



# SA5.0~SA220CA

## GLASS PASSIVATED JUNCTION TRANSIENT VOLTAGE SUPPRESSOR

**VOLTAGE** 5.0 to 220 Volts **POWER** 500 Watts

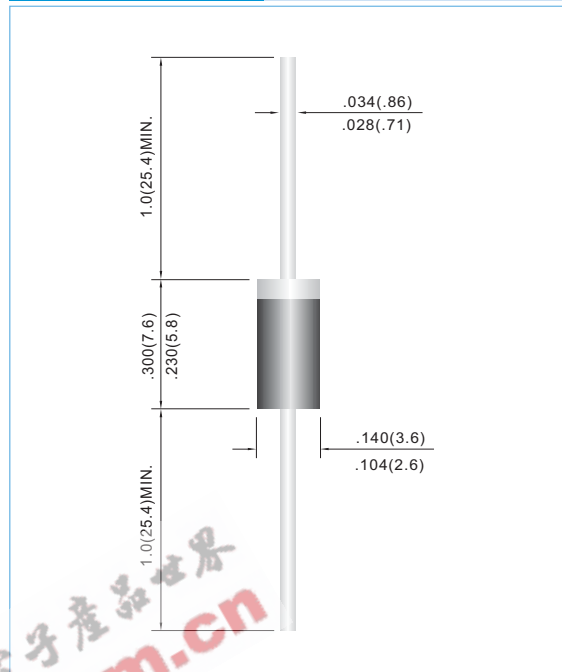
**DO-15** Unit: inch(mm)

### FEATURES

- Plastic package has Underwriters Laboratory Flammability Classification 94V-O
- Glass passivated chip junction in DO-15 package
- 500W surge capability at 1ms
- Excellent clamping capability
- Low zener impedance
- Fast response time: typically less than 1.0 ps from 0 volts to BV min
- Typical IR less than 1μA above 10V
- High temperature soldering guaranteed: 260°C/10 seconds/.375" (9.5mm) lead length/5lbs., (2.3kg) tension
- In compliance with EU RoHS 2002/95/EC directives

### MECHANICAL DATA

- Case: JEDEC DO-15 molded plastic
- Terminals: Axial leads, solderable per MIL-STD-750, Method 2026
- Polarity: Color band denoted cathode except Bipolar
- Mounting Position: Any
- Weight: 0.015 ounce, 0.4 gram



### DEVICES FOR BIPOLAR APPLICATIONS

For Bidirectional use C or CA Suffix for types Electrical characteristics apply in both directions.

### MAXIMUM RATINGS AND CHARACTERISTICS

Rating at 25°C ambient temperature unless otherwise specified. Resistive or inductive load, 60Hz.  
For Capacitive load derate current by 20%.

| RATING  | SYMBOL         | VALUE       | UNITS |
|---|----------------|-------------|-------|
| Peak Pulse Power Dissipation at $T_A=25^\circ\text{C}$ , $T_P=1\text{ms}$ (Note 1, Fig.1)                 | $P_{PPM}$      | 500         | Watts |
| Peak Pulse Current of on 10/1000μs waveform (Note 1, Fig.3)   | $I_{PPM}$      | SEE TABLE 1 | Amps  |
| Steady State Power Dissipation at $T_L=75^\circ\text{C}$ Lead Lengths .375", (9.5mm) (Note 2)             | $P_{M(AV)}$    | 1.0         | Watts |
| Peak Forward Surge Current, 8.3ms Single Half Sine-Wave Superimposed on Rated Load(JECED Method) (Note 3) | $I_{FSM}$      | 70          | Amps  |
| Operating and Storage Temperature Range   | $T_J, T_{STG}$ | -65 to +175 | °C    |

#### NOTES:

- 1.Non-repetitive current pulse, per Fig. 3 and derated above  $T_A=25^\circ\text{C}$  per Fig. 2.
- 2.Mounted on Copper Leaf area of  $1.57\text{in}^2(40\text{mm}^2)$ .
- 3.8.3ms single half sine-wave, duty cycle= 4 pulses per minutes maximum.

