

# TLWF1109A(T11

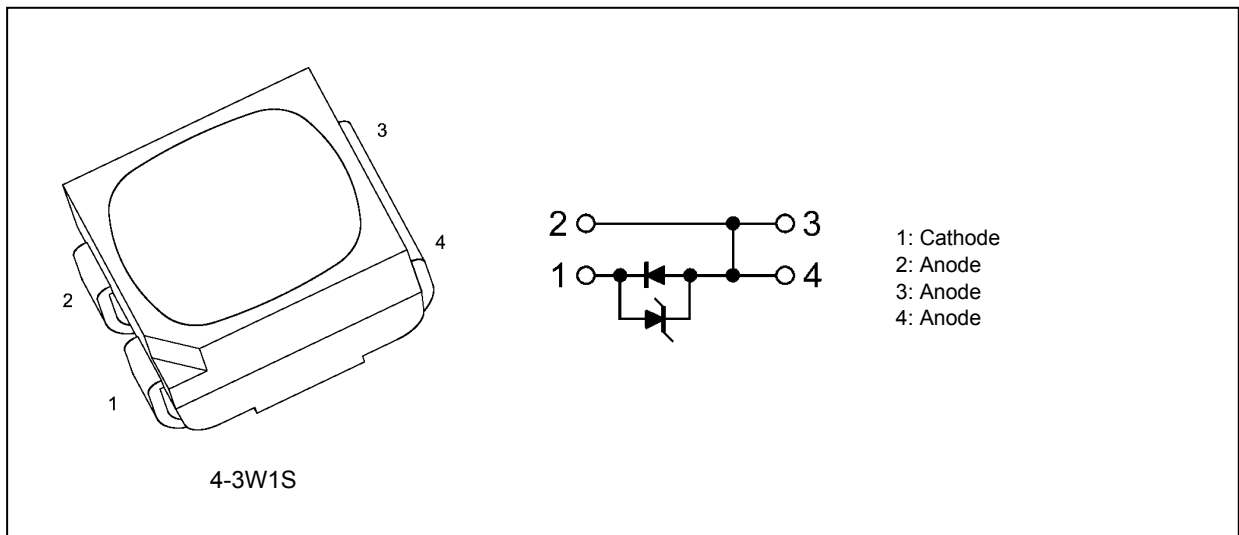
## 1. Applications

- General Lighting
- Backlighting
- Pilot Lamps

## 2. Features

- (1) Size: 3.2 (L) mm × 2.9 (W) mm × 1.9 (H) mm
- (2) Luminous intensity:  $I_V = 3600$  mcd (typ.) @  $I_F = 40$  mA
- (3) LED chip and phosphor
- (4) Emitting material: InGaN
- (5) Color: White (Daylight)
- (6) High heat-resistant type:  $T_{opr}/T_{stg} = -40$  to  $100^\circ\text{C}$
- (7) High current driving:  $I_F = 50$  mA (max)
- (8) Standard embossed tape packing: 4-mm pitch: T11 type (2000 pcs/reel), 8-mm tape/reel

## 3. Packaging and Internal Circuit

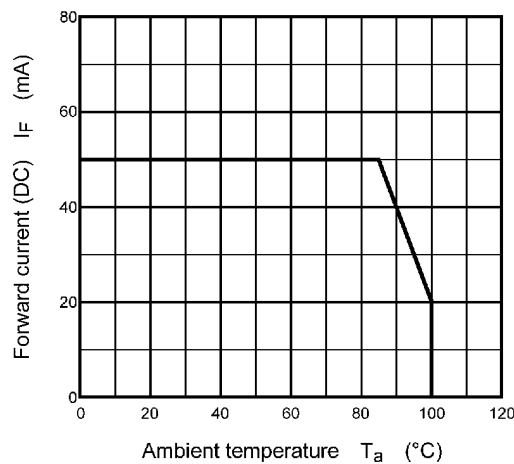


**4. Absolute Maximum Ratings (Note) (Unless otherwise specified,  $T_a = 25^\circ\text{C}$ )**

| Characteristics       | Symbol    | Note         | Max        | Unit             |
|-----------------------|-----------|--------------|------------|------------------|
| Forward current (DC)  | $I_F$     | See Fig. 4.1 | 50         | mA               |
| Power dissipation     | $P_D$     |              | 215        | mW               |
| Operating temperature | $T_{opr}$ |              | -40 to 100 | $^\circ\text{C}$ |
| Storage temperature   | $T_{stg}$ |              | -40 to 100 | $^\circ\text{C}$ |

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).



