

LED Lamps InGaN and Phosphor

TL1F1-WH1,L

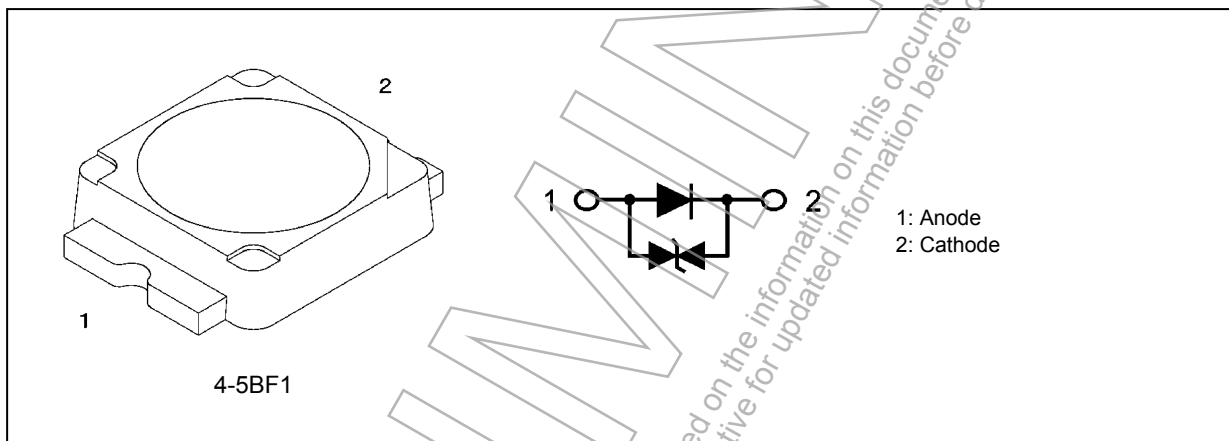
1. Applications

- General Lighting

2. Features

- (1) Size: 6.4 (L) mm × 5.0 (W) mm × 1.35 (H) mm
- (2) High luminous flux LED: 85 lm (typ.) @ $I_F = 350$ mA
- (3) Color: White (color temperature: 4000 K (typ.))
- (4) High Color Rendering Index : $R_a = 80$ (min.)
- (5) Operating temperature range: $T_{opr} = -40$ to 100°C
- (6) Reflow-soldering is available.

3. Packaging and Internal Circuit



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

Characteristics	Symbol	Note	Rating	Unit
Forward current (DC)	I_F	See Fig. 4.1	800	mA
Forward current (pulsed)	I_{FP}	(Note 1)	1000	
Power dissipation	P_D		2.9	W
Operating temperature	T_{opr}		-40 to 100	$^\circ\text{C}$
Storage temperature	T_{stg}		-40 to 100	
Junction temperature	T_j		130	

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.).

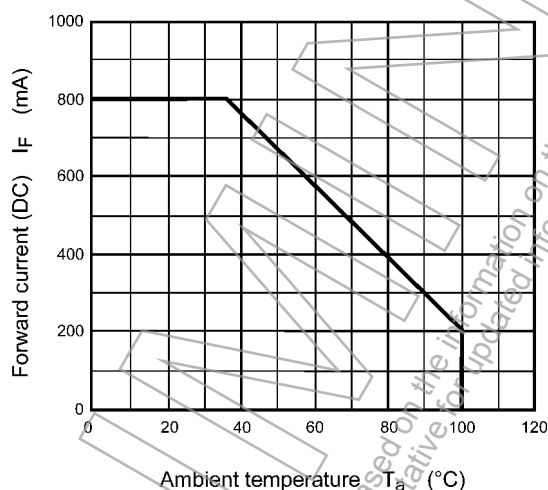


Fig. 4.1 $I_F - T_a$ (Note)

Note: The junction-to-ambient thermal resistance, $R_{th(j-a)}$, should be kept below 20°C/W so that this product is not exposed to a condition beyond the absolute maximum ratings.

$R_{th(j-a)}$: Thermal resistance from the LED junction to ambient temperature

Note 1: Pulse width 10 ms, duty = 1/10

5. Handling Precautions

- This product is sensitive to electrostatic and care must be fully taken when handling products. Particularly in the case that an overvoltage 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.
- 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.)
- 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.

