

# MDE Semiconductor, Inc.

78-150 Calle Tampico, Unit 210, La Quinta, CA., USA 92253 Tel: 760-564-8656 • Fax: 760-564-2414  
1-800-831-4881 Email: sales@mdesemiconductor.com Web: www.mdesemiconductor.com

## BZW04 SERIES

### GLASS PASSIVATED JUNCTION TRANSIENT VOLTAGE SUPPRESSOR VOLTAGE-6.8 TO 376 Volts 400 Watt Peak Pulse Power

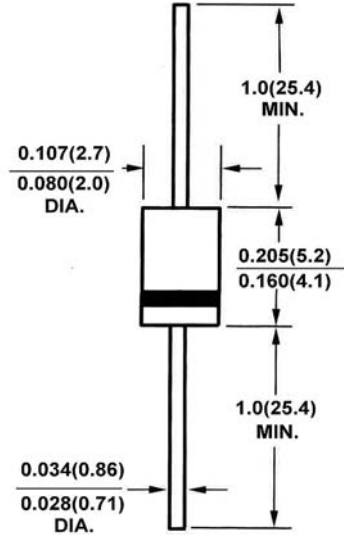
#### FEATURES

- Plastic package has Underwriters Laboratory Flammability Classification 94 V-O
- Glass passivated chip junction in DO-41 package
- 400W surge capability at 1ms
- Excellent clamping capability
- Low zener impedance
- Low incremental surge resistance
- Excellent clamping capability
- 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: 300°C/10 seconds/ .375", (9.5mm) lead length, 5lbs., (2.3kg) tension

#### MECHANICAL DATA

Case: JEDEC DO-41 Molded plastic  
Terminals: Axial leads, solderable per MIL-STD-750, Method 2026  
Polarity: Color band denoted positive end (cathode) except Bipolar  
Mounting Position: Any  
Weight: 0.012 ounces, 0.3 grams

DO-204AL (DO-41 Plastic)



Dimensions in inches (millimeters)

#### DEVICES FOR BIPOLAR APPLICATIONS

For Bidirectional use C or CA Suffix for types BZW-04-5V8 thru types BZW04-376 (e.g. BZW04-5V8B, BZW04-376B)  
Electrical characteristics apply in both directions.

#### MAXIMUM RATINGS AND CHARACTERISTICS

Ratings at 25°C ambient temperature unless otherwise specified.

Single phase, half wave, 60Hz, resistive or inductive load.

For Capacitive load, derate current by 20%

| RATING  | SYMBOL                            | VALUE       | UNITS |
|---|-----------------------------------|-------------|-------|
| Peak Pulse Power Dissipation at TA = 25 °C, TP = 1ms<br>(NOTE 1)  | P <sub>PPM</sub>                  | Minimum 400 | Watts |
| Peak Pulse Current of on 10/1000 µs waveform (Note 1)   | I <sub>ppm</sub>                  | SEE TABLE 1 | Amps  |
| Steady State Power Dissipation at TL = 75°C<br>lengths .375", 9.5mm (Note 2)                                  | P <sub>M(AV)</sub>                | 1.0         | Watts |
| Peak Forward Surge Current, 8.3ms Single Half Sine-wave<br>Superimposed on Rated Load, (JEDEC Method)(Note 3) | I <sub>FSM</sub>                  | 40          | Amps  |
| Operatings and Storage Temperature Range  | T <sub>J</sub> , T <sub>STG</sub> | -55 +175    | °C    |

NOTES:

1. Non-repetitive current pulse, per Fig.3 and derated above Ta=25 °C per Fig.2.
2. Mounted on Copper Pad area of 1.6x1.6" (40x40mm) per Fig.5.
3. 8.3ms single half sine-wave, or equivalent square wave, Duty cycle=4 pulses per minutes maximum.

