

## DATASHEET

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### LM3535LD

( TL3535LUXxxNAxx )

- 3535 SMD(Surface Mount Device) Package
- UV Radiant power up to 4mW
- Dimension : 3.7 x 3.7 x 1.86 mm
- Lead-free reflow soldering application
- RoHS compliant

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## 1. Product description

### (1) Description

- The UV LED is designed for the high power operation to get the high power output applications.
- Spec output peak wavelengths are typical 275nm which enable powerful and compact applications in disinfection

### (2) Features

- Lead frame type LED Package : 3.7mm x 3.7mm x 1.86mm ( L x W x H )
- Available in from 270nm to 280nm
- Low thermal resistance as low as 30°C/W
- Viewing angle of 115 degrees
- Chip material : AlGaIn based
- Reflow soldering
- RoHS compliant

### (3) Applications

- Disinfection (Water / Surface / Air)
- Portable devices

## 2. Absolute maximum ratings

Parameters	Symbol	Value	Unit
Power dissipated	$P_D$	0.2	W
Forward current	$I_F$	40	mA
Operating temperature	$T_{OPR}$	-10 ~ +55	°C
Storage temperature	$T_{STG}$	-30 ~ +65	°C
<sup>(1)</sup> Junction temperature	$T_J$	≤ 90	°C
Soldering temperature	Reflow Soldering : 260°C for 10 sec.		

(1) Proper current derating must be observed to maintain junction temperature below the Maximum.

### 3. Electro-optical characteristics (Ta=25°C)

Parameters	Symbol	If(mA)	Typ.	Unit
Forward voltage	Vf	30	6.5	V
Viewing angle FWHM	2θ <sub>1/2</sub>	30	115	degrees
Thermal resistance junction to solder pad	Rth <sub>j-a</sub>	30	30	°C/W

- Lumens maintains a tolerance of ±3% on forward voltage measurements.
- Viewing angle 115±5 degree.

### 4. Electro-optical chart (Sorting current=30mA, Ta=25°C)

Parameter	Symbol	Min	Typ	Max	Unit
Peak wavelength	λp	270	275	280	nm
Radiant power	Φe	2.0	3.0	4.0	mW
Forward voltage	Vf	6.0	6.5	8.0	V
FWHM	Δλ	-	10.5	-	nm
View angle	2θ <sub>1/2</sub>	-	115	-	deg.
Thermal resistance	Rθ <sub>J-s</sub>	30			°C/W

- Tested and binned at 30mA, 25°C
- Lumens maintains a tolerance of ±2nm on Peak wavelength measurements.
- Lumens maintains a tolerance of ±10% on Radiant flux measurements.
- Lumens maintains a tolerance of ±0.5 on Forward voltage measurements.

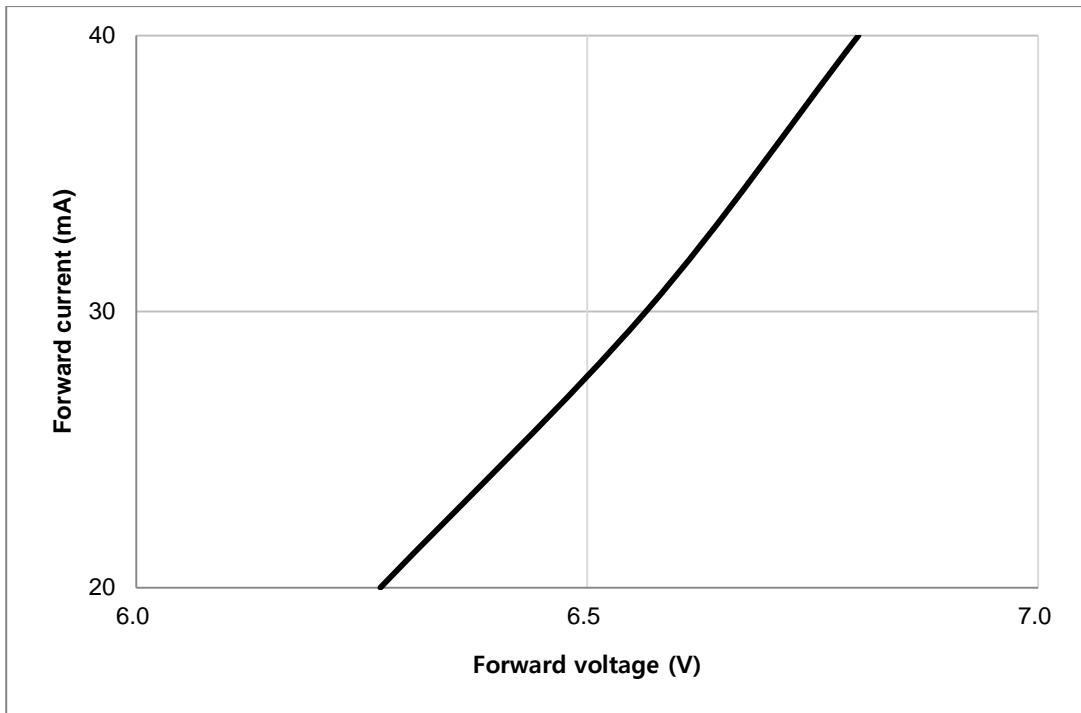
## 5. Ranks (Sorting current=30mA, Ta=25°C)

Item	Symbol	Model name	Wavelength Range (nm)	Rank	If=30mA (Sorting current)			Unit
					Min	Typ	Max	
Radiant Flux	Φe	TL3535LUX27NAxx	270 - 280	P2	2.0	-	2.5	mW
				P3	2.5	-	3.0	
				P4	3.0	-	3.5	
				P5	3.5	-	4.0	
Forward voltage	Vf	All		V6	6.0	-	7.0	V
				V7	7.0	-	8.0	

