

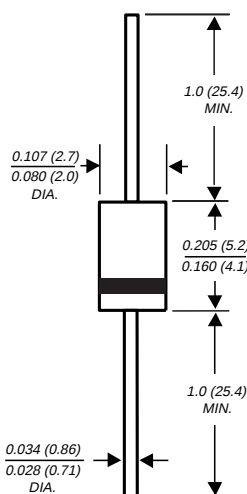
# BZW04P-5V8 THRU BZW04-376

## TRANSZORB™ TRANSIENT VOLTAGE SUPPRESSOR

Stand-off Voltage - 5.8 to 376 Volts

Peak Pulse Power - 400 Watts

### DO204AL



Dimensions are in inches  
and  
(millimeters)

### FEATURES

- ◆ Plastic package has Underwriters Laboratory Flammability Classification 94V-0
- ◆ Glass passivated chip junction
- ◆ 400W peak pulse power capability with a 10/1000 $\mu$ s waveform, repetition rate (duty cycle): 0.01%
- ◆ Excellent clamping capability
- ◆ Low incremental surge resistance
- ◆ Fast response time: typically less than 1.0 ps from 0 Volts to  $V_{(BR)}$  for uni-directional and 5.0ns for bi-directional types
- ◆ Typical  $I_D$  less than 1 $\mu$ A above 10V rating
- ◆ High temperature soldering guaranteed: 265°C/10 seconds, 0.375" (9.5mm) lead length, 5lbs. (2.3 kg) tension

### MECHANICAL DATA

**Case:** JEDEC DO-204AL molded plastic over passivated junction

**Terminals:** Plated axial leads, solderable per MIL-STD-750, Method 2026

**Polarity:** For unidirectional types the color band denotes the cathode, which is positive with respect to the anode under normal TVS operation

**Mounting Position:** Any

**Weight:** 0.012 ounce, 0.3 gram

### DEVICES FOR BIDIRECTIONAL APPLICATIONS

For bi-directional use add suffix Letter "B" (e.g. BZW04P-6V4B).

Electrical characteristics apply in both directions.

### MAXIMUM RATINGS AND CHARACTERISTICS

Ratings at 25°C ambient temperature unless otherwise specified.

|                                                                                                                                      | SYMBOL         | VALUE       | UNITS            |
|--------------------------------------------------------------------------------------------------------------------------------------|----------------|-------------|------------------|
| Peak pulse power dissipation with a 10/1000 $\mu$ s waveform<br>(NOTE 1, FIG. 1)                                                     | PPPM           | Minimum 400 | Watts            |
| Peak pulse current with a 10/1000 $\mu$ s waveform<br>(NOTE 1)                                                                       | IPPM           | SEE TABLE 1 | Amps             |
| Steady state power dissipation at $T_L=75^\circ\text{C}$<br>lead lengths, 0.375" (9.5mm) (NOTE 2)                                    | $P_{M(AV)}$    | 1.0         | Watts            |
| Peak forward surge current, 8.3ms single half<br>Sine-wave superimposed on rated load<br>(JEDEC Method) (NOTE 3) unidirectional only | $I_{FSM}$      | 40.0        | Amps             |
| Maximum instantaneous forward voltage at 25A<br>(NOTE 4) uni-directional only                                                        | $V_F$          | 3.5/5.0     | Volts            |
| Operating junction and storage temperature range                                                                                     | $T_J, T_{STG}$ | -55 to +175 | $^\circ\text{C}$ |

#### 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 pad area of 1.6 x 1.6" (40 x 40mm) per Fig. 5

(3) 8.3ms single half sine-wave or equivalent square wave, duty cycle=4 pulses per minute maximum

(4)  $V_F=3.5\text{V}$  max. for devices of  $V_{(BR)}\leq 220\text{V}$  and  $V_F=5.0\text{V}$  max. for devices of  $V_{(BR)}>220\text{V}$

