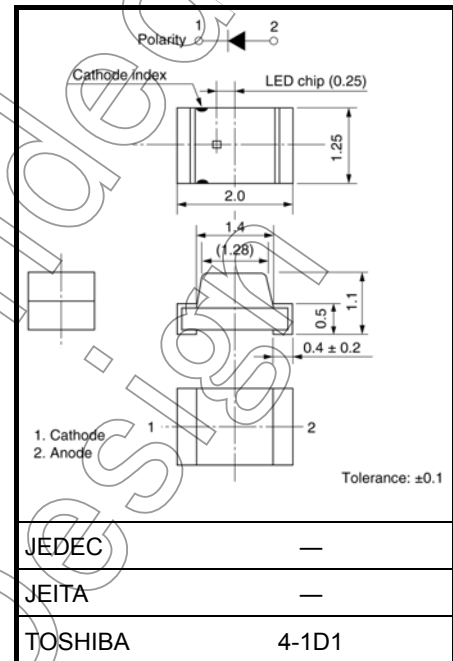


TLRE1002A(T02), TLSE1002A(T02) TLOE1002A(T02), TLYE1002A(T02), TLPYE1002A(T02) TLGE1002A(T02), TLFGE1002A(T02), TLPGE1002A(T02)

Unit: mm

Panel Circuit Indicators

- Surface-mount devices
- 2.0 (L) × 1.25 (W) × 1.1 (H) mm
- InGaAlP LEDs
- Replacing standard-intensity LEDs with high-intensity ones helps increase the brightness or reduce the power consumption of end products.
- Colors: red, orange, yellow, pure yellow, green, pure green
- Applications:
 - Backlighting for battery-powered equipment
 - Pilot lamps for mobile handsets
 - Low-power electronic equipment, etc.
- Standard embossed tape packing: T02 (3000 pcs / reel)
8-mm tape reel



Weight: 0.002 g (typ.)

Color and Material

Part Number	Color	Material
TLRE1002A	Red	InGaAlP
TLSE1002A	Red	
TLOE1002A	Orange	
TLYE1002A	Yellow	
TLPYE1002A	Pure Yellow	
TLGE1002A	Green	
TLFGE1002A	Green	
TLPGE1002A	Pure Green	

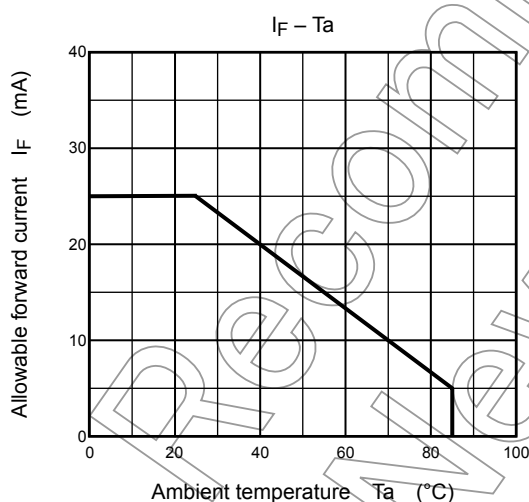
Absolute Maximum Ratings (Ta = 25°C)

Part Number	Forward Current I _F (mA) Please see Note 1	Reverse Voltage V _R (V)	Power Dissipation P _D (mW)	Operation Temperature T _{opr} (°C)	Storage Temperature T _{stg} (°C)
TLRE1002A	25	4	60	-40 to 85	-40 to 100
TLSE1002A					
TLOE1002A					
TLYE1002A					
TLPYE1002A					
TLGE1002A					
TLFGE1002A					
TLPGE1002A					

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).

Note 1: Forward current derating



Electrical Characteristics (Ta = 25°C)

Part Number	Forward Voltage V _F			Reverse Current I _R	Max	V _R
	Min	Typ.	Min	I _F		
TLRE1002A	1.6	1.9	2.4	20	50	4
TLSE1002A	1.6	1.9	2.4			
TLOE1002A	1.6	2.0	2.4			
TLYE1002A	1.6	2.0	2.4			
TLPYE1002A	1.6	2.0	2.4			
TLGE1002A	1.6	2.0	2.4			
TLFGE1002A	1.6	2.0	2.4			
TLPGE1002A	1.6	2.1	2.4			
Unit	V			mA	μA	V

Optical Characteristics-1 (Ta = 25°C)

Part Number	Luminous Intensity I _v				Available I _v rank Please see Note 2
	Min	Typ.	Max	I _F	
TLRE1002A	27.2	70	—	20	L / M / N / P
TLSE1002A	47.6	140	—	20	M / N / P / Q
TLOE1002A	47.6	180	—	20	M / N / P / Q
TLYE1002A	27.2	105	—	20	L / M / N / P
TLPYE1002A	27.2	70	—	20	L / M / N / P
TLGE1002A	27.2	70	—	20	L / M / N / P
TLFGE1002A	8.5	25	—	20	J / K / L / M
TLPGE1002A	4.76	18	—	20	H / J / K / L
Unit	mcd	mcd	mcd	mA	

Note 2: The specification on the above table is used for I_v 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 _v	
	Min	Max
H	4.76	12.9
J	8.5	23
K	15.3	41.4
L	27.2	73.6
M	47.6	129
N	85	230
P	153	414
Q	272	736
Unit	mcd	mcd