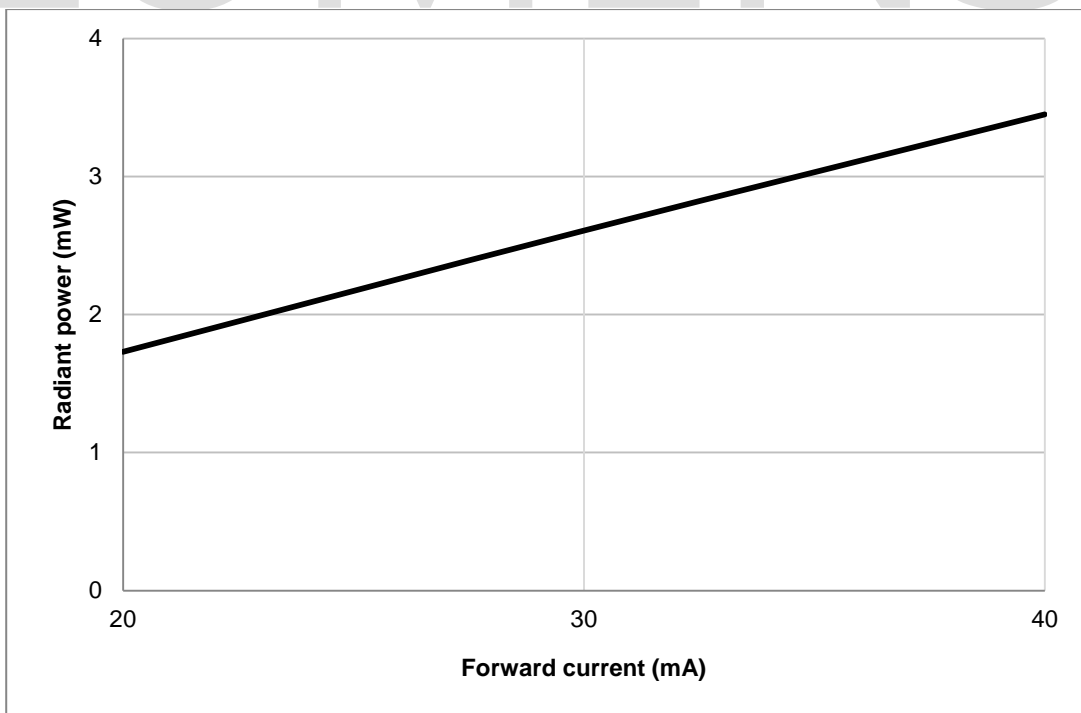
- Lumens maintains a tolerance of  $\pm 7\%$  on Radiant flux measurements.
- Lumens maintains a tolerance of  $\pm 3\%$  on Forward voltage measurements.
- Lumens maintains a tolerance of  $\pm 1$  on wavelength measurements.

## 6. Characteristic Graphs (Ta=25°C)

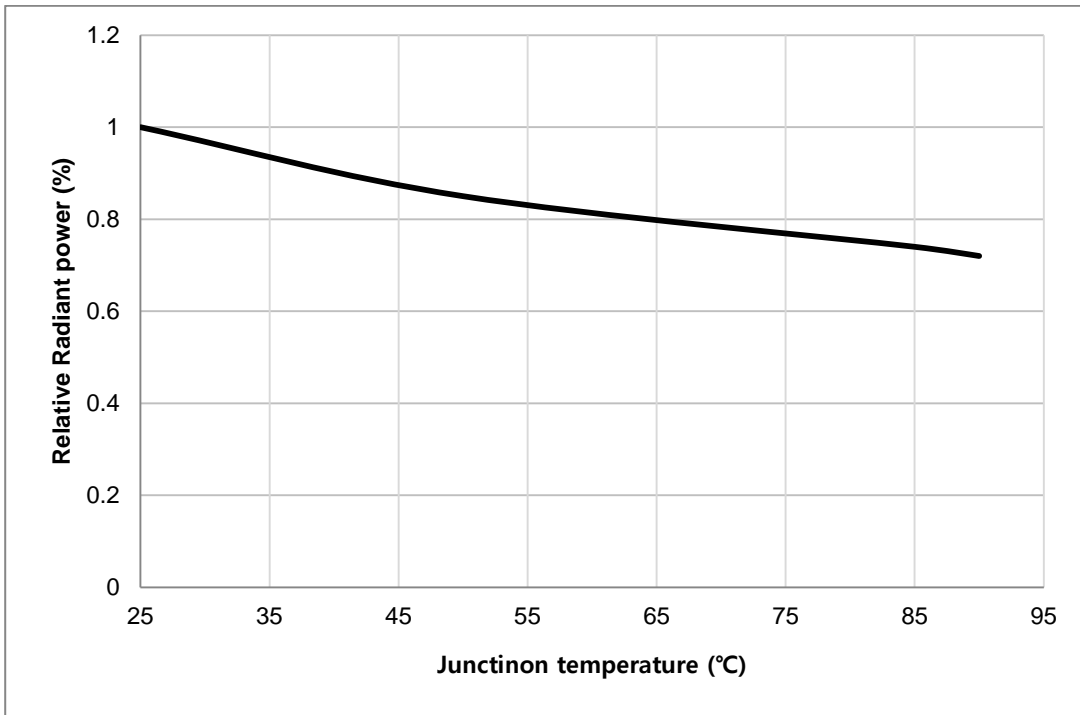
(1) Typical Forward Current vs. Forward Voltage



