# TL21W02-D1(T34

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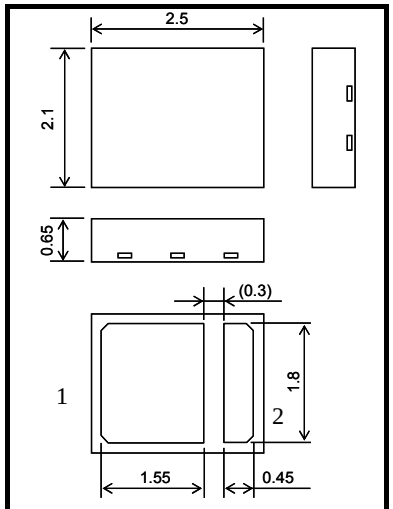
TOSHIBA LED lamps

# TL21W02-D1(T34

## ○ Surface-mount devices

- 2.1 (L) mm × 2.5 (W) mm × 0.65 (H ) mm size
- High luminous flux LED: 45 lm(typ.) @IF=150 mA
- Color: white (6500K)
- High Color Rendering Index : Ra=85 (Typ.)
- Reflow-soldering is available
- Applications : general lighting and etc.

Unit: mm




1. CATHODE
2. ANODE

| | |
|---|---|
| JEDEC | — |
| JEITA | — |
| TOSHIBA | 4-2J1 |

Weight: **** g (typ.)

## Color and Material

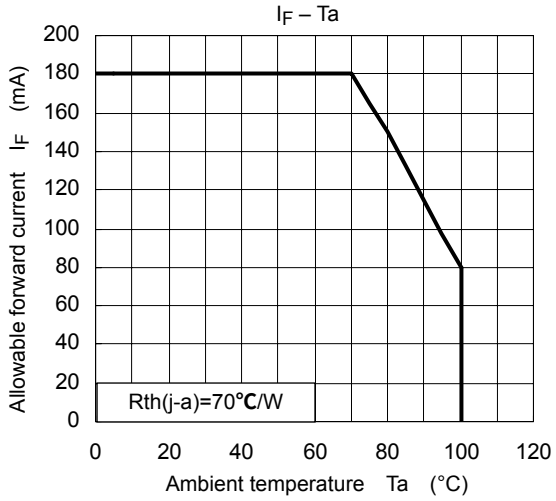
| Part Number | Color | Material |
|---|---|---|
| TL21W02-D1 | White (6500K) | InGaN |

## Absolute Maximum Ratings (Ta = 25°C) (Note.1)

| Characteristics | Symbol | Rating | Unit |
|---|---|---|---|
| Forward Current (Note.2) | $I_F$ | (180) | mA |
| Pulse current (Note.3) | $I_{FP}$ | (300) | mA |
| Power Dissipation | $P_D$ | 0.76 | W |
| Operating Temperature | $T_{opr}$ | −40 to 100 | °C |
| Storage Temperature | $T_{stg}$ | −40 to 100 | °C |
| Junction Temperature | Tj | 120 | °C |

Note 1: 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).

Note 2: The junction-to-ambient thermal resistance, Rth(j-a), should be kept below 70℃/W so that the TL21W02-D1(T34 is not exposed to a condition beyond the absolute maximum ratings. Rth(j-a): Thermal resistance from the LED junction to ambient temperature




Note 3: Pulse width 10ms, Duty 1/10



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## Electrical Characteristics (Ta = 25°C)

| Characteristics | Symbol | Test condition | Min | Typ. | Max | Unit |
|---|---|---|---|---|---|---|
| Forward Voltage (Note 4) | $V_F$ | $I_F$ =150 mA | (2.9) | (3.25) | (3.8) | V |
| Reverse Voltage | $V_R$ | $I_R$ = 1 mA | — | 0.75 | — | V |
| Thermal Resistance (Note 5) | Rth(j-s) | $I_F$ = 150 mA | — | (20) | — | °C/W |

Note 4: $V_F$ rank classification

The specification on the following table is used for $V_F$ classification of LEDs in Toshiba facility.
Each reel includes the same rank LEDs. Let the delivery ratio of each rank be unquestioned.

Ta=25°C
Tolerance: +/-0.1V

| Part Number | | Forward Voltage $V_F$ | | | |
|---|---|---|---|---|---|
| | | Min | Typ. | Max | $I_F$ |
| TL21W02-D1(T34 | | (2.9) | (3.25) | (3.8) | 150 |
| | 1 | 2.9 | — | 3.2 | |
| | 2 | 3.2 | — | 3.5 | |
| | 3 | 3.5 | — | 3.8 | |
| Unit | | V | | | mA |

Note 5: Rth(j-s): Thermal resistance from the LED junction to solder point.