ELECTRICAL CHARACTERISTICS at (T<sub>A</sub>=25°C unless otherwise noted) TABLE 1

| Device Type | Breakdown Voltage<br>V <sub>(BR)</sub><br>Volts (NOTE 1) |      | Test<br>Current<br>at I <sub>r</sub><br>(mA) | Stand-off<br>Voltage<br>V <sub>WM</sub><br>(Volts) | Maximum<br>Reverse<br>Leakage<br>at V <sub>WM</sub><br>I <sub>D</sub> (μA)<br>(NOTE4) | Maximum<br>Peak Pulse<br>Current<br>I <sub>PPM</sub><br>(Amps)<br>(NOTE 2) | Maximum<br>Clamping<br>Voltage at<br>I <sub>PPM</sub><br>V <sub>c</sub> (Volts) | Maximum<br>Temperature<br>Coefficient<br>of V <sub>(BR)</sub><br>(% / C) |
|-------------|----------------------------------------------------------|------|----------------------------------------------|----------------------------------------------------|---------------------------------------------------------------------------------------|----------------------------------------------------------------------------|---------------------------------------------------------------------------------|--------------------------------------------------------------------------|
|             | MIN                                                      | MAX  |                                              |                                                    |                                                                                       |                                                                            |                                                                                 |                                                                          |
| BZW04P5V8   | 6.45                                                     | 7.48 | 10.0                                         | 5.80                                               | 1000                                                                                  | 38.0                                                                       | 10.5                                                                            | 0.057                                                                    |
| BZW04-5V8   | 6.45                                                     | 7.14 | 10.0                                         | 5.80                                               | 1000                                                                                  | 38.0                                                                       | 10.5                                                                            | 0.057                                                                    |
| BZW04P6V4   | 7.13                                                     | 8.25 | 10.0                                         | 6.40                                               | 500                                                                                   | 35.4                                                                       | 11.3                                                                            | 0.061                                                                    |
| BZW04-6V4   | 7.13                                                     | 7.88 | 10.0                                         | 6.40                                               | 500                                                                                   | 35.4                                                                       | 11.3                                                                            | 0.061                                                                    |
| BZW04P7V0   | 7.79                                                     | 9.02 | 10.0                                         | 7.02                                               | 200                                                                                   | 33.0                                                                       | 12.1                                                                            | 0.065                                                                    |
| BZW04-7V0   | 7.79                                                     | 8.61 | 10.0                                         | 7.02                                               | 200                                                                                   | 33.0                                                                       | 12.1                                                                            | 0.065                                                                    |
| BZW04P7V8   | 8.65                                                     | 10.0 | 1.0                                          | 7.78                                               | 50.0                                                                                  | 30.0                                                                       | 13.4                                                                            | 0.068                                                                    |
| BZW04-7V8   | 8.65                                                     | 9.55 | 1.0                                          | 7.78                                               | 50.0                                                                                  | 30.0                                                                       | 13.4                                                                            | 0.073                                                                    |
| BZW04P8V5   | 9.50                                                     | 11.0 | 1.0                                          | 8.55                                               | 10.0                                                                                  | 27.6                                                                       | 14.5                                                                            | 0.073                                                                    |
| BZW04-8V5   | 9.50                                                     | 10.5 | 1.0                                          | 8.55                                               | 10.0                                                                                  | 27.6                                                                       | 14.5                                                                            | 0.075                                                                    |
| BZW04P9V4   | 10.5                                                     | 12.1 | 1.0                                          | 9.4                                                | 5.0                                                                                   | 25.7                                                                       | 15.6                                                                            | 0.075                                                                    |
| BZW04-9V4   | 10.5                                                     | 11.6 | 1.0                                          | 9.4                                                | 5.0                                                                                   | 25.7                                                                       | 15.6                                                                            | 0.075                                                                    |
| BZW0P10     | 11.4                                                     | 13.2 | 1.0                                          | 10.2                                               | 5.0                                                                                   | 24.0                                                                       | 16.7                                                                            | 0.078                                                                    |
