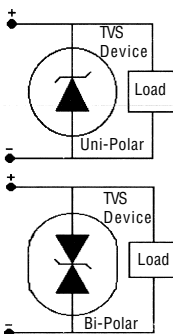


# 5.0V to 170V GPP TRANSIENT VOLTAGE SUPPRESSORS

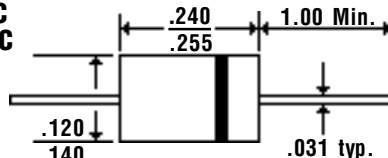
**SA5.0...170**

## Description



## Mechanical Dimensions

**JEDEC 204-AC**



## Features

- 500 WATT PEAK POWER PROTECTION
- EXCELLENT CLAMPING CAPABILITY
- FAST RESPONSE TIME
- TYPICAL  $I_R < 1\mu A$  ABOVE 10V
- GLASS PASSIVATED CHIP CONSTRUCTION
- MEETS UL SPECIFICATION 94V-0

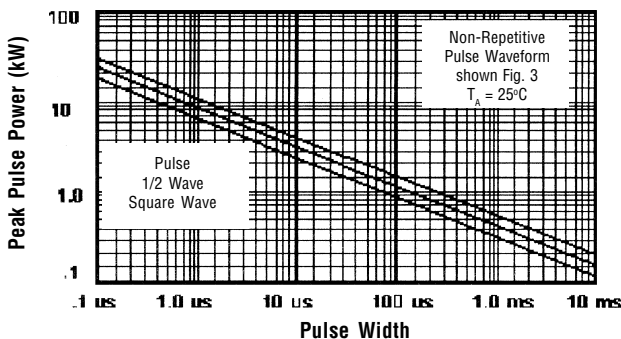
| <b>SA5.0...170</b>                                                                                                                 |            | <b>Units</b>   |
|------------------------------------------------------------------------------------------------------------------------------------|------------|----------------|
| <b>Maximum Ratings</b>                                                                                                             |            |                |
| Peak Power Dissipation... $P_{PK}$<br>$T_p = 1ms$ (Note 5)                                                                         | 500 Min.   | Watts          |
| Steady State Power Dissipation... $P_D$<br>@ $T_L = 75^\circ C$                                                                    | 1          | Watts          |
| Non-Repetitive Peak Forward Surge Current... $I_{FSM}$<br>@ Rated Load Conditions, 8.3 ms, 1/2 Sine Wave, Single Phase<br>(Note 3) | 70         | Amps           |
| Forward Voltage @ 50A... $V_F$<br>(Unidirectional Only)                                                                            | 3.5        | Volts          |
| Weight... $G_{RM}$                                                                                                                 | 0.4        | Grams          |
| Soldering Requirements (Time & Temp)... $S_T$<br>@ $300^\circ C$                                                                   | 10 Sec.    | Min. to Solder |
| Operating & Storage Temperature Range... $T_J, T_{STRG}$                                                                           | -55 to 175 | $^\circ C$     |

- NOTES:**
1. For Bi-Directional Applications, Use C or CA. Electrical Characteristics Apply in Both Directions.
  2. Lead Length .375 Inches.
  3. 8.3 ms, 1/2 Sine Wave, Single Phase Duty Cycle, @ 4 Pulses Per Minute Maximum.
  4.  $V_{BR}$  Measured After  $I_T$  Applies for 300  $\mu s$ .  $I_T$  = Square Wave Pulse or Equivalent.
  5. Non-Repetitive Current Pulse. Per Fig. 3 and Derated Above  $T_A = 25^\circ C$  per Fig. 2.

