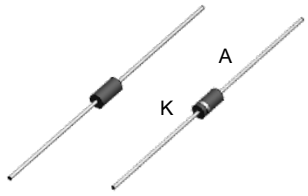
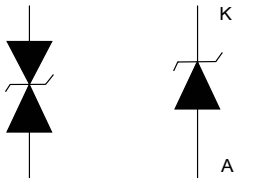
# BZW06-xx, BZW06-xxB

Datasheet

## 600 W TVS in DO-15




**DO-15 (JEDEC DO-204AC)**




**Bidirectional** **Unidirectional**

| Product status link | |
|---|---|
| BZW06-5V8, BZW06-15, BZW06-28, BZW06-31, BZW06-33, BZW06-58, BZW06-342, BZW06-376. | BZW06-5V8B, BZW06-15B, BZW06-28B, BZW06-31B, BZW06-33B, BZW06-58B, BZW06-342B, BZW06-376B. |

## Features

- Peak pulse power:
  - 600 W (10/1000 µs)
  - up to 4 kW (8/20 µs)
- Stand-off voltage range from 5.8 V to 376 V
- Unidirectional and bidirectional types
- Operating $T_j$ max: 175 °C
- High power capability at $T_j$ max.: up to 300 W (10/1000 µs)
- Lead finishing: matte tin plating

## Complies with the following standards

- UL94, V0
- J-STD-020 MSL level 1
- J-STD-002, JESD 22-B102 E3 and MIL-STD-750, method 2026
- JESD-201 class 2 whisker test
- UL 497B file number: QVGQ2.E136224
- IEC 61000-4-4 level 4:
  - 4 k V
- IEC 61000-4-2, C = 150 pF, R = 330 Ω exceeds level 4:
  - 30 kV (air discharge)
  - 30 kV (contact discharge)

## Description

The BZW06 TVS series is designed to protect sensitive equipment against electrostatic discharges according to IEC 61000-4-2, MIL STD 883 Method 3015, and electrical overstress such as IEC 61000-4-4 and 5. They are used for surges below 600 W 10/1000 µs.

This planar technology makes it compatible with high-end equipment and SMPS where low leakage current and high junction temperature are required to provide reliability and stability over time.

# 1 Characteristics

**Table 1. Absolute maximum ratings ($T_{amb}$ = 25 °C)**

| Symbol | Parameter | | Value | Unit |
|---|---|---|---|---|
| $V_{PP}$ | Peak pulse voltage | IEC 61000-4-2 (C = 150 pF, R = 330 Ω)<br>Contact discharge<br>Air discharge | <br>30<br>30 | kV |
| $P_{PP}$ | Peak pulse power dissipation | 10/1000 µs, $T_j$ initial = $T_{amb}$ | 600 | W |
| $I_{FSM}$ | Non repetitive surge peak forward current for unidirectional types | $t_p$ = 10 ms, $T_j$ initial = $T_{amb}$ | 100 | A |
| $T_{stg}$ | Storage temperature range | | -65 to +175 | °C |
| $T_j$ | Operating junction temperature range | | -55 to +175 | °C |
| $T_L$ | Maximum lead temperature for soldering during 10 s at 5 mm from case | | 260 | °C |