### LEGAL STATEMENT

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# SA5.0~SA220CA

| Part Number                              |         | Reverse Stand-off Voltage | Breakdown Voltage                |       | Test Current   | Reverse Leakage                   |       | Max. Clamp Voltage 10/1000μs     | Peak Pulse Current 10/1000 μs | Marking Code |         |
|--|---------|---------------------------|----------------------------------|-------|----------------|-----------------------------------|-------|----------------------------------|-------------------------------|--------------|---------|
|  |         | V <sub>RWM</sub>          | V <sub>BR</sub> @ I <sub>T</sub> |       | I <sub>T</sub> | I <sub>R</sub> @ V <sub>RWM</sub> |       | V <sub>C</sub> @ I <sub>PP</sub> | I <sub>PP</sub>               |              |         |
|  |         |                           | Min.                             | Max.  |                | UNI-uA                            | BI-uA |                                  |                               | UNI          | BI      |
| UNI                                      | BI      | V                         | V                                | V     | mA             | uA                                | uA    | V                                | A                             | UNI          | BI      |
| <b>500W Transient Voltage Suppressor</b> |         |                           |                                  |       |                |                                   |       |                                  |                               |              |         |
| SA5.0                                    | SA5.0C  | 5                         | 6.4                              | 7.55  | 10             | 600                               | 1200  | 9.6                              | 52.3                          | SA5.0        | SA5.0C  |
| SA5.0A                                   | SA5.0CA | 5                         | 6.4                              | 7.25  | 10             | 600                               | 1200  | 9.2                              | 54.3                          | SA5.0A       | SA5.0CA |
| SA6.0                                    | SA6.0C  | 6                         | 6.67                             | 8.45  | 10             | 600                               | 1200  | 11.4                             | 43.9                          | SA6.0        | SA6.0C  |
| SA6.0A                                   | SA6.0CA | 6                         | 6.67                             | 7.67  | 10             | 600                               | 1200  | 10.3                             | 48.5                          | SA6.0A       | SA6.0CA |
| SA6.5                                    | SA6.5C  | 6.5                       | 7.22                             | 9.14  | 10             | 400                               | 800   | 12.3                             | 40.7                          | SA6.5        | SA6.5C  |
| SA6.5A                                   | SA6.5CA | 6.5                       | 7.22                             | 8.3   | 10             | 400                               | 800   | 11.2                             | 44.7                          | SA6.5A       | SA6.5CA |
| SA7.0                                    | SA7.0C  | 7                         | 7.78                             | 9.86  | 10             | 150                               | 300   | 13.3                             | 37.8                          | SA7.0        | SA7.0C  |
| SA7.0A                                   | SA7.0CA | 7                         | 7.78                             | 8.95  | 10             | 150                               | 300   | 12                               | 41.7                          | SA7.0A       | SA7.0CA |
| SA7.5                                    | SA7.5C  | 7.5                       | 8.33                             | 10.67 | 1              | 50                                | 100   | 14.3                             | 35                            | SA7.5        | SA7.5C  |
| SA7.5A                                   | SA7.5CA | 7.5                       | 8.33                             | 9.58  | 1              | 50                                | 100   | 12.9                             | 38.8                          | SA7.5A       | SA7.5CA |
| SA8.0                                    | SA8.0C  | 8                         | 8.89                             | 11.3  | 1              | 25                                | 50    | 15                               | 33.3                          | SA8.0        | SA8.0C  |
| SA8.0A                                   | SA8.0CA | 8                         | 8.89                             | 10.23 | 1              | 25                                | 50    | 13.6                             | 36.7                          | SA8.0A       | SA8.0CA |
| SA8.5                                    | SA8.5C  | 8.5                       | 9.44                             | 11.92 | 1              | 10                                | 20    | 15.9                             | 31.4                          | SA8.5        | SA8.5C  |
