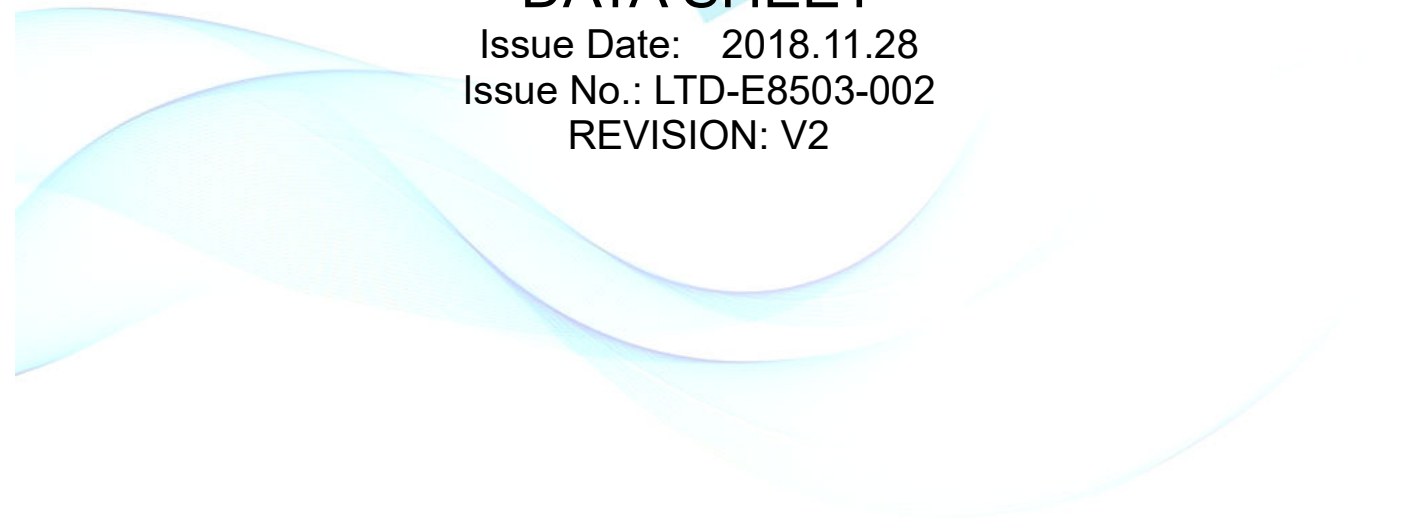


<b>Customer Approved</b>
<b>Date:</b>

**Part No.:**  
**LE8503R6AGHB1C-B01T1**

**DATA SHEET**

Issue Date: 2018.11.28  
Issue No.: LTD-E8503-002  
REVISION: V2



Designer	Checker	Approver
<i>Lisa</i>	<i>Rock</i>	<i>Allen</i>

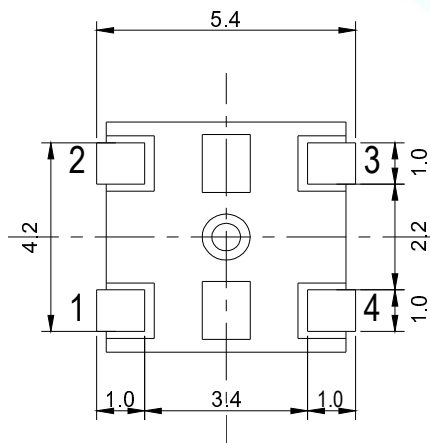
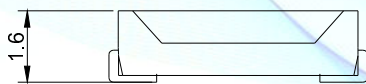
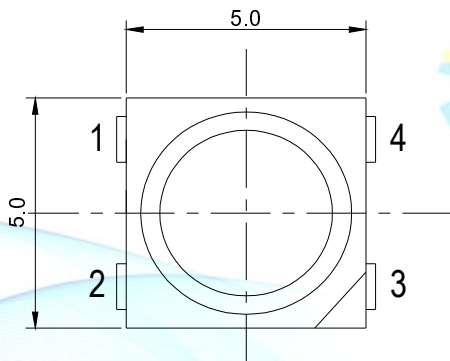
## LED Built-in IC Type ■ Top view Full-color 5050 Package LE8503R6AGHB1C-B01T1