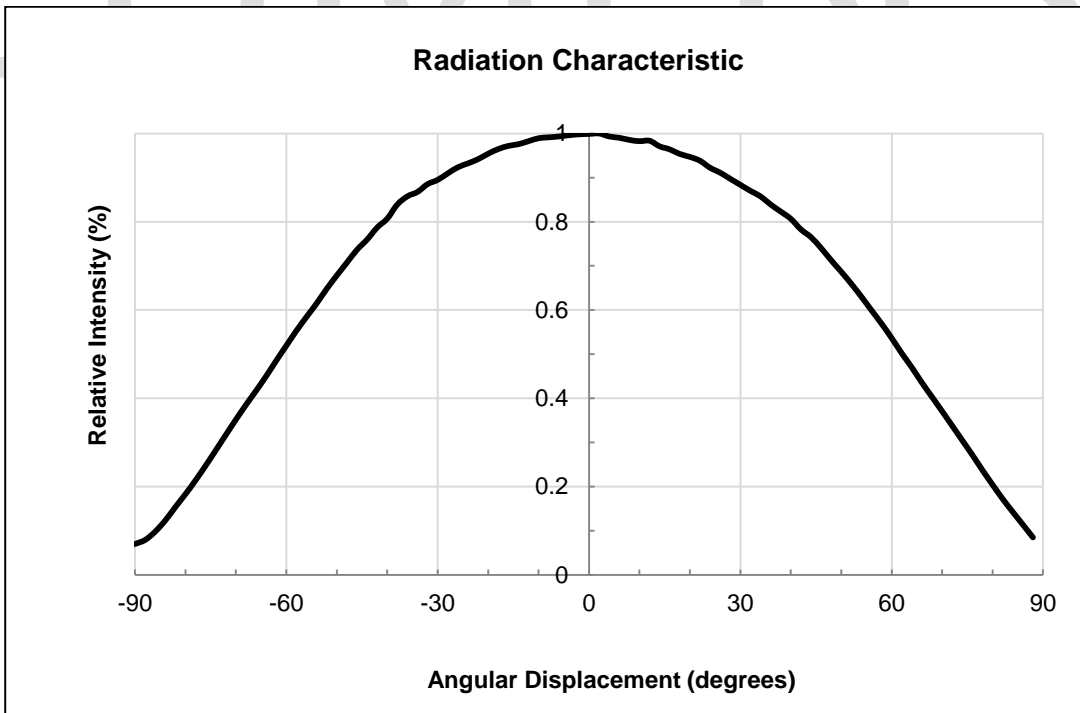
(2) Typical Relative Radiant Power vs. Forward Current



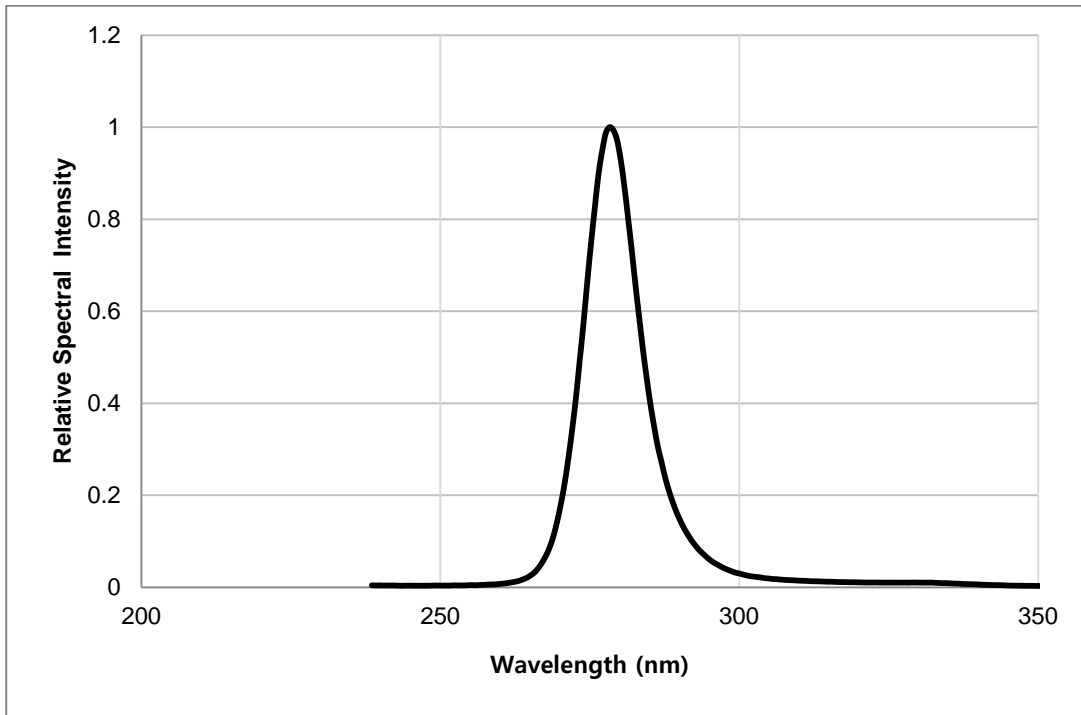
(3) Typical Relative Radiant power vs. Junction Temperature



(4) Typical Spatial Radiation Characteristic



## (5) Relative spectral Intensity vs. Wavelength



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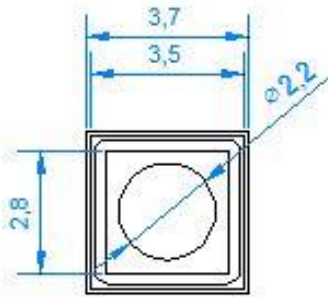


## 7. Outline Dimensions

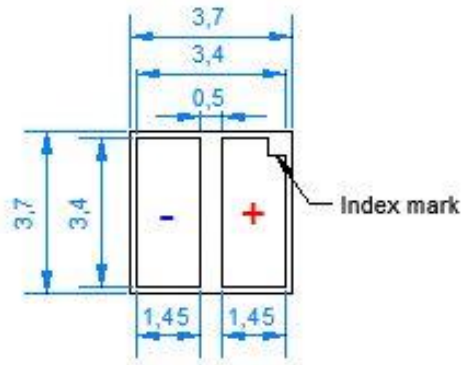
- Package outline (Width x Length x Height) of 3.7 x 3.7 x 1.86mm
- Undefined tolerance is  $\pm 0.1$  mm

(Unit : mm)

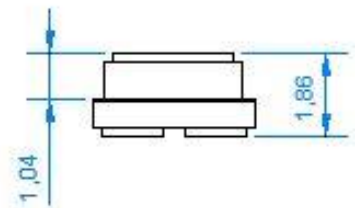
[ TOP View ]



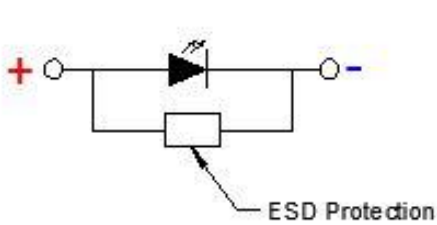
[ Bottom View ]



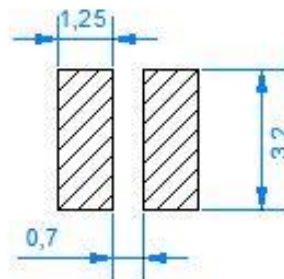
[ Side View ]



[ Circuit diagram ]



[ Solder pad ]



