

## ElecSuper SuperTVS – 400W Transient Voltage Suppressor

## 1. 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
- Meets MSL level 1, per J-STD-020
- IEC 61000-4-2(ESD)  $\pm 30\text{KV}$ (air)  $\pm 30\text{KV}$ (contact)
- 400W peak pulse power capability at 10/1000 $\mu\text{s}$  waveform, repetition rate (duty cycle): 0.01%
- Fast response time
- Typical IR less than 1 $\mu\text{A}$  above 10V
- Plastic package has underwriters laboratory flammability 94V-0
- High Temperature soldering: 260 $^{\circ}\text{C}$ /10 seconds at terminals

## 2. Mechanical Data

- Case: JEDEC DO-214AC. Molded plastic over glass passivated junction
- Terminal: Solder plated, solderable per MIL-STD-750, Method 2026
- Polarity: Color band denotes cathode except bi-directional models
- Standard Packaging: 12mm tape
- Weight: 0.07g

## 3. Marking Information

| BI- directional                                                                     | UNI-directional                                                                                   | Marking                                                                |
|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|------------------------------------------------------------------------|
|  |                | XXXX= Product type marking code (See Electrical Characteristics Table) |
|  | cathode  anode |                                                                        |

## 4. Maximum Ratings and Characteristics

Ratings at 25° ambient temperature unless otherwise specified

| Rating                                                                                                    | Symbol             | Value     | Units |
|-----------------------------------------------------------------------------------------------------------|--------------------|-----------|-------|
| Peak pulse power dissipation at 10/1000us waveform (Note1,2)                                              | P <sub>PPM</sub>   | 400       | W     |
| Peak pulse current of at 10/1000us waveform                                                               | I <sub>PPM</sub>   | See Table | A     |
| Steady state power dissipation at TA=50°C                                                                 | P <sub>M(AV)</sub> | 3.3       | W     |
| Peak forward surge current, 8.3ms single half sine-wave superimposed on rated load (JEDEC Method) (Note3) | I <sub>FSM</sub>   | 40        | A     |

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|--------------------------------------------------------------------------------|-----------------|------------|------|
| Operating junction and Storage Temperature Range                               | $T_J, T_{STG}$  | -65 to 150 | °C   |
| Typical thermal resistance junction to lead                                    | $R_{\theta JL}$ | 30         | °C/W |
| Typical thermal resistance junction to ambient                                 | $R_{\theta JA}$ | 120        | °C/W |
| Maximum instantaneous forward voltage @ at 25A for unidirectional only (Note4) | $V_F$           | 3.5/5      | V    |
| Maximum instantaneous forward voltage @ at 1A for unidirectional only          | $V_F$           | 1.5        | V    |

Notes:

1. Non-repetitive current pulse, per Fig.3 and derated above  $T_A=25^\circ\text{C}$  per Fig.2.
2. Mounted on 5.0mm×5.0mm copper pads to each terminal.
3. 8.3ms single half sine-wave, or equivalent square wave, duty cycle=4 pulses per minutes maximum.
4.  $V_F<3.5\text{V}$  for devices of  $V_{BR}<200\text{V}$  and  $V_F<5.0\text{V}$  for devices of  $V_{BR}>201\text{V}$ .