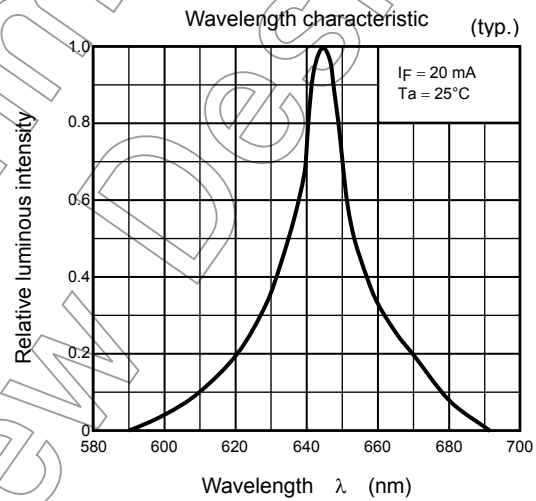
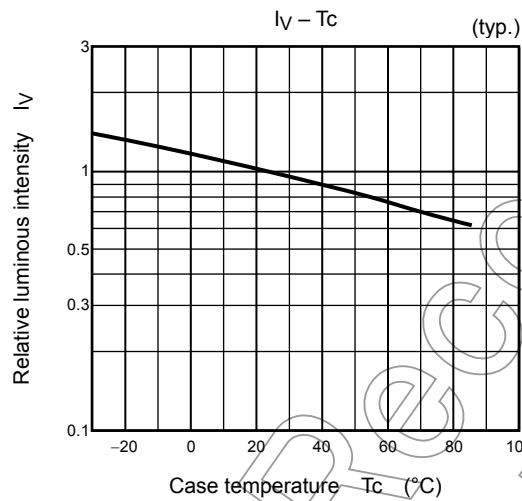
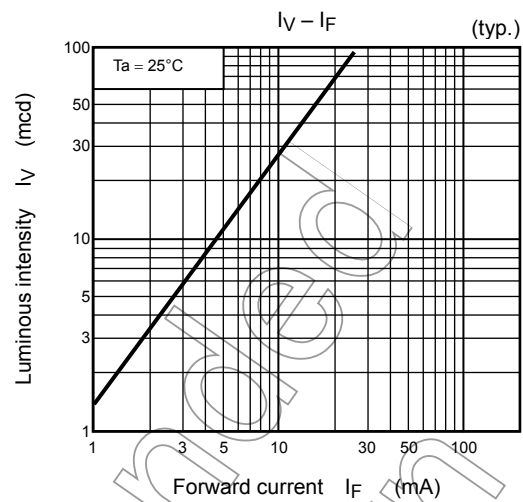
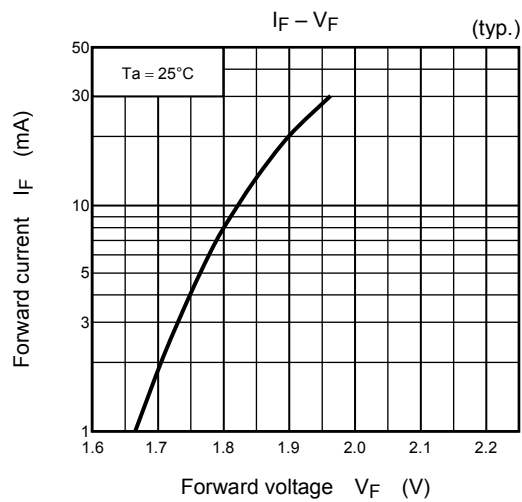
Optical Characteristics-2 (Ta = 25°C)

Part Number	Peak Emission Wavelength λ_p			Emission Spectrum				I _F
	Min	Typ.	Max	$\Delta\lambda$	Dominant Wavelength λ_d			
				Typ.	Min	Typ.	Max	
TLRE1002A	—	644	—	18	624	630	638	20
TLSE1002A	—	623	—	17	607	613	621	
TLOE1002A	—	612	—	15	599	605	613	
TLYE1002A	—	590	—	13	581	587	595	
TLPYE1002A	—	583	—	13	574	580	586	
TLGE1002A	—	574	—	11	565	571	576	
TLFGE1002A	—	568	—	11	559	565	571	
TLPGE1002A	—	562	—	11	—	558	564	
Unit	nm			nm	nm			mA

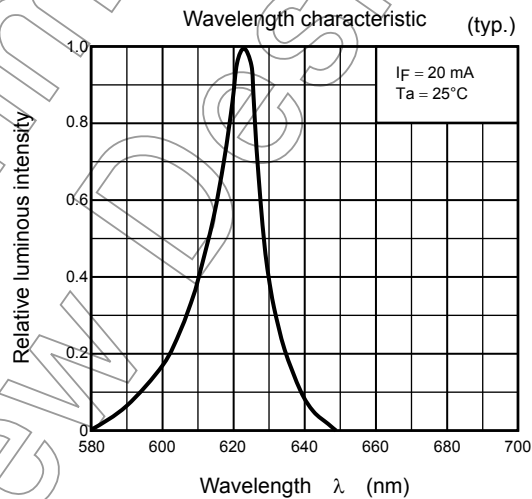
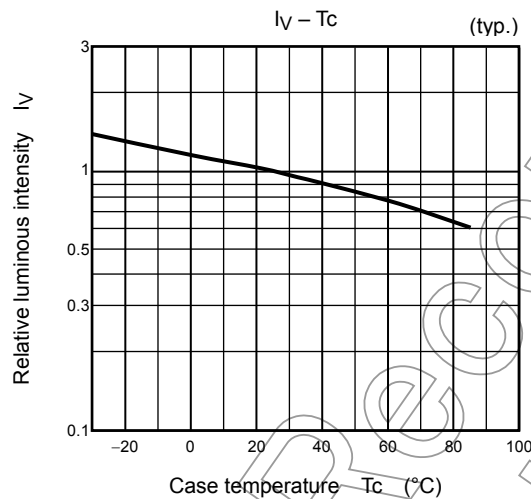
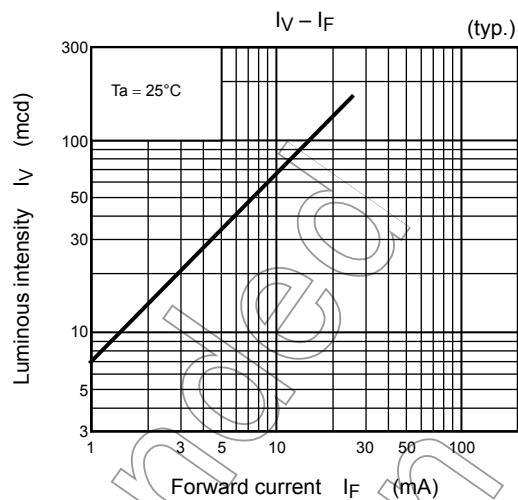
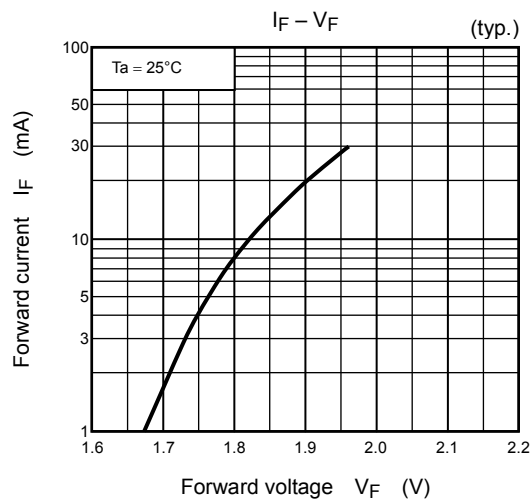
Cautions

- 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.

