

## Transient Voltage Suppressor

**Breakdown Voltage** 5.0 to 170 Volts  
**Peak Pulse Power** 500 Watts

### Features

- Breakdown Voltages ( $V_{BR}$ ) from 5.0 to 170V
- 500W peak pulse power capability with a 10/1000 $\mu$ s waveform, repetitive rate (duty cycle):0.01%
- Fast Response Time
- Low incremental surge resistance
- Excellent clamping capability
- Available in uni-directional and bi-directional
- High temperature soldering guaranteed: 265°C /10 seconds, 0.375" (9.5mm) lead length, 5lbs. (2.3kg) tension

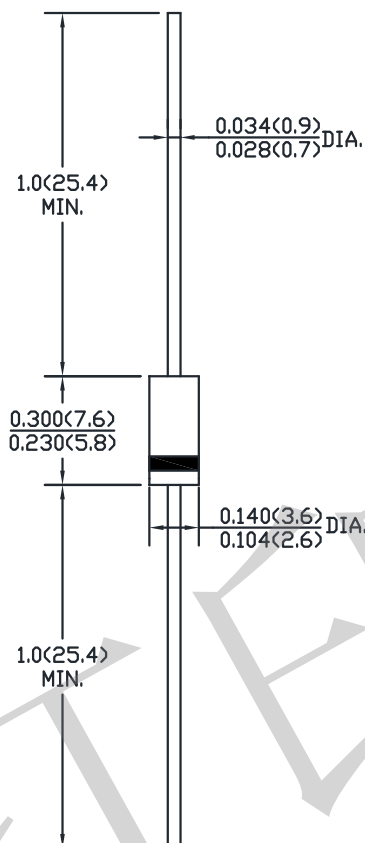
### Application

- Use in sensitive electronics protection against voltage transients induced by inductive load switching and lighting on ICs, MOSFE, signal lines of sensor units for consumer, computer, industrial, automotive and telecommunication

### Mechanical Data

- **Case:** Void-free transfer molded thermosetting epoxy body meeting UL94V-O
- **Terminals:** Tin-Lead or ROHS Compliant annealed matte-Tin plating readily solderable per MIL-STD-750, Method 2026
- **Marking:** Body marked with part number
- **Polarity:** Band denotes cathode. Bidirectional not marked
- **Weight:** 0.4g (Approximately)

#### CASE: DO-204AC (DO-15)



Dimensions in inches and (millimeters)

### Maximum Ratings and Electrical Characteristics @ 25°C unless otherwise specified

| Symbol          | Conditions                                                                           | Value       | Unit               |
|-----------------|--------------------------------------------------------------------------------------|-------------|--------------------|
| $P_{PPM}$       | Peak pulse power capability with a 10/1000 $\mu$ s                                   | 500         | W                  |
| $I_{PPM}$       | Peak pulse current with a 10/1000 $\mu$ s                                            | SEE TABLE1  | A                  |
| $P_{M(AV)}$     | Steady state power dissipation at $T_L=75^\circ\text{C}$ , Lead lengths 0.375"(10mm) | 2.5         | W                  |
| $I_{FSM}$       | Peak forward surge current, 8.3ms single half sine-wave unidirectional only          | 70          | A                  |
| $V_F$           | Maximum instantaneous forward voltage at 30A for unidirectional only(1)              | 3.5         | V                  |
| $R_{\theta JL}$ | Thermal resistance junction to lead                                                  | 45          | $^\circ\text{C/W}$ |
| $R_{\theta JA}$ | Thermal resistance junction to ambient                                               | 105         | $^\circ\text{C/W}$ |
| $T_J, T_{STG}$  | Operating and Storage Temperature                                                    | -65 to +150 | $^\circ\text{C}$   |

Notes:

(1) Measured on 8.3ms single half sine-wave

**Electrical Characteristics @ 25°C (Unless Otherwise Noted) TABLE1**

| Part Number | Breakdown Voltage<br>$V_{BR} @ I_{BR}$ |      |              | Rated Stand Off Voltage<br>$V_{WM}$ | Maximum Reverse Standby current<br>$I_D @ V_{WM}$ | Maximum Peak Pulse Current<br>$I_{PP}$ | Maximum Peak Reverse Voltage<br>$V_C @ I_{PP}$ | Maximum Temperature Coefficient of $V_{(BR)}$ |
|-------------|----------------------------------------|------|--------------|-------------------------------------|---------------------------------------------------|----------------------------------------|------------------------------------------------|-----------------------------------------------|
|             | MIN                                    | MAX  |              |                                     |                                                   |                                        |                                                |                                               |
|             | $V_{BR}(V)$                            |      | $I_{BR}(mA)$ |                                     | $I_D(\mu A)$                                      | $I_{PP}(A)$                            | $V_C(V)$                                       | $\alpha_{V(BR)} (\%/^{\circ}C)$               |
| SA5.0       | 6.40                                   | 7.30 | 10           | 5.0                                 | 600                                               | 52.0                                   | 9.6                                            | .057                                          |
| SA5.0A      | 6.40                                   | 7.00 | 10           | 5.0                                 | 600                                               | 54.3                                   | 9.2                                            | .057                                          |
| SA6.0       | 6.67                                   | 8.15 | 10           | 6.0                                 | 600                                               | 43.9                                   | 11.4                                           | .059                                          |
| SA6.0A      | 6.67                                   | 7.37 | 10           | 6.0                                 | 600                                               | 48.5                                   | 10.3                                           | .059                                          |
| SA6.5       | 7.22                                   | 8.82 | 10           | 6.5                                 | 400                                               | 40.7                                   | 12.3                                           | .061                                          |
| SA6.5A      | 7.22                                   | 7.98 | 10           | 6.5                                 | 400                                               | 44.7                                   | 11.2                                           | .061                                          |
| SA7.0       | 7.78                                   | 9.51 | 10           | 7.0                                 | 150                                               | 37.8                                   | 13.3                                           | .065                                          |
| SA7.0A      | 7.78                                   | 8.60 | 10           | 7.0                                 | 150                                               | 41.7                                   | 12.0                                           | .065                                          |
| SA7.5       | 8.33                                   | 10.2 | 1            | 7.5                                 | 50                                                | 35.0                                   | 14.3                                           | .067                                          |
| SA7.5A      | 8.33                                   | 9.21 | 1            | 7.5                                 | 50                                                | 38.8                                   | 12.9                                           | .067                                          |
| SA8.0       | 8.89                                   | 10.9 | 1            | 8.0                                 | 25                                                | 33.3                                   | 15.0                                           | .070                                          |
| SA8.0A      | 8.89                                   | 9.83 | 1            | 8.0                                 | 25                                                | 36.7                                   | 13.6                                           | .070                                          |
| SA8.5       | 9.44                                   | 11.5 | 1            | 8.5                                 | 5                                                 | 31.4                                   | 15.9                                           | .073                                          |
| SA8.5A      | 9.44                                   | 10.4 | 1            | 8.5                                 | 5                                                 | 34.7                                   | 14.4                                           | .073                                          |
| SA9.0       | 10.0                                   | 12.2 | 1            | 9.0                                 | 1                                                 | 29.5                                   | 16.9                                           | .076                                          |
| SA9.0A      | 10.0                                   | 11.1 | 1            | 9.0                                 | 1                                                 | 32.5                                   | 15.4                                           | .076                                          |
| SA10        | 11.1                                   | 13.6 | 1            | 10.0                                | 1                                                 | 26.6                                   | 18.8                                           | .078                                          |
| SA10A       | 11.1                                   | 12.3 | 1            | 10.0                                | 1                                                 | 29.4                                   | 17.0                                           | .078                                          |
| SA11        | 12.2                                   | 14.9 | 1            | 11.0                                | 1                                                 | 24.9                                   | 20.1                                           | .081                                          |
| SA11A       | 12.2                                   | 13.5 | 1            | 11.0                                | 1                                                 | 27.4                                   | 18.2                                           | .081                                          |
| SA12        | 13.3                                   | 16.3 | 1            | 12.0                                | 1                                                 | 22.7                                   | 22.0                                           | .082                                          |
| SA12A       | 13.3                                   | 14.7 | 1            | 12.0                                | 1                                                 | 25.1                                   | 19.9                                           | .082                                          |
| SA13        | 14.4                                   | 17.6 | 1            | 13.0                                | 1                                                 | 21.0                                   | 23.8                                           | .084                                          |
| SA13A       | 14.4                                   | 15.9 | 1            | 13.0                                | 1                                                 | 23.2                                   | 21.5                                           | .084                                          |
