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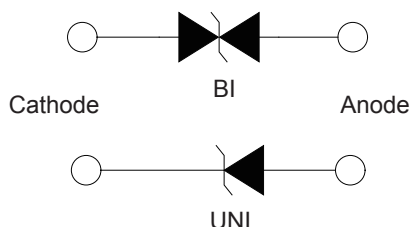
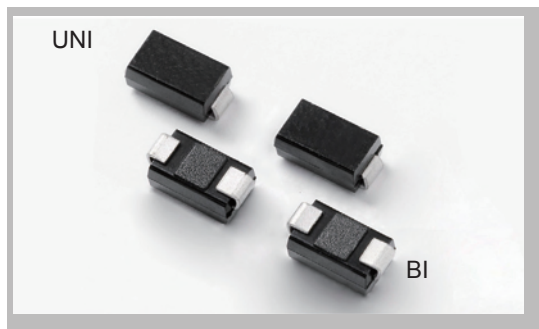


Transient Voltage Suppressor

瞬态抑制二极管

SMAJ Series

Transient Voltage Suppressors - SMAJ Series



Features

1. Halogen-free
2. Rohs compliant
3. Typical maximum temperature coefficient
4. $\Delta V_{BR}=0.1\% \times V_{BR}@25^{\circ}\text{C} \times \Delta T$
5. Glass passivated Chip junction in DO-214AC package
6. 800W peak pulse capability at 10x1000 μs waveform, repetition rate (duty cycles):0.01%
7. Fast response time: typically less than 1.0ps from 0 Volts to BV min
8. Excellent clamping capability
9. Low incremental surge resistance
10. Typical IR less than 5 μA above 11V
11. High temperature soldering guaranteed: 260 $^{\circ}\text{C}$ /40 seconds / 0.375", (9.5mm) lead length, 5lbs., (2.3kg)tension
12. Plastic package has underwriters laboratory flammability classification 94v-0

Applications

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.

Mechanical Characteristics

| Rating | Symbol | Value | Units |
|--|----------------|--|-----------------------------|
| Peak Pulse Power Dissipation at TA=25 $^{\circ}\text{C}$ by 10x1000 μs test waveform (Fig.1)(Note 1),(Note 2) | P_{PPM} | 600 | Watts |
| Power Dissipation on infinite heat sink at TA=50 $^{\circ}\text{C}$ | P_D | 3.3 | Watts |
| Peak Forward Surge Current, 8.3ms Single Half Sine Wave(Note 3) | I_{FSM} | 40 | Amps |
| Maximum Instantaneous Forward Voltage at 25A for Unidirectional only (Note 4) | V_F | 3.5/5.0 | V |
| Operating junction and Storage Temperature Range. | T_J, T_{STG} | -55 $^{\circ}\text{C}$ to 150 $^{\circ}\text{C}$ | $^{\circ}\text{C}$ |
| Typical Thermal Resistance Junction to Lead | R_{WJL} | 30 | $^{\circ}\text{C}/\text{W}$ |
| Typical Thermal Resistance Junction to Ambient | R_{WA} | 150 | $^{\circ}\text{C}/\text{W}$ |

Notes:

1. Non-repetitive current pulse, per Fig. 3 and derated above TA = 25 $^{\circ}\text{C}$ per Fig. 2.
2. Measured on 8.3ms single half sine wave or equivalent square wave, duty cycle=4 per minute maximum.
3. $V_F < 3.5\text{V}$ for devices of $V_{BR} \leq 200\text{V}$ and $V_F < 5.0\text{V}$ for devices of $V_{BR} \geq 201\text{V}$.