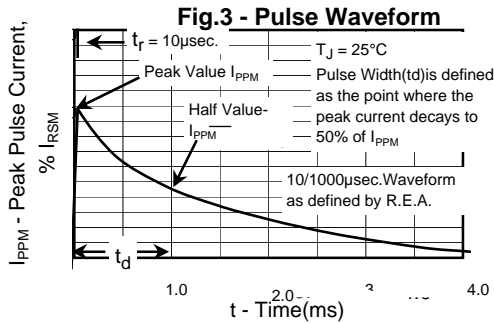
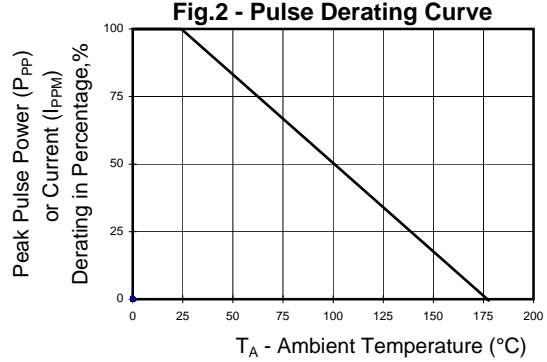
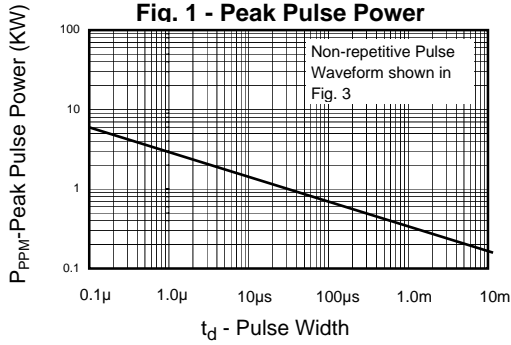
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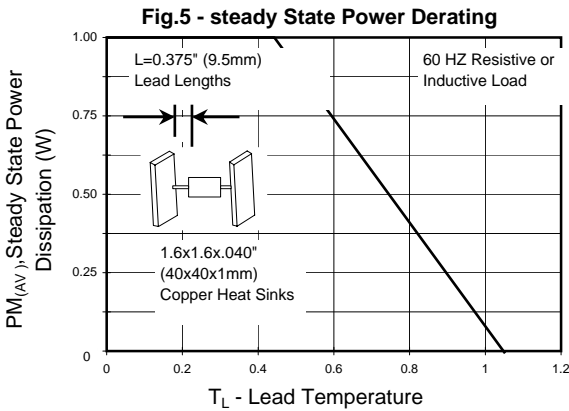
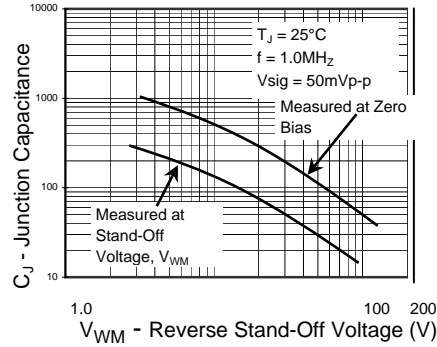
## RATINGS AND CHARACTERISTIC CURVES BZW04 SERIES

### Ratings and

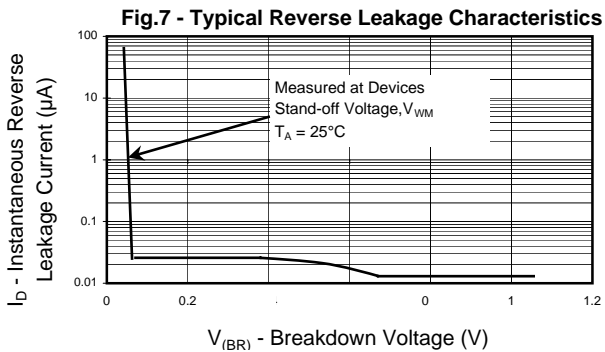
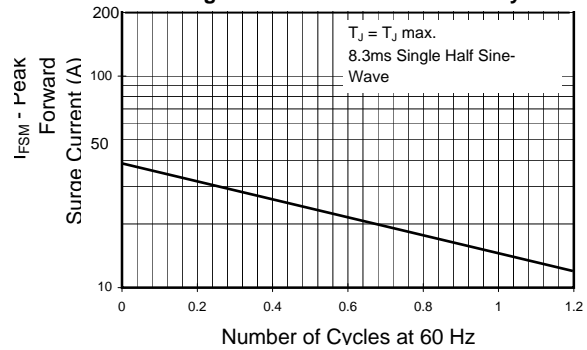
### Characteristic Curves ( $T_A=25^\circ\text{C}$ unless otherwise noted)