## 8. Reliability test items and conditions

Item	Reference	Test Conditions	Duration Cycle
Room Temperature Operating Life (RTOL)	Internal Reference	Ta = 25°C, If = Sorting current	1,000 hours
High Temperature Operating Life (HTOL)	Internal Reference	Ta = 85°C, If = Sorting current	1,000 hours
Low Temperature Storage (LTS)	Internal Reference	Ta = -40°C	1,000 hours
High Temperature Storage (HTS)	Internal Reference	Ta = 100°C	1,000 hours
Wet Operating Life of High Temperature (WHTOL)	Internal Reference	Ta = 60°C, 90% RH If = Sorting current	1,000 hours
Moisture Sensitivity Level (MSL)	Internal Reference	Tsoldering = 260°C (Pre-treatment 60°C, 60%, 168hr)	1 times

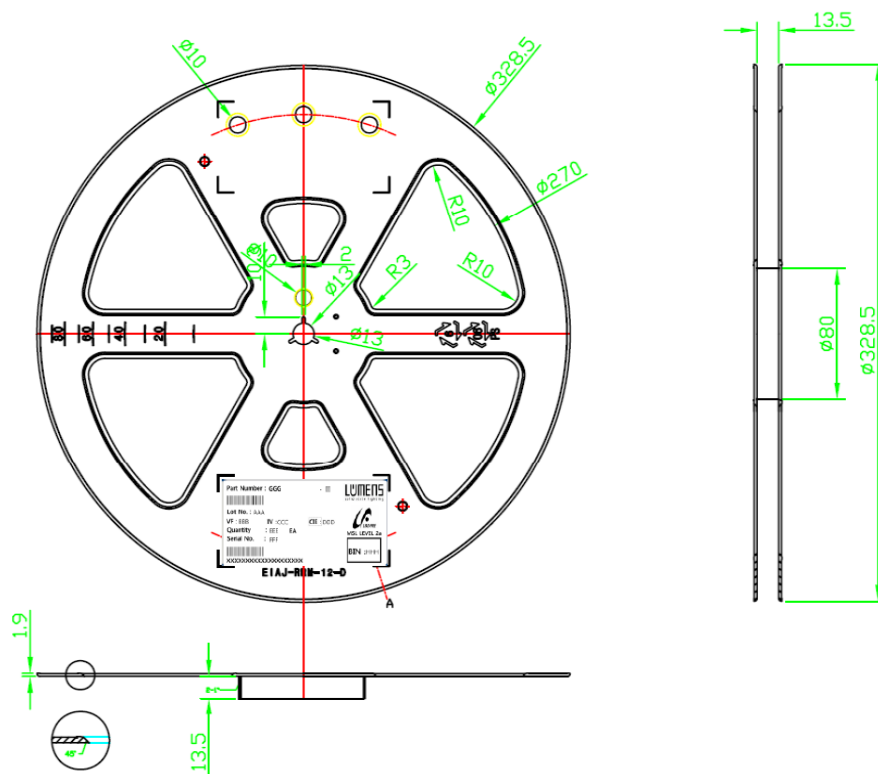
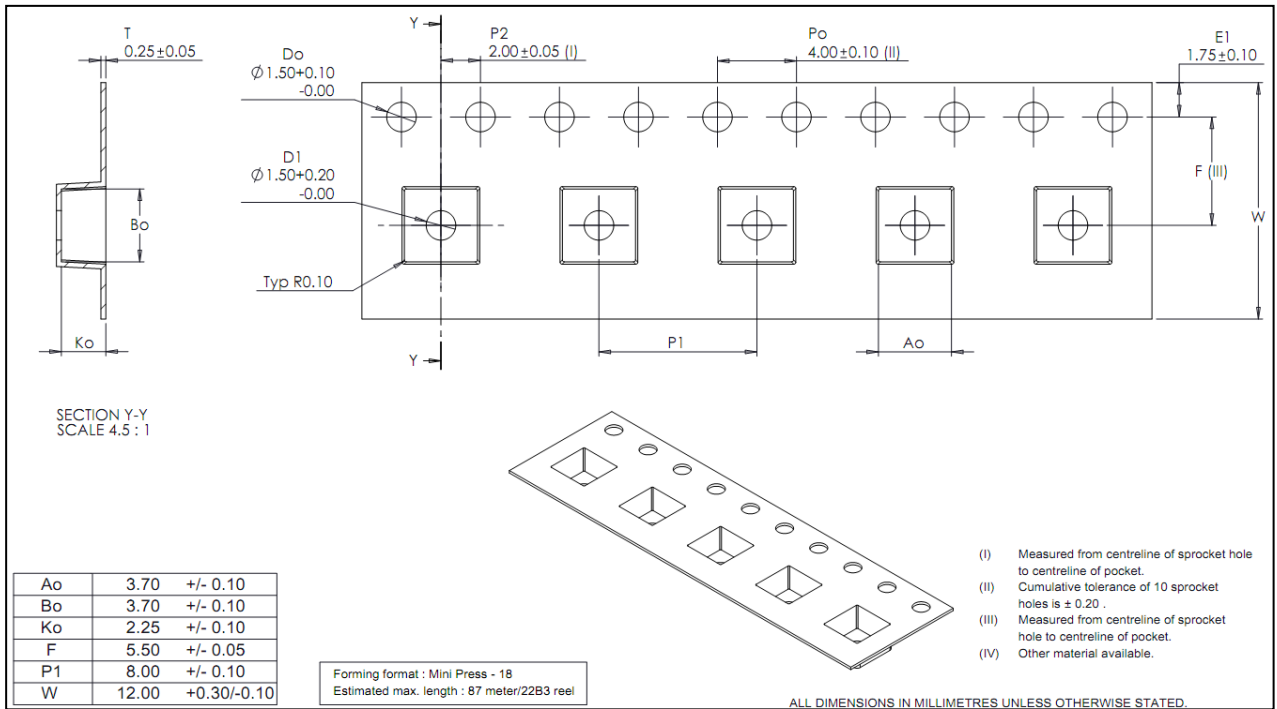
### (1) Criteria for judging the damage

Item	Symbol	Condition	Criteria for Judgment	
			MIN	MAX
Forward Voltage	Vf	If = 30mA	-	USL (1) × 1.1
Radiant Intensity	Φe	If = 30mA	LSL (2) × 0.7	-