| SA8.5A                                   | SA8.5CA | 8.5                       | 9.44                             | 10.82 | 1              | 10                                | 20    | 14.4                             | 34.7                          | SA8.5A       | SA8.5CA |
| SA9.0                                    | SA9.0C  | 9                         | 10                               | 12.6  | 1              | 5                                 | 5     | 16.9                             | 29.5                          | SA9.0        | SA9.0C  |
| SA9.0A                                   | SA9.0CA | 9                         | 10                               | 11.5  | 1              | 5                                 | 5     | 15.4                             | 32.5                          | SA9.0A       | SA9.0CA |
| SA10                                     | SA10C   | 10                        | 11.1                             | 14.1  | 1              | 3                                 | 3     | 18.8                             | 26.6                          | SA10         | SA10C   |
| SA10A                                    | SA10CA  | 10                        | 11.1                             | 12.8  | 1              | 3                                 | 3     | 17                               | 29.4                          | SA10A        | SA10CA  |
| SA11                                     | SA11C   | 11                        | 12.2                             | 15.4  | 1              | 3                                 | 3     | 20.1                             | 24.9                          | SA11         | SA11C   |
| SA11A                                    | SA11CA  | 11                        | 12.2                             | 14    | 1              | 3                                 | 3     | 18.2                             | 27.4                          | SA11A        | SA11CA  |
| SA12                                     | SA12C   | 12                        | 13.3                             | 16.9  | 1              | 3                                 | 3     | 22                               | 22.7                          | SA12         | SA12C   |
| SA12A                                    | SA12CA  | 12                        | 13.3                             | 15.3  | 1              | 3                                 | 3     | 19.9                             | 25.1                          | SA12A        | SA12CA  |
| SA13                                     | SA13C   | 13                        | 14.4                             | 18.2  | 1              | 3                                 | 3     | 23.8                             | 21                            | SA13         | SA13C   |
| SA13A                                    | SA13CA  | 13                        | 14.4                             | 16.5  | 1              | 3                                 | 3     | 21.5                             | 23.2                          | SA13A        | SA13CA  |
| SA14                                     | SA14C   | 14                        | 15.6                             | 19.8  | 1              | 3                                 | 3     | 25.8                             | 19.4                          | SA14         | SA14C   |
| SA14A                                    | SA14CA  | 14                        | 15.6                             | 17.9  | 1              | 3                                 | 3     | 23.2                             | 21.5                          | SA14A        | SA14CA  |
| SA15                                     | SA15C   | 15                        | 16.7                             | 21.1  | 1              | 3                                 | 3     | 26.9                             | 18.8                          | SA15         | SA15C   |
| SA15A                                    | SA15CA  | 15                        | 16.7                             | 19.2  | 1              | 3                                 | 3     | 24.4                             | 20.6                          | SA15A        | SA15CA  |
| SA16                                     | SA16C   | 16                        | 17.8                             | 22.6  | 1              | 3                                 | 3     | 28.8                             | 17.6                          | SA16         | SA16C   |
| SA16A                                    | SA16CA  | 16                        | 17.8                             | 20.5  | 1              | 3                                 | 3     | 26                               | 19.2                          | SA16A        | SA16CA  |
| SA17                                     | SA17C   | 17                        | 18.9                             | 23.9  | 1              | 3                                 | 3     | 30.5                             | 16.4                          | SA17         | SA17C   |
| SA17A                                    | SA17CA  | 17                        | 18.9                             | 21.7  | 1              | 3                                 | 3     | 27.6                             | 16.1                          | SA17A        | SA17CA  |
| SA18                                     | SA18C   | 18                        | 20                               | 25.3  | 1              | 3                                 | 3     | 32.2                             | 15.5                          | SA18         | SA18C   |
