



Certificate Number: Q10561

Certificate Number: E17276

# BZW04 SERIES

**V<sub>BR</sub> : 6.8 - 440 Volts**

**P<sub>PK</sub> : 400 Watts**

## FEATURES :

- \* 400W surge capability at 1ms
- \* Excellent clamping capability
- \* Low zener impedance
- \* Fast response time : typically less than 1.0 ps from 0 volt to  $V_{BR(min)}$
- \* Typical  $I_R$  less than  $1\mu A$  above 10V

## MECHANICAL DATA

- \* Case : DO-41 Molded plastic
- \* Epoxy : UL94V-O rate flame retardant
- \* Lead : Axial lead solderable per MIL-STD-202, method 208 guaranteed
- \* Polarity : Color band denotes cathode end except Bipolar.
- \* Mounting position : Any
- \* Weight : 0.339 gram

## DEVICES FOR BIPOLAR APPLICATIONS

For bi-directional use B Suffix.

Electrical characteristics apply in both directions

## MAXIMUM RATINGS

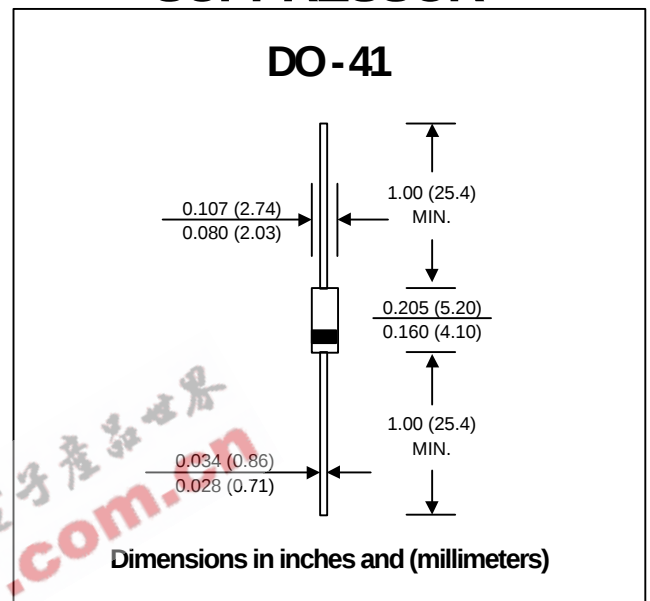
Rating at 25 °C ambient temperature unless otherwise specified.

| Rating                                                                                                           | Symbol                            | Value         | Unit  |
|------------------------------------------------------------------------------------------------------------------|-----------------------------------|---------------|-------|
| Peak Power Dissipation at Ta = 25 °C, Tp=1ms (Note1)                                                             | P <sub>PK</sub>                   | Minimum 400   | Watts |
| Steady State Power Dissipation at T <sub>L</sub> = 75 °C<br>Lead Lengths 0.375", (9.5mm) (Note 2)                | P <sub>D</sub>                    | 1.0           | Watt  |
| Peak Forward Surge Current, 8.3ms Single Half<br>Sine-Wave Superimposed on Rated Load<br>(JEDEC Method) (Note 3) | I <sub>FSM</sub>                  | 40            | Amps. |
| Operating and Storage Temperature Range                                                                          | T <sub>J</sub> , T <sub>STG</sub> | - 65 to + 175 | °C    |

**Note :**

- (1) Non-repetitive Current pulse, per Fig. 5 and derated above  $T_a = 25^\circ\text{C}$  per Fig. 1
- (2) Mounted on Copper Leaf area of  $1.57\text{ in}^2$  ( $40\text{mm}^2$ ).
- (3)  $8.3\text{ ms}$  single half sine-wave, duty cycle = 4 pulses per minutes maximum.

# TRANSIENT VOLTAGE SUPPRESSOR



**Dimensions in inches and (millimeters)**

**UPDATE : MAY 18, 1998**



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## ELECTRICAL CHARACTERISTICS