**Figure 1. Electrical characteristics - parameter definitions**

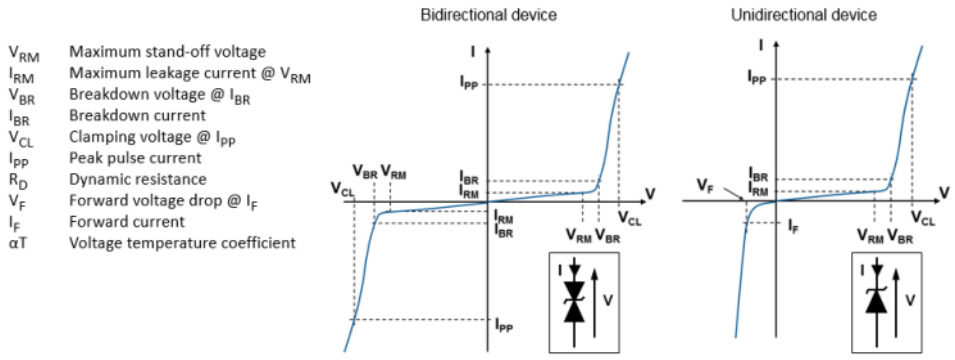



**Figure 2. Pulse definition for electrical characteristics**

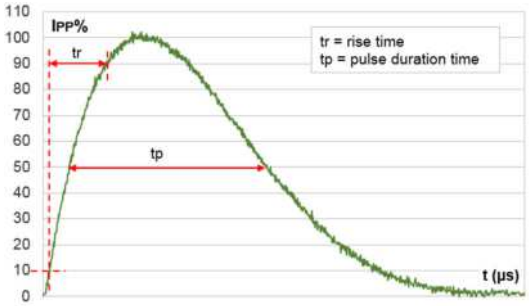


**Table 2. Electrical characteristics - parameter values ($T_{amb}$ = 25 °C, unless otherwise specified)**

| Type | $I_{RM}$ max at $V_{RM}$ | | $V_{BR}$ at $I_{BR}$ (1) | | | | 10 / 1000 µs | | | 8 / 20µs | | | αT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | $V_{CL}$(2)(3) | $I_{PP}$(4) | $R_D$ | $V_{CL}$(2)(3) | $I_{PP}$(4) | $R_D$ | |
| | 25 °C | | Min. | Typ. | Max. | | Max. | | Max. | Max. | | Max. | Max. |
| | µA | V | V | | | mA | V | A | Ω | V | A | Ω | $10^{-4}$/°C |
| BZW06-5V8/B | 20 | 5.8 | 6.45 | 6.8 | 7.14 | 10 | 10.5 | 57.0 | 0.059 | 13.4 | 298 | 0.021 | 5.7 |
| BZW06-15/B | 0.2 | 15 | 17.1 | 18 | 18.9 | 1 | 25.2 | 24.0 | 0.263 | 32.5 | 123 | 0.111 | 8.9 |
| BZW06-28/B | 0.2 | 28 | 31.4 | 33.1 | 34.8 | 1 | 45.7 | 13.1 | 0.835 | 59 | 68 | 0.357 | 9.8 |
| BZW06-31/B | 0.2 | 31 | 34.2 | 36 | 37.8 | 1 | 49.9 | 12.0 | 1.01 | 64.3 | 62 | 0.427 | 9.9 |
| BZW06-33/B | 0.2 | 33 | 37.1 | 39.1 | 41.1 | 1 | 53.9 | 11.1 | 1.16 | 69.7 | 57 | 0.503 | 10 |
| BZW06-58/B | 0.2 | 58 | 64.6 | 68 | 71.4 | 1 | 92.0 | 6.5 | 3.17 | 121 | 33 | 1.50 | 10.4 |
| BZW06-342/B | 0.2 | 342 | 380 | 400 | 420 | 1 | 548 | 1.1 | 116 | 706 | 6 | 50.2 | 11 |
| BZW06-376/B | 0.2 | 376 | 418 | 440 | 462 | 1 | 603 | 1 | 141 | 776 | 5.7 | 55.1 | 11 |

1. *To calculate $V_{BR}$ versus $T_j$ : $V_{BR}$ at $T_j$ = $V_{BR}$ at 25 °C x (1 + αT x ($T_j$ - 25))*
2. *To calculate $V_{CL}$ versus $T_j$ : $V_{CL}$ at $T_j$ = $V_{CL}$ at 25 °C x (1 + αT x ($T_j$ - 25))*
3. *To calculate $V_{CL}$ max versus $I_{PPappli}$: $V_{CL}$ max = $V_{BR}$ max. + $R_D$ x $I_{PPappli}$*
4. *Surge capability given for both directions for unidirectional and bidirectional devices*