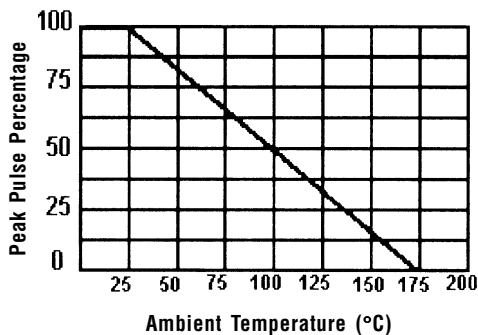
# 5.0V to 170V GPP TRANSIENT VOLTAGE SUPPRESSORS

**SA5.0 ...170**

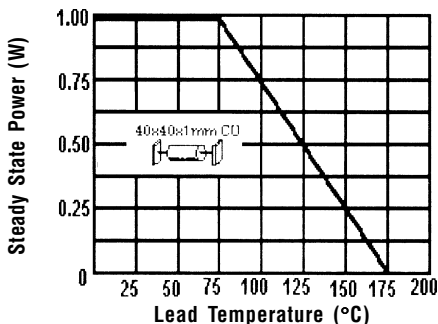
**Fig. 1 Pulse Rating Curve**



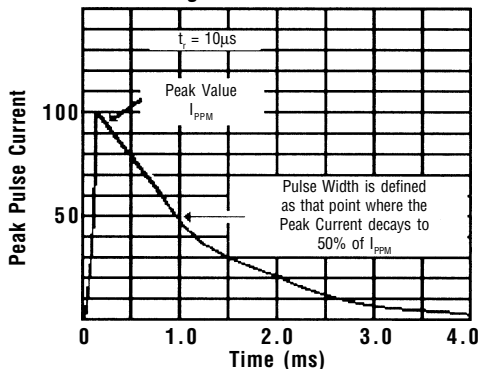
**Fig. 2 Pulse Derating Curve**



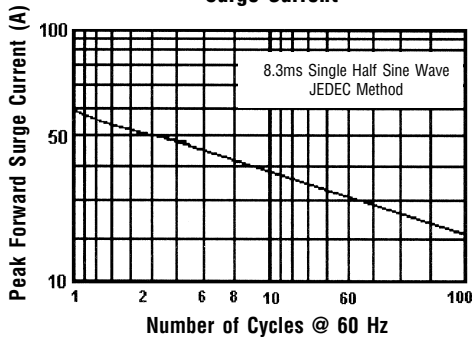
**Fig. 5 Steady State Power Derating**



**Fig. 3 Pulse Waveform**



**Fig. 6 Maximum Non-Repetitive Surge Current**



Ratings at 25 Deg. C ambient temperature unless otherwise specified.

Single Phase Half Wave, 60 Hz Resistive or Inductive Load.

For Capacitive Load, Derate Current by 20%.