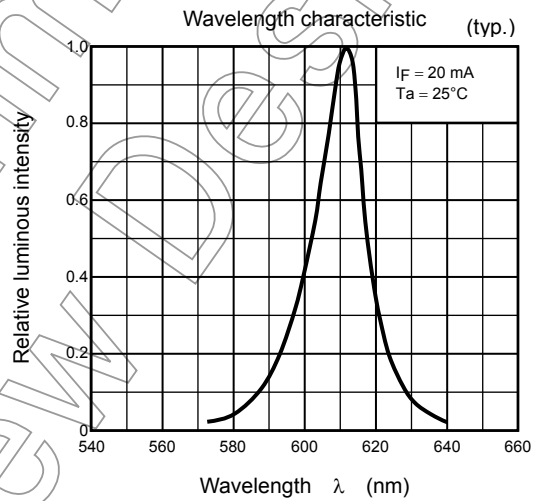
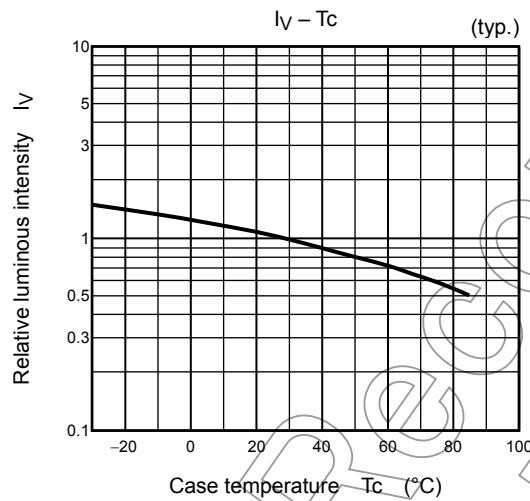
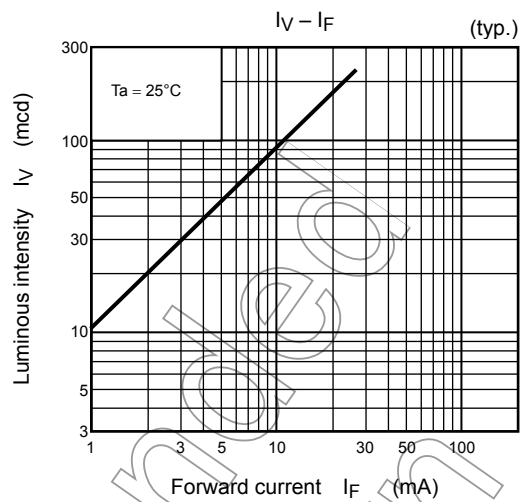
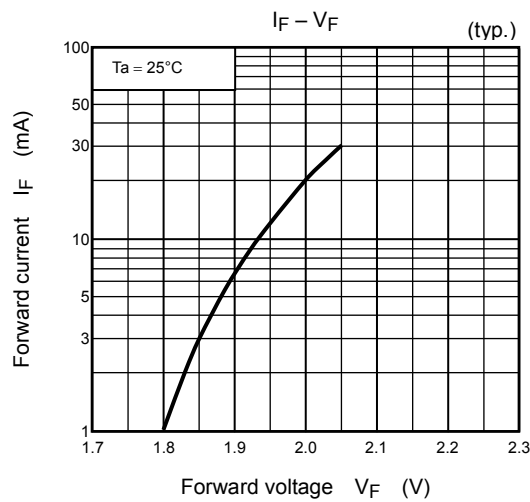
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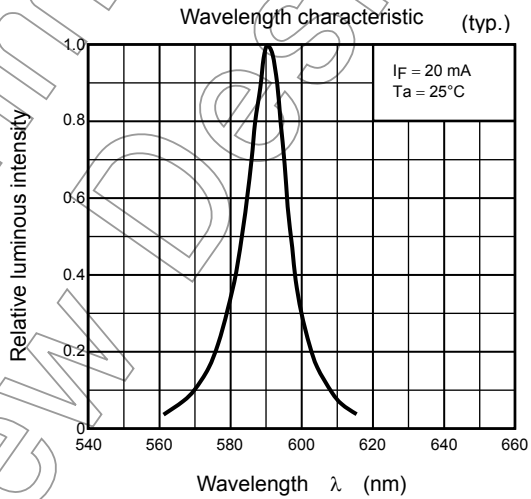
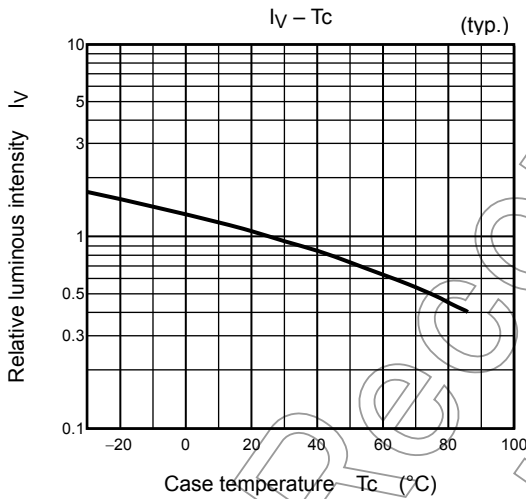
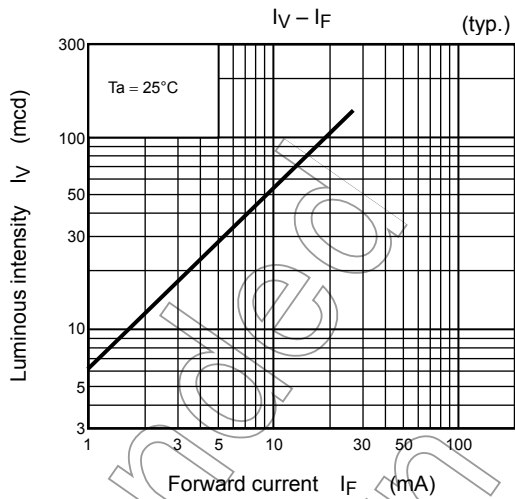
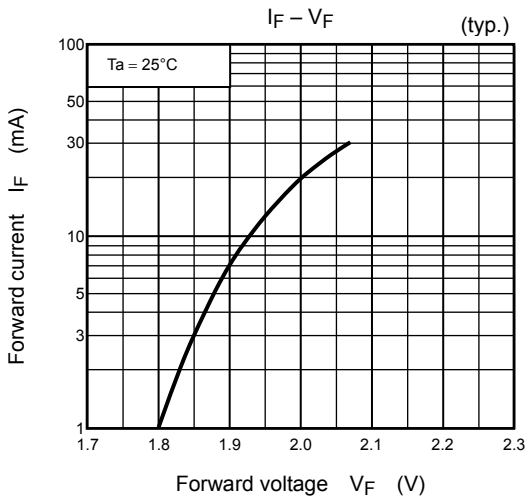
TLSE1002A



