

# SA5.0 THRU SA180CA



500 WATT PEAK POWER TRANSIENT VOLTAGE SUPPRESSORS



## FEATURES

- \* 500 Watts Surge Capability at 1ms
- \* Excellent clamping capability
- \* Low zener impedance
- \* Fast response time: Typically less than 1.0ps from 0 volt to BV min.
- \* Typical  $I_R$  less than  $1\mu A$  above 10V
- \* High temperature soldering guaranteed:  $260^\circ C$  / 10 seconds / .375"(9.5mm) lead length, 5lbs.(2.3kg) tension

## MECHANICAL DATA

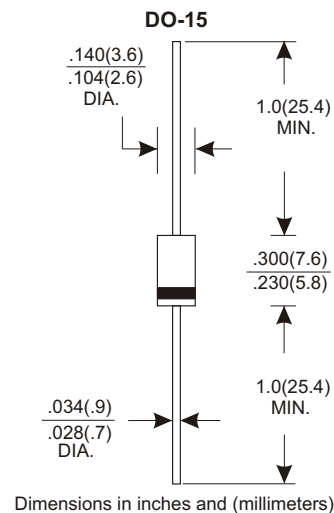
- \* Case: Molded plastic
- \* Epoxy: UL 94V-0 rate flame retardant
- \* Lead: Axial leads, solderable per MIL-STD-202, method 208 guaranteed
- \* Polarity: Color band denotes cathode end
- \* Mounting position: Any
- \* Weight: 0.40 grams

## VOLTAGE RANGE

5.0 to 180 Volts

500 Watts Peak Power

3.0 Watts Steady State



## MAXIMUM RATINGS AND ELECTRICAL CHARACTERISTICS

Rating  $25^\circ C$  ambient temperature unless otherwise specified.  
Single phase half wave, 60Hz, resistive or inductive load.  
For capacitive load, derate current by 20%.

| RATINGS                                                                                                         | SYMBOL            | VALUE       | UNITS      |
|-----------------------------------------------------------------------------------------------------------------|-------------------|-------------|------------|
| Peak Power Dissipation at $T_A=25^\circ C$ , $T_P=1ms$ (NOTE 1)                                                 | $P_{PK}$          | Minimum 500 | Watts      |
| Steady State Power Dissipation at $T_L=75^\circ C$<br>Lead Length .375"(9.5mm) (NOTE 2)                         | $P_D$             | 3.0         | Watts      |
| Peak Forward Surge Current at 8.3ms Single Half Sine-Wave<br>superimposed on rated load (JEDEC method) (NOTE 3) | $I_{FSM}$         | 70          | Amps       |
| Operating and Storage Temperature Range                                                                         | $T_J$ , $T_{STG}$ | -55 to +175 | $^\circ C$ |

### NOTES:

1. Non-repetitive current pulse per Fig. 3 and derated above  $T_A=25^\circ C$  per Fig. 2.
2. Mounted on Copper Pad area of 1.6" X 1.6" (40mm X 40mm) per Fig.5.
3. 8.3ms single half sine-wave, duty cycle = 4 pulses per minute maximum.

## DEVICES FOR BIPOLAR APPLICATIONS

1. For Bidirectional use C or CA Suffix for types SA5.0 thru SA180.
2. Electrical characteristics apply in both directions.

