

TOSHIBA Zener Diode Silicon Epitaxial Type

# CRY62~CRZ47

**Applications:**

Communication, Control and  
Measurement Equipment  
Constant Voltage Regulation  
Transient Suppressors

- Average power dissipation:  $P = 0.7 \text{ W}$
- Zener voltage:  $V_Z = 6.2\sim 47 \text{ V}$
- Suitable for compact assembly due to small surface-mount package  
"S-FLAT™" (Toshiba package name)

**Absolute Maximum Ratings ( $T_a = 25^\circ\text{C}$ )**

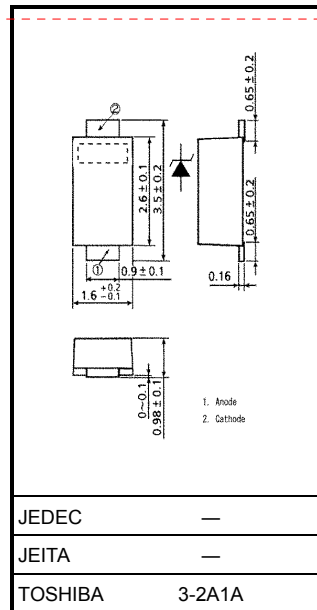
| Characteristic            | Symbol    | Rating    | Unit |
|---------------------------|-----------|-----------|------|
| Power dissipation         | P         | 700       | mW   |
| Junction temperature      | $T_j$     | -40 ~ 150 | °C   |
| Storage temperature range | $T_{stg}$ | -40 ~ 150 | °C   |

Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings. Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/Derating Concept and Methods) and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

Unit: mm

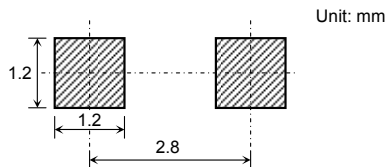
削除: Use in

削除: Automation



Weight: 0.013 g (typ.)

**Standard Soldering Pad**



**Electrical Characteristics (Ta = 25°C)**

| Product No. | Zener Voltage      |      |      | Measurement Current I <sub>Z</sub> (mA) | Zener Impedance    |   | Temperature Coefficient of Zener Voltage α <sub>T</sub> (mV / °C) |     | Forward Voltage    |  | Reverse Current     |  |
|-------------|--------------------|------|------|---|--------------------|---|---|-----|--------------------|--|---------------------|--|
|             | V <sub>Z</sub> (V) |      |      |   | r <sub>d</sub> (Ω) | Measurement Current I <sub>Z</sub> (mA) | Typ.  | Max | V <sub>F</sub> (V) | Measurement Current I <sub>F</sub> (A) | I <sub>R</sub> (μA) | Measurement Voltage V <sub>R</sub> (V) |
|             | Min                | Typ. | Max  | Max                                     |                    |   |   |     |                    |  |                     |  |
| CRY62       | 5.6                | 6.2  | 6.8  | 10                                      | 60                 | 10                                      | 2   | 3   | 1.0                | 0.2                                    | 10                  | 3.0                                    |
| CRY68       | 6.2                | 6.8  | 7.4  | 10                                      | 60                 | 10                                      | 3   | 4   | 1.0                | 0.2                                    | 10                  | 3.0                                    |
| CRY75       | 6.8                | 7.5  | 8.3  | 10                                      | 30                 | 10                                      | 4   | 5   | 1.0                | 0.2                                    | 10                  | 4.5                                    |
| CRY82       | 7.4                | 8.2  | 9.0  | 10                                      | 30                 | 10                                      | 4   | 6   | 1.0                | 0.2                                    | 10                  | 4.9                                    |
| CRY91       | 8.2                | 9.1  | 10.0 | 10                                      | 30                 | 10                                      | 5   | 8   | 1.0                | 0.2                                    | 10                  | 5.5                                    |
| CRZ10       | 9.0                | 10.0 | 11.0 | 10                                      | 30                 | 10                                      | 6   | 9   | 1.0                | 0.2                                    | 10                  | 6.0                                    |
| CRZ11       | 9.9                | 11.0 | 12.1 | 10                                      | 30                 | 10                                      | 7   | 11  | 1.0                | 0.2                                    | 10                  | 7.0                                    |
| CRZ12       | 10.8               | 12.0 | 13.2 | 10                                      | 30                 | 10                                      | 8   | 13  | 1.0                | 0.2                                    | 10                  | 8.0                                    |
