

Surface Mount Transient Voltage Suppressor

Stand-Off Voltage - 5.0 to 440 Volts

400 Watt Peak Pulse Power

Features

- For surface mounted applications in order to optimize board space
- Low profile package
- Built-in strain relief
- Glass passivated junction
- Low inductance
- Excellent clamping capability
- Repetition Rate (duty cycle):0.01%
- Fast response time: typically less than 1.0ps from 0 Volts to V(BR) for unidirectional types
- Typical IR less than 1μA above 10V
- High Temperature soldering: 260°C/10 seconds at terminals
- Plastic package has Underwriters Laboratory Flammability 94V-O
- Pb-free plated
- AEC-Q101



Mechanical Data

- **Case:** JEDEC DO-214AC. Molded plastic over glass passivated junction
- **Terminals:** Solderable per MIL-STD-750, Method 2026
- **Polarity:** Color band denoted positive end (cathode) except Bidirectional
- **Standard Packaging:** 12mm tape (EIA STD RS-481)
- **Weight:** 0.002ounce, 0.061gram

Devices For Bipolar Application

- For Bidirectional use C or CA Suffix for types SMAJ5.0 thru types SMAJ170 (e.g. SMAJ5.0C , SMAJ170CA)
- Electrical characteristics apply in both directions

Maximum Ratings And Characteristics

Ratings at 25°C ambient temperature unless otherwise specified.

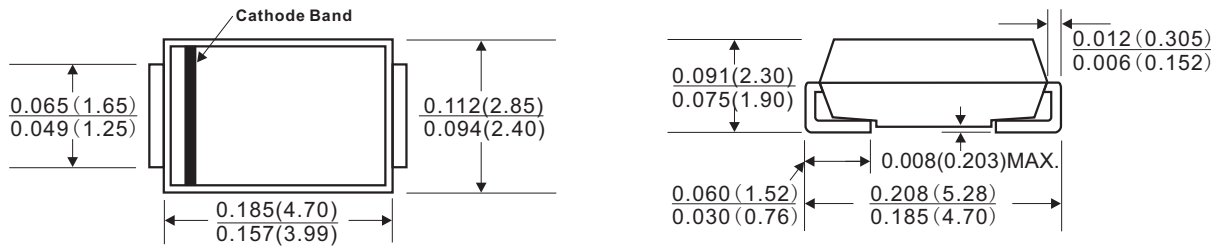
| RATING | SYMBOL | VALUE | UNITS |
|--|-----------------------------------|----------------|-------|
| Peak Pulse Power Dissipation on 10/1000μs waveform (Note 1,2 ,FIG.1) | P _{PPM} | Minimum 400 | Watts |
| Peak Pulse Current of on 10/1000μs waveform (Note 1,FIG.3) | I _{PPM} | SEE TABLE 1 | Amps |
| Peak Forward Surge Current,8.3ms Single Half Sine-Wave Superimposed on Rated Load,(JEDEC Method) (Note2,3) | I _{FSM} | 20 | Amps |
| Operating junction and Storage Temperature Range | T _J , T _{STG} | -55 to +150 | °C |

Notes :

- 1.Non-repetitive current pulse , per Fig. 3 and derated above TA = 25°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.

Dimensions (DO-214AC)

DO-214AC(SMA J-Bend)



Dimensions in inches and (millimeters)