| BZW04-10    | 11.4                                                     | 12.6 | 1.0                                          | 10.2                                               | 5.0                                                                                   | 24.0                                                                       | 16.7                                                                            | 0.078                                                                    |
| BZW04P11    | 12.4                                                     | 14.3 | 1.0                                          | 11.1                                               | 5.0                                                                                   | 22.0                                                                       | 18.2                                                                            | 0.081                                                                    |
| BZW04-11    | 12.4                                                     | 13.7 | 1.0                                          | 11.1                                               | 5.0                                                                                   | 22.0                                                                       | 18.2                                                                            | 0.081                                                                    |
| BZW04P13    | 14.3                                                     | 16.5 | 1.0                                          | 12.8                                               | 5.0                                                                                   | 19.0                                                                       | 21.2                                                                            | 0.084                                                                    |
| BZW04-13    | 14.3                                                     | 15.8 | 1.0                                          | 12.8                                               | 5.0                                                                                   | 19.0                                                                       | 21.2                                                                            | 0.084                                                                    |
| BZW04P14    | 15.2                                                     | 17.6 | 1.0                                          | 13.6                                               | 5.0                                                                                   | 17.8                                                                       | 22.5                                                                            | 0.086                                                                    |
| BZW04-14    | 15.2                                                     | 16.8 | 1.0                                          | 13.6                                               | 5.0                                                                                   | 17.8                                                                       | 22.5                                                                            | 0.086                                                                    |
| BZW04P15    | 17.1                                                     | 19.8 | 1.0                                          | 15.3                                               | 5.0                                                                                   | 16.0                                                                       | 25.2                                                                            | 0.088                                                                    |
| BZW04-15    | 17.1                                                     | 18.9 | 1.0                                          | 15.3                                               | 5.0                                                                                   | 16.0                                                                       | 25.2                                                                            | 0.088                                                                    |
| BZW04P17    | 19.0                                                     | 22.0 | 1.0                                          | 17.1                                               | 5.0                                                                                   | 14.5                                                                       | 27.7                                                                            | 0.090                                                                    |
| BZW04-17    | 19.0                                                     | 21.0 | 1.0                                          | 17.1                                               | 5.0                                                                                   | 14.5                                                                       | 27.7                                                                            | 0.090                                                                    |
| BZW04P19    | 20.9                                                     | 24.2 | 1.0                                          | 18.8                                               | 5.0                                                                                   | 13.0                                                                       | 30.6                                                                            | 0.092                                                                    |
| BZW04-19    | 20.9                                                     | 23.1 | 1.0                                          | 18.8                                               | 5.0                                                                                   | 13.0                                                                       | 30.6                                                                            | 0.092                                                                    |
| BZW04P20    | 22.8                                                     | 26.4 | 1.0                                          | 20.5                                               | 5.0                                                                                   | 12.0                                                                       | 33.2                                                                            | 0.094                                                                    |
| BZW04-20    | 22.8                                                     | 25.2 | 1.0                                          | 20.5                                               | 5.0                                                                                   | 12.0                                                                       | 33.2                                                                            | 0.094                                                                    |
| BZW04P23    | 25.7                                                     | 29.7 | 1.0                                          | 23.1                                               | 5.0                                                                                   | 10.7                                                                       | 37.5                                                                            | 0.096                                                                    |
| BZW04-23    | 25.7                                                     | 28.4 | 1.0                                          | 23.1                                               | 5.0                                                                                   | 10.7                                                                       | 37.5                                                                            | 0.096                                                                    |