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	See Table 6.1	$I_F = 350\text{ mA}$	2.8	2.9	3.6	V
Reverse current	I_R		$V_R = 4\text{ V}$	—	—	10	μA
Thermal resistance (junction-to-soldering point)	$R_{th(j-s)}$	(Note 1)	$I_F = 350\text{ mA}$	—	8	—	$^\circ\text{C/W}$

Note 1: $R_{th(j-s)}$: Thermal resistance from the LED junction to solder point.

Table 6.1 Forward Voltage (Note)

Rank	Test Condition	Forward Voltage (Min)	Forward Voltage (Max)	Unit
1	$I_F = 350\text{ mA}$, $T_a = 25^\circ\text{C}$, Tolerance $\pm 0.1\text{ V}$	2.8	3.0	V
2		3.0	3.2	
3		3.2	3.4	
4		3.4	3.6	

Note: This LED lamp is sorted into forward voltage (V_F) ranks shown above. Each reel includes the same rank LEDs. Let the delivery ratio of each rank be unquestioned.

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

Characteristics	Symbol	Note	Test Condition	Min	Typ.	Max	Unit
Chromaticity	C_x	(Note 1)	$I_F = 350\text{ mA}$	—	—	—	—
	C_y	(Note 1)	$I_F = 350\text{ mA}$	—	—	—	
Luminous flux	ϕ_v	(Note 2)	$I_F = 350\text{ mA}$	75	85	105	lm
Color temperature	CCT		$I_F = 350\text{ mA}$	—	4000	—	K
Color rendering index	Ra	(Note 3)	$I_F = 350\text{ mA}$	80	—	—	—

Note 1: See Fig. 7.1 and Table 7.1 for chromaticity rank.

Note 2: See Table 7.2 for luminous flux rank.

Note 3: Tolerance: ± 5

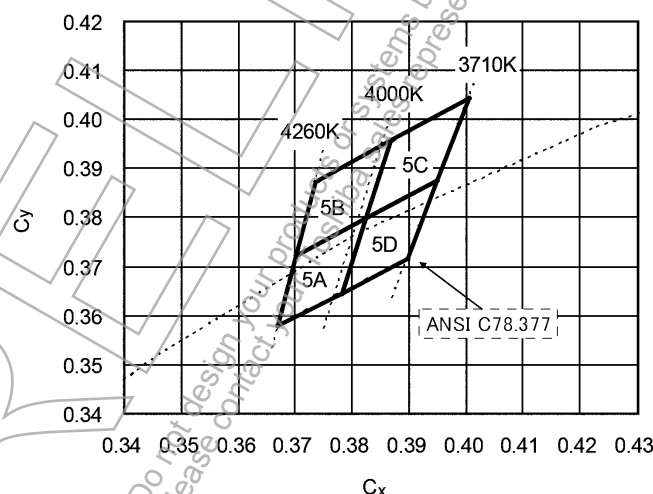


Fig. 7.1 Chromaticity Rank (Note)

Note: Test conditions: $I_F = 350\text{ mA}$, $T_a = 25^\circ\text{C}$, Tolerance: ± 0.01

Table 7.1 Chromaticity Rank (Note)

	C_x	C_y		C_x	C_y
5A	0.3670	0.3578	5C	0.3825	0.3798
	0.3702	0.3722		0.3869	0.3958
	0.3825	0.3798		0.4006	0.4044
	0.3783	0.3646		0.3950	0.3875
5B	0.3702	0.3722	5D	0.3783	0.3646
	0.3736	0.3874		0.3825	0.3798
	0.3869	0.3958		0.3950	0.3875
	0.3825	0.3798		0.3898	0.3716

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 Flux Rank (Note)

Rank	Test Condition	Luminous Flux (Min)	Luminous Flux (Max)	Unit
B07B	$I_F = 350 \text{ mA}$, $T_a = 25^\circ\text{C}$, Tolerance $\pm 10\%$	75	80	lm
B08A		80	85	
B08B		85	90	
B09A		90	95	
B09B		95	100	
B10A		100	105	

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

Rank notations: The luminous flux, chromaticity and V_F ranks are printed on labels as shown below:

Example: 5A B08B 2

5A: Chromaticity rank

B08B: Luminous flux rank

2: V_F rank

8. Characteristics Curves (Note)

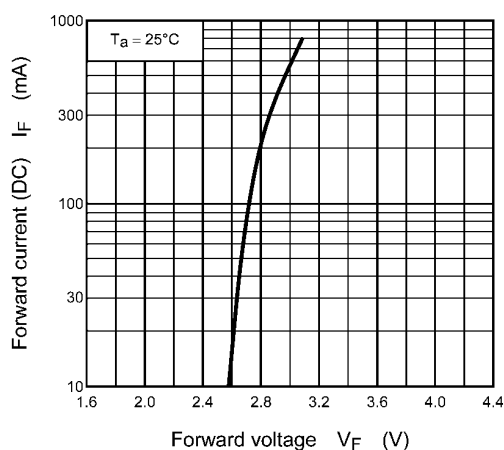


Fig. 8.1 $I_F - V_F$

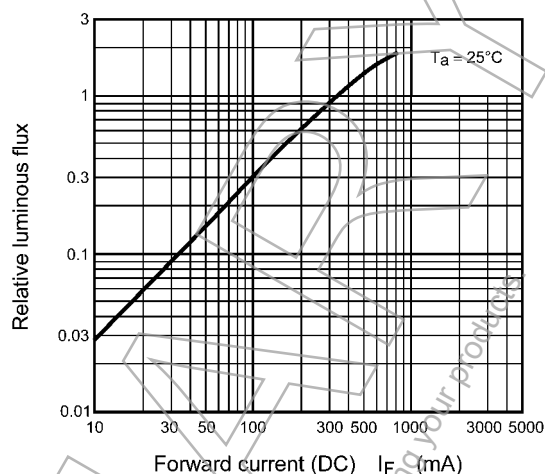


Fig. 8.2 Relative luminous flux - I_F

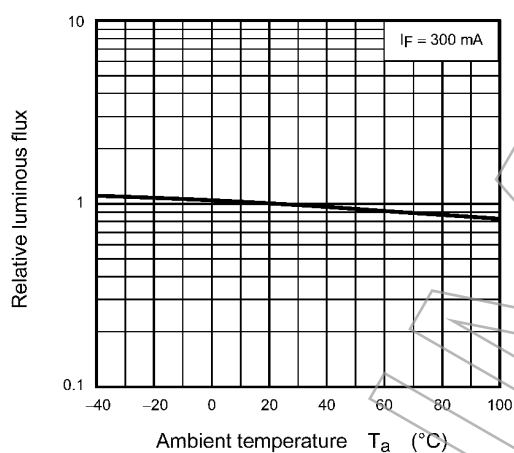


Fig. 8.3 Relative luminous flux - T_a

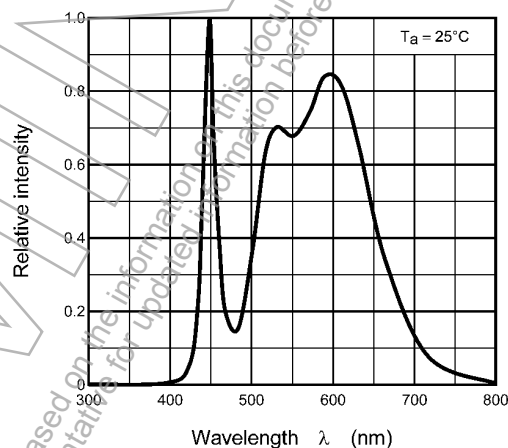


Fig. 8.4 Wavelength characteristic

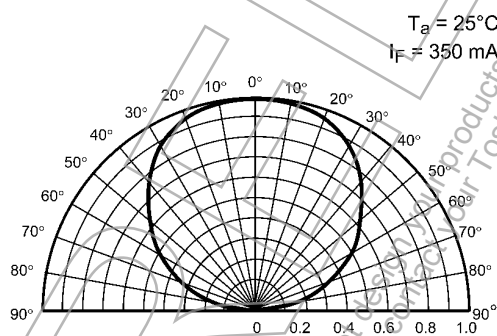


Fig. 8.5 Radiation Pattern

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

10.1. Mounting Precautions

- Do not apply mechanical stress to the resin body at high temperature.
The time taken for a device to return to the room temperature after reflow soldering depends on the mounting board and environmental conditions.
- The resin body is easily scratched. Avoid friction against hard materials.
- When installing an assembled board into equipment, ensure that the devices on the board do not contact with other components.