Electrical Characteristics

TABLE 1

**Stand for commonly used models

| SMAJ Part Number | | Device Marking Code | | Reverse Stand-Off Voltage | Breakdown Voltage @IT | Breakdown Voltage @IT | Test Current | Maximum Clamping Voltage @Ipp | Peak Pulse Current | Reverse Leakage @VRWM |
|------------------|-------------|---------------------|----|---------------------------|-----------------------|-----------------------|--------------|-------------------------------|--------------------|-----------------------|
| UNI-Polar | BI-Polar | UNI | BI | VRWM(V) | VBR(V)Min. | VBR(V)Max. | IT(mA) | Vc(V) | Ipp(A) | Ir(μA) |
| SMAJ5.0A | SMAJ5.0CA | AE | WE | 5.0 | 6.40 | 7.00 | 10 | 9.2 | 43.5 | 500 |
| * SMAJ6.0A | * SMAJ6.0CA | AG | WG | 6.0 | 6.67 | 7.37 | 10 | 10.3 | 38.8 | 500 |
| SMAJ6.5A | SMAJ6.5CA | AK | WK | 6.5 | 7.22 | 7.98 | 10 | 11.2 | 35.7 | 300 |
| SMAJ7.0A | SMAJ7.0CA | AM | WM | 7.0 | 7.78 | 8.60 | 10 | 12.0 | 33.3 | 200 |
| SMAJ7.5A | SMAJ7.5CA | AP | WP | 7.5 | 8.33 | 9.21 | 1 | 12.9 | 31.0 | 100 |
| * SMAJ8.0A | * SMAJ8.0CA | AR | WR | 8.0 | 8.89 | 9.83 | 1 | 13.6 | 29.4 | 50 |
| SMAJ8.5A | SMAJ8.5CA | AT | WT | 8.5 | 9.44 | 10.40 | 1 | 14.4 | 27.8 | 20 |
| SMAJ9.0A | SMAJ9.0CA | AV | WV | 9.0 | 10.00 | 11.10 | 1 | 15.4 | 26.0 | 10 |
| SMAJ10A | SMAJ10CA | AX | WX | 10.0 | 11.10 | 12.30 | 1 | 17.0 | 23.5 | 5 |
| SMAJ11A | SMAJ11CA | AZ | WZ | 11.0 | 12.20 | 13.50 | 1 | 18.2 | 22.0 | 1 |
| SMAJ12A | * SMAJ12CA | BE | XE | 12.0 | 13.30 | 14.70 | 1 | 19.9 | 20.1 | 1 |
| SMAJ13A | SMAJ13CA | BG | XG | 13.0 | 14.40 | 15.90 | 1 | 21.5 | 18.6 | 1 |
| SMAJ14A | SMAJ14CA | BK | XK | 14.0 | 15.60 | 17.20 | 1 | 23.2 | 17.2 | 1 |
| SMAJ15A | * SMAJ15CA | BM | XM | 15.0 | 16.70 | 18.50 | 1 | 24.4 | 16.4 | 1 |
| SMAJ16A | SMAJ16CA | BP | XP | 16.0 | 17.80 | 19.70 | 1 | 26.0 | 15.4 | 1 |
| SMAJ17A | SMAJ17CA | BR | XR | 17.0 | 18.90 | 20.90 | 1 | 27.6 | 14.5 | 1 |
| SMAJ18A | * SMAJ18CA | BT | XT | 18.0 | 20.00 | 22.10 | 1 | 29.2 | 13.7 | 1 |
| SMAJ20A | SMAJ20CA | BV | XV | 20.0 | 22.20 | 24.50 | 1 | 32.4 | 12.3 | 1 |
| SMAJ22A | SMAJ22CA | BX | XY | 22.0 | 24.40 | 26.90 | 1 | 35.5 | 11.3 | 1 |
| SMAJ24A | SMAJ24CA | BZ | XZ | 24.0 | 26.70 | 29.50 | 1 | 38.9 | 10.3 | 1 |
| SMAJ26A | SMAJ26CA | CE | YE | 26.0 | 28.90 | 31.90 | 1 | 42.1 | 9.5 | 1 |
| SMAJ28A | SMAJ28CA | CG | YG | 28.0 | 31.10 | 34.40 | 1 | 45.4 | 8.8 | 1 |

Notes :

