

# CW3205VGBMBN2 Datasheet

iC LED Series (L\* W\*H): 3.2\*0.5\*1.0mm



## Applications

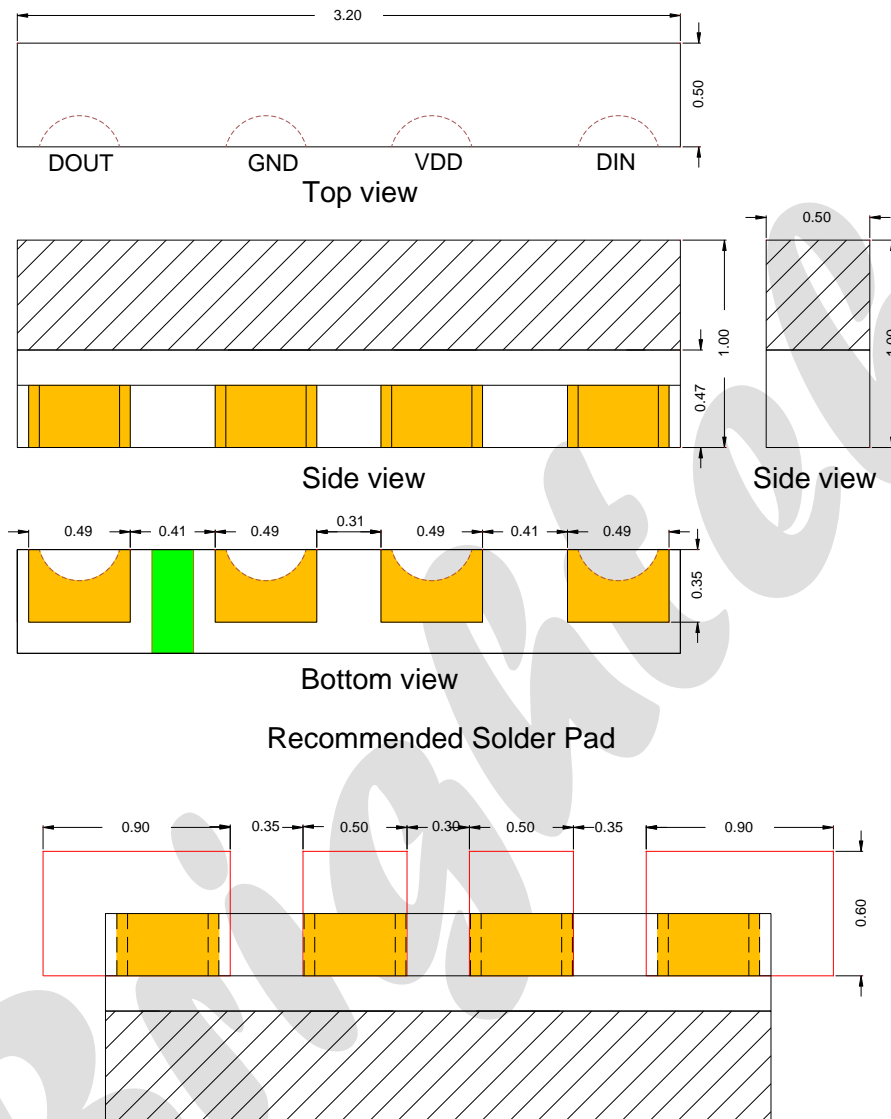
- Telecommunication, office automation, home appliances, industrial equipment
- Full-color strip
- Consumer electronics
- Other applications

## Features

- Serial data transmission signal by single wire.
- RGB and driver chip are integrated in a package, to form a complete control of pixel point with constant current.
- One pixel contains R, G, and B color that each can achieve 256 level brightness grayscale, which forms 16, 777, 216 combination colors. Internal clock frequency operates at 800 kHz.
- Lens color: White diffused
- RoHS2.0 and REACH-compliant
- ESD level 2kV(HBM)
- Preconditioning: accelerate to JEDEC level 3
- Typical view angle 50% Iv:140°

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## Dimensional Drawing



1. Dimensions are in millimeters.
2. General tolerance is  $\pm 0.1$ mm.

No.	Symbol	Function description
1	DIN	Control data signal input
2	VDD	Power supply LED
3	DOUT	Control data signal output
4	GND	Ground