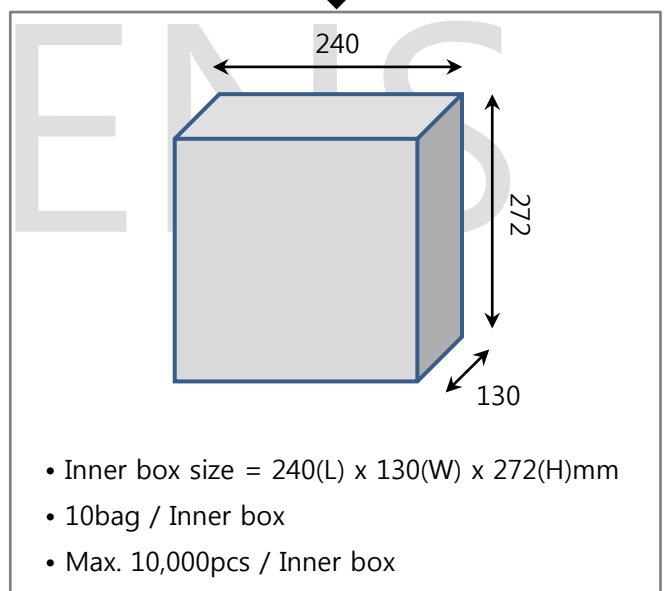
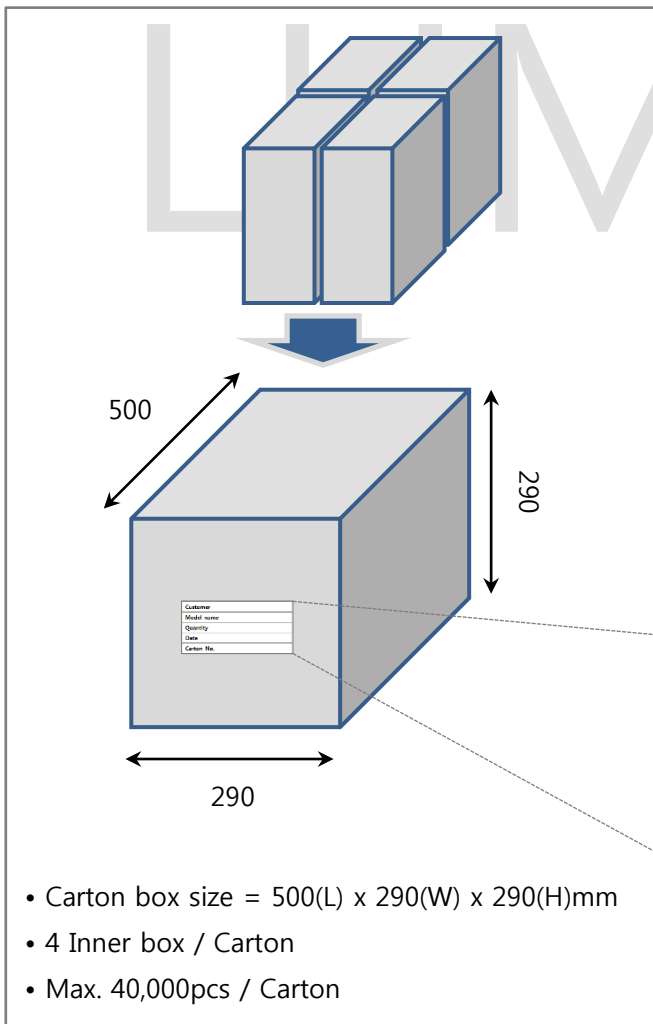
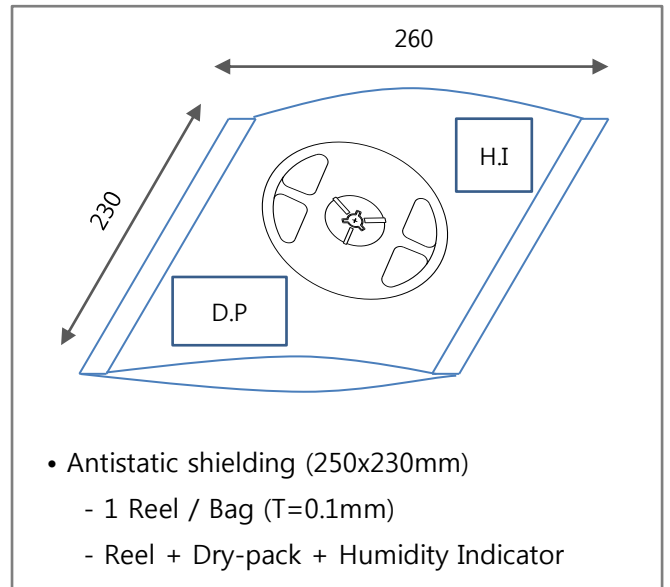
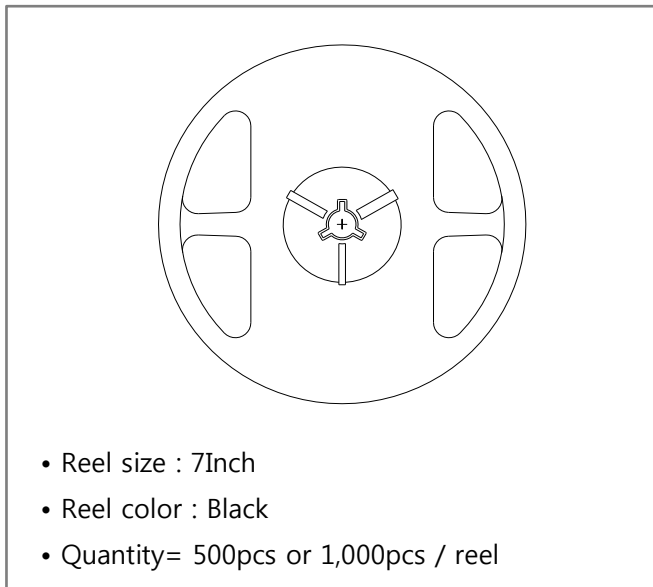
- USL : Upper Standard Level
- LSL : Lower Standard Level

