



**THE DATASHEET OF  
BZW04-376B**





# BZW04-5V8/376 BZW04-5V8B/376B

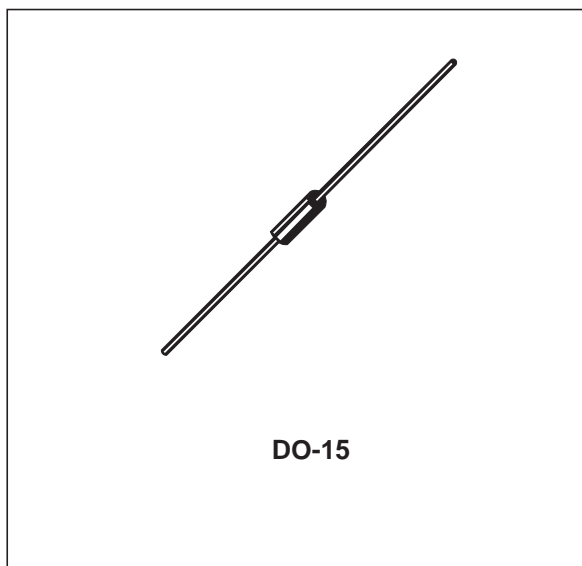
TRANSIL™

## FEATURES

- PEAK PULSE POWER : 400 W (10/1000 $\mu$ s)
- STAND-OFF VOLTAGE RANGE :  
From 5.8V to 376 V
- UNI AND BIDIRECTIONAL TYPES
- LOW CLAMPING FACTOR
- FAST RESPONSE TIME
- UL RECOGNIZED

## DESCRIPTION

Transil diodes provide high overvoltage protection by clamping action. Their instantaneous response to transient overvoltages makes them particularly suited to protect voltage sensitive devices such as MOS Technology and low voltage supplied IC's.



## ABSOLUTE MAXIMUM RATINGS ( $T_{amb} = 25^{\circ}\text{C}$ )

| Symbol             | Parameter  |  | Value                | Unit                                     |
|--------------------|--|--|----------------------|--|
| $P_{PP}$           | Peak pulse power dissipation (see note 1)                          | $T_j \text{ initial} = T_{amb}$                        | 400                  | W  |
| P                  | Power dissipation on infinite heatsink                             | $T_{amb} = 75^{\circ}\text{C}$                         | 1.7                  | W  |
| $I_{FSM}$          | Non repetitive surge peak forward current for unidirectional types | $t_p = 10\text{ms}$<br>$T_j \text{ initial} = T_{amb}$ | 30                   | A  |
| $T_{stg}$<br>$T_j$ | Storage temperature range<br>Maximum junction temperature          |  | - 65 to + 175<br>175 | $^{\circ}\text{C}$<br>$^{\circ}\text{C}$ |
| $T_L$              | Maximum lead temperature for soldering during 10s a 5mm from case. |  | 230                  | $^{\circ}\text{C}$                       |

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

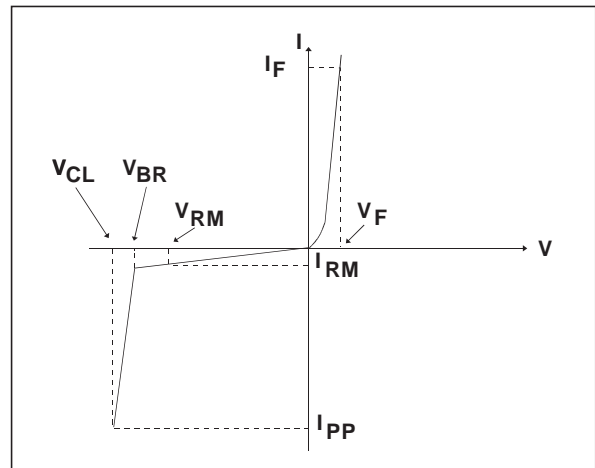
## THERMAL RESISTANCES

| Symbol        | Parameter                               |                          | Value | Unit                        |
|---------------|---|--------------------------|-------|-----------------------------|
| $R_{th(j-l)}$ | Junction to leads                       |                          | 60    | $^{\circ}\text{C}/\text{W}$ |
| $R_{th(j-a)}$ | Junction to ambient on printed circuit. | $L_{lead} = 10\text{mm}$ | 100   | $^{\circ}\text{C}/\text{W}$ |

