

# 1 Characteristics

**Table 1. Absolute maximum ratings ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ )**

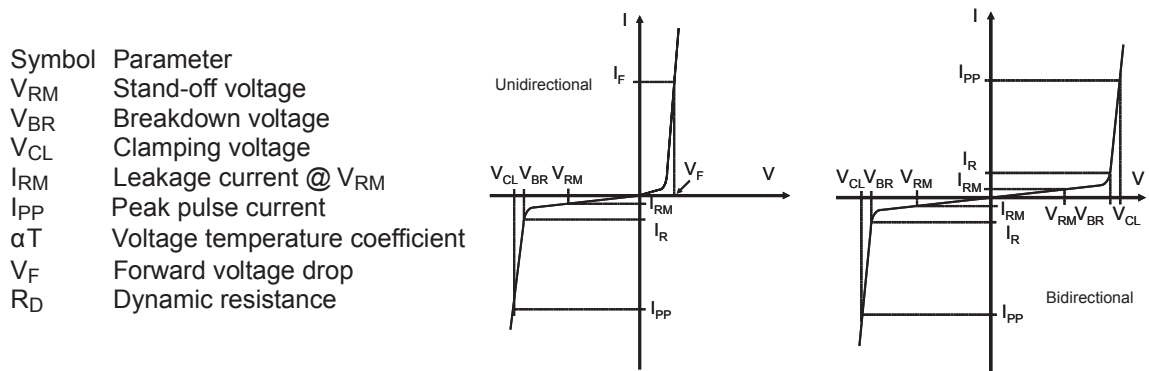
| Symbol    | Parameter                                                             | Value       | Unit               |
|-----------|-----------------------------------------------------------------------|-------------|--------------------|
| $P_{PP}$  | Peak pulse power dissipation <sup>(1)</sup>                           | 5000        | W                  |
| $P$       | Power dissipation on infinite heatsink                                | 6.5         | W                  |
| $I_{FSM}$ | Non repetitive surge peak forward current for unidirectional types    | 500         | A                  |
| $T_{stg}$ | Storage temperature range                                             | -65 to +175 | $^{\circ}\text{C}$ |
| $T_{op}$  | Maximum operating junction temperature                                | 175         | $^{\circ}\text{C}$ |
| $T_L$     | Maximum lead temperature for soldering during 10 s at 5 mm from case. | 260         | $^{\circ}\text{C}$ |

1. For a surge greater than the maximum values, the diode will fail in short-circuit.

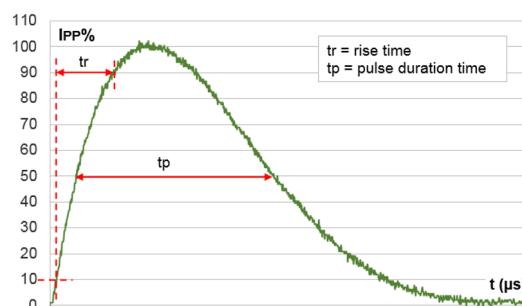
**Table 2. Thermal resistance parameter**

| Symbol        | Parameter                                                         | Value | Unit                 |
|---------------|-------------------------------------------------------------------|-------|----------------------|
| $R_{th(j-l)}$ | Junction to leads                                                 | 15    | $^{\circ}\text{C/W}$ |
| $R_{th(j-a)}$ | Junction to ambient on printed circuit. $L_{lead} = 10\text{ mm}$ | 65    | $^{\circ}\text{C/W}$ |

**Figure 1. Electrical characteristics (definitions)**



**Figure 2. Pulse definition for electrical characteristics**



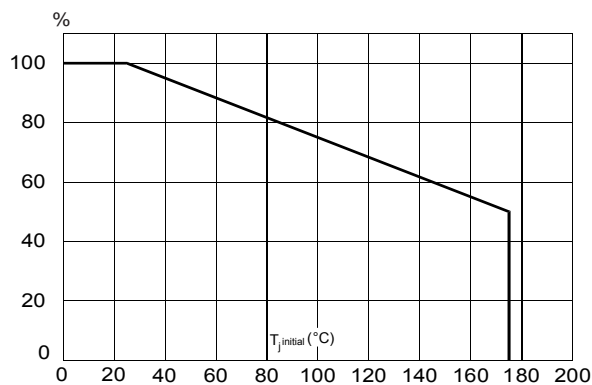
**Table 3. Electrical characteristics - values ( $T_{amb} = 25\text{ °C}$ )**