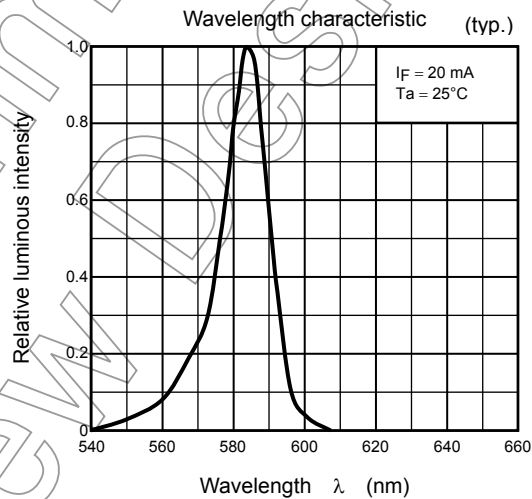
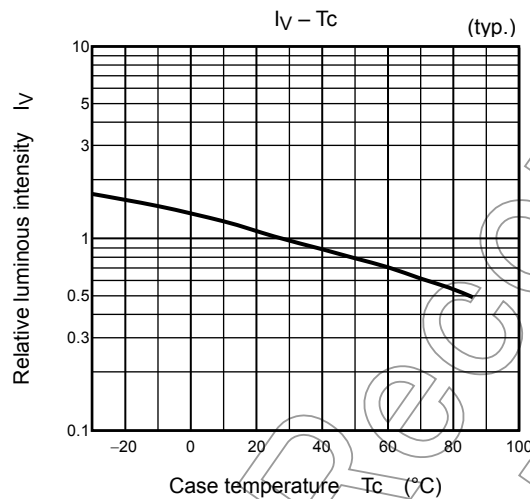
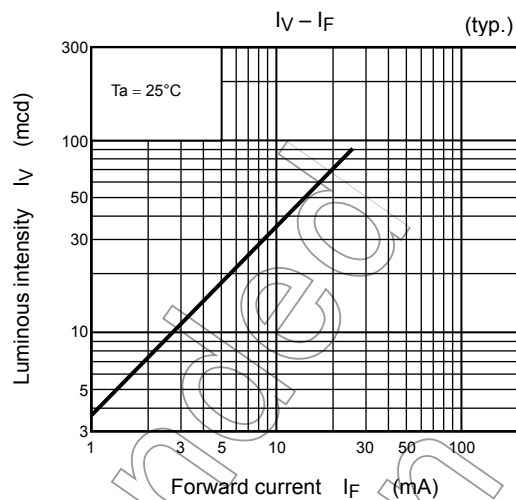
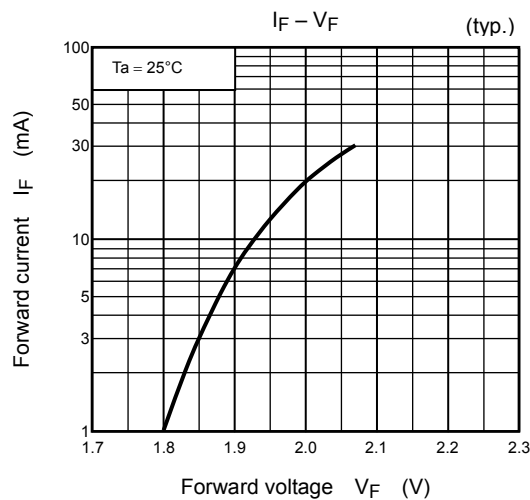
TLOE1002A