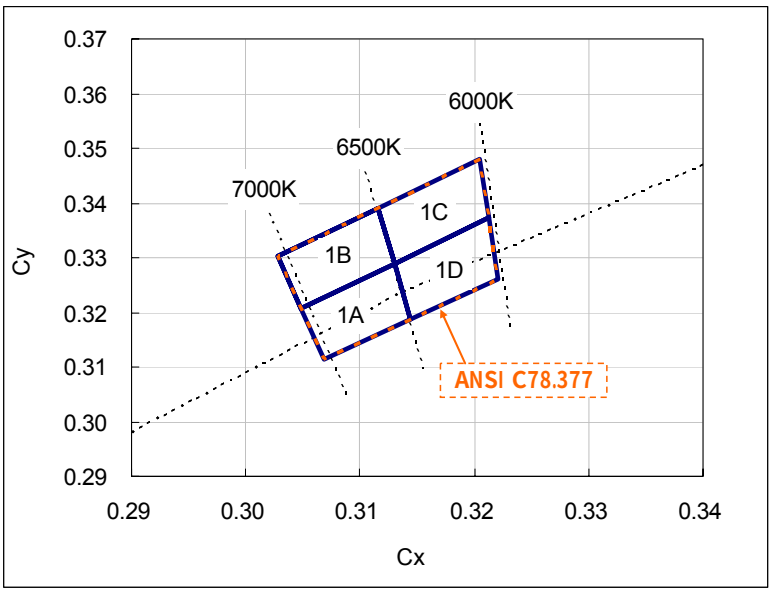
## Optical Characteristics (Ta = 25°C)

| Characteristics | Symbol | Test condition | Min | Typ. | Max | Unit |
|---|---|---|---|---|---|---|
| Chromaticity | $C_x$ | $I_F$ = 150 mA | (Note 6) | | | — |
| | $C_y$ | $I_F$ = 150 mA | (Note 6) | | | — |
| Color temperature | CCT | $I_F$ = 150 mA | — | 6500 | — | K |
| Luminous flux (Note 7) | $\Phi_V$ | $I_F$ = 150 mA | (30.3) | (45) | (60.5) | lm |
| Color rendering index | Ra | $I_F$ = 150 mA | 80 | 85 | — | — |

Note 6: Chromaticity classification

The product is classified at the following chromaticity coordinate groups.
Each reel includes the same rank LEDs. Let the delivery ratio of each rank be unquestioned.

Test conditions: $I_F$=150 mA, Ta=25°C
Tolerance: ±0.01




| | Cx | Cy |
|---|---|---|
| 1A | 0.3048 | 0.3207 |
| | 0.3130 | 0.3290 |
| | 0.3144 | 0.3186 |
| | 0.3068 | 0.3113 |
| 1B | 0.3028 | 0.3304 |
| | 0.3115 | 0.3391 |
| | 0.3130 | 0.3290 |
| | 0.3048 | 0.3207 |
| 1C | 0.3115 | 0.3391 |
| | 0.3205 | 0.3481 |
| | 0.3213 | 0.3373 |
| | 0.3130 | 0.3290 |
| 1D | 0.3130 | 0.3290 |
| | 0.3213 | 0.3373 |
| | 0.3221 | 0.3261 |
| | 0.3144 | 0.3186 |

Note 7: $\Phi_V$ rank classification

The specification on the following table is used for F classification of LEDs in Toshiba facility.
Each reel includes the same rank LEDs. Let the delivery ratio of each rank be unquestioned.

Ta=25°C
Tolerance: +/-10%

| Part Number | | Luminous flux $\Phi_V$ | | | |
|---|---|---|---|---|---|
| | | Min | Typ. | Max | $I_F$ |
| TL21W02-D1(T34 | | (30.3) | (45) | (60.5) | 150 |
| | C16 | 30.3 | — | 36.0 | |
| | C17 | 36.0 | — | 42.8 | |
| | C18 | 42.8 | — | 51.0 | |
| | C19 | 51.0 | — | 60.5 | |
| Unit | | lm | | | mA |

Note 8: Color Rendering Index

Measurement tolerance : +/- 5

## Cautions

- The product is sensitive to electrostatic and care must be fully taken when handling products. Particularly in the case that an over-voltage shall be applied, the overflowed energy may cause damage to or possibly result in destruction of the product. Users shall take absolutely secure countermeasures against electrostatic and surge when handling the product.
- 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.
- Please note the handling of products during evaluation.