1. For bidirectional type having VRWM of 10 volts and less, the Ir limit is double
2. For parts with A, the VBR is ± 5%

Electrical Characteristics

TABLE 1

***Stand for commonly used models

| SMAJ Part Number | | Device Marking Code | | Reverse Stand-Off Voltage | Breakdown Voltage @I _T | Breakdown Voltage @I _T | Test Current | Maximum Clamping Voltage @I _{pp} | Peak Pulse Current | Reverse Leakage @V _{RWM} |
|------------------|-------------|---------------------|----|---------------------------|-----------------------------------|-----------------------------------|---------------------|---|---------------------|-----------------------------------|
| UNI-Polar | BI-Polar | UNI | BI | V _{RWM} (V) | V _{BR} (V)Min. | V _{BR} (V)Max. | I _T (mA) | V _C (V) | I _{pp} (A) | I _R (μA) |
| SMAJ30A | * SMAJ30CA | CK | YK | 30.0 | 33.30 | 36.80 | 1 | 48.4 | 8.3 | 1 |
| SMAJ33A | SMAJ33CA | CM | YM | 33.0 | 36.70 | 40.60 | 1 | 53.3 | 7.5 | 1 |
| SMAJ36A | SMAJ36CA | CP | YP | 36.0 | 40.00 | 44.20 | 1 | 58.1 | 6.9 | 1 |
| SMAJ40A | * SMAJ40CA | CR | YR | 40.0 | 44.40 | 49.10 | 1 | 64.5 | 6.2 | 1 |
| SMAJ43A | * SMAJ43CA | CT | YT | 43.0 | 47.80 | 52.80 | 1 | 69.4 | 5.8 | 1 |
| SMAJ45A | SMAJ45CA | CV | YV | 45.0 | 50.00 | 55.30 | 1 | 72.7 | 5.5 | 1 |
| SMAJ48A | SMAJ48CA | CX | YX | 48.0 | 53.30 | 58.90 | 1 | 77.4 | 5.2 | 1 |
| SMAJ51A | SMAJ51CA | CZ | YZ | 51.0 | 56.70 | 62.70 | 1 | 82.4 | 4.9 | 1 |
| SMAJ54A | SMAJ54CA | RE | ZE | 54.0 | 60.00 | 66.30 | 1 | 87.1 | 4.6 | 1 |
| SMAJ58A | SMAJ58CA | RG | ZG | 58.0 | 64.40 | 71.20 | 1 | 93.6 | 4.3 | 1 |
| SMAJ60A | SMAJ60CA | RK | ZK | 60.0 | 66.70 | 73.70 | 1 | 96.8 | 4.1 | 1 |
| SMAJ64A | SMAJ64CA | RM | ZM | 64.0 | 71.10 | 78.60 | 1 | 103.0 | 3.9 | 1 |
| SMAJ70A | SMAJ70CA | RP | ZP | 70.0 | 77.80 | 86.00 | 1 | 113.0 | 3.5 | 1 |
| SMAJ75A | SMAJ75CA | RR | ZR | 75.0 | 83.30 | 92.10 | 1 | 121.0 | 3.3 | 1 |
| SMAJ78A | SMAJ78CA | RT | ZT | 78.0 | 86.70 | 95.80 | 1 | 126.0 | 3.2 | 1 |
| SMAJ85A | SMAJ85CA | RV | ZV | 85.0 | 94.40 | 104.00 | 1 | 137.0 | 2.9 | 1 |
| SMAJ90A | SMAJ90CA | RX | ZX | 90.0 | 100.00 | 111.00 | 1 | 146.0 | 2.7 | 1 |
| SMAJ100A | SMAJ100CA | RZ | ZZ | 100.0 | 111.00 | 123.00 | 1 | 162.0 | 2.5 | 1 |
| SMAJ110A | SMAJ110CA | SE | VE | 110.0 | 122.00 | 135.00 | 1 | 177.0 | 2.3 | 1 |
| SMAJ120A | SMAJ120CA | SG | VG | 120.0 | 133.00 | 147.00 | 1 | 193.0 | 2.1 | 1 |
| SMAJ130A | SMAJ130CA | SK | VK | 130.0 | 144.00 | 159.00 | 1 | 209.0 | 1.9 | 1 |
| SMAJ150A | SMAJ150CA | SM | VM | 150.0 | 167.00 | 185.00 | 1 | 243.0 | 1.6 | 1 |
| SMAJ160A | SMAJ160CA | SP | VP | 160.0 | 178.00 | 197.00 | 1 | 259.0 | 1.5 | 1 |
| SMAJ170A | SMAJ170CA | SR | VR | 170.0 | 189.00 | 209.00 | 1 | 275.0 | 1.5 | 1 |
| SMAJ180A | SMAJ180CA | ST | VT | 180.0 | 201.00 | 222.00 | 1 | 292.0 | 1.4 | 1 |
| SMAJ200A | SMAJ200CA | SV | VV | 200.0 | 224.00 | 247.00 | 1 | 324.0 | 1.2 | 1 |
| SMAJ220A | SMAJ220CA | SX | VX | 220.0 | 246.00 | 272.00 | 1 | 356.0 | 1.1 | 1 |
| SMAJ250A | SMAJ250CA | SZ | VZ | 250.0 | 279.00 | 309.00 | 1 | 405.0 | 1.0 | 1 |
| SMAJ300A | SMAJ300CA | TE | UE | 300.0 | 335.00 | 371.00 | 1 | 486.0 | 0.8 | 1 |
| SMAJ350A | SMAJ350CA | TG | UG | 350.0 | 391.00 | 432.00 | 1 | 567.0 | 0.7 | 1 |
| SMAJ400A | * SMAJ400CA | TK | UK | 400.0 | 447.00 | 494.00 | 1 | 648.0 | 0.6 | 1 |
| SMAJ440A | * SMAJ440CA | TM | UM | 440.0 | 492.00 | 543.00 | 1 | 713.0 | 0.6 | 1 |

