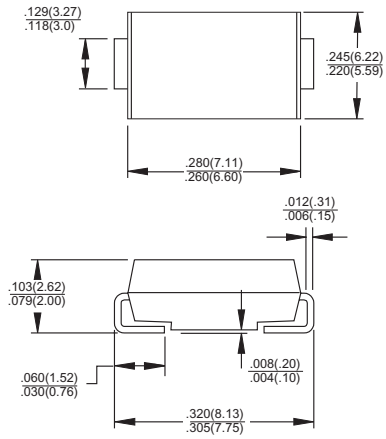
SMCJ SERIES

Surface Mount Transient Voltage Suppressor

Voltage Range
5.0 to 170 Volts
1500 Watts Peak Power

SMC/DO-214AB



Dimensions in inches and (millimeters)

Features

- ✧ For surface mounted application
- ✧ Low profile package
- ✧ Built-in strain relief
- ✧ Glass passivated junction
- ✧ Excellent clamping capability
- ✧ Fast response time: Typically less than 1.0ps from 0 volt to BV min.
- ✧ Typical I_R less than 1 μA above 10V
- ✧ High temperature soldering guaranteed: 260^{O}C / 10 seconds at terminals
- ✧ Plastic material used carries Underwriters Laboratory Flammability Classification 94V-0
- ✧ 1500 watts peak pulse power capability with a 10 X 1000 us waveform by 0.01% duty cycle

Mechanical Data

- ✧ Case: Molded plastic
- ✧ Terminals: Solder plated
- ✧ Polarity: Indicated by cathode band
- ✧ Standard packaging: 16mm tape (EIA STD RS-481)
- ✧ Weight: 0.21gram

Maximum Ratings and Electrical Characteristics

Rating at 25℃ ambient temperature unless otherwise specified.

Type Number	Symbol	Value	Units
Peak Power Dissipation at T_A=25^{O}C, Tp=1ms (Note 1)	P_{PK}	Minimum 1500	Watts
Steady State Power Dissipation	Pd	5	Watts
Peak Forward Surge Current, 8.3 ms Single Half Sine-wave Superimposed on Rated Load (JEDEC method) (Note 2, 3) - Unidirectional Only	I_{FSM}	200	Amps
Maximum Instantaneous Forward Voltage at 100.0A for Unidirectional Only (Note 4)	V_F	3.5 / 5.0	Volts
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to + 150	^{O}C

Notes: 1. Non-repetitive Current Pulse Per Fig. 3 and Derated above T_A=25^{O}C Per Fig. 2.
2. Mounted on 0.6 x 0.6" (16 x 16mm) Copper Pads to Each Terminal.
3. 8.3ms Single Half Sine-wave or Equivalent Square Wave, Duty Cycle=4 Pulses Per Minute Maximum.
4. V_F=3.5V on SMCJ5.0 thru SMCJ90 Devices and V_F=5.0V on SMCJ100 thru SMCJ170 Devices.

Devices for Bipolar Applications
1. For Bidirectional Use C or CA Suffix for Types SMCJ5.0 through Types SMCJ170.
2. Electrical Characteristics Apply in Both Directions.

RATINGS AND CHARACTERISTIC CURVES (SMCJ SERIES)