## 1.1 Characteristics (curves)

**Figure 3. Maximum peak power dissipation versus initial junction temperature**

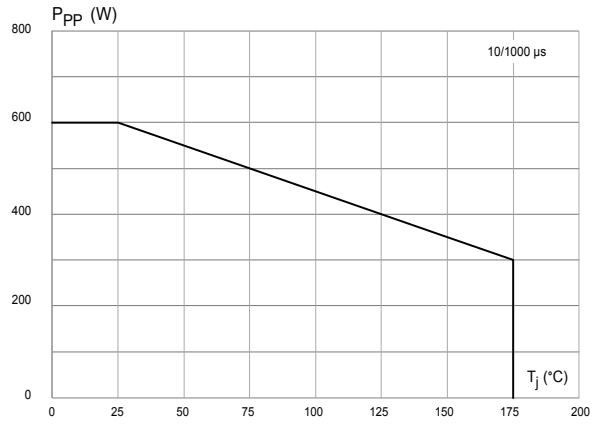



**Figure 4. Maximum peak pulse power versus exponential pulse duration**

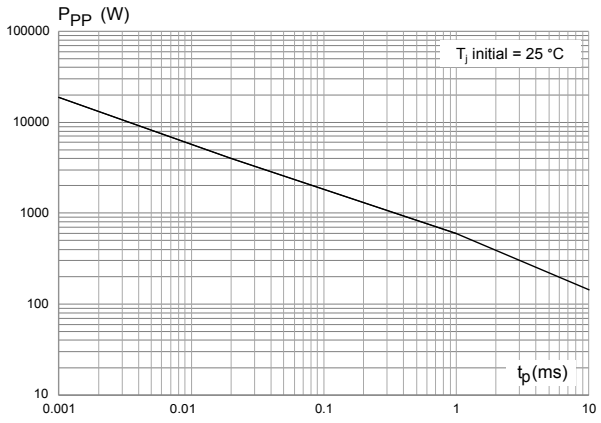



**Figure 5. Maximum peak pulse current versus clamping voltage**

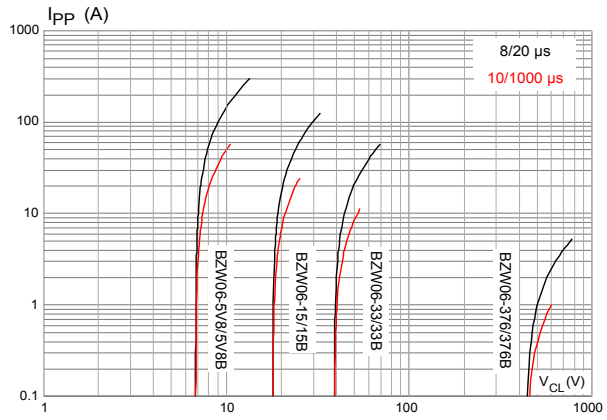



**Figure 6. Dynamic resistance versus pulse duration**

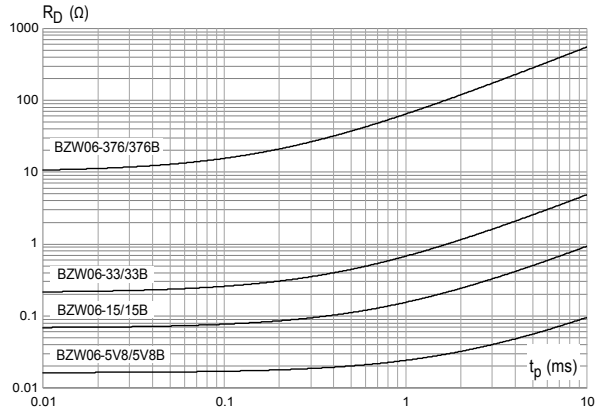



**Figure 7. Junction capacitance versus reverse applied voltage (unidirectional type)**

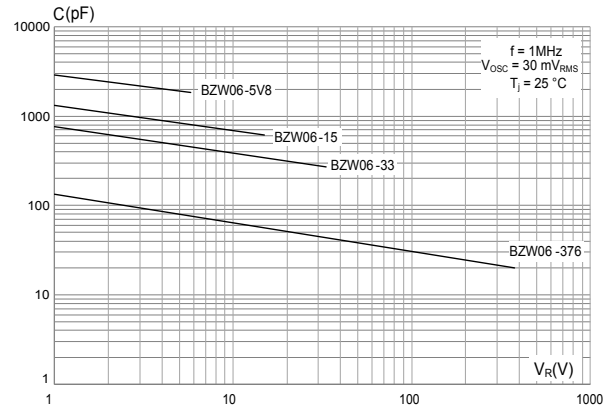



