

# 500 mW DO-35 Hermetically Sealed Glass Zener Voltage Regulators



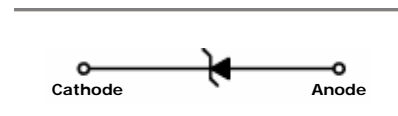
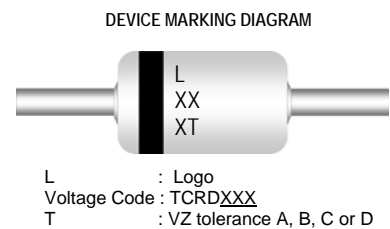
## Absolute Maximum Ratings T<sub>A</sub> = 25°C unless otherwise noted

| Parameter   | Value       | Units |
|---|-------------|-------|
| Power Dissipation                                 | 500         | mW    |
| Storage Temperature Range                         | -65 to +200 | °C    |
| Operating Junction Temperature                    | +200        | °C    |
| Lead Temperature (1/16" from case for 10 seconds) | +230        | °C    |

These ratings are limiting values above which the serviceability of the diode may be impaired.

## Specification Features:

- Zener Voltage Range 2.0 to 39 Volts
- DO-35 Package (JEDEC)
- Through-Hole Device Type Mounting
- Hermetically Sealed Glass
- Compression Bonded Construction
- All external surfaces are corrosion resistant and leads are readily solderable
- Cathode indicated by polarity band



ELECTRICAL SYMBOL

## Electrical Characteristics (T<sub>A</sub> = 25°C unless otherwise noted)

| Device Type | VZ Tolerance | VZ@IZT |      |      | Izt (mA) | Zzt@Izt (Ohms) Max | Zzk@Izk (Ohms) Max | Izk (mA) | I <sub>R</sub> @V <sub>R</sub> (uA) Max | V <sub>R</sub> (V) |
|-------------|--------------|--------|------|------|----------|--------------------|--------------------|----------|---|--------------------|
|             |              | Min    | Nom  | Max  |          |                    |                    |          |   |                    |
| TCRD2V2     | A            | 2.12   | 2.21 | 2.30 | 20       | 35                 | 400                | 1        | 55                                      | 0.7                |
|             | B            | 2.22   | 2.32 | 2.41 |          |                    |                    |          |   |                    |
| TCRD2V4     | A            | 2.33   | 2.42 | 2.51 | 20       | 35                 | 400                | 1        | 84                                      | 1                  |
|             | B            | 2.44   | 2.53 | 2.62 |          |                    |                    |          |   |                    |
| TCRD2V7     | A            | 2.54   | 2.64 | 2.74 | 20       | 35                 | 450                | 1        | 70                                      | 1                  |
|             | B            | 2.69   | 2.80 | 2.91 |          |                    |                    |          |   |                    |
| TCRD3V0     | A            | 2.85   | 2.96 | 3.06 | 20       | 35                 | 450                | 1        | 35                                      | 1                  |
|             | B            | 3.01   | 3.12 | 3.22 |          |                    |                    |          |   |                    |
| TCRD3V3     | A            | 3.16   | 3.27 | 3.37 | 20       | 35                 | 450                | 1        | 14                                      | 1                  |
|             | B            | 3.32   | 3.43 | 3.53 |          |                    |                    |          |   |                    |
| TCRD3V6     | A            | 3.47   | 3.57 | 3.67 | 20       | 48                 | 850                | 1        | 2.8                                     | 1                  |
|             | B            | 3.63   | 3.73 | 3.82 |          |                    |                    |          |   |                    |
| TCRD3V9     | A            | 3.77   | 3.88 | 3.98 | 20       | 40                 | 850                | 1        | 1.4                                     | 1                  |
|             | B            | 3.92   | 4.03 | 4.13 |          |                    |                    |          |   |                    |
| TCRD4V3     | A            | 4.06   | 4.15 | 4.24 | 20       | 32                 | 850                | 1        | 0.47                                    | 1                  |
|             | B            | 4.21   | 4.30 | 4.38 |          |                    |                    |          |   |                    |
|             | C            | 4.33   | 4.44 | 4.54 |          |                    |                    |          |   |                    |
| TCRD4V7     | A            | 4.46   | 4.56 | 4.66 | 20       | 21                 | 770                | 1        | 0.19                                    | 1                  |
|             | B            | 4.58   | 4.68 | 4.77 |          |                    |                    |          |   |                    |
|             | C            | 4.71   | 4.81 | 4.91 |          |                    |                    |          |   |                    |
| TCRD5V1     | A            | 4.84   | 4.94 | 5.04 | 20       | 17                 | 685                | 1        | 0.19                                    | 1.5                |
|             | B            | 4.97   | 5.08 | 5.18 |          |                    |                    |          |   |                    |
|             | C            | 5.11   | 5.23 | 5.35 |          |                    |                    |          |   |                    |

