

TOSHIBA Zener Diode Silicon Diffused Type

## CMZ12~CMZ53

### Applications:

Communication, Control and  
Measurement Equipment  
Constant Voltage Regulation  
Transient Suppressors

- Average power dissipation :  $P = 2.0 \text{ W}$
- Zener voltage :  $V_Z = 12 \text{ V} \sim 53 \text{ V}$
- Suitable for compact assembly due to small surface-mount package  
“M-FLAT™” (Toshiba package name)

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

| Characteristics           | Symbol    | Rating       | Unit             |
|---------------------------|-----------|--------------|------------------|
| Power dissipation         | P         | 2.0 (Note 1) | W                |
| Junction temperature      | $T_j$     | -40~150      | $^\circ\text{C}$ |
| Storage temperature range | $T_{stg}$ | -40~150      | $^\circ\text{C}$ |

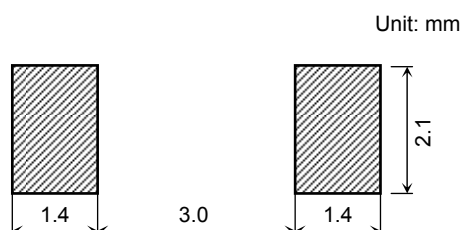
Note 1:  $T_a = 30^\circ\text{C}$

Device mounted on a ceramic board  
Board size: 50 mm  $\times$  50 mm  
Soldering size: 2 mm  $\times$  2 mm  
Board thickness: 0.64 t

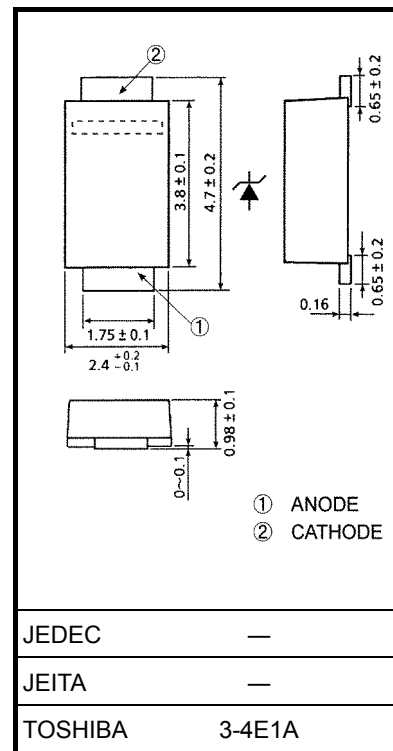
Note 2: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) 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).

### Standard Soldering Pad



Unit: mm



|         |        |
|---------|--------|
| JEDEC   | —      |
| JEITA   | —      |
| TOSHIBA | 3-4E1A |

Weight: 0.023 g (typ.)

