

TLRH1032(T14,F), TLRMH1032(T14,F), TLSH1032(T14,F),  
TLOH1032(T14,F), TLYH1032(T14,F), TLGH1032(T14,F),  
TLFGH1032(T14,F)

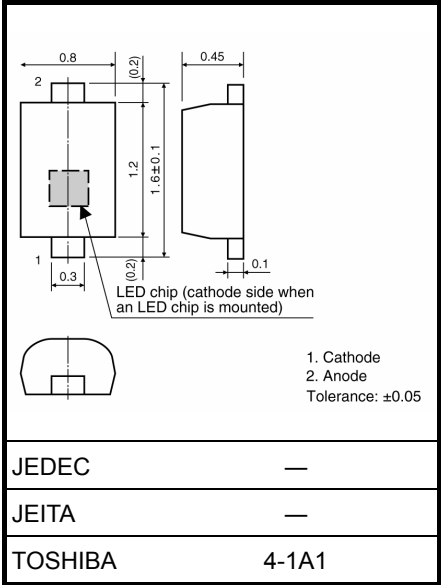
Panel Circuit Indicator

- Surface-mount devices
- 1.6 (L) × 0.8 (W) × 0.45 (H) mm (including lead length)
- InGaAlP LEDs
- High luminous intensity and low power consumption
- Colors: red, orange, yellow, green, pure green
- Lead(Pb)-free reflow soldering is possible
- Applications: Backlighting for LCDs and switches for automotive applications.
- Standard embossed tape packing: T14 (4000/reel)  
4-mm pitch

Color and Material

| Product Name | Color       | Material |
|--------------|-------------|----------|
| TLRH1032     | Red         | InGaAlP  |
| TLRMH1032    | Red         |          |
| TLSH1032     | Red         |          |
| TLOH1032     | Orange      |          |
| TLYH1032     | Yellow      |          |
| TLGH1032     | Green       |          |
| TLFGH1032    | Fresh Green |          |

Unit: mm



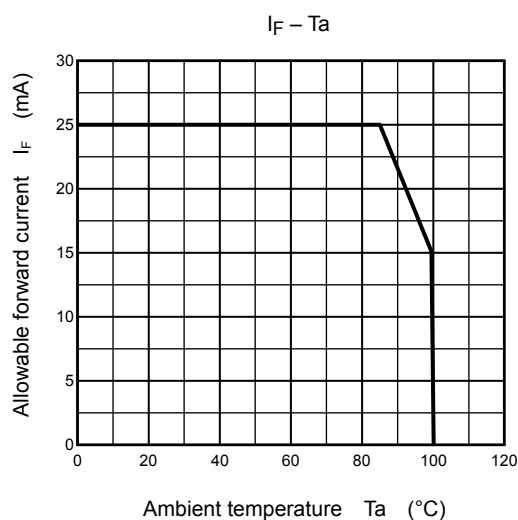
Weight: 0.001 g (typ.)

### Maximum Ratings (Ta = 25°C)

| Product Name | Forward Current<br>I <sub>F</sub> (mA)<br>Please see Note 1 | Reverse Voltage<br>V <sub>R</sub> (V) | Power Dissipation<br>P <sub>D</sub> (mW) | Operating<br>Temperature<br>T <sub>opr</sub> (°C) | Storage<br>Temperature<br>T <sub>stg</sub> (°C) |
|--------------|-------------------------------------------------------------|---------------------------------------|------------------------------------------|---------------------------------------------------|-------------------------------------------------|
| TLRH1032     | 25                                                          | 4                                     | 60                                       | -40~100                                           | -40~100                                         |
| TLRMH1032    |                                                             |                                       |                                          |                                                   |                                                 |
| TLSH1032     |                                                             |                                       |                                          |                                                   |                                                 |
| TLOH1032     |                                                             |                                       |                                          |                                                   |                                                 |
| TLYH1032     |                                                             |                                       |                                          |                                                   |                                                 |
| TLGH1032     |                                                             |                                       | 62.5                                     |                                                   |                                                 |
| TLFGH1032    |                                                             |                                       |                                          |                                                   |                                                 |

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Note 1: Forward current derating



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

| Product Name | Forward Voltage V <sub>F</sub> |      |     |                | Reverse Current<br>I <sub>R</sub> |                |
|--------------|--------------------------------|------|-----|----------------|-----------------------------------|----------------|
|              | Min                            | Typ. | Max | I <sub>F</sub> | Max                               | V <sub>R</sub> |
| TLRH1032     | 1.7                            | 2.0  | 2.4 | 20             | 10                                | 4              |
| TLRMH1032    | 1.7                            | 2.0  | 2.4 |                |                                   |                |
| TLSH1032     | 1.7                            | 2.0  | 2.4 |                |                                   |                |
| TLOH1032     | 1.7                            | 2.0  | 2.4 |                |                                   |                |
| TLYH1032     | 1.7                            | 2.0  | 2.4 |                |                                   |                |
| TLGH1032     | 1.8                            | 2.1  | 2.5 |                |                                   |                |
| TLFGH1032    | 1.9                            | 2.2  | 2.5 |                |                                   |                |
| Unit         | V                              |      |     | mA             | μA                                | V              |

## Optical Characteristics-1 (Ta = 25°C)

| Product Name | Luminous Intensity I <sub>v</sub> |      |     |                | Available I <sub>v</sub> rank<br>Please see Note 2 |
|--------------|-----------------------------------|------|-----|----------------|----------------------------------------------------|
|              | Min                               | Typ. | Max | I <sub>F</sub> |                                                    |
| TLRH1032     | 25                                | 56   | 125 | 20             | NA / PA / QA                                       |
| TLRMH1032    | 40                                | 85   | 200 |                | PA / QA / RA                                       |
| TLSH1032     | 63                                | 160  | 320 |                | QA / RA / SA                                       |
| TLOH1032     | 100                               | 200  | 500 |                | RA / SA / TA                                       |
| TLYH1032     | 40                                | 100  | 200 |                | PA / QA / RA                                       |
| TLGH1032     | 25                                | 60   | 125 |                | NA / PA / QA                                       |
| TLFGH1032    | 10                                | 25   | 50  |                | LA / MA / NA                                       |
| Unit         | mcd                               | mcd  | mcd | mA             |                                                    |