**Electrical Characteristics** ( $T_A = 25^\circ\text{C}$  unless otherwise noted)

| Device Type | T Tolerance | V <sub>z</sub> @I <sub>zt</sub> |       |       | I <sub>zt</sub> (mA) | Z <sub>zt</sub> @I <sub>zt</sub> (Ohms) Max | Z <sub>zk</sub> @I <sub>zk</sub> (Ohms) Max | I <sub>zk</sub> (mA) | I <sub>R</sub> @V <sub>R</sub> (uA) Max | V <sub>R</sub> (V) |
|-------------|-------------|---------------------------------|-------|-------|----------------------|---|---|----------------------|---|--------------------|
|             |             | Min                             | Nom   | Max   |                      |   |   |                      |   |                    |
| TCRD5V6     | A           | 5.29                            | 4.41  | 5.52  | 20                   | 10.5  | 425   | 1                    | 0.75                                    | 2.5                |
|             | B           | 5.46                            | 5.58  | 5.70  |                      |   |   |                      |   |                    |
|             | C           | 5.64                            | 5.76  | 5.88  |                      |   |   |                      |   |                    |
| TCRD6V2     | A           | 5.81                            | 5.94  | 6.06  | 20                   | 8.5   | 255   | 1                    | 3.30                                    | 3.0                |
|             | B           | 5.99                            | 6.12  | 6.24  |                      |   |   |                      |   |                    |
|             | C           | 6.16                            | 6.28  | 6.40  |                      |   |   |                      |   |                    |
| TCRD6V8     | A           | 6.31                            | 6.45  | 6.59  | 20                   | 6.6   | 123   | 0.5                  | 1.10                                    | 3.5                |
|             | B           | 6.52                            | 6.66  | 6.79  |                      |   |   |                      |   |                    |
|             | C           | 6.70                            | 6.83  | 6.95  |                      |   |   |                      |   |                    |
| TCRD7V5     | A           | 6.88                            | 7.04  | 7.20  | 20                   | 6.6   | 95  | 0.5                  | 0.30                                    | 4.0                |
|             | B           | 7.11                            | 7.26  | 7.42  |                      |   |   |                      |   |                    |
|             | C           | 7.32                            | 7.49  | 7.65  |                      |   |   |                      |   |                    |
| TCRD8V2     | A           | 7.55                            | 7.73  | 7.91  | 20                   | 6.6   | 95  | 0.5                  | 0.30                                    | 5.0                |
|             | B           | 7.81                            | 7.99  | 8.16  |                      |   |   |                      |   |                    |
|             | C           | 8.06                            | 8.24  | 8.42  |                      |   |   |                      |   |                    |
| TCRD9V1     | A           | 8.31                            | 8.51  | 8.71  | 20                   | 6.6   | 95  | 0.5                  | 0.30                                    | 6.0                |
|             | B           | 8.60                            | 8.80  | 9.00  |                      |   |   |                      |   |                    |
|             | C           | 8.88                            | 9.09  | 9.30  |                      |   |   |                      |   |                    |
| TCRD10V     | A           | 9.18                            | 9.39  | 9.60  | 20                   | 6.6   | 95  | 0.5                  | 0.11                                    | 7.0                |
|             | B           | 9.47                            | 9.69  | 9.91  |                      |   |   |                      |   |                    |
|             | C           | 9.81                            | 10.06 | 10.32 |                      |   |   |                      |   |                    |
| TCRD11V     | A           | 10.16                           | 10.41 | 10.65 | 10                   | 8.5   | 95  | 0.5                  | 0.133                                   | 8.0                |
|             | B           | 10.49                           | 10.73 | 10.96 |                      |   |   |                      |   |                    |
