

Transient Voltage Suppressors

PRODUCT SUMMARY

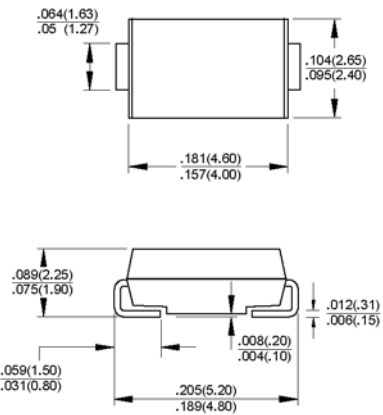
Stand-off Voltage ratings from 5.0V to 440V

Peak pulse power 400W in SMA surface-mount package

FEATURES

- Plastic package has Underwriters Laboratory Flammability Classification 94V-0
- Optimized for LAN protection applications
- Ideal for ESD protection of data lines in accordance with IEC 1000-4-2 (IEC801-2)
- Ideal for EFT protection of data lines in accordance with IEC 1000-4-4 (IEC801-4)
- Low profile package with built-in strain relief for surface-mount
- Glass passivated junction
- Low incremental surge resistance, excellent clamping capability
- Peak pulse power capability of 400W with a 10/1000us waveform, repetition rate (duty cycle): 0.01% (300W above 78V)
- Very fast response time
- High temperature soldering guaranteed:
260°C for 10 seconds at terminals

DO-214AC (SMA)



MECHANICAL DATA

- Case: JEDEC DO-214AC (SMA) molded plastic over passivated chip
- Terminals: Matte-Sn plated, solderable per MIL-STD-750, Method 2026
- Polarity: For uni-directional types the band denotes the cathode, which is positive with respect to the anode under normal TVS operation.
- Mounting position: Any
- Weight: 0.002oz., 0.064g

Pb-free; RoHS-compliant

Devices for Bidirectional Applications

For bi-directional devices, use suffix CA (e.g. SMAJ10CA). Electrical characteristics apply in both directions.

MAXIMUM RATINGS

Rating at 25°C ambient temperature unless otherwise specified.

| Parameter | Symbol | Value | Unit |
|---|-----------------|----------------|------|
| Peak pulse power dissipation with a 10/1000us waveform ^(1,2) (see Fig. 1) | P_{PPM} | 400 | W |
| Peak pulse current with a 10/1000us waveform ⁽¹⁾ | I_{PPM} | See Next Table | A |
| Peak forward surge current, 8.3ms single half sine-wave uni-directional only ⁽²⁾ | I_{FSM} | 40 | A |
| Typical thermal resistance, junction to ambient ⁽³⁾ | $R_{\theta JA}$ | 120 | °C/W |
| Typical thermal resistance, junction to lead | $R_{\theta JL}$ | 30 | °C/W |
| 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 $T_A=25^\circ\text{C}$ per Fig. 2. Rating is 300W above 78V
 2. Mounted on 0.2" x 0.2" (5.0 mm x 5.0 mm) copper pads at each terminal
 3. Mounted on minimum recommended pad layout

ELECTRICAL PARAMETERS

At 25°C ambient temperature unless otherwise specified. $V_F=3.5V$ at $I_F=25A$ (uni-directional only)