Note 2: The specification on the above table is used for I<sub>v</sub> classification of LEDs in Toshiba facility.  
Each reel includes the same rank LEDs. Let the delivery ratio of each rank be unquestioned.

| Rank | Luminous Intensity I <sub>v</sub> |     |
|------|-----------------------------------|-----|
|      | Min                               | Max |
| LA   | 10                                | 20  |
| MA   | 16                                | 32  |
| NA   | 25                                | 50  |
| PA   | 40                                | 80  |
| QA   | 63                                | 125 |
| RA   | 100                               | 200 |
| SA   | 160                               | 320 |
| TA   | 250                               | 500 |
| Unit | mcd                               | mcd |

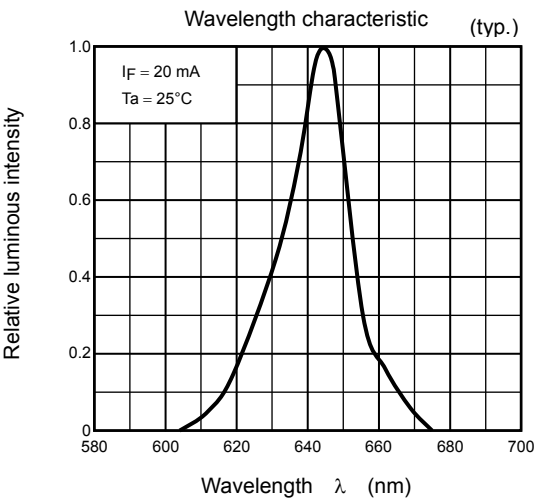
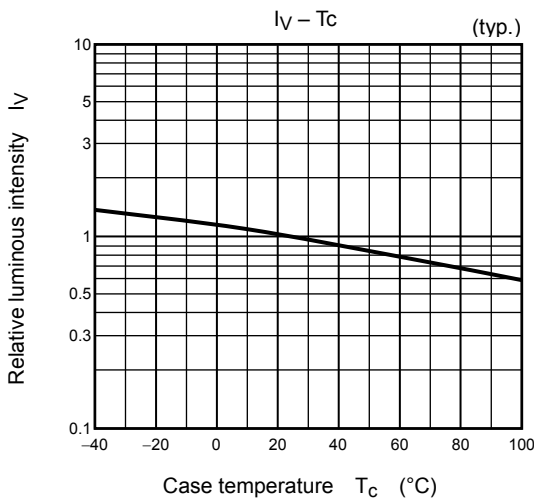
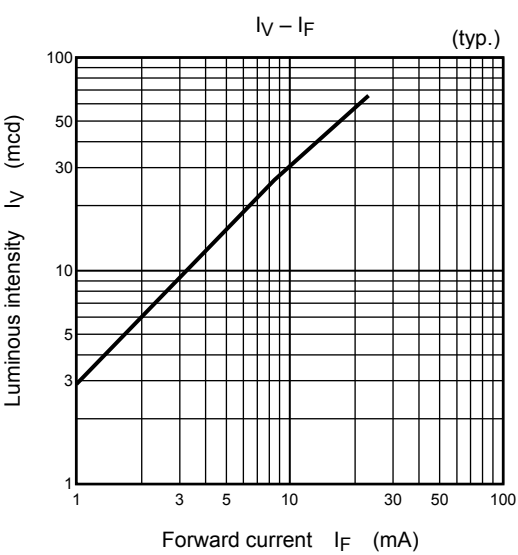
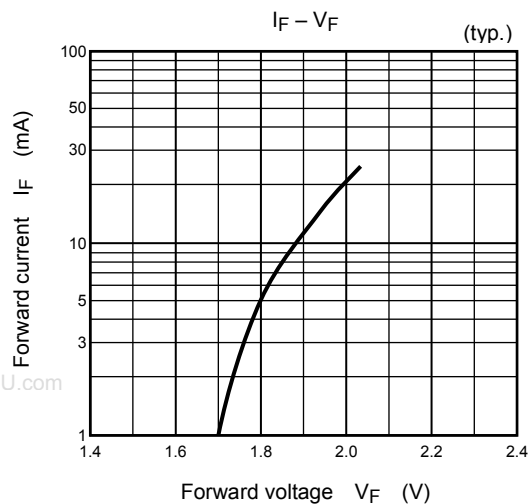
## Optical Characteristics-2 (Ta = 25°C)

| Product Name | Emission Spectrum                       |      |     |            |                                    |      |     |                |
|--------------|-----------------------------------------|------|-----|------------|------------------------------------|------|-----|----------------|
|              | Peak Emission Wavelength λ <sub>p</sub> |      |     | Δλ<br>Typ. | Dominant Wavelength λ <sub>d</sub> |      |     | I <sub>F</sub> |
|              | Min                                     | Typ. | Max |            | Min                                | Typ. | Max |                |
| TLRH1032     | —                                       | 644  | —   | 17         | 624                                | 630  | 638 | 20             |
| TLRMH1032    | —                                       | 636  | —   | 17         | 620                                | 626  | 634 |                |
| TLSH1032     | —                                       | 623  | —   | 17         | 607                                | 613  | 621 |                |
| TLOH1032     | —                                       | 612  | —   | 17         | 599                                | 605  | 613 |                |
| TLYH1032     | —                                       | 590  | —   | 13         | 581                                | 587  | 595 |                |
| TLGH1032     | —                                       | 574  | —   | 13         | 565                                | 571  | 576 |                |
| TLFGH1032    | —                                       | 568  | —   | 11         | 560                                | 565  | 571 |                |
| Unit         | nm                                      |      |     | nm         | nm                                 |      |     | mA             |