**Figure 8. Junction capacitance versus applied voltage (bidirectional type)**

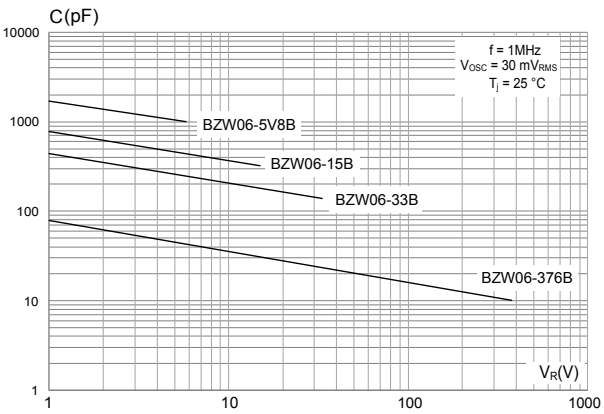


**Figure 9. Leakage current versus junction temperature**

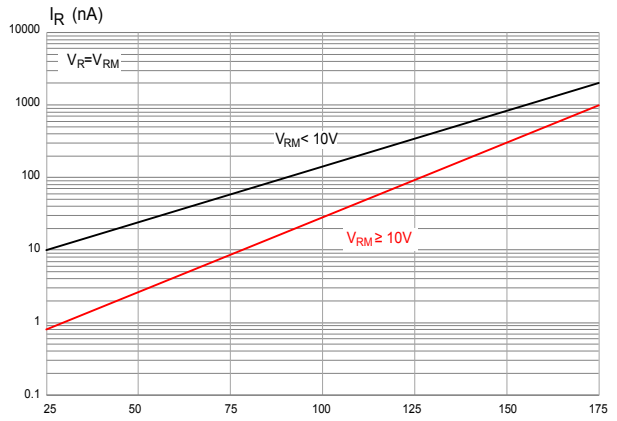



**Figure 10. Peak forward voltage drop versus peak forward current**

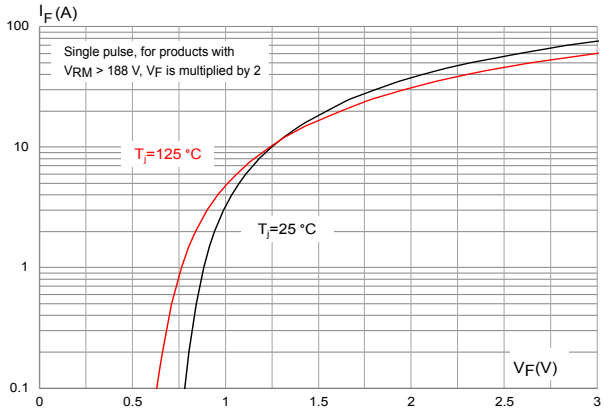



**Figure 11. Thermal impedance junction to ambient versus pulse duration**

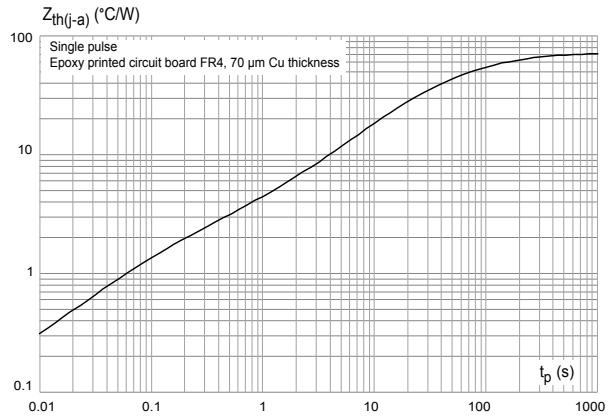
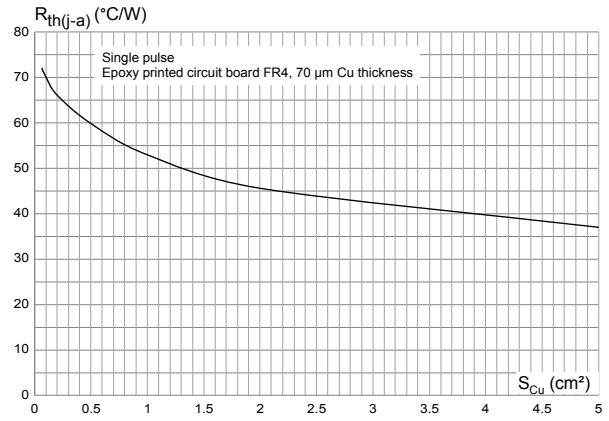



**Figure 12. Thermal resistance junction to ambient versus copper area under each lead**



# 2 Package information

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. ECOPACK is an ST trademark.