|             | C           | 10.81                           | 11.04 | 11.27 |                      |   |   |                      |   |                    |
| TCRD12V     | A           | 11.12                           | 11.38 | 11.64 | 10                   | 9.5   | 95  | 0.5                  | 0.133                                   | 9.0                |
|             | B           | 11.49                           | 11.71 | 11.93 |                      |   |   |                      |   |                    |
|             | C           | 11.79                           | 12.05 | 12.31 |                      |   |   |                      |   |                    |
| TCRD13V     | A           | 12.17                           | 12.45 | 12.72 | 10                   | 11.4  | 95  | 0.5                  | 0.133                                   | 10                 |
|             | B           | 12.58                           | 12.87 | 13.17 |                      |   |   |                      |   |                    |
|             | C           | 13.02                           | 13.33 | 13.63 |                      |   |   |                      |   |                    |
| TCRD15V     | A           | 13.47                           | 13.79 | 14.10 | 10                   | 13.3  | 95  | 0.5                  | 0.133                                   | 11                 |
|             | B           | 13.94                           | 14.26 | 14.57 |                      |   |   |                      |   |                    |
|             | C           | 14.40                           | 14.72 | 15.04 |                      |   |   |                      |   |                    |
| TCRD16V     | A           | 14.85                           | 15.19 | 15.52 | 10                   | 15.2  | 132   | 0.5                  | 0.133                                   | 12                 |
|             | B           | 15.30                           | 15.65 | 15.99 |                      |   |   |                      |   |                    |
|             | C           | 15.77                           | 16.14 | 16.51 |                      |   |   |                      |   |                    |
| TCRD18V     | A           | 16.32                           | 16.70 | 17.08 | 10                   | 19.4  | 123   | 0.5                  | 0.133                                   | 13                 |
|             | B           | 16.90                           | 17.29 | 17.67 |                      |   |   |                      |   |                    |
|             | C           | 17.50                           | 17.90 | 18.30 |                      |   |   |                      |   |                    |
| TCRD20V     | A           | 17.11                           | 18.52 | 18.93 | 10                   | 23.5  | 170   | 0.5                  | 0.133                                   | 15                 |
|             | B           | 17.71                           | 19.13 | 19.55 |                      |   |   |                      |   |                    |
|             | C           | 19.35                           | 19.80 | 20.25 |                      |   |   |                      |   |                    |
|             | D           | 19.86                           | 20.30 | 20.74 |                      |   |   |                      |   |                    |
| TCRD22V     | A           | 20.21                           | 20.66 | 21.10 | 5                    | 25.6  | 170   | 0.5                  | 0.133                                   | 17                 |
|             | B           | 20.75                           | 21.21 | 21.67 |                      |   |   |                      |   |                    |
|             | C           | 21.22                           | 21.66 | 22.10 |                      |   |   |                      |   |                    |
|             | D           | 21.67                           | 22.15 | 22.62 |                      |   |   |                      |   |                    |
| TCRD24V     | A           | 22.24                           | 22.69 | 23.14 | 5                    | 29.0  | 170   | 0.5                  | 0.133                                   | 19                 |
|             | B           | 22.73                           | 23.24 | 23.75 |                      |   |   |                      |   |                    |
|             | C           | 23.27                           | 23.78 | 24.29 |                      |   |   |                      |   |                    |
|             | D           | 23.79                           | 24.31 | 24.84 |                      |   |   |                      |   |                    |