## BZW04-xx

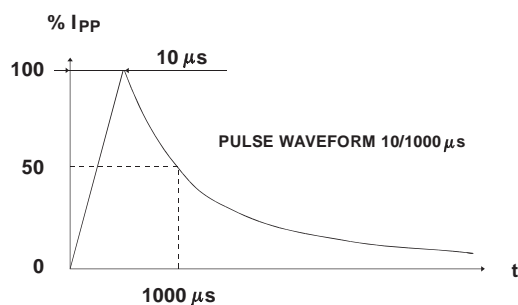
### ELECTRICAL CHARACTERISTICS (T<sub>amb</sub> = 25°C)

| Symbol          | Parameter                         |
|-----------------|-----------------------------------|
| V <sub>RM</sub> | Stand-off voltage                 |
| V <sub>BR</sub> | Breakdown voltage                 |
| V <sub>CL</sub> | Clamping voltage                  |
| I <sub>RM</sub> | Leakage current @ V <sub>RM</sub> |
| I <sub>PP</sub> | Peak pulse current                |
| αT              | Voltage temperature coefficient   |
| V <sub>F</sub>  | Forward voltage drop              |



| Types          |               | I <sub>RM</sub> @ V <sub>RM</sub> |      | V <sub>BR</sub> @ I <sub>R</sub> |    | V <sub>CL</sub> @ I <sub>PP</sub> |      | V <sub>CL</sub> @ I <sub>PP</sub> |      | αT                   | C     |
|----------------|---------------|-----------------------------------|------|----------------------------------|----|-----------------------------------|------|-----------------------------------|------|----------------------|-------|
|                |               | max                               |      | min                              |    | max                               |      | max                               |      | max                  | typ   |
|                |               |                                   |      | note2                            |    | 10/1000μs                         |      | 8/20μs                            |      | note3                | note4 |
| Unidirectional | Bidirectional | μA                                | V    | V                                | mA | V                                 | A    | V                                 | A    | 10 <sup>-4</sup> /°C | pF    |
| BZW04-5V8      | BZW04-5V8B    | 1000                              | 5.8  | 6.45                             | 10 | 10.5                              | 38.0 | 13.4                              | 174  | 5.7                  | 3500  |
| BZW04-6V4      | BZW04-6V4B    | 500                               | 6.4  | 7.13                             | 10 | 11.3                              | 35.4 | 14.5                              | 160  | 6.1                  | 3100  |
| BZW04-8V5      | BZW04-8V5B    | 10                                | 8.5  | 9.5                              | 1  | 14.5                              | 27.6 | 18.6                              | 124  | 7.3                  | 2000  |
| BZW04-10       | BZW04-10B     | 5                                 | 10.2 | 11.4                             | 1  | 16.7                              | 24.0 | 21.7                              | 106  | 7.8                  | 1550  |
| BZW04-13       | BZW04-13B     | 5                                 | 12.8 | 14.3                             | 1  | 21.2                              | 19.0 | 27.2                              | 85   | 8.4                  | 1200  |
| BZW04-15       | BZW04-15B     | 1                                 | 15.3 | 17.1                             | 1  | 25.2                              | 16.0 | 32.5                              | 71   | 8.8                  | 975   |
| BZW04-19       | BZW04-19B     | 1                                 | 18.8 | 20.9                             | 1  | 30.6                              | 13.0 | 39.3                              | 59   | 9.2                  | 800   |
| BZW04-20       | BZW04-20B     | 1                                 | 20.5 | 22.8                             | 1  | 33.2                              | 12.0 | 42.8                              | 54   | 9.4                  | 725   |
| BZW04-23       | BZW04-23B     | 1                                 | 23.1 | 25.7                             | 1  | 37.5                              | 10.7 | 48.3                              | 48   | 9.6                  | 625   |
| BZW04-26       | BZW04-26B     | 1                                 | 25.6 | 28.5                             | 1  | 41.5                              | 9.6  | 53.5                              | 43   | 9.7                  | 575   |
| BZW04-28       | BZW04-28B     | 1                                 | 28.2 | 31.4                             | 1  | 45.7                              | 8.8  | 59.0                              | 39   | 9.8                  | 510   |
| BZW04-31       | BZW04-31B     | 1                                 | 30.8 | 34.2                             | 1  | 49.9                              | 8.0  | 64.3                              | 36   | 9.6                  | 480   |
| BZW04-33       | BZW04-33B     | 1                                 | 33.3 | 37.1                             | 1  | 53.9                              | 7.4  | 69.7                              | 33   | <b>10.0</b>          | 450   |