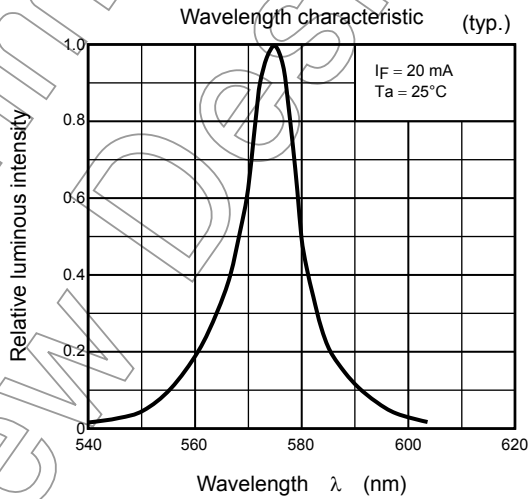
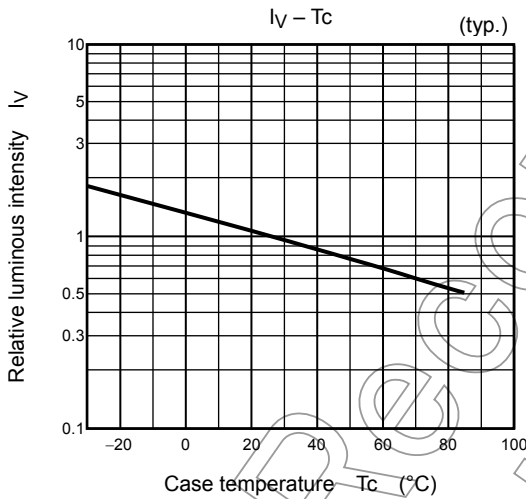
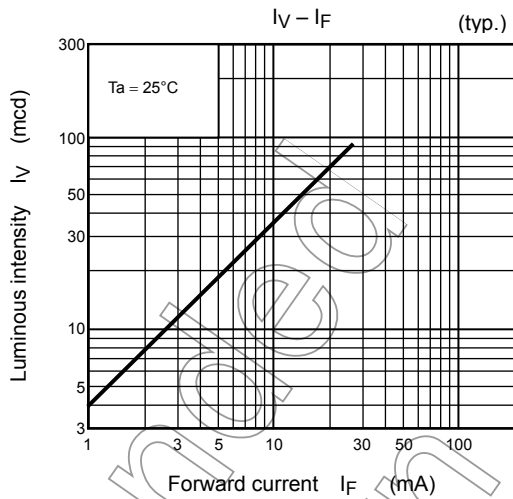
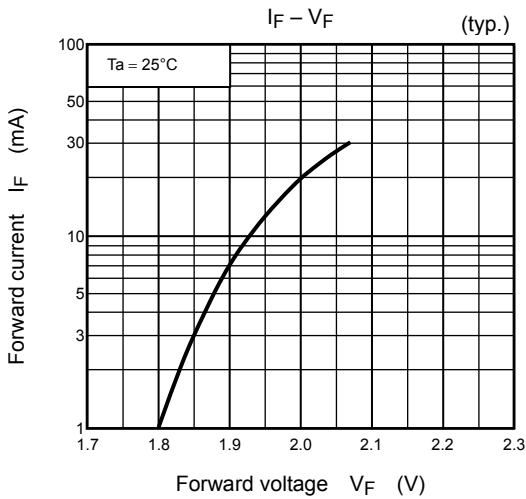
TLYE1002A



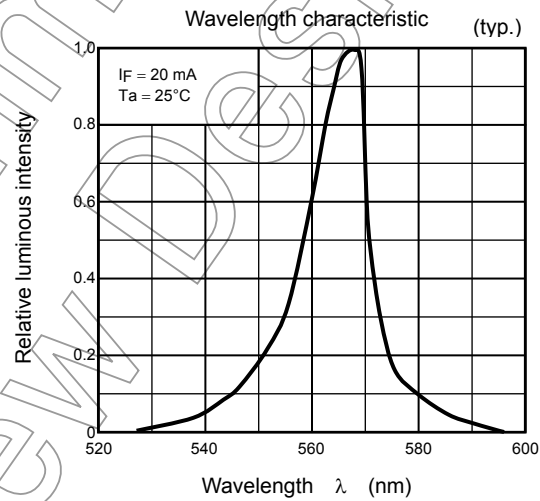
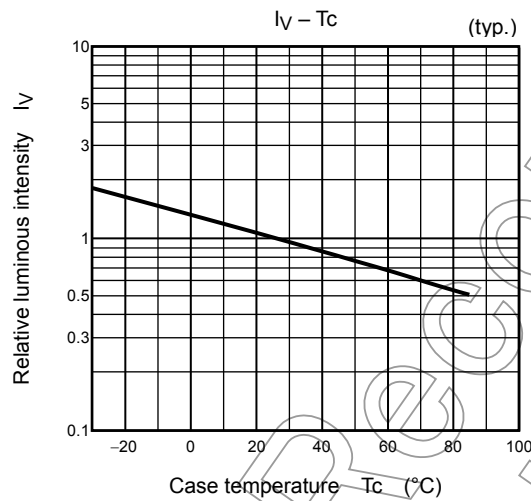
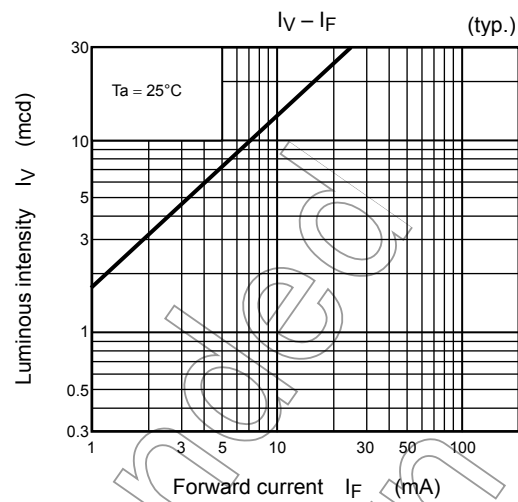
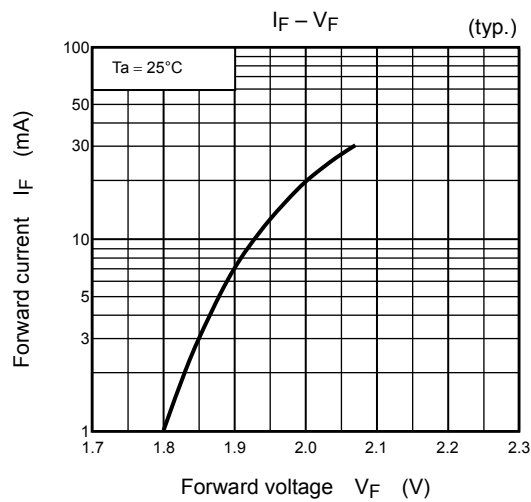
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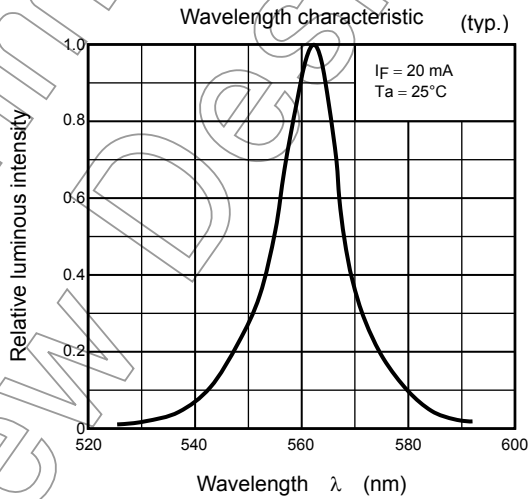
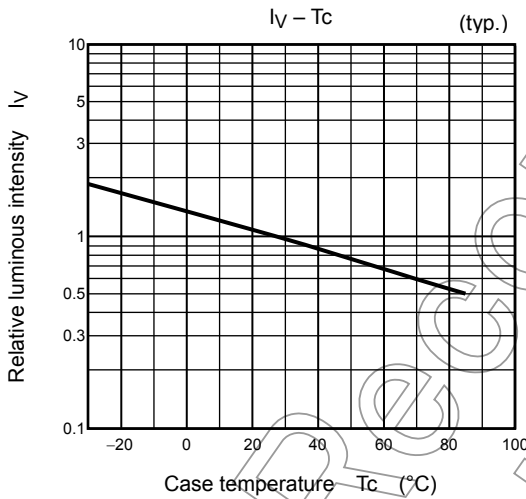
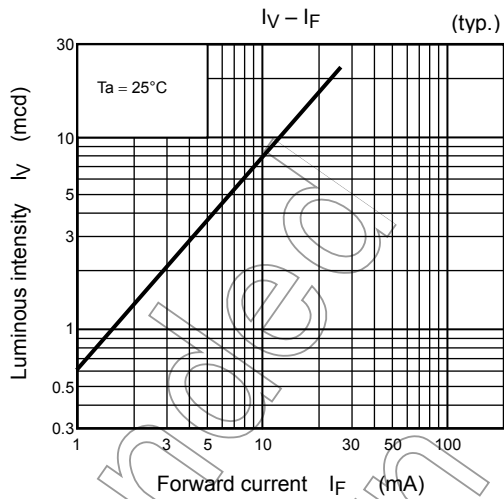
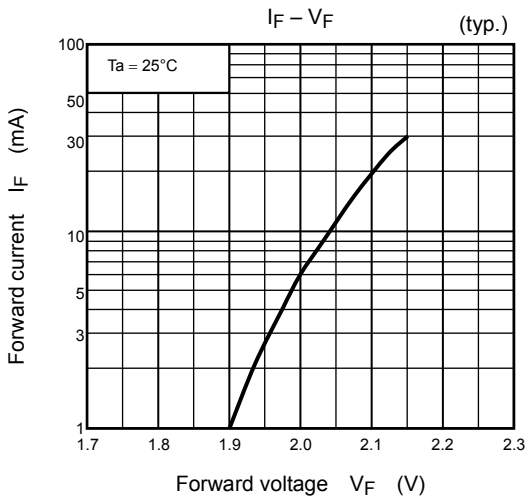
TLGE1002A