### Features

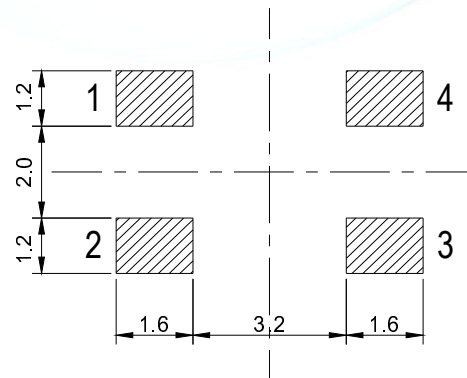
- Top SMD Integrated intelligent control chip.
- Support for single wire communication, serial connection.
- Constant current output current: 20mA/12mA (maximum value)
- Gray level adjustment circuit (256 gray level adjustable).
- Display data double latch, transfer data does not affect display
- Built-in high-precision oscillator.
- Display maximum refresh rate up to 10khz
- Pb-free
- RoHS compliant



### Package Dimensions



### Recommended solder pad



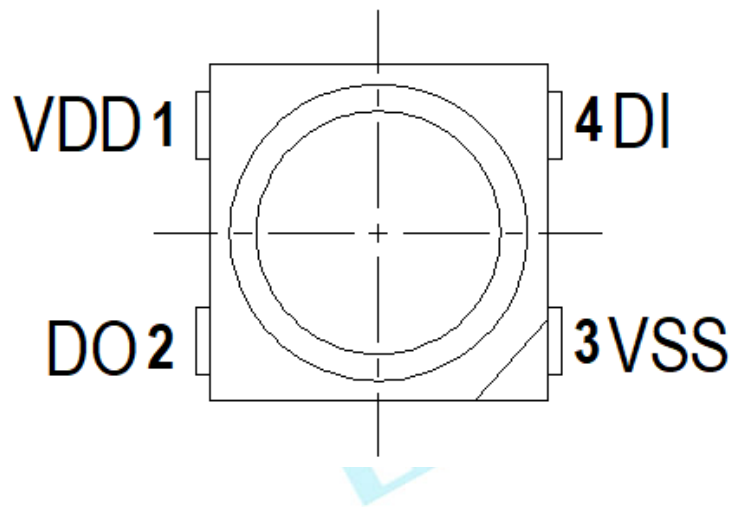
### Note:

Tolerance unless mentioned is  $\pm 0.1$ mm, Unit = mm.

## Applications

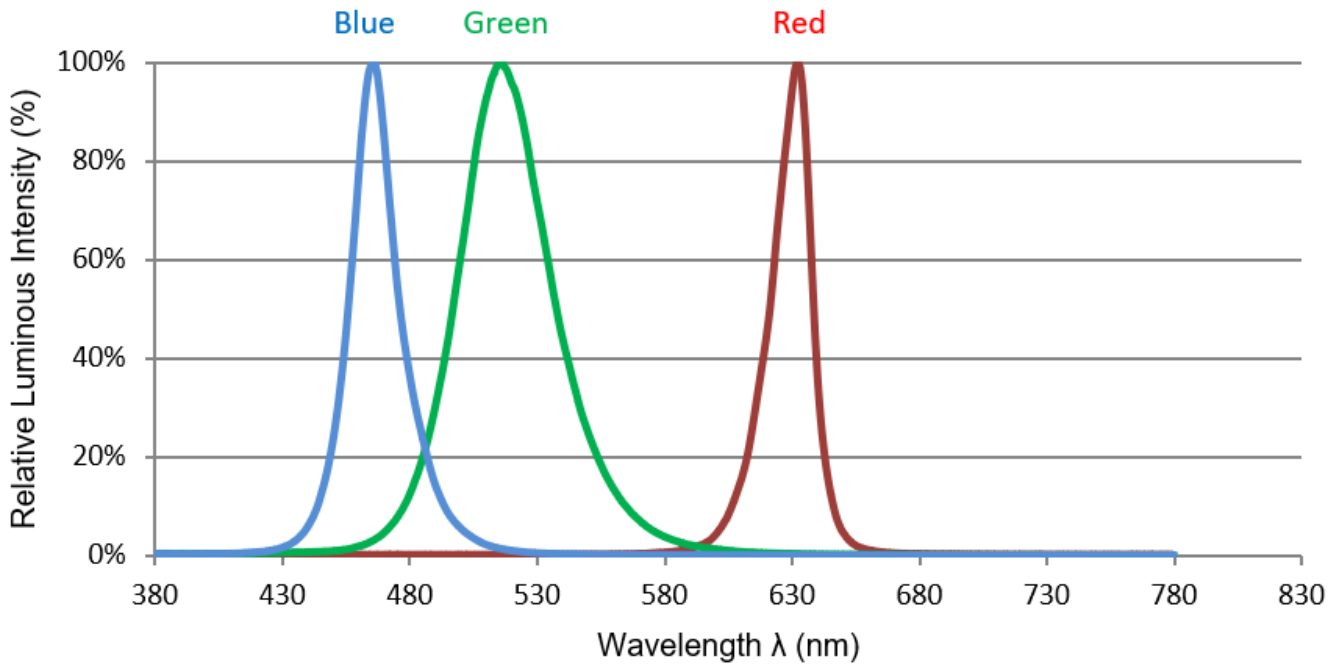
- LED point light source, LED pixel screen.
- LED fantasy soft light bar, LED fantasy color hard light bar.
- LED Phantom running Horse Lamp, LED Phantom Color guardrail Tube.
- LED Phantom Module Lamp, LED Phantom Lamp string.