| BZW04-40       | BZW04-40B     | 1                                 | 40.2 | 44.7                             | 1  | 64.8                              | 6.2  | 84                                | 27   | 10.1                 | 370   |
| BZW04-48       | BZW04-48B     | 1                                 | 47.8 | 53.2                             | 1  | 77.0                              | 5.2  | 100                               | 23   | 10.3                 | 320   |
| BZW04-58       | BZW04-58B     | 1                                 | 58.1 | 64.6                             | 1  | 92.0                              | 4.3  | 121                               | 19   | 10.4                 | 270   |
| BZW04-70       | BZW04-70B     | 1                                 | 70.1 | 77.9                             | 1  | 113                               | 3.5  | 146                               | 16.0 | 10.5                 | 230   |
| BZW04-85       | BZW04-85B     | 1                                 | 85.5 | 95.0                             | 1  | 137                               | 2.9  | 178                               | 13.0 | 10.6                 | 200   |
| BZW04-102      | BZW04-102B    | 1                                 | 102  | 114                              | 1  | 165                               | 2.4  | 212                               | 11.0 | 10.7                 | 170   |
| BZW04-128      | BZW04-128B    | 1                                 | 128  | 143                              | 1  | 207                               | 2.0  | 265                               | 9.0  | 10.8                 | 145   |
| BZW04-154      | BZW04-154B    | 1                                 | 154  | 171                              | 1  | 246                               | 1.6  | 317                               | 7.0  | 10.8                 | 125   |
| BZW04-171      | BZW04-171B    | 1                                 | 171  | 190                              | 1  | 274                               | 1.5  | 353                               | 6.5  | 10.8                 | 120   |
| BZW04-188      | BZW04-188B    | 1                                 | 188  | 209                              | 1  | 328                               | 1.4  | 388                               | 6.0  | 10.8                 | 110   |
| BZW04-213      | BZW04-213B    | 1                                 | 231  | 237                              | 1  | 344                               | 1.5  | 442                               | 5.2  | 11.0                 | 100   |
| BZW04-256      | BZW04-256B    | 1                                 | 256  | 285                              | 1  | 414                               | 1.2  | 529                               | 4.3  | 11.0                 | 90    |

| Types          |               | I <sub>RM</sub> @ V <sub>RM</sub> |     | V <sub>BR</sub> @ I <sub>R</sub> |       | V <sub>CL</sub> @ I <sub>PP</sub> |     | V <sub>CL</sub> @ I <sub>PP</sub> |     | αT                   | C     |
|----------------|---------------|-----------------------------------|-----|----------------------------------|-------|-----------------------------------|-----|-----------------------------------|-----|----------------------|-------|
|                |               |                                   |     | min                              | note2 | max                               |     | max                               |     | max                  | note3 |
| Unidirectional | Bidirectional | μA                                | V   | V                                | mA    | V                                 | A   | V                                 | A   | 10 <sup>-4</sup> /°C | pF    |
| BZW04-273      | BZW04-273B    | 1                                 | 273 | 304                              | 1     | 438                               | 1.2 | 564                               | 4.0 | 11.0                 | 85    |
| BZW04-299      | BZW04-299B    | 1                                 | 299 | 332                              | 1     | 482                               | 0.9 | 618                               | 3.7 | 11.0                 | 80    |
| BZW04-342      | BZW04-342B    | 1                                 | 342 | 380                              | 1     | 548                               | 0.9 | 706                               | 3.2 | 11.0                 | 75    |
| BZW04-376      | BZW04-376B    | 1                                 | 376 | 418                              | 1     | 603                               | 0.8 | 776                               | 3.0 | 11.0                 | 70    |



