Features

- RoHS2.0 Compliant
- Top SMD internal integrated high-quality external control line serial cascade constant current IC; 12V application.
- Built-in reset circuits, the light does not turn on when powered on.
- Grayscale adjustment：256 levels.
- Single-line return-to-zero code transmission protocol, unlimited cascading.
- The data transmission frequency is operated at 800Kbps. When the refresh rate reaches 30 frames/second, the number of cascade points must be less than 1024 points.
- Low power consumption, low product heat and high reliability.
- High-voltage R/G/B high-brightness chips, high light efficiency.
- Small pressure drops and high color consistency.

Description

The IN-PIH33TBT2R2G2B is 3.7*3.5*1.28x`mm RGB LED with integrated IC. It is a single-wire transmission LED with three channel (RGB) intelligent driving control circuit and light emitting circuit. The LED contains a signal decoding module, data buffer, and a built-in reset circuit.

Applications

- Full color LED string light
- LED full color module
- LED scene lighting
- Consumer electronics

Package Outline Dimensions & Pin Configuration

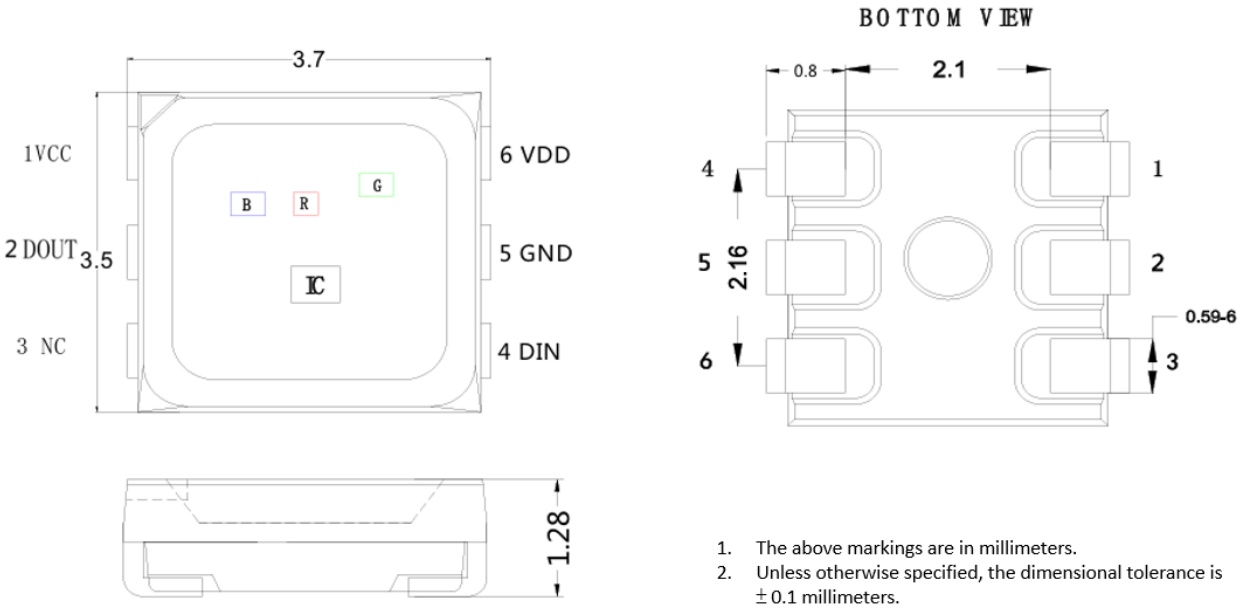