## Pin diagram and functions:



NO.	Symbol	Pin name	Function description
1	VDD	Power Supply	5V±10%
2	DO	Data output	Built-in Pull down resistance @ input mode
3	VSS	Ground	
4	DIN	Data input	Built-in Pull down resistance
/	G、R、B	Constant current output	

**Spectrum Distribution**



**RGB LED Photoelectric parameters**

Color	IF=12mA	
	WD(nm)	Iv (mcd)
Red	620-625	380-480
Green	520-525	1100-1400
Blue	465-470	250-350

**Electrical Characteristics** ( Limit parameter, Ta= -20 ~ +70°C , VDD=5.0V,Vss=0V )

Parameter	Symbol	Range	Company
Voltage	VDD	-0.5 ~+ 6.0	V
Logic input voltage	VIn	-0.5~VDD+0.5	V
R G B Output drive current	Io	25	mA
Power	PD	400	mW
Working temperature	Topt	-40~+85	°C
Storage temperature	Tstg	-40~+150	°C
ESD(Human Body Model)	VESD	1K	V

**Electrical Characteristics** (Ta = -40~+85°C , VDD=3.3V~5.5V, VSS = 0 V)

Parameter	Symbol	Min.	Avg.	Max.	Unit	Test conditions
Chip internal supply voltage	VDD	3.3	5.0	5.5	V	--
Working current	IDD	--	--	2	mA	R G B non-loaded
High level input voltage	VIH	2.7	--	VDD	V	Din
Low level input voltage	VIL	0	--	1.0	V	Din
High level output voltage	VOH	4.5	--	---	V	IoH=4mA
Low level output voltage	VOL	--	--	0.4	V	IoL=4mA
Pull down resistance	RPD	--	500K	--	Ω	Din、 Dout (VDD=5V)
R G B Maximum Sink current	Isink	11.4	12	12.6	mA	Vo=VDD-3.0V (VDD=5V)
RGB leakage current (When closed)	Ioff	--	--	--	--	PWM off, G、 R、 B Port=5V

**Dynamic Parameter** (Ta = 25°C, VDD=5.0V, GND = 0V) :

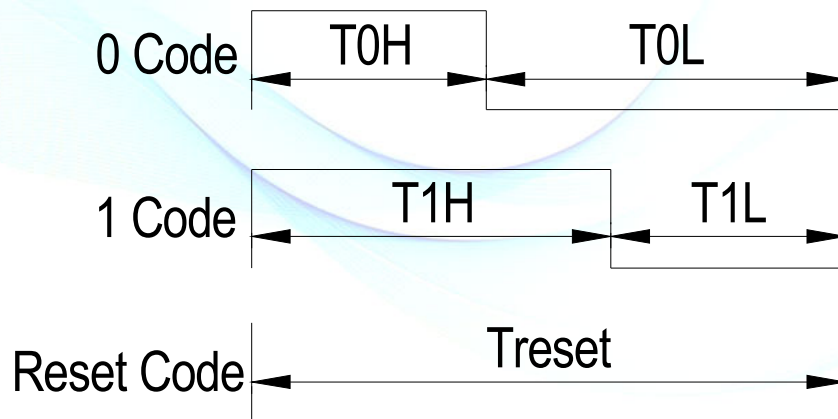
Parameter	Symbol	Min.	Avg.	Max.	Unit	Test conditions
Propagation delay time	tPLZ	--	--	300	ns	Din → Dout, CL=15pF, RL=10KΩ
	tPZL			300	ns	
Rise time	tTZH			200	ns	G、R、B=20mA, CL=30pF
Drop-out time	tTHZ			200	ns	
Data transmission speed	F <sub>data</sub>	---	800	---	KHz	

**Coding description**

Coding sequence:

The data of the microprocessor communicate with the chip through the single wire bus interface. The communication protocol is carried out in the form of polarity to zero, and each word symbol must have a low level. The starting level of each character of this protocol is high, and the time width of the high level is determined by "0" or "1" code.