| BZW04P26    | 28.5                                                     | 33.0 | 1.0                                          | 25.6                                               | 5.0                                                                                   | 9.6                                                                        | 41.5                                                                            | 0.097                                                                    |
| BZW04-26    | 28.5                                                     | 31.5 | 1.0                                          | 25.6                                               | 5.0                                                                                   | 9.6                                                                        | 41.5                                                                            | 0.097                                                                    |
| BZW04P28    | 31.4                                                     | 36.3 | 1.0                                          | 28.2                                               | 5.0                                                                                   | 8.8                                                                        | 45.7                                                                            | 0.098                                                                    |
| BZW04-28    | 31.4                                                     | 34.7 | 1.0                                          | 28.2                                               | 5.0                                                                                   | 8.8                                                                        | 45.7                                                                            | 0.098                                                                    |
| BZW04P31    | 34.2                                                     | 39.6 | 1.0                                          | 30.8                                               | 5.0                                                                                   | 8.0                                                                        | 49.9                                                                            | 0.099                                                                    |
| BZW04-31    | 34.2                                                     | 37.8 | 1.0                                          | 30.8                                               | 5.0                                                                                   | 8.0                                                                        | 49.9                                                                            | 0.099                                                                    |
| BZW04P33    | 37.1                                                     | 42.9 | 1.0                                          | 33.3                                               | 5.0                                                                                   | 7.4                                                                        | 53.9                                                                            | 0.100                                                                    |
| BZW04-33    | 37.1                                                     | 41.0 | 1.0                                          | 33.3                                               | 5.0                                                                                   | 7.4                                                                        | 53.9                                                                            | 0.100                                                                    |
| BZW04P37    | 40.9                                                     | 47.3 | 1.0                                          | 36.8                                               | 5.0                                                                                   | 6.7                                                                        | 59.3                                                                            | 0.101                                                                    |
| BZW04-37    | 40.9                                                     | 45.2 | 1.0                                          | 36.8                                               | 5.0                                                                                   | 6.7                                                                        | 59.3                                                                            | 0.101                                                                    |
| BZW04P40    | 44.7                                                     | 51.7 | 1.0                                          | 40.2                                               | 5.0                                                                                   | 6.2                                                                        | 64.8                                                                            | 0.101                                                                    |
| BZW04-40    | 44.7                                                     | 49.4 | 1.0                                          | 40.2                                               | 5.0                                                                                   | 6.2                                                                        | 64.8                                                                            | 0.101                                                                    |
| BZW04P44    | 48.5                                                     | 56.1 | 1.0                                          | 43.6                                               | 5.0                                                                                   | 5.7                                                                        | 70.1                                                                            | 0.102                                                                    |
| BZW04-44    | 48.5                                                     | 53.6 | 1.0                                          | 43.6                                               | 5.0                                                                                   | 5.7                                                                        | 70.1                                                                            | 0.102                                                                    |
| BZW04P48    | 53.2                                                     | 61.6 | 1.0                                          | 47.8                                               | 5.0                                                                                   | 5.2                                                                        | 77.0                                                                            | 0.103                                                                    |
| BZW04-48    | 53.2                                                     | 58.8 | 1.0                                          | 47.8                                               | 5.0                                                                                   | 5.2                                                                        | 77.0                                                                            | 0.103                                                                    |

