



# SMAJ5.0 thru 440CA

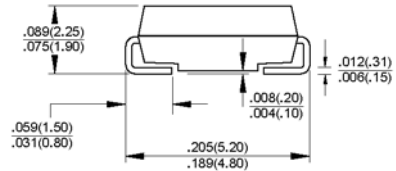
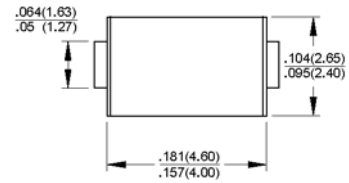
Surface Mount Transient Voltage Suppressors  
Peak Pulse Power 400W Stand Off Voltage 5.0 to 440V

## 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 mounted applications
- ◆ Glass passivated junction
- ◆ Low incremental surge resistance, excellent clamping capability
- ◆ 400W peak pulse power capability with a 10/1000us waveform, repetition rate (duty cycle): 0.01% (300W above 78V)
- ◆ Very fast response time
- ◆ High temperature soldering guaranteed:  
250°C/10 seconds at terminals



DO-214AC (SMA)



Dimensions in inches and (millimeters)

## Mechanical Data

- ◆ Case: JEDEC DO-214AC(SMA) molded plastic over passivated chip
- ◆ Terminals: Solder 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

## Devices for Bidirectional Applications

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

## Maximum Ratings and Thermal Characteristics

(Ratings at 25°C ambient temperature unless otherwise specified.)

| Parameter                                                                                   | Symbol          | Value          | Unit |
|---------------------------------------------------------------------------------------------|-----------------|----------------|------|
| Peak pulse power dissipation with a 10/1000us waveform <sup>(1,2)</sup> (see Fig. 1)        | $P_{PPM}$       | 400            | W    |
| Peak pulse current with a 10/1000us waveform <sup>(1)</sup>                                 | $I_{PPM}$       | See Next Table | A    |
| Peak forward surge current, 8.3ms single half sine-wave uni-directional only <sup>(2)</sup> | $I_{FSM}$       | 40             | A    |
| Typical thermal resistance, junction to ambient <sup>(3)</sup>                              | $R_{\theta JA}$ | 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 x 5.0 mm) copper pads to each terminal
  3. Mounted on minimum recommended pad layout

## Electrical Characteristics

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

| Device type             | Device marking code |    | Breakdown voltage $V_{(BR)}$ (Volts) <sup>(1)</sup> |      | Test current at $I_T$ (mA) | Stand-off voltage $V_{WM}$ (Volts) | Maximum reverse leakage at $V_{WM}$ $I_{V_{WM}}^{(3)}$ (uA) | 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 <sup>(5)</sup> | 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                  | WV | 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 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  $I_b$  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 Characteristics

Ratings 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) <sup>(1)</sup> |      | Test current at $I_F$ (mA) | Stand-off voltage $V_{WM}$ (Volts) | Maximum reverse leakage at $V_{WM}$ $I_{RO}$ <sup>(2)</sup> (uA) | Maximum peak pulse surge current $I_{PPM}$ <sup>(2)</sup> (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                  | ZZ | 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  $I_F$  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  $I_{RO}$  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

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