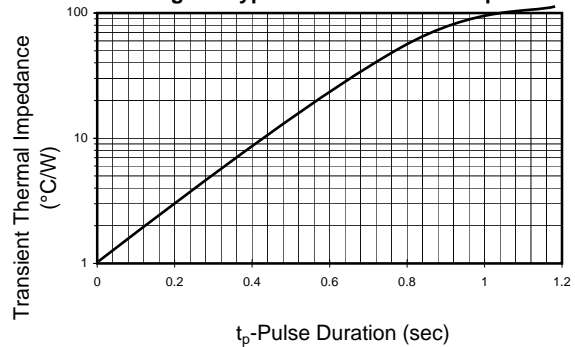
**Fig. 4 - Typ. Junction Capacitance Uni-Directional**



**Fig. 6 - Maximum Non-Repetitive Forward Surge Current Uni-Directional Only**



**Fig. 8 - Typ. Transient Thermal Impedance**



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## 400 Watt TVS

| BZW04      |             | REVERSE<br>STAND-<br>OFF<br>VOLTAGE<br>$V_{RWM}(V)$ | BREAKDOWN<br>VOLTAGE<br>$V_{BR}(V)$<br>MIN. @ $I_T$ | BREAKDOWN<br>VOLTAGE<br>$V_{BR}(V)$<br>MAX. @ $I_T$ | TEST<br>CURRENT<br>$I_T$ (mA) | MAXIMUM<br>CLAMPING<br>VOLTAGE<br>@ $I_{pp}$ $V_c(V)$ | PEAK<br>PULSE<br>CURRENT<br>$I_{pp}$ (A) | REVERSE<br>LEAKAGE<br>@ $V_{RWM}$<br>$I_R(\mu A)$ |
|------------|-------------|---|---|---|-------------------------------|---|--|---|
| UNI- POLAR | BI-POLAR    |   |   |   |                               |   |  |   |
| BZW 04P5V8 | BZW 04P5V8B | 5.80  | 6.45  | 7.48  | 10.0                          | 10.5  | 38.00                                    | 900   |
| BZW 04-5V8 | BZW 04-5V8B | 5.90  | 6.45  | 7.14  | 10.0                          | 10.5  | 38.00                                    | 900   |
| BZW 04P6V4 | BZW 04P6V4B | 6.40  | 7.13  | 8.25  | 10.0                          | 11.3  | 35.00                                    | 500   |
| BZW 04-6V4 | BZW 04-6V4B | 6.40  | 7.13  | 7.88  | 10.0                          | 11.3  | 35.00                                    | 500   |
| BZW 04P7V0 | BZW 04P7V0B | 7.02  | 7.79  | 9.02  | 1.0                           | 12.1  | 33.00                                    | 200   |
| BZW 04-7V0 | BZW 04-7V0B | 7.02  | 7.79  | 8.61  | 1.0                           | 12.1  | 33.00                                    | 200   |
| BZW 04P7V8 | BZW 04P7V8B | 7.78  | 8.65  | 10.00   | 1.0                           | 13.4  | 30.00                                    | 50  |
| BZW 04-7V8 | BZW 04-7V8B | 7.78  | 8.65  | 9.55  | 1.0                           | 13.4  | 30.00                                    | 50  |
| BZW 04P8V5 | BZW 04P8V5B | 8.55  | 9.50  | 11.00   | 1.0                           | 14.5  | 28.00                                    | 10.0  |
| BZW04-8V5  | BZW04-8V5B  | 8.55  | 9.50  | 10.50   | 1.0                           | 14.5  | 28.00                                    | 10.0  |
| BZW 04P9V4 | BZW 04P9V4B | 9.40  | 10.50   | 12.10   | 1.0                           | 15.6  | 25.70                                    | 5.0   |
| BZW 04-9V4 | BZW 04-9V4B | 9.40  | 10.50   | 11.60   | 1.0                           | 15.6  | 25.70                                    | 5.0   |
| BZW 04P10  | BZW 04P10B  | 10.20   | 11.40   | 13.20   | 1.0                           | 16.7  | 24.00                                    | 5.0   |
| BZW 04-10  | BZW 04-10B  | 10.20   | 11.40   | 12.60   | 1.0                           | 16.7  | 24.00                                    | 5.0   |
| BZW 04P11  | BZW 04P11B  | 11.10   | 12.40   | 14.30   | 1.0                           | 18.2  | 22.00                                    | 5.0   |
| BZW 04-11  | BZW 04-11B  | 11.10   | 12.40   | 13.70   | 1.0                           | 18.2  | 22.00                                    | 5.0   |
| BZW 04P13  | BZW 04P13B  | 12.80   | 14.30   | 16.50   | 1.0                           | 21.2  | 19.00                                    | 5.0   |
| BZW 04-13  | BZW 04-13B  | 12.80   | 14.30   | 15.80   | 1.0                           | 21.2  | 19.00                                    | 5.0   |
| BZW 04P14  | BZW 04P14B  | 13.60   | 15.20   | 17.60   | 1.0                           | 22.5  | 17.80                                    | 5.0   |
| BZW 04-14  | BZW 04-14B  | 13.60   | 15.20   | 16.80   | 1.0                           | 22.5  | 17.80                                    | 5.0   |