**Fig. 4.1 Forward Current Derating,  $I_F - T_a$**

**5. Handling Precautions**

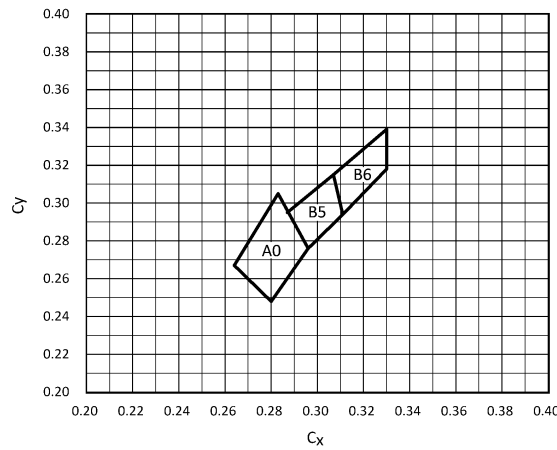
- When handling this LED, take the following measures to prevent the LED from being damaged or otherwise adversely affected.
  1. Use a conductive tablemat and conductive floor mat, and ground the workbench and floor.
  2. Operators handling laser diodes must be grounded via a high resistance (about 1 M $\Omega$ ). A conductive strap is good for this purpose.
  3. Ground all tools including soldering irons.
- Since this product is intended to be used for display lighting, the measurement standard is based on the spectral sensitivity of the human eye. It is not intended to be used for any applications other than display lighting (e.g., sensors and light communications systems.)

**6. Electrical Characteristics (Unless otherwise specified,  $T_a = 25^\circ\text{C}$ )**

| Characteristics | Symbol | Note | Test Condition        | Min | Typ. | Max | Unit |
|-----------------|--------|------|-----------------------|-----|------|-----|------|
| Forward voltage | $V_F$  |      | $I_F = 40 \text{ mA}$ | 3.1 | 3.6  | 4.3 | V    |
| Reverse voltage | $V_R$  |      | $I_R = 1 \text{ mA}$  | —   | 0.75 | —   |      |

**7. Optical Characteristics (Unless otherwise specified,  $T_a = 25^\circ\text{C}$ )**

| Characteristics              | Symbol | Note                    | Test Condition        | Min  | Typ. | Max  | Unit |
|------------------------------|--------|-------------------------|-----------------------|------|------|------|------|
| Chromaticity                 | $C_x$  | See Fig. 7.1, Table 7.1 | $I_F = 40 \text{ mA}$ | —    | —    | —    | —    |
|                              | $C_y$  |                         | $I_F = 40 \text{ mA}$ | —    | —    | —    | —    |
| Luminous intensity (on-axis) | $I_V$  | See Table 7.2           | $I_F = 40 \text{ mA}$ | 2000 | 3600 | 8000 | mcd  |



**Fig. 7.1 Chromaticity Rank (Note)**

Note: Test conditions:  $I_F = 40 \text{ mA}$ ,  $T_a = 25^\circ\text{C}$ , Tolerance:  $\pm 0.01$

**Table 7.1 Chromaticity Rank (Note)**

| Rank | $C_x$ | $C_y$ |
|------|-------|-------|
| A0   | 0.280 | 0.248 |
|      | 0.296 | 0.276 |
|      | 0.283 | 0.305 |
|      | 0.264 | 0.267 |
| B5   | 0.296 | 0.276 |
|      | 0.311 | 0.294 |
|      | 0.307 | 0.315 |
|      | 0.287 | 0.295 |
| B6   | 0.311 | 0.294 |
|      | 0.330 | 0.318 |
|      | 0.330 | 0.339 |
|      | 0.307 | 0.315 |

Note: This LED lamp is sorted into chromaticity coordinate groups shown above. Each reel includes the same rank LEDs. Let the delivery ratio of each rank be unquestioned.

**Table 7.2 Luminous Intensity Rank (Note)**

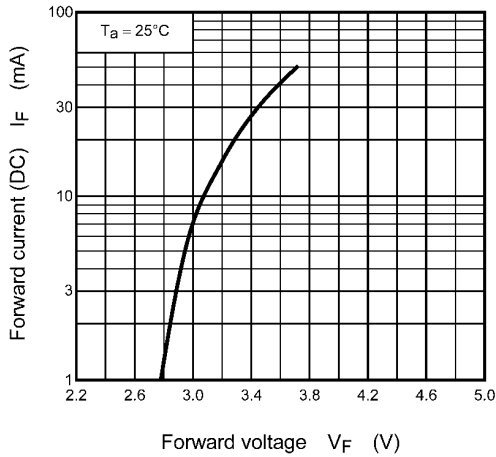
| Rank | Test Condition                                | Luminous Intensity (Min) | Luminous Intensity (Max) | Unit |
|------|---|--------------------------|--------------------------|------|
| XA2  | I <sub>F</sub> = 40 mA, T <sub>a</sub> = 25°C | 2000                     | 3200                     | mcd  |
| YA1  |   | 2500                     | 4000                     |      |
| YA2  |   | 3200                     | 5000                     |      |
| ZA1  |   | 4000                     | 6300                     |      |
| ZA2  |   | 5000                     | 8000                     |      |

Note: This LED lamp is sorted into luminous intensity ranks shown above. Each reel includes the same rank LEDs. Let the delivery ratio of each rank be unquestioned.