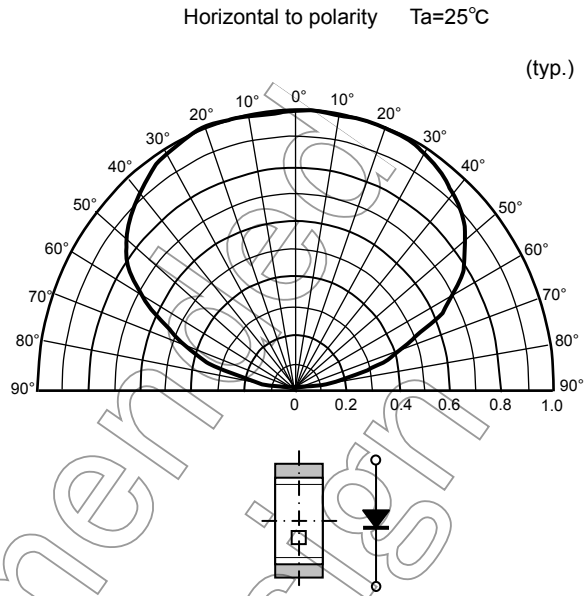
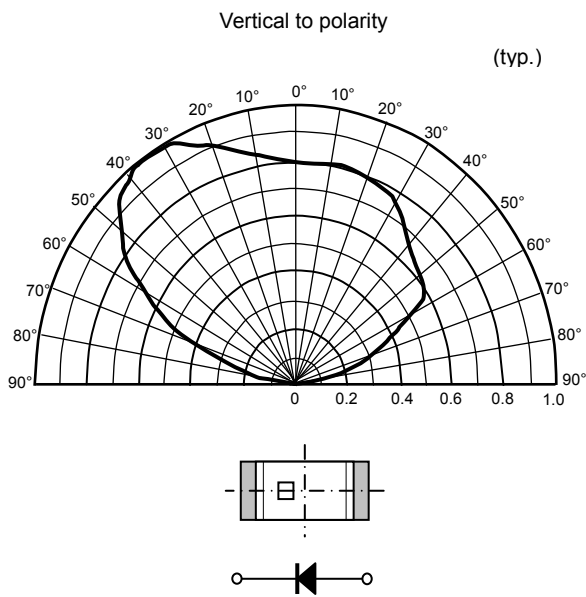
TLFGE1002A