- Note 2 :** Pulse test: t<sub>p</sub> < 50 ms.
- Note 3 :** ΔV<sub>BR</sub> = αT \* (T<sub>amb</sub> - 25) \* V<sub>BR</sub>(25°C)
- Note 4 :** V<sub>R</sub> = 0 V, F = 1 MHz. For bidirectional types, capacitance value is divided by 2

**Fig. 1:** Peak pulse power dissipation versus initial junction temperature (printed circuit board).

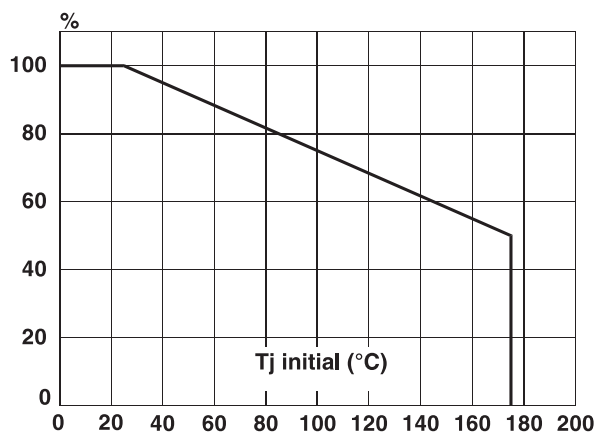


Fig. 2 : Peak pulse power versus exponential pulse duration.

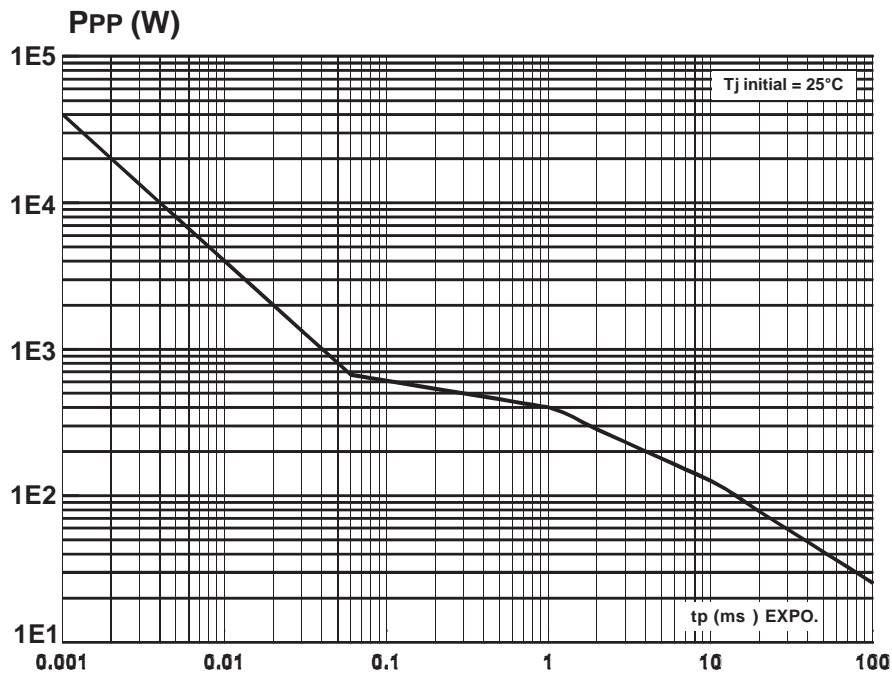
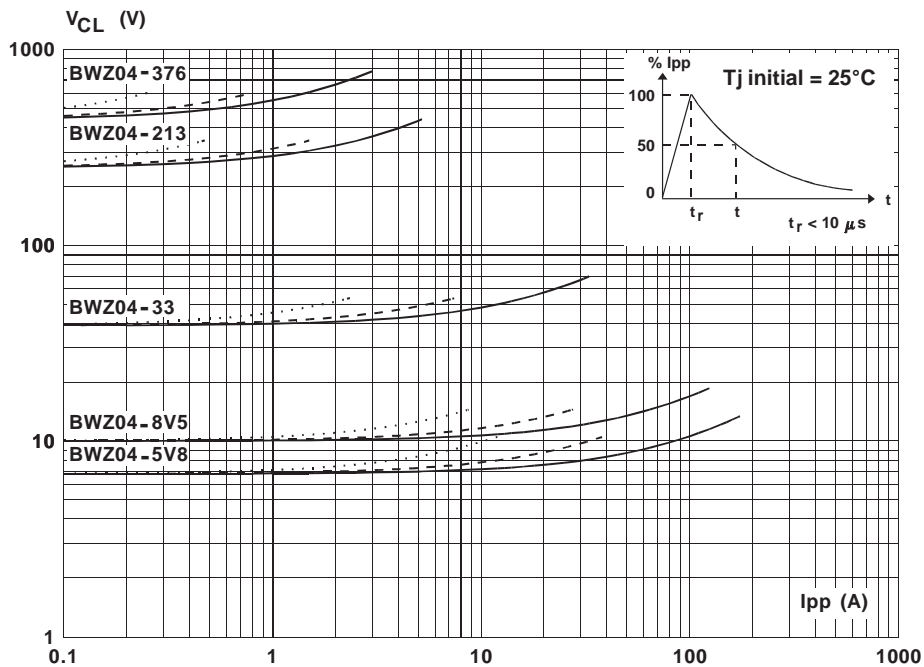