| Device type | Device marking code | | Breakdown voltage $V_{(BR)}$ (Volts) ⁽¹⁾ | | Test current at I_T (mA) | Stand-off voltage V_{WM} (Volts) | Maximum reverse leakage at V_{WM} $I_D^{(3)}$ (µA) | Maximum peak pulse surge current $I_{PPM}^{(2)}$ (A) | Maximum clamping voltage at I_{PPM} V_C (Volts) |
|-------------------------|---------------------|----|---|------|----------------------------|------------------------------------|--|--|---|
| | UNI | BI | Min. | Max. | | | | | |
| SMAJ5.0 | AD | WD | 6.40 | 7.82 | 10 | 5.0 | 800 | 41.7 | 9.6 |
| SMAJ5.0A ⁽⁶⁾ | AE | WE | 6.40 | 7.07 | 10 | 5.0 | 800 | 43.5 | 9.2 |
| SMAJ6.0 | AF | WF | 6.67 | 8.15 | 10 | 6.0 | 800 | 35.1 | 11.4 |
| SMAJ6.0A | AG | WG | 6.67 | 7.37 | 10 | 6.0 | 800 | 38.8 | 10.3 |
| SMAJ6.5 | AH | WH | 7.22 | 8.82 | 10 | 6.5 | 500 | 32.5 | 12.3 |
| SMAJ6.5A | AK | WK | 7.22 | 7.98 | 10 | 6.5 | 500 | 35.7 | 11.2 |
| SMAJ7.0 | AL | WL | 7.78 | 9.51 | 10 | 7.0 | 200 | 30.1 | 13.3 |
| SMAJ7.0A | AM | WM | 7.78 | 8.60 | 10 | 7.0 | 200 | 33.3 | 12.0 |
| SMAJ7.5 | AN | WN | 8.33 | 10.2 | 1.0 | 7.5 | 100 | 28.0 | 14.3 |
| SMAJ7.5A | AP | WP | 8.33 | 9.21 | 1.0 | 7.5 | 100 | 31.0 | 12.9 |
| SMAJ8.0 | AQ | WQ | 8.89 | 10.9 | 1.0 | 8.0 | 50 | 26.7 | 15.0 |
| SMAJ8.0A | AR | WR | 8.89 | 9.83 | 1.0 | 8.0 | 50 | 29.4 | 13.6 |
| SMAJ8.5 | AS | WS | 9.44 | 11.5 | 1.0 | 8.5 | 10 | 25.2 | 15.9 |
| SMAJ8.5A | AT | WT | 9.44 | 10.4 | 1.0 | 8.5 | 10 | 27.8 | 14.4 |
| SMAJ9.0 | AU | WU | 10.0 | 12.2 | 1.0 | 9.0 | 5.0 | 23.7 | 16.9 |
| SMAJ9.0A | AV | VV | 10.0 | 11.1 | 1.0 | 9.0 | 5.0 | 26.0 | 15.4 |
| SMAJ10 | AW | WW | 11.1 | 13.6 | 1.0 | 10 | 1.0 | 21.3 | 18.8 |
| SMAJ10A | AX | WX | 11.1 | 12.3 | 1.0 | 10 | 1.0 | 23.5 | 17.0 |
| SMAJ11 | AY | WY | 12.2 | 14.9 | 1.0 | 11 | 1.0 | 19.9 | 20.1 |