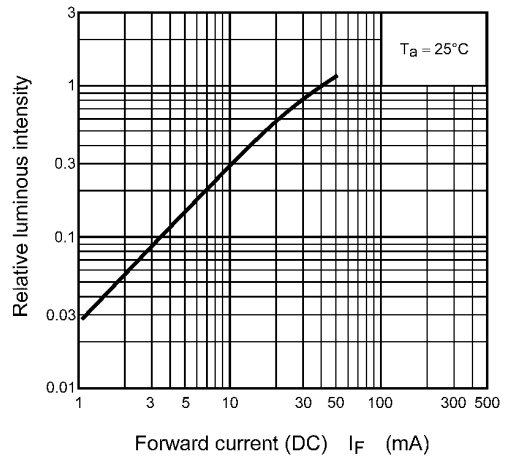
Rank notations: The luminous intensity and chromaticity ranks are printed on labels as shown below:

- Example: A0XA2
- A0: Chromaticity rank
- XA2: Luminous intensity rank

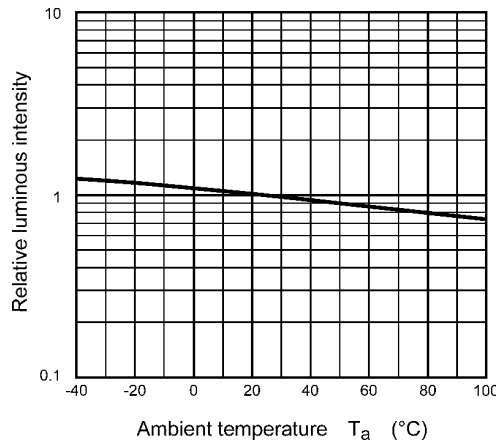
**8. Characteristics Curves (Note)**



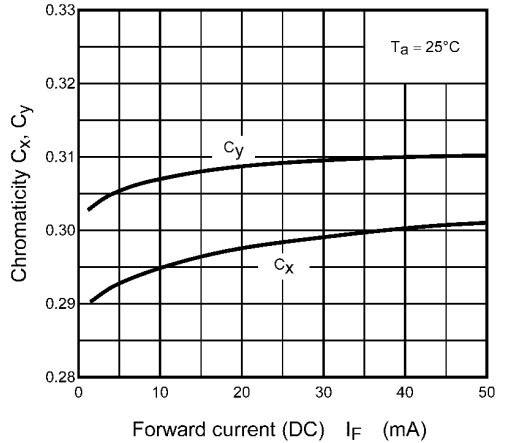
**Fig. 8.1  $I_F - V_F$**



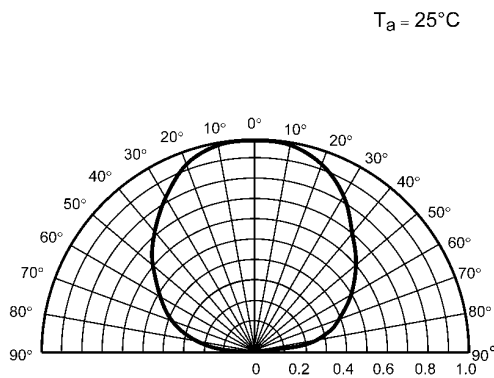
**Fig. 8.2 Relative Luminous Intensity -  $I_F$**



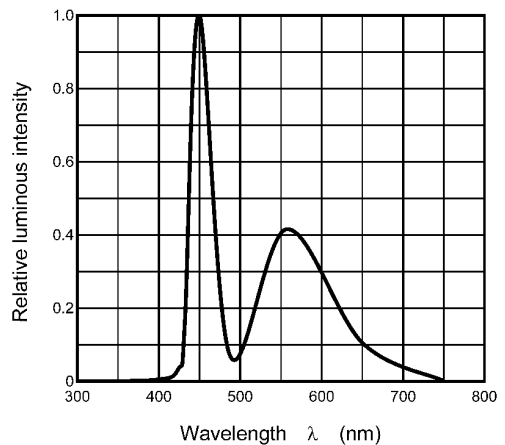
**Fig. 8.3 Relative Luminous Intensity -  $T_a$**



**Fig. 8.4  $C_x, C_y - I_F$**



**Fig. 8.5 Radiation Pattern**



**Fig. 8.6 Wavelength Characteristic**

Note: The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.