| BZW 04P15  | BZW 04P15B  | 15.30   | 17.10   | 19.80   | 1.0                           | 25.2  | 16.00                                    | 5.0   |
| BZW 04-15  | BZW 04-15B  | 15.30   | 17.10   | 18.90   | 1.0                           | 25.2  | 16.00                                    | 5.0   |
| BZW 04P17  | BZW 04P17B  | 17.10   | 19.00   | 22.00   | 1.0                           | 27.7  | 14.50                                    | 5.0   |
| BZW 04-17  | BZW 04-17B  | 17.10   | 19.00   | 21.00   | 1.0                           | 27.7  | 14.50                                    | 5.0   |
| BZW 04P19  | BZW 04P19B  | 18.80   | 20.90   | 24.20   | 1.0                           | 30.6  | 13.00                                    | 5.0   |
| BZW 04-19  | BZW 04-19B  | 18.80   | 20.90   | 23.10   | 1.0                           | 30.6  | 13.00                                    | 5.0   |
| BZW 04P20  | BZW 04P20B  | 20.50   | 22.80   | 26.40   | 1.0                           | 33.2  | 12.00                                    | 5.0   |
| BZW 04-20  | BZW 04-20B  | 20.50   | 22.80   | 25.20   | 1.0                           | 33.2  | 12.00                                    | 5.0   |
| BZW 04P23  | BZW 04P23B  | 23.10   | 25.70   | 29.70   | 1.0                           | 37.5  | 10.70                                    | 5.0   |
| BZW 04-23  | BZW 04-23B  | 23.10   | 25.70   | 28.40   | 1.0                           | 37.5  | 10.70                                    | 5.0   |
| BZW 04P26  | BZW 04P26B  | 26.50   | 28.50   | 33.00   | 1.0                           | 41.5  | 9.60                                     | 5.0   |
| BZW 04-26  | BZW 04-26B  | 26.50   | 28.50   | 31.50   | 1.0                           | 41.5  | 9.60                                     | 5.0   |
| BZW 04 P28 | BZW 04P28B  | 28.20   | 31.40   | 36.30   | 1.0                           | 45.7  | 8.80                                     | 5.0   |
| BZW 04-28  | BZW 04-28B  | 28.20   | 31.40   | 34.70   | 1.0                           | 45.7  | 8.80                                     | 5.0   |
| BZW 04P31  | BZW 04P31B  | 30.80   | 34.20   | 39.60   | 1.0                           | 49.9  | 8.00                                     | 5.0   |
| BZW 04-31  | BZW 04-31B  | 30.80   | 34.20   | 37.80   | 1.0                           | 49.9  | 8.00                                     | 5.0   |
| BZW 04P33  | BZW 04P33B  | 33.35   | 37.10   | 42.90   | 1.0                           | 53.9  | 7.40                                     | 5.0   |
| BZW 04-33  | BZW 04-33B  | 33.35   | 37.10   | 41.00   | 1.0                           | 53.9  | 7.40                                     | 5.0   |
| BZW 04P37  | BZW 04P37B  | 36.80   | 40.90   | 47.30   | 1.0                           | 59.3  | 6.70                                     | 5.0   |
| BZW 04-37  | BZW 04-37B  | 36.80   | 40.90   | 45.20   | 1.0                           | 59.3  | 6.70                                     | 5.0   |
| BZW 04P40  | BZW 04P40B  | 40.20   | 44.70   | 51.70   | 1.0                           | 64.8  | 6.20                                     | 5.0   |
| BZW 04-40  | BZW 04-40B  | 40.20   | 44.70   | 49.40   | 1.0                           | 64.8  | 6.20                                     | 5.0   |
| BZW 04P44  | BZW 04P44B  | 43.60   | 48.50   | 56.10   | 1.0                           | 70.1  | 5.70                                     | 5.0   |
| BZW 04-44  | BZW 04-44B  | 43.60   | 48.50   | 53.60   | 1.0                           | 70.1  | 5.70                                     | 5.0   |

For bidirectional type having  $V_{RWM}$  of 10 volts and less, the IR limit is double.