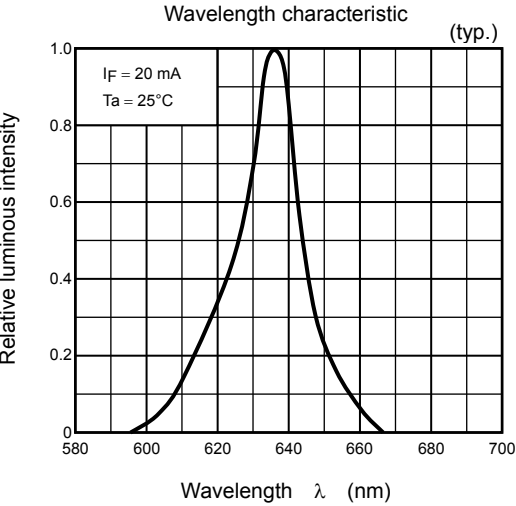
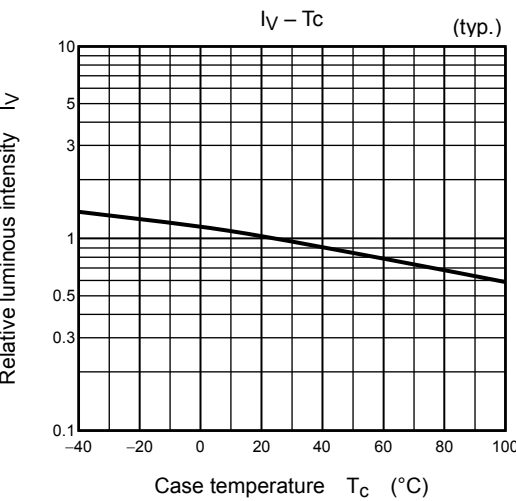
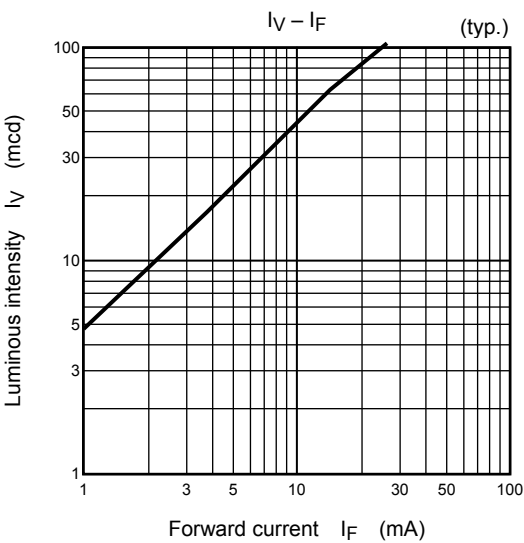
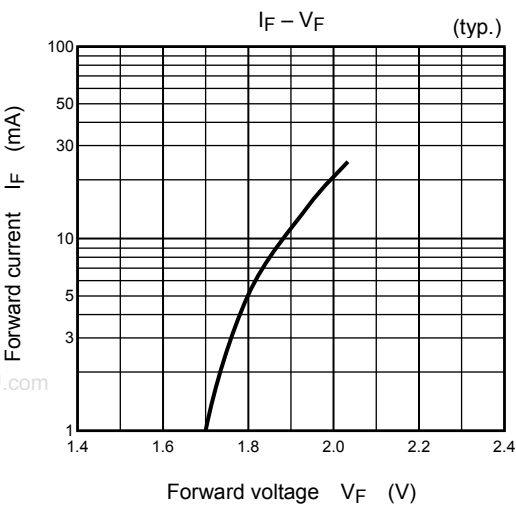
## The cautions

- This visible LED lamp also emits some IR light.  
If a photodetector is located near the LED lamp, please ensure that it will not be affected by the IR light.
- This product is designed as a general display light source usage, and it has applied the measurement standard that matched with the sensitivity of human's eyes. Therefore, it is not intended for usage of functional application (ex. Light source for sensor, optical communication and etc) except general display light source.

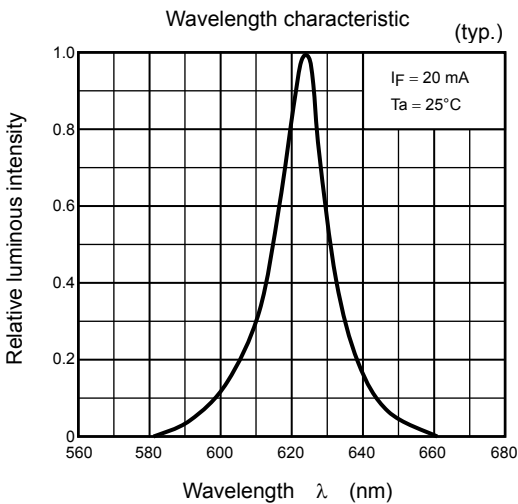
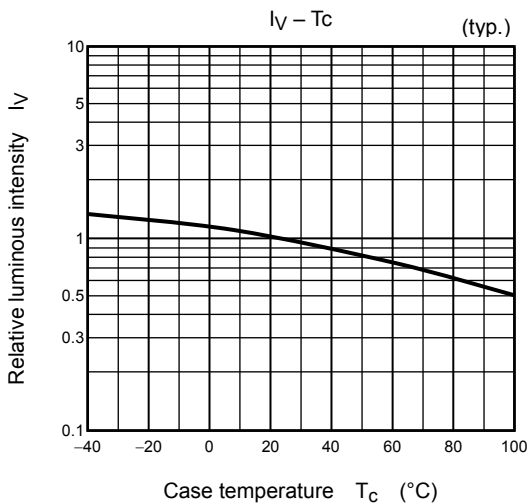
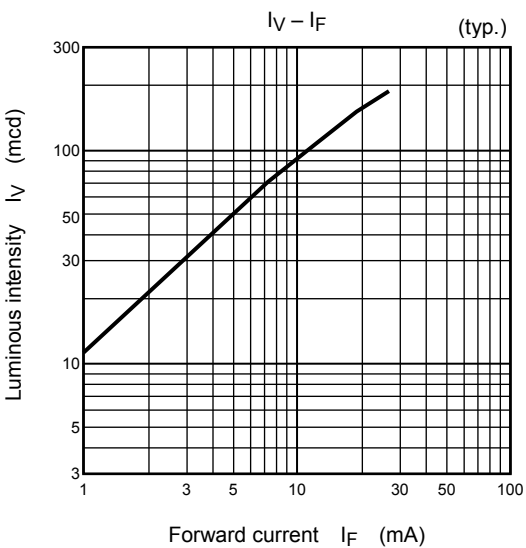
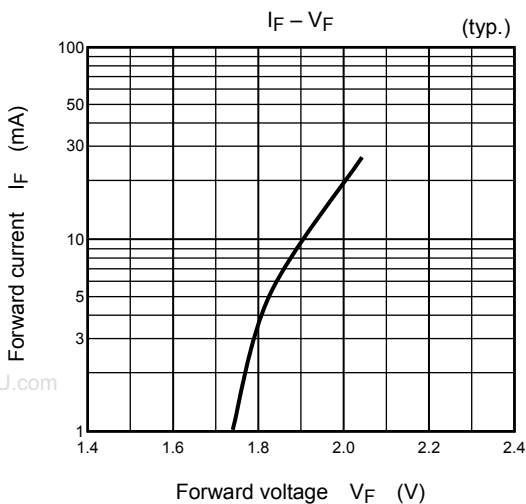
TLRH1032