FIG.1- PEAK PULSE POWER RATING CURVE

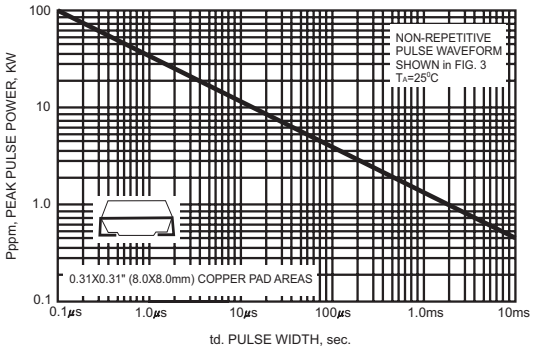


FIG.2- PULSE DERATING CURVE

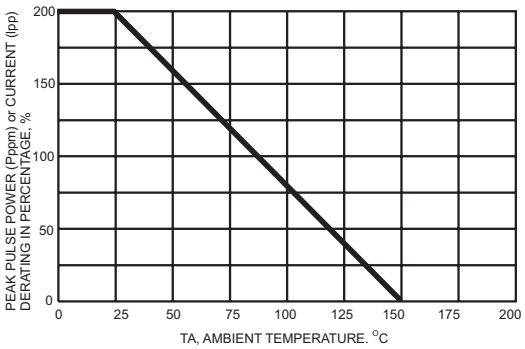


FIG.3- PULSE WAVEFORM

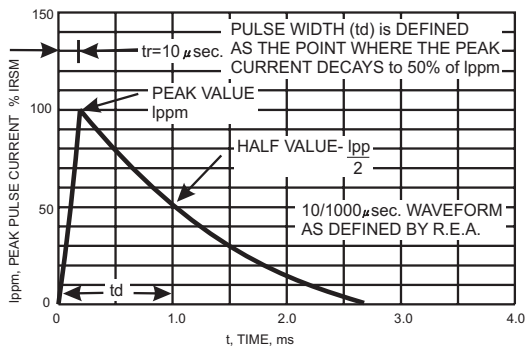


FIG.4- MAXIMUM NON-REPETITIVE FORWARD SURGE CURRENT

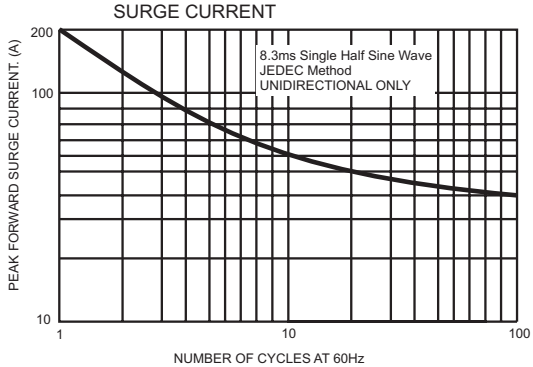


FIG.5- TYPICAL JUNCTION CAPACITANCE BIDIRECTIONAL

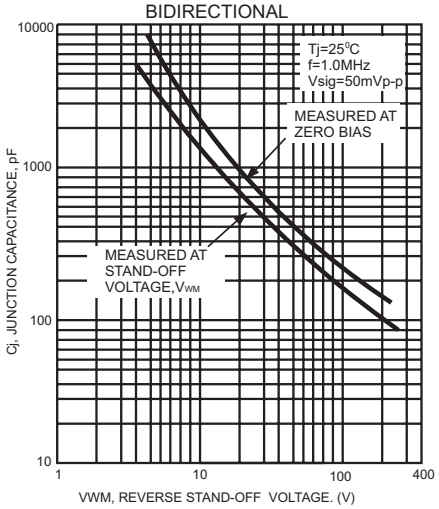
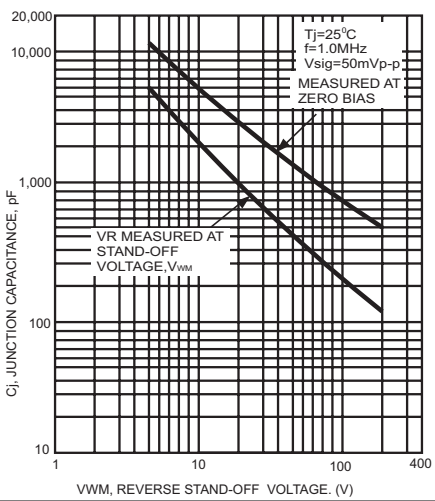


FIG.6- TYPICAL JUNCTION CAPACITANCE



ELECTRICAL CHARACTERISTICS (TA=25°C unless otherwise noted)