| SA14        | 15.6                                   | 19.1 | 1            | 14.0                                | 1                                                 | 19.4                                   | 25.8                                           | .086                                          |
| SA14A       | 15.6                                   | 17.2 | 1            | 14.0                                | 1                                                 | 21.5                                   | 23.2                                           | .086                                          |
| SA15        | 16.7                                   | 20.4 | 1            | 15.0                                | 1                                                 | 18.8                                   | 26.9                                           | .087                                          |
| SA15A       | 16.7                                   | 18.5 | 1            | 15.0                                | 1                                                 | 20.6                                   | 24.4                                           | .087                                          |
| SA16        | 17.8                                   | 21.8 | 1            | 16.0                                | 1                                                 | 17.6                                   | 28.8                                           | .088                                          |
| SA16A       | 17.8                                   | 19.7 | 1            | 16.0                                | 1                                                 | 19.2                                   | 26.0                                           | .088                                          |
| SA17        | 18.9                                   | 23.1 | 1            | 17.0                                | 1                                                 | 16.4                                   | 30.5                                           | .090                                          |
| SA17A       | 18.9                                   | 20.9 | 1            | 17.0                                | 1                                                 | 18.1                                   | 27.6                                           | .090                                          |
| SA18        | 20.0                                   | 24.4 | 1            | 18.0                                | 1                                                 | 15.5                                   | 32.2                                           | .092                                          |
| SA18A       | 20.0                                   | 22.1 | 1            | 18.0                                | 1                                                 | 17.2                                   | 29.2                                           | .092                                          |
| SA20        | 22.2                                   | 27.1 | 1            | 20.0                                | 1                                                 | 13.9                                   | 35.8                                           | .093                                          |
| SA20A       | 22.2                                   | 24.5 | 1            | 20.0                                | 1                                                 | 15.4                                   | 32.4                                           | .093                                          |
| SA22        | 24.4                                   | 29.8 | 1            | 22.0                                | 1                                                 | 12.7                                   | 39.4                                           | .094                                          |
| SA22A       | 24.4                                   | 26.9 | 1            | 22.0                                | 1                                                 | 14.1                                   | 35.5                                           | .094                                          |
| SA24        | 26.7                                   | 32.6 | 1            | 24.0                                | 1                                                 | 11.6                                   | 43.0                                           | .096                                          |
| SA24A       | 26.7                                   | 29.5 | 1            | 24.0                                | 1                                                 | 12.8                                   | 38.9                                           | .096                                          |
| SA26        | 28.9                                   | 35.3 | 1            | 26.0                                | 1                                                 | 10.7                                   | 46.6                                           | .097                                          |
| SA26A       | 28.9                                   | 31.9 | 1            | 26.0                                | 1                                                 | 11.9                                   | 42.1                                           | .097                                          |
| SA28        | 31.1                                   | 38.0 | 1            | 28.0                                | 1                                                 | 9.9                                    | 50.0                                           | .098                                          |
| SA28A       | 31.1                                   | 34.4 | 1            | 28.0                                | 1                                                 | 11.0                                   | 45.4                                           | .098                                          |
| SA30        | 33.3                                   | 40.7 | 1            | 30.0                                | 1                                                 | 9.3                                    | 53.5                                           | .099                                          |
| SA30A       | 33.3                                   | 36.8 | 1            | 30.0                                | 1                                                 | 10.3                                   | 48.4                                           | .099                                          |
| SA33        | 36.7                                   | 44.9 | 1            | 33.0                                | 1                                                 | 8.5                                    | 59.0                                           | .100                                          |
| SA33A       | 36.7                                   | 40.6 | 1            | 33.0                                | 1                                                 | 9.4                                    | 53.3                                           | .100                                          |
| SA36        | 40.0                                   | 48.9 | 1            | 36.0                                | 1                                                 | 7.8                                    | 64.3                                           | .101                                          |
| SA36A       | 40.0                                   | 44.2 | 1            | 36.0                                | 1                                                 | 8.6                                    | 58.1                                           | .101                                          |
| SA40        | 44.4                                   | 54.3 | 1            | 40.0                                | 1                                                 | 7.0                                    | 71.4                                           | .101                                          |
| SA40A       | 44.4                                   | 49.1 | 1            | 40.0                                | 1                                                 | 7.8                                    | 64.5                                           | .101                                          |