## RATING AND CHARACTERISTIC CURVES (SA5.0 THRU SA180CA)

FIG.1-PEAK PULSE POWER DERATING CURVE

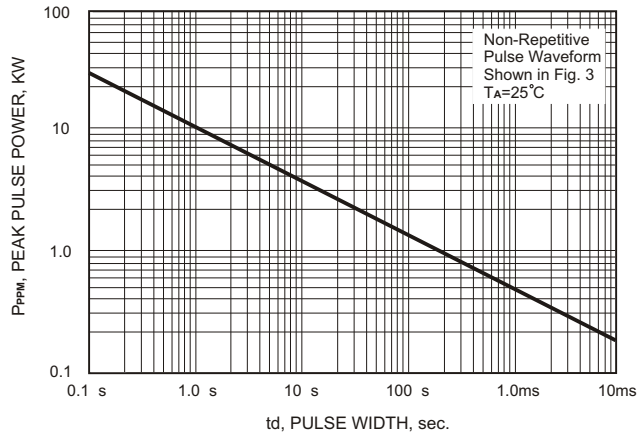


FIG.2-PULSE DERATING CURVE

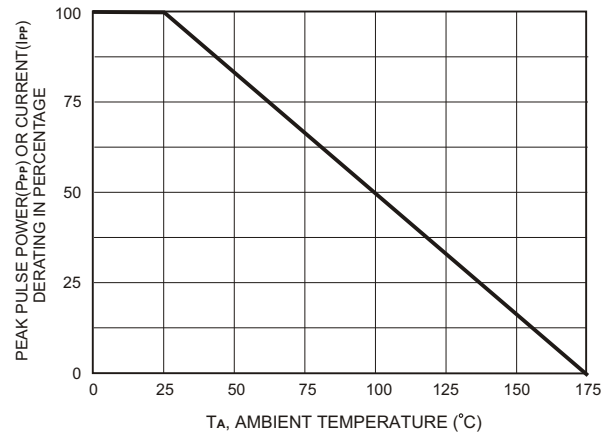


FIG.3-PULSE WAVE FORM

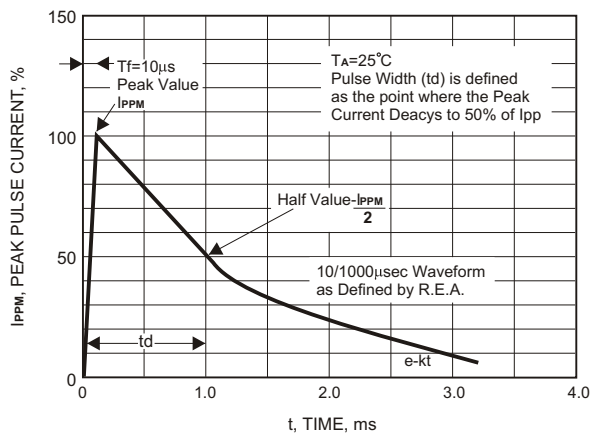


FIG.4-TYPICAL JUNCTION CAPACITANCE

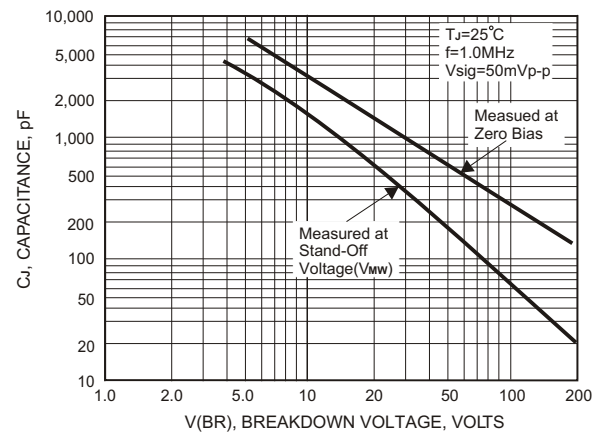


FIG.5-STEADY STATE POWER DERATING CURVE

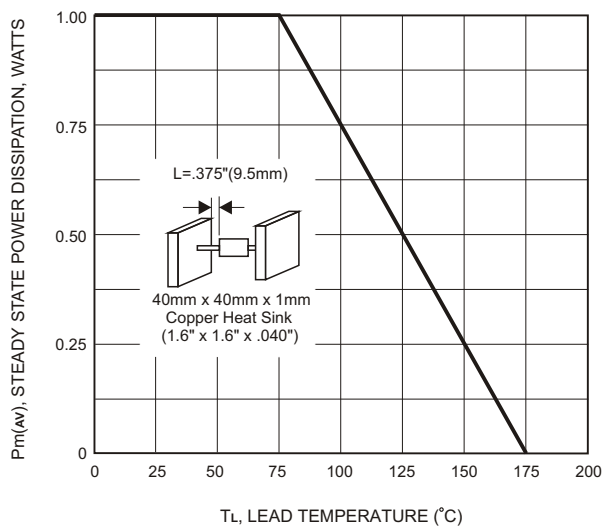
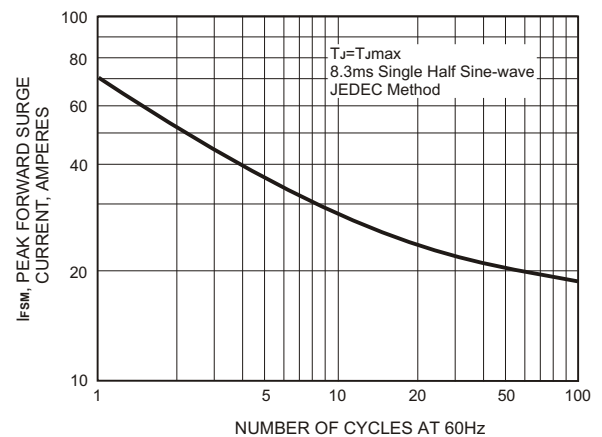