# 5.0V to 170V GPP TRANSIENT VOLTAGE SUPPRESSORS

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| DEVICE | Breakdown Voltage                 |       |                          | Working Peak Reverse Voltage<br>V <sub>RWM</sub> (V) | Maximum Reverse Leakage<br>@ V <sub>PPM</sub><br>I <sub>R</sub> (μA) | Peak Pulse Current<br>I <sub>PPM</sub> (A)<br>(Note 2) | Maximum Clamping Voltage<br>@ I <sub>PPM</sub><br>V <sub>C</sub> (V) | Maximum Temperature Coefficient<br>of V <sub>BR</sub><br>% /°C |
|--------|-----------------------------------|-------|--------------------------|------------------------------------------------------|----------------------------------------------------------------------|--------------------------------------------------------|----------------------------------------------------------------------|----------------------------------------------------------------|
|        | V <sub>BR</sub><br>Volts (Note 1) |       | @ I <sub>T</sub><br>(mA) |                                                      |                                                                      |                                                        |                                                                      |                                                                |
|        | Min.                              | Max.  |                          |                                                      |                                                                      |                                                        |                                                                      |                                                                |
| SA5.0  | 6.40                              | 7.30  | 10.00                    | 5.00                                                 | 600                                                                  | 52.00                                                  | 9.60                                                                 | 5.00                                                           |
| SA5.0A | 6.40                              | 7.00  | 10.00                    | 5.00                                                 | 600                                                                  | 54.30                                                  | 9.20                                                                 | 5.00                                                           |
| SA6.0  | 6.67                              | 8.15  | 10.00                    | 6.00                                                 | 600                                                                  | 43.90                                                  | 11.40                                                                | 5.00                                                           |
| SA6.0A | 6.67                              | 7.37  | 10.00                    | 6.00                                                 | 600                                                                  | 48.50                                                  | 10.30                                                                | 5.00                                                           |
| SA6.5  | 7.22                              | 8.82  | 10.00                    | 6.50                                                 | 400                                                                  | 40.70                                                  | 12.30                                                                | 5.00                                                           |
| SA6.5A | 7.22                              | 7.98  | 10.00                    | 6.50                                                 | 400                                                                  | 44.70                                                  | 11.20                                                                | 5.00                                                           |
| SA7.0  | 7.78                              | 9.51  | 10.00                    | 7.00                                                 | 150                                                                  | 37.80                                                  | 13.30                                                                | 6.00                                                           |
| SA7.0A | 7.78                              | 8.60  | 10.00                    | 7.00                                                 | 150                                                                  | 41.70                                                  | 12.00                                                                | 6.00                                                           |
| SA7.5  | 8.33                              | 10.20 | 1.00                     | 7.50                                                 | 50.00                                                                | 35.00                                                  | 14.30                                                                | 7.00                                                           |
| SA7.5A | 8.33                              | 9.21  | 1.00                     | 7.50                                                 | 50.00                                                                | 38.80                                                  | 12.90                                                                | 7.00                                                           |
| SA8.0  | 8.89                              | 10.90 | 1.00                     | 8.00                                                 | 25.00                                                                | 33.30                                                  | 15.00                                                                | 7.00                                                           |
| SA8.0A | 8.89                              | 9.83  | 1.00                     | 8.00                                                 | 25.00                                                                | 36.70                                                  | 13.60                                                                | 7.00                                                           |
| SA8.5  | 9.44                              | 11.50 | 1.00                     | 8.50                                                 | 10.00                                                                | 31.40                                                  | 15.90                                                                | 8.00                                                           |
| SA8.5A | 9.44                              | 10.40 | 1.00                     | 8.50                                                 | 10.00                                                                | 34.70                                                  | 14.40                                                                | 8.00                                                           |
| SA9.0  | 10.00                             | 12.20 | 1.00                     | 9.00                                                 | 5.00                                                                 | 29.50                                                  | 16.90                                                                | 9.00                                                           |
| SA9.0A | 10.00                             | 11.10 | 1.00                     | 9.00                                                 | 5.00                                                                 | 32.50                                                  | 15.40                                                                | 9.00                                                           |
| SA10   | 11.10                             | 13.60 | 1.00                     | 10.00                                                | 1.00                                                                 | 26.60                                                  | 18.80                                                                | 10.00                                                          |
| SA10A  | 11.10                             | 12.30 | 1.00                     | 10.00                                                | 1.00                                                                 | 29.40                                                  | 17.00                                                                | 10.00                                                          |
| SA11   | 12.20                             | 14.90 | 1.00                     | 11.00                                                | 1.00                                                                 | 24.90                                                  | 20.10                                                                | 11.00                                                          |