1. Please do not apply pressure to the upper surface of the product with finger, tweezers, and others. Failure of product to light up may occur due to package deformation, wire deformation and/or disconnection.
2. Should tweezers be used in product handling, one with flat surfaces is recommended.
3. Please handle the product widthwise.
4. Please do not drop the product. There is a possibility for package transformation etc. to occur when the product is dropped.
5. Please do not stack the Printed Circuit Boards on which the product is mounted to prevent damages to product surface. Also, please note not to damage the surface of the product with cushioning material etc. Surface damage to the product may influence their optical characteristics.

## Packaging

This LED device is 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:

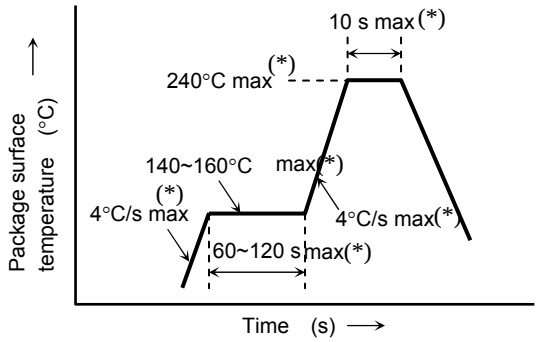
1. This moisture proof bag may be stored unopened within 12 months at the following conditions.
   Temperature: 5°C~30°C
   Humidity: 90% (max)
2. After opening the moisture proof bag, the device should be assembled within 168 hours in an environment of 5°C to 30°C/60% RH or below.
3. If upon opening, the moisture indicator card shows humidity 30% or above (Color of indication changes to pink) or the expiration date has passed, the 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 24 to 48 hours.
   Expiration date: 12 months from sealing date, which is imprinted on the label affixed.
4. Repeated baking can cause the peeling strength of the taping to change, then leads to trouble in mounting.
5. If the packing material of laminate would be broken, the hermeticity would deteriorate. Therefore, do not throw or drop the packed devices.

## Mounting Method

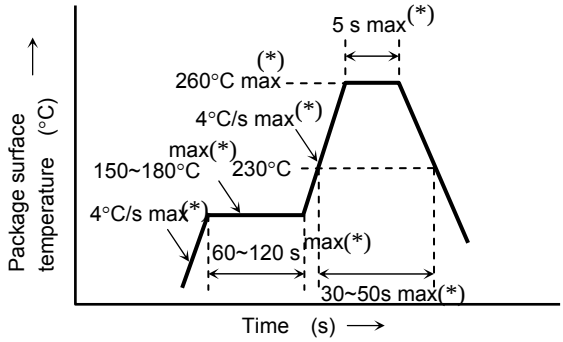
### Soldering

- Reflow soldering (example)

Temperature profile for Pb soldering (example)

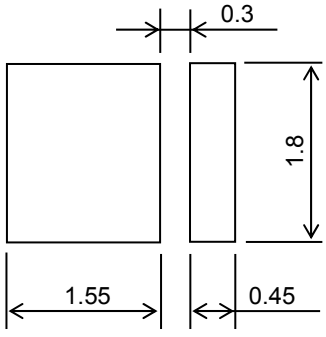



Temperature profile for Pb-free soldering (example)




- The 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 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, 60% RH (max)
- When any soldering corrections are made manually,a hot-plate should be used and do not use soldering iron. (only once at each soldering point)
- Do not perform wave soldering.

### Land pattern dimensions for reference only




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 750HS | : (made by KAO) |
| PINE ALPHA ST-100S | : (made by ARAKAWA CHEMICAL) |

## Precautions when Mounting

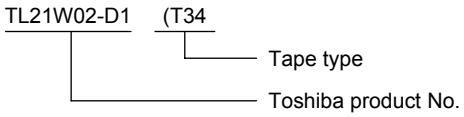
Do not apply force to the plastic part of the LED under high-temperature conditions.
To avoid damaging the LED plastic, do not apply friction using a hard material.
When installing the PCB in a product, ensure that the device does not come into contact with other components.