5. Electrical Characteristics ( $T_A=25^\circ\text{C}$ )

| Part Number | Part Number | Marking |    | Reverse Stand off Voltage $V_R$ | Breakdown Voltage $V_{BR}$ (Volts) @ $I_T$ |      | Test Current $I_T$ | Maximum Clamping Voltage $V_C$ @ $I_{PP}$ | Maximum Peak Pulse Current $I_{PP}$ | Maximum Reverse Leakage $I_R$ @ $V_R$ | ROHS2.0 |
|-------------|-------------|---------|----|---------------------------------|--------------------------------------------|------|--------------------|-------------------------------------------|-------------------------------------|---------------------------------------|---------|
|             |             | UNI     | BI |                                 | MIN                                        | MAX  |                    |                                           |                                     |                                       |         |
| SMAJ5.0A    | SMAJ5.0CA   | AE      | WE | 5                               | 6.4                                        | 7    | 10                 | 9.2                                       | 43.5                                | 400                                   | y       |
| SMAJ6.0A    | SMAJ6.0CA   | AG      | WG | 6                               | 6.67                                       | 7.37 | 10                 | 10.3                                      | 38.8                                | 400                                   | y       |
| SMAJ6.5A    | SMAJ6.5CA   | AK      | WK | 6.5                             | 7.22                                       | 7.98 | 10                 | 11.2                                      | 35.7                                | 250                                   | y       |
| SMAJ7.0A    | SMAJ7.0CA   | AM      | WM | 7                               | 7.78                                       | 8.6  | 10                 | 12                                        | 33.3                                | 100                                   | y       |
| SMAJ7.5A    | SMAJ7.5CA   | AP      | WP | 7.5                             | 8.33                                       | 9.21 | 1                  | 12.9                                      | 31                                  | 80                                    | y       |
| SMAJ8.0A    | SMAJ8.0CA   | AR      | WR | 8                               | 8.89                                       | 9.83 | 1                  | 13.6                                      | 29.4                                | 50                                    | y       |
| SMAJ8.5A    | SMAJ8.5CA   | AT      | WT | 8.5                             | 9.44                                       | 10.4 | 1                  | 14.4                                      | 27.8                                | 20                                    | y       |
| SMAJ9.0A    | SMAJ9.0CA   | AV      | WV | 9                               | 10                                         | 11.1 | 1                  | 15.4                                      | 26                                  | 10                                    | y       |
| SMAJ10A     | SMAJ10CA    | AX      | WX | 10                              | 11.1                                       | 12.3 | 1                  | 17                                        | 23.5                                | 5                                     | y       |
| SMAJ11A     | SMAJ11CA    | AZ      | WZ | 11                              | 12.2                                       | 13.5 | 1                  | 18.2                                      | 22                                  | 1                                     | y       |
| SMAJ12A     | SMAJ12CA    | BE      | XE | 12                              | 13.3                                       | 14.7 | 1                  | 19.9                                      | 20.1                                | 1                                     | y       |
| SMAJ13A     | SMAJ13CA    | BG      | XG | 13                              | 14.4                                       | 15.9 | 1                  | 21.5                                      | 18.6                                | 1                                     | y       |
| SMAJ14A     | SMAJ14CA    | BK      | XK | 14                              | 15.6                                       | 17.2 | 1                  | 23.2                                      | 17.2                                | 1                                     | y       |
| SMAJ15A     | SMAJ15CA    | BM      | XM | 15                              | 16.7                                       | 18.5 | 1                  | 24.4                                      | 16.4                                | 1                                     | y       |
| SMAJ16A     | SMAJ16CA    | BP      | XP | 16                              | 17.8                                       | 19.7 | 1                  | 26                                        | 15.4                                | 1                                     | y       |
| SMAJ17A     | SMAJ17CA    | BR      | XR | 17                              | 18.9                                       | 20.9 | 1                  | 27.6                                      | 14.5                                | 1                                     | y       |
| SMAJ18A     | SMAJ18CA    | BT      | XT | 18                              | 20                                         | 22.1 | 1                  | 29.2                                      | 13.7                                | 1                                     | y       |
| SMAJ20A     | SMAJ20CA    | BV      | XV | 20                              | 22.2                                       | 24.5 | 1                  | 32.4                                      | 12.3                                | 1                                     | y       |
| SMAJ22A     | SMAJ22CA    | BX      | XX | 22                              | 24.4                                       | 26.9 | 1                  | 35.5                                      | 11.3                                | 1                                     | y       |
| SMAJ24A     | SMAJ24CA    | BZ      | XZ | 24                              | 26.7                                       | 29.5 | 1                  | 38.9                                      | 10.3                                | 1                                     | y       |