TLPGE1002A



Radiation Pattern



Packaging

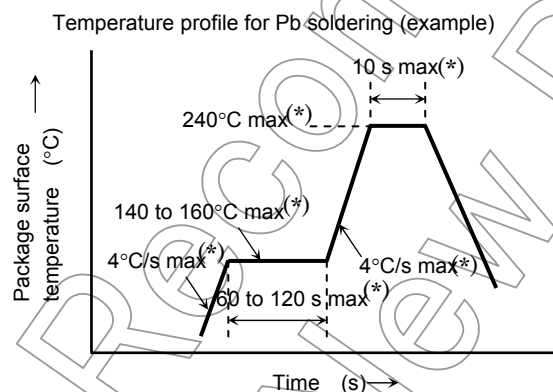
These LED devices are packed in an aluminum envelope with a silica gel and a moisture indicator to avoid moisture absorption. The optical characteristics of the devices may be affected by exposure to moisture in the air before soldering and they should therefore be stored under the following conditions:

1. This moisture proof bag may be stored unopened within 12 months at the following conditions.
Temperature: 5°C to 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.
When performing lead(Pb)-free soldering, the devices should be assembled within 72 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

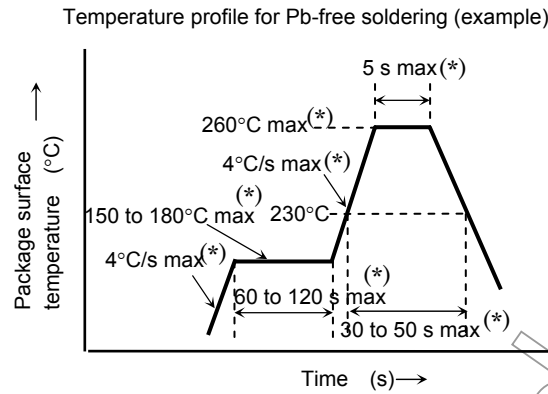
Soldering

- Reflow soldering (example)



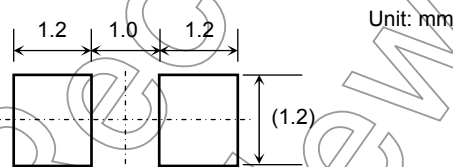
- The products are evaluated using above reflow soldering conditions. No additional test is performed exceed the condition (i.e. the condition more than (*)MAX values) as a evaluation. Please perform reflow soldering under the above conditions.
- Please perform the first reflow soldering with reference 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
- Do not perform wave soldering.

- Reflow 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 72 h of opening the package.
- Second reflow soldering
In case of second reflow soldering should be performed within 72 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
- Do not perform wave soldering.

Recommended soldering pattern



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 THROUGH 750H	: (made by KAO)
PINE ALPHA ST-100S	: (made by ARAKAWA CHEMICAL)

Precaution when mounting

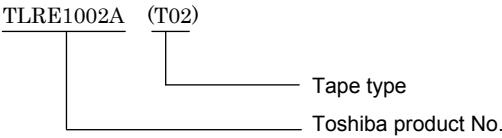
Do not apply force to the plastic part of the LED under high-temperature conditions.
To avoid damaging the LED plastic, do not apply friction using a hard material.
When installing the PCB in a product, ensure that the device does not come into contact with other components.

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: T02 (4-mm pitch)
- (2) Example



2. Handling precautions

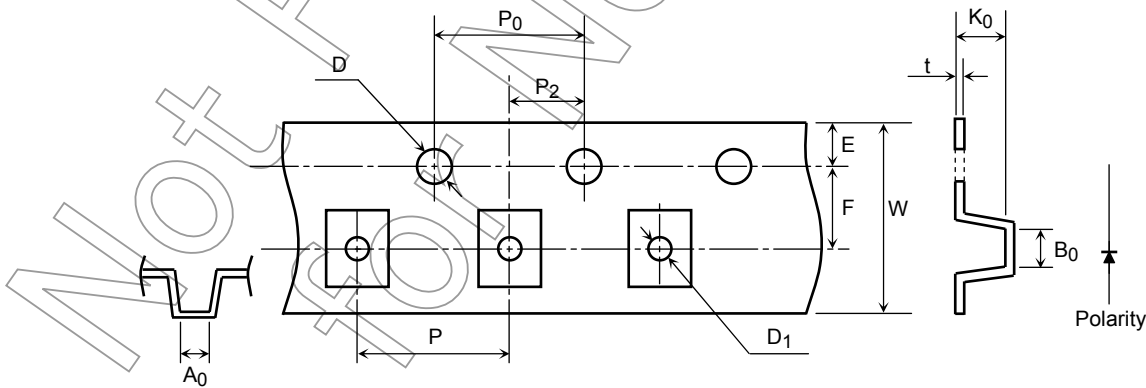
Tape material protected against static electricity. However, static electricity may occur depending on quantity of charged static electricity and a device may attach to a tape, or a device may be unstable when peeling a tape cover.

- (a) Since tape materials may accumulate an electrostatic charge, use an ionizer to neutralize the ambient air.
- (b) 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

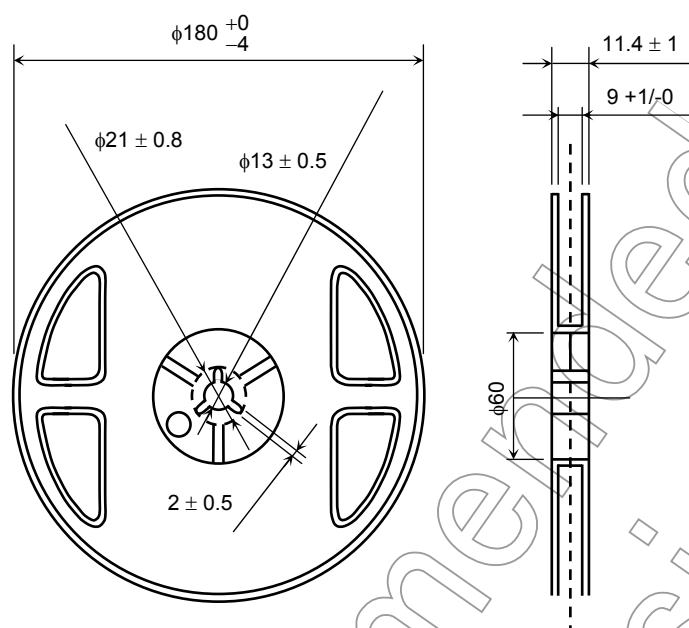
Unit: mm

Symbol	Value	Tolerance	Symbol	Value	Tolerance
D	1.50	+0.1/-0	P ₂	2.00	±0.05
E	1.75	±0.1	W	8.00	±0.3
P ₀	4.00	±0.1	P	4.00	±0.1
t	0.20	±0.05	A ₀	1.45	±0.1
F	3.50	±0.05	B ₀	2.25	±0.1
D ₁	1.10	±0.1	K ₀	1.30	±0.05