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## Naming Rule

### CW-3205-VGB-M-B-N2

CW	3205	VGB	M	B	N2
Type	Package Size	Color	Lens color	Output current	Serial number
CW: With IC Series	3205: 3.2*0.5mm	V:red G:green B:blue	M:White diffused	B:5mA	N2: Serial number

## Maximum Ratings

T<sub>A</sub> : 25 °C

Parameter	Symbol	Values	Unit
Forward current	I <sub>F</sub>	5	mA
IC Power Supply Voltage	VDD	+3.8~+5.5	V
IC Input Voltage	V <sub>I</sub>	-0.4~VDD+0.4	V
Operating Temperature Range	/	-40°Cto+85	°C
Storage Temperature Range	/	-40°Cto+105	°C
Soldering temperature	T <sub>SD</sub>	260	°C

1. The maximum of soldering time is 10 seconds in T<sub>SD</sub>.

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## Characteristics

VDD:5V | T<sub>A</sub> : 25 °C

Characteristics	Symbol	Min.	Typ.	Max.	Unit	Test condition	
Luminous Intensity	I <sub>v</sub>	R	63	105	200	mcd	VDD=5V
		G	125	237	400		
		B	13	35	63		
		W	250	362	800		
Dominant Wavelength	λ <sub>d</sub>	R	615	-	630	nm	VDD=5V
		G	520	-	535		
		B	460	-	475		
Color Coordinate	x	-	0.2864	-	-	VDD=5V	
	y	-	0.2981	-	-		
View Angle	2θ <sub>1/2</sub>	-	140	-	-	VDD=5V	

1. Luminous intensity is measured with a light sensor and filter combination that approximates the CIE eye-response curve.
2. 2θ<sub>1/2</sub> is the off-axis angle at which the luminous intensity is half the axial luminous intensity.
3. The dominant wavelength, λ<sub>d</sub> is derived from CIE chromaticity diagram and represents the single wavelength which defines the color of the device. Peak Emission Wavelength Tolerance is ±1nm.