Notes :

1. For bidirectional type having V_{RWM} of 10 volts and less, the I_R limit is double
2. For parts with A, the V_{BR} is ± 5%

Characteristic Curves (TA=25 °C unless otherwise noted)

Fig.1 Peak Pulse Power Rating

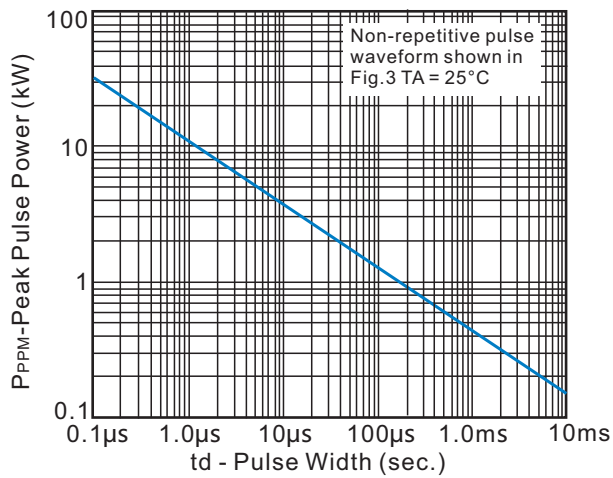


Fig.2 Pulse Derating Curve