Input code type:

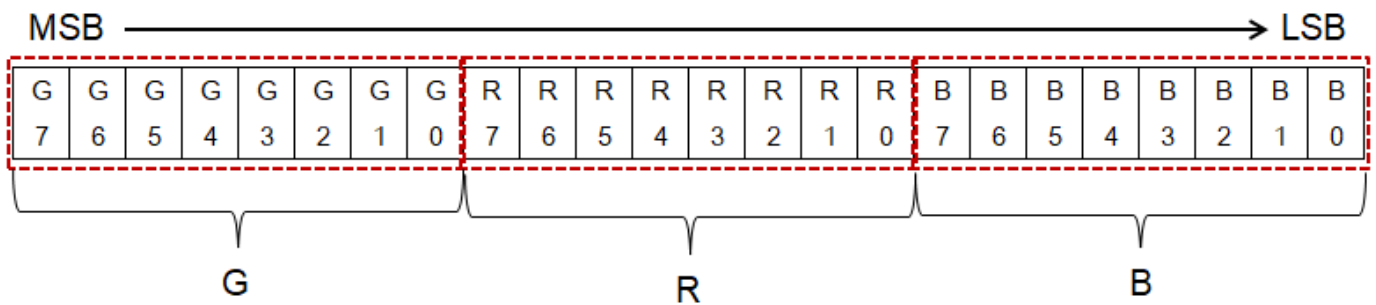


**Data Transfer Time** (VDD=5.0V )

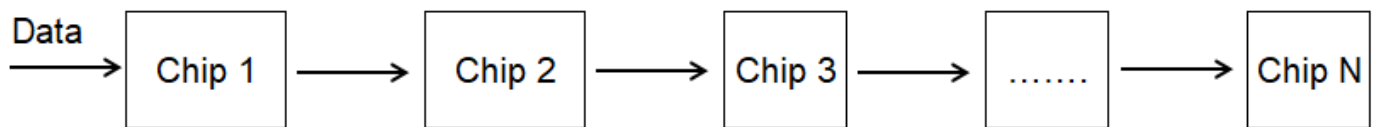
Name	Description	Min.	Avg.	Max.	Admissible error	Unit
T0H	0 code, high level time	--	0.3	--	±0.15	us
T1H	1 code, high level time	--	0.9	--	±0.15	us
T0L	0 code, low level time	--	0.9	--	±0.15	us
T1L	1 code, low level time	--	0.3	--	±0.15	us
Trst	Reset code, low level time	250				us

**Protocol data format:**

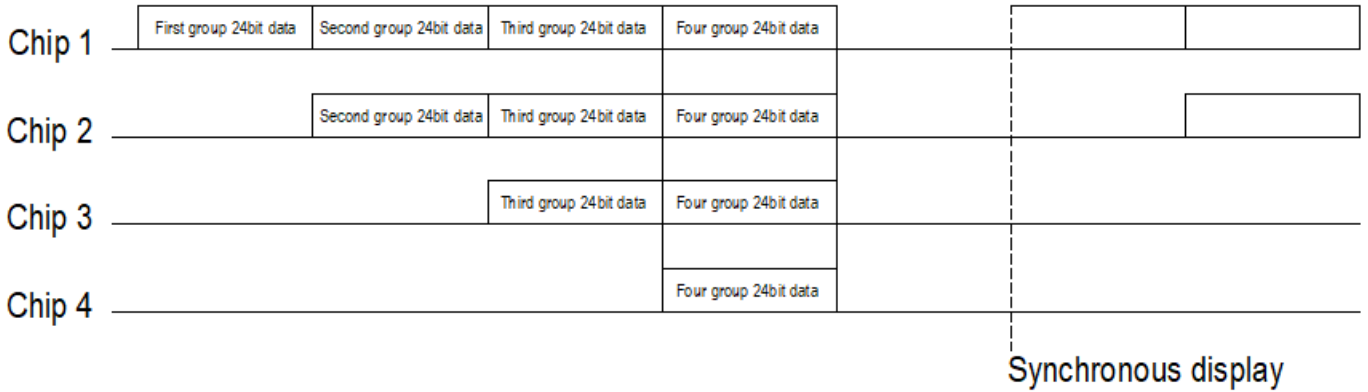
Trst first chip 24-bit data second chip 24-bit data. N wafer 24-bit data Trst.  
24-bit grayscale data structure: high up, sent in order



