

Surface Mount Transient Voltage Suppressors (TVS)

SMCJ Series 5.0 To 440 V 1500W

Description

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

Features

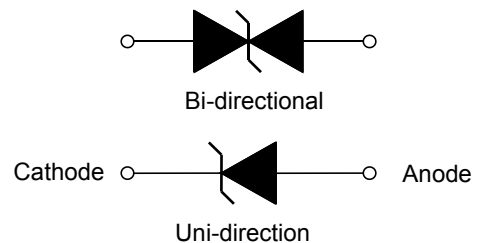
- ◆ For surface mounted applications in order to optimize board space
- ◆ Low leakage
- ◆ Uni and Bidirectional unit
- ◆ Glass passivated junction
- ◆ Low inductance
- ◆ Excellent clamping capability
- ◆ 1500W Peak power capability at 10 × 1000μs waveform Repetition rate (duty cycle):0.01%
- ◆ Fast response time: typically less than 1.0ps from 0 Volts to V_{BR} min
- ◆ Typical I_R less than 5μA above 12V.
- ◆ High Temperature soldering: 260°C/40 seconds at terminals
- ◆ Typical maximum temperature coefficient $\Delta V_{BR} = 0.1\% \times V_{BR}@25^\circ\text{C} \times \Delta T$
- ◆ Plastic package has Underwriters Laboratory Flammability 94V-0
- ◆ Matte tin lead-free Plated
- ◆ Halogen free and RoHS compliant
- ◆ Typical failure mode is short from over-specified voltage or current
- ◆ Whisker test is conducted based on JEDEC JESD201A per its table 4a and 4c
- ◆ IEC-61000-4-2 ESD 15kV(Air), 8kV (Contact)
- ◆ ESD protection of data lines in accordance with IEC 61000-4-2 (IEC801-2)
- ◆ EFT protection of data lines in accordance with IEC 61000-4-4 (IEC801-4)

Uni-directional

Bi-directional



Functional Diagram



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.

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

Parameter	Symbol	Value	Unit
Peak Pulse Power Dissipation with a 10/1000μs waveform (Fig.1)(Note 1), (Note 2)	P_{PPM}	1500	Watts
Peak Pulse Current with a 10/1000μs waveform.(Note1, Fig.3)	I_{PP}	See Next Table	Amps
Power Dissipation on Infinite Heat Sink at $T_L=75^\circ\text{C}$	$P_{M(AV)}$	6.5	Watt
Peak Forward Surge Current, 8.3ms Single Half Sine Wave (Note 3)	I_{FSM}	200	Amps
Maximum Instantaneous Forward Voltage at 25A for Unidirectional Only (Note 4)	V_F	3.5/5.0	Voltage
Operating junction and Storage Temperature Range.	T_J, T_{STG}	-55 to +150	$^\circ\text{C}$

Notes:

1. Non-repetitive current pulse, per Fig. 3 and derated above $T_A = 25^\circ\text{C}$ per Fig. 2.
2. Mounted on 5.0mm x 5.0mm (0.03mm thick) Copper Pads to each terminal.
3. 8.3ms single half sine-wave, or equivalent square wave, Duty cycle = 4 pulses per minutes maximum.
4. $V_F < 3.5\text{V}$ for $V_{BR} < 200\text{V}$ and $V_F < 6.5\text{V}$ for $V_{BR} > 201\text{V}$.

Surface Mount Transient Voltage Suppressors (TVS)