## Electrical Characteristics (Ta = 25°C)

| Type  | Zener Voltage<br>V <sub>Z</sub> (V) |      |      |                                                    | Zener Impedance<br>r <sub>d</sub> (Ω) |                                                    | Temperature<br>Coefficient<br>Of Zener<br>αT (mV/°C) |     | Forward Voltage<br>V <sub>F</sub> (V) |                                                   | Reverse Current<br>I <sub>R</sub> (μA) |                                                   |
|-------|-------------------------------------|------|------|----------------------------------------------------|---------------------------------------|----------------------------------------------------|------------------------------------------------------|-----|---------------------------------------|---------------------------------------------------|----------------------------------------|---------------------------------------------------|
|       | Min                                 | Typ. | Max  | Measure-<br>ment<br>Current<br>I <sub>Z</sub> (mA) | Max                                   | Measure-<br>ment<br>Current<br>I <sub>Z</sub> (mA) | Typ.                                                 | Max | Max                                   | Measure-<br>ment<br>Current<br>I <sub>F</sub> (A) | Max                                    | Measure-<br>ment<br>Voltage<br>V <sub>R</sub> (V) |
| CMZ12 | 10.8                                | 12   | 13.2 | 10                                                 | 30                                    | 10                                                 | 8                                                    | 13  | 1.2                                   | 0.2                                               | 10                                     | 8                                                 |
| CMZ13 | 11.7                                | 13   | 14.3 | 10                                                 | 30                                    | 10                                                 | 9                                                    | 14  | 1.2                                   | 0.2                                               | 10                                     | 9                                                 |
| CMZ15 | 13.5                                | 15   | 16.5 | 10                                                 | 30                                    | 10                                                 | 11                                                   | 17  | 1.2                                   | 0.2                                               | 10                                     | 10                                                |
| CMZ16 | 14.4                                | 16   | 17.6 | 10                                                 | 30                                    | 10                                                 | 12                                                   | 19  | 1.2                                   | 0.2                                               | 10                                     | 11                                                |
| CMZ18 | 16.2                                | 18   | 19.8 | 10                                                 | 30                                    | 10                                                 | 14                                                   | 23  | 1.2                                   | 0.2                                               | 10                                     | 13                                                |
| CMZ20 | 18.0                                | 20   | 22.0 | 10                                                 | 30                                    | 10                                                 | 16                                                   | 26  | 1.2                                   | 0.2                                               | 10                                     | 14                                                |
| CMZ22 | 19.8                                | 22   | 24.2 | 10                                                 | 30                                    | 10                                                 | 18                                                   | 28  | 1.2                                   | 0.2                                               | 10                                     | 16                                                |
| CMZ24 | 21.6                                | 24   | 26.4 | 10                                                 | 30                                    | 10                                                 | 20                                                   | 32  | 1.2                                   | 0.2                                               | 10                                     | 17                                                |
| CMZ27 | 24.3                                | 27   | 29.7 | 10                                                 | 30                                    | 10                                                 | 23                                                   | 36  | 1.2                                   | 0.2                                               | 10                                     | 19                                                |
| CMZ30 | 27.0                                | 30   | 33.0 | 10                                                 | 30                                    | 10                                                 | 25                                                   | 40  | 1.2                                   | 0.2                                               | 10                                     | 21                                                |
| CMZ33 | 29.7                                | 33   | 36.3 | 10                                                 | 30                                    | 10                                                 | 26                                                   | 41  | 1.2                                   | 0.2                                               | 10                                     | 26.4                                              |
| CMZ36 | 32.4                                | 36   | 39.6 | 9                                                  | 30                                    | 9                                                  | 28                                                   | 45  | 1.2                                   | 0.2                                               | 10                                     | 28.8                                              |
| CMZ39 | 35.1                                | 39   | 42.9 | 8                                                  | 35                                    | 8                                                  | 30                                                   | 48  | 1.2                                   | 0.2                                               | 10                                     | 31.2                                              |
| CMZ43 | 38.7                                | 43   | 47.3 | 7                                                  | 40                                    | 7                                                  | 33                                                   | 53  | 1.2                                   | 0.2                                               | 10                                     | 34.4                                              |
| CMZ47 | 42.3                                | 47   | 51.7 | 6                                                  | 65                                    | 6                                                  | 38                                                   | 60  | 1.2                                   | 0.2                                               | 10                                     | 37.6                                              |
| CMZ51 | 45.9                                | 51   | 56.1 | 6                                                  | 65                                    | 6                                                  | 43                                                   | 68  | 1.2                                   | 0.2                                               | 10                                     | 40.8                                              |
| CMZ53 | 47.7                                | 53   | 58.3 | 5                                                  | 85                                    | 5                                                  | 49                                                   | 77  | 1.2                                   | 0.2                                               | 10                                     | 42.4                                              |

## Marking

| Abbreviation Code | Part No. |
|-------------------|----------|
| 12                | CMZ12    |
| 13                | CMZ13    |
| 15                | CMZ15    |
| 16                | CMZ16    |
| 18                | CMZ18    |
| 20                | CMZ20    |
| 22                | CMZ22    |
| 24                | CMZ24    |
| 27                | CMZ27    |
| 30                | CMZ30    |
| 33                | CMZ33    |
| 36                | CMZ36    |
| 39                | CMZ39    |
| 43                | CMZ43    |
| 47                | CMZ47    |
| 51                | CMZ51    |
| 53                | CMZ53    |