## 2.1 DO-15 package information

**Figure 13. DO-15 package outline**

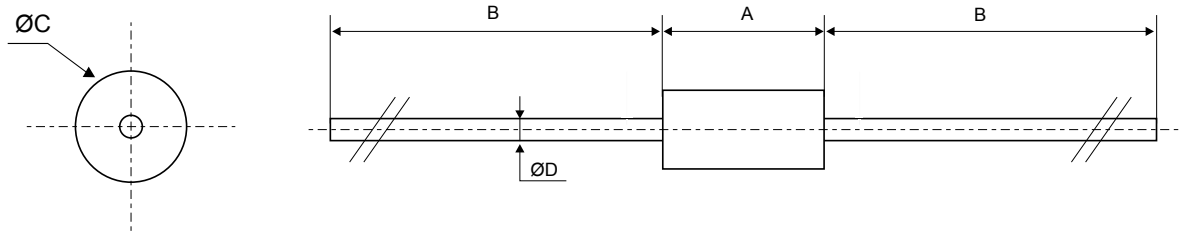



**Table 3. DO-15 package mechanical data**

| Ref. | Dimensions | | | | | |
|---|---|---|---|---|---|---|
| | Millimeters | | | Inches (for reference only) | | |
| | Min. | Typ. | Max. | Min. | Typ. | Max. |
| A | 6.05 | 6.40 | 6.75 | 0.238 | 0.252 | 0.266 |
| B | 26.00 | 28.5 | 31.00 | 1.023 | 1.122 | 1.221 |
| C | 2.95 | 3.24 | 3.53 | 0.116 | 0.128 | 0.139 |
| D | 0.71 | 0.80 | 0.88 | 0.027 | 0.031 | 0.035 |