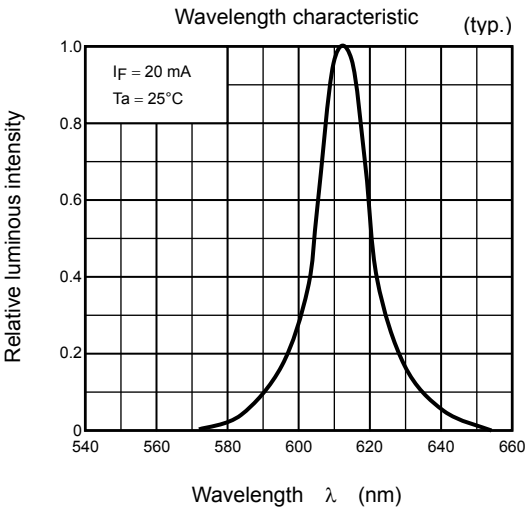
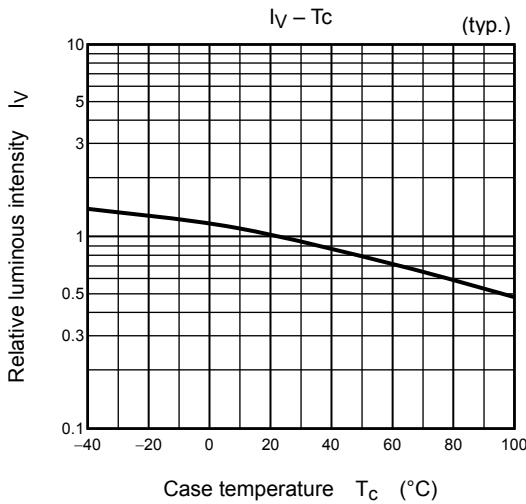
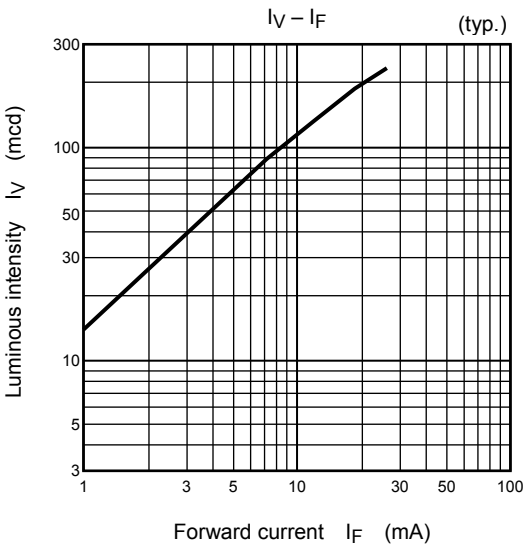
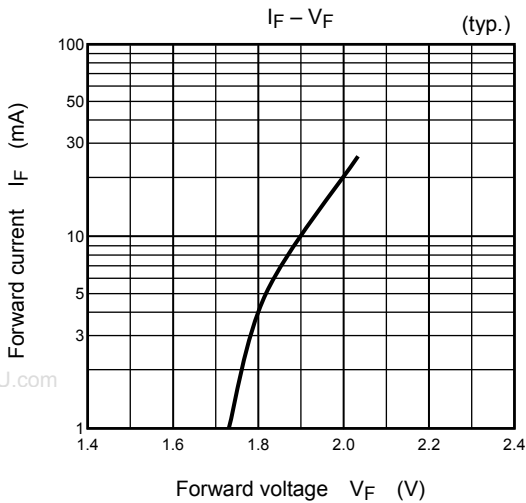
TLRMH1032