Following show examples of reflow soldering.

-
- The graph plots Package surface temperature in degrees Celsius against Time in seconds. The temperature starts at 25°C, rises linearly to a peak T_P , and then falls linearly. Key points and durations are marked: $T_S \text{ max}$ (start of rise), $T_S \text{ min}$ (end of rise), T_L (start of fall), T_P (peak), and $T_P - 5^\circ\text{C}$ (5°C below peak). Durations t_S (rise time), t_L (fall time), and t_P (peak time) are indicated.

	Symbol	Min	Max	Unit
Ramp-up rate (25 to 150°C)		1	3	°C/s
Preheat temperature	T_S	150	200	°C
Preheat time	t_S	60	120	s
Ramp-up rate (T_L to T_P)		1	3	°C/s
Liquidous temperature	T_L	217		°C
Time above T_L	t_L	60	100	s
Peek temperature	T_P		260	°C
Time within 5°C of actual peak temperature	t_P		30	s
Ramp-down rate (T_P to T_L)			6	°C/s

Table 10.2.1 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 h 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.
- When any soldering corrections are made manually, a hot-plate should be used. (only once at each soldering point)

Technical drawing of a mechanical part with dimensions:

- Overall width: 9.5
- Distance between the centers of the two left holes: 8.0
- Distance from the center of the leftmost hole to the center of the rightmost hole: 4.5
- Height of the part: 4.3
- Height of the central section: 3.9
- Distance from the center of the leftmost hole to the center of the rightmost hole: 1.1

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 Naming Conventions

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: TL1F1-WH1,L

Toshiba part number: TL1F1-WH1

Packing type: L (Taping)

12.2. Handling Precautions

- The tape is antistatic-coated. However, if the tape is charged with excess static electricity, devices might cling to the tape or waggle in the tape when the cover tape peeled off. Be aware of the following to avoid this:

Use an ionizer to neutralize the ions when utilizing an automatic mounter.

For transport and temporary storage of devices, use containers (boxes, jigs, bags) that are made with antistatic materials or materials that dissipate static electricity.

12.3. Tape Dimensions

Table 12.3.1 Tape Dimensions (Unit: mm)

	D	E	P ₀	t	F	D ₁	P ₂	W	P	A ₀	B ₀	K ₀
Dimensions	1.5	1.75	4.0	0.25	5.5	1.7	2.0	12.0	8.0	6.8	5.4	1.55
Tolerance	+0.1/-0	±0.1	±0.1	±0.05	±0.05	±0.1	±0.05	±0.2	±0.1	±0.1	±0.1	±0.1