| CRZ13       | 11.7               | 13.0 | 14.3 | 10                                      | 30                 | 10                                      | 9   | 14  | 1.0                | 0.2                                    | 10                  | 9.0                                    |
| CRZ15       | 13.5               | 15.0 | 16.5 | 10                                      | 30                 | 10                                      | 11  | 17  | 1.0                | 0.2                                    | 10                  | 10.0                                   |
| CRZ16       | 14.4               | 16.0 | 17.6 | 10                                      | 30                 | 10                                      | 12  | 19  | 1.0                | 0.2                                    | 10                  | 11.0                                   |
| CRZ18       | 16.2               | 18.0 | 19.8 | 10                                      | 30                 | 10                                      | 14  | 23  | 1.0                | 0.2                                    | 10                  | 13.0                                   |
| CRZ20       | 18.0               | 20.0 | 22.0 | 10                                      | 30                 | 10                                      | 16  | 26  | 1.0                | 0.2                                    | 10                  | 14.0                                   |
| CRZ22       | 19.8               | 22.0 | 24.2 | 10                                      | 30                 | 10                                      | 18  | 28  | 1.0                | 0.2                                    | 10                  | 16.0                                   |
| CRZ24       | 21.6               | 24.0 | 26.4 | 10                                      | 30                 | 10                                      | 20  | 32  | 1.0                | 0.2                                    | 10                  | 17.0                                   |
| CRZ27       | 24.3               | 27.0 | 29.7 | 10                                      | 30                 | 10                                      | 23  | 36  | 1.0                | 0.2                                    | 10                  | 19.0                                   |
| CRZ30       | 27.0               | 30.0 | 33.0 | 10                                      | 30                 | 10                                      | 25  | 40  | 1.0                | 0.2                                    | 10                  | 21.0                                   |
| CRZ33       | 29.7               | 33.0 | 36.3 | 10                                      | 30                 | 10                                      | 26  | 41  | 1.0                | 0.2                                    | 10                  | 26.4                                   |
| CRZ36       | 32.4               | 36.0 | 39.6 | 9                                       | 30                 | 9                                       | 28  | 45  | 1.0                | 0.2                                    | 10                  | 28.8                                   |
| CRZ39       | 35.1               | 39.0 | 42.9 | 8                                       | 35                 | 8                                       | 30  | 48  | 1.0                | 0.2                                    | 10                  | 31.2                                   |
| CRZ43       | 38.7               | 43.0 | 47.3 | 7                                       | 40                 | 7                                       | 33  | 53  | 1.0                | 0.2                                    | 10                  | 34.4                                   |
| CRZ47       | 42.3               | 47.0 | 51.7 | 6                                       | 65                 | 6                                       | 38  | 60  | 1.0                | 0.2                                    | 10                  | 37.6                                   |