| SMAJ11A | AZ | WZ | 12.2 | 13.5 | 1.0 | 11 | 1.0 | 22.0 | 18.2 |
| SMAJ12 | BD | XD | 13.3 | 16.3 | 1.0 | 12 | 1.0 | 18.2 | 22.0 |
| SMAJ12A | BE | XE | 13.3 | 14.7 | 1.0 | 12 | 1.0 | 20.1 | 19.9 |
| SMAJ13 | BF | XF | 14.4 | 17.6 | 1.0 | 13 | 1.0 | 16.8 | 23.8 |
| SMAJ13A | BG | XG | 14.4 | 15.9 | 1.0 | 13 | 1.0 | 18.6 | 21.5 |
| SMAJ14 | BH | XH | 15.6 | 19.1 | 1.0 | 14 | 1.0 | 15.5 | 25.8 |
| SMAJ14A | BK | XK | 15.6 | 17.2 | 1.0 | 14 | 1.0 | 17.2 | 23.2 |
| SMAJ15 | BL | XL | 16.7 | 20.4 | 1.0 | 15 | 1.0 | 14.9 | 26.9 |
| SMAJ15A | BM | XM | 16.7 | 18.5 | 1.0 | 15 | 1.0 | 16.4 | 24.4 |
| SMAJ16 | BN | XN | 17.8 | 21.8 | 1.0 | 16 | 1.0 | 13.9 | 28.8 |
| SMAJ16A | BP | XP | 17.8 | 19.7 | 1.0 | 16 | 1.0 | 15.4 | 26.0 |
| SMAJ17 | BQ | XQ | 18.9 | 23.1 | 1.0 | 17 | 1.0 | 13.1 | 30.5 |
| SMAJ17A | BR | XR | 18.9 | 20.9 | 1.0 | 17 | 1.0 | 14.5 | 27.6 |
| SMAJ18 | BS | XS | 20.0 | 24.4 | 1.0 | 18 | 1.0 | 12.4 | 32.2 |
| SMAJ18A | BT | XT | 20.0 | 22.1 | 1.0 | 18 | 1.0 | 13.7 | 29.2 |
| SMAJ20 | BU | XU | 22.2 | 27.1 | 1.0 | 20 | 1.0 | 11.2 | 35.8 |
| SMAJ20A | BV | XV | 22.2 | 24.5 | 1.0 | 20 | 1.0 | 12.3 | 32.4 |
| SMAJ22 | BW | XW | 24.4 | 29.8 | 1.0 | 22 | 1.0 | 10.2 | 39.4 |
| SMAJ22A | BX | XX | 24.4 | 26.9 | 1.0 | 22 | 1.0 | 11.3 | 35.5 |
| SMAJ24 | BY | XY | 26.7 | 32.6 | 1.0 | 24 | 1.0 | 9.3 | 43.0 |
| SMAJ24A | BZ | XZ | 26.7 | 29.5 | 1.0 | 24 | 1.0 | 10.3 | 38.9 |
| SMAJ26 | CD | YD | 28.9 | 35.3 | 1.0 | 26 | 1.0 | 8.6 | 46.6 |
| SMAJ26A | CE | YE | 28.9 | 31.9 | 1.0 | 26 | 1.0 | 9.5 | 42.1 |
| SMAJ28 | CF | YF | 31.1 | 38.0 | 1.0 | 28 | 1.0 | 8.0 | 50.0 |
| SMAJ28A | CG | YG | 31.1 | 34.4 | 1.0 | 28 | 1.0 | 8.8 | 45.4 |
| SMAJ30 | CH | YH | 33.3 | 40.7 | 1.0 | 30 | 1.0 | 7.5 | 53.5 |
| SMAJ30A | CK | YK | 33.3 | 36.8 | 1.0 | 30 | 1.0 | 8.3 | 48.4 |