ELECTRICAL CHARACTERISTICS at (T<sub>A</sub>=25°C unless otherwise noted) TABLE 1 (Cont'd)

| Device Type | Breakdown Voltage<br>V <sub>(BR)</sub><br>Volts (NOTE 1) |      | Test<br>Current<br>at I <sub>T</sub><br>(mA) | Stand-off<br>Voltage<br>V <sub>WM</sub><br>(Volts) | Maximum<br>Reverse<br>Leakage<br>at V <sub>WM</sub><br>I <sub>D</sub> (μA)<br>(NOTE4) | Maximum<br>Peak Pulse<br>Current<br>I <sub>PPM</sub><br>(Amps)<br>(NOTE 2) | Maximum<br>Clamping<br>Voltage at<br>I <sub>PPM</sub><br>V <sub>C</sub> (Volts) | Maximum<br>Temperature<br>Coefficient<br>of V <sub>(BR)</sub><br>(% / C) |
|-------------|----------------------------------------------------------|------|----------------------------------------------|----------------------------------------------------|---------------------------------------------------------------------------------------|----------------------------------------------------------------------------|---------------------------------------------------------------------------------|--------------------------------------------------------------------------|
|             | MIN                                                      | MAX  |                                              |                                                    |                                                                                       |                                                                            |                                                                                 |                                                                          |
| BZW04P53    | 58.9                                                     | 68.2 | 1.0                                          | 53.0                                               | 5.0                                                                                   | 4.7                                                                        | 85.0                                                                            | 0.104                                                                    |
| BZW04-53    | 58.9                                                     | 65.1 | 1.0                                          | 53.0                                               | 5.0                                                                                   | 4.7                                                                        | 85.0                                                                            | 0.104                                                                    |
| BZW04P58    | 64.6                                                     | 74.8 | 1.0                                          | 58.1                                               | 5.0                                                                                   | 4.3                                                                        | 92.0                                                                            | 0.104                                                                    |
| BZW04-58    | 64.6                                                     | 71.4 | 1.0                                          | 58.1                                               | 5.0                                                                                   | 4.3                                                                        | 92.0                                                                            | 0.104                                                                    |
| BZW04P64    | 71.3                                                     | 82.5 | 1.0                                          | 64.1                                               | 5.0                                                                                   | 3.9                                                                        | 103                                                                             | 0.105                                                                    |
| BZW04-64    | 71.3                                                     | 78.8 | 1.0                                          | 64.1                                               | 5.0                                                                                   | 3.9                                                                        | 103                                                                             | 0.105                                                                    |
| BZW04P70    | 77.9                                                     | 90.2 | 1.0                                          | 70.1                                               | 5.0                                                                                   | 3.5                                                                        | 113                                                                             | 0.105                                                                    |
| BZW04-70    | 77.9                                                     | 86.1 | 1.0                                          | 70.1                                               | 5.0                                                                                   | 3.5                                                                        | 113                                                                             | 0.105                                                                    |
| BZW04P78    | 86.5                                                     | 100  | 1.0                                          | 78.0                                               | 5.0                                                                                   | 3.2                                                                        | 125                                                                             | 0.105                                                                    |
| BZW04-78    | 86.5                                                     | 95.5 | 1.0                                          | 78.0                                               | 5.0                                                                                   | 3.2                                                                        | 125                                                                             | 0.105                                                                    |
| BZW04P85    | 95.0                                                     | 110  | 1.0                                          | 85.5                                               | 5.0                                                                                   | 2.9                                                                        | 137                                                                             | 0.106                                                                    |
| BZW04-85    | 95.0                                                     | 105  | 1.0                                          | 85.5                                               | 5.0                                                                                   | 2.9                                                                        | 137                                                                             | 0.106                                                                    |
| BZW04P94    | 105                                                      | 121  | 1.0                                          | 94.0                                               | 5.0                                                                                   | 2.6                                                                        | 152                                                                             | 0.107                                                                    |
| BZW04-94    | 105                                                      | 116  | 1.0                                          | 94.0                                               | 5.0                                                                                   | 2.6                                                                        | 152                                                                             | 0.107                                                                    |
| BZW04P102   | 114                                                      | 132  | 1.0                                          | 102                                                | 5.0                                                                                   | 2.4                                                                        | 165                                                                             | 0.107                                                                    |
| BZW04-102   | 114                                                      | 126  | 1.0                                          | 102                                                | 5.0                                                                                   | 2.4                                                                        | 165                                                                             | 0.107                                                                    |
| BZW04P110   | 124                                                      | 143  | 1.0                                          | 111                                                | 5.0                                                                                   | 2.2                                                                        | 179                                                                             | 0.107                                                                    |
| BZW04-110   | 124                                                      | 137  | 1.0                                          | 111                                                | 5.0                                                                                   | 2.2                                                                        | 179                                                                             | 0.107                                                                    |
| BZW04P128   | 143                                                      | 165  | 1.0                                          | 128                                                | 5.0                                                                                   | 2.0                                                                        | 207                                                                             | 0.108                                                                    |
| BZW04-128   | 143                                                      | 158  | 1.0                                          | 128                                                | 5.0                                                                                   | 2.0                                                                        | 207                                                                             | 0.108                                                                    |