**Electrical Characteristics @ 25°C (Unless Otherwise Noted) TABLE1**

| Part Number | Breakdown Voltage<br>$V_{BR}$ @ $I_{BR}$ |       |               | Rated Stand Off Voltage<br>$V_{WM}$ (V) | Maximum Reverse Standby current<br>$I_D$ @ $V_{WM}$ | Maximum Peak Pulse Current<br>$I_{PP}$ (A) | Maximum Peak Reverse Voltage<br>$V_C$ @ $I_{PP}$ | Maximum Temperature Coefficient of $V_{BR}$<br>%/°C |
|-------------|------------------------------------------|-------|---------------|-----------------------------------------|-----------------------------------------------------|--------------------------------------------|--------------------------------------------------|-----------------------------------------------------|
|             | MIN                                      | MAX   |               |                                         |                                                     |                                            |                                                  |                                                     |
|             | $V_{BR}$ (V)                             |       | $I_{BR}$ (mA) |                                         |                                                     |                                            |                                                  |                                                     |
| SA43        | 47.8                                     | 58.4  | 1             | 43.0                                    | 1                                                   | 6.5                                        | 76.7                                             | .102                                                |
| SA43A       | 47.8                                     | 52.8  | 1             | 43.0                                    | 1                                                   | 7.2                                        | 69.4                                             | .102                                                |
| SA45        | 50.0                                     | 61.1  | 1             | 45.0                                    | 1                                                   | 6.2                                        | 80.3                                             | .102                                                |
| SA45A       | 50.0                                     | 55.3  | 1             | 45.0                                    | 1                                                   | 6.9                                        | 72.7                                             | .102                                                |
| SA48        | 53.3                                     | 65.1  | 1             | 48.0                                    | 1                                                   | 5.8                                        | 85.5                                             | .103                                                |
| SA48A       | 53.3                                     | 58.9  | 1             | 48.0                                    | 1                                                   | 6.5                                        | 77.4                                             | .103                                                |
| SA51        | 56.7                                     | 69.3  | 1             | 51.0                                    | 1                                                   | 5.5                                        | 91.1                                             | .103                                                |
| SA51A       | 56.7                                     | 62.7  | 1             | 51.0                                    | 1                                                   | 6.1                                        | 82.4                                             | .103                                                |
| SA54        | 60.0                                     | 73.3  | 1             | 54.0                                    | 1                                                   | 5.2                                        | 96.3                                             | .104                                                |
| SA54A       | 60.0                                     | 66.3  | 1             | 54.0                                    | 1                                                   | 5.7                                        | 87.1                                             | .104                                                |
| SA58        | 64.4                                     | 78.7  | 1             | 58.0                                    | 1                                                   | 4.9                                        | 103.0                                            | .104                                                |
| SA58A       | 64.4                                     | 71.2  | 1             | 58.0                                    | 1                                                   | 5.3                                        | 93.6                                             | .104                                                |
| SA60        | 66.7                                     | 81.5  | 1             | 60.0                                    | 1                                                   | 4.7                                        | 107.0                                            | .104                                                |
| SA60A       | 66.7                                     | 73.7  | 1             | 60.0                                    | 1                                                   | 5.2                                        | 96.8                                             | .104                                                |
| SA64        | 71.1                                     | 86.9  | 1             | 64.0                                    | 1                                                   | 4.4                                        | 114.0                                            | .105                                                |
| SA64A       | 71.1                                     | 78.6  | 1             | 64.0                                    | 1                                                   | 4.9                                        | 103.0                                            | .105                                                |
| SA70        | 77.8                                     | 95.1  | 1             | 70.0                                    | 1                                                   | 4.0                                        | 125.0                                            | .105                                                |
| SA70A       | 77.8                                     | 86.0  | 1             | 70.0                                    | 1                                                   | 4.4                                        | 113.0                                            | .105                                                |