**System topology graph:**



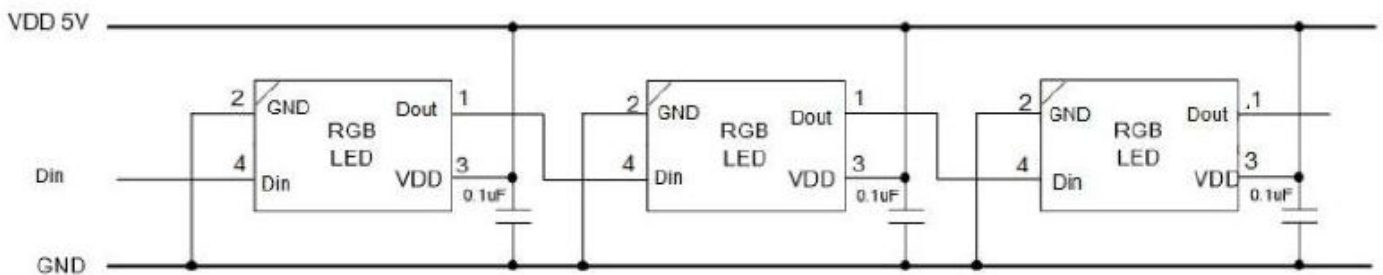
**Input data stream for each chip (take 4 chips as an example)**



**Higher-order working mode:**

The microprocessor can make the chip work in high order mode through specific command setting. In the high order mode, the chip supports two-way transmission of data. Can return the chip link number and current output configuration other information to the microprocessor; In addition, with proper data encoding arrangement, the microprocessor can adjust the current gain independently to the R, G, B LED, and there are 32 stages (5bits) gain adjustment in each channel of the LED. In this mode, options are also available to change the display update frequency or to change the display synchronization settings.

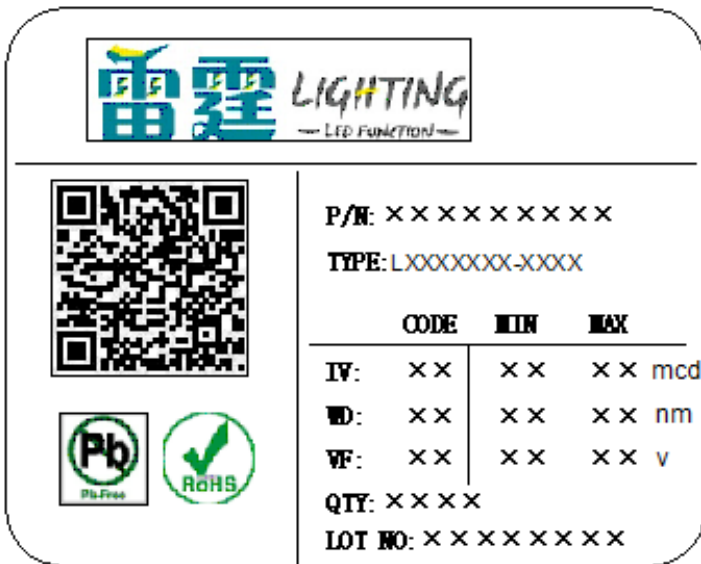
**Typical application circuit:**





**Moisture Resistant Packing Materials**

**Label Explanation**



·QR code:

Contains all of the following information

·P/N: Product Number

·TYPE :Part NO.

