



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.

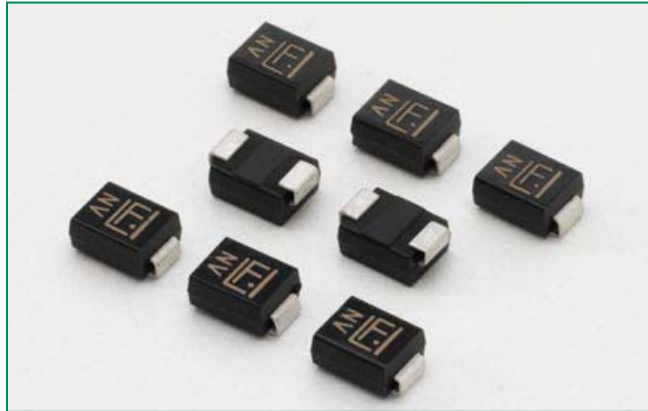
TVS devices are ideal for the protection of I/O Interfaces, VCC bus and other vulnerable circuits used in Telecom, Computer, Industrial and Consumer electronic applications.

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 (°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
$V_{CL} @ I_{PP}$ (μA)	11.2
I_{PP} 10x1000(A)	53.6
I_{PP} (A)	53.6
P_{PP} 10x1000μs (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 10x1000 μs 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 0.2x0.2" (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 $V_{BR} \leq 200\text{V}$ 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 10x1000 μs 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 μA 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

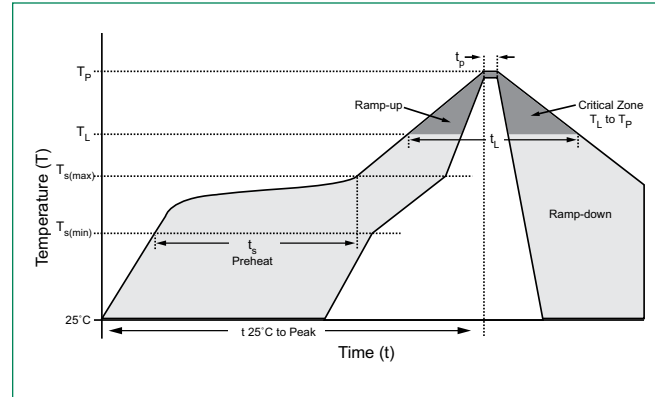
Part Number (Uni)	Part Number (Bi)	Marking		Reverse Stand off Voltage V_R (Volts)	Breakdown Voltage V_{BR} (Volts) @ I_T		Test Current I_T (mA)	Maximum Clamping Voltage V_C @ I_{PP} (V)	Maximum Peak Pulse Current I_{PP} (A)	Maximum Reverse Leakage I_R @ V_R (μ A)	Agency Approval 
		UNI	BI		MIN	MAX					
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 ^{+0/-5} °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

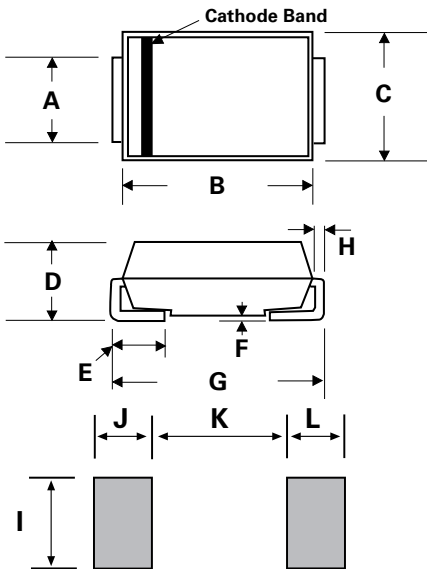
Weight	0.003 ounce, 0.093 grams
Case	JEDEC DO214AA. Molded plastic body over glass passivated junction
Polarity	Color band denotes cathode except Bidirectional
Terminal	Matte Tin-plated leads, Solderable per JESD22-B102D

Environmental Specifications

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

Dimensions

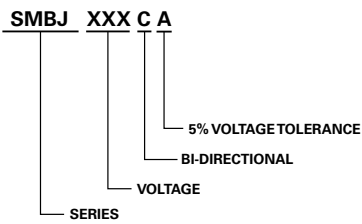
DO-214AA (SMB J-Bend)



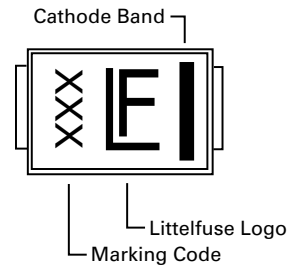
Dimensions	Inches		Millimeters	
	Min	Max	Min	Max
A	0.077	0.086	1.950	2.200
B	0.160	0.180	4.060	4.570
C	0.130	0.155	3.300	3.940
D	0.084	0.096	2.130	2.440
E	0.030	0.060	0.760	1.520
F	-	0.008	-	0.203
G	0.205	0.220	5.210	5.590
H	0.006	0.012	0.152	0.305
I	0.089	-	2.260	-
J	0.085	-	2.160	-
K	-	0.107	-	2.740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