## 9. Packing

### 9.1. Moisture-Proof Packing

These LED devices are packed in an aluminum envelope with a silica gel and a moisture indicator to avoid moisture absorption. The optical characteristics of the device may be affected by exposure to moisture in the air before soldering and the device should therefore be stored under the following conditions:

- This moisture proof bag may be stored unopened within 12 months at the following conditions.  
Temperature: 5°C to 30°C  
Humidity: 90% (max)
- After opening the moisture proof bag, the device should be assembled within 4 weeks in an environment of 5°C to 30°C/60% RH or below.
- If upon opening, the moisture indicator card shows humidity 30% or above (Color of indication changes to pink) or the expiration date has passed, the device should be baked in taping with reel.  
After baking, use the baked device within 72 hours, but perform baking only once.  
Baking conditions: 60±5°C, for 12 to 24 hours.  
Expiration date: 12 months from sealing date, which is imprinted on the label affixed.
- Repeated baking can cause the peeling strength of the taping to change, then leads to trouble in mounting. Furthermore, prevent the devices from being destructed against static electricity for baking of it.
- If the packing material of laminate would be broken, the hermeticity would deteriorate. Therefore, do not throw or drop the packed devices.

**10. Mounting Method**

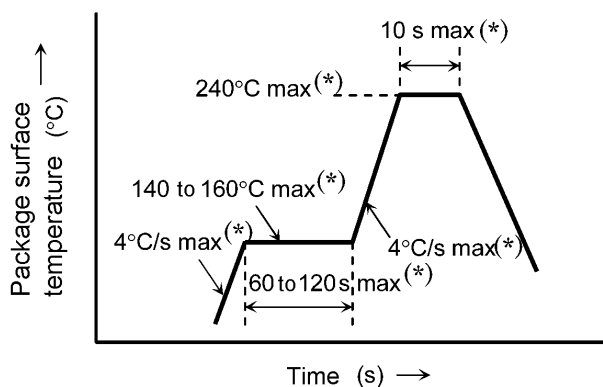
**10.1. Precautions when Mounting**

- Do not apply force to the plastic part of the LED under high-temperature conditions.
- To avoid damaging the LED plastic, do not apply friction using a hard material.
- When installing the PCB in a product, ensure that the device does not come into contact with other components.
- For this product, silicone is used as the encapsulated material. Therefore the top surface of this product is soft. Please do not stress on the encapsulated part of LEDs to avoid affecting the reliability of the product. When using the mounting devices, please use the picking up nozzle that does not affect the silicone resin.

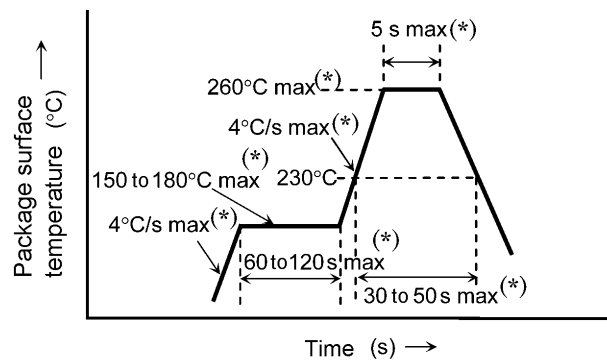
**10.2. Soldering**

Following show examples of reflow soldering.

- Temperature Profile (see following figures.)