**Electrical Characteristics** ( $T_A = 25^\circ\text{C}$  unless otherwise noted)

| Device Type | T Tolerance | V <sub>Z</sub> @I <sub>ZT</sub> |       |       | I <sub>ZT</sub> (mA) | Z <sub>zt</sub> @I <sub>ZT</sub> (Ohms) Max | Z <sub>zk</sub> @I <sub>ZK</sub> (Ohms) Max | I <sub>ZK</sub> (mA) | I <sub>R</sub> @V <sub>R</sub> (uA) Max | V <sub>R</sub> (V) |
|-------------|-------------|---------------------------------|-------|-------|----------------------|---|---|----------------------|---|--------------------|
|             |             | Min                             | Nom   | Max   |                      |   |   |                      |   |                    |
| TCRD27V     | A           | 24.24                           | 24.89 | 25.54 | 5                    | 38.0  | 210   | 0.5                  | 0.133                                   | 21                 |
|             | B           | 24.95                           | 25.62 | 26.28 |                      |   |   |                      |   |                    |
|             | C           | 25.60                           | 26.29 | 26.97 |                      |   |   |                      |   |                    |
|             | D           | 26.28                           | 26.97 | 27.67 |                      |   |   |                      |   |                    |
| TCRD30V     | A           | 26.98                           | 27.69 | 28.41 | 5                    | 46.0  | 210   | 0.5                  | 0.133                                   | 23                 |
|             | B           | 27.67                           | 28.41 | 29.15 |                      |   |   |                      |   |                    |
|             | C           | 28.34                           | 29.09 | 29.84 |                      |   |   |                      |   |                    |
|             | D           | 29.00                           | 29.77 | 30.54 |                      |   |   |                      |   |                    |
| TCRD33V     | A           | 29.66                           | 30.45 | 31.25 | 5                    | 55.0  | 210   | 0.5                  | 0.133                                   | 25                 |
|             | B           | 30.29                           | 31.10 | 31.91 |                      |   |   |                      |   |                    |
|             | C           | 30.88                           | 31.70 | 32.52 |                      |   |   |                      |   |                    |
|             | D           | 31.46                           | 32.30 | 33.15 |                      |   |   |                      |   |                    |
| TCRD36V     | A           | 32.19                           | 32.96 | 33.74 | 5                    | 63.0  | 210   | 0.5                  | 0.133                                   | 27                 |
|             | B           | 32.83                           | 33.63 | 34.42 |                      |   |   |                      |   |                    |
|             | C           | 33.46                           | 34.27 | 35.07 |                      |   |   |                      |   |                    |
|             | D           | 34.07                           | 34.89 | 35.71 |                      |   |   |                      |   |                    |
| TCRD39V     | A           | 34.74                           | 35.57 | 36.41 | 5                    | 72.0  | 210   | 0.5                  | 0.133                                   | 30                 |
|             | B           | 35.41                           | 36.26 | 37.12 |                      |   |   |                      |   |                    |
|             | C           | 36.05                           | 36.92 | 37.79 |                      |   |   |                      |   |                    |
|             | D           | 36.69                           | 37.58 | 38.46 |                      |   |   |                      |   |                    |

VF (forward voltage) = 1.2 V maximum @ IF = 200mA for all types

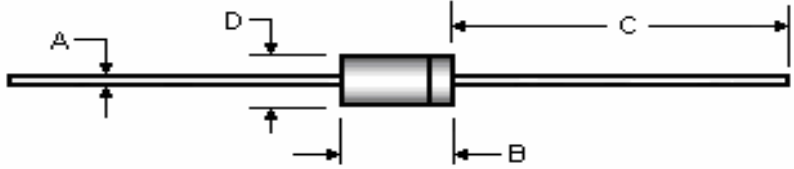
**Notes:**

1. The zener voltage subdivision (VZ) is measured 40mS after diode is powered up.
2. The operating resistance (Zzt and Zzk) is measured by superimposing a minute alternation current in the regulated current (Iz).
3. When ordering, please specify tolerance A, B, C or D.

**Ordering Information**

| Device     | Package  | Quantity |
|------------|--|----------|
| TCRDxxxx   | Bulk   | 10,000   |
| TCRDxxxxTB | Tape and Ammo  | 5,000    |
| TCRDxxxxTR | Tape and Reel  | 10,000   |
| TCRDxxxx   | Others (...contact Tak Cheong sales representatives) |          |

Package Outline

| Package  | Case Outline   |                    |       |               |       |
|----------|--|--------------------|-------|---------------|-------|
| DO-35    |  |                    |       |               |       |
|          | <b>DO-35</b>   |                    |       |               |       |
|          | <b>DIM</b>   | <b>Millimeters</b> |       | <b>Inches</b> |       |
|          |  | Min                | Max   | Min           | Max   |
|          | <b>A</b>   | 0.46               | 0.55  | 0.018         | 0.022 |
|          | <b>B</b>   | 3.05               | 5.08  | 0.120         | 0.200 |
| <b>C</b> | 25.40  | 38.10              | 1.000 | 1.500         |       |
| <b>D</b> | 1.53   | 2.28               | 0.060 | 0.090         |       |

Notes:

1. All dimensions are within JEDEC standard.
2. DO35 polarity denoted by cathode band.