| SA18A                                    | SA18CA  | 18                        | 20                               | 23.3  | 1              | 3                                 | 3     | 29.2                             | 17.2                          | SA18A        | SA18CA  |
| SA20                                     | SA20C   | 20                        | 22.2                             | 28.1  | 1              | 3                                 | 3     | 35.8                             | 13.9                          | SA20         | SA20C   |
| SA20A                                    | SA20CA  | 20                        | 22.2                             | 25.5  | 1              | 3                                 | 3     | 32.4                             | 15.4                          | SA20A        | SA20CA  |
| SA22                                     | SA22C   | 22                        | 24.4                             | 30.9  | 1              | 3                                 | 3     | 39.4                             | 12.7                          | SA22         | SA22C   |
| SA22A                                    | SA22CA  | 22                        | 24.4                             | 28    | 1              | 3                                 | 3     | 35.5                             | 14.1                          | SA22A        | SA22CA  |
| SA24                                     | SA24C   | 24                        | 26.7                             | 33.8  | 1              | 3                                 | 3     | 43                               | 11.6                          | SA24         | SA24C   |
| SA24A                                    | SA24CA  | 24                        | 26.7                             | 30.7  | 1              | 3                                 | 3     | 38.9                             | 12.8                          | SA24A        | SA24CA  |
| SA26                                     | SA26C   | 26                        | 28.9                             | 36.6  | 1              | 3                                 | 3     | 46.6                             | 10.7                          | SA26         | SA26C   |
| SA26A                                    | SA26CA  | 26                        | 28.9                             | 33.2  | 1              | 3                                 | 3     | 42.1                             | 11.9                          | SA26A        | SA26CA  |
| SA28                                     | SA28C   | 28                        | 31.1                             | 39.4  | 1              | 3                                 | 3     | 50                               | 9.9                           | SA28         | SA28C   |
| SA28A                                    | SA28CA  | 28                        | 31.1                             | 35.8  | 1              | 3                                 | 3     | 45.4                             | 11                            | SA28A        | SA28CA  |
| SA30                                     | SA30C   | 30                        | 33.3                             | 42.2  | 1              | 3                                 | 3     | 53.5                             | 9.3                           | SA30         | SA30C   |
| SA30A                                    | SA30CA  | 30                        | 33.3                             | 38.3  | 1              | 3                                 | 3     | 48.4                             | 10.3                          | SA30A        | SA30CA  |
| SA33                                     | SA33C   | 33                        | 36.7                             | 46.5  | 1              | 3                                 | 3     | 59                               | 5.8                           | SA33         | SA33C   |
| SA33A                                    | SA33CA  | 33                        | 36.7                             | 42.2  | 1              | 3                                 | 3     | 53.3                             | 9.4                           | SA33A        | SA33CA  |
| SA36                                     | SA36C   | 36                        | 40                               | 50.7  | 1              | 3                                 | 3     | 64.3                             | 7.8                           | SA36         | SA36C   |
| SA36A                                    | SA36CA  | 36                        | 40                               | 46    | 1              | 3                                 | 3     | 58.1                             | 8.6                           | SA36A        | SA36CA  |
| SA40                                     | SA40C   | 40                        | 44.4                             | 56.3  | 1              | 3                                 | 3     | 71.4                             | 7                             | SA40         | SA40C   |
| SA40A                                    | SA40CA  | 40                        | 44.4                             | 51.1  | 1              | 3                                 | 3     | 64.5                             | 7.8                           | SA40A        | SA40CA  |