**Fig. 10.2.1 Temperature Profile for Pb Soldering (Example)**

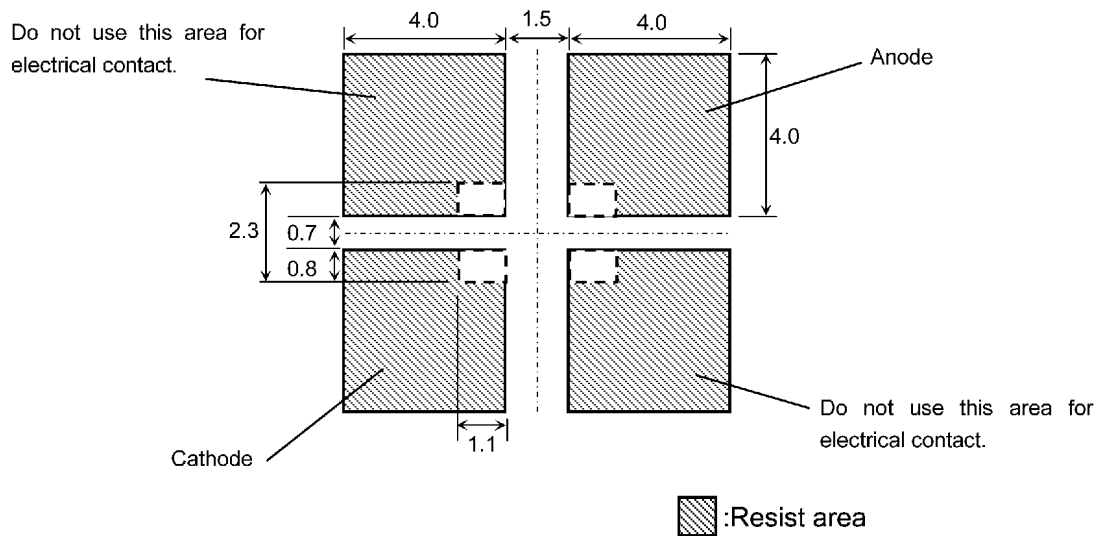


**Fig. 10.2.2 Temperature Profile for Lead(Pb)-free Soldering (Example)**

- The product is evaluated using above reflow soldering conditions. No additional test is performed exceed the condition (i.e. the condition more than (\*)MAX values) as a evaluation. Please perform reflow soldering under the above conditions.
- Please perform the first reflow soldering with reference to the above temperature profile and within 4 weeks of opening the package.
- If a second reflow process is necessary, reflow soldering should be performed within 168 hours of the first reflow under the above conditions. Storage conditions before the second reflow soldering: 30°C, 60% RH (max)
- Do not perform wave soldering.
- Manual soldering with a soldering iron should meet the following conditions:  
 Temperature at tip of iron: 300°C (max)  
 Soldering iron capacity: 25 W  
 Time: 3 seconds (max) (only once at each soldering point)

**10.3. Land Pattern Dimensions for Reference Only**

Cu area > 16 mm<sup>2</sup> (The following Cu area shows an example of the dimensions.)



**Fig. 10.3.1 Land Pattern Dimensions for Reference Only (Unit: mm)**

**11. Cleaning**

When cleaning is required after soldering, Toshiba recommends the following cleaning solvents. It is confirmed that these solvents have no effect on semiconductor devices in our dipping test (under the recommended conditions). In selecting the one for your actual usage, please perform sufficient review on washing condition, using condition and etc.

Recommended cleaning solvents

ASAHI CLEAN AK-225AES: (made by ASAHI GLASS)

KAO CLEANTHROUGH 750HS: (made by KAO)

PINE ALPHA ST-100S: (made by ARAKAWA CHEMICAL)



**12. Tape Specifications**

**12.1. Product number format**

The type of package used for shipment is denoted by a symbol suffix after the part number. The method of classification is as below. (this method, however does not apply to products whose electrical characteristics differ from standard Toshiba specifications)

Example: TLWF1109A(T11)

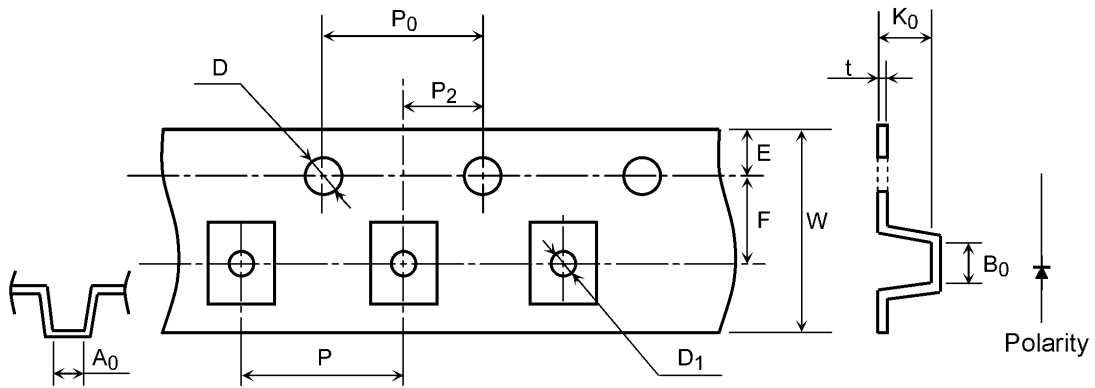
Toshiba part number: TLWF1109A

Tape type: T11(4-mm pitch)