## 9. Reel

### Specifying Part Number, Quantity and Lot Number



## 10. Packing

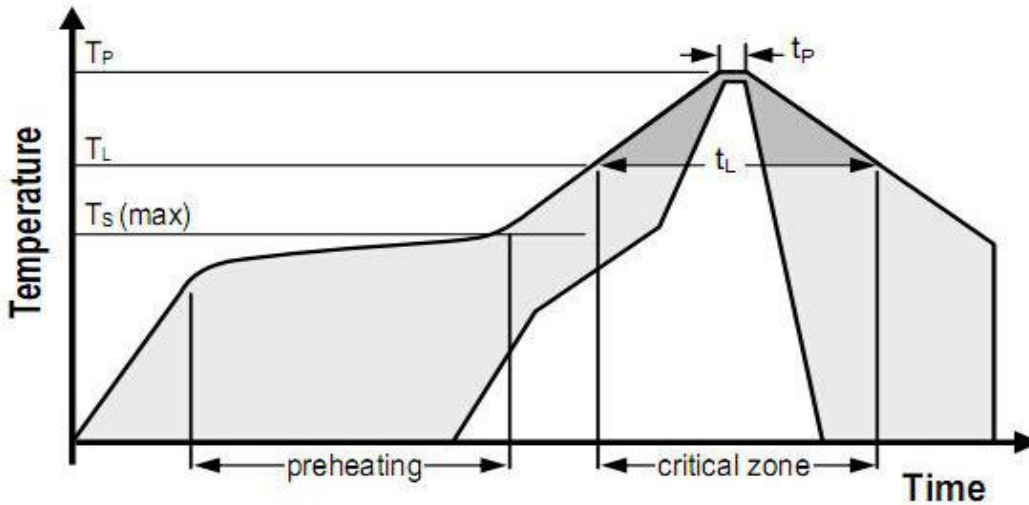


<b>Customer</b>	
<b>Model name</b>	
<b>Quantity</b>	
<b>Date</b>	
<b>Carton No.</b>	

## 11. Reflow condition

Reflow soldering is the recommended method for assembling LEDs on a circuit board.

Recommended Soldering Profile (according to JEDEC J-STD-020D)



Profile Parameter	Lead-free Solder
Average Ramp-up Rate (T <sub>smax</sub> to T <sub>p</sub> )	3°C/second max
Pre-heat : Temperature Min (T <sub>smin</sub> )	150°C
Pre-heat : Temperature Max (T <sub>smax</sub> )	200°C
Pre-heat : Time (t <sub>smin</sub> to t <sub>smax</sub> )	60-120 seconds
Time Maintained Above : Temperature (T <sub>L</sub> )	217°C
Time Maintained Above : Time (t <sub>L</sub> )	60-150 second max
Peak / Classification Temperature (T <sub>p</sub> )	240°C
Time Within 5°C of Actual Peak Temperature (t <sub>p</sub> )	30 seconds
Ramp-Down Rate	6°C/sec max
Time 25°C to Peak Temperature	8 minutes max

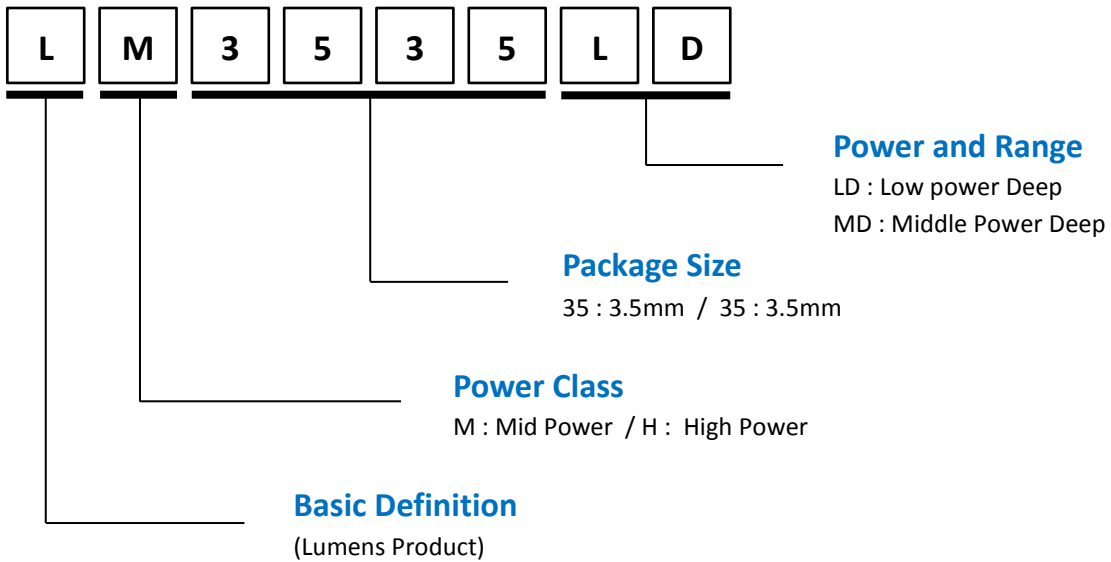
The lens at the top of the LED package is an optical surface, which can be damaged by pressure.

Precautions should be taken to avoid strong pressure on the lens when handling with pick and place machines