Rating at = 25 °C ambient temperature unless otherwise specified

| TYPE      | Breakdown Voltage @ It<br>( Note 1 ) |      |      | Working Peak<br>Reverse<br>Voltage<br>VRWM<br>(V) | Maximum<br>Reverse Leakage<br>@ VRWM<br>IR<br>(μA) | Maximum<br>Reverse<br>Current<br>IRSM<br>(A) | Maximum<br>Clamping<br>Voltage @ IRSM<br>VRSM<br>(V) | Maximum<br>Temperature<br>Co-efficient<br>of VBR<br>(% / °C) |
|-----------|--------------------------------------|------|------|---------------------------------------------------|----------------------------------------------------|----------------------------------------------|------------------------------------------------------|--------------------------------------------------------------|
|           | VBR (V)                              |      | It   |                                                   |                                                    |                                              |                                                      |                                                              |
|           | Min.                                 | Max. | (mA) |                                                   |                                                    |                                              |                                                      |                                                              |
| BZW04P5V8 | 6.45                                 | 7.48 | 10   | 5.80                                              | 1000                                               | 38.0                                         | 10.5                                                 | 0.057                                                        |
| BZW04-5V8 | 6.45                                 | 7.14 | 10   | 5.80                                              | 1000                                               | 38.0                                         | 10.5                                                 | 0.057                                                        |
| BZW04P6V4 | 7.13                                 | 8.25 | 10   | 6.40                                              | 500                                                | 35.4                                         | 11.3                                                 | 0.061                                                        |
| BZW04-6V4 | 7.13                                 | 7.88 | 10   | 6.40                                              | 500                                                | 35.4                                         | 11.3                                                 | 0.061                                                        |
| BZW04P7V0 | 7.79                                 | 9.02 | 10   | 7.02                                              | 200                                                | 33.0                                         | 12.1                                                 | 0.065                                                        |
| BZW04-7V0 | 7.79                                 | 8.61 | 10   | 7.02                                              | 200                                                | 33.0                                         | 12.1                                                 | 0.065                                                        |
| BZW04P7V8 | 8.65                                 | 10.0 | 1.0  | 7.78                                              | 50                                                 | 30.0                                         | 13.4                                                 | 0.068                                                        |
| BZW04-7V8 | 8.65                                 | 9.55 | 1.0  | 7.78                                              | 50                                                 | 30.0                                         | 13.4                                                 | 0.068                                                        |
| BZW04P8V5 | 9.50                                 | 11.0 | 1.0  | 8.55                                              | 10                                                 | 27.6                                         | 14.5                                                 | 0.073                                                        |
| BZW04-8V5 | 9.50                                 | 10.5 | 1.0  | 8.55                                              | 10                                                 | 27.6                                         | 14.5                                                 | 0.073                                                        |
| BZW04P9V4 | 10.5                                 | 12.1 | 1.0  | 9.40                                              | 5.0                                                | 25.7                                         | 15.6                                                 | 0.075                                                        |
| BZW04-9V4 | 10.5                                 | 11.6 | 1.0  | 9.40                                              | 5.0                                                | 25.7                                         | 15.6                                                 | 0.075                                                        |
| BZW04P10  | 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                                                        |
| 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                                                        |



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## ELECTRICAL CHARACTERISTICS

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| TYPE      | Breakdown Voltage @ It<br>( Note 1 ) |      | Working Peak<br>Reverse<br>Voltage | Maximum<br>Reverse Leakage<br>@ VRWM | Maximum<br>Reverse<br>Current | Maximum<br>Clamping<br>Voltage @ IRSM | Maximum<br>Temperature<br>Co-efficient<br>of VBR |       |
|-----------|--------------------------------------|------|------------------------------------|--------------------------------------|-------------------------------|---------------------------------------|--------------------------------------------------|-------|
|           | VBR (V)                              |      | VRWM                               | IR                                   | IRSM                          | VRSM                                  | of VBR<br>of VBR                                 |       |
|           | Min.                                 | Max. | (mA)                               | (V)                                  | (μA)                          | (A)                                   |                                                  | (V)   |
| 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                                | 77.8                                 | 5.0                           | 3.2                                   | 125                                              | 0.106 |
| BZW04-78  | 86.5                                 | 95.5 | 1.0                                | 77.8                                 | 5.0                           | 3.2                                   | 125                                              | 0.106 |
| 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 |
| BZW04P111 | 124                                  | 143  | 1.0                                | 111                                  | 5.0                           | 2.2                                   | 179                                              | 0.107 |
| BZW04-111 | 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 |
| BZW04-136 | 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                           | 1.3                                   | 344                                              | 0.110 |
| BZW04-213 | 237                                  | 263  | 1.0                                | 213                                  | 5.0                           | 1.3                                   | 344                                              | 0.110 |
| BZW04P239 | 266                                  | 308  | 1.0                                | 239                                  | 5.0                           | 1.3                                   | 384                                              | 0.110 |
| BZW04-239 | 266                                  | 294  | 1.0                                | 239                                  | 5.0                           | 1.3                                   | 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                           | 0.9                                   | 482                                              | 0.110 |
| BZW04-299 | 332                                  | 368  | 1.0                                | 299                                  | 5.0                           | 0.9                                   | 482                                              | 0.110 |
| BZW04P342 | 380                                  | 440  | 1.0                                | 342                                  | 5.0                           | 0.9                                   | 548                                              | 0.110 |
| BZW04-342 | 380                                  | 420  | 1.0                                | 342                                  | 5.0                           | 0.9                                   | 548                                              | 0.110 |
| BZW04P376 | 418                                  | 484  | 1.0                                | 376                                  | 5.0                           | 0.8                                   | 603                                              | 0.110 |
| BZW04-376 | 418                                  | 462  | 1.0                                | 376                                  | 5.0                           | 0.8                                   | 603                                              | 0.110 |