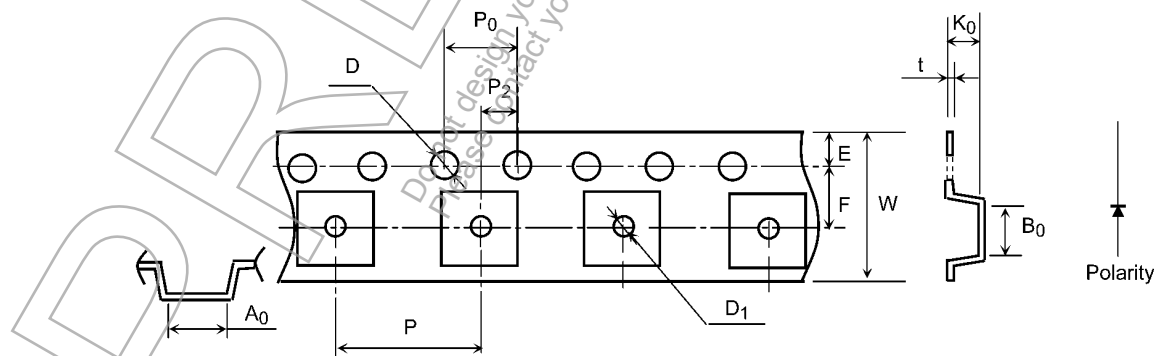


Fig. 12.3.1 Tape Dimensions

12.4. Reel Specification

12.4.1. Reel Dimensions

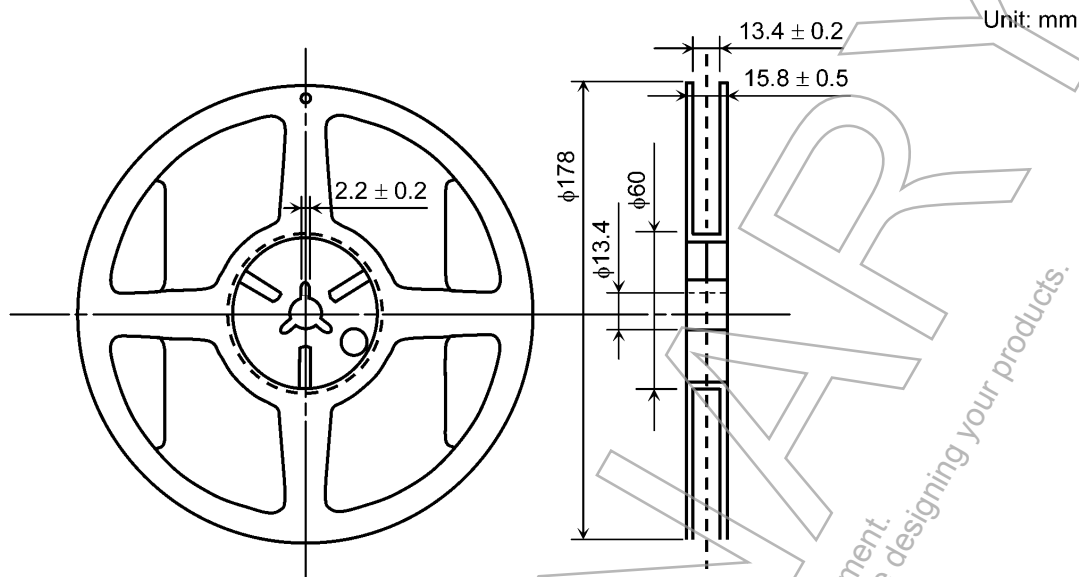


Fig. 12.4.1.1 Reel Dimensions

12.4.2. Tape Leader and Trailer

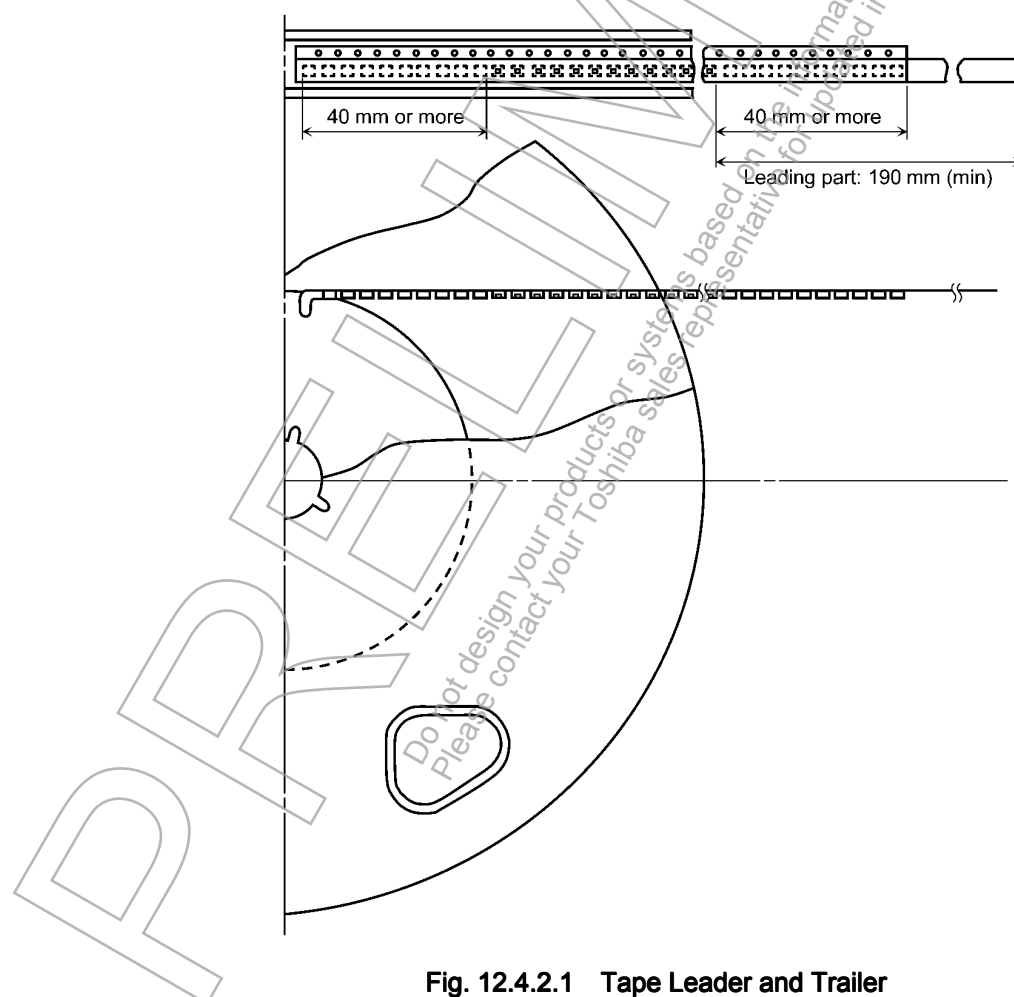


Fig. 12.4.2.1 Tape Leader and Trailer

12.5. Packing Form

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

- Reel: 1,000 pcs
- Carton: 5,000 pcs
- Sealed aluminum pack with silica gel

12.6. Label Format

Label example for TL1F1-LW1,L and label location are as shown below.

12.6.1. Label Example

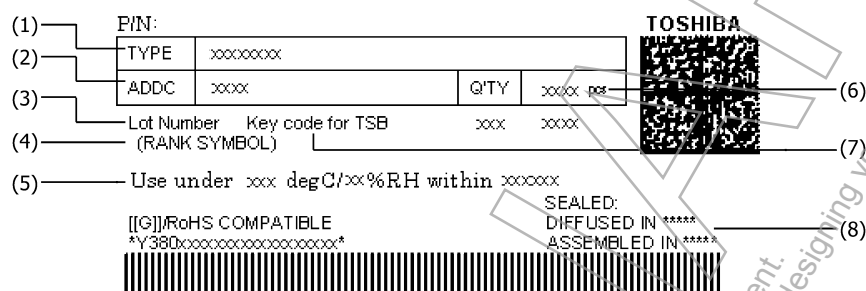