## Bin groups

### 1. Luminous Intensity-White

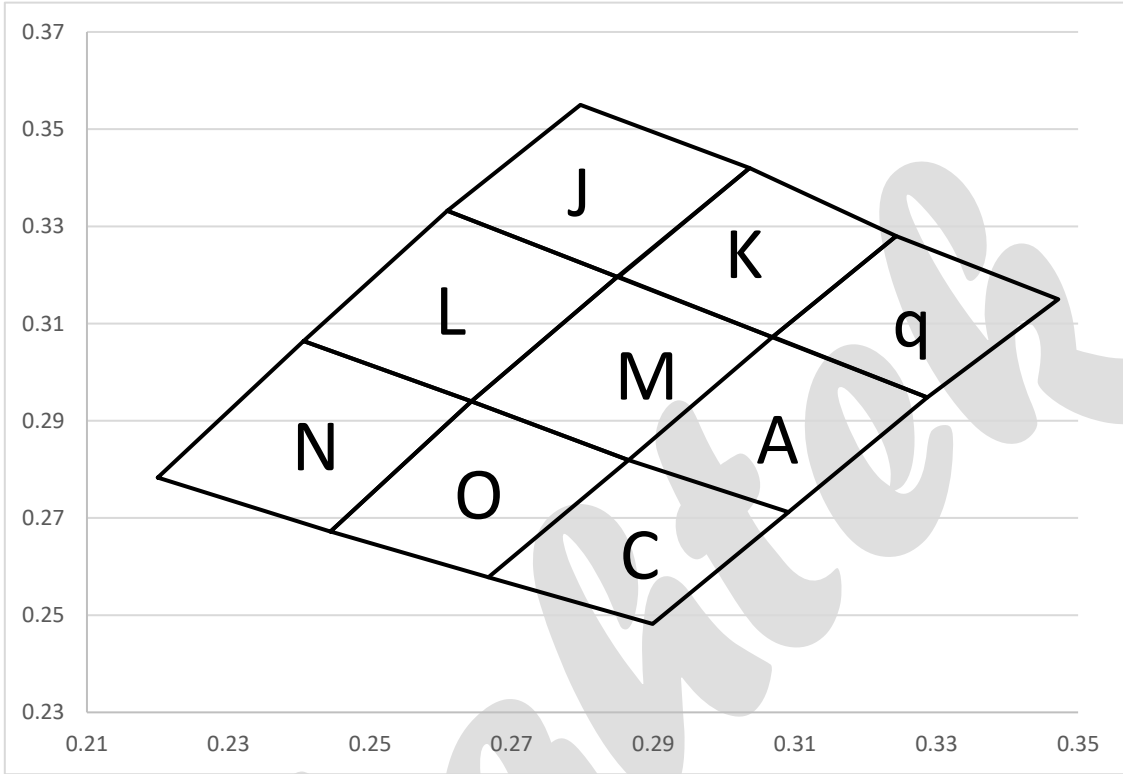
VDD:5V | IF : 5mA\*3

Bin Code	Min. I <sub>V</sub> (mcd)	Max. I <sub>V</sub> (mcd)
15	200	250
16	250	320
17	320	400
18	400	500
19	500	630

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## 2. Chromaticity Coordinate Groups

VDD:5V | IF : 5mA\*3



Bin	X	Y	X	Y	X	Y	X	Y
J	0.2609	0.3332	0.2797	0.355	0.3036	0.342	0.2849	0.3196
K	0.2851	0.3196	0.3036	0.342	0.3243	0.328	0.3068	0.3072
q	0.3068	0.3072	0.3243	0.328	0.3472	0.315	0.3287	0.2948
A	0.307	0.3072	0.3287	0.2948	0.3091	0.2712	0.2865	0.2819
L	0.2406	0.3064	0.2609	0.3332	0.2849	0.3196	0.2643	0.294
M	0.2643	0.294	0.2849	0.3196	0.3068	0.3072	0.2865	0.2819
C	0.2865	0.2819	0.3091	0.2712	0.2899	0.2482	0.2667	0.2578
N	0.22	0.2783	0.2406	0.3064	0.2643	0.294	0.2444	0.2672
O	0.2444	0.2672	0.2643	0.294	0.2865	0.2819	0.2667	0.2578

Tolerance of X/Y : ±0.005

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## Electrical Characteristics

T<sub>A</sub> : 25 °C

Characteristics	Symbol	Condition	Min.	Typ.	Max.	Unit
Standby current	I <sub>STB</sub>	V <sub>DD</sub> =4.5V, I <sub>out</sub> = "OFF" "	-	0.5	-	mA
Input voltage level	V <sub>IH</sub>	D <sub>IN</sub> , Input high level voltage	3.1	-	-	V
	V <sub>IL</sub>	D <sub>IN</sub> , Input low level voltage	-	-	1.5	V

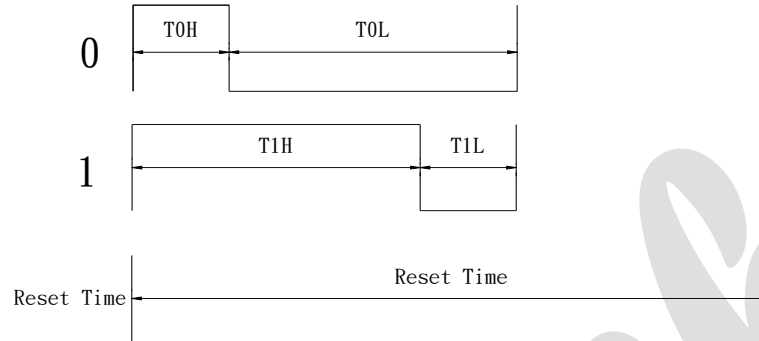
## Switching Characteristics

T<sub>A</sub> : 25 °C

Characteristics	Symbol	Condition	Min.	Typ.	Max.	Unit
Rate of data signal	F <sub>DIN</sub>	-	-	800	-	kHz
Transfer time	T <sub>PLH</sub>	D <sub>IN</sub> →D <sub>OUT</sub> D <sub>OUT</sub> port to GND	-	-	80	ns
	T <sub>PHL</sub>	CL=30pF	-	-	80	ns
Conversion time of IOUT R/G/B	T <sub>R</sub>	I <sub>OUT</sub> R/G/B =5mA	-	500	-	ns
	T <sub>F</sub>	R <sub>L</sub> =200Ω, CL=30pF	-	500	-	ns