Electrical Characteristics

| Type Number | | Device Marking Code | | Reverse Stand-Off Voltage | Breakdown Voltage@I _T | | Test Current | Maximum Clamping Voltage@I _{pp} | Peak Pulse Current | Reverse Leakage @V _{RWM} |
|-------------|-----------|---------------------|----|---------------------------|----------------------------------|--------|---------------------|--|---------------------|-----------------------------------|
| (UNI) | (BI) | UNI | BI | V _{RWM} (V) | V _{BR MIN.} (V) | (V) | I _T (mA) | V _C (V) | I _{pp} (A) | I _R (μA) |
| SMAJ5.0A | SMAJ5.0CA | HE | TE | 5.0 | 6.40 | 7.25 | 10 | 9.2 | 43.5 | 800 |
| SMAJ6.0A | SMAJ6.0CA | HG | TG | 6.0 | 6.67 | 7.67 | 10 | 10.3 | 38.8 | 800 |
| SMAJ6.5A | SMAJ6.5CA | HK | TK | 6.5 | 7.22 | 8.30 | 10 | 11.2 | 35.7 | 500 |
| SMAJ7.0A | SMAJ7.0CA | HM | TM | 7.0 | 7.78 | 8.95 | 10 | 12.0 | 33.3 | 200 |
| SMAJ7.5A | SMAJ7.5CA | HP | TP | 7.5 | 8.33 | 9.58 | 1 | 12.9 | 31.0 | 100 |
| SMAJ8.0A | SMAJ8.0CA | HR | TR | 8.0 | 8.89 | 10.23 | 1 | 13.6 | 29.4 | 50 |
| SMAJ8.5A | SMAJ8.5CA | HT | TT | 8.5 | 9.44 | 10.82 | 1 | 14.4 | 27.7 | 20 |
| SMAJ9.0A | SMAJ9.0CA | HV | TV | 9.0 | 10.00 | 11.50 | 1 | 15.4 | 26.0 | 10 |
| SMAJ10A | SMAJ10CA | HX | TX | 10.0 | 11.10 | 12.80 | 1 | 17.0 | 23.5 | 5 |
| SMAJ11A | SMAJ11CA | HZ | TZ | 11.0 | 12.20 | 14.00 | 1 | 18.2 | 22.0 | 5 |
| SMAJ12A | SMAJ12CA | IE | UE | 12.0 | 13.30 | 15.30 | 1 | 19.9 | 20.1 | 5 |
| SMAJ13A | SMAJ13CA | IG | UG | 13.0 | 14.40 | 16.50 | 1 | 21.5 | 18.6 | 5 |
| SMAJ14A | SMAJ14CA | IK | UK | 14.0 | 15.60 | 17.90 | 1 | 23.2 | 17.2 | 5 |
| SMAJ15A | SMAJ15CA | IM | UM | 15.0 | 16.70 | 19.20 | 1 | 24.4 | 16.4 | 5 |
| SMAJ16A | SMAJ16CA | IP | UP | 16.0 | 17.80 | 20.50 | 1 | 26.0 | 15.3 | 5 |
| SMAJ17A | SMAJ17CA | IR | UR | 17.0 | 18.90 | 21.70 | 1 | 27.6 | 14.5 | 5 |
| SMAJ18A | SMAJ18CA | IT | UT | 18.0 | 20.00 | 23.30 | 1 | 29.2 | 13.7 | 5 |
| SMAJ20A | SMAJ20CA | IV | UV | 20.0 | 22.20 | 25.50 | 1 | 32.4 | 12.3 | 5 |
| SMAJ22A | SMAJ22CA | IX | UX | 22.0 | 24.40 | 28.00 | 1 | 35.5 | 11.2 | 5 |
| SMAJ24A | SMAJ24CA | IZ | UZ | 24.0 | 26.70 | 30.70 | 1 | 38.9 | 10.3 | 5 |
| SMAJ26A | SMAJ26CA | JE | VE | 26.0 | 28.90 | 33.20 | 1 | 42.1 | 9.5 | 5 |
| SMAJ28A | SMAJ28CA | JG | VG | 28.0 | 31.10 | 35.80 | 1 | 45.4 | 8.8 | 5 |
| SMAJ30A | SMAJ30CA | JK | VK | 30.0 | 33.30 | 38.30 | 1 | 48.4 | 8.3 | 5 |