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

Part Number		Reverse Stand-Off Voltage V_{RWM} (V)	Breakdown Voltage V_{BR} (V) @ 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_{RWM} (μA)
Uni	Bi		MIN	MAX				
SMCJ5.0A	SMCJ5.0CA	5.0	6.40	7.00	10	9.2	163.04	1000
SMCJ6.0A	SMCJ6.0CA	6.0	6.67	7.37	10	10.3	145.63	1000
SMCJ6.5A	SMCJ6.5CA	6.5	7.22	7.98	10	11.2	133.93	500
SMCJ7.0A	SMCJ7.0CA	7.0	7.78	8.60	10	12.0	125.00	200
SMCJ7.5A	SMCJ7.5CA	7.5	8.33	9.21	1	12.9	116.28	100
SMCJ8.0A	SMCJ8.0CA	8.0	8.89	9.83	1	13.6	110.29	50
SMCJ8.5A	SMCJ8.5CA	8.5	9.44	10.40	1	14.4	104.17	20
SMCJ9.0A	SMCJ9.0CA	9.0	10.00	11.10	1	15.4	97.40	10
SMCJ10A	SMCJ10CA	10.0	11.10	12.30	1	17.0	88.24	5
SMCJ11A	SMCJ11CA	11.0	12.20	13.50	1	18.2	82.42	5
SMCJ12A	SMCJ12CA	12.0	13.30	14.70	1	19.9	75.38	5
SMCJ13A	SMCJ13CA	13.0	14.40	15.90	1	21.5	69.77	5
SMCJ14A	SMCJ14CA	14.0	15.60	17.20	1	23.2	64.66	5
SMCJ15A	SMCJ15CA	15.0	16.70	18.50	1	24.4	61.48	5
SMCJ16A	SMCJ16CA	16.0	17.80	19.70	1	26.0	57.69	5
SMCJ17A	SMCJ17CA	17.0	18.90	20.90	1	27.6	54.35	5
SMCJ18A	SMCJ18CA	18.0	20.00	22.10	1	29.2	51.37	5
SMCJ19A	SMCJ19CA	19.0	21.10	23.30	1	30.8	48.73	5
SMCJ20A	SMCJ20CA	20.0	22.20	24.50	1	32.4	46.30	5
SMCJ22A	SMCJ22CA	22.0	24.40	26.90	1	35.5	42.25	5
SMCJ24A	SMCJ24CA	24.0	26.70	29.50	1	38.9	38.56	5
SMCJ26A	SMCJ26CA	26.0	28.90	31.90	1	42.1	35.63	5
SMCJ28A	SMCJ28CA	28.0	31.10	34.40	1	45.4	33.04	5
SMCJ30A	SMCJ30CA	30.0	33.30	36.80	1	48.4	30.99	5
SMCJ33A	SMCJ33CA	33.0	36.70	40.60	1	53.3	28.14	5
SMCJ36A	SMCJ36CA	36.0	40.00	44.20	1	58.1	25.82	5
SMCJ40A	SMCJ40CA	40.0	44.40	49.10	1	64.5	23.26	5
SMCJ43A	SMCJ43CA	43.0	47.80	52.80	1	69.4	21.61	5

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

Part Number		Reverse Stand-Off Voltage V_{RWM} (V)	Breakdown Voltage V_{BR} (V) @ 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_{RWM} (μA)
Uni	Bi		MIN	MAX				
SMCJ45A	SMCJ45CA	45.0	50.00	55.30	1	72.7	20.63	5
SMCJ48A	SMCJ48CA	48.0	53.30	58.90	1	77.4	19.38	5
SMCJ51A	SMCJ51CA	51.0	56.70	62.70	1	82.4	18.20	5
SMCJ54A	SMCJ54CA	54.0	60.00	66.30	1	87.1	17.22	5
SMCJ58A	SMCJ58CA	58.0	64.40	71.20	1	93.6	16.03	5
SMCJ60A	SMCJ60CA	60.0	66.70	73.70	1	96.8	15.50	5
SMCJ64A	SMCJ64CA	64.0	71.10	78.60	1	103.0	14.56	5
SMCJ70A	SMCJ70CA	70.0	77.80	86.00	1	113.0	13.27	5
SMCJ75A	SMCJ75CA	75.0	83.30	92.10	1	121.0	12.40	5
SMCJ78A	SMCJ78CA	78.0	86.70	95.80	1	126.0	11.90	5
SMCJ80A	SMCJ80CA	80.0	88.80	97.60	1	129.6	11.57	5
SMCJ85A	SMCJ85CA	85.0	94.40	104.00	1	137.0	10.95	5
SMCJ90A	SMCJ90CA	90.0	100.00	111.00	1	146.0	10.27	5
SMCJ100A	SMCJ100CA	100.0	111.00	123.00	1	162.0	9.26	5
SMCJ110A	SMCJ110CA	110.0	122.00	135.00	1	177.0	8.47	5
SMCJ120A	SMCJ120CA	120.0	133.00	147.00	1	193.0	7.77	5
SMCJ130A	SMCJ130CA	130.0	144.00	159.00	1	209.0	7.18	5
SMCJ140A	SMCJ140CA	140.0	155.00	171.00	1	226.8	6.61	5
SMCJ150A	SMCJ150CA	150.0	167.00	185.00	1	243.0	6.17	5
SMCJ160A	SMCJ160CA	160.0	178.00	197.00	1	259.0	5.79	5
SMCJ170A	SMCJ170CA	170.0	189.00	209.00	1	275.0	5.45	5
SMCJ180A	SMCJ180CA	180.0	201.00	220.00	1	291.6	5.14	5
SMCJ190A	SMCJ190CA	190.0	211.00	232.00	1	307.8	4.87	5
SMCJ200A	SMCJ200CA	200.0	224.00	247.00	1	324.0	4.60	5
SMCJ220A	SMCJ220CA	220.0	246.00	272.00	1	356.0	4.20	5
SMCJ250A	SMCJ250CA	250.0	279.00	309.00	1	405.0	3.70	5
SMCJ300A	SMCJ300CA	300.0	335.00	371.00	1	486.0	3.10	5
SMCJ350A	SMCJ350CA	350.0	391.00	432.00	1	567.0	2.60	5
SMCJ400A	SMCJ400CA	400.0	447.00	494.00	1	648.0	2.30	5
SMCJ440A	SMCJ440CA	440.0	492.00	543.00	1	713.0	2.10	5