# SA5.0~SA220CA

| Part Number                              |         | Reverse Stand-off Voltage | Breakdown Voltage                |       | Test Current   | Reverse Leakage                   |           | Max. Clamp Voltage 10/1000µs     | Peak Pulse Current 10/1000 µs | Marking Code |         |
|--|---------|---------------------------|----------------------------------|-------|----------------|-----------------------------------|-----------|----------------------------------|-------------------------------|--------------|---------|
|  |         | V <sub>RWM</sub>          | V <sub>BR</sub> @ I <sub>T</sub> |       | I <sub>T</sub> | I <sub>R</sub> @ V <sub>RWM</sub> |           | V <sub>C</sub> @ I <sub>PP</sub> | I <sub>PP</sub>               |              |         |
|  |         |                           | Min.                             | Max.  |                | UNI-<br>µA                        | BI-<br>µA |                                  |                               |              |         |
| UNI                                      | BI      | V                         | V                                | V     | mA             | µA                                | µA        | V                                | A                             | UNI          | BI      |
| <b>500W Transient Voltage Suppressor</b> |         |                           |                                  |       |                |                                   |           |                                  |                               |              |         |
| SA43                                     | SA43C   | 43                        | 47.8                             | 60.5  | 1              | 3                                 | 3         | 76.7                             | 6.5                           | SA43         | SA43C   |
| SA43A                                    | SA43CA  | 43                        | 47.8                             | 54.9  | 1              | 3                                 | 3         | 69.4                             | 7.2                           | SA43A        | SA43CA  |
| SA45                                     | SA45C   | 45                        | 50                               | 63.3  | 1              | 3                                 | 3         | 80.3                             | 6.2                           | SA45         | SA45C   |
| SA45A                                    | SA45CA  | 45                        | 50                               | 57.5  | 1              | 3                                 | 3         | 72.7                             | 6.9                           | SA45A        | SA45CA  |
| SA48                                     | SA48C   | 48                        | 53.3                             | 67.5  | 1              | 3                                 | 3         | 85.5                             | 5.8                           | SA48         | SA48C   |
| SA48A                                    | SA48CA  | 48                        | 53.3                             | 61.3  | 1              | 3                                 | 3         | 77.4                             | 6.5                           | SA48A        | SA48CA  |
| SA51                                     | SA51C   | 51                        | 56.7                             | 71.8  | 1              | 3                                 | 3         | 91.1                             | 5.5                           | SA51         | SA51C   |
| SA51A                                    | SA51CA  | 51                        | 56.7                             | 65.2  | 1              | 3                                 | 3         | 82.4                             | 6.1                           | SA51A        | SA51CA  |
| SA54                                     | SA54C   | 54                        | 60                               | 76    | 1              | 3                                 | 3         | 96.3                             | 5.2                           | SA54         | SA54C   |
| SA54A                                    | SA54CA  | 54                        | 60.0                             | 69    | 1              | 3                                 | 3         | 87.1                             | 5.7                           | SA54A        | SA54CA  |
| SA58                                     | SA58C   | 58                        | 64.4                             | 81.6  | 1              | 3                                 | 3         | 103                              | 4.9                           | SA58         | SA58C   |
| SA58A                                    | SA58CA  | 58                        | 64.4                             | 74.1  | 1              | 3                                 | 3         | 93.6                             | 5.3                           | SA58A        | SA58CA  |
| SA60                                     | SA60C   | 60                        | 66.7                             | 84.5  | 1              | 3                                 | 3         | 107                              | 4.7                           | SA60         | SA60C   |
| SA60A                                    | SA60CA  | 60                        | 66.7                             | 76.7  | 1              | 3                                 | 3         | 96.8                             | 5.2                           | SA60A        | SA60CA  |
| SA64                                     | SA64C   | 64                        | 71.1                             | 90.1  | 1              | 3                                 | 3         | 114                              | 4.4                           | SA64         | SA64C   |
| SA64A                                    | SA64CA  | 64                        | 71.1                             | 81.8  | 1              | 3                                 | 3         | 103                              | 4.9                           | SA64A        | SA64CA  |
| SA70                                     | SA70C   | 70                        | 77.8                             | 98.6  | 1              | 3                                 | 3         | 125                              | 4                             | SA70         | SA70C   |
| SA70A                                    | SA70CA  | 70                        | 77.8                             | 89.5  | 1              | 3                                 | 3         | 113                              | 4.4                           | SA70A        | SA70CA  |
| SA75                                     | SA75C   | 75                        | 83.3                             | 105.7 | 1              | 3                                 | 3         | 134                              | 3.7                           | SA75         | SA75C   |
| SA75A                                    | SA75CA  | 75                        | 83.3                             | 95.8  | 1              | 3                                 | 3         | 121                              | 4.1                           | SA75A        | SA75CA  |
| SA78                                     | SA78C   | 78                        | 86.7                             | 109.8 | 1              | 3                                 | 3         | 139                              | 3.6                           | SA78         | SA78C   |
| SA78A                                    | SA78CA  | 78                        | 86.7                             | 99.7  | 1              | 3                                 | 3         | 126                              | 4                             | SA78A        | SA78CA  |