## 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. (this method, however does not apply to products whose electrical characteristics differ from standard Toshiba specifications)

(1) Tape Type: T34 (8-mm pitch)
(2) Example

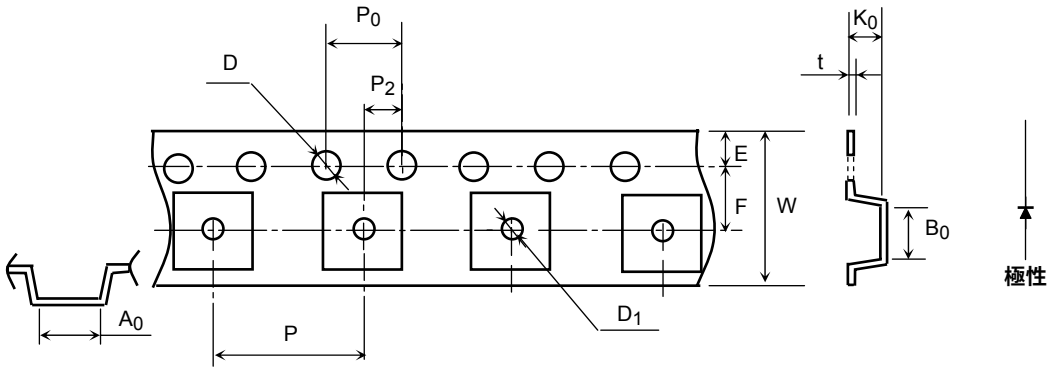



### 2. Tape dimensions

Unit: mm

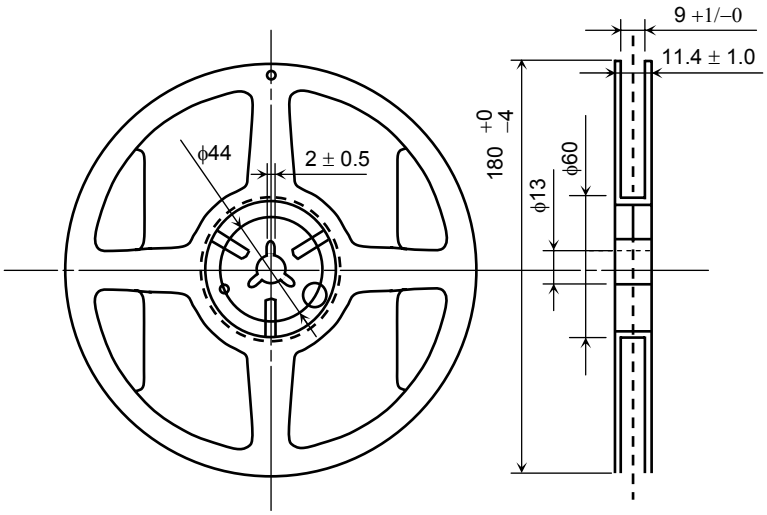
| Symbol | Dimension | Tolerance |
|---|---|---|
| D | 1.5 | +0.1/−0 |
| E | 1.75 | ±0.1 |
| $P_0$ | 4.0 | ±0.1 |
| t | 0.3 | ±0.05 |
| F | 3.5 | ±0.05 |
| $D_1$ | 1.1 | ±0.1 |

| Symbol | Dimension | Tolerance |
|---|---|---|
| $P_2$ | 2.0 | ±0.05 |
| W | 8.0 | ±0.2 |
| P | 8.0 | ±0.1 |
| $A_0$ | (2.4) | ±0.1 |
| $B_0$ | (2.8) | ±0.1 |
| $K_0$ | 0.8 | ±0.05 |

