJ160A	SMBJ160CA	PP	EP	160.0	178.00	197.00	1	259.0	2.3	1	X
SMBJ170A	SMBJ170CA	PR	ER	170.0	189.00	209.00	1	275.0	2.2	1	X
SMBJ180A	SMBJ180CA	PT	ET	180.0	201.00	222.00	1	292.0	2.1	1	X
SMBJ200A	SMBJ200CA	PV	EV	200.0	224.00	247.00	1	324.0	1.9	1	X
SMBJ220A	SMBJ220CA	PX	EX	220.0	246.00	272.00	1	356.0	1.7	1	X
SMBJ250A	SMBJ250CA	PZ	EZ	250.0	279.00	309.00	1	405.0	1.5	1	X
SMBJ300A	SMBJ300CA	QE	FE	300.0	335.00	371.00	1	486.0	1.3	1	X
SMBJ350A	SMBJ350CA	QG	FG	350.0	391.00	432.00	1	567.0	1.1	1	X
SMBJ400A	SMBJ400CA	QK	FK	400.0	447.00	494.00	1	648.0	0.9	1	X
SMBJ440A	SMBJ440CA	QM	FM	440.0	492.00	543.00	1	713.0	0.9	1	X

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

For parts without A, the  $V_{BR}$  is  $\pm 10\%$  and  $V_C$  is 5% higher than with A parts.

### 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) ( $t_s$ )	60 – 150 seconds
Peak Temperature ( $T_p$ )		260 <sup>+0/-5</sup> °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 ( $T_p$ )		8 minutes Max.
Do not exceed		280°C



### Physical Specifications

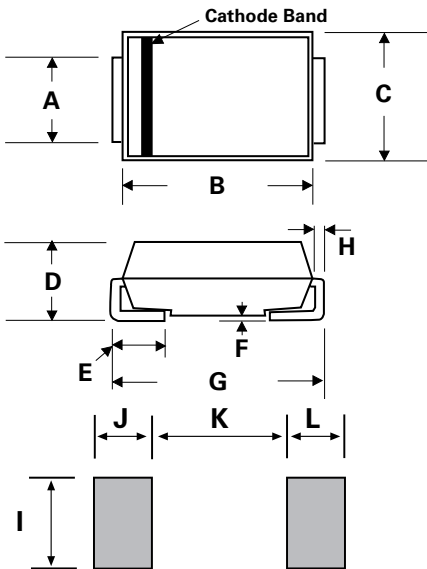
<b>Weight</b>	0.003 ounce, 0.093 grams
<b>Case</b>	JEDEC DO214AA. Molded plastic body over glass passivated junction
<b>Polarity</b>	Color band denotes cathode except Bidirectional
<b>Terminal</b>	Matte Tin-plated leads, Solderable per JESD22-B102D

### Environmental Specifications

<b>Temperature Cycle</b>	JESD22-A104
<b>Pressure Cooker</b>	JESD 22-A102
<b>High Temp. Storage</b>	JESD22-A103
<b>HTRB</b>	JESD22-A108
<b>Thermal Shock</b>	JESD22-A106

**Dimensions**

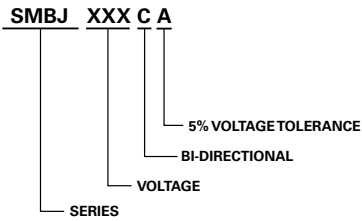
**DO-214AA (SMB J-Bend)**



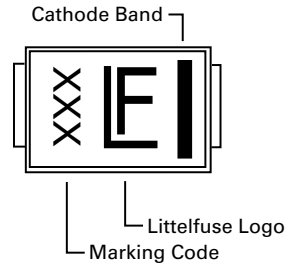
Dimensions	Inches		Millimeters	
	Min	Max	Min	Max
A	0.077	0.086	1.950	2.200
B	0.160	0.180	4.060	4.570
C	0.130	0.155	3.300	3.940
D	0.084	0.096	2.130	2.440
E	0.030	0.060	0.760	1.520
F	-	0.008	-	0.203
G	0.205	0.220	5.210	5.590
H	0.006	0.012	0.152	0.305
I	0.089	-	2.260	-
J	0.085	-	2.160	-
K	-	0.107	-	2.740
L	0.085	-	2.160	-

SMBJ Series

**Part Numbering System**



**Part Marking System**



**Packaging**

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