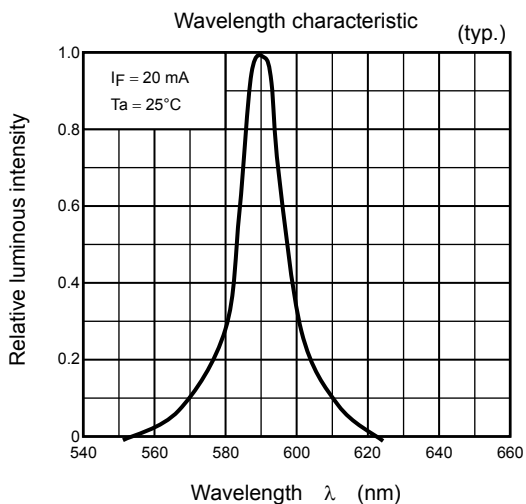
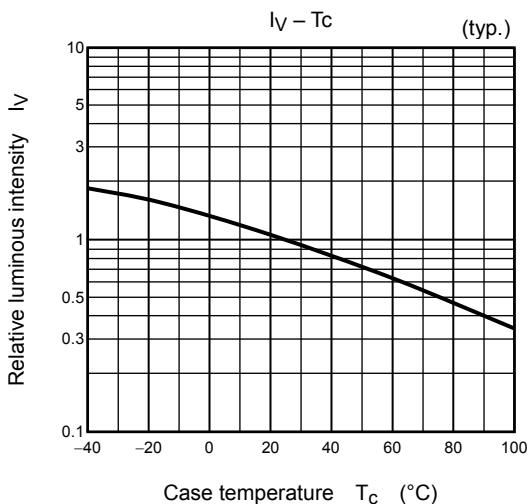
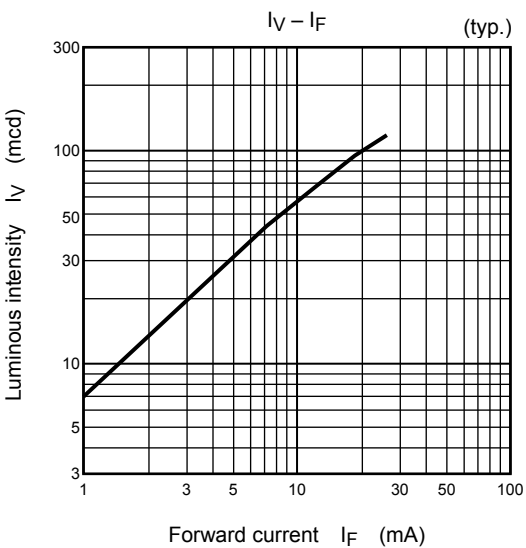
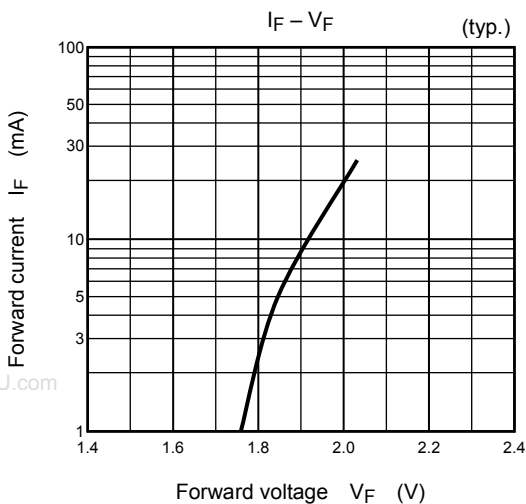
TLSH1032



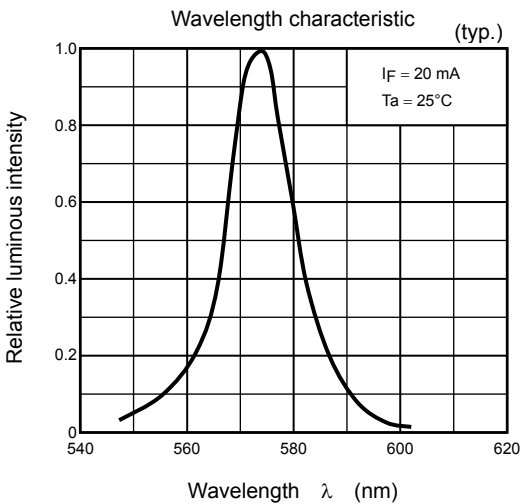
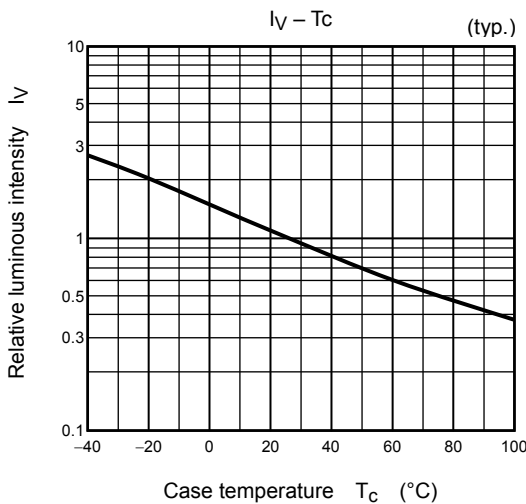
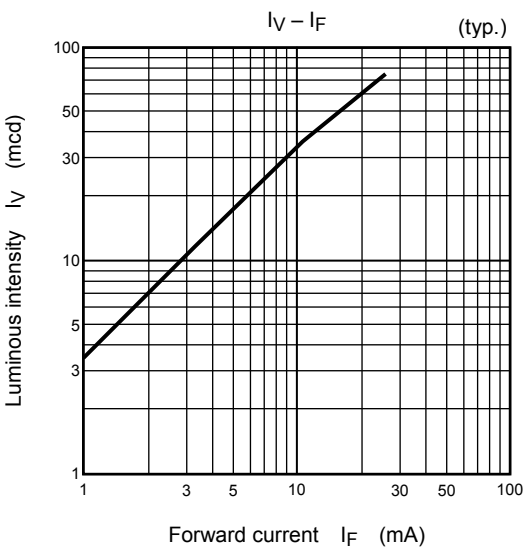
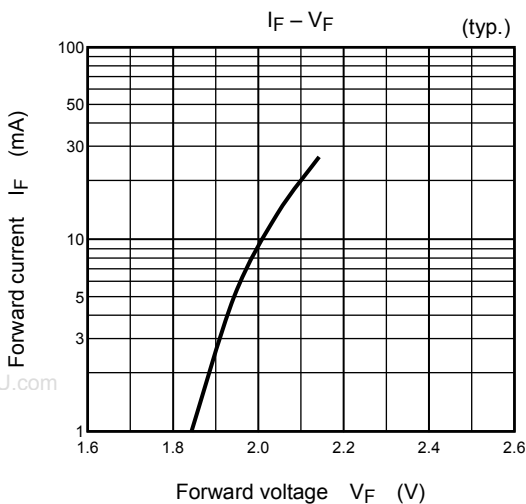
TLOH1032