## Data transfer time

### 1. Timing Wave Form



### 2. Data transfer time

Item	Description	Typical	Allowance
$T_{0H}$	0 code, high voltage time	0.3 $\mu$ s	$\pm 0.05\mu$ s
$T_{0L}$	0 code, low voltage time	0.9 $\mu$ s	$\pm 0.05\mu$ s
$T_{1H}$	1 code, high voltage time	0.9 $\mu$ s	$\pm 0.05\mu$ s
$T_{1L}$	1 code, low voltage time	0.3 $\mu$ s	$\pm 0.05\mu$ s
RES	reset time	>200 $\mu$ s	-

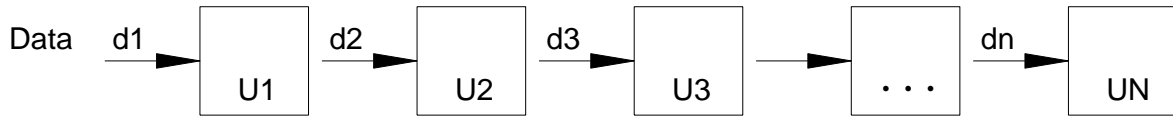
### 3. Composition of 24 bit data

R7	R6	R5	R4	R3	R2	R1	R0	G7	G6	G5	G4	G3	G2	G1	G0	B7	B6	B5	B4	B3	B2	B1	B0
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The single wire data transfer protocol supports 24-bit data for each LED's RGB display data refresh. ICLED receives 24-bit data and passes the remaining data to next ICLED. The 24-bit data consist of green, red and blue data, each with 8-bit width, and are transferred with MSB first

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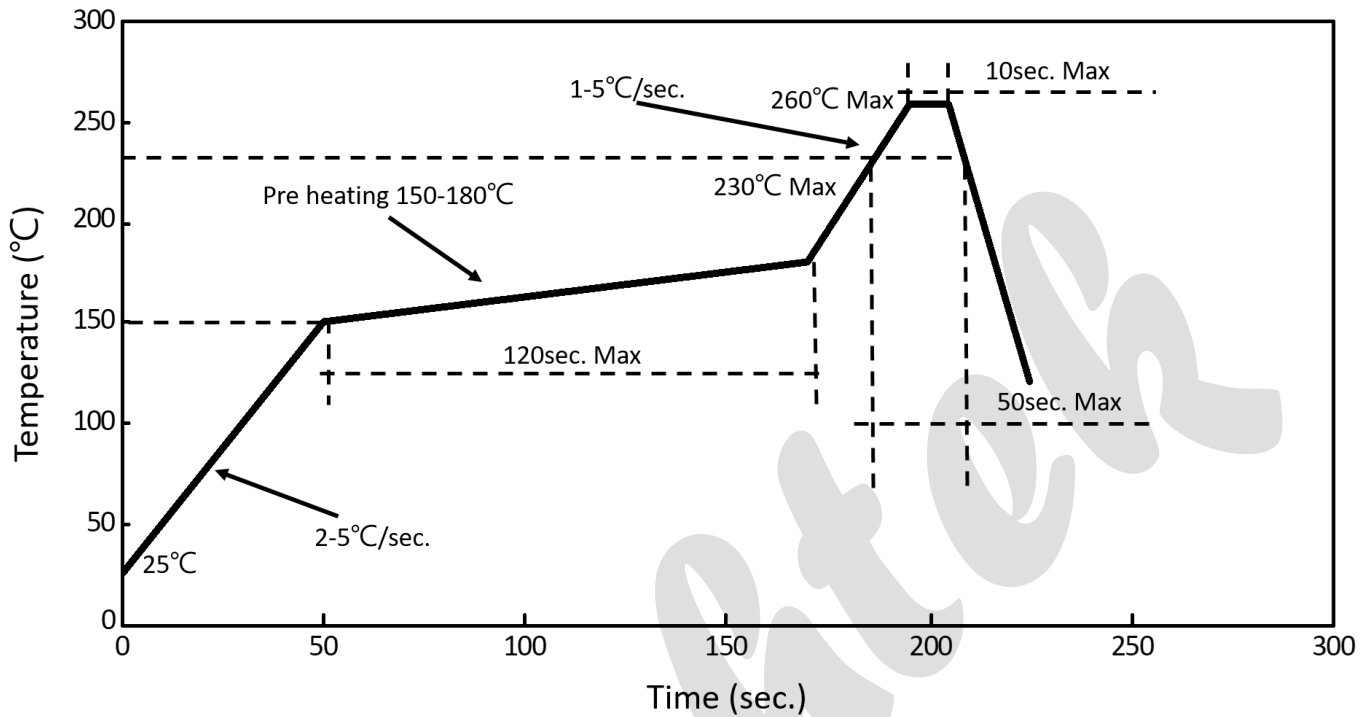
## 3.1 Data transmission method