| Order code     |               | $I_{RM} @ V_{RM}$<br>max. |     | $V_{BR} @ I_R^{(1)}$ min. |    | $V_{CL} @ I_{PP}$<br>10/1000 $\mu s$ max. |      | $V_{CL} @ I_{PP}$ 8/20 $\mu s$<br>max. |      | $\alpha T^{(2)}$    | $C^{(3)}$ typ. |
|----------------|---------------|---------------------------|-----|---------------------------|----|-------------------------------------------|------|----------------------------------------|------|---------------------|----------------|
| Unidirectional | Bidirectional | $\mu A$                   | V   | V                         | mA | V                                         | A    | V                                      | A    | $10^{-4}/^{\circ}C$ | pF             |
| BZW50-10       | BZW50-10B     | 5                         | 10  | 11.1                      | 1  | 18.8                                      | 266  | 23.4                                   | 2564 | 7.8                 | 24000          |
| BZW50-12       | BZW50-12B     | 5                         | 12  | 13.3                      | 1  | 22                                        | 227  | 28                                     | 2143 | 8.4                 | 18500          |
| BZW50-15       | BZW50-15B     | 5                         | 15  | 16.6                      | 1  | 26.9                                      | 186  | 35                                     | 1714 | 8.8                 | 13500          |
| BZW50-18       | BZW50-18B     | 5                         | 18  | 20                        | 1  | 32.2                                      | 155  | 41.5                                   | 1446 | 9.2                 | 11500          |
| BZW50-22       | BZW50-22B     | 5                         | 22  | 24.4                      | 1  | 39.4                                      | 127  | 51                                     | 1177 | 9.6                 | 8500           |
| BZW50-27       | BZW50-27B     | 5                         | 27  | 30                        | 1  | 48.3                                      | 103  | 62                                     | 968  | 9.8                 | 7000           |
| BZW50-33       | BZW50-33B     | 5                         | 33  | 36.6                      | 1  | 59                                        | 85   | 76                                     | 789  | 10                  | 5750           |
| BZW50-39       | BZW50-39B     | 5                         | 39  | 43.3                      | 1  | 69.4                                      | 72   | 90                                     | 667  | 10.1                | 4800           |
| BZW50-47       | BZW50-47B     | 5                         | 47  | 52                        | 1  | 83.2                                      | 60.1 | 108                                    | 556  | 10.3                | 4100           |
| BZW50-56       | BZW50-56B     | 5                         | 56  | 62.2                      | 1  | 99.6                                      | 50   | 129                                    | 465  | 10.4                | 3400           |
| BZW50-68       | BZW50-68B     | 5                         | 68  | 75.6                      | 1  | 121                                       | 41   | 157                                    | 382  | 10.5                | 3000           |
| BZW50-82       | BZW50-82B     | 5                         | 82  | 91                        | 1  | 145                                       | 34   | 189                                    | 317  | 10.6                | 2600           |
| BZW50-100      | BZW50-100B    | 5                         | 100 | 111                       | 1  | 179                                       | 28   | 228                                    | 263  | 10.7                | 2300           |
| BZW50-120      | BZW50-120B    | 5                         | 120 | 133                       | 1  | 215                                       | 23   | 274                                    | 219  | 10.8                | 1900           |
| BZW50-150      | BZW50-150B    | 5                         | 150 | 166                       | 1  | 269                                       | 19   | 343                                    | 175  | 10.8                | 1700           |
| BZW50-180      | BZW50-180B    | 5                         | 180 | 200                       | 1  | 322                                       | 16   | 410                                    | 146  | 10.8                | 1500           |

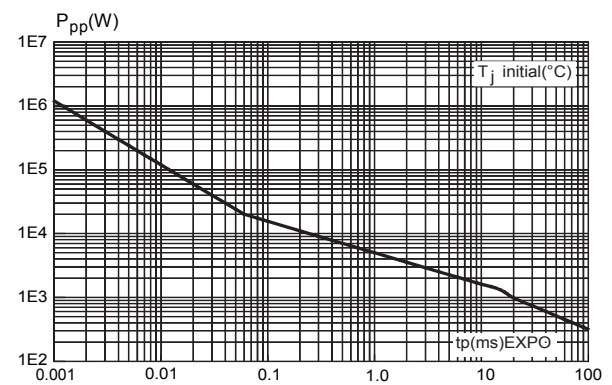
1. Pulse test:  $t_p < 50\text{ ms}$ .
2. To calculate  $V_{BR}$  versus  $T_j$ :  $V_{BR}$  at  $T_j = V_{BR}$  at  $25\text{ °C} \times (1 + \alpha T \times (T_j - 25))$
3.  $V_R = 0\text{ V}$ ,  $F = 1\text{ MHz}$ . For bidirectional types, capacitance value is divided by 2.