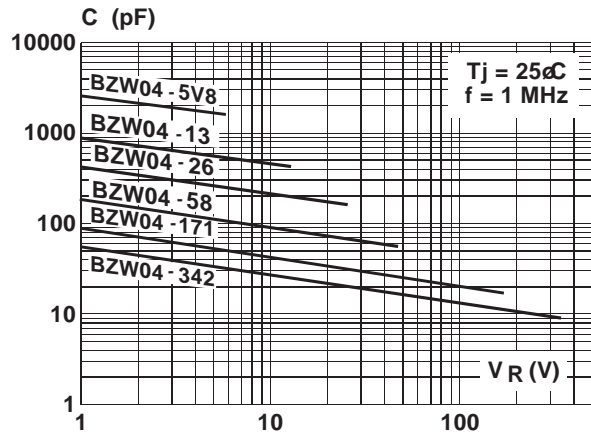
Fig. 3 : Clamping voltage versus peak pulse current.

Exponential waveform  $t_p = 20 \mu s$  \_\_\_\_\_  
 $t_p = 1 ms$  \_\_\_\_\_  
 $t_p = 10 ms$  .....

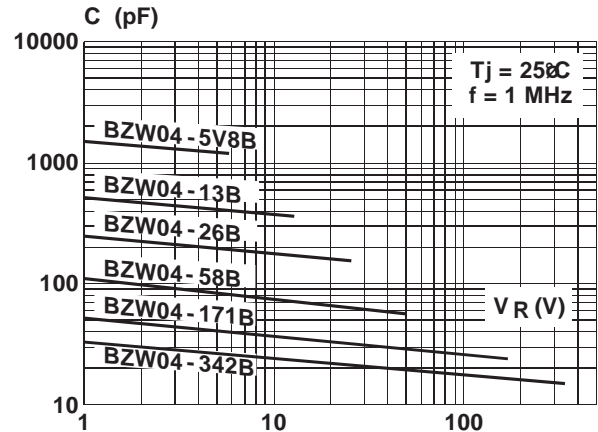


**Note :** The curves of the figure 3 are specified for a junction temperature of 25°C before surge.  
 The given results may be extrapolated for other junction temperatures by using the following formula :  
 $\Delta V_{BR} = \alpha T * (T_{amb} - 25) * V_{BR} (25^\circ C)$ .  
 For intermediate voltages, extrapolate the given results.