Device Type Modified "J" Bend Lead	Device Marking Code	Breakdown Voltage V(BR) (Volts) (Note 1) (MIN / MAX)	Test Current at I_T(mA)	Stand-off voltage V_{WM}(Volts)	Maximum Reverse Leakage at V_{WM} (Note 3) I_D(uA)	Maximum Peak Pulse Surge Current I_{PPM} (Note 2) (Amps)	Maximum Clamping Voltage at I_{PPM} V_C(Volts)
SMCJ5.0	GDD	6.40 / 7.3	10.0	5.0	1000	164.0	9.6
SMCJ5.0A	GDE	6.40 / 7.0	10.0	5.0	1000	171.0	9.2
SMCJ6.0	GDF	6.67 / 8.15	10.0	6.0	1000	138.0	11.4
SMCJ6.0A	GDG	6.67 / 7.37	10.0	6.0	1000	152.0	10.3
SMCJ6.5	GDH	7.22 / 8.82	10.0	6.5	500	128.0	12.3
SMCJ6.5A	GDK	7.22 / 7.98	10.0	6.5	500	140.0	11.2
SMCJ7.0	GDL	7.78 / 9.51	10.0	7.0	200	118.0	13.3
SMCJ7.0A	GDM	7.78 / 8.60	10.0	7.0	200	131.0	12.0
SMCJ7.5	GDN	8.33 / 10.3	1.0	7.5	100	110.0	14.3
SMCJ7.5A	GDP	8.33 / 9.21	1.0	7.5	100	122.0	12.9
SMCJ8.0	GDQ	8.89 / 10.9	1.0	8.0	50	105.0	15.0
SMCJ8.0A	GDR	8.89 / 9.83	1.0	8.0	50	115.0	13.6
SMCJ8.5	GDS	9.44 / 11.5	1.0	8.5	20	99.0	15.9
SMCJ8.5A	GDT	9.44 / 10.4	1.0	8.5	20	109.0	14.4
SMCJ9.0	GDU	10.0 / 12.2	1.0	9.0	10	93.0	16.9
SMCJ9.0A	GDV	10.0 / 11.1	1.0	9.0	10	102.0	15.4
SMCJ10	GDW	11.1 / 13.6	1.0	10.0	5.0	83.0	18.8
SMCJ10A	GDX	11.1 / 12.3	1.0	10.0	5.0	92.0	17.0
SMCJ11	GDY	12.2 / 14.9	1.0	11.0	5.0	78.0	20.1
SMCJ11A	GDZ	12.2 / 13.5	1.0	11.0	5.0	86.0	18.2
SMCJ12	GED	13.3 / 16.3	1.0	12.0	5.0	71.0	22.0
SMCJ12A	GEE	13.3 / 14.7	1.0	12.0	5.0	79.0	19.9
SMCJ13	GEF	14.4 / 17.6	1.0	13.0	5.0	66.0	23.8
SMCJ13A	GEG	14.4 / 15.9	1.0	13.0	5.0	73.0	21.5
SMCJ14	GEH	15.6 / 19.1	1.0	14.0	5.0	61.0	25.8
SMCJ14A	GEK	15.6 / 17.2	1.0	14.0	5.0	67.0	23.2
SMCJ15	GEL	16.7 / 20.4	1.0	15.0	5.0	58.0	26.9
SMCJ15A	GEM	16.7 / 18.5	1.0	15.0	5.0	64.0	24.4
SMCJ16	GEN	17.8 / 21.8	1.0	16.0	5.0	54.0	28.8
SMCJ16A	GEP	17.8 / 19.7	1.0	16.0	5.0	60.0	26.0
SMCJ17	GEQ	18.9 / 23.1	1.0	17.0	5.0	51.0	30.5
SMCJ17A	GER	18.9 / 20.9	1.0	17.0	5.0	57.0	27.6
SMCJ18	GES	20.0 / 24.4	1.0	18.0	5.0	48.0	32.2
SMCJ18A	GET	20.0 / 22.1	1.0	18.0	5.0	53.0	29.2
SMCJ20	GEU	22.2 / 27.1	1.0	20.0	5.0	43.0	35.8
SMCJ20A	GEV	22.2 /24.5	1.0	20.0	5.0	48.0	32.4
SMCJ22	GEW	24.4 / 29.8	1.0	22.0	5.0	39.0	39.4
SMCJ22A	GEX	24.4 / 26.9	1.0	22.0	5.0	44.0	35.5
SMCJ24	GEY	26.7 / 32.6	1.0	24.0	5.0	36.0	43.0
SMCJ24A	GEZ	26.7 / 29.5	1.0	24.0	5.0	40.0	38.9
SMCJ26	GFD	28.9 / 35.3	1.0	26.0	5.0	33.0	46.6
SMCJ26A	GFE	28.9 / 31.9	1.0	26.0	5.0	37.0	42.1
SMCJ28	GFF	31.1 / 38.0	1.0	28.0	5.0	31.0	50.0
SMCJ28A	GFG	31.1 / 34.4	1.0	28.0	5.0	34.0	45.4
SMCJ30	GFH	33.3 / 40.7	1.0	30.0	5.0	29.0	53.5
SMCJ30A	GFK	33.3 / 36.8	1.0	30.0	5.0	32.0	48.4
SMCJ33	GFL	36.7 / 44.9	1.0	33.0	5.0	26.0	59.0
SMCJ33A	GFM	36.7 / 40.6	1.0	33.0	5.0	29.0	53.3
SMCJ36	GFN	40.0 / 48.9	1.0	36.0	5.0	24.0	64.3
SMCJ36A	GFP	40.0 / 44.2	1.0	36.0	5.0	27.0	58.1
SMCJ40	GFQ	44.4 / 54.3	1.0	40.0	5.0	22.0	71.4
SMCJ40A	GFR	44.4 / 49.1	1.0	40.0	5.0	24.0	64.5
SMCJ43	GFS	47.8 / 58.4	1.0	43.0	5.0	20.0	76.7
SMCJ43A	GFT	47.8 / 52.8	1.0	43.0	5.0	22.0	69.4