·IV: /

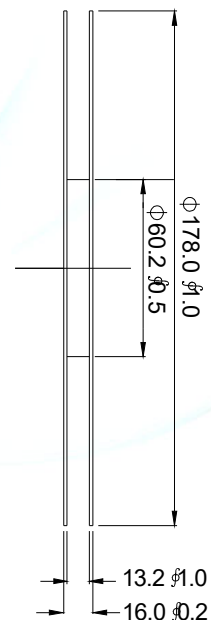
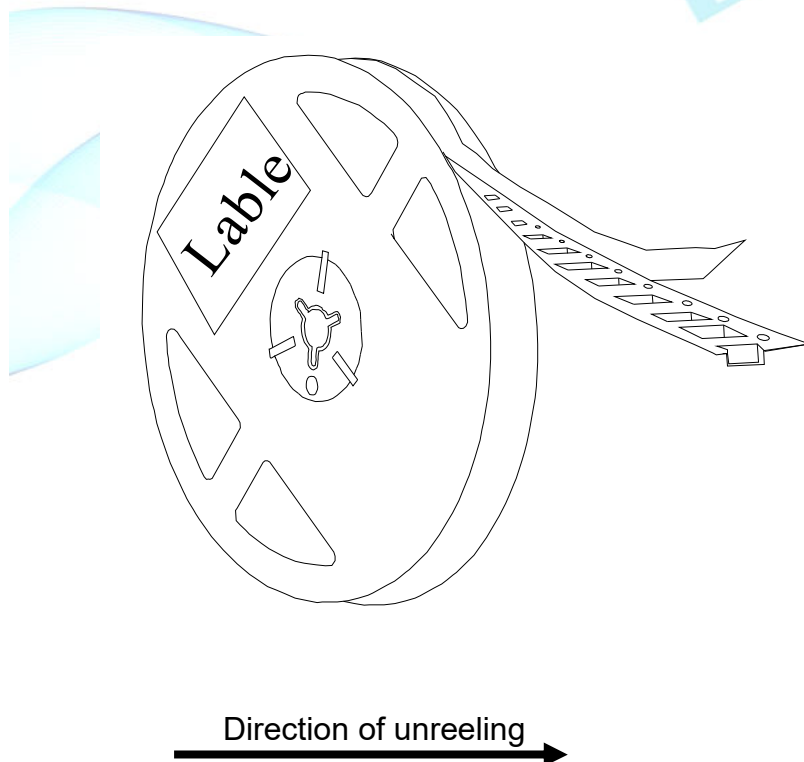
·WD: /

·VF: /

·QTY: Packing Quantity

·LOT NO.: Lot Number

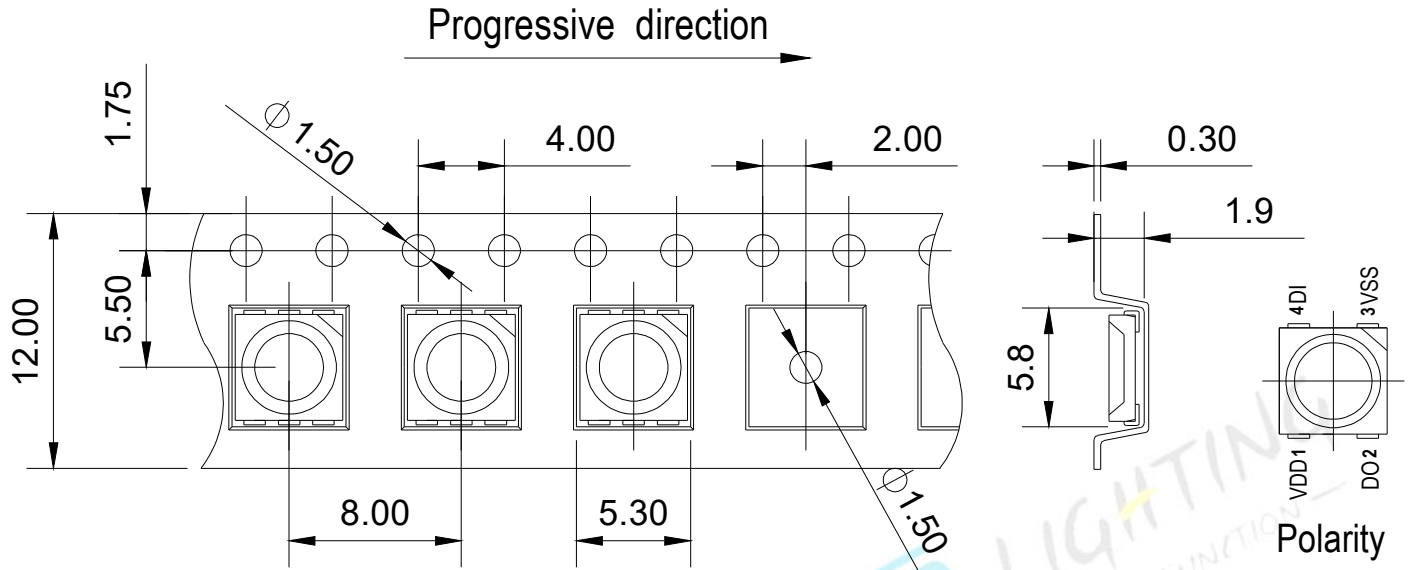
**Taping method: Loaded Quantity 1,000 pcs Per Reel**