| BZW04P136   | 152                                                      | 176  | 1.0                                          | 136                                                | 5.0                                                                                   | 1.8                                                                        | 219                                                                             | 0.108                                                                    |
| BZW404-136  | 152                                                      | 168  | 1.0                                          | 136                                                | 5.0                                                                                   | 1.8                                                                        | 219                                                                             | 0.108                                                                    |
| BZW04P145   | 161                                                      | 187  | 1.0                                          | 145                                                | 5.0                                                                                   | 1.7                                                                        | 234                                                                             | 0.108                                                                    |
| BZW04-145   | 161                                                      | 179  | 1.0                                          | 145                                                | 5.0                                                                                   | 1.7                                                                        | 234                                                                             | 0.108                                                                    |
| BZW04P154   | 171                                                      | 198  | 1.0                                          | 154                                                | 5.0                                                                                   | 1.6                                                                        | 246                                                                             | 0.108                                                                    |
| BZW04-154   | 171                                                      | 189  | 1.0                                          | 154                                                | 5.0                                                                                   | 1.6                                                                        | 246                                                                             | 0.108                                                                    |
| BZW04P171   | 190                                                      | 220  | 1.0                                          | 171                                                | 5.0                                                                                   | 1.5                                                                        | 274                                                                             | 0.108                                                                    |
| BZW04-171   | 190                                                      | 210  | 1.0                                          | 171                                                | 5.0                                                                                   | 1.5                                                                        | 274                                                                             | 0.108                                                                    |
| BZW04P188   | 209                                                      | 242  | 1.0                                          | 188                                                | 5.0                                                                                   | 1.4                                                                        | 301                                                                             | 0.108                                                                    |
| BZW04-188   | 209                                                      | 231  | 1.0                                          | 188                                                | 5.0                                                                                   | 1.4                                                                        | 301                                                                             | 0.108                                                                    |
| BZW04P213   | 237                                                      | 275  | 1.0                                          | 213                                                | 5.0                                                                                   | 1.5                                                                        | 344                                                                             | 0.110                                                                    |
| BZW04-213   | 237                                                      | 263  | 1.0                                          | 213                                                | 5.0                                                                                   | 1.5                                                                        | 344                                                                             | 0.110                                                                    |
| BZW04P239   | 266                                                      | 308  | 1.0                                          | 239                                                | 5.0                                                                                   | 1.5                                                                        | 384                                                                             | 0.110                                                                    |
| BZW04-239   | 266                                                      | 294  | 1.0                                          | 239                                                | 5.0                                                                                   | 1.5                                                                        | 384                                                                             | 0.110                                                                    |
| BZW04P256   | 285                                                      | 330  | 1.0                                          | 256                                                | 5.0                                                                                   | 1.2                                                                        | 414                                                                             | 0.110                                                                    |
| BZW04-256   | 285                                                      | 315  | 1.0                                          | 256                                                | 5.0                                                                                   | 1.2                                                                        | 414                                                                             | 0.110                                                                    |
| BZW04P273   | 304                                                      | 352  | 1.0                                          | 273                                                | 5.0                                                                                   | 1.2                                                                        | 438                                                                             | 0.110                                                                    |
| BZW04-273   | 304                                                      | 336  | 1.0                                          | 273                                                | 5.0                                                                                   | 1.2                                                                        | 438                                                                             | 0.110                                                                    |
| BZW04P299   | 332                                                      | 385  | 1.0                                          | 299                                                | 5.0                                                                                   | 0.90                                                                       | 482                                                                             | 0.110                                                                    |
| BZW04-299   | 332                                                      | 368  | 1.0                                          | 299                                                | 5.0                                                                                   | 0.90                                                                       | 482                                                                             | 0.110                                                                    |
| BZW04P342   | 380                                                      | 440  | 1.0                                          | 342                                                | 5.0                                                                                   | 0.90                                                                       | 548                                                                             | 0.110                                                                    |
| BZW04-342   | 380                                                      | 420  | 1.0                                          | 342                                                | 5.0                                                                                   | 0.90                                                                       | 548                                                                             | 0.110                                                                    |
| BZW04P376   | 418                                                      | 484  | 1.0                                          | 376                                                | 5.0                                                                                   | 0.80                                                                       | 603                                                                             | 0.110                                                                    |
| BZW04-376   | 418                                                      | 462  | 1.0                                          | 376                                                | 5.0                                                                                   | 0.80                                                                       | 603                                                                             | 0.110                                                                    |