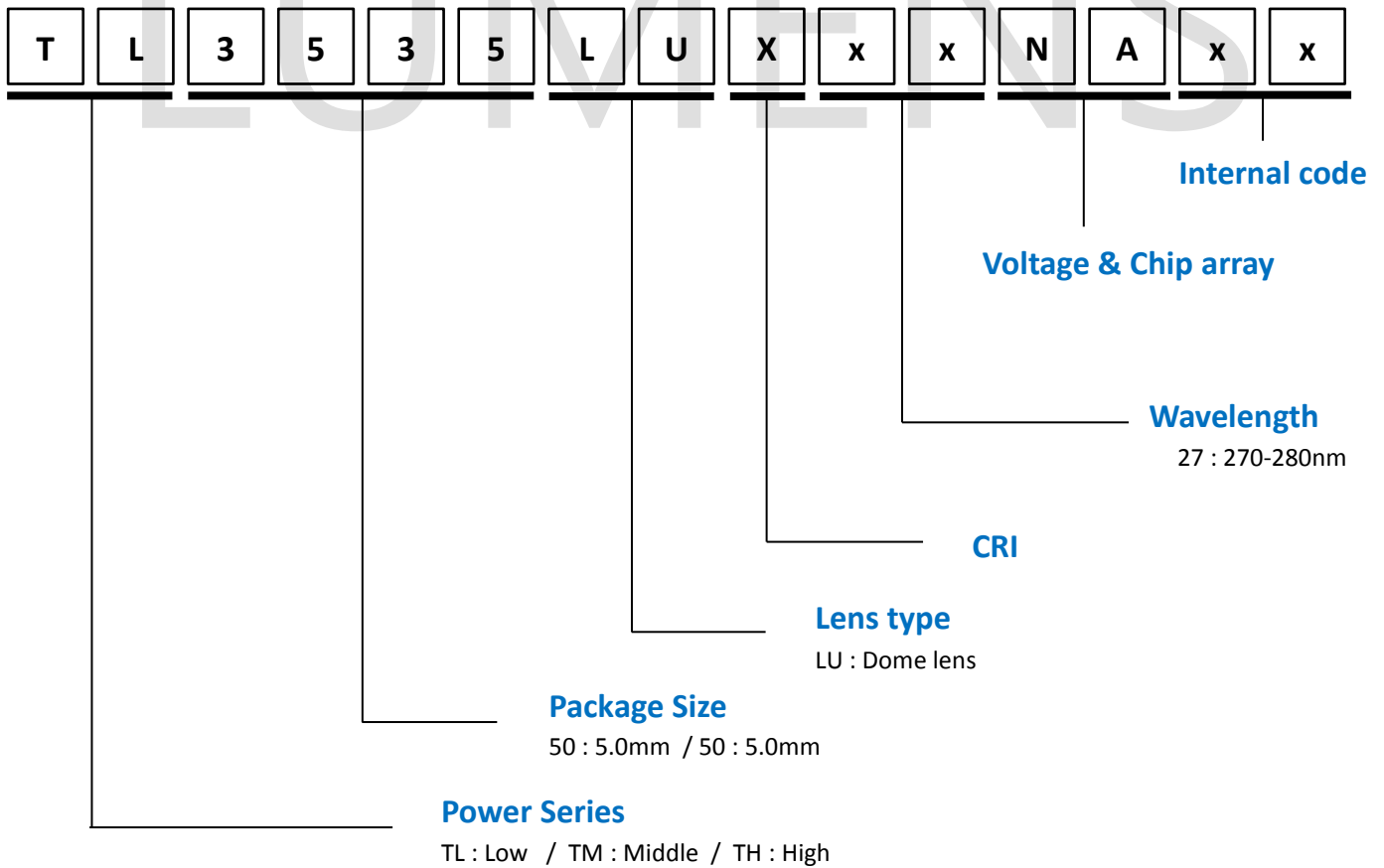
Reflow soldering should not be done more than two times

## 12. Product and Model name Nomenclature

### (1) Product detail

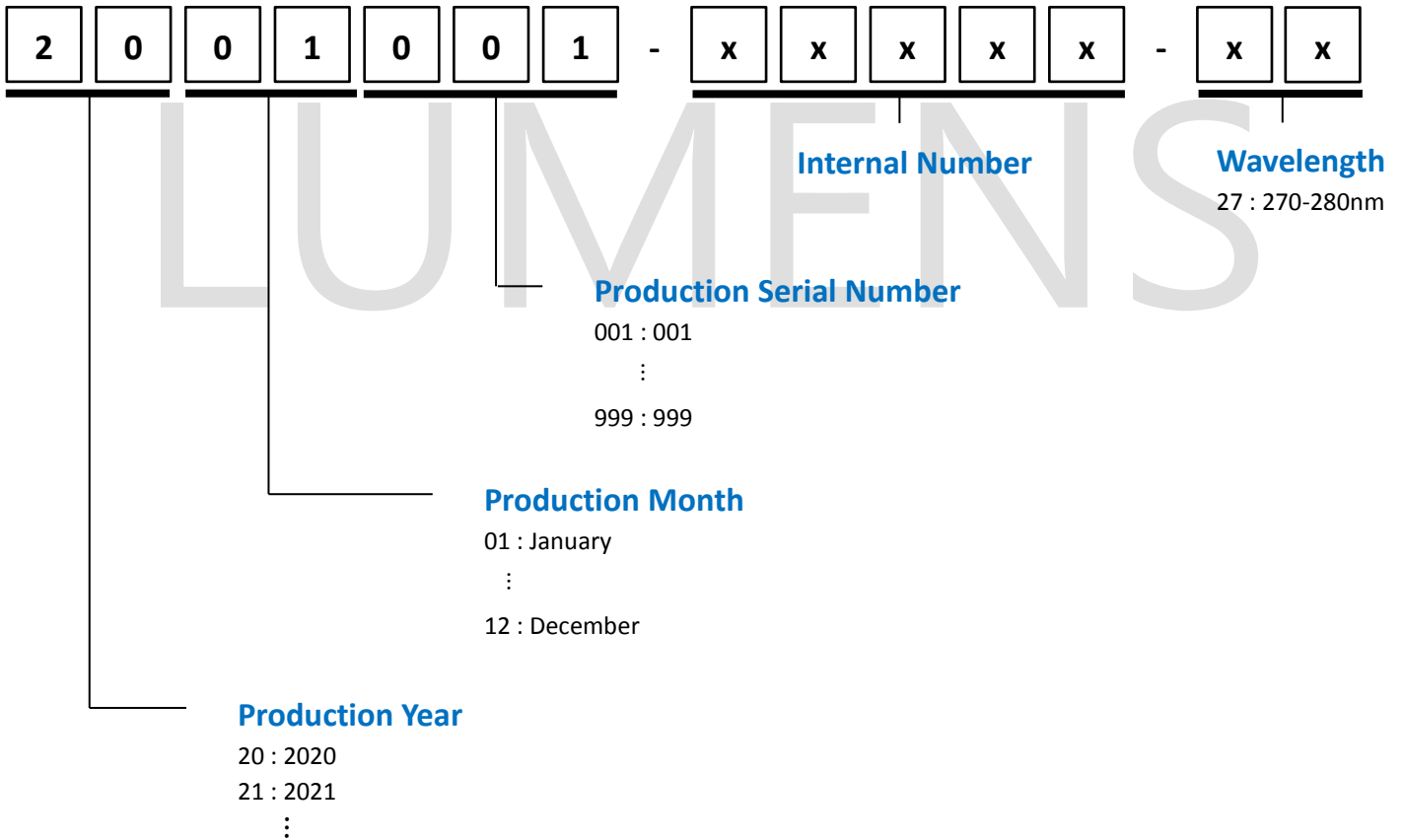
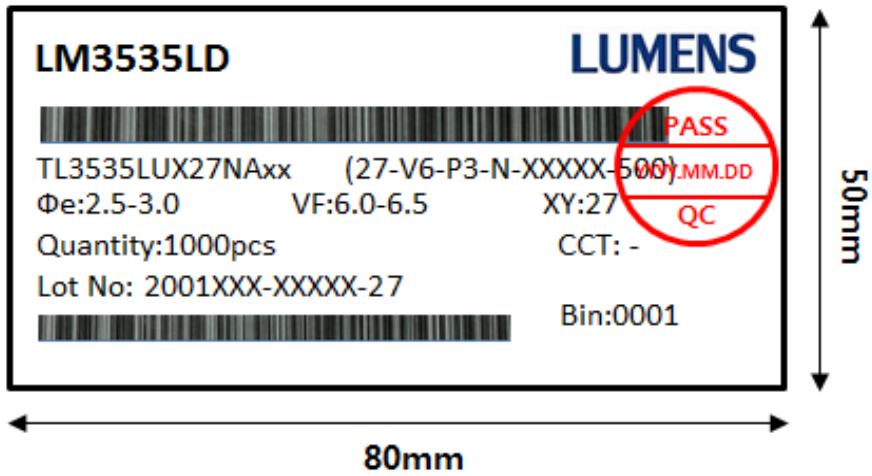