- Notes:**
1. $V_{(BR)}$ measured after I_T applied for 300µs square wave pulse or equivalent
 2. Surge current waveform per Fig. 3 and derate per Fig. 2
 3. For bi-directional 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
 5. For the bidirectional SMAJ5.0CA, the maximum $V_{(BR)}$ is 7.25V.

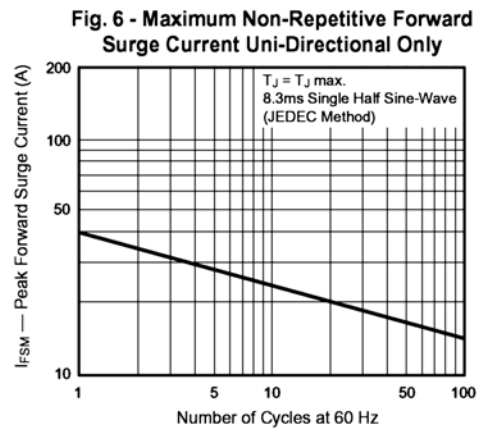
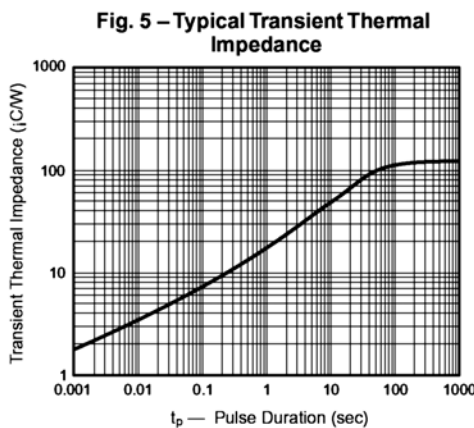
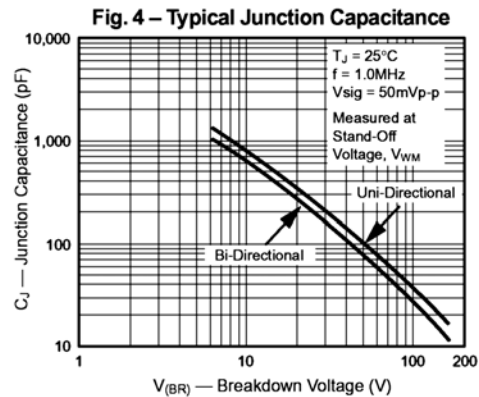
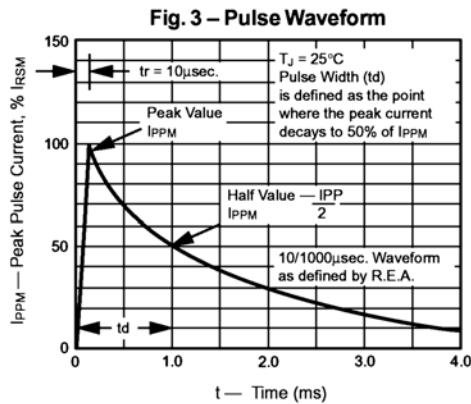
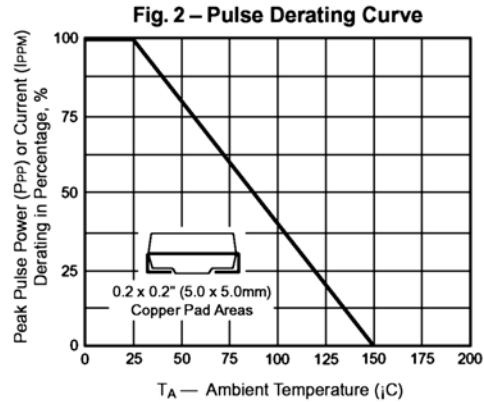
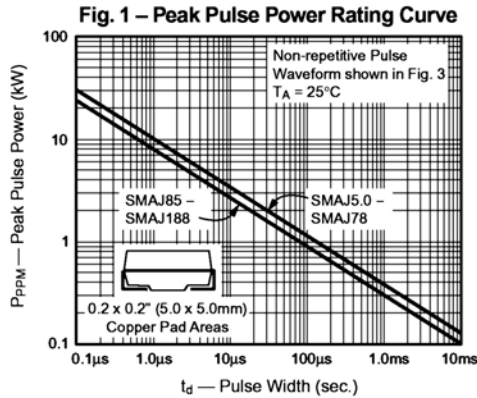
ELECTRICAL PARAMETERS

At 25°C ambient temperature unless otherwise specified. $V_F=3.5V$ at $I_F=25A$ (uni-directional only)