## Marking

| Abbreviation Code | Part No. |
|-------------------|----------|
| 6□2               | CRY62    |
| 6□8               | CRY68    |
| 7□5               | CRY75    |
| 8□2               | CRY82    |
| 9□1               | CRY91    |
| □10               | CRZ10    |
| □11               | CRZ11    |
| □12               | CRZ12    |
| □13               | CRZ13    |
| □15               | CRZ15    |
| □16               | CRZ16    |
| □18               | CRZ18    |
| □20               | CRZ20    |
| □22               | CRZ22    |
| □24               | CRZ24    |
| □27               | CRZ27    |
| □30               | CRZ30    |
| □33               | CRZ33    |
| □36               | CRZ36    |
| □39               | CRZ39    |
| □43               | CRZ43    |
| □47               | CRZ47    |

## Handling Precaution

The absolute maximum ratings denote the absolute maximum ratings, which are rated values and must not be exceeded during operation, even for an instant. The following are the general derating methods that we recommend when you design a circuit with a device.

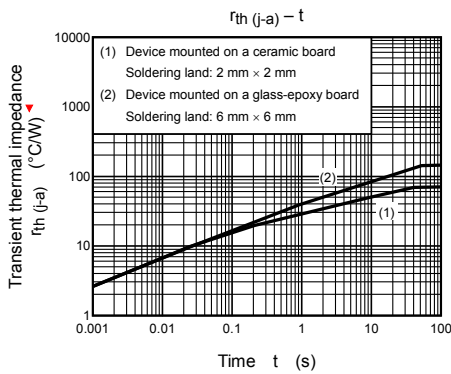
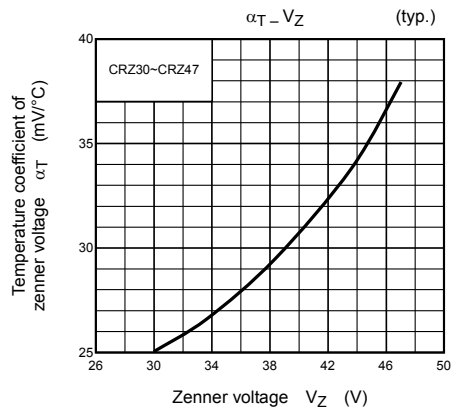
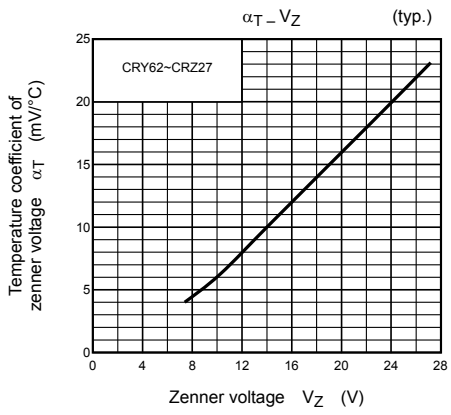
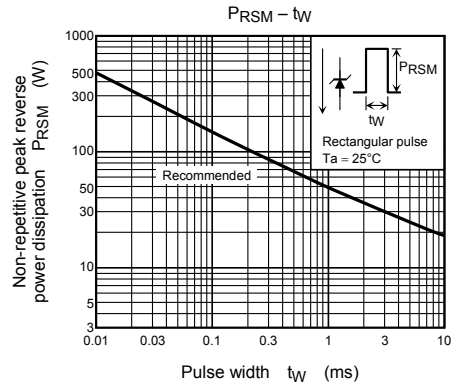
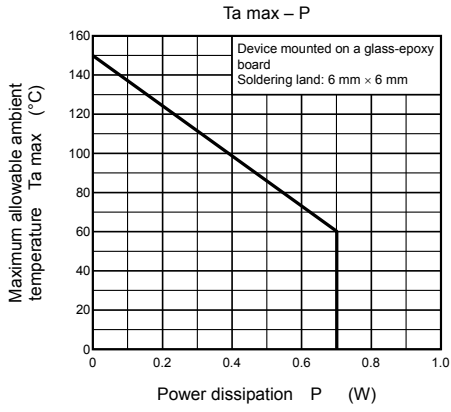
P: We recommend that the worst case power dissipation be no greater than 50% of the absolute maximum rating of power dissipation. Carry out adequate heat design.

PRSM: We recommend that a device be used within the recommended area in the figure, PRSM-tw.

T<sub>j</sub>: Derate this rating when using a device in order to ensure high reliability. We recommend that the device be used at a T<sub>j</sub> of below 120°C.

Thermal resistance between junction and ambient fluctuates depending on the device's mounting condition. When using a device, design a circuit board and a soldering land size to match the appropriate thermal resistance value.

Please refer to the Rectifiers databook for further information.



削除: n

**RESTRICTIONS ON PRODUCT USE**

20070701-EN

- The information contained herein is subject to change without notice.
- TOSHIBA is continually working to improve the quality and reliability of its products. Nevertheless, semiconductor devices in general can malfunction or fail due to their inherent electrical sensitivity and vulnerability to physical stress. It is the responsibility of the buyer, when utilizing TOSHIBA products, to comply with the standards of safety in making a safe design for the entire system, and to avoid situations in which a malfunction or failure of such TOSHIBA products could cause loss of human life, bodily injury or damage to property.  
In developing your designs, please ensure that TOSHIBA products are used within specified operating ranges as set forth in the most recent TOSHIBA products specifications. Also, please keep in mind the precautions and conditions set forth in the "Handling Guide for Semiconductor Devices," or "TOSHIBA Semiconductor Reliability Handbook" etc.
- The TOSHIBA products listed in this document are intended for usage in general electronics applications (computer, personal equipment, office equipment, measuring equipment, industrial robotics, domestic appliances, etc.). These TOSHIBA products are neither intended nor warranted for usage in equipment that requires extraordinarily high quality and/or reliability or a malfunction or failure of which may cause loss of human life or bodily injury ("Unintended Usage"). Unintended Usage include atomic energy control instruments, airplane or spaceship instruments, transportation instruments, traffic signal instruments, combustion control instruments, medical instruments, all types of safety devices, etc.. Unintended Usage of TOSHIBA products listed in this document shall be made at the customer's own risk.
- The products described in this document shall not be used or embedded to any downstream products of which manufacture, use and/or sale are prohibited under any applicable laws and regulations.
- The information contained herein is presented only as a guide for the applications of our products. No responsibility is assumed by TOSHIBA for any infringements of patents or other rights of the third parties which may result from its use. No license is granted by implication or otherwise under any patents or other rights of TOSHIBA or the third parties.
- Please contact your sales representative for product-by-product details in this document regarding RoHS compatibility. Please use these products in this document in compliance with all applicable laws and regulations that regulate the inclusion or use of controlled substances. Toshiba assumes no liability for damage or losses occurring as a result of noncompliance with applicable laws and regulations.