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| Part Number | Part Number | Marking |    | Reverse Stand off Voltage $V_R$ (Volts) | Breakdown Voltage $V_{BR}$ (Volts) @ $I_R$ |      | Test Current $I_T$ (mA) | Maximum Clamping Voltage $V_C$ @ $I_{PP}$ (V) | Maximum Peak Pulse Current $I_{PP}$ (A) | Maximum Reverse Leakage $I_R$ @ $V_R$ ( $\mu A$ ) | ROHS2.0 |
|-------------|-------------|---------|----|-----------------------------------------|--------------------------------------------|------|-------------------------|-----------------------------------------------|-----------------------------------------|---------------------------------------------------|---------|
|             |             |         |    |                                         |                                            |      |                         |                                               |                                         |                                                   |         |
| UNI         | BI          | UNI     | BI |                                         | MIN                                        | MAX  | (mA)                    | (V)                                           |                                         |                                                   |         |
| SMAJ26A     | SMAJ26CA    | CE      | YE | 26                                      | 28.9                                       | 31.9 | 1                       | 42.1                                          | 9.5                                     | 1                                                 | y       |
| SMAJ28A     | SMAJ28CA    | CG      | YG | 28                                      | 31.1                                       | 34.4 | 1                       | 45.4                                          | 8.8                                     | 1                                                 | y       |
| SMAJ30A     | SMAJ30CA    | CK      | YK | 30                                      | 33.3                                       | 36.8 | 1                       | 48.4                                          | 8.3                                     | 1                                                 | y       |
| SMAJ33A     | SMAJ33CA    | CM      | YM | 33                                      | 36.7                                       | 40.6 | 1                       | 53.3                                          | 7.5                                     | 1                                                 | y       |
| SMAJ36A     | SMAJ36CA    | CP      | YP | 36                                      | 40                                         | 44.2 | 1                       | 58.1                                          | 6.9                                     | 1                                                 | y       |
| SMAJ40A     | SMAJ40CA    | CR      | YR | 40                                      | 44.4                                       | 49.1 | 1                       | 64.5                                          | 6.2                                     | 1                                                 | y       |
| SMAJ43A     | SMAJ43CA    | CT      | YT | 43                                      | 47.8                                       | 52.8 | 1                       | 69.4                                          | 5.8                                     | 1                                                 | y       |
| SMAJ45A     | SMAJ45CA    | CV      | YV | 45                                      | 50                                         | 55.3 | 1                       | 72.7                                          | 5.5                                     | 1                                                 | y       |
| SMAJ48A     | SMAJ48CA    | CX      | YX | 48                                      | 53.3                                       | 58.9 | 1                       | 77.4                                          | 5.2                                     | 1                                                 | y       |
| SMAJ51A     | SMAJ51CA    | CZ      | YZ | 51                                      | 56.7                                       | 62.7 | 1                       | 82.4                                          | 4.9                                     | 1                                                 | y       |
| SMAJ54A     | SMAJ54CA    | RE      | ZE | 54                                      | 60                                         | 66.3 | 1                       | 87.1                                          | 4.6                                     | 1                                                 | y       |
| SMAJ58A     | SMAJ58CA    | RG      | ZG | 58                                      | 64.4                                       | 71.2 | 1                       | 93.6                                          | 4.3                                     | 1                                                 | y       |
| SMAJ60A     | SMAJ60CA    | RK      | ZK | 60                                      | 66.7                                       | 73.7 | 1                       | 96.8                                          | 4.1                                     | 1                                                 | y       |
| SMAJ64A     | SMAJ64CA    | RM      | ZM | 64                                      | 71.1                                       | 78.6 | 1                       | 103                                           | 3.9                                     | 1                                                 | y       |
| SMAJ70A     | SMAJ70CA    | RP      | ZP | 70                                      | 77.8                                       | 86   | 1                       | 113                                           | 3.5                                     | 1                                                 | y       |