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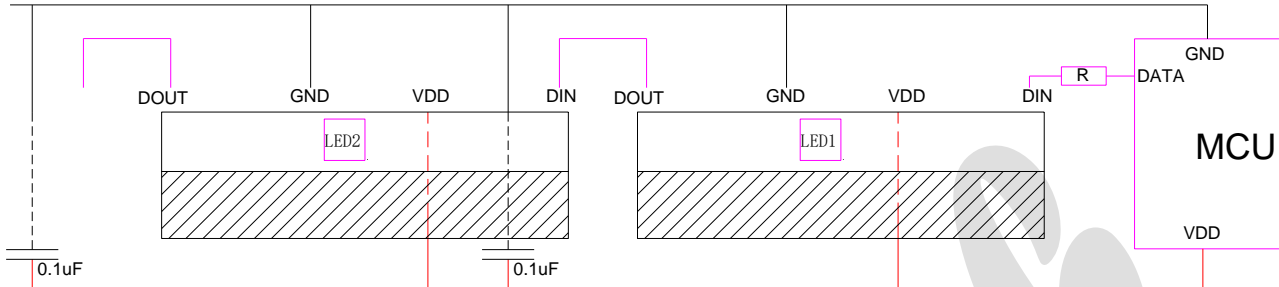
## Reflow Soldering Profile



1. We recommend the reflow temperature 240°C ( $\pm 5^\circ\text{C}$ ).the maximum soldering temperature should be limited to 260°C.
2. Do not stress the silicone resin while it is exposed to high temperature.
3. Reflow soldering must not be performed more than twice.

## Test Circuit and Precautions for User

### 1. Typical application circuit



#### Notes:

When the first LED is connected to the MCU, a resistance R is needed in series between its signal input line and the MCU. The size of R depends on the number of cascade beads. The more cascades, the smaller resistance R is used. It is generally recommended that the value be between 100-1K. Usually the recommended value is around 300 R. In order to make the LEDs work more stably, a parallel capacitor is needed between VDD and GND of each LED.

In order to avoid harmful effects in use, please try to add resistance and capacitance when using. If capacitors and resistors are not added, the number of LEDs on the lamp should be minimized, but this way still does not exclude the risk of problems.

### 2. Handling precautions

#### 2.1 Over-current-proof

Customer must apply resistors for protection; otherwise slight voltage shift will cause big current change (Burn out will happen).

#### 2.2 Storage

① It is recommended to store the products in the following conditions:

- Humidity: 60% R.H. Max.
- Temperature : 5°C~30°C (41°F~86°F)

② Shelf life in sealed bag: 12 month at < 5°C~30°C and < 60% R.H. after the package is Opened, the products should be used within 1 weeks or they should be keeping to stored at  $\leq 20\%$ R.H. with zip-lock sealed.