### Note:

- ( 1 ) VBR measured after It applied for 300  $\mu$ s., It = square wave pulse or equivalent.
- ( 2 ) VF = 3.5 Vmax., IF = 25 Amps. ( 6.8 Volts thru 110 Volts )  
VF = 5.0 Vmax., IF = 25 Amps. ( 120 Volts thru 440 Volts ) per 1/2 square or equivalent sine wave.  
PW = 8.3 ms, duty cycle = 4 pulses per minute maximum.

## RATING AND CHARACTERISTIC CURVES ( BZW04 SERIES )

FIG.1 - PULSE DERATING CURVE

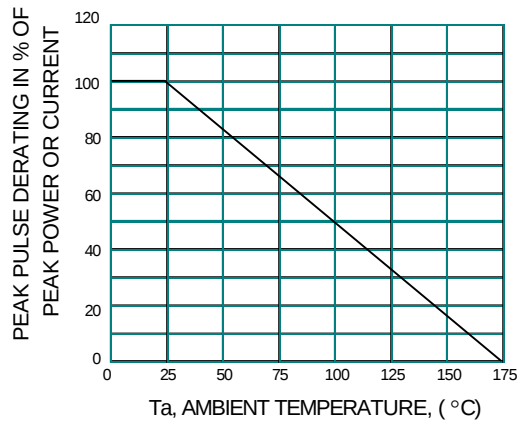


FIG.2 - MAXIMUM NON-REPETITIVE SURGE CURRENT

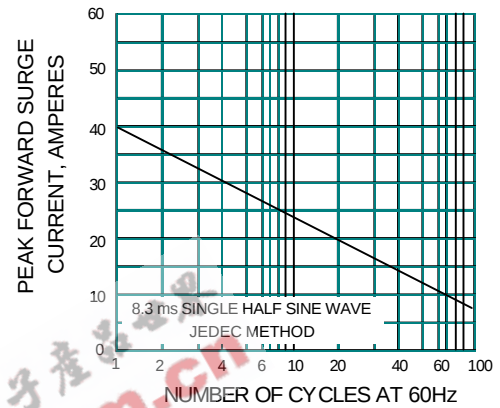


FIG.3 - STEADY STATE POWER DERATING

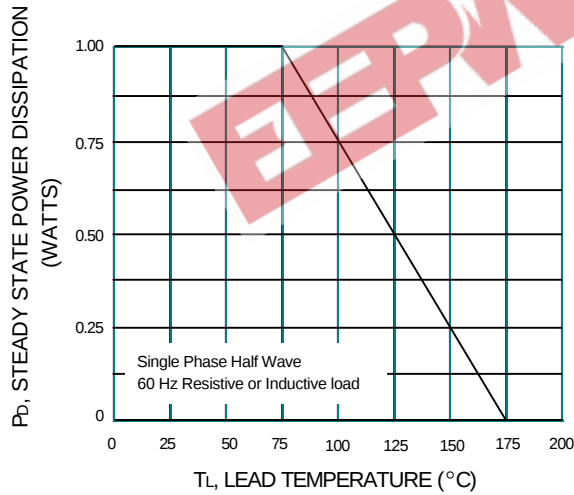


FIG.4 - PULSE RATING CURVE

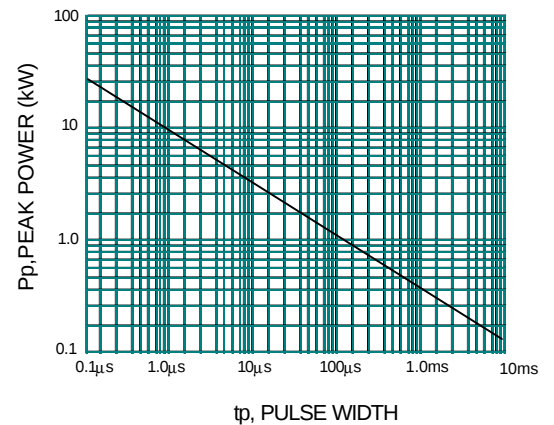


FIG.5 - PULSE WAVEFORM