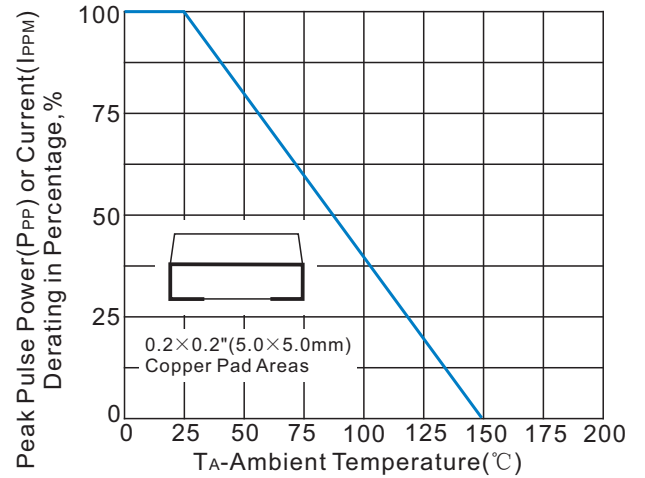


Fig.3 Pulse Waveform

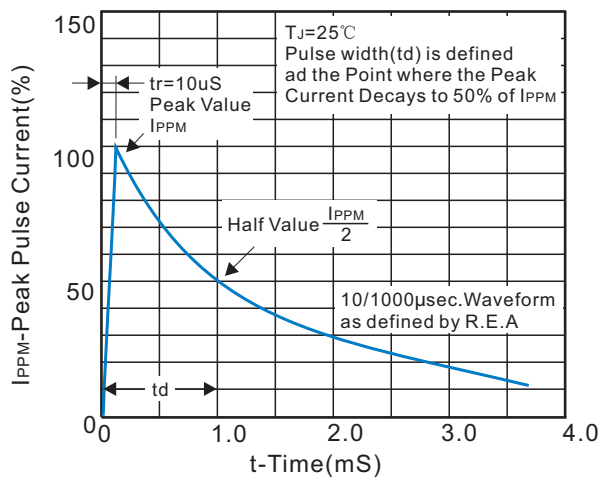


Fig.4 Typical Junction Capacitance

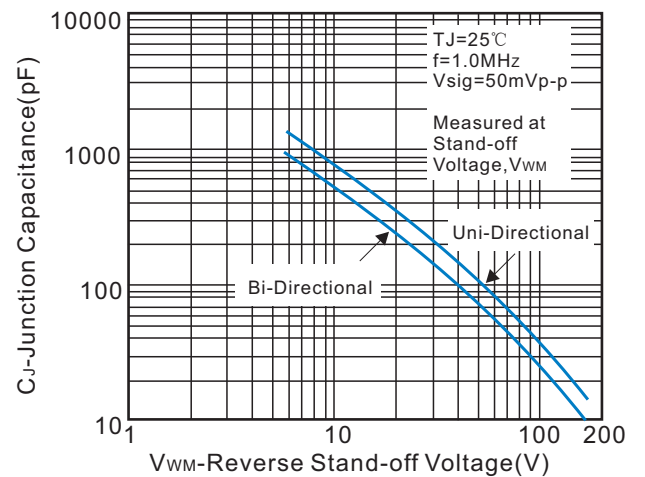


Fig.5 Typ. Transient Thermal Impedance

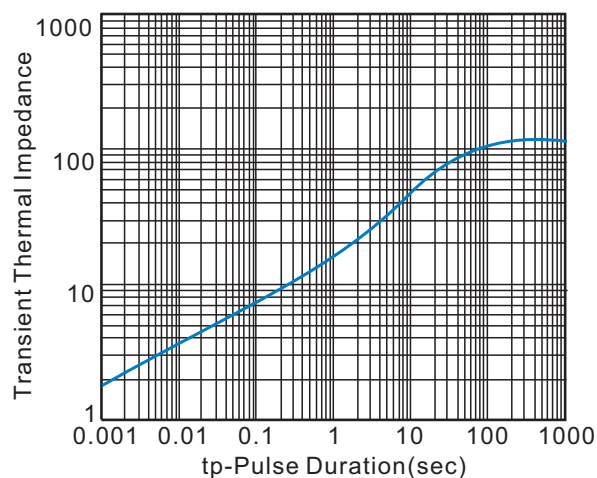
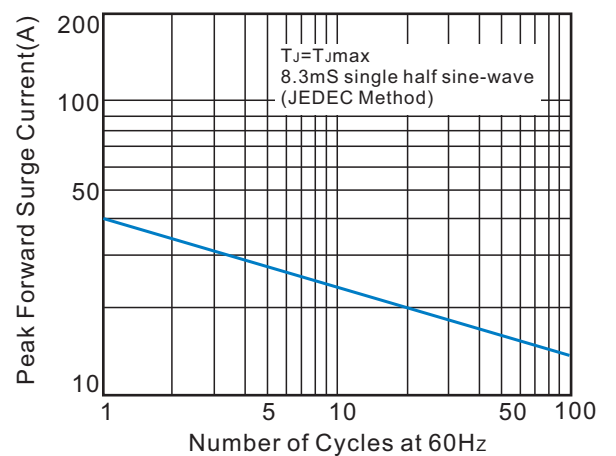