| SMAJ75A     | SMAJ75CA    | RR      | ZR | 75                                      | 83.3                                       | 92.1 | 1                       | 121                                           | 3.3                                     | 1                                                 | y       |
| SMAJ78A     | SMAJ78CA    | RT      | ZT | 78                                      | 86.7                                       | 95.8 | 1                       | 126                                           | 3.2                                     | 1                                                 | y       |
| SMAJ85A     | SMAJ85CA    | RV      | ZV | 85                                      | 94.4                                       | 104  | 1                       | 137                                           | 2.9                                     | 1                                                 | y       |
| SMAJ90A     | SMAJ90CA    | RX      | ZX | 90                                      | 100                                        | 111  | 1                       | 146                                           | 2.7                                     | 1                                                 | y       |
| SMAJ100A    | SMAJ100CA   | RZ      | ZZ | 100                                     | 111                                        | 123  | 1                       | 162                                           | 2.5                                     | 1                                                 | y       |
| SMAJ110A    | SMAJ110CA   | SE      | VE | 110                                     | 122                                        | 135  | 1                       | 177                                           | 2.3                                     | 1                                                 | y       |
| SMAJ120A    | SMAJ120CA   | SG      | VG | 120                                     | 133                                        | 147  | 1                       | 193                                           | 2.1                                     | 1                                                 | y       |
| SMAJ130A    | SMAJ130CA   | SK      | VK | 130                                     | 144                                        | 159  | 1                       | 209                                           | 1.9                                     | 1                                                 | y       |
| SMAJ150A    | SMAJ150CA   | SM      | VM | 150                                     | 167                                        | 185  | 1                       | 243                                           | 1.6                                     | 1                                                 | y       |
| SMAJ160A    | SMAJ160CA   | SP      | VP | 160                                     | 178                                        | 197  | 1                       | 259                                           | 1.5                                     | 1                                                 | y       |
| SMAJ170A    | SMAJ170CA   | SR      | VR | 170                                     | 189                                        | 209  | 1                       | 275                                           | 1.5                                     | 1                                                 | y       |
| SMAJ180A    | SMAJ180CA   | ST      | VT | 180                                     | 201                                        | 222  | 1                       | 292                                           | 1.4                                     | 1                                                 | y       |
| SMAJ200A    | SMAJ200CA   | SV      | VV | 200                                     | 224                                        | 247  | 1                       | 324                                           | 1.2                                     | 1                                                 | y       |
| SMAJ220A    | SMAJ220CA   | SX      | VX | 220                                     | 246                                        | 272  | 1                       | 356                                           | 1.1                                     | 1                                                 | y       |
| SMAJ250A    | SMAJ250CA   | SZ      | VZ | 250                                     | 279                                        | 309  | 1                       | 405                                           | 1                                       | 1                                                 | y       |
| SMAJ300A    | SMAJ300CA   | TE      | UE | 300                                     | 335                                        | 371  | 1                       | 486                                           | 0.8                                     | 1                                                 | y       |
| SMAJ350A    | SMAJ350CA   | TG      | UG | 350                                     | 391                                        | 432  | 1                       | 567                                           | 0.7                                     | 1                                                 | y       |
| SMAJ400A    | SMAJ400CA   | TK      | UK | 400                                     | 447                                        | 494  | 1                       | 648                                           | 0.6                                     | 1                                                 | y       |
| SMAJ440A    | SMAJ440CA   | TM      | UM | 440                                     | 492                                        | 543  | 1                       | 713                                           | 0.6                                     | 1                                                 | y       |