Fig. 12.6.1.1 Label Example

12.6.2. Label Details

No. (# refer to to the above label example)	Information for Customers Use	Information for Toshiba Use
(1)	Part No.	TL1F1-WH1,L
(2)	ADD code	—
(3)	Lot code	Example: 270xxxx
(4)	Rank symbol	Example: 5AB08B2
(5)	Storage condition after Opening	Use under 5-30°C/60%RH within 4 weeks
(6)	Packing quantity	Example: 1,000 pcs
(7)	Key code	Example: 12345
(8)	Country of origin	Example: JAPAN

12.6.3. Label Location

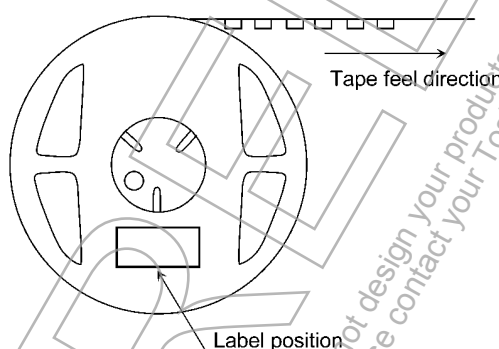


Fig. 12.6.3.1 Label Position on the Reel

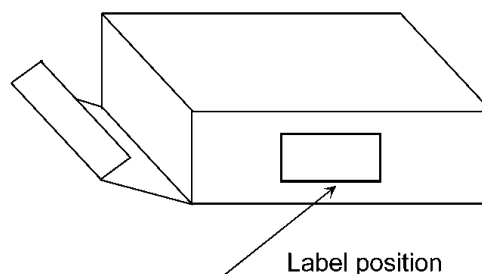
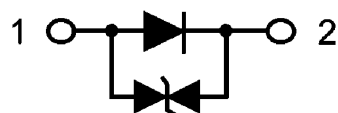