Note:

1. Suffix 'A' denotes 5% tolerance device.
2. Add suffix 'CA' after part number to specify Bi-directional devices.
3. For Bi-Directional devices having V_R of 10 volts and under, the I_R limit is doubl.

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

Figure 1 - Peak Pulse Power Rating Curve

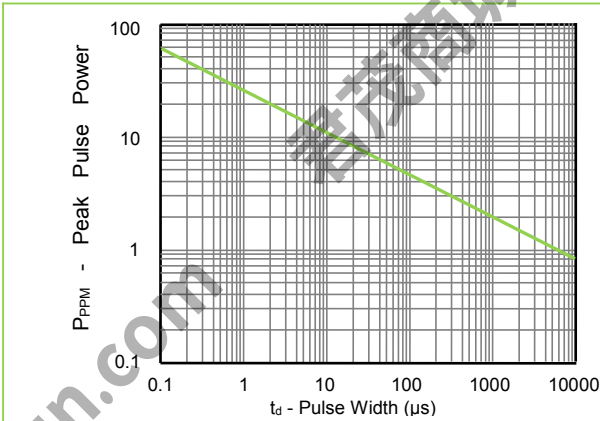


Figure 2 - Pulse Derating Curve

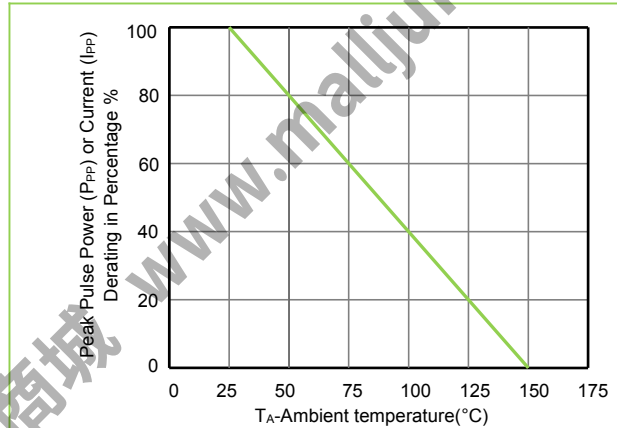