| SA85                                     | SA85C   | 85                        | 94.4                             | 119.2 | 1              | 3                                 | 3         | 151                              | 3.3                           | SA85         | SA85C   |
| SA85A                                    | SA85CA  | 85                        | 94.4                             | 108.2 | 1              | 3                                 | 3         | 137                              | 3.6                           | SA85A        | SA85CA  |
| SA90                                     | SA90C   | 90                        | 100                              | 126.5 | 1              | 3                                 | 3         | 160                              | 3.1                           | SA90         | SA90C   |
| SA90A                                    | SA90CA  | 90                        | 100                              | 115.5 | 1              | 3                                 | 3         | 146                              | 3.4                           | SA90A        | SA90CA  |
| SA100                                    | SA100C  | 100                       | 111                              | 141   | 1              | 3                                 | 3         | 179                              | 2.8                           | SA100        | SA100C  |
| SA100A                                   | SA100CA | 100                       | 111                              | 128   | 1              | 3                                 | 3         | 162                              | 3.1                           | SA100A       | SA100CA |
| SA110                                    | SA110C  | 110                       | 122                              | 154.5 | 1              | 3                                 | 3         | 196                              | 2.6                           | SA110        | SA110C  |
| SA110A                                   | SA110CA | 110                       | 122                              | 140.5 | 1              | 3                                 | 3         | 177                              | 2.8                           | SA110A       | SA110CA |
| SA120                                    | SA120C  | 120                       | 133                              | 169   | 1              | 3                                 | 3         | 214                              | 2.3                           | SA120        | SA120C  |
| SA120A                                   | SA120CA | 120                       | 133                              | 153   | 1              | 3                                 | 3         | 193                              | 2                             | SA120A       | SA120CA |
| SA130                                    | SA130C  | 130                       | 144                              | 182.5 | 1              | 3                                 | 3         | 231                              | 2.2                           | SA130        | SA130C  |
| SA130A                                   | SA130CA | 130                       | 144                              | 165.5 | 1              | 3                                 | 3         | 209                              | 2.4                           | SA130A       | SA130CA |
| SA150                                    | SA150C  | 150                       | 167                              | 211.5 | 1              | 3                                 | 3         | 268                              | 1.9                           | SA150        | SA150C  |
| SA150A                                   | SA150CA | 150                       | 167                              | 192.5 | 1              | 3                                 | 3         | 243                              | 2.1                           | SA150A       | SA150CA |
| SA160                                    | SA160C  | 160                       | 178                              | 226   | 1              | 3                                 | 3         | 287                              | 1.7                           | SA160        | SA160C  |
| SA160A                                   | SA160CA | 160                       | 178                              | 205   | 1              | 3                                 | 3         | 259                              | 1.9                           | SA160A       | SA160CA |
| SA170                                    | SA170C  | 170                       | 189                              | 239.5 | 1              | 3                                 | 3         | 304                              | 1.6                           | SA170        | SA170C  |
| SA170A                                   | SA170CA | 170                       | 189                              | 217.5 | 1              | 3                                 | 3         | 275                              | 1.8                           | SA170A       | SA170CA |
| SA180                                    | SA180C  | 180                       | 198                              | 253.8 | 1              | 3                                 | 3         | 322                              | 1.6                           | SA180        | SA180C  |
| SA180A                                   | SA180CA | 180                       | 198                              | 230.4 | 1              | 3                                 | 3         | 292                              | 1.7                           | SA180A       | SA180CA |
| SA190                                    | SA190C  | 190                       | 209                              | 267.9 | 1              | 3                                 | 3         | 340                              | 1.5                           | SA190        | SA190C  |
| SA190A                                   | SA190CA | 190                       | 209                              | 243.2 | 1              | 3                                 | 3         | 308                              | 1.6                           | SA190A       | SA190CA |
| SA200                                    | SA200C  | 200                       | 220                              | 282   | 1              | 3                                 | 3         | 358                              | 1.4                           | SA200        | SA200C  |
| SA200A                                   | SA200CA | 200                       | 220                              | 256   | 1              | 3                                 | 3         | 324                              | 1.5                           | SA200A       | SA200CA |
| SA210                                    | SA210C  | 210                       | 231                              | 296.1 | 1              | 3                                 | 3         | 376                              | 1.3                           | SA210        | SA210C  |
| SA210A                                   | SA210CA | 210                       | 231                              | 268.8 | 1              | 3                                 | 3         | 340                              | 1.5                           | SA210A       | SA210CA |
| SA220                                    | SA220C  | 220                       | 242                              | 310.2 | 1              | 3                                 | 3         | 394                              | 1.3                           | SA220        | SA220C  |
| SA220A                                   | SA220CA | 220                       | 242                              | 281.6 | 1              | 3                                 | 3         | 356                              | 1.4                           | SA220A       | SA220CA |