**Fig. 4a:** Capacitance versus reverse applied voltage for unidirectional types (typical values).

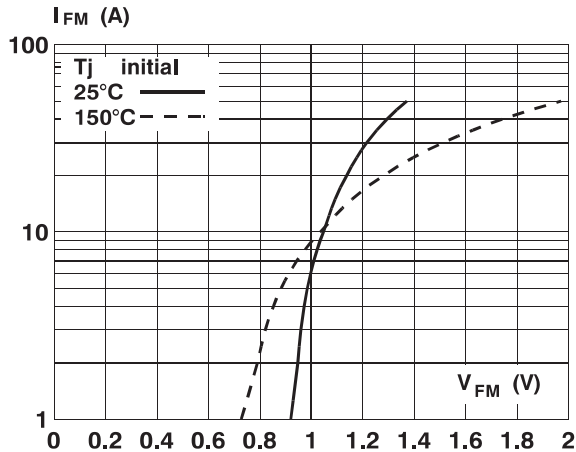


**Fig. 4b:** Capacitance versus reverse applied voltage for bidirectional types (typical values).

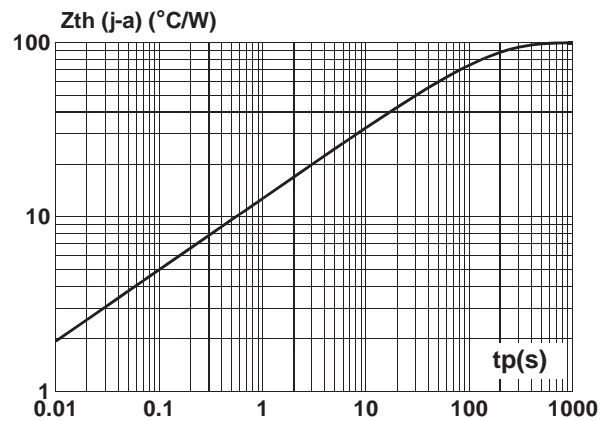


**Fig. 5:** Peak forward voltage drop versus peak forward current (typical values for unidirectional types).

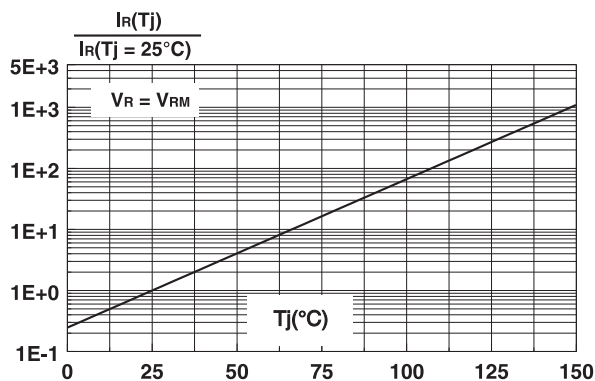
Note : Multiply by 2 for units with  $V_{BR} > 220V$ .