Figure 3 - Pulse Waveform

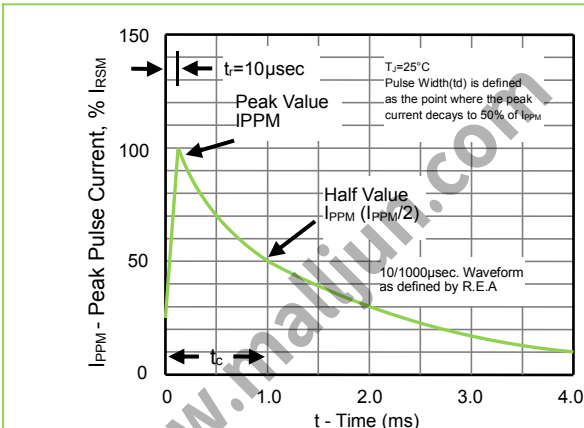


Figure 4 - Typical Junction Capacitance

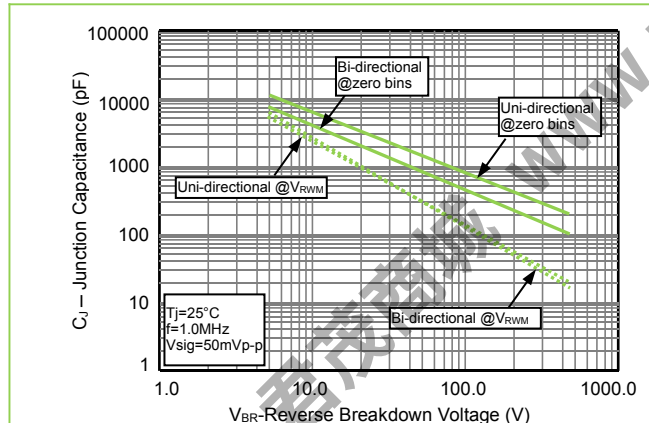


Figure 5 - Steady State Power Derating Curve

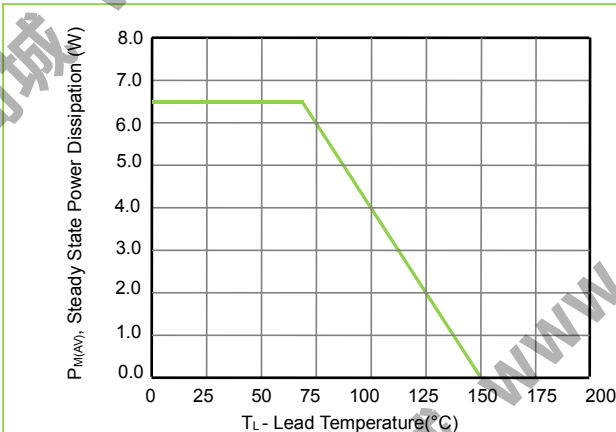
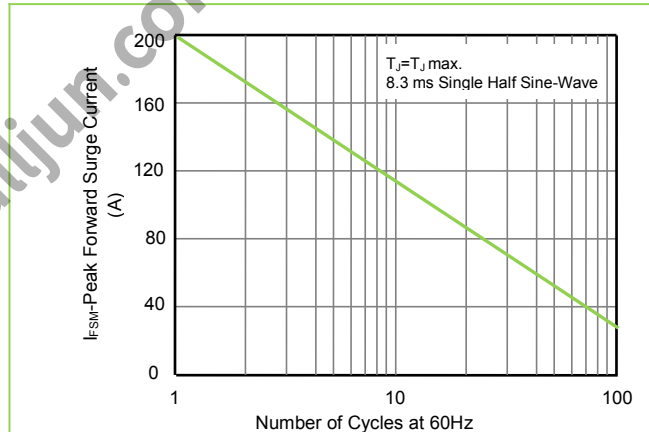


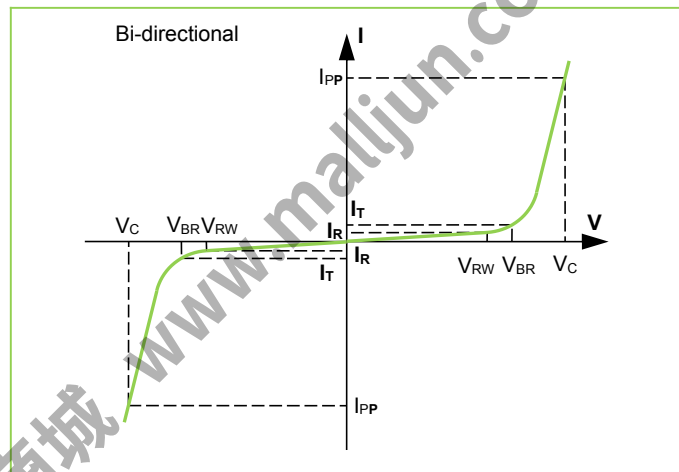
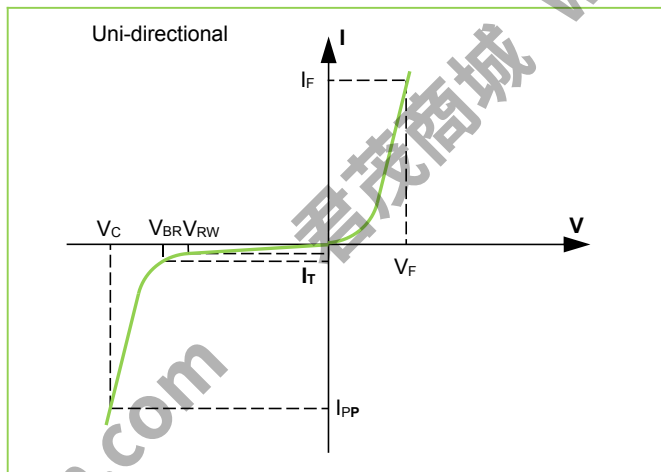
Figure 6 - Maximum Non-Repetitive Surge Current