| SA11A  | 12.20                             | 13.50 | 1.00                     | 11.00                                                | 1.00                                                                 | 27.40                                                  | 18.20                                                                | 11.00                                                          |
| SA12   | 13.30                             | 16.30 | 1.00                     | 12.00                                                | 1.00                                                                 | 22.70                                                  | 22.00                                                                | 12.00                                                          |
| SA12A  | 13.30                             | 14.70 | 1.00                     | 12.00                                                | 1.00                                                                 | 25.10                                                  | 19.90                                                                | 12.00                                                          |
| SA13   | 14.40                             | 17.60 | 1.00                     | 13.00                                                | 1.00                                                                 | 21.00                                                  | 23.80                                                                | 13.00                                                          |
| SA13A  | 14.40                             | 15.90 | 1.00                     | 13.00                                                | 1.00                                                                 | 23.20                                                  | 21.50                                                                | 13.00                                                          |
| SA14   | 15.60                             | 19.10 | 1.00                     | 14.00                                                | 1.00                                                                 | 19.40                                                  | 25.80                                                                | 14.00                                                          |
| SA14A  | 15.60                             | 17.20 | 1.00                     | 14.00                                                | 1.00                                                                 | 21.50                                                  | 23.20                                                                | 14.00                                                          |
| SA15   | 16.70                             | 20.40 | 1.00                     | 15.00                                                | 1.00                                                                 | 18.80                                                  | 26.90                                                                | 16.00                                                          |
| SA15A  | 16.70                             | 18.50 | 1.00                     | 15.00                                                | 1.00                                                                 | 20.60                                                  | 24.40                                                                | 16.00                                                          |
| SA16   | 17.80                             | 21.80 | 1.00                     | 16.00                                                | 1.00                                                                 | 17.60                                                  | 28.80                                                                | 19.00                                                          |
| SA16A  | 17.80                             | 19.70 | 1.00                     | 16.00                                                | 1.00                                                                 | 19.20                                                  | 26.00                                                                | 17.00                                                          |
| SA17   | 18.90                             | 23.10 | 1.00                     | 17.00                                                | 1.00                                                                 | 16.40                                                  | 30.50                                                                | 20.00                                                          |
| SA17A  | 18.90                             | 20.90 | 1.00                     | 17.00                                                | 1.00                                                                 | 18.10                                                  | 27.60                                                                | 19.00                                                          |
| SA18   | 20.00                             | 24.40 | 1.00                     | 18.00                                                | 1.00                                                                 | 15.50                                                  | 32.20                                                                | 21.00                                                          |
| SA18A  | 20.00                             | 22.10 | 1.00                     | 18.00                                                | 1.00                                                                 | 17.20                                                  | 29.20                                                                | 20.00                                                          |
| SA20   | 22.20                             | 27.10 | 1.00                     | 20.00                                                | 1.00                                                                 | 13.90                                                  | 35.80                                                                | 25.00                                                          |
| SA20A  | 22.20                             | 24.50 | 1.00                     | 20.00                                                | 1.00                                                                 | 15.40                                                  | 32.40                                                                | 23.00                                                          |
| SA22   | 24.40                             | 29.80 | 1.00                     | 22.00                                                | 1.00                                                                 | 12.70                                                  | 39.40                                                                | 28.00                                                          |
| SA22A  | 24.40                             | 26.90 | 1.00                     | 22.00                                                | 1.00                                                                 | 14.10                                                  | 35.50                                                                | 25.00                                                          |
| SA24   | 26.70                             | 32.60 | 1.00                     | 24.00                                                | 1.00                                                                 | 11.60                                                  | 43.00                                                                | 31.00                                                          |
| SA24A  | 26.70                             | 29.50 | 1.00                     | 24.00                                                | 1.00                                                                 | 12.80                                                  | 38.90                                                                | 28.00                                                          |
| SA26   | 28.90                             | 35.30 | 1.00                     | 26.00                                                | 1.00                                                                 | 10.70                                                  | 46.60                                                                | 31.00                                                          |
| SA26A  | 28.90                             | 31.90 | 1.00                     | 26.00                                                | 1.00                                                                 | 11.90                                                  | 42.10                                                                | 30.00                                                          |