For bidirectional type having  $V_R$  of 10 volts and less, the  $I_R$  limit is double.

6. Ratings and Characteristic Curves (TA =25°C unless otherwise noted)

Figure 1. Peak Pulse Power Rating Curve

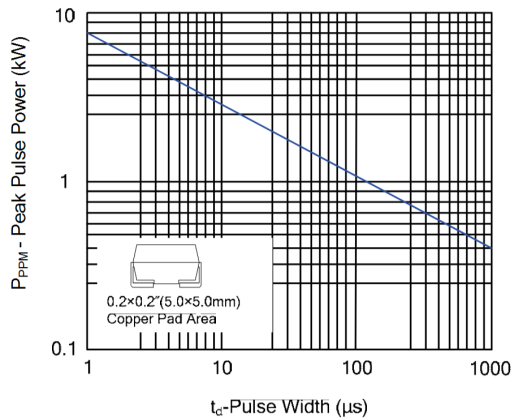


Figure 2 Pulse Derating Curve

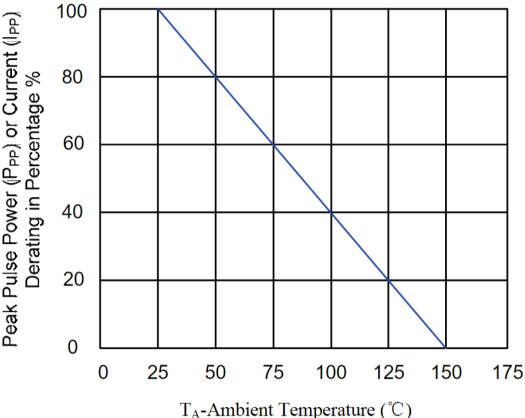


Figure 3 Pulse Waveform

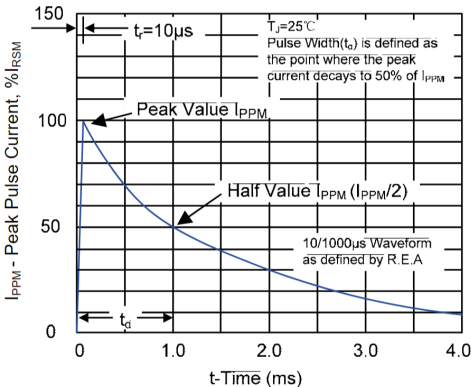


Figure 4 Typical Junction Capacitance

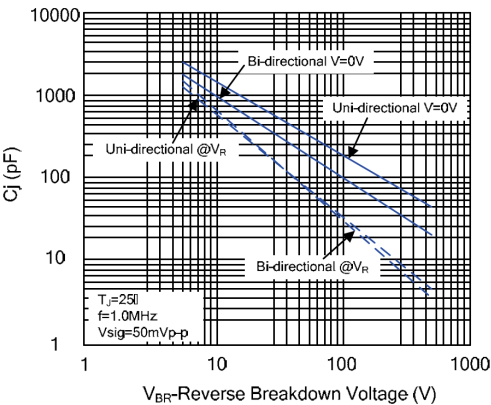


Figure 5 Steady State Power Dissipation Derating Curve

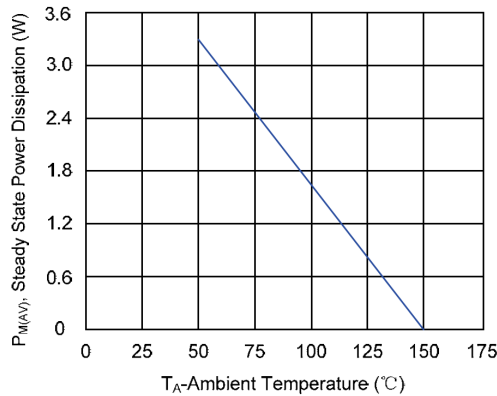
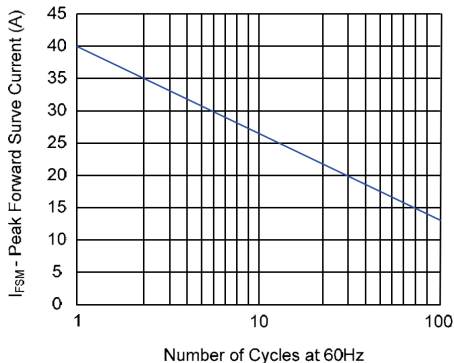