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I-V Curve Characteristics



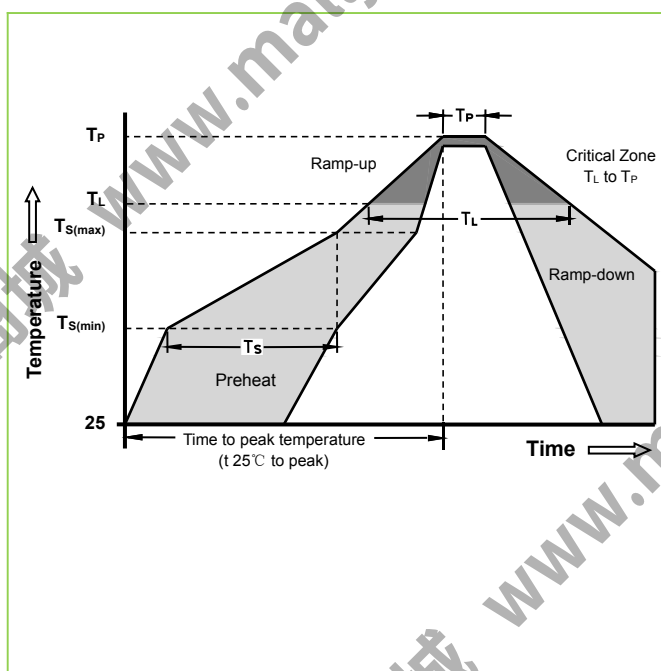
Physical Specifications

Weight	0.007 ounce, 0.21 gram
Case	JEDEC DO-214AB Molded Plastic over glass passivated junction
Polarity	Color band denotes cathode except Bipolar
Terminal	Matte Tin-plated leads, Solderable per JESD22-B102D

Environmental Specifications

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

Soldering Parameters

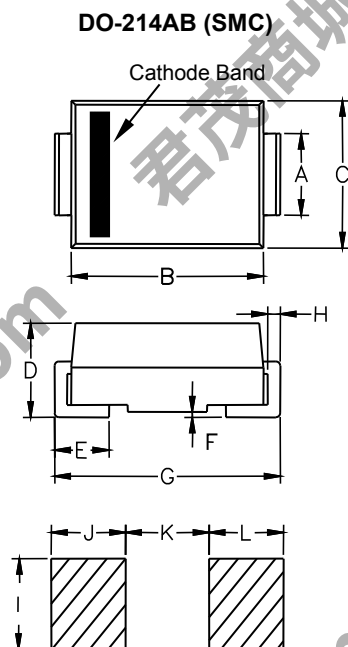


Reflow Condition		Lead-free assembly
Pre Heat	-Temperature Min (T _{S(min)})	150°C
	-Temperature Max (T _{S(max)})	200°C
	- Time (min to max) (T _S)	60 -180 Seconds
Average ramp up rate (Liquidus Temp T _L) to peak		3°C/second max
T _{S(max)} to T _L - Ramp-up Rate		3°C/second max
Reflow	- Temperature (T _L) (Liquidus)	217°C
	- Time (min to max) (T _L)	60 -150 Seconds
Peak Temperature (T _P)		260 +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

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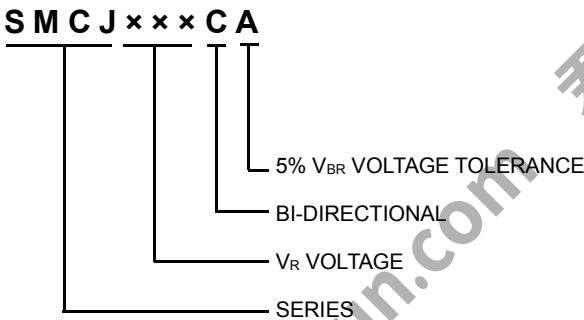
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Dimensions



Dimensions	Inches		Millimeters	
	Min	Max	Min	Max
A	0.108	0.126	2.75	3.20
B	0.260	0.280	6.60	7.11
C	0.220	0.244	5.59	6.20
D	0.085	0.103	2.15	2.62
E	0.030	0.060	0.76	1.52
F	0.002	0.008	0.051	0.203
G	0.305	0.320	7.74	8.13
H	0.006	0.012	0.15	0.31
I	0.121	-	3.07	-
J	0.068	-	1.715	-
K	-	0.185	-	4.69
L	0.068	-	1.715	-

Part Numbering



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Packaging

Part Number	Component Package	Quantity	Packaging Option	Reel Diameters (mm)
SMCJXXXXX	DO-214AB (SMC)	500 pcs	Tape & Reel -16mm/7"tape	177.8
SMCJXXXXX	DO-214AB (SMC)	3000 pcs	Tape & Reel -16mm/13"tape	330.0

Tape and Reel Specifications