## 1.1 Characteristics (curves)

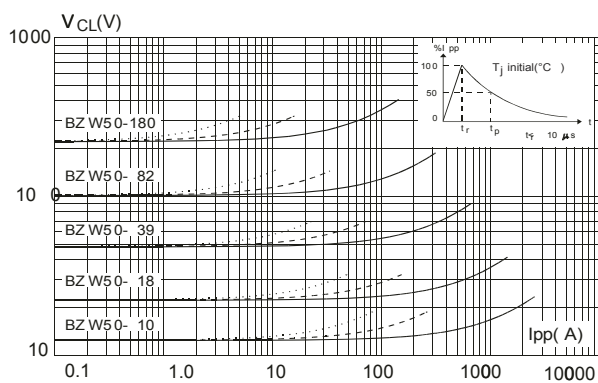
**Figure 3. Peak power dissipation vs. initial junction temperature (printed circuit board)**



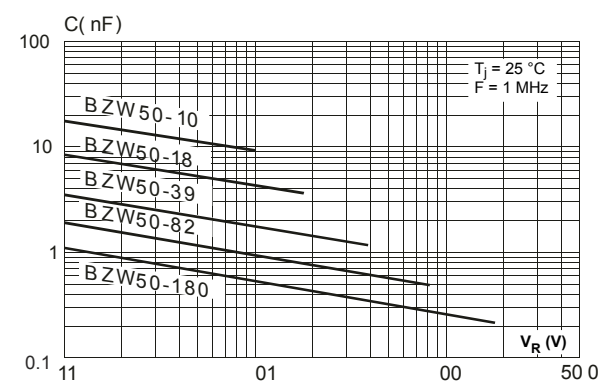
**Figure 4. Peak pulse power versus exponential pulse duration**



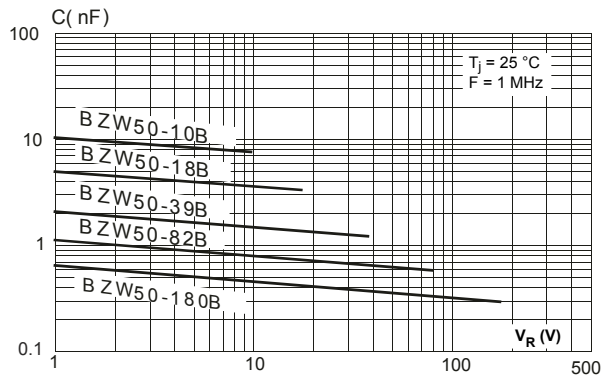
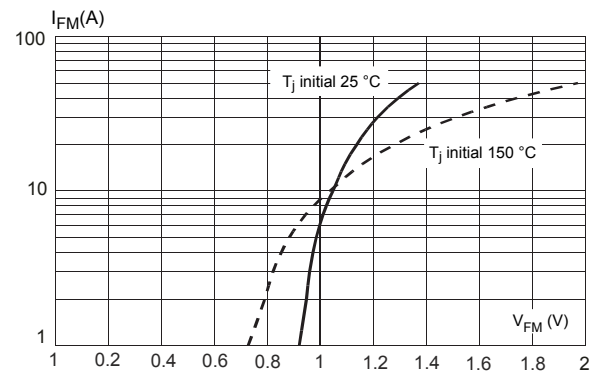
**Figure 5. Clamping voltage vs. peak pulse current**