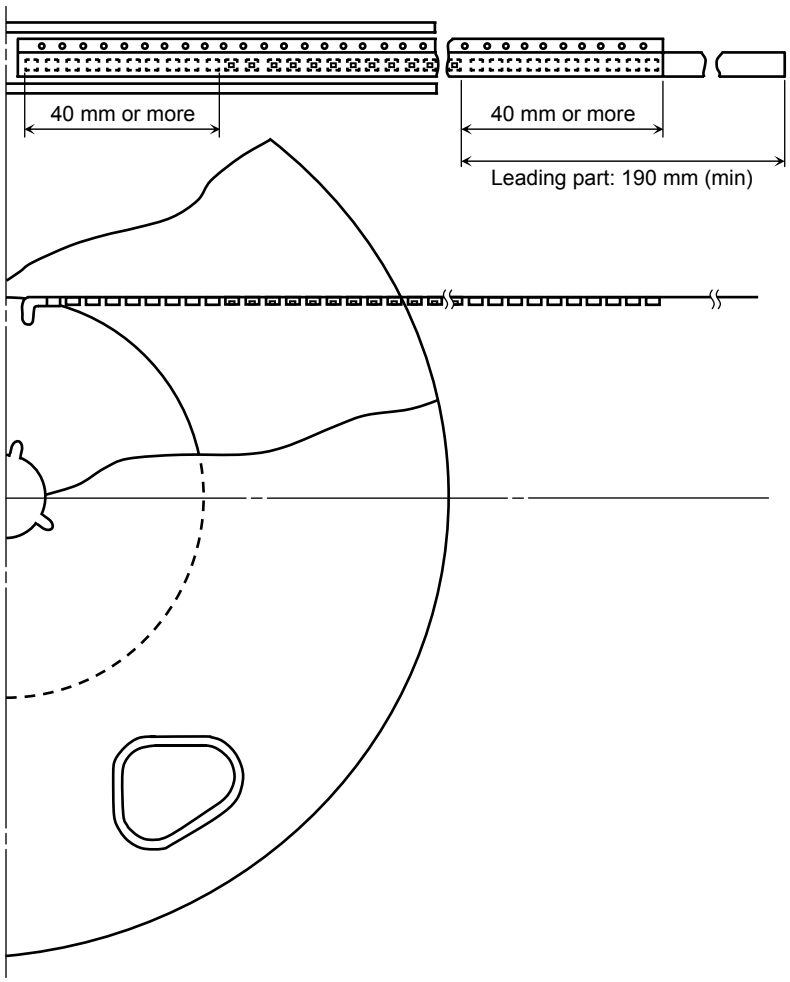


### 3. Reel dimensions

Unit: mm




### 4. Leader and trailer sections of tape



## 5. Packing form

(1) Packing quantity

| | |
|---|---|
| Reel | 1,000 pcs |
| Carton | 5,000 pcs |

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

## 6. Label format

(1) Example : TL21W02-D1(T34

P/N:

| | | | |
|---|---|---|---|
| TYPE | **TL21W02-D1(T34** | | |
| ADDC | xxx | Q'TY | 1,000 pcs |

TOSHIBA

1) xxxxxx 2) xxxxxxxx 4) xxx 5)xxxx
3) (xxxxx)
6) xxxxxxxxxx
7) Use under 5-30degC/60%RH within 168h

[[G]]/RoHS COMPATIBLE
*Y380xxxxxxxxxxxxxxxxxx*

SEALED:
DIFFUSED IN xxxxx
ASSEMBLED IN xxxxx

(1)-1 Contents about Note section (Each example means the contents are different for each lot.)

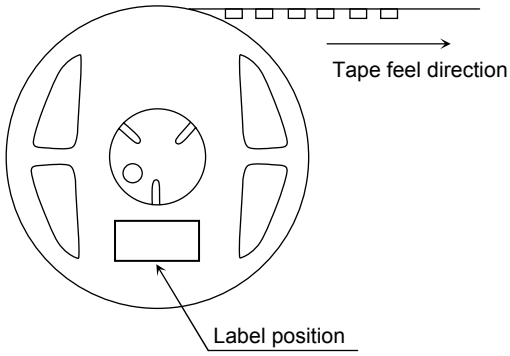
| Information for customers use | Information for Toshiba use |
|---|---|
| 1) Lot code<br>Example: 2707C2B | 4) Management code<br>Example: 015 32G |
| 2) Key code<br>Example: 12345 | 5) Packing quantity<br>Example: 1000 |
| 3) Rank symbol<br>Example: 1AC182 | 6) Product information (refer to section (1)-2)<br>Exxxx |
| | 7) Storage condition after opening<br>Use under 5-30 degC/60%RH within 168h |

(1)-2 Explanations for "ADDC" and "Product information"

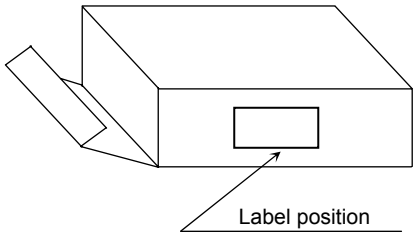
| | ADDC | Product information |
|---|---|---|
| Assembled in domestic : | (L1 | xxx |
| Assembled in overseas : | (L2 | xxx |

(2) Label location

- Reel




- Carton




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

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