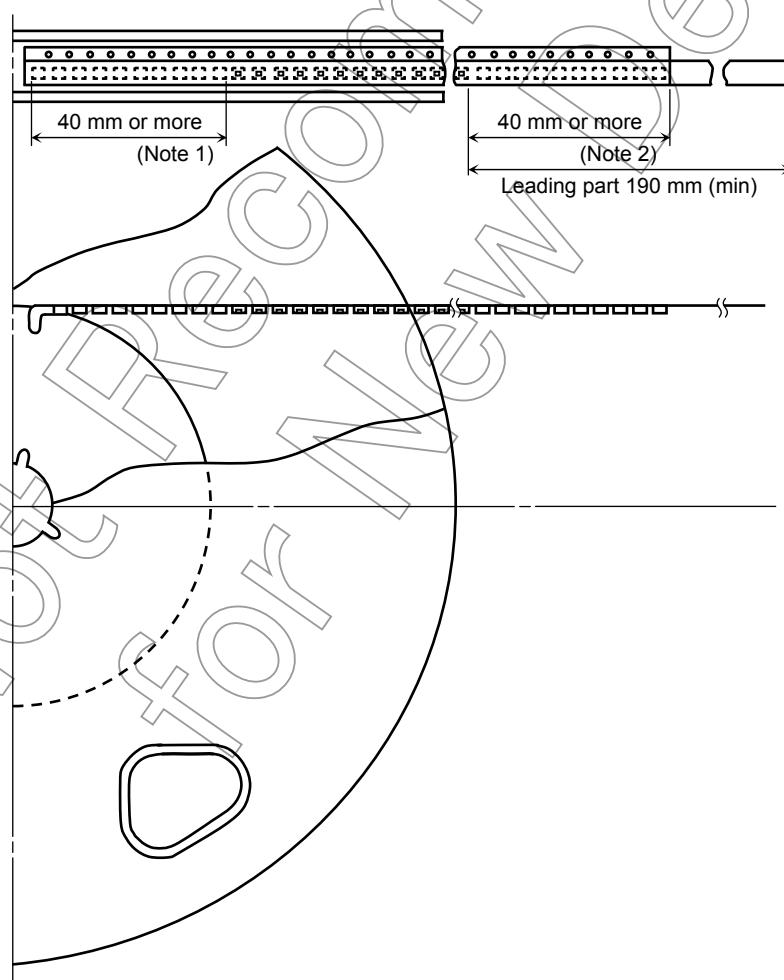


4. Reel dimensions

Unit: mm



5. Leader and trailer section of tape



Note 1: Empty trailer section

Note 2: Empty leader section

6. Packing display

(1) Packing quantity

Reel	3,000 pcs
Carton	15,000 pcs

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

7. Label format

(1) Example: TLRE1002A (T02)

P/N:

TYPE	TLRE1002A		
ADDC	(T02)	Q'TY	3,000 pcs

Lot Number

Key code for TSB

(RANK SYMBOL)

32C

3000

Use under 5-30degC/70%RH within 72h

[[G]]/RoHS COMPATIBLE

Y380xxxxxxxxxxxxxxxxx

SEAL

ED

DIFFUSED IN *****

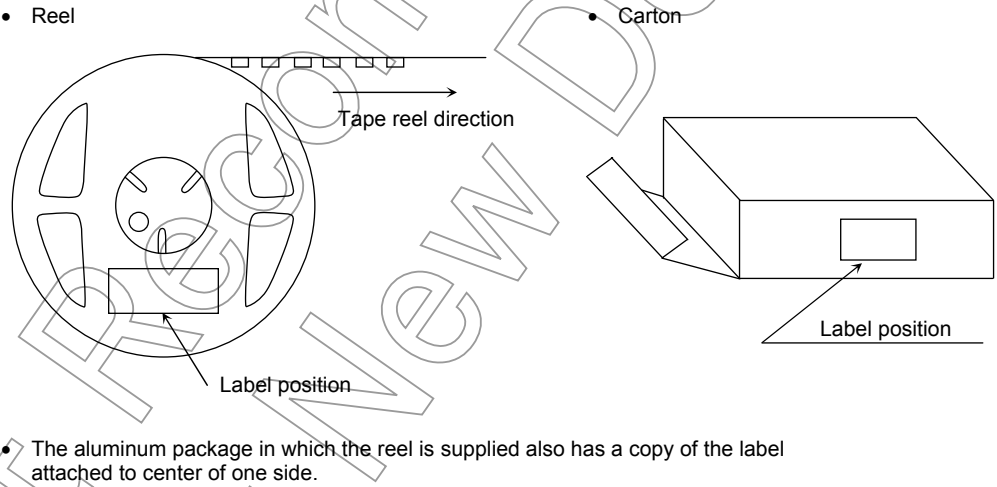
ASSEMBLED IN *****

TOSHIBA





(2) Label location



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- GaAs (Gallium Arsenide) is used in Product. GaAs is harmful to humans if consumed or absorbed, whether in the form of dust or vapor. Handle with care and do not break, cut, crush, grind, dissolve chemically or otherwise expose GaAs in Product.
- Do not use or otherwise make available Product or related software or technology for any military purposes, including without limitation, for the design, development, use, stockpiling or manufacturing of nuclear, chemical, or biological weapons or missile technology products (mass destruction weapons). Product and related software and technology may be controlled under the Japanese Foreign Exchange and Foreign Trade Law and the U.S. Export Administration Regulations. Export and re-export of Product or related software or technology are strictly prohibited except in compliance with all applicable export laws and regulations.
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