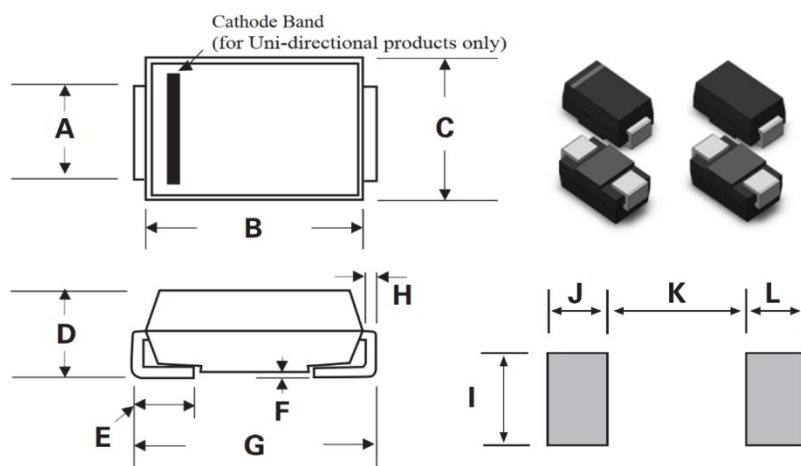
Figure 6 Maximum Non-Repetitive Forward Surge Current  
Uni-Directional Only



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## 7. Dimension (SMA/DO-214AC)



| Dimensions | Inches |       | Millimeters |       |
|------------|--------|-------|-------------|-------|
|            | Min    | Max   | Min         | Max   |
| A          | 0.049  | 0.065 | 1.25        | 1.65  |
| B          | 0.157  | 0.177 | 3.99        | 4.5   |
| C          | 0.1    | 0.11  | 2.54        | 2.79  |
| D          | 0.078  | 0.09  | 1.98        | 2.29  |
| E          | 0.03   | 0.06  | 0.78        | 1.52  |
| F          | -      | 0.008 | -           | 0.203 |
| G          | 0.194  | 0.208 | 4.93        | 5.28  |
| H          | 0.006  | 0.012 | 0.152       | 0.305 |
| I          | 0.07   | -     | 1.8         | -     |
| J          | 0.082  | -     | 2.1         | -     |
| K          | -      | 0.09  | -           | 2.3   |
| L          | 0.082  | -     | 2.1         | -     |

## 8. Packaging

| Tape     |  | Symbol            | Dimension (mm) |
|----------|--|-------------------|----------------|
|          |  | W                 | 12.00±0.20     |
|          |  | P0                | 4.00±0.10      |
|          |  | P1                | 4.00±0.10      |
|          |  | P2                | 2.00±0.10      |
|          |  | D0                | Φ1.5±0.10      |
|          |  | D1                | Φ1.5±0.10      |
|          |  | E                 | 1.75±0.10      |
|          |  | F                 | 5.50±0.05      |
|          |  | A0                | 2.79±0.10      |
|          |  | B0                | 5.33±0.10      |
|          |  | K0                | 2.55±0.15      |
|          |  | T                 | 0.25±0.05      |
|          |  | Quantity: 1000PCS |                |
|          |  | Quantity: 5000PCS |                |
| 7" Reel  |  | D2                | Φ178.0±2.0     |
|          |  | D3                | Φ50.0Min.      |
|          |  | D4                | Φ13.0±0.5      |
|          |  | W1                | 16.0±2.0       |
|          |  | Quantity: 1000PCS |                |
| 13" Reel |  | D5                | Φ330.0±2.0     |
|          |  | D6                | Φ13.5±0.5      |
|          |  | H                 | 2.5±1.0        |
|          |  | W2                | 16.0±2.0       |
|          |  | Quantity: 5000PCS |                |

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