| SA75        | 83.3                                     | 102.0 | 1             | 75.0                                    | 1                                                   | 3.7                                        | 134.0                                            | .105                                                |
| SA75A       | 83.3                                     | 92.1  | 1             | 75.0                                    | 1                                                   | 4.1                                        | 121.0                                            | .105                                                |
| SA78        | 86.7                                     | 106.0 | 1             | 78.0                                    | 1                                                   | 3.6                                        | 139.0                                            | .106                                                |
| SA78A       | 86.7                                     | 95.8  | 1             | 78.0                                    | 1                                                   | 4.0                                        | 126.0                                            | .106                                                |
| SA85        | 94.4                                     | 115.0 | 1             | 85.0                                    | 1                                                   | 3.3                                        | 151.0                                            | .106                                                |
| SA85A       | 94.4                                     | 104.0 | 1             | 85.0                                    | 1                                                   | 3.6                                        | 137.0                                            | .106                                                |
| SA90        | 100.0                                    | 122.0 | 1             | 90.0                                    | 1                                                   | 3.1                                        | 160.0                                            | .107                                                |
| SA90A       | 100.0                                    | 111.0 | 1             | 90.0                                    | 1                                                   | 3.4                                        | 146.0                                            | .107                                                |
| SA100       | 111.0                                    | 136.0 | 1             | 100.0                                   | 1                                                   | 2.8                                        | 179.0                                            | .107                                                |
| SA100A      | 111.0                                    | 123.0 | 1             | 100.0                                   | 1                                                   | 3.1                                        | 162.0                                            | .107                                                |
| SA110       | 122.0                                    | 149.0 | 1             | 110.0                                   | 1                                                   | 2.6                                        | 196.0                                            | .107                                                |
| SA110A      | 122.0                                    | 135.0 | 1             | 110.0                                   | 1                                                   | 2.8                                        | 177.0                                            | .107                                                |
| SA120       | 133.0                                    | 163.0 | 1             | 120.0                                   | 1                                                   | 2.3                                        | 214.0                                            | .107                                                |
| SA120A      | 133.0                                    | 147.0 | 1             | 120.0                                   | 1                                                   | 2.0                                        | 193.0                                            | .107                                                |
| SA130       | 144.0                                    | 176.0 | 1             | 130.0                                   | 1                                                   | 2.2                                        | 231.0                                            | .108                                                |
| SA130A      | 144.0                                    | 159.0 | 1             | 130.0                                   | 1                                                   | 2.4                                        | 209.0                                            | .108                                                |
| SA150       | 167.0                                    | 204.0 | 1             | 150.0                                   | 1                                                   | 1.9                                        | 268.0                                            | .108                                                |
| SA150A      | 167.0                                    | 185.0 | 1             | 150.0                                   | 1                                                   | 2.1                                        | 243.0                                            | .108                                                |
| SA160       | 178.0                                    | 218.0 | 1             | 160.0                                   | 1                                                   | 1.7                                        | 287.0                                            | .108                                                |
| SA160A      | 178.0                                    | 197.0 | 1             | 160.0                                   | 1                                                   | 1.9                                        | 259.0                                            | .108                                                |
| SA170       | 189.0                                    | 231.0 | 1             | 170.0                                   | 1                                                   | 1.6                                        | 304.0                                            | .108                                                |
| SA170A      | 189.0                                    | 209.0 | 1             | 170.0                                   | 1                                                   | 1.8                                        | 275.0                                            | .108                                                |