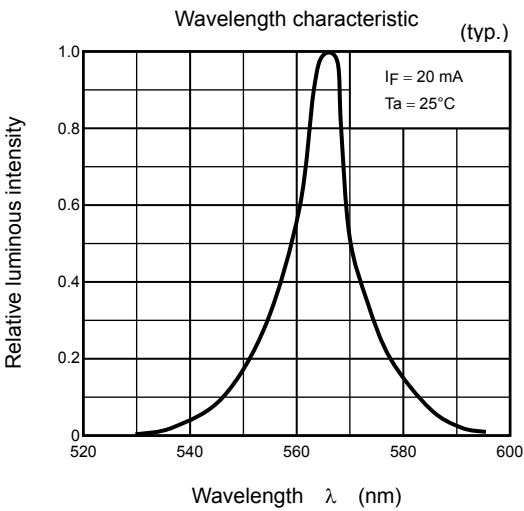
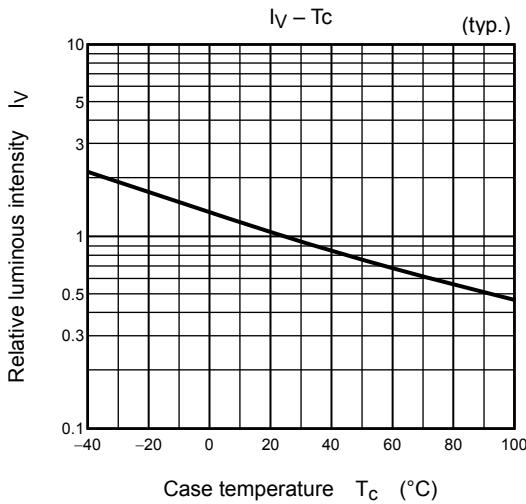
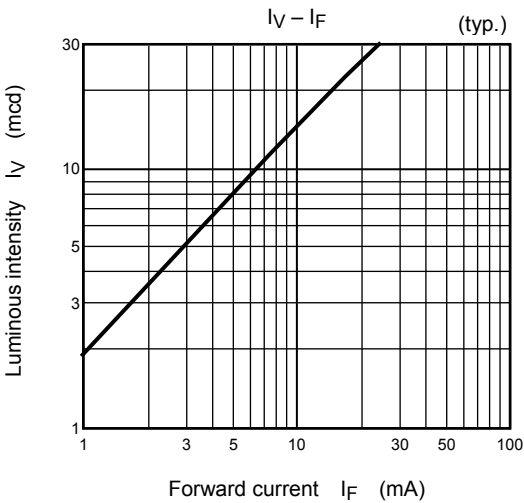
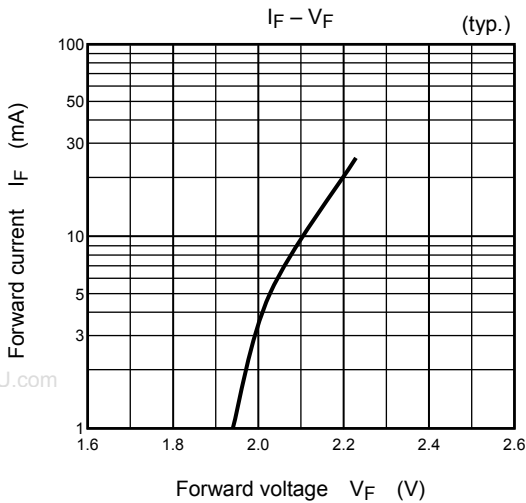
TLYH1032



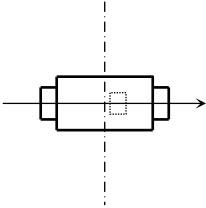
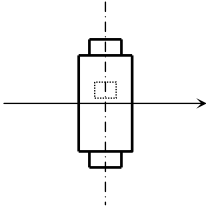
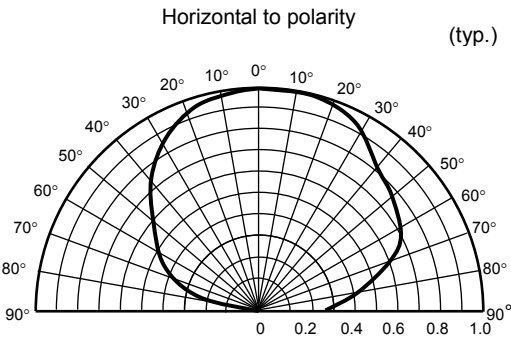
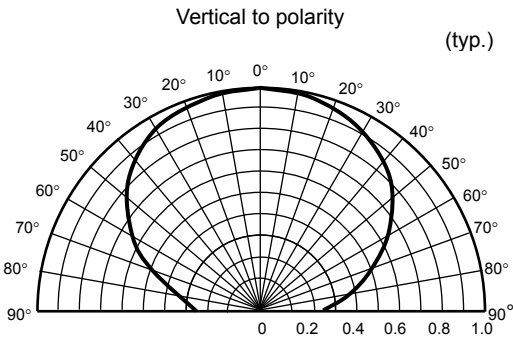
TLGH1032



TLFGH1032



Radiation Pattern



## Packaging

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 devices may be affected by exposure to moisture in the air before soldering and they should therefore be stored under the following conditions:

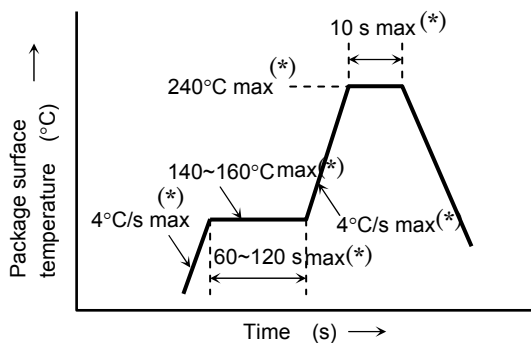
1. This moisture proof bag may be stored unopened within 12 months at the following conditions.  
Temperature: 5°C~30°C  
Humidity: 90% (max)
2. After opening the moisture proof bag, the devices should be assembled within 168 hours in an environment of 5°C to 30°C/70% RH or below.
3. If upon opening, the moisture indicator card shows humidity 30% or above (Color of indication changes to pink) or the expiration date has passed, the devices should be baked in taping with reel.  
After baking, use the baked devices 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 same side as this label affixed.
4. 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.
5. If the packing material of laminate would be broken, the air tightness would deteriorate. Therefore, do not throw or drop the packed devices.