## NOTES:

- (1) V<sub>(BR)</sub> measured after I<sub>T</sub> applied for 300μs I<sub>T</sub>=square wave pulse or equivalent
- (2) Surge current waveform per Fig. 3 and derated per Fig. 2
- (3) All terms and symbols are consistent with ANSI/IEEE C62.35
- (4) For bi-directional devices with V<sub>WM</sub> of 10 Volts and less, the I<sub>D</sub> limit is doubled

# RATINGS AND CHARACTERISTIC CURVES BZW04P5V8 THRU BZW04-376

FIG. 1 - PEAK PULSE POWER RATING CURVE

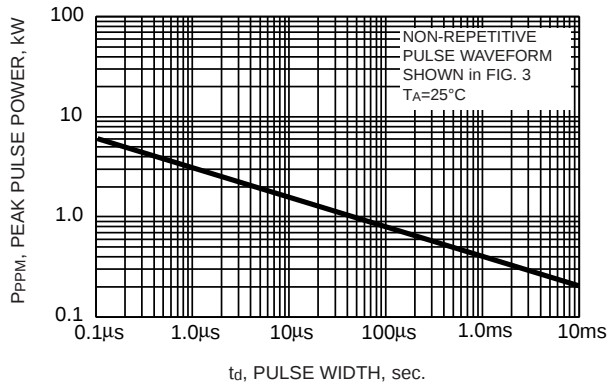