**Handling Precaution**

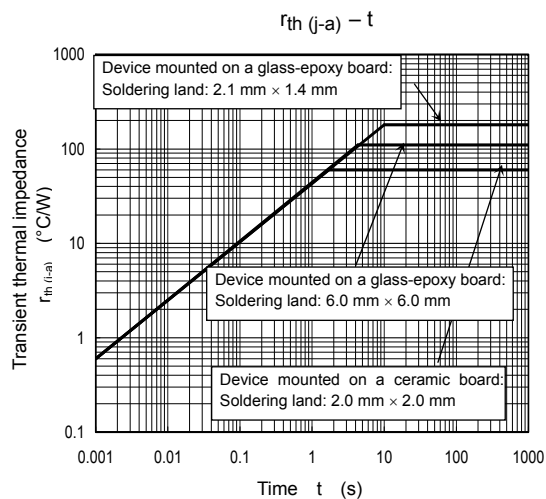
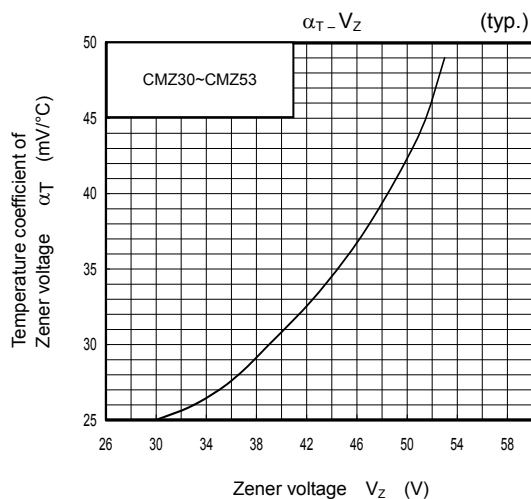
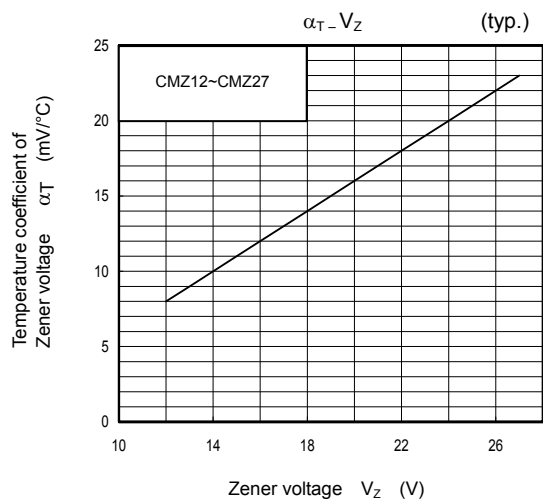
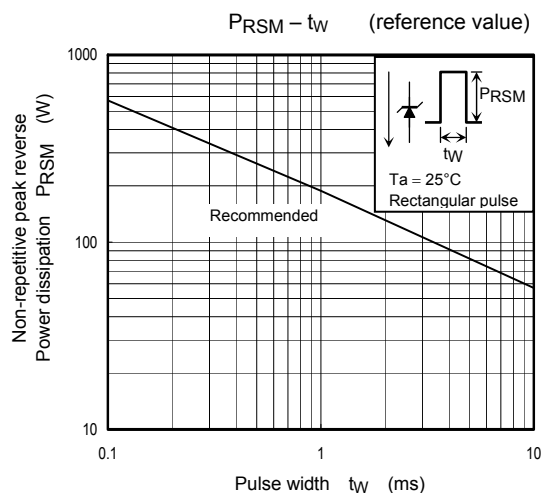
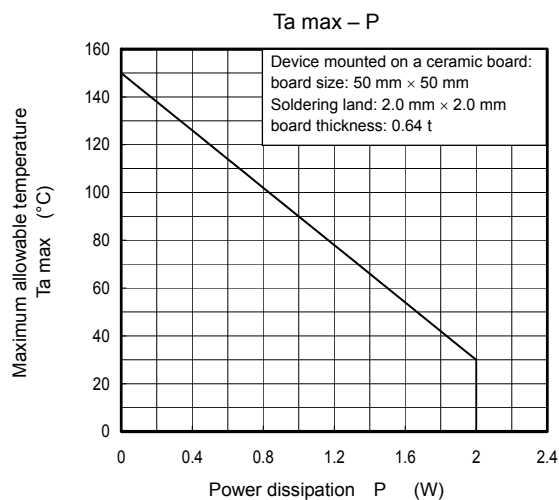
- 1) The absolute maximum ratings denote the absolute maximum ratings, which are rated values and must not be exceeded during operation, even for an instant. The following are the general derating methods that we recommend when you design a circuit with a device.

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.

- 2) 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.
- 3) Please refer to the Rectifiers databook for further information.



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