FIG.6-MAXIMUM NON-REPETITIVE PEAK FORWARD SURGE CURRENT, UNIDIRECTIONAL



500 Watt Axial Lead TVS



| UNI<br>DIRECTIONAL<br>PART<br>NUMBER | REVERSE<br>STAND-OFF<br>VOLTAGE<br>VRWM (V) | BREAKDOWN<br>VOLTAGE<br>VBR (V)<br>MIN. @IT | BREAKDOWN<br>VOLTAGE<br>VRB (V)<br>MAX. @IT | TEST<br>CURRENT<br>IT<br>(mA) | MAXIMUM<br>CLAMPING<br>VOLTAGE<br>@Ipp Vc (V) | PEAK<br>PULSE<br>CURRENT<br>Ipp (A) | REVERSE<br>LEAKAGE<br>@ VRWM<br>IR(μA) |
|--------------------------------------|---------------------------------------------|---------------------------------------------|---------------------------------------------|-------------------------------|-----------------------------------------------|-------------------------------------|----------------------------------------|
| SA5.0                                | 5.00                                        | 6.40                                        | 7.30                                        | 10                            | 9.6                                           | 53.1                                | 600                                    |
| SA5.0A                               | 5.00                                        | 6.40                                        | 7.00                                        | 10                            | 9.2                                           | 55.4                                | 600                                    |
| SA6.0                                | 6.00                                        | 6.67                                        | 8.15                                        | 10                            | 11.4                                          | 44.7                                | 600                                    |
| SA6.0A                               | 6.00                                        | 6.67                                        | 7.37                                        | 10                            | 10.3                                          | 49.5                                | 600                                    |
| SA6.5                                | 6.50                                        | 7.22                                        | 8.82                                        | 10                            | 12.3                                          | 41.5                                | 400                                    |
| SA6.5A                               | 6.50                                        | 7.22                                        | 7.98                                        | 10                            | 11.2                                          | 45.5                                | 400                                    |
| SA7.0                                | 7.00                                        | 7.78                                        | 9.51                                        | 10                            | 13.3                                          | 38.3                                | 150                                    |
| SA7.0A                               | 7.00                                        | 7.78                                        | 8.60                                        | 10                            | 12.0                                          | 42.5                                | 150                                    |
| SA7.5                                | 7.50                                        | 8.33                                        | 10.20                                       | 1                             | 14.3                                          | 35.7                                | 50                                     |
| SA7.5A                               | 7.50                                        | 8.33                                        | 9.21                                        | 1                             | 12.9                                          | 39.5                                | 50                                     |
| SA8.0                                | 8.00                                        | 8.89                                        | 10.90                                       | 1                             | 15.0                                          | 34.0                                | 25                                     |
| SA8.0A                               | 8.00                                        | 8.89                                        | 9.83                                        | 1                             | 13.6                                          | 37.5                                | 25                                     |
| SA8.5                                | 8.50                                        | 9.44                                        | 11.50                                       | 1                             | 15.9                                          | 32.1                                | 10                                     |
| SA8.5A                               | 8.50                                        | 9.44                                        | 10.40                                       | 1                             | 14.4                                          | 35.4                                | 10                                     |
| SA9.0                                | 9.00                                        | 10.00                                       | 12.20                                       | 1                             | 16.9                                          | 30.2                                | 5                                      |
| SA9.0A                               | 9.00                                        | 10.00                                       | 11.10                                       | 1                             | 15.4                                          | 33.1                                | 5                                      |
| SA10                                 | 10.00                                       | 11.10                                       | 13.60                                       | 1                             | 18.8                                          | 27.1                                | 3                                      |
| SA10A                                | 10.00                                       | 11.10                                       | 12.30                                       | 1                             | 17.0                                          | 30.0                                | 3                                      |
| SA11                                 | 11.00                                       | 12.20                                       | 14.90                                       | 1                             | 20.1                                          | 25.4                                | 3                                      |
| SA11A                                | 11.00                                       | 12.20                                       | 13.50                                       | 1                             | 18.2                                          | 28.0                                | 3                                      |
| SA12                                 | 12.00                                       | 13.30                                       | 16.30                                       | 1                             | 22.0                                          | 23.2                                | 3                                      |
| SA12A                                | 12.00                                       | 13.30                                       | 14.70                                       | 1                             | 19.9                                          | 25.6                                | 3                                      |
| SA13                                 | 13.00                                       | 14.40                                       | 17.60                                       | 1                             | 23.8                                          | 21.4                                | 3                                      |
| SA13A                                | 13.00                                       | 14.40                                       | 15.90                                       | 1                             | 21.5                                          | 23.7                                | 3                                      |
| SA14                                 | 14.00                                       | 15.60                                       | 19.10                                       | 1                             | 25.8                                          | 19.8                                | 3                                      |