Fig.6 Maximum Non-Repetitive Peak Forward Surge Current Uni-Directional Only

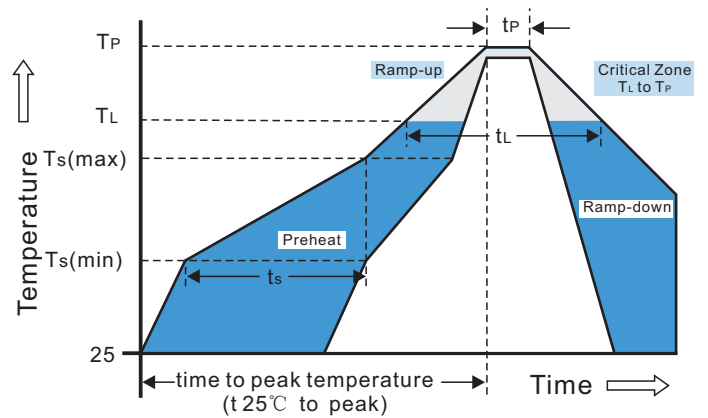


Recommended Soldering Conditions

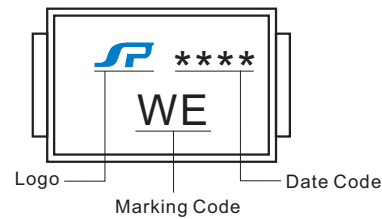
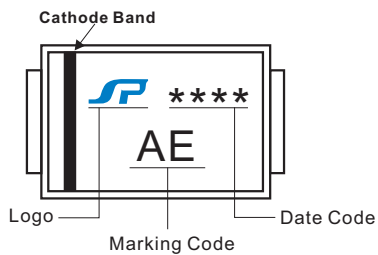
Recommended Conditions

| Reflow Condition | | Pb-Free assembly (see Fig.1) |
|--|------------------------------------|---------------------------------|
| Pre Heat | -Temperature Min($T_{s(min)}$) | +150°C |
| | -Temperature Max($T_{s(max)}$) | +200°C |
| | -Time(Min to Max)(t _s) | 60-180secs |
| Average ramp up rate (Liquidus Temp(T_L) to peak) | | 3°C/sec.Max. |
| $T_{s(max)}$ to T_L -Ramp-up Rate | | 3°C/sec.Max. |
| Reflow | -Temperature(T_L)(Liquidus) | +217°C |
| | -Temperature(t_L) | 60-150secs |
| Peak Temp(T_P) | | +260(+0/-5)°C |
| Time within 5°C of actual Peak Temp(t_P) | | 30 secs.Max. |
| Ramp-down Rate | | 6°C/sec.Max. |
| Time 25°C to Peak Temp(T_P) | | 8 min.Max. |
| Do not exceed | | +260°C |

Reflow Soldering



Marking Code



Tape And Reel Specification

| Symbol | Ea Per Reel | REEL DIA (mm) | Industry Standard |
|---------|-------------|---------------|-------------------|
| SMAJ*** | 5000 | 330 | EIA RS-481 |