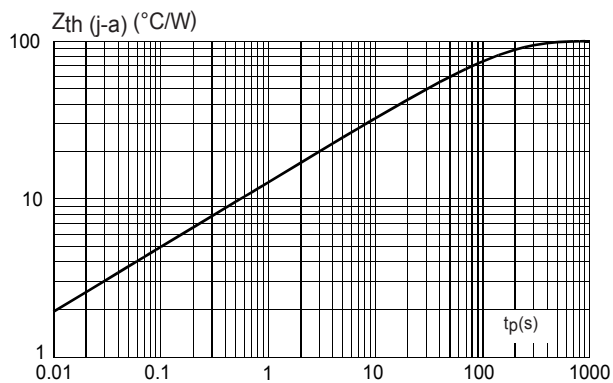
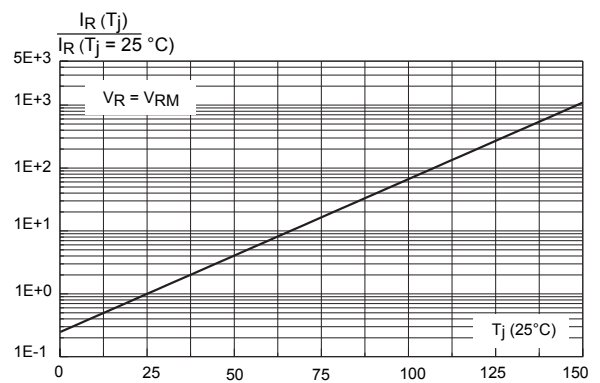
**Figure 6. Capacitance vs. reverse applied voltage for unidirectional types (typical values)**



**Note:** The curves in [Figure 5. Clamping voltage vs. peak pulse current](#) are specified for a junction temperature of 25 °C before surge. The given results may be extrapolated for other junction temperatures by using the following formula:  $\Delta V_{BR} = \alpha T \times [T_{amb} - 25] \times V_{BR}(25\text{ °C})$ . For intermediate voltages, extrapolate the given results.

**Figure 7. Capacitance vs. reverse applied voltage for bidirectional types (typical values)**

**Figure 8. Peak forward voltage drop vs. peak forward current for unidirectional types (typical value)**


**Note:** For Figure 8. Peak forward voltage drop vs. peak forward current for unidirectional types (typical value), multiply by 2 for units with  $V_{BR} > 220$  V.

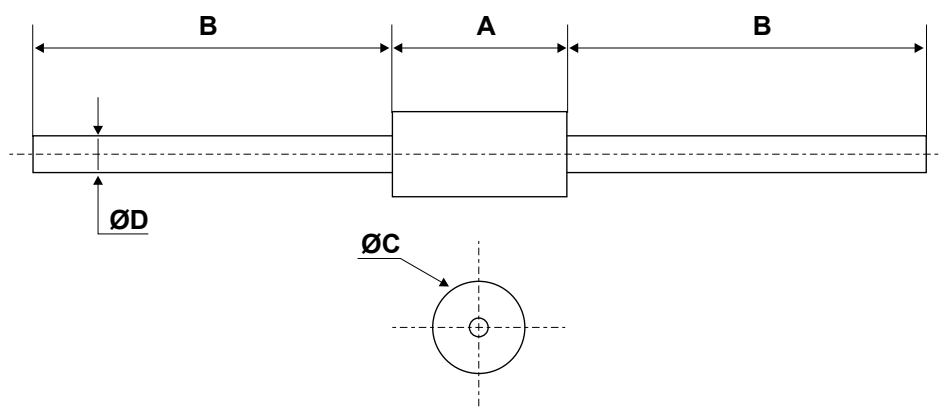
**Figure 9. Transient thermal impedance junction to ambient vs. pulse duration**

**Figure 10. Relative variation of leakage current vs. junction temperature**


## 2 Package information

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: [www.st.com](http://www.st.com). ECOPACK® is an ST trademark.