| SMAJ33A | SMAJ33CA | JM | VM | 33.0 | 36.70 | 42.20 | 1 | 53.3 | 7.5 | 5 |
| SMAJ36A | SMAJ36CA | JP | VP | 36.0 | 40.00 | 46.00 | 1 | 58.1 | 6.9 | 5 |
| SMAJ40A | SMAJ40CA | JR | VR | 40.0 | 44.40 | 51.10 | 1 | 64.5 | 6.2 | 5 |
| SMAJ43A | SMAJ43CA | JT | VT | 43.0 | 47.80 | 54.90 | 1 | 69.4 | 5.7 | 5 |
| SMAJ45A | SMAJ45CA | JV | VV | 45.0 | 50.00 | 57.50 | 1 | 72.7 | 5.5 | 5 |
| SMAJ48A | SMAJ48CA | JX | VX | 48.0 | 53.30 | 61.30 | 1 | 77.4 | 5.2 | 5 |
| SMAJ51A | SMAJ51CA | JZ | VZ | 51.0 | 56.70 | 65.20 | 1 | 82.4 | 4.9 | 5 |
| SMAJ54A | SMAJ54CA | RE | WE | 54.0 | 60.00 | 69.00 | 1 | 87.1 | 4.6 | 5 |
| SMAJ58A | SMAJ58CA | RG | WG | 58.0 | 64.40 | 74.10 | 1 | 93.6 | 4.3 | 5 |
| SMAJ60A | SMAJ60CA | RK | WK | 60.0 | 66.70 | 76.70 | 1 | 96.8 | 4.1 | 5 |
| SMAJ64A | SMAJ64CA | RM | WM | 64.0 | 71.10 | 81.80 | 1 | 103.0 | 3.9 | 5 |
| SMAJ70A | SMAJ70CA | RP | WP | 70.0 | 77.80 | 89.50 | 1 | 113.0 | 3.5 | 5 |
| SMAJ75A | SMAJ75CA | RR | WR | 75.0 | 83.30 | 95.80 | 1 | 121.0 | 3.3 | 5 |
| SMAJ78A | SMAJ78CA | RT | WT | 78.0 | 86.70 | 99.70 | 1 | 126.0 | 3.2 | 5 |
| SMAJ85A | SMAJ85CA | RV | WV | 85.0 | 94.40 | 108.20 | 1 | 137.0 | 2.9 | 5 |
| SMAJ90A | SMAJ90CA | RX | WX | 90.0 | 100.00 | 115.50 | 1 | 146.0 | 2.7 | 5 |
| SMAJ100A | SMAJ100CA | RZ | WZ | 100.0 | 111.00 | 128.00 | 1 | 162.0 | 2.5 | 5 |
| SMAJ110A | SMAJ110CA | SE | XE | 110.0 | 122.00 | 140.50 | 1 | 177.0 | 2.3 | 5 |
| SMAJ120A | SMAJ120CA | SG | XG | 120.0 | 133.00 | 153.00 | 1 | 193.0 | 2.0 | 5 |
| SMAJ130A | SMAJ130CA | SK | XK | 130.0 | 144.00 | 165.50 | 1 | 209.0 | 1.9 | 5 |
| SMAJ150A | SMAJ150CA | SM | XM | 150.0 | 167.00 | 192.60 | 1 | 243.0 | 1.6 | 5 |
| SMAJ160A | SMAJ160CA | SP | XP | 160.0 | 178.00 | 205.00 | 1 | 259.0 | 1.5 | 5 |
| SMAJ170A | SMAJ170CA | SR | XR | 170.0 | 189.00 | 217.50 | 1 | 275.0 | 1.4 | 5 |
| SMAJ180A | SMAJ180CA | ST | XT | 180.0 | 198.00 | 230.40 | 1 | 292.0 | 1.3 | 5 |
| SMAJ190A | SMAJ190CA | SV | XV | 190.0 | 209.00 | 243.20 | 1 | 308.0 | 1.3 | 5 |
| SMAJ200A | SMAJ200CA | SX | XX | 200.0 | 220.00 | 256.00 | 1 | 324.0 | 1.2 | 5 |
| SMAJ210A | SMAJ210CA | SZ | XZ | 210.0 | 231.00 | 268.80 | 1 | 340.0 | 1.2 | 5 |
| SMAJ220A | SMAJ220CA | ZE | YE | 220.0 | 242.00 | 281.60 | 1 | 356.0 | 1.1 | 5 |
| SMAJ250A | SMAJ250CA | ZG | YG | 250.0 | 279.00 | 309.00 | 1 | 405.0 | 1.0 | 5 |
| SMAJ300A | SMAJ300CA | ZK | YK | 300.0 | 335.00 | 371.00 | 1 | 486.0 | 0.8 | 5 |