## Mounting Method

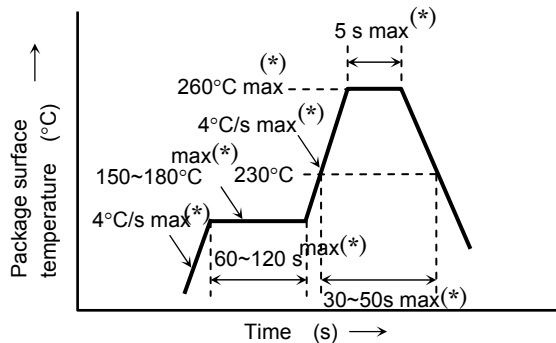
### Soldering

- Reflow soldering (example)

Temperature profile for Pb soldering (example)

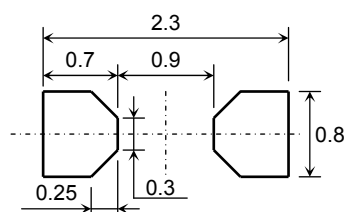


Temperature profile for Pb-free soldering (example)



- The products are 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 168 h of opening the package.
- Second reflow soldering  
In case of second reflow soldering should be performed within 168 h of the first reflow under the above conditions.  
Storage conditions before the second reflow soldering: 30°C, 70% RH (max)
- Make any necessary soldering corrections manually.  
(only once at each soldering point)  
Soldering iron: 25 W  
Temperature : 300°C or less  
Time : within 3 s
- If the products need to be performed by other soldering method (ex. wave soldering), please contact Toshiba sales representative.

### Recommended soldering pattern



Unit: mm

## 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.

|                                                |                                  |
|------------------------------------------------|----------------------------------|
| ASAHI CLEAN AK-225AES                          | : (made by ASAHI GLASS)          |
| KAO CLEAN TROUGH 750H                          | : (made by KAO)                  |
| PINE ALPHA ST-100S                             | : (made by ARAKAWA CHEMICAL)     |
| TOSHIBA TECHNOCARE<br>(FRW-17, FRW-1, FRV-100) | : (made by GE TOSHIBA SILICONES) |

## Precaution 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.

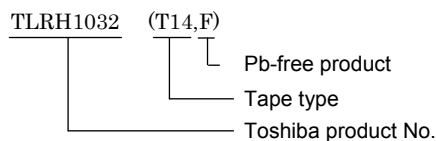
## Tape Specifications

### 1. Product number format

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

(1) Tape Type: T14 (4-mm pitch)

(2) Example



### 2. Handling precautions

Tape material protected against static electricity. However, static electricity may occur depending on quantity of charged static electricity and a device may attach to a tape, or a device may be unstable when peeling a tape cover.

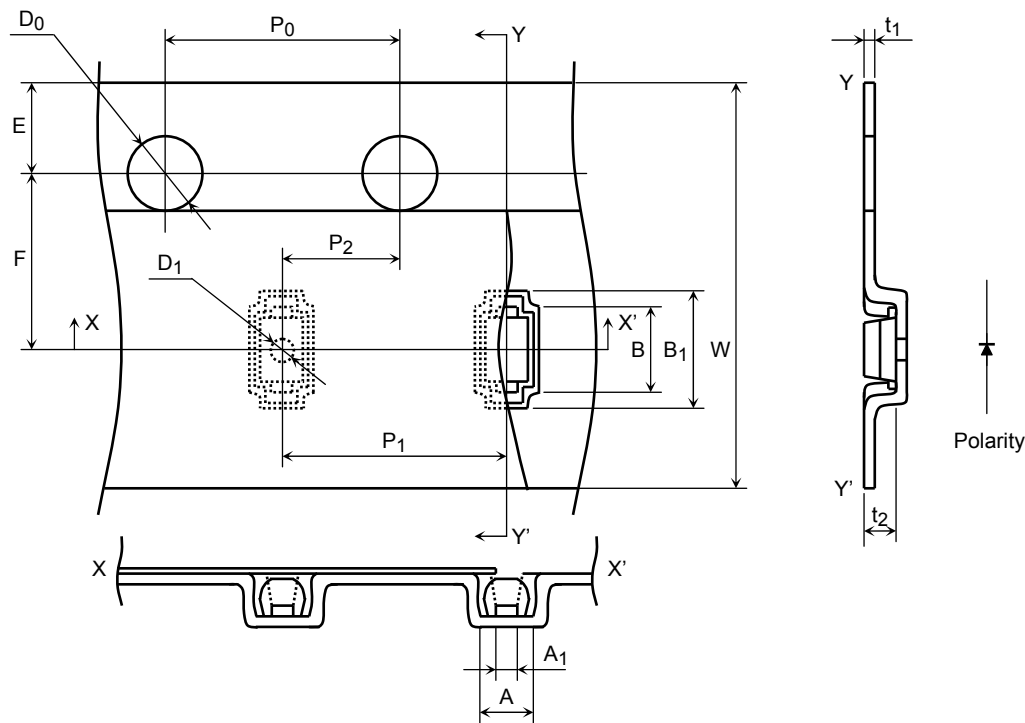
- Since tape materials may accumulate an electrostatic charge, use an ionizer to neutralize the ambient air.
- For transport and temporary storage of devices, use containers (boxes and bags) and jigs that are made of anti-static materials or of materials which dissipate electrostatic charge.

3. Tape dimensions

Unit: mm

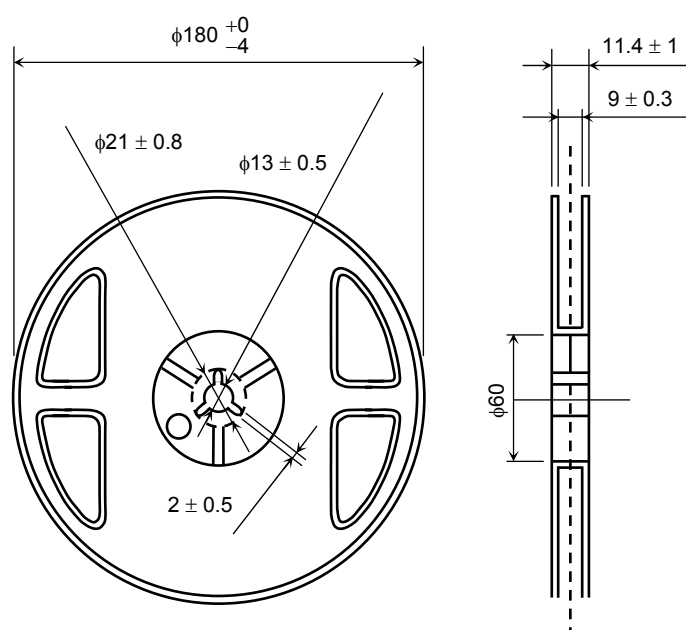
| Item                      |                        | Symbol         | Value | Tolerance |
|---------------------------|------------------------|----------------|-------|-----------|
| Carrier tape              | Width                  | W              | 8.0   | ±0.2      |
|                           | Thickness              | t <sub>1</sub> | 0.2   | ±0.05     |
| Feed hole                 | Diameter               | D <sub>0</sub> | 1.55  | ±0.1      |
|                           | Pitch                  | P <sub>0</sub> | 4.0   | ±0.1      |
|                           | Position               | E              | 1.75  | ±0.1      |
| Distance from center line | Vertical Direction (1) | P <sub>1</sub> | 4.0   | ±0.1      |
|                           | Vertical Direction (2) | P <sub>2</sub> | 2.0   | ±0.1      |
|                           | Horizontal Direction   | F              | 3.5   | ±0.1      |