1. For bi-directional construction, indicate a C or CA suffix after part number, i.e. SA170C or SA170CA

## Characteristic Curve

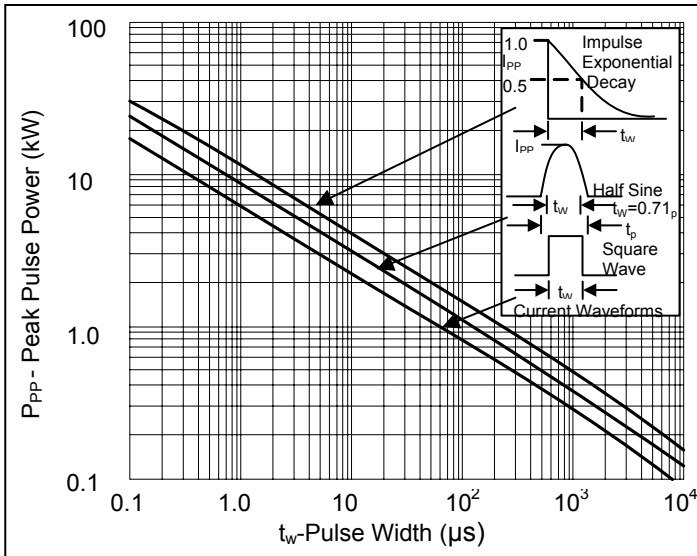


Fig. 1 Peak Pulse Power vs. Pulse Time

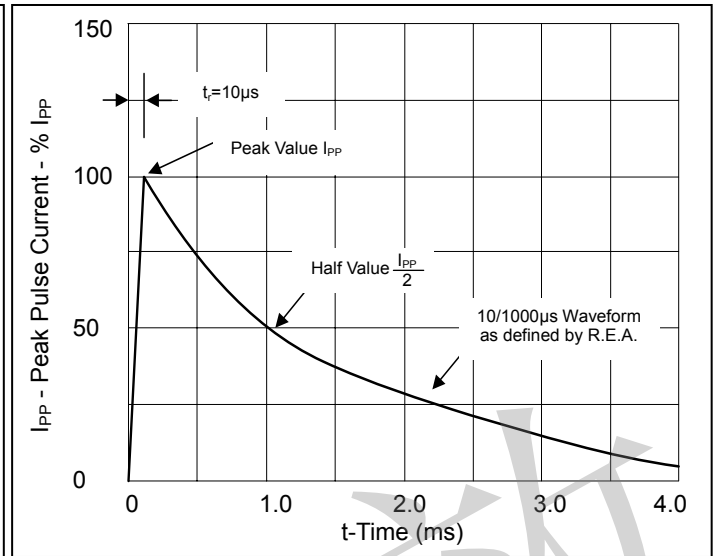


Fig. 2 Pulse Waveform for Exponential Surge