| Device type | Device marking code | | Breakdown voltage $V_{(BR)}$ (Volts) ⁽¹⁾ | | Test current at I_T (mA) | Stand-off voltage V_{WM} (Volts) | Maximum reverse leakage at V_{WM} I_D (uA) | Maximum peak surge current I_{PPM} ⁽²⁾ (A) | Maximum clamping voltage at I_{PPM} V_C (Volts) |
|-------------|---------------------|--|---|------|----------------------------|------------------------------------|--|---|---|
| | UNI | BI | Min. | Max. | | | | | |
| SMAJ33 | CL | YL | 36.7 | 44.9 | 1.0 | 33 | 1.0 | 6.8 | 59.0 |
| SMAJ33A | CM | YM | 36.7 | 40.6 | 1.0 | 33 | 1.0 | 7.5 | 53.3 |
| SMAJ36 | CN | YN | 40.0 | 48.9 | 1.0 | 36 | 1.0 | 6.2 | 64.3 |
| SMAJ36A | CP | YP | 40.0 | 44.2 | 1.0 | 36 | 1.0 | 6.9 | 58.1 |
| SMAJ40 | CQ | YQ | 44.4 | 54.3 | 1.0 | 40 | 1.0 | 5.6 | 71.4 |
| SMAJ40A | CR | YR | 44.4 | 49.1 | 1.0 | 40 | 1.0 | 6.2 | 64.5 |
| SMAJ43 | CS | YS | 47.8 | 58.4 | 1.0 | 43 | 1.0 | 5.2 | 76.7 |
| SMAJ43A | CT | YT | 47.8 | 52.8 | 1.0 | 43 | 1.0 | 5.8 | 69.4 |
| SMAJ45 | CU | YU | 50.0 | 61.1 | 1.0 | 45 | 1.0 | 5.0 | 80.3 |
| SMAJ45A | CV | YV | 50.0 | 55.3 | 1.0 | 45 | 1.0 | 5.5 | 72.7 |
| SMAJ48 | CW | YW | 53.3 | 65.1 | 1.0 | 48 | 1.0 | 4.7 | 85.5 |
| SMAJ48A | CX | YX | 53.3 | 58.9 | 1.0 | 48 | 1.0 | 5.2 | 77.4 |
| SMAJ51 | CY | YY | 56.7 | 69.3 | 1.0 | 51 | 1.0 | 4.4 | 91.1 |
| SMAJ51A | CZ | YZ | 56.7 | 62.7 | 1.0 | 51 | 1.0 | 4.9 | 82.4 |
| SMAJ54 | RD | ZD | 60.0 | 73.3 | 1.0 | 54 | 1.0 | 4.2 | 96.3 |
| SMAJ54A | RE | ZE | 60.0 | 66.3 | 1.0 | 54 | 1.0 | 4.6 | 87.1 |
| SMAJ58 | RF | ZF | 64.4 | 78.7 | 1.0 | 58 | 1.0 | 3.9 | 103 |
| SMAJ58A | RG | ZG | 64.4 | 71.2 | 1.0 | 58 | 1.0 | 4.3 | 93.6 |
| SMAJ60 | RH | ZH | 66.7 | 81.5 | 1.0 | 60 | 1.0 | 3.7 | 107 |
| SMAJ60A | RK | ZK | 66.7 | 73.7 | 1.0 | 60 | 1.0 | 4.1 | 96.8 |
| SMAJ64 | RL | ZL | 71.1 | 86.9 | 1.0 | 64 | 1.0 | 3.5 | 114 |
| SMAJ64A | RM | ZM | 71.1 | 78.6 | 1.0 | 64 | 1.0 | 3.9 | 103 |
| SMAJ70 | RN | ZN | 77.8 | 95.1 | 1.0 | 70 | 1.0 | 3.2 | 125 |
| SMAJ70A | RP | ZP | 77.8 | 86.0 | 1.0 | 70 | 1.0 | 3.5 | 113 |
| SMAJ75 | RQ | ZQ | 83.3 | 102 | 1.0 | 75 | 1.0 | 3.0 | 134 |
| SMAJ75A | RR | ZR | 83.3 | 92.1 | 1.0 | 75 | 1.0 | 3.3 | 121 |
| SMAJ78 | RS | ZS | 86.7 | 106 | 1.0 | 78 | 1.0 | 2.9 | 139 |