# 5.0V to 170V GPP TRANSIENT VOLTAGE SUPPRESSORS

| DEVICE | Breakdown Voltage          |        |                 | Working Peak Reverse Voltage<br>$V_{RWM}$ (V) | Maximum Reverse Leakage<br>@ $V_{RWM}$<br>$I_R$ ( $\mu$ A) | Peak Pulse Current<br>$I_{PPM}$ (A)<br>(Note 2) | Maximum Clamping Voltage<br>@ $I_{PPM}$<br>$V_C$ (V) | Maximum Temperature Coefficient<br>of $V_{BR}$<br>% /°C |
|--------|----------------------------|--------|-----------------|-----------------------------------------------|------------------------------------------------------------|-------------------------------------------------|------------------------------------------------------|---------------------------------------------------------|
|        | $V_{BR}$<br>Volts (Note 1) |        | @ $I_T$<br>(mA) |                                               |                                                            |                                                 |                                                      |                                                         |
|        | Min.                       | Max.   |                 |                                               |                                                            |                                                 |                                                      |                                                         |
|        |                            |        |                 |                                               |                                                            |                                                 |                                                      |                                                         |
| SA28   | 31.10                      | 38.00  | 1.00            | 28.00                                         | 1.00                                                       | 9.90                                            | 50.10                                                | 35.00                                                   |
| SA28A  | 31.10                      | 34.40  | 1.00            | 28.00                                         | 1.00                                                       | 11.00                                           | 45.40                                                | 31.00                                                   |
| SA30   | 33.30                      | 40.70  | 1.00            | 30.00                                         | 1.00                                                       | 9.30                                            | 53.50                                                | 39.00                                                   |
| SA30A  | 33.30                      | 36.80  | 1.00            | 30.00                                         | 1.00                                                       | 10.30                                           | 48.40                                                | 36.00                                                   |
| SA33   | 36.70                      | 44.90  | 1.00            | 33.00                                         | 1.00                                                       | 8.60                                            | 59.00                                                | 42.00                                                   |
| SA33A  | 36.70                      | 40.60  | 1.00            | 33.00                                         | 1.00                                                       | 9.40                                            | 53.30                                                | 39.00                                                   |
| SA36   | 40.00                      | 48.90  | 1.00            | 36.00                                         | 1.00                                                       | 7.80                                            | 64.30                                                | 46.00                                                   |
| SA36A  | 40.00                      | 44.20  | 1.00            | 36.00                                         | 1.00                                                       | 8.60                                            | 58.10                                                | 41.00                                                   |
| SA40   | 44.40                      | 54.30  | 10.00           | 40.00                                         | 1.00                                                       | 7.00                                            | 71.40                                                | 51.00                                                   |
| SA40A  | 44.40                      | 49.10  | 10.00           | 40.00                                         | 1.00                                                       | 7.80                                            | 64.50                                                | 46.00                                                   |
| SA43   | 47.80                      | 58.40  | 10.00           | 43.00                                         | 1.00                                                       | 6.50                                            | 76.70                                                | 55.00                                                   |
| SA43A  | 47.80                      | 52.80  | 10.00           | 43.00                                         | 1.00                                                       | 7.20                                            | 69.40                                                | 50.00                                                   |
| SA45   | 50.00                      | 61.10  | 10.00           | 45.00                                         | 1.00                                                       | 6.20                                            | 80.30                                                | 58.00                                                   |
| SA45A  | 50.00                      | 55.30  | 10.00           | 45.00                                         | 1.00                                                       | 6.90                                            | 72.70                                                | 52.00                                                   |
| SA48   | 53.30                      | 65.10  | 10.00           | 48.00                                         | 1.00                                                       | 5.80                                            | 85.50                                                | 63.00                                                   |
| SA48A  | 53.30                      | 58.90  | 10.00           | 48.00                                         | 1.00                                                       | 6.50                                            | 77.40                                                | 56.00                                                   |
| SA51   | 56.70                      | 69.30  | 1.00            | 51.00                                         | 1.00                                                       | 5.50                                            | 91.10                                                | 66.00                                                   |
| SA51A  | 56.70                      | 62.70  | 1.00            | 51.00                                         | 1.00                                                       | 6.10                                            | 82.40                                                | 61.00                                                   |
| SA54   | 60.00                      | 73.30  | 1.00            | 54.00                                         | 1.00                                                       | 5.20                                            | 96.30                                                | 71.00                                                   |
| SA54A  | 60.00                      | 66.30  | 1.00            | 54.00                                         | 1.00                                                       | 5.70                                            | 87.10                                                | 65.00                                                   |
| SA58   | 64.40                      | 78.70  | 1.00            | 58.00                                         | 1.00                                                       | 4.90                                            | 103.00                                               | 78.00                                                   |
| SA58A  | 64.40                      | 71.20  | 1.00            | 58.00                                         | 1.00                                                       | 5.30                                            | 93.60                                                | 70.00                                                   |
| SA60   | 66.70                      | 81.50  | 1.00            | 60.00                                         | 1.00                                                       | 4.70                                            | 107.00                                               | 80.00                                                   |