ELECTRICAL CHARACTERISTICS (T_A=25^{O}C unless otherwise noted)

Device Type Modified "J" Bend Lead	Device Marking Code	Breakdown Voltage $V_{(BR)}$ (Volts) (Note 1) (MIN / MAX)	Test Current at I_T(mA)	Stand-off voltage V_{WM}(Volts)	Maximum Reverse Leakage at V_{WM} (Note 3) I_D(uA)	Maximum Peak Pulse Surge Current I_{PPM} (Note 2) (Amps)	Maximum Clamping Voltage at I_{PPM} V_C(Volts)
SMCJ45	GFU	50.0 / 61.1	1.0	45.0	5.0	19.0	80.3
SMCJ45A	GFV	50.0 / 55.3	1.0	45.0	5.0	21.0	72.7
SMCJ48	GFW	53.3 / 65.1	1.0	48.0	5.0	18.0	85.5
SMCJ48A	GFX	53.3 / 58.9	1.0	48.0	5.0	20.0	77.4
SMCJ51	GFY	56.7 / 69.3	1.0	51.0	5.0	17.0	91.1
SMCJ51A	GFZ	56.7 / 62.7	1.0	51.0	5.0	19.0	82.4
SMCJ54	GGD	60.0 / 73.3	1.0	54.0	5.0	16.0	96.3
SMCJ54A	GGE	60.0 / 66.3	1.0	54.0	5.0	18.0	87.1
SMCJ58	GGF	64.4 / 78.7	1.0	58.0	5.0	15.0	103.0
SMCJ58A	GGG	64.4 / 71.2	1.0	58.0	5.0	16.0	93.6
SMCJ60	GGH	66.7 / 81.5	1.0	60.0	5.0	14.0	107.0
SMCJ60A	GGK	66.7 / 73.7	1.0	60.0	5.0	16.0	96.8
SMCJ64	GGL	71.1 / 86.9	1.0	64.0	5.0	13.8	114.0
SMCJ64A	GGM	71.1 / 78.6	1.0	64.0	5.0	15.0	103.0
SMCJ70	GGN	77.8 / 95.1	1.0	70.0	5.0	12.6	125.0
SMCJ70A	GGP	77.8 / 86.0	1.0	70.0	5.0	13.9	113.0
SMCJ75	GGQ	83.3 / 102	1.0	75.0	5.0	11.7	134.0
SMCJ75A	GGR	83.3 / 92.1	1.0	75.0	5.0	13.0	121.0
MSJC78	GGS	86.7 / 106	1.0	78.0	5.0	11.3	139.0
SMCJ78A	GGT	86.7 / 95.8	1.0	78.0	5.0	12.5	126.0
SMCJ85	GGU	94.4 / 115	1.0	85.0	5.0	10.4	151.0
SMCJ85A	GGV	94.4 / 104	1.0	85.0	5.0	11.5	137.0
SMCJ90	GGW	100 / 122	1.0	90.0	5.0	9.8	160.0
SMCJ90A	GGX	100 / 111	1.0	90.0	5.0	10.7	146.0
SMCJ100	GGY	111 / 136	1.0	100.0	5.0	8.8	179.0
SMCJ100A	GGZ	111 / 123	1.0	100.0	5.0	9.7	162.0
SMCJ110	GHD	122 / 149	1.0	110.0	5.0	8.0	196.0
SMCJ110A	GHE	122 / 135	1.0	110.0	5.0	8.9	177.0
SMCJ120	GHF	133 / 163	1.0	120.0	5.0	7.3	214.0
SMCJ120A	GHG	133 / 147	1.0	120.0	5.0	8.1	193.0
SMCJ130	GHH	144 / 176	1.0	130.0	5.0	6.8	231.0
SMCJ130A	GHK	144 / 159	1.0	130.0	5.0	7.5	209.0
SMCJ150	GHL	167 / 204	1.0	150.0	5.0	5.8	268.0
SMCJ150A	GHM	167 / 185	1.0	150.0	5.0	6.4	243.0
SMCJ160	GHN	178 / 218	1.0	160.0	5.0	5.4	287.0
SMCJ160A	GHP	178 / 197	1.0	160.0	5.0	6.0	259.0
SMCJ170	GHQ	189 / 231	1.0	170.0	5.0	5.1	304.0
SMCJ170A	GHR	189 / 209	1.0	170.0	5.0	5.7	275.0