Notes:

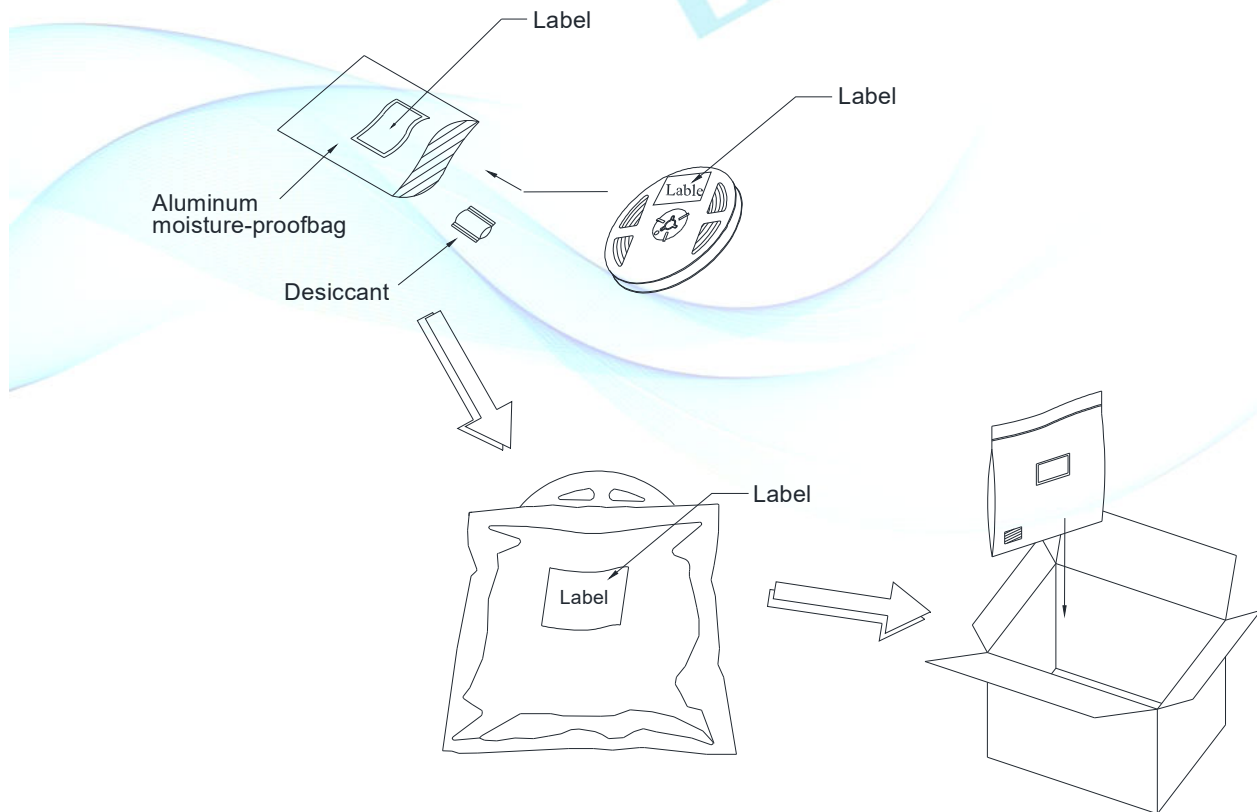
- 1.Tolerance unless mentioned is  $\pm 0.1\text{mm}$ ,Unit = mm.
- 2.Minimum packing amount is 500 pcs per reel.

**Carrier Tape Dimensions:**



Note:  
Tolerance unless mentioned is  $\pm 0.1$  mm, Unit = mm.

**Moisture Resistant Packing Process**



Moisture/Reflow sensitivity classification  
IPC / JEDEC J-STD-020C: Level 3

### Reliability Test Items and Conditions

The reliability of products shall be satisfied with items listed below.