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Ratings and Characteristic Curves

Figure 1 - Peak Pulse Power Rating Curve

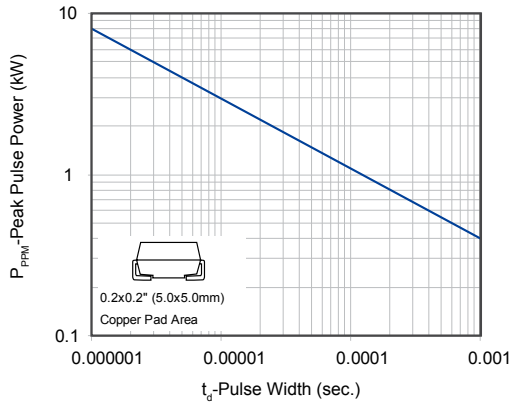


Figure 2 - Pulse Derating Curve

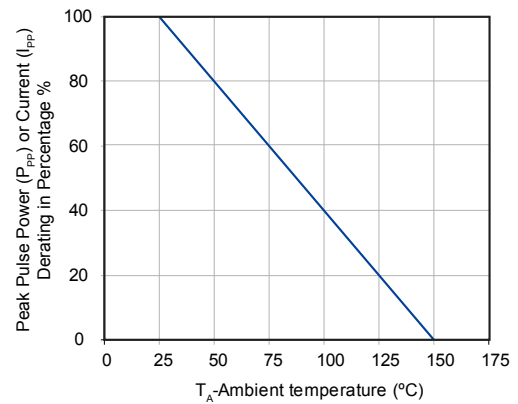


Figure 3 - Pulse Waveform

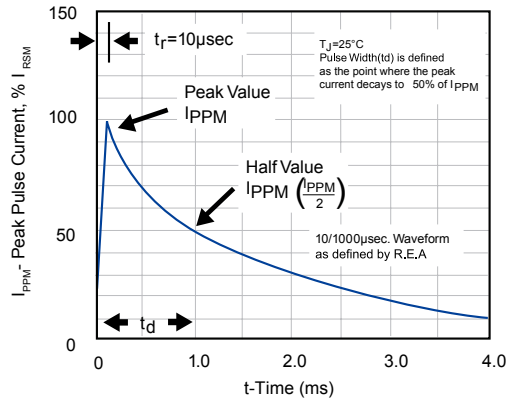


Figure 4 - Typical Junction Capacitance

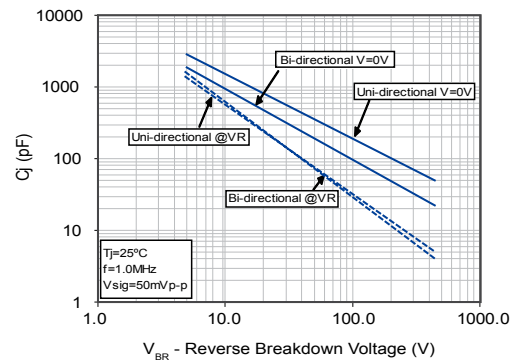


Figure 5 - Steady State Power Derating Curve

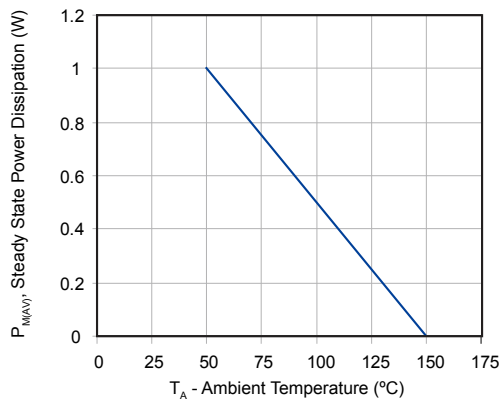
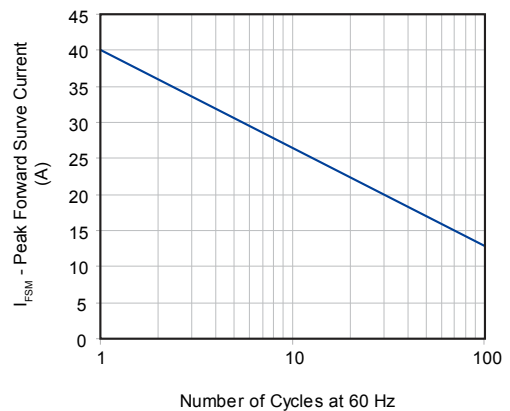


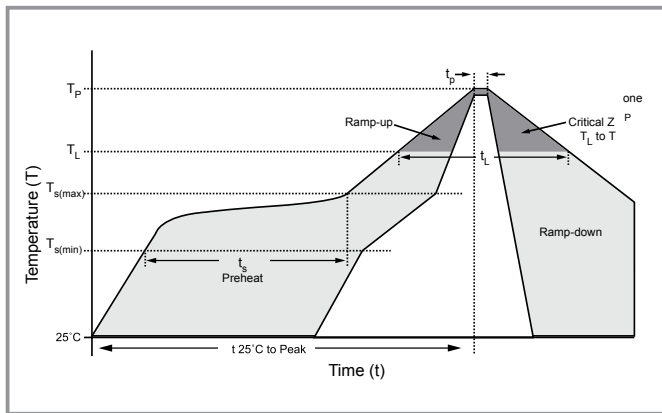
Figure 6 - Maximum Non-Repetitive Peak Forward Surge Current