**12.2. Tape Dimensions**

**Table 12.2.1 Tape Dimensions (Unit: mm)**

|            | D       | E    | P <sub>0</sub> | t     | F     | D <sub>1</sub> | P <sub>2</sub> | W    | P    | A <sub>0</sub> | B <sub>0</sub> | K <sub>0</sub> |
|------------|---------|------|----------------|-------|-------|----------------|----------------|------|------|----------------|----------------|----------------|
| Dimensions | 1.5     | 1.75 | 4.0            | 0.3   | 3.5   | 1.5            | 2.0            | 8.0  | 4.0  | 2.9            | 3.7            | 2.3            |
| Tolerance  | +0.1/-0 | ±0.1 | ±0.1           | ±0.05 | ±0.05 | ±0.1           | ±0.05          | ±0.3 | ±0.1 | ±0.1           | ±0.1           | ±0.1           |

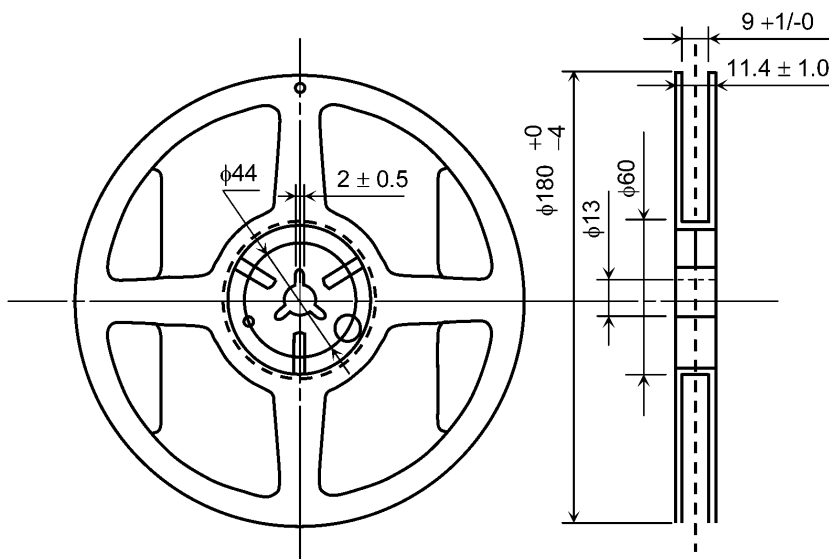


**Fig. 12.2.1 Tape Dimensions**

**12.3. Reel Specification**

**12.3.1. Reel Dimensions**

Unit: mm



**Fig. 12.3.1.1 Reel Dimensions**

12.3.2. Tape Leader and Trailer

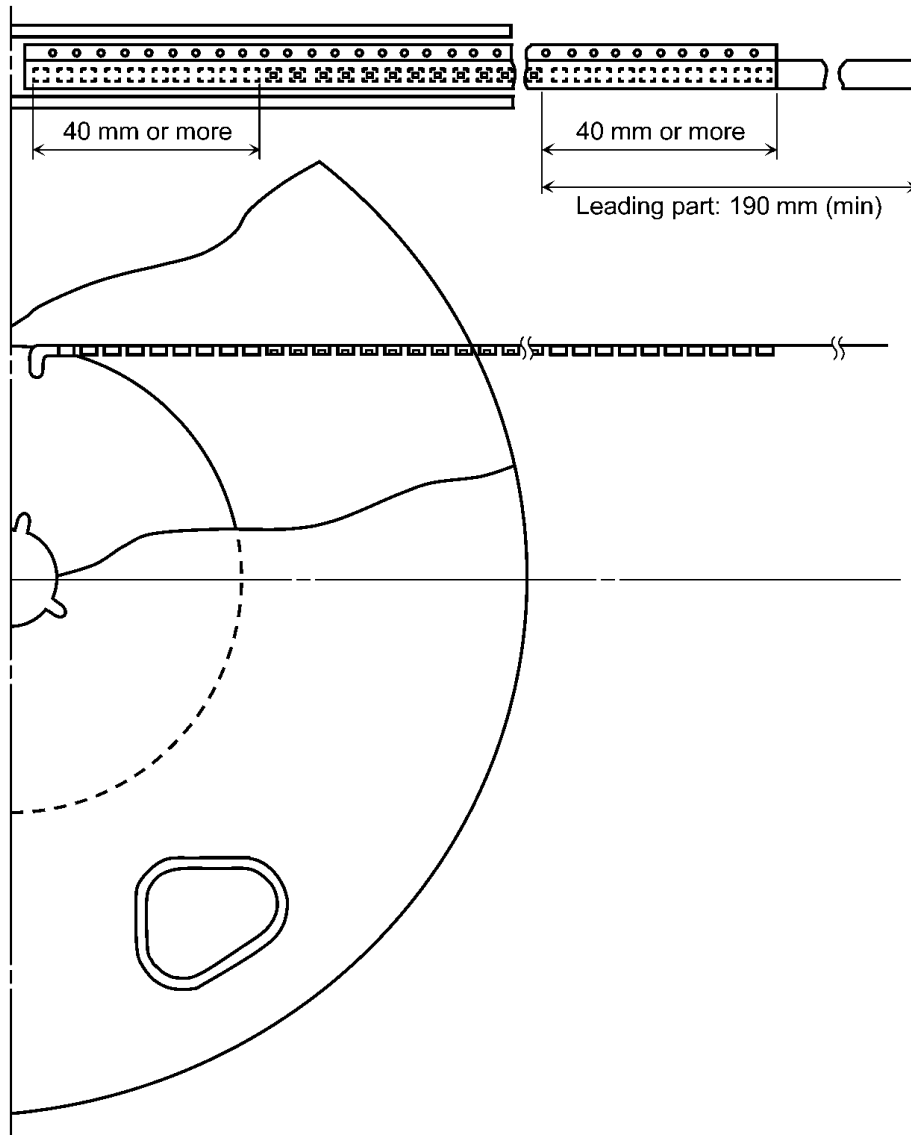


Fig. 12.3.2.1 Tape Leader and Trailer

**12.4. Packing Form**

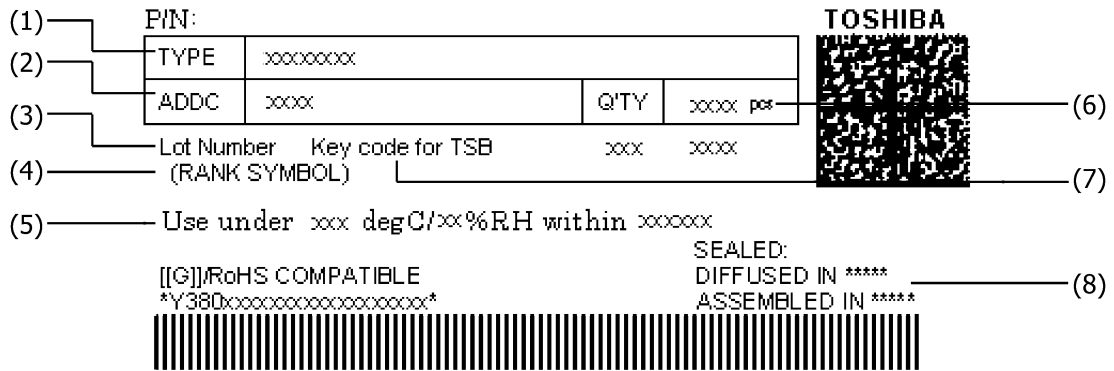
Each reel is sealed in an aluminum pack with silica gel. Packing quantity is as shown below.

- Reel: 2,000 pcs
- Carton: 10,000 pcs

**12.5. Label Format**

Label example for TLWF1109A(T11 and label location are as shown below.

**12.5.1. Label Example**

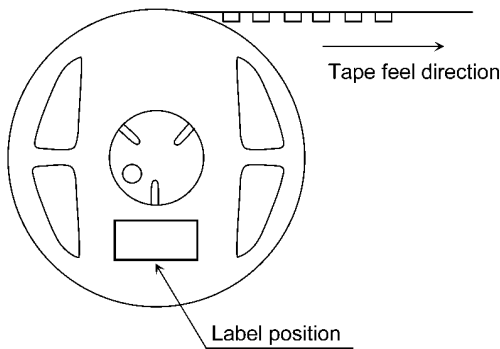


**Fig. 12.5.1.1 Label Example**

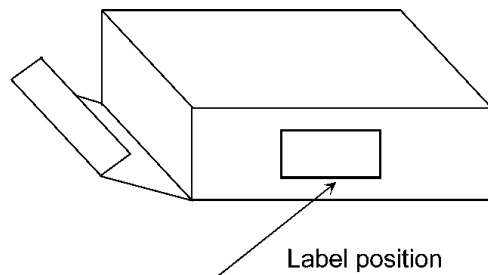
**12.5.2. Label Details**

| No. (# refer to the above label example) | Information for Toshiba Use     | Remarks  |
|--|---------------------------------|--|
| (1)                                      | Part No.                        | TLWF1109A(T11  |
| (2)                                      | ADD code                        | Notation explanation<br>(O Assembled in Japan, sales for domestic and overseas customers<br>(J Assembled in overseas factory, sales for domestic customers<br>(T Assembled in overseas factory, sales for overseas customers |
| (3)                                      | Lot code                        | Example: 270xxxxx  |
| (4)                                      | Rank symbol                     | Example: A0XA2   |
| (5)                                      | Storage condition after opening | Use under 5 to 30°C/60%RH within 4 weeks   |
| (6)                                      | Packing quantity                | Example: 2,000 pcs   |
| (7)                                      | Key code                        | Example: 12345   |
| (8)                                      | Country of origin               | Example: JAPAN   |

**12.5.3. Label Location**



**Fig. 12.5.3.1 Label Position on the Reel**



**Fig. 12.5.3.2 Label Position on the Carton**

Aluminum pack: The aluminum pack in which the reel is supplied also has the label attached to center of one side.