# SA5.0~SA220CA

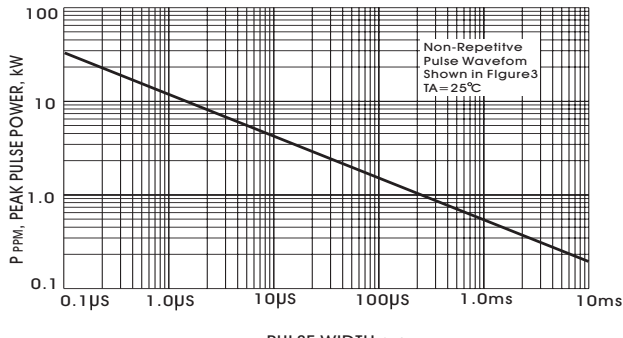


FIGURE 1-PEAK PULSE POWER RATING VERSUS PULSE TIME CURVE

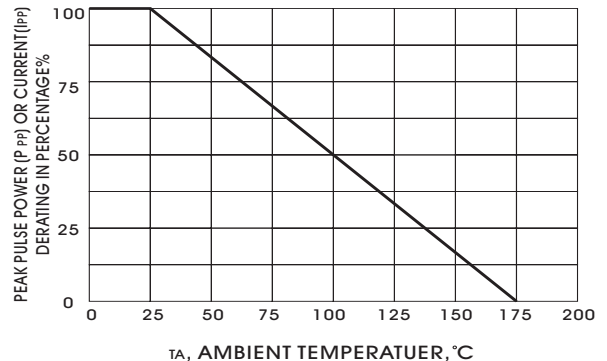


FIGURE 2-PULSE DERATING CURVE

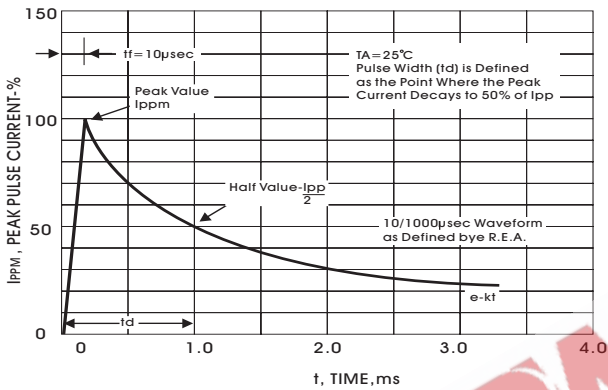


FIGURE 3-PULSE WAVEFORM

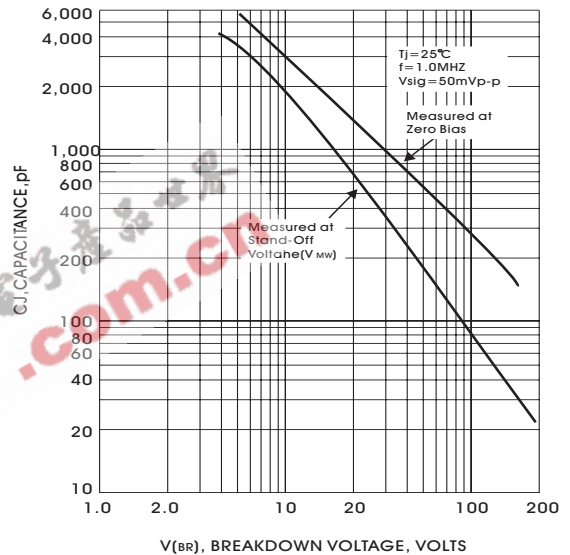


FIG. 4-TYPICAL JUNCTION CAPACITANCE UNIDIRECTIONAL

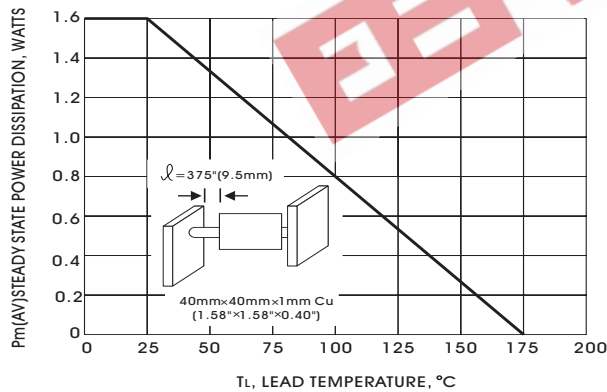


FIG. 5-STEADY STATE POWER DERATING CURVE

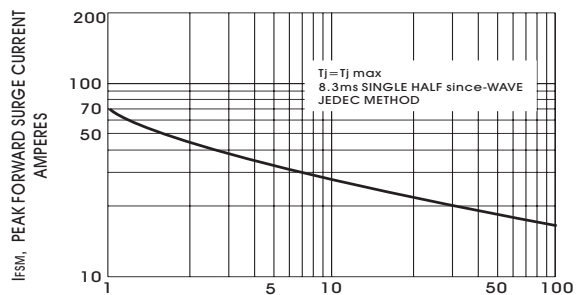


FIG. 6-MAXIMUM NON-REPETITIVE PEAK FORWARD SURGE CURRENT UNIDIRECTIONAL

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<http://www.panjit.com/protection-transient-voltage-suppressors.html>