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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

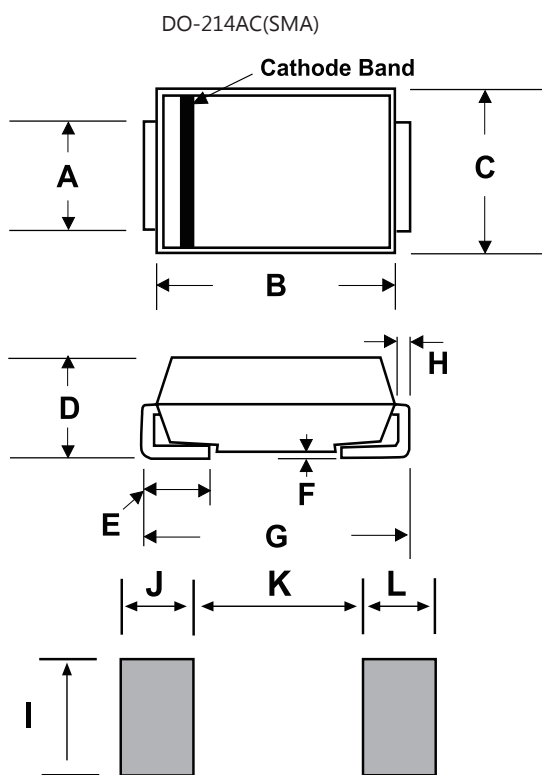
| | |
|-------------|--|
| Weight | 0.002 ounce, 0.061 gram |
| Case | JEDEC DO-214AC molded plastic body over passivated junction. |
| Polarity | Color band denotes the cathode except Bipolar. |
| Termination | Matte Tin axial leads, solderable per JESD22-B102D. |

Environmental Specifications

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

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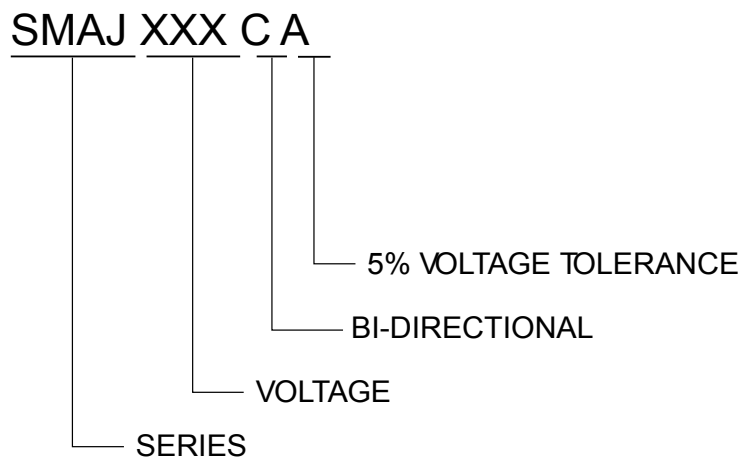
Dimensions



Unit:mm

| DIM | Inches | | Millimeters | |
|-----|--------|-------|-------------|-------|
| | Min | Max | Min | Max |
| A | 0.049 | 0.065 | 1.250 | 1.650 |
| B | 0.157 | 0.177 | 3.990 | 4.500 |
| C | 0.100 | 0.110 | 2.540 | 2.790 |
| D | 0.078 | 0.090 | 1.980 | 2.290 |
| E | 0.030 | 0.060 | 0.780 | 1.520 |
| F | - | 0.008 | - | 0.203 |
| G | 0.194 | 0.208 | 4.930 | 5.280 |
| H | 0.006 | 0.012 | 0.152 | 0.305 |
| I | 0.070 | - | 1.800 | - |
| J | 0.082 | - | 2.100 | - |
| K | - | 0.090 | - | 2.300 |
| L | 0.082 | - | 2.100 | - |

Part Numbering System



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Packaging

| Part Number | Component Package | Quantity | Packaging Option | Packaging Specification |
|-------------|-------------------|----------|---------------------|-------------------------|
| SMAJxxxXX | DO-214AC | 2000 | Tape&Reel - 7' tape | EIA RS-481 |

Warehouse Storage Conditions of Products

- Storage Conditions:
 1. Storage Temperature: -10°C~+40°C
 2. Relative Humidity: ≤75%RH
 3. Keep away from corrosive atmosphere and sunlight.
- Period of Storage: 1 year