For Part No. which use the character "p", the VBR is  $\pm 10\%$

Certified RoHS Compliant  
UL File # E223026

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| BZW04      |             | REVERSE<br>STAND-<br>OFF<br>VOLTAGE<br>$V_{RWM}(V)$ | BREAKDOWN<br>VOLTAGE<br>$V_{BR}(V)$<br>MIN. @ $I_T$ | BREAKDOWN<br>VOLTAGE<br>$V_{BR}(V)$<br>MAX. @ $I_T$ | TEST<br>CURRENT<br>$I_T$ (mA) | MAXIMUM<br>CLAMPING<br>VOLTAGE<br>@ $I_{pp}$ $V_c(V)$ | PEAK<br>PULSE<br>CURRENT<br>$I_{pp}$ (A) | REVERSE<br>LEAKAGE<br>@ $V_{RWM}$<br>$I_R(\mu A)$ |
|------------|-------------|---|---|---|-------------------------------|---|--|---|
| UNI- POLAR | BI-POLAR    |   |   |   |                               |   |  |   |
| BZW 04P48  | BZW 04P48B  | 47.80   | 53.20   | 61.60   | 1.0                           | 77.0  | 5.20                                     | 5.0   |
| BZW 04-48  | BZW 04-48B  | 47.80   | 53.20   | 58.80   | 1.0                           | 77.0  | 5.20                                     | 5.0   |
| BZW 04P53  | BZW 04P53B  | 53.00   | 58.90   | 68.20   | 1.0                           | 85.0  | 4.70                                     | 5.0   |
| BZW 04-53  | BZW 04-53B  | 53.00   | 58.90   | 65.10   | 1.0                           | 85.0  | 4.70                                     | 5.0   |
| BZW 04P58  | BZW 04P58B  | 58.10   | 64.60   | 74.80   | 1.0                           | 92.0  | 4.30                                     | 5.0   |
| BZW 04-58  | BZW 04-58B  | 58.10   | 64.60   | 71.40   | 1.0                           | 92.0  | 4.30                                     | 5.0   |
| BZW 04P64  | BZW 04P64B  | 64.10   | 71.30   | 82.50   | 1.0                           | 103.0   | 3.90                                     | 5.0   |
| BZW 04-64  | BZW 04-64B  | 64.10   | 71.30   | 78.80   | 1.0                           | 103.0   | 3.90                                     | 5.0   |
| BZW 04P70  | BZW 04P70B  | 70.10   | 77.90   | 90.20   | 1.0                           | 113.0   | 3.50                                     | 5.0   |
| BZW 04-70  | BZW 04-70B  | 70.10   | 77.90   | 86.10   | 1.0                           | 113.0   | 3.50                                     | 5.0   |
| BZW 04P78  | BZW 04P78B  | 78.00   | 86.50   | 100.00  | 1.0                           | 125.0   | 3.20                                     | 5.0   |
| BZW 04-78  | BZW 04-78B  | 78.00   | 86.50   | 95.50   | 1.0                           | 125.0   | 3.20                                     | 5.0   |
| BZW 04P85  | BZW 04P85B  | 85.80   | 95.00   | 110.00  | 1.0                           | 137.0   | 2.90                                     | 5.0   |
| BZW 04-85  | BZW 04-85B  | 85.50   | 95.00   | 105.00  | 1.0                           | 137.0   | 2.90                                     | 5.0   |
| BZW 04P94  | BZW 04P94B  | 94.00   | 105.00  | 121.00  | 1.0                           | 152.0   | 2.60                                     | 5.0   |
| BZW 04-94  | BZW 04-94B  | 94.00   | 105.00  | 116.00  | 1.0                           | 152.0   | 2.60                                     | 5.0   |
| BZW 04P102 | BZW 04P102B | 102.00  | 114.00  | 132.00  | 1.0                           | 165.0   | 2.40                                     | 5.0   |
| BZW 04-102 | BZW 04-102B | 102.00  | 114.00  | 126.00  | 1.0                           | 165.0   | 2.40                                     | 5.0   |
| BZW 04P110 | BZW 04P110B | 111.00  | 124.00  | 143.00  | 1.0                           | 179.0   | 2.20                                     | 5.0   |
| BZW 04-110 | BZW 04-110B | 111.00  | 124.00  | 137.00  | 1.0                           | 179.0   | 2.20                                     | 5.0   |
| BZW 04P128 | BZW 04P128B | 128.00  | 143.00  | 165.00  | 1.0                           | 207.0   | 2.00                                     | 5.0   |