Fig. 12.6.3.2 Label Position on the Carton

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

13. Internal Circuit

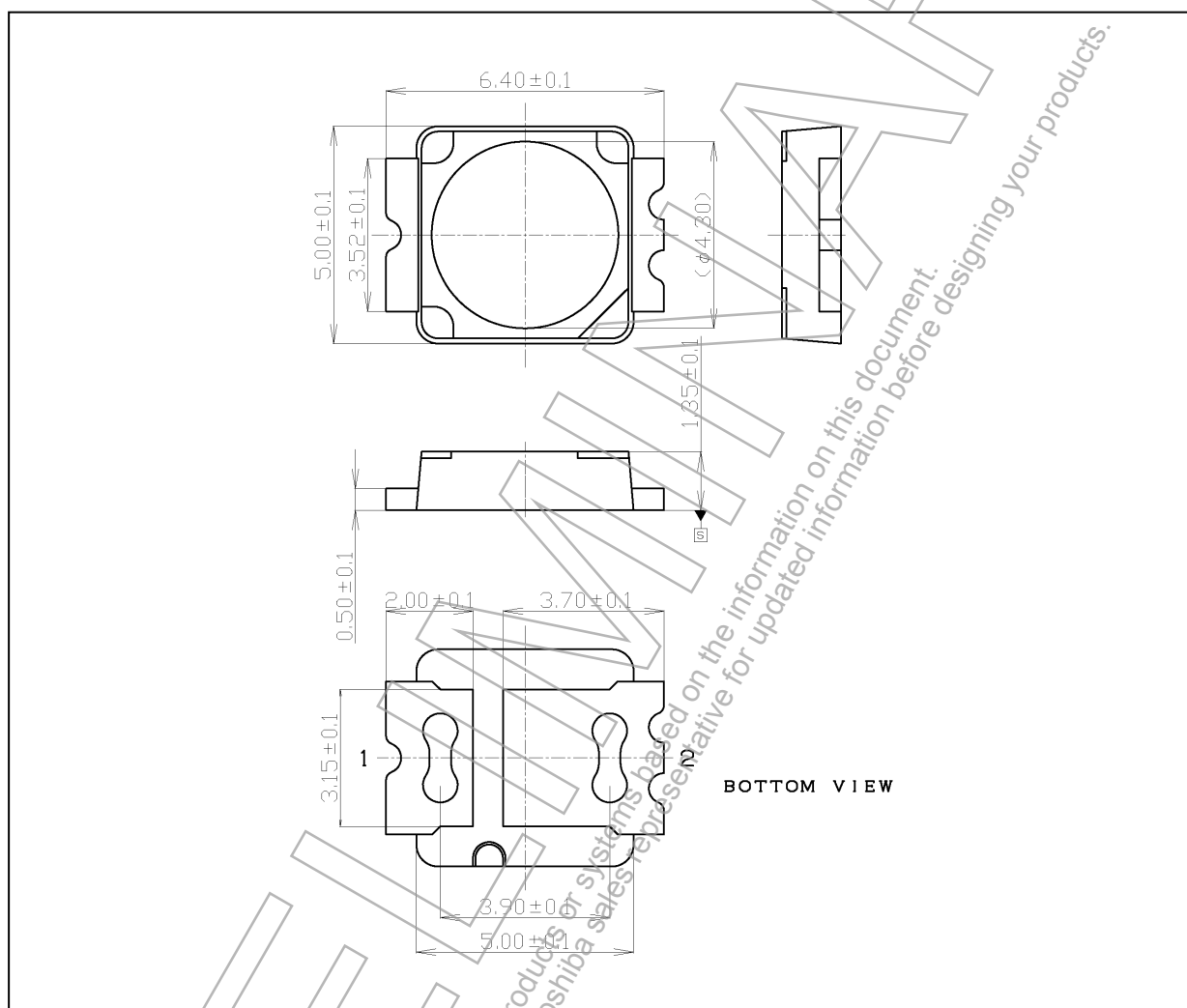


1: Anode
2: Cathode

Fig. 13.1 Internal Circuit

Package Dimensions

Unit: mm



Weight: 0.11 g (typ.)

Package Name(s)
TOSHIBA: 4-5BF1

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