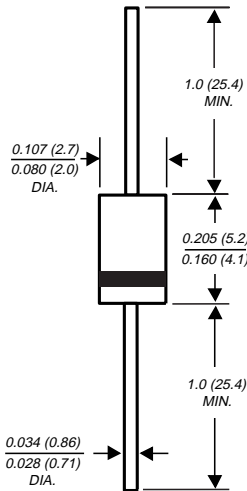


# BZW04P-5V8 THRU BZW04-376

**TRANSZORB™ TRANSIENT VOLTAGE SUPPRESSOR**  
*Stand-off Voltage - 5.8 to 376 Volts      Peak Pulse Power - 400 Watts*

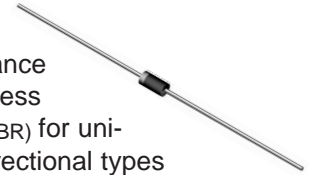
## DO204AL



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

**ELECTRICAL CHARACTERISTICS at (TA=25°C unless otherwise noted) TABLE 1**

| Device Type | Breakdown Voltage V <sub>(BR)</sub> Volts (NOTE 1) |      | Test Current at I <sub>r</sub> (mA) | Stand-off Voltage V <sub>WM</sub> (Volts) | Maximum Reverse Leakage at V <sub>WM</sub> I <sub>D</sub> (μA) (NOTE4) | Maximum Peak Pulse Current I <sub>PPM</sub> (Amps) (NOTE 2) | Maximum Clamping Voltage at I <sub>PPM</sub> V <sub>c</sub> (Volts) | Maximum Temperature Coefficient of V <sub>(BR)</sub> (% / 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 V <sub>(BR)</sub> Volts (NOTE 1) |      | Test Current at I <sub>T</sub> (mA) | Stand-off Voltage V <sub>WM</sub> (Volts) | Maximum Reverse Leakage at V <sub>WM</sub> I <sub>D</sub> (μA) (NOTE4) | Maximum Peak Pulse Current I <sub>PPM</sub> (Amps) (NOTE 2) | Maximum Clamping Voltage at I <sub>PPM</sub> V <sub>c</sub> (Volts) | Maximum Temperature Coefficient of V <sub>(BR)</sub> (% / 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>p</sub> limit is doubled