### 2.1 R6 package information

**Figure 11. R6 package outline**



**Table 4. R6 package mechanical data**

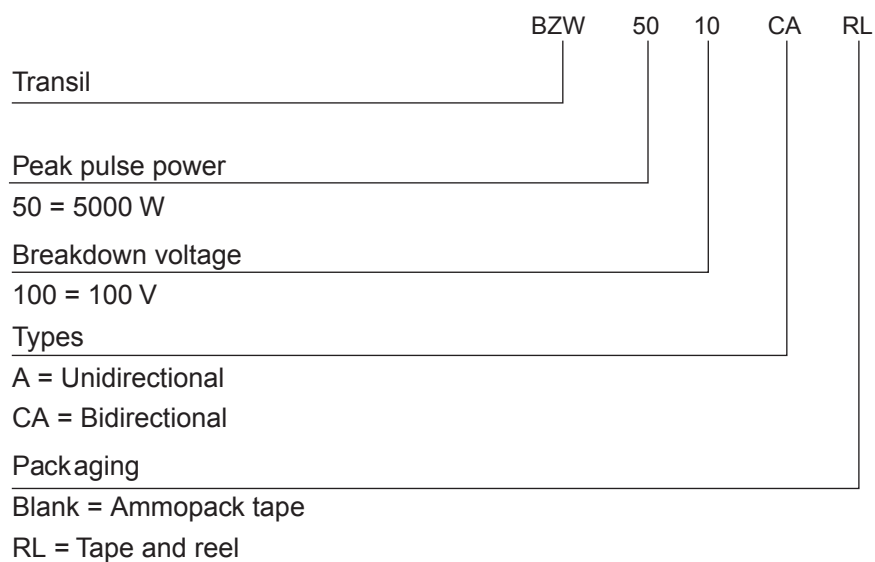
| Ref. | Dimensions  |      |      |        |      |       |
|------|-------------|------|------|--------|------|-------|
|      | Millimeters |      |      | Inches |      |       |
|      | Min.        | Typ. | Max. |        | Typ. | Max.  |
| A    | 8.6         | -    | 9.1  | 0.338  | -    | 0.358 |
| B    | 25.4        | -    |      | 1      | -    |       |
| C    | 8.6         | -    | 9.1  | 0.338  | -    | 0.358 |
| D    | 1.20        | -    | 1.30 | 0.047  | -    | 0.051 |

**Table 5. Marking**

| Unidirectional order code | Marking   | Bidirectional order code | Marking    |
|---------------------------|-----------|--------------------------|------------|
| BZW50-10                  | BZW50-10  | BZW50-10B                | BZW50-10B  |
| BZW50-12                  | BZW50-12  | BZW50-12B                | BZW50-12B  |
| BZW50-15                  | BZW50-15  | BZW50-15B                | BZW50-15B  |
| BZW50-18                  | BZW50-18  | BZW50-18B                | BZW50-18B  |
| BZW50-22                  | BZW50-22  | BZW50-22B                | BZW50-22B  |
| BZW50-27                  | BZW50-27  | BZW50-27B                | BZW50-27B  |
| BZW50-33                  | BZW50-33  | BZW50-33B                | BZW50-33B  |
| BZW50-39                  | BZW50-39  | BZW50-39B                | BZW50-39B  |
| BZW50-47                  | BZW50-47  | BZW50-47B                | BZW50-47B  |
| BZW50-56                  | BZW50-56  | BZW50-56B                | BZW50-56B  |
| BZW50-68                  | BZW50-68  | BZW50-68B                | BZW50-68B  |
| BZW50-82                  | BZW50-82  | BZW50-82B                | BZW50-82B  |
| BZW50-100                 | BZW50-100 | BZW50-100B               | BZW50-100B |
| BZW50-120                 | BZW50-120 | BZW50-120B               | BZW50-120B |
| BZW50-150                 | BZW50-150 | BZW50-150B               | BZW50-150B |
| BZW50-180                 | BZW50-180 | BZW50-180B               | BZW50-180B |

### 3 Ordering information

**Figure 12. Ordering information scheme**



**Table 6. Ordering information**

| Order code   | Marking                              | Package | Weight  | Base qty. | Delivery mode |
|--------------|--------------------------------------|---------|---------|-----------|---------------|
| BZW50xxxx    | See <a href="#">Table 5. Marking</a> | R6      | 2.050 g | 1000      | Ammopack      |
| BZW50xxxxB   |                                      |         |         | 100       | Tape and reel |
| BZW50xxxxRL  |                                      |         |         |           |               |
| BZW50xxxxBRL |                                      |         |         |           |               |

1. Logo, date code, type code, cathode band (for unidirectional types only).

## Revision history

**Table 7. Document revision history**

| Date        | Revision | Changes                                                                                                                                                                   |
|-------------|----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Feb-2003    | 1        | Last update.                                                                                                                                                              |
| 14-Dec-2012 | 2        | Updated ECOPACK statement.                                                                                                                                                |
| 25-May-2018 | 3        | Updated title description. Updated <a href="#">Figure 2. Pulse definition for electrical characteristics</a> and <a href="#">Figure 12. Ordering information scheme</a> . |

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