| SMAJ78A | RT | ZT | 86.7 | 95.8 | 1.0 | 78 | 1.0 | 3.2 | 126 |
| SMAJ85 | RU | ZU | 94.4 | 115 | 1.0 | 85 | 1.0 | 2.0 | 151 |
| SMAJ85A | RV | ZV | 94.4 | 104 | 1.0 | 85 | 1.0 | 2.2 | 137 |
| SMAJ90 | RW | ZW | 100 | 122 | 1.0 | 90 | 1.0 | 1.9 | 160 |
| SMAJ90A | RX | ZX | 100 | 111 | 1.0 | 90 | 1.0 | 2.1 | 146 |
| SMAJ100 | RY | ZY | 111 | 136 | 1.0 | 100 | 1.0 | 1.7 | 179 |
| SMAJ100A | RZ | <td>111</td> <td>123</td> <td>1.0</td> <td>100</td> <td>1.0</td> <td>1.9</td> <td>162</td> | 111 | 123 | 1.0 | 100 | 1.0 | 1.9 | 162 |
| SMAJ110 | SD | VD | 122 | 149 | 1.0 | 110 | 1.0 | 1.5 | 196 |
| SMAJ110A | SE | VE | 122 | 135 | 1.0 | 110 | 1.0 | 1.7 | 177 |
| SMAJ120 | SF | VF | 133 | 163 | 1.0 | 120 | 1.0 | 1.4 | 214 |
| SMAJ120A | SG | VG | 133 | 147 | 1.0 | 120 | 1.0 | 1.6 | 193 |
| SMAJ130 | SH | VH | 144 | 176 | 1.0 | 130 | 1.0 | 1.3 | 231 |
| SMAJ130A | SK | VK | 144 | 159 | 1.0 | 130 | 1.0 | 1.4 | 209 |
| SMAJ150 | SL | VL | 167 | 204 | 1.0 | 150 | 1.0 | 1.1 | 268 |
| SMAJ150A | SM | VM | 167 | 185 | 1.0 | 150 | 1.0 | 1.2 | 243 |
| SMAJ160 | SN | VN | 178 | 218 | 1.0 | 160 | 1.0 | 1.0 | 287 |
| SMAJ160A | SP | VP | 178 | 197 | 1.0 | 160 | 1.0 | 1.2 | 259 |
| SMAJ170 | SQ | VQ | 189 | 231 | 1.0 | 170 | 1.0 | 0.99 | 304 |
| SMAJ170A | SR | VR | 189 | 209 | 1.0 | 170 | 1.0 | 1.09 | 275 |
| SMAJ180A | ST | VT | 201 | 222 | 1.0 | 180 | 1.0 | 1.4 | 292 |
| SMAJ200A | SV | VV | 224 | 247 | 1.0 | 200 | 1.0 | 1.2 | 324 |
| SMAJ220A | SX | VX | 246 | 272 | 1.0 | 220 | 1.0 | 1.1 | 356 |
| SMAJ250A | SZ | VZ | 279 | 309 | 1.0 | 250 | 1.0 | 1.0 | 405 |
| SMAJ300A | TE | UE | 335 | 371 | 1.0 | 300 | 1.0 | 0.8 | 486 |
| SMAJ350A | TG | UG | 391 | 432 | 1.0 | 350 | 1.0 | 0.7 | 567 |
| SMAJ400A | TK | UK | 447 | 494 | 1.0 | 400 | 1.0 | 0.6 | 648 |
| SMAJ440A | TM | UM | 492 | 543 | 1.0 | 440 | 1.0 | 0.6 | 713 |

- Notes:**
1. $V_{(BR)}$ measured after I_T applied for 300us square wave pulse or equivalent
 2. Surge current waveform per Fig. 3 and derate per Fig. 2
 3. For bi-directional 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
 5. For parts without A, the V_{BR} is +10%

RATINGS AND CHARACTERISTIC CURVES



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