#### 2.3 Baking

Suggest packing open after 1 weeks, before use baking products, conditions as follows:

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- ①  $60\pm 3^{\circ}\text{C}$  X 6hrs and  $< 5\%RH$ , for reel
- ②  $125\pm 3^{\circ}\text{C}$  X 2hrs, for single LED

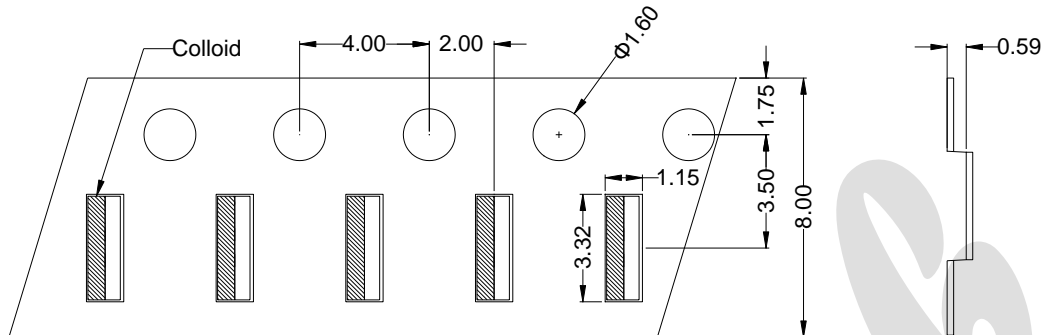
It shall be normal to see slight color fading of carrier (light yellow) after baking in process.

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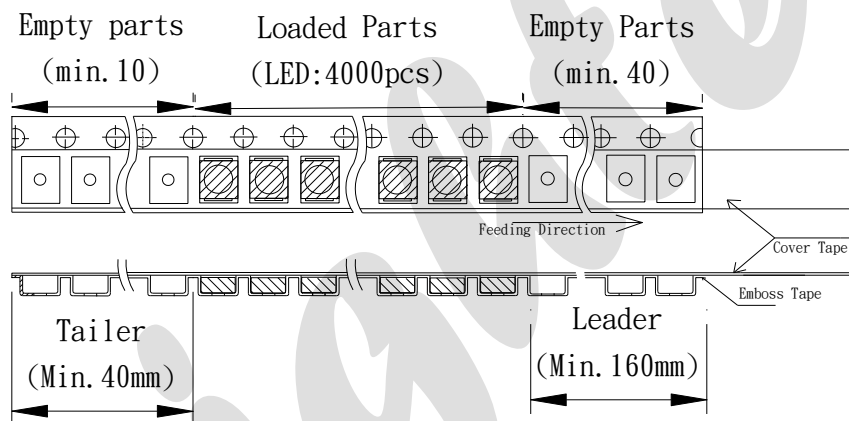
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## Tapping

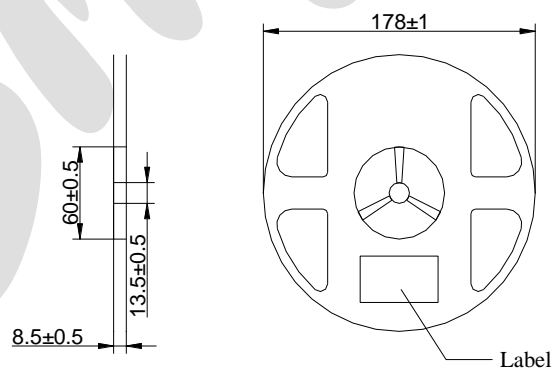
### 1. Dimensions of Tape (Unit: mm)