| Item   |                       | Symbol         | Value | Tolerance |
|--------|-----------------------|----------------|-------|-----------|
| Cavity | Length                | B <sub>1</sub> | 1.85  | ±0.05     |
|        |                       | B              | 1.3   | ±0.05     |
|        | Width                 | A              | 0.9   | ±0.05     |
|        |                       | A <sub>1</sub> | 0.35  | ±0.05     |
|        | Depth                 | t <sub>2</sub> | 0.52  | ±0.05     |
|        | Diameter of mark hole | D <sub>1</sub> | 0.5   | ±0.05     |

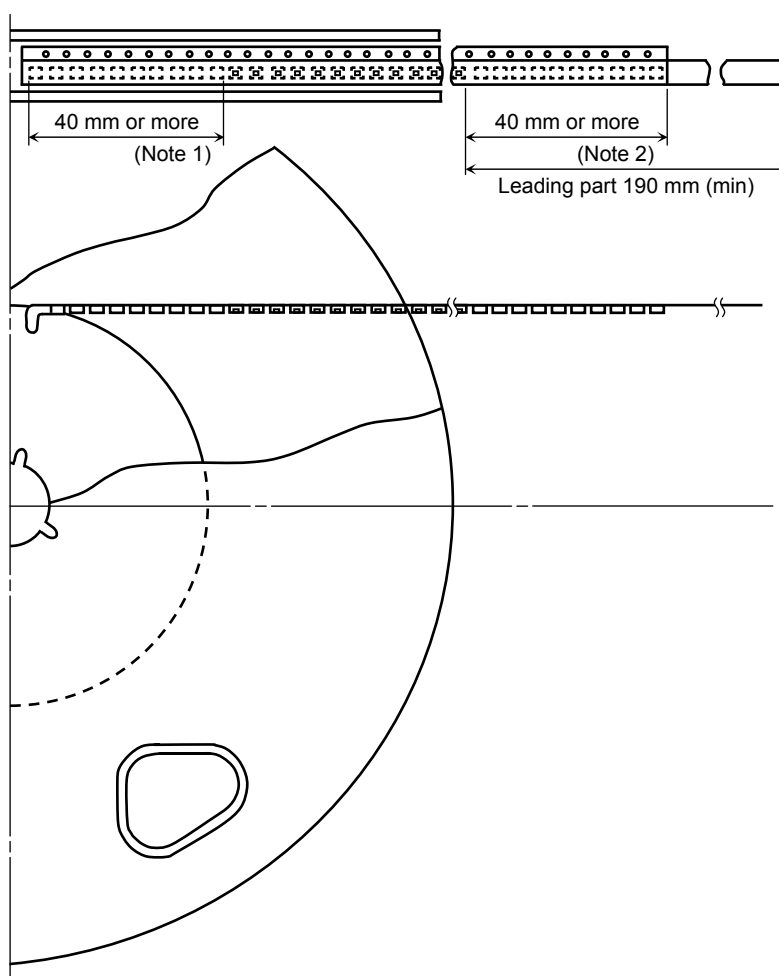


### 4. Reel dimensions

Unit: mm



### 5. Leader and trailer section of tape



Note 1: Empty trailer section

Note 2: Empty leader section

(1) Packing quantity

|        |            |
|--------|------------|
| Reel   | 4,000 pcs  |
| Carton | 20,000 pcs |

(2) Package form: Each reel is sealed in an aluminum pack with silica gel.

(1) Example: TLRH1032 (T14,F)

**TOSHIBA**

|      |                 |      |           |
|------|-----------------|------|-----------|
| TYPE | <b>TLRH1032</b> |      |           |
| ADDC | (T14,F)         | Q'TY | 4,000 pcs |

|               |                  |     |      |
|---------------|------------------|-----|------|
| Lot Number    | Key code for TSB | 32C | 4000 |
| (RANK SYMBOL) |                  |     |      |



Use under 5-30degC/70%RH within 168h

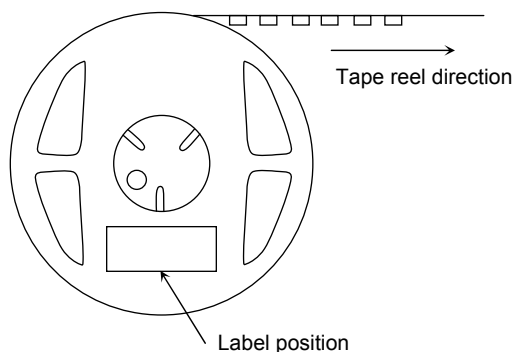
[[G]]/RoHS COMPATIBLE  
\*Y3804xxxxxxxxxxxxxxxxxxxxx\*

SEAL DATE: \_\_\_\_\_  
DIFFUSED IN \*\*\*\*\*  
ASSEMBLED IN \*\*\*\*\*

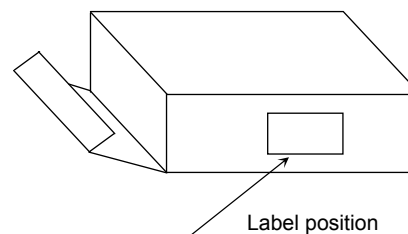


(2) Label location

- Reel



- Carton



- The aluminum package in which the reel is supplied also has a copy of the label attached to center of one side.

**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.
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