**Fig. 6:** Transient thermal impedance junction ambient versus pulse duration (For FR4 PC Board with L lead = 10mm).

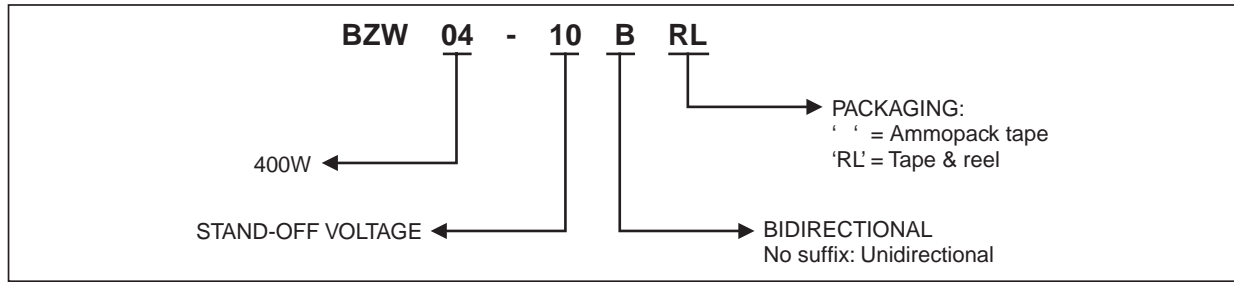


**Fig. 7 :** Relative variation of leakage current versus junction temperature.



## BZW04-xx

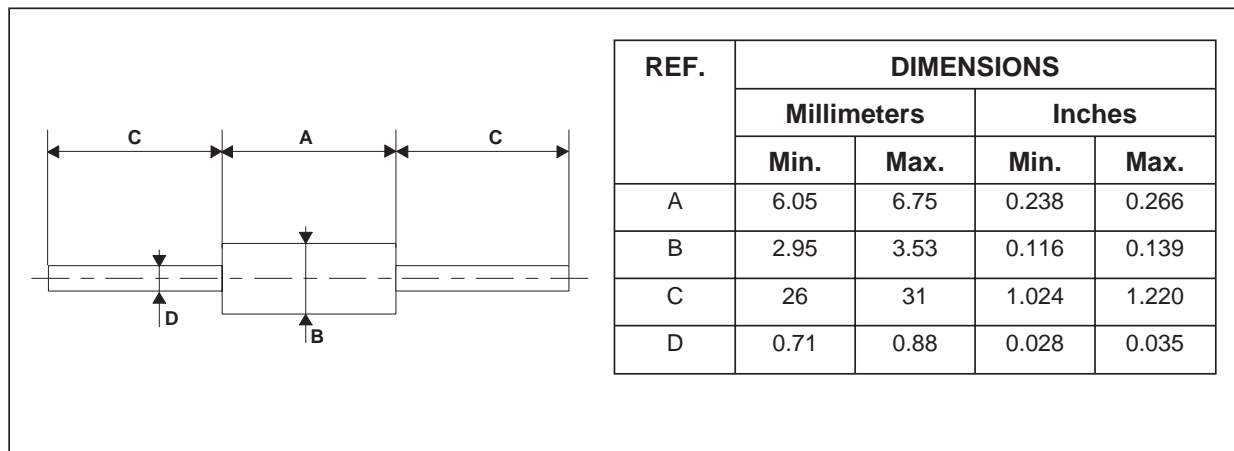
### ORDER



**MARKING** : Logo, Date Code, Type Code, Cathode Band (for unidirectional types only).

### PACKAGE MECHANICAL DATA

DO-15 (Plastic)



**Packaging:** standard packaging is in tape and reel.

**Weight** = 0.4 g.



Information furnished is believed to be accurate and reliable. However, STMicroelectronics assumes no responsibility for the consequences of use of such information nor for any infringement of patents or other rights of third parties which may result from its use. No license is granted by implication or otherwise under any patent or patent rights of STMicroelectronics. Specifications mentioned in this publication are subject to change without notice. This publication supersedes and replaces all information previously supplied. STMicroelectronics products are not authorized for use as critical components in life support devices or systems without express written approval of STMicroelectronics.

The ST logo is a registered trademark of STMicroelectronics  
 © 2003 STMicroelectronics - Printed in Italy - All rights reserved.  
 STMicroelectronics GROUP OF COMPANIES  
 Australia - Brazil - Canada - China - Finland - France - Germany  
 Hong Kong - India - Israel - Italy - Japan - Malaysia - Malta - Morocco - Singapore  
 Spain - Sweden - Switzerland - United Kingdom - United States.

<http://www.st.com>

## Looking for pricing, stock, or lifecycle information?

Click below to explore more details on WIN SOURCE:

-  [View BZW04-376B on WIN SOURCE](#)
-  [STMicroelectronics](#) Information

## Optimize Your Supply Chain with WIN SOURCE Solutions

-  Global Sourcing Solution
-  Obsolete Management
-  Cost Control Management
-  Shortage Management
-  Alternative Solution
-  Excess Inventory Management