| SA14A                                | 14.00                                       | 15.60                                       | 17.20                                       | 1                             | 23.2                                          | 22.0                                | 3                                      |
| SA15                                 | 15.00                                       | 16.70                                       | 20.40                                       | 1                             | 26.9                                          | 19.0                                | 3                                      |
| SA15A                                | 15.00                                       | 16.70                                       | 18.50                                       | 1                             | 24.4                                          | 20.9                                | 3                                      |
| SA16                                 | 16.00                                       | 17.80                                       | 21.80                                       | 1                             | 28.8                                          | 17.7                                | 3                                      |
| SA16A                                | 16.00                                       | 17.80                                       | 19.70                                       | 1                             | 26.0                                          | 19.6                                | 3                                      |
| SA17                                 | 17.00                                       | 18.90                                       | 23.10                                       | 1                             | 30.5                                          | 16.7                                | 3                                      |
| SA17A                                | 17.00                                       | 18.90                                       | 20.90                                       | 1                             | 27.6                                          | 18.5                                | 3                                      |
| SA18                                 | 18.00                                       | 20.00                                       | 24.40                                       | 1                             | 32.2                                          | 15.8                                | 3                                      |
| SA18A                                | 18.00                                       | 20.00                                       | 22.10                                       | 1                             | 29.2                                          | 17.5                                | 3                                      |
| SA20                                 | 20.00                                       | 22.20                                       | 27.10                                       | 1                             | 35.8                                          | 14.2                                | 3                                      |
| SA20A                                | 20.00                                       | 22.20                                       | 24.50                                       | 1                             | 32.4                                          | 15.7                                | 3                                      |
| SA22                                 | 22.00                                       | 24.40                                       | 29.80                                       | 1                             | 39.4                                          | 12.9                                | 3                                      |
| SA22A                                | 22.00                                       | 24.40                                       | 26.90                                       | 1                             | 35.5                                          | 14.4                                | 3                                      |
| SA24                                 | 24.00                                       | 26.70                                       | 32.60                                       | 1                             | 43.0                                          | 11.9                                | 3                                      |
| SA24A                                | 24.00                                       | 26.70                                       | 29.50                                       | 1                             | 38.9                                          | 13.1                                | 3                                      |
| SA26                                 | 26.00                                       | 28.90                                       | 35.30                                       | 1                             | 46.6                                          | 10.9                                | 3                                      |
| SA26A                                | 26.00                                       | 28.90                                       | 31.90                                       | 1                             | 42.1                                          | 12.1                                | 3                                      |
| SA28                                 | 28.00                                       | 31.10                                       | 38.00                                       | 1                             | 50.1                                          | 10.2                                | 3                                      |
| SA28A                                | 28.00                                       | 31.10                                       | 34.40                                       | 1                             | 45.4                                          | 11.2                                | 3                                      |
| SA30                                 | 30.00                                       | 33.30                                       | 40.70                                       | 1                             | 53.5                                          | 9.5                                 | 3                                      |
| SA30A                                | 30.00                                       | 33.30                                       | 36.80                                       | 1                             | 48.4                                          | 10.5                                | 3                                      |
| SA33                                 | 33.00                                       | 36.70                                       | 44.90                                       | 1                             | 59.0                                          | 8.6                                 | 3                                      |
| SA33A                                | 33.00                                       | 36.70                                       | 40.60                                       | 1                             | 53.3                                          | 9.6                                 | 3                                      |
| SA36                                 | 36.00                                       | 40.00                                       | 48.90                                       | 1                             | 64.3                                          | 7.9                                 | 3                                      |
| SA36A                                | 36.00                                       | 40.00                                       | 44.20                                       | 1                             | 58.1                                          | 8.8                                 | 3                                      |
| SA40                                 | 40.00                                       | 44.40                                       | 54.30                                       | 1                             | 71.4                                          | 7.1                                 | 3                                      |
| SA40A                                | 40.00                                       | 44.40                                       | 49.10                                       | 1                             | 64.5                                          | 7.9                                 | 3                                      |