### (2) Model name detail



### (3) Label structure and detail

The lot number is composed of the following characters.



## 13. Cautions

### (1) Eye and Skin Safety Guidelines

Do not directly look at the light when the LEDs are on. Proceed with caution to avoid any risks of damage to the eyes when examining the LEDs with optical instruments. Protect your eyes and skin while operating. Equipment should be designed to completely screen or filter UV radiation



The attached label should be used on products and systems that use UV LEDs

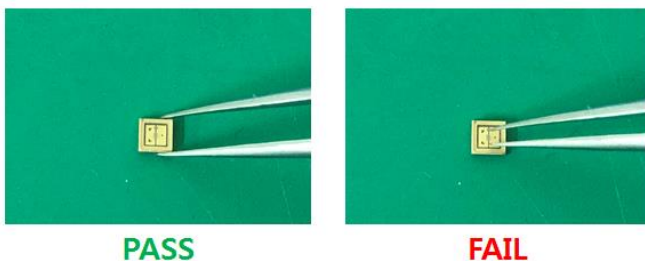


### (2) Cleaning

- 2.1 Do not scrub the LEDs using hard brush or with excessive force
- 2.2 Do not clean LEDs using acetone or trichloroethylene.
- 2.3 To clean LEDs, only use soft foam-tip clean-room swab and isopropyl alcohol with gentle cleaning motions. Distilled water can be used for rinsing, but LEDs must be completely dried. (for example with nitrogen blow dry) before they can be used
- 2.4 Electrical and optical measurements are recommended before and after cleaning to ensure that LEDs are not damaged.

### (3) Handling of Glass (Lens) LEDs

- 3.1 Avoid silicone resin parts especially with sharp tools such as tweezers.
- 3.2 Avoid leaving fingerprints on silicone lens part.



### (4) Thermal Management

The thermal design of the system must be considered, particularly at the beginning of the system design process. In order to maximize performance it is necessary to reduce heat in the system by optimizing thermal conductivity of circuit boards and housings and also by minimizing density of the LED array and other components.



## (5) Static Electricity

Wristbands and anti-electrostatic gloves are strongly recommended and all devices, equipment and machinery must be properly grounded when handling the LEDs, which are sensitive to static electricity. Precautions should be taken against surge voltage to the equipment that mounts the LEDs. Unusual characteristics such as significant increase of current leakage, decrease of turn-on voltage, or non-operation at a low current can occur when the LED is damaged

## (6) Moisture-Proof Package

- 6.1 When moisture is absorbed into the LED package it may vaporize and expand products during soldering. There is a possibility that this may cause exfoliation of the contacts and damage to the optical characteristics of the LEDs. For this reason, the moisture-proof package is used to keep moisture to a minimum in the package.
- 6.2 A package of a moisture-absorbent material (silica gel) is inserted into the shielding bag. The silica gel changes its color from blue to pink as it absorbs moisture.

## (7) Current limiting

A resistor should be used to limit current spikes that can be caused by voltage fluctuations. Otherwise damage could occur.

## (8) Storage Conditions

- 8.1 Before opening the package: The LEDs should be kept at 30°C or less and 90%RH or less. The LEDs should be used within a year. When storing the LEDs, moisture-proof packaging with moisture-absorbent material (silica gel) is recommended.
- 8.2 After opening the package: The LEDs should be kept at 30°C or less and 70%RH or less. The LEDs should be soldered within 168 hours (7 days) after opening the package. If unused LEDs remain, they should be stored in moisture-proof packages, such as sealed containers with packages of moisture-absorbent material (silica gel). It is also recommended to return the LEDs to the original moisture-proof bag and to reseal the moisture-proof bag again.
- 8.3 If the moisture-absorbent material (silica gel) has faded away or the LEDs have exceeded the recommended storage time, baking treatment should be performed using the following conditions.  
Baking treatment: more than 24 hours at 65±5°C
- 8.4 Lumens LED electrode sections are comprised of a silver-plated copper alloy. The silver surface may be affected by environments which contain corrosive gases and so on. Please avoid condition which may cause difficulty environments during soldering operations. It is recommended that the user uses the LEDs as soon as possible.
- 8.5 Please avoid rapid transitions in ambient temperature, especially in high humidity environments where condensation can occur.

(9) Usage

9.1 Do not exceed the values given in this specification.

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