| SA60A  | 66.70                      | 73.70  | 1.00            | 60.00                                         | 1.00                                                       | 5.20                                            | 96.80                                                | 71.00                                                   |
| SA64   | 71.10                      | 86.90  | 1.00            | 64.00                                         | 1.00                                                       | 4.40                                            | 114.00                                               | 86.00                                                   |
| SA64A  | 71.10                      | 78.60  | 1.00            | 64.00                                         | 1.00                                                       | 4.90                                            | 103.00                                               | 75.00                                                   |
| SA70   | 77.80                      | 95.00  | 1.00            | 70.00                                         | 1.00                                                       | 4.00                                            | 125.00                                               | 94.00                                                   |
| SA70A  | 77.80                      | 86.00  | 1.00            | 70.00                                         | 1.00                                                       | 4.40                                            | 113.00                                               | 85.00                                                   |
| SA75   | 83.30                      | 102.00 | 1.00            | 75.00                                         | 1.00                                                       | 3.70                                            | 134.00                                               | 101.00                                                  |
| SA75A  | 83.30                      | 92.10  | 1.00            | 75.00                                         | 1.00                                                       | 4.10                                            | 121.00                                               | 91.00                                                   |
| SA78   | 86.70                      | 106.00 | 1.00            | 78.00                                         | 1.00                                                       | 3.60                                            | 139.00                                               | 105.00                                                  |
| SA78A  | 86.70                      | 95.80  | 1.00            | 78.00                                         | 1.00                                                       | 4.00                                            | 126.00                                               | 95.00                                                   |
| SA85   | 94.40                      | 115.00 | 1.00            | 85.00                                         | 1.00                                                       | 3.30                                            | 151.00                                               | 114.00                                                  |
| SA85A  | 94.40                      | 104.00 | 1.00            | 85.00                                         | 1.00                                                       | 3.60                                            | 137.00                                               | 103.00                                                  |
| SA90   | 100.00                     | 122.00 | 1.00            | 90.00                                         | 1.00                                                       | 3.10                                            | 160.00                                               | 121.00                                                  |
| SA90A  | 100.00                     | 111.00 | 1.00            | 90.00                                         | 1.00                                                       | 3.40                                            | 146.00                                               | 110.00                                                  |
| SA100  | 111.00                     | 136.00 | 1.00            | 100.00                                        | 1.00                                                       | 2.80                                            | 179.00                                               | 135.00                                                  |
| SA100A | 111.00                     | 123.00 | 1.00            | 100.00                                        | 1.00                                                       | 3.10                                            | 162.00                                               | 123.00                                                  |
| SA110  | 122.00                     | 149.00 | 1.00            | 110.00                                        | 1.00                                                       | 2.60                                            | 196.00                                               | 148.00                                                  |
| SA110A | 122.00                     | 135.00 | 1.00            | 110.00                                        | 1.00                                                       | 2.80                                            | 177.00                                               | 133.00                                                  |
| SA120  | 133.00                     | 163.00 | 1.00            | 120.00                                        | 1.00                                                       | 2.30                                            | 214.00                                               | 162.00                                                  |
| SA120A | 133.00                     | 147.00 | 1.00            | 120.00                                        | 1.00                                                       | 2.00                                            | 193.00                                               | 145.00                                                  |
| SA130  | 144.00                     | 176.00 | 1.00            | 130.00                                        | 1.00                                                       | 2.20                                            | 231.00                                               | 175.00                                                  |
| SA130A | 144.00                     | 159.00 | 1.00            | 130.00                                        | 1.00                                                       | 2.40                                            | 209.00                                               | 158.00                                                  |
| SA150  | 167.00                     | 204.00 | 1.00            | 150.00                                        | 1.00                                                       | 1.90                                            | 268.00                                               | 203.00                                                  |
| SA150A | 167.00                     | 185.00 | 1.00            | 150.00                                        | 1.00                                                       | 2.10                                            | 243.00                                               | 184.00                                                  |
| SA160  | 178.00                     | 218.00 | 1.00            | 160.00                                        | 1.00                                                       | 1.70                                            | 287.00                                               | 217.00                                                  |
| SA160A | 178.00                     | 197.00 | 1.00            | 160.00                                        | 1.00                                                       | 1.90                                            | 259.00                                               | 196.00                                                  |
| SA170  | 189.00                     | 231.00 | 1.00            | 170.00                                        | 1.00                                                       | 1.60                                            | 304.00                                               | 230.00                                                  |
| SA170A | 189.00                     | 209.00 | 1.00            | 170.00                                        | 1.00                                                       | 1.80                                            | 275.00                                               | 208.00                                                  |

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