Figure 14. **Marking layout**

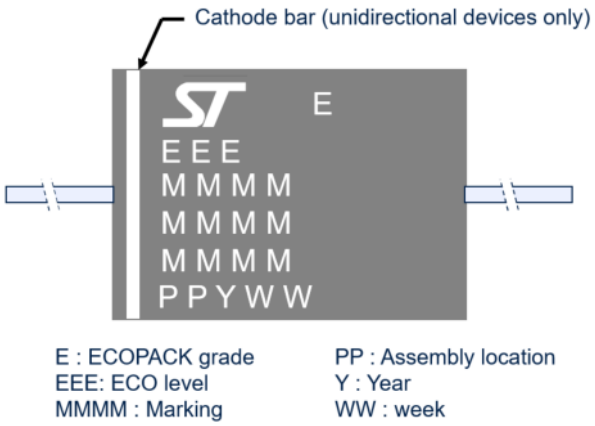



Figure 15. **Tape and reel orientation**

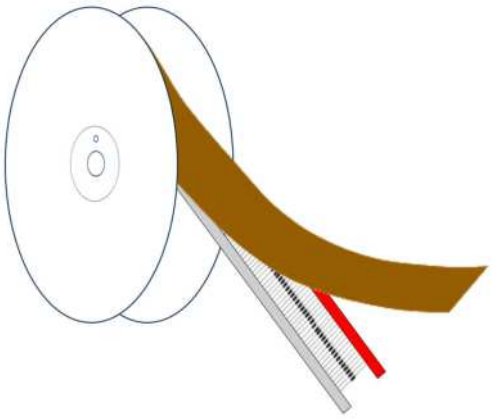


Figure 16. **Reel dimension values (mm)**

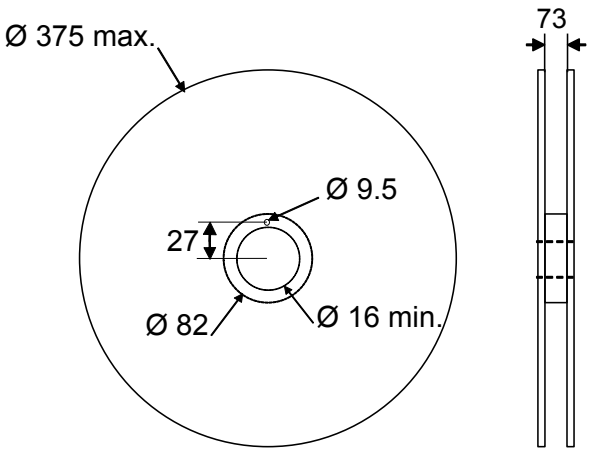



Figure 17. **Inner box dimension values (mm)**

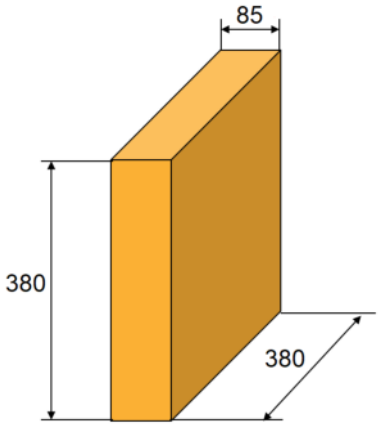



Figure 18. **Ammopack dimension values (mm)**

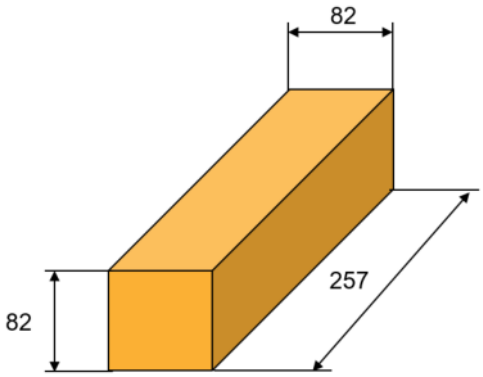
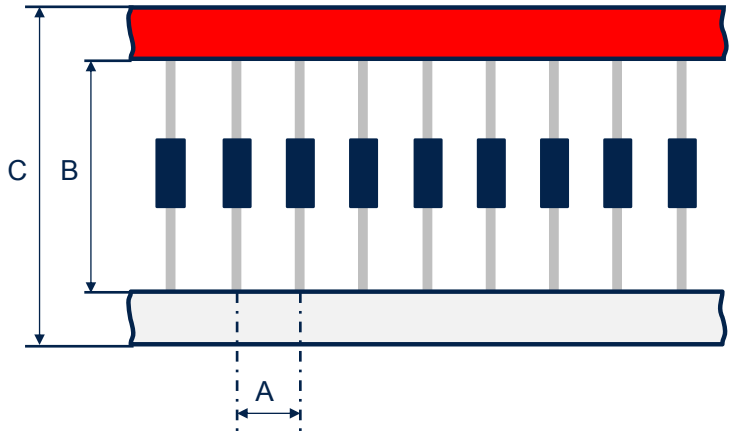