# RATINGS AND CHARACTERISTIC CURVES BZW04P5V8 THRU BZW04-376

FIG. 1 - PEAK PULSE POWER RATING CURVE

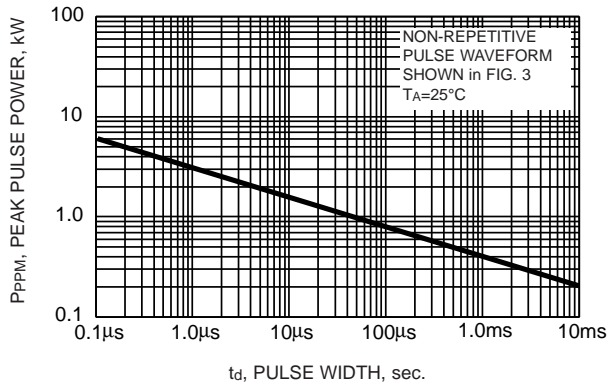


FIG. 2 - PULSE DERATING CURVE

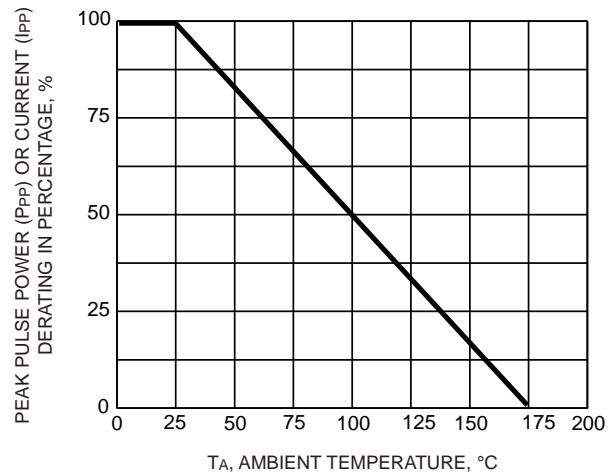


FIG. 3 - PULSE WAVEFORM

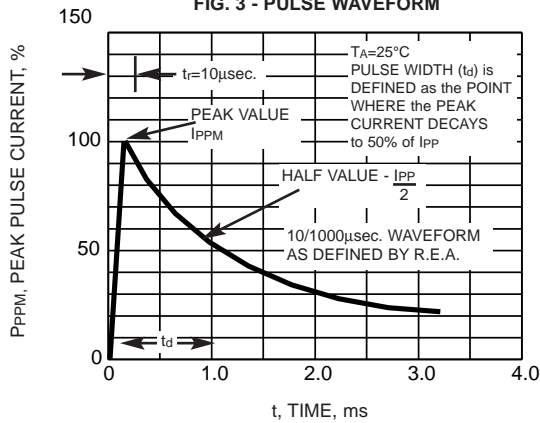


FIG. 4 - TYPICAL JUNCTION CAPACITANCE UNIDIRECTIONAL

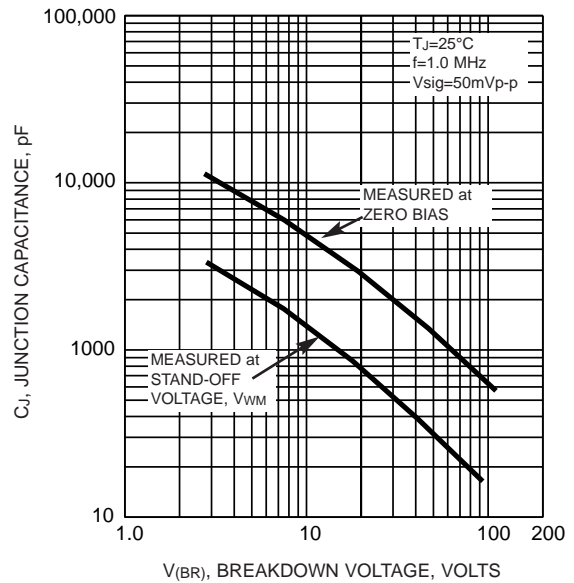


FIG. 5 - STEADY STATE POWER DERATING CURVE

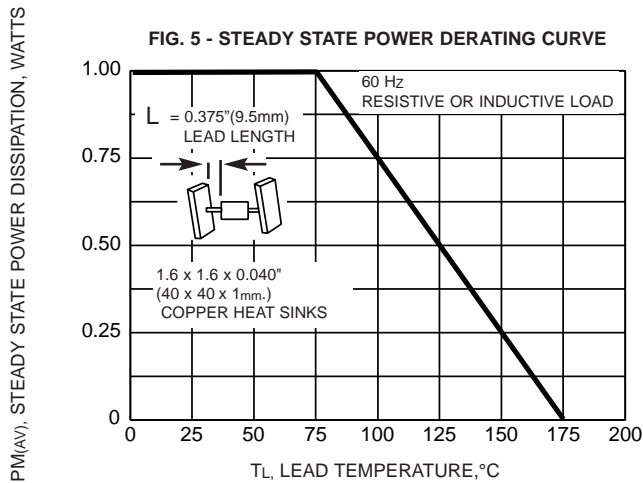


FIG. 6 - MAXIMUM NON-REPETITIVE FORWARD SURGE CURRENT UNIDIRECTIONAL

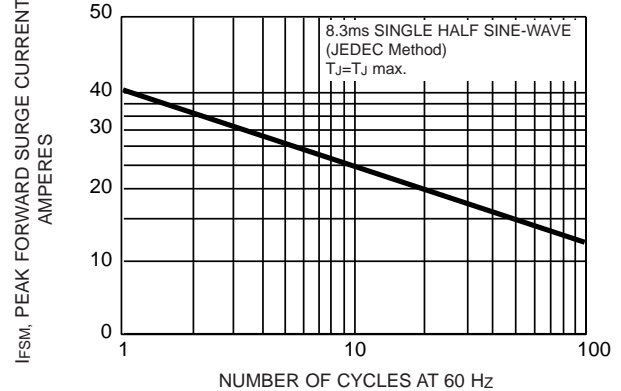
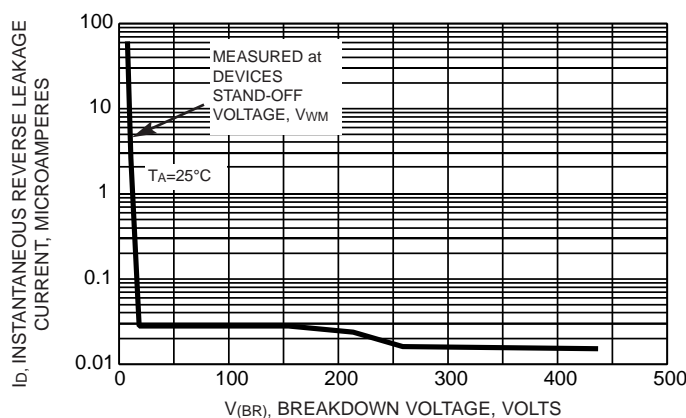


FIG. 7 - TYPICAL REVERSE LEAKAGE CHARACTERISTICS





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