FIG. 2 - PULSE DERATING CURVE

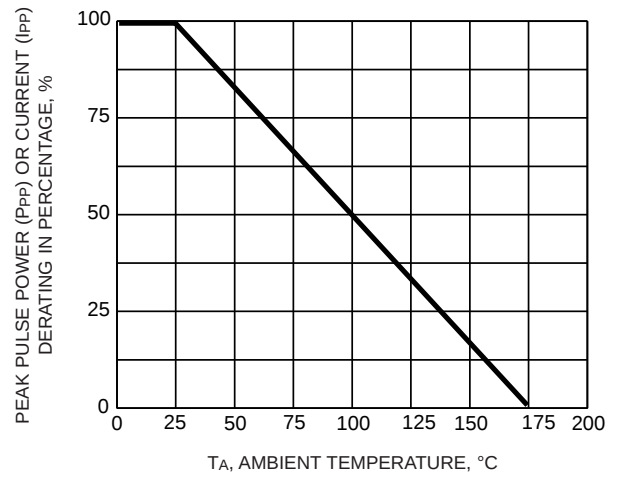


FIG. 3 - PULSE WAVEFORM

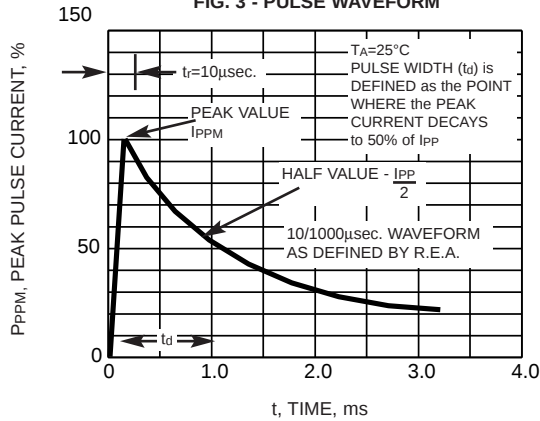


FIG. 4 - TYPICAL JUNCTION CAPACITANCE UNIDIRECTIONAL

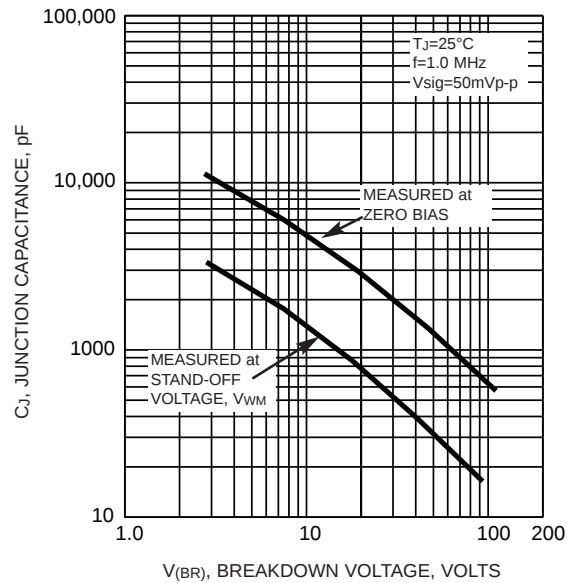


FIG. 5 - STEADY STATE POWER DERATING CURVE

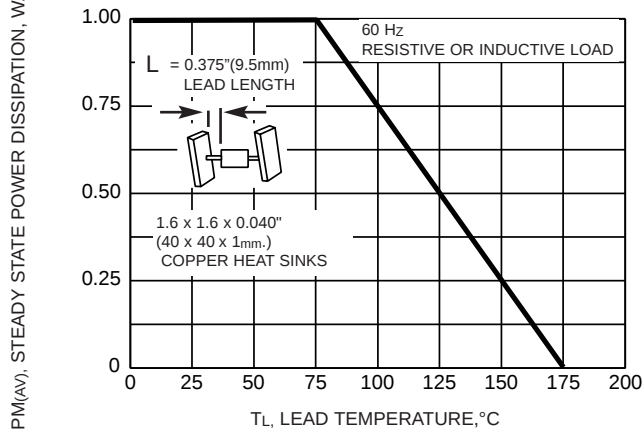


FIG. 6 - MAXIMUM NON-REPETITIVE FORWARD SURGE CURRENT UNIDIRECTIONAL

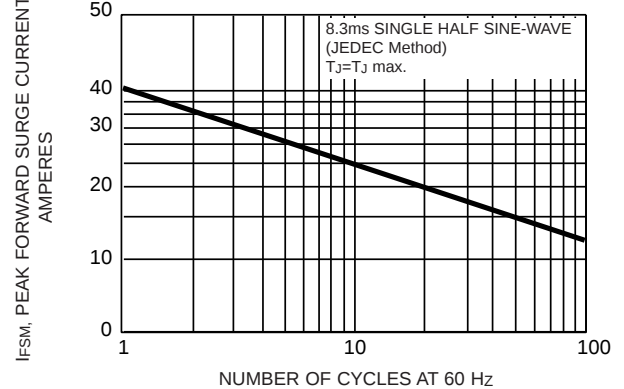


FIG. 7-TYPICAL REVERSE LEAKAGE CHARACTERISTICS