Notes:

1. $V_{(BR)}$ measured after I_T applied for 300us, I_T=Square wave pulse or equivalent.

2. Surge current waveform per Fig. 3 and derate per Figure 2.

3. For bidirectional types having V_{WM} of 10 Volts and less, the I_D limit is doubled

4. all terms and symbols are consistent with ANSI/IEEE C62.35

TVS APPLICATION NOTES:

Transient Voltage Suppressors may be used at various points in a circuit to provide various degrees of protection. The following is a typical linear power supply with transient voltage suppressor units placed at different points. All provide protection of the load.

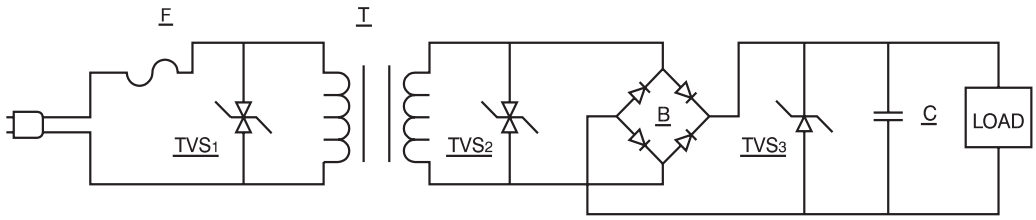


FIGURE 1

Transient Voltage Suppressors 1 provides maximum protection. However, the system will probably require replacement of the line fuse(F) since it provides a dominant portion of the series impedance when a surge is encountered.

However, we do not recommend to use the TVS diode here, unless we can know the electric circuit impedance and the magnitude of surge rushed into the circuit. Otherwise the TVS diode is easy to be destroyed by voltage surge.

Transient Voltage Suppressor 2 provides execllent protection of circuitry excluding the transformer(T). However, since the transformer is a large part of the series impedance, the chance of the line fuse opening during the surge condition is reduced.

Transient Voltage Suppressor 3 provides the load with complete protection. It uses a unidirectional Transient Voltage Suppressor, which is a cost advantage. The series impedance now includes the line fuse, transformer, and bridge rectifier(B) so failure of the line fuse is further reduced. If only Transient Voltage Suppressor 3 is in use, then the bridge rectifier is unprotected and would require a higher voltage and current rating to prevent failure by transients.

Any combination of these three, or any one of these applications, will prevent damage to the load. This would require varying trade-offs in power supply protection versus maintenance(changing the time fuse).

An additional method is to utilize the Transient Voltage Suppressor units as a controlled avalanche bridge. This reduces the parts count and incorporates the protection within the bridge rectifier.

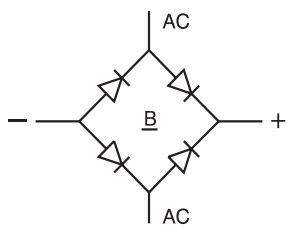


FIGURE 2

RECOMMENDED PAD SIZES

The pad dimensions should be 0.010"(0.25mm) longer than the contact size, in the lead axis.

This allows a solder fillet to form, see figure below. Contact factory for soldering methods.