| BZW 04-128 | BZW 04-128B | 128.00  | 143.00  | 158.00  | 1.0                           | 207.0   | 2.00                                     | 5.0   |
| BZW 04P136 | BZW 04P136B | 136.00  | 152.00  | 176.00  | 1.0                           | 219.0   | 1.80                                     | 5.0   |
| BZW 04-136 | BZW 04-136B | 136.00  | 152.00  | 168.00  | 1.0                           | 219.0   | 1.80                                     | 5.0   |
| BZW 04P145 | BZW 04P145B | 145.00  | 161.00  | 187.00  | 1.0                           | 234.0   | 1.70                                     | 5.0   |
| BZW 04-145 | BZW 04-145B | 145.00  | 161.00  | 179.00  | 1.0                           | 234.0   | 1.70                                     | 5.0   |
| BZW 04P154 | BZW 04P154B | 154.00  | 171.00  | 198.00  | 1.0                           | 246.0   | 1.60                                     | 5.0   |
| BZW 04-154 | BZW 04-154B | 154.00  | 171.00  | 189.00  | 1.0                           | 246.0   | 1.60                                     | 5.0   |
| BZW 04P171 | BZW 04P171B | 171.00  | 190.00  | 220.00  | 1.0                           | 274.0   | 1.50                                     | 5.0   |
| BZW 04-171 | BZW 04-171B | 171.00  | 190.00  | 210.00  | 1.0                           | 274.0   | 1.50                                     | 5.0   |
| BZW 04P188 | BZW 04P188B | 188.00  | 209.00  | 242.00  | 1.0                           | 301.0   | 1.40                                     | 5.0   |
| BZW 04-188 | BZW 04-188B | 188.00  | 209.00  | 231.00  | 1.0                           | 301.0   | 1.40                                     | 5.0   |
| BZW 04P213 | BZW 04P213B | 213.00  | 237.00  | 275.00  | 1.0                           | 344.0   | 1.50                                     | 5.0   |
| BZW 04-213 | BZW 04-213B | 213.00  | 237.00  | 263.00  | 1.0                           | 344.0   | 1.50                                     | 5.0   |
| BZW 04P239 | BZW 04P239B | 239.00  | 266.00  | 308.00  | 1.0                           | 384.0   | 1.50                                     | 5.0   |
| BZW 04-239 | BZW 04-239B | 239.00  | 266.00  | 294.00  | 1.0                           | 384.0   | 1.50                                     | 5.0   |
| BZW 04P256 | BZW 04P256B | 256.00  | 285.00  | 330.00  | 1.0                           | 414.0   | 1.20                                     | 5.0   |
| BZW 04-256 | BZW 04-256B | 256.00  | 285.00  | 315.00  | 1.0                           | 414.0   | 1.20                                     | 5.0   |
| BZW 04P273 | BZW 04P273B | 273.00  | 304.00  | 352.00  | 1.0                           | 438.0   | 1.20                                     | 5.0   |
| BZW 04-273 | BZW 04-273B | 273.00  | 304.00  | 336.00  | 1.0                           | 438.0   | 1.20                                     | 5.0   |
| BZW 04P299 | BZW 04P299B | 299.00  | 332.00  | 385.00  | 1.0                           | 482.0   | 0.90                                     | 5.0   |
| BZW 04-299 | BZW 04-299B | 299.00  | 332.00  | 368.00  | 1.0                           | 482.0   | 0.90                                     | 5.0   |
| BZW 04P342 | BZW 04P342B | 342.00  | 380.00  | 440.00  | 1.0                           | 548.0   | 0.90                                     | 5.0   |
| BZW 04-342 | BZW 04-342B | 342.00  | 380.00  | 420.00  | 1.0                           | 548.0   | 0.90                                     | 5.0   |
| BZW 04P376 | BZW 04P376B | 376.00  | 418.00  | 484.00  | 1.0                           | 603.0   | 0.80                                     | 5.0   |
| BZW 04-376 | BZW 04-376B | 376.00  | 418.00  | 462.00  | 1.0                           | 603.0   | 0.80                                     | 5.0   |

For bidirectional type having  $V_{RWM}$  of 10 volts and less, the IR limit is double.

For Part No. which use the character "p" , the  $V_{BR}$  is  $\pm 10\%$

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UL File # E223026