Figure 19. **Tape outline**



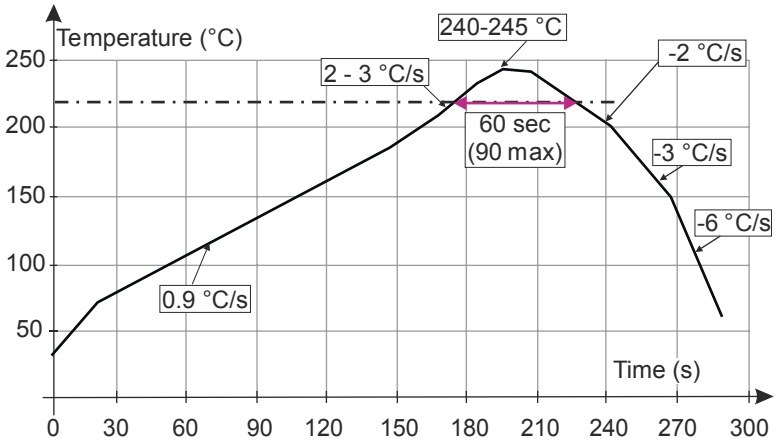

Dimensions are not to scale
Unidirectional components are oriented with red tape on the cathode and white tape on the anode.
Bidirectional components have red tape on both sides.

Table 4. **Tape dimension values**

| Ref. | Dimensions | | |
|---|---|---|---|
| | Millimeters | | |
| | Min. | Typ. | Max. |
| A | 4.5 | 5 | 5.5 |
| B | 51 | 53 | 55 |
| C | 62 | 65 | 68 |

## 2.2 Reflow profile

**Figure 20. ST ECOPACK recommended soldering reflow profile for PCB mounting**




*Note: Minimize air convection currents in the reflow oven to avoid component movement. Maximum soldering profile corresponds to the latest IPC/JEDEC J-STD-020.*

For wave soldering profile refer to AN5088 chapter 1.5.

- AN5088: Rectifiers thermal management, handling and mounting recommendations.

# 3 Ordering information

**Table 5. Ordering information**

| Order code | Marking | Package | Weight | Base qty. | Delivery mode |
|---|---|---|---|---|---|
| BZW06-xxRL / BZW06-xxBRL(1) | Equal to order code (without RL suffix) | DO-15 | 0.4 g | 6000 | Reel |
| BZW06-xx / BZW06-xxB | Equal to order code | | | 1000 | Ammopack |

1. *Where xx corresponds to $V_{RM}$ and blank or B indicates unidirectional or bidirectional version.*

## Revision history

Table 6. **Document revision history**

| Date | Revision | Changes |
|---|---|---|
| Feb-2003 | 3A | Last update. |
| 06-Apr-2017 | 4 | Updated *Table 1*, *Table 3*, *Characteristics* (curves) and *DO-15 package information*. |
| 10-Jan-2023 | 5 | Updated *Package information*. Minor text changes. |
| 07-Apr-2023 | 6 | Updated *Table 5*. |
| 10-Dec-2024 | 7 | Updated Features, Figure 3, Figure 9 and Figure 16. |

**IMPORTANT NOTICE – READ CAREFULLY**

STMicroelectronics NV and its subsidiaries (“ST”) reserve the right to make changes, corrections, enhancements, modifications, and improvements to ST products and/or to this document at any time without notice. Purchasers should obtain the latest relevant information on ST products before placing orders. ST products are sold pursuant to ST’s terms and conditions of sale in place at the time of order acknowledgment.

Purchasers are solely responsible for the choice, selection, and use of ST products and ST assumes no liability for application assistance or the design of purchasers’ products.

No license, express or implied, to any intellectual property right is granted by ST herein.

Resale of ST products with provisions different from the information set forth herein shall void any warranty granted by ST for such product.

ST and the ST logo are trademarks of ST. For additional information about ST trademarks, refer to www.st.com/trademarks. All other product or service names are the property of their respective owners.

Information in this document supersedes and replaces information previously supplied in any prior versions of this document.

© 2024 STMicroelectronics – All rights reserved