Confidence level : 90%

LTPD : 10%

No.	Items	Test Condition	Test Hours/Cycles	Sample Size	Ac/Re
1	Reflow Soldering	Temp.: 260°C/10sec.	6 Min.	22 PCS.	0/1
2	Thermal Shock	H : +100°C/5min ∫ 10 sec L : -10°C/5min	300 Cycles	22 PCS.	0/1
3	Temperature Cycle	H : +100°C/15min ∫ 5 min L : -40°C/15min	300 Cycles	22 PCS.	0/1
4	High Temperature/Humidity Storage	Ta=85°C,85%RH	1000 Hrs.	22 PCS.	0/1
5	Low Temperature Storage	Ta=-40°C	1000 Hrs.	22 PCS.	0/1
6	High Temperature Storage	Ta=100°C	1000 Hrs.	22 PCS.	0/1
7	DC Operation Life	Ta=25°C, VDD = 5 V	1000 Hrs.	22 PCS.	0/1

## Precautions for Use

### 1. Over-current-proof

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

### 2. Storage

2.1 Do not open moisture proof bag before the products are ready to use.

2.2 Before opening the package: The LEDs should be kept at 30°C or less and 90%RH or less.

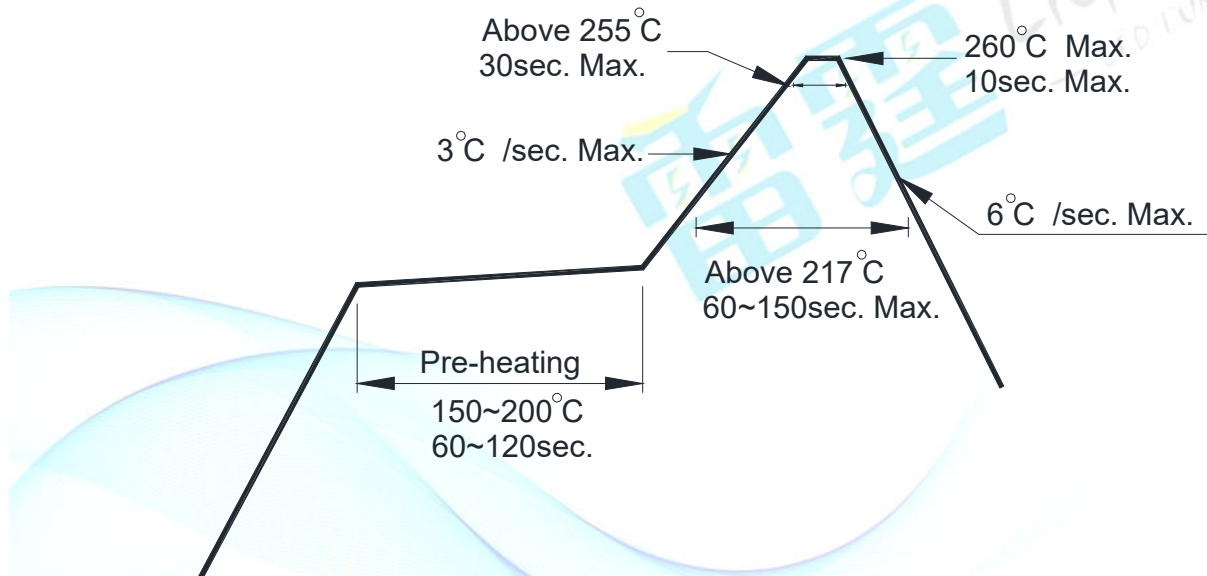
2.3 After opening the package: The LED's floor life is 168 hours under 30°C or less and 60%RH or less. If unused LEDs remain, it should be stored in moisture proof packages.

2.4 If the moisture absorbent material (silica gel) has faded away or the LEDs have exceeded the storage time, baking treatment should be performed using the following conditions.

Baking treatment: 60±5°C for 24 hours.

### 3. Soldering Condition

#### 3.1 Pb-free solder temperature profile



3.2 Reflow soldering should not be done more than two times.

3.3 When soldering, do not put stress on the LEDs during heating.

3.4 After soldering, do not warp the circuit board.

### 4. Soldering Iron

Each terminal is to go to the tip of soldering iron temperature less than 350°C for 3 seconds within once in less than the soldering iron capacity 25W. Leave two seconds and more intervals and do soldering of each terminal. Be careful because the damage of the product is often started at the time of the hand solder.

### 5. Repairing

Repair should not be done after the LEDs have been soldered. When repairing is unavoidable, a double-head soldering iron should be used (as below figure). It should be confirmed beforehand whether the characteristics of the LEDs will or will not be damaged by repairing.