# 500 Watt Axial Lead TVS



| UNI<br>DIRECTIONAL<br>PART<br>NUMBER | REVERSE<br>STAND-OFF<br>VOLTAGE<br>VRWM (V) | BREAKDOWN<br>VOLTAGE<br>VBR (V)<br>MIN. @IT | BREAKDOWN<br>VOLTAGE<br>VRB (V)<br>MAX. @IT | TEST<br>CURRENT<br>IT<br>(mA) | MAXIMUM<br>CLAMPING<br>VOLTAGE<br>@Ipp Vc (V) | PEAK<br>PULSE<br>CURRENT<br>Ipp (A) | REVERSE<br>LEAKAGE<br>@ VRWM<br>IR(μA) |
|--------------------------------------|---------------------------------------------|---------------------------------------------|---------------------------------------------|-------------------------------|-----------------------------------------------|-------------------------------------|----------------------------------------|
| SA43                                 | 43.00                                       | 47.80                                       | 58.40                                       | 1                             | 76.7                                          | 6.6                                 | 3                                      |
| SA43A                                | 43.00                                       | 47.80                                       | 52.80                                       | 1                             | 69.4                                          | 7.3                                 | 3                                      |
| SA45                                 | 45.00                                       | 50.00                                       | 61.10                                       | 1                             | 80.3                                          | 6.4                                 | 3                                      |
| SA45A                                | 45.00                                       | 50.00                                       | 55.30                                       | 1                             | 72.7                                          | 7.0                                 | 3                                      |
| SA48                                 | 48.00                                       | 53.30                                       | 65.20                                       | 1                             | 85.5                                          | 6.0                                 | 3                                      |
| SA48A                                | 48.00                                       | 53.30                                       | 58.90                                       | 1                             | 77.4                                          | 6.6                                 | 3                                      |
| SA51                                 | 51.00                                       | 56.70                                       | 69.30                                       | 1                             | 91.1                                          | 5.6                                 | 3                                      |
| SA51A                                | 51.00                                       | 56.70                                       | 62.70                                       | 1                             | 82.4                                          | 6.2                                 | 3                                      |
| SA54                                 | 54.00                                       | 60.00                                       | 73.30                                       | 1                             | 96.3                                          | 5.3                                 | 3                                      |
| SA54A                                | 54.00                                       | 60.00                                       | 66.30                                       | 1                             | 87.1                                          | 5.9                                 | 3                                      |
| SA58                                 | 58.00                                       | 64.40                                       | 78.70                                       | 1                             | 103.0                                         | 5.0                                 | 3                                      |
| SA58A                                | 58.00                                       | 64.40                                       | 71.20                                       | 1                             | 93.6                                          | 5.4                                 | 3                                      |
| SA60                                 | 60.00                                       | 66.70                                       | 81.50                                       | 1                             | 107.0                                         | 4.8                                 | 3                                      |
| SA60A                                | 60.00                                       | 66.70                                       | 73.70                                       | 1                             | 96.8                                          | 5.3                                 | 3                                      |
| SA64                                 | 64.00                                       | 71.10                                       | 86.90                                       | 1                             | 114.0                                         | 4.5                                 | 3                                      |
| SA64A                                | 64.00                                       | 71.10                                       | 78.60                                       | 1                             | 103.0                                         | 5.0                                 | 3                                      |
| SA70                                 | 70.00                                       | 77.80                                       | 95.10                                       | 1                             | 125.0                                         | 4.1                                 | 3                                      |
| SA70A                                | 70.00                                       | 77.80                                       | 86.00                                       | 1                             | 113.0                                         | 4.5                                 | 3                                      |
| SA75                                 | 75.00                                       | 83.30                                       | 102.00                                      | 1                             | 134.0                                         | 3.8                                 | 3                                      |
| SA75A                                | 75.00                                       | 83.30                                       | 92.10                                       | 1                             | 121.0                                         | 4.2                                 | 3                                      |