### 2. Arrangement of Tape



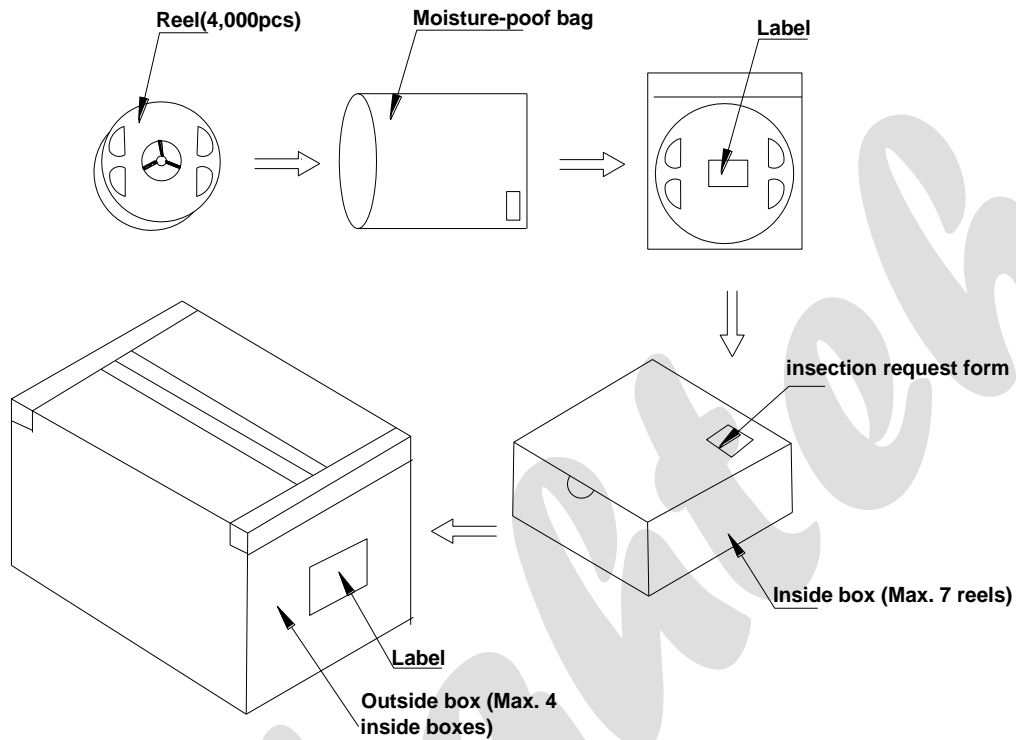
### 3. Dimensions of Reel (Unit: mm)



#### Notes:

1. Empty component pockets are sealed with top cover tape
2. The max loss number of SMD is 2pcs
3. The cathode is oriented towards the tape sprocket hole in accordance with ANSI/EIA RS-481 specifications
4. 4,000pcs per reel
5. The remainder packing in multiples of 500pcs.

## Packing



Reeled product (max.4,000 ) is packed in a sealed moisture-proof bag. Seven bags are packed in an inner box (size: about 260 X 230 X 100 mm) and four inner boxes are in an outer box (size: about 480 X 275 X 215 mm). On the label of moisture-proof bag, there should be the information of Part No., Lot No. and quantity number; also the total quantity number should be on inspection request form on outer box.

## Precautions

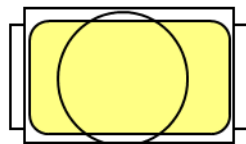
### 1. Abnormal situation caused by improper setting of collet

To choose the right collet is the key issue in improving the product's quality. LED is different from other electronic components, which is not only about electrical output but also for optical output. This characteristic made LED more fragile in the process of SMT. If the collet's lowering down height is not well set, it will bring damage to the gold wire at the time of collet's picking up and loading which will cause the LED fail to light up, light up now and then or other quality problems.

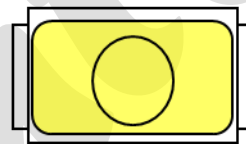
### 2. How to choose the collet

During SMT, please choose the collet that has larger outer diameter than the lighting area of lens, in case that improper position of collet will damage the gold wire inside the LED. Different collets fit for different products, please refer to the following pictures cross out.

**Outer diameter of collet should be larger than the lighting area**



Picture 1 (✓)



Picture 2 (X)

### 3. Other points for attention

- No pressure should be exerted to the epoxy shell of the SMD under high temperature.
- Do not scratch or wipe the lens since the lens and gold wire inside are rather fragile and cross out easy to break.
- LED should be used as soon as possible when being taken out of the original package, and should be stored in anti-moisture and anti-ESD package.

### 4. This usage and handling instruction is only for your reference.

## Disclaimer

1. Brightek reserves the right(s) on the adjustment of product material mix for the specification.
2. The product meets Brightek published specification for a period of one year from date of shipment.
3. The graphs shown in this datasheet are representing typical data only and do not show guaranteed values.
4. When using this product, please observe the absolute maximum ratings and the
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