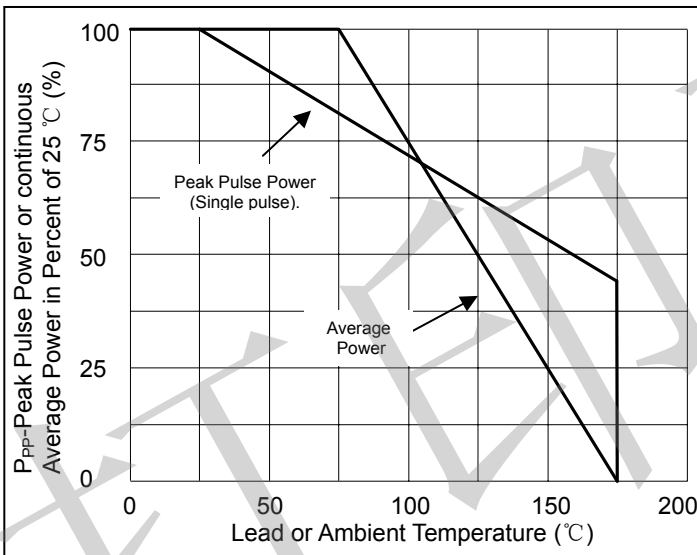


Fig. 3 Derating Curve

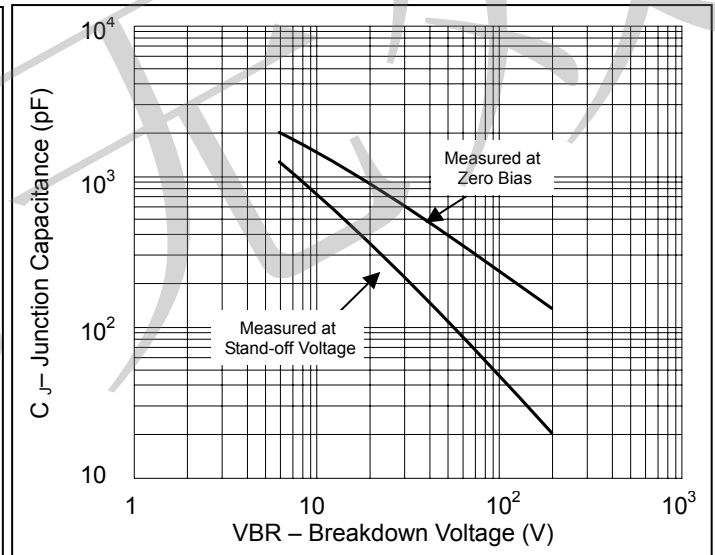


Fig. 4 Typical Capacitance vs. Breakdown Voltage (Unipolar)

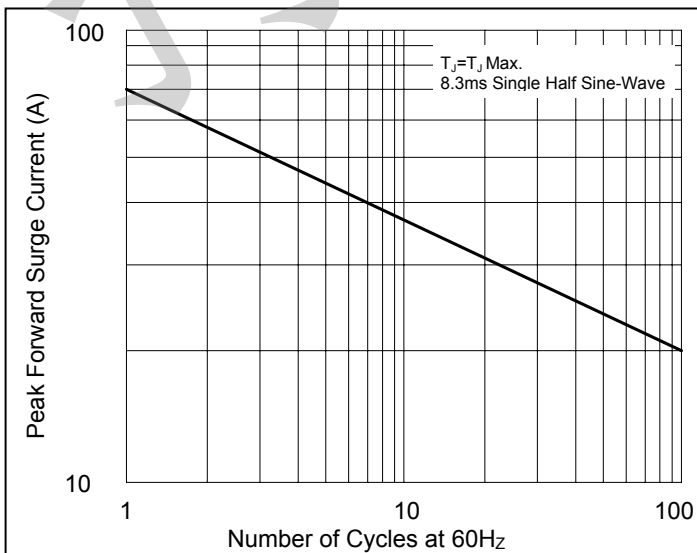


Fig. 5 Max. Non-Repetitive Forward Surge Current Uni-Directional Only