| SA78                                 | 78.00                                       | 86.70                                       | 106.00                                      | 1                             | 139.0                                         | 3.7                                 | 3                                      |
| SA78A                                | 78.00                                       | 86.70                                       | 95.80                                       | 1                             | 126.0                                         | 4.0                                 | 3                                      |
| SA85                                 | 85.00                                       | 94.40                                       | 115.00                                      | 1                             | 151.0                                         | 3.4                                 | 3                                      |
| SA85A                                | 85.00                                       | 94.40                                       | 104.00                                      | 1                             | 137.0                                         | 3.7                                 | 3                                      |
| SA90                                 | 90.00                                       | 100.00                                      | 122.00                                      | 1                             | 160.0                                         | 3.2                                 | 3                                      |
| SA90A                                | 90.00                                       | 100.00                                      | 111.00                                      | 1                             | 146.0                                         | 3.5                                 | 3                                      |
| SA100                                | 100.00                                      | 111.00                                      | 136.00                                      | 1                             | 179.0                                         | 2.8                                 | 3                                      |
| SA100A                               | 100.00                                      | 111.00                                      | 123.00                                      | 1                             | 162.0                                         | 3.1                                 | 3                                      |
| SA110                                | 110.00                                      | 122.00                                      | 149.00                                      | 1                             | 196.0                                         | 2.6                                 | 3                                      |
| SA110A                               | 110.00                                      | 122.00                                      | 135.00                                      | 1                             | 177.0                                         | 2.9                                 | 3                                      |
| SA120                                | 120.00                                      | 133.00                                      | 163.00                                      | 1                             | 214.0                                         | 2.4                                 | 3                                      |
| SA120A                               | 120.00                                      | 133.00                                      | 147.00                                      | 1                             | 193.0                                         | 2.6                                 | 3                                      |
| SA130                                | 130.00                                      | 144.00                                      | 176.00                                      | 1                             | 230.0                                         | 2.2                                 | 3                                      |
| SA130A                               | 130.00                                      | 144.00                                      | 159.00                                      | 1                             | 209.0                                         | 2.4                                 | 3                                      |
| SA150                                | 150.00                                      | 167.00                                      | 204.00                                      | 1                             | 268.0                                         | 1.9                                 | 3                                      |
| SA150A                               | 150.00                                      | 167.00                                      | 185.00                                      | 1                             | 243.0                                         | 2.1                                 | 3                                      |
| SA160                                | 160.00                                      | 178.00                                      | 218.00                                      | 1                             | 287.0                                         | 1.7                                 | 3                                      |
| SA160A                               | 160.00                                      | 178.00                                      | 197.00                                      | 1                             | 259.0                                         | 2.0                                 | 3                                      |
| SA170                                | 170.00                                      | 189.00                                      | 231.00                                      | 1                             | 304.0                                         | 1.7                                 | 3                                      |
| SA170A                               | 170.00                                      | 189.00                                      | 209.00                                      | 1                             | 275.0                                         | 1.9                                 | 3                                      |
| SA180                                | 180.00                                      | 200.00                                      | 244.00                                      | 1                             | 320.0                                         | 1.6                                 | 3                                      |
| SA180A                               | 180.00                                      | 200.00                                      | 233.00                                      | 1                             | 289.0                                         | 1.7                                 | 3                                      |