13. Internal Circuit

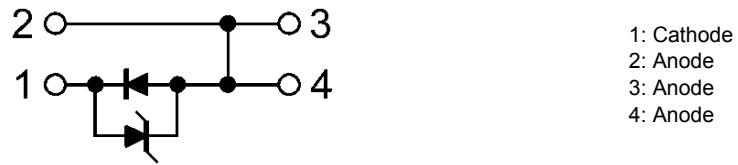
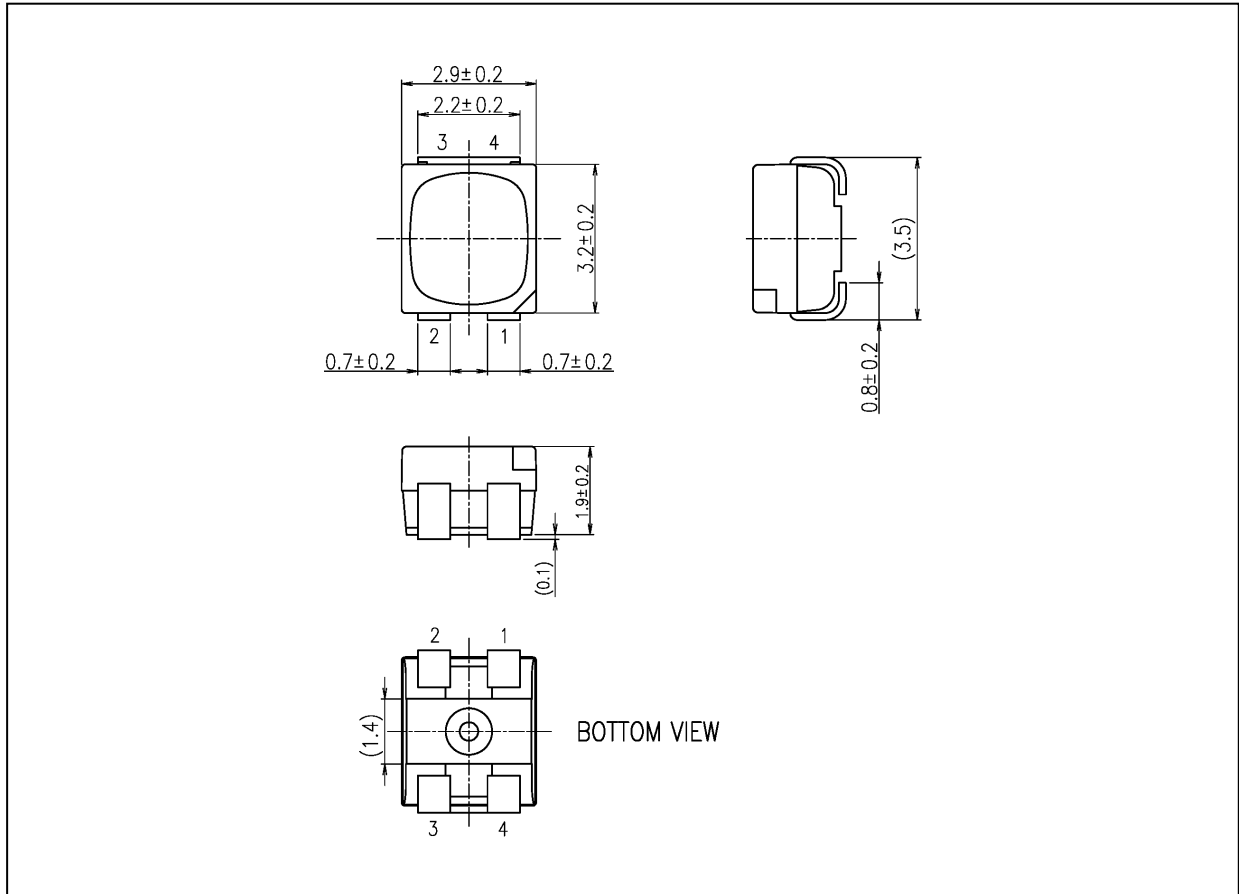


Fig. 13.1 Internal Circuit

Package Dimensions

Unit: mm



Weight: 0.035 g (typ.)

| Package Name(s) |
|-----------------|
| TOSHIBA: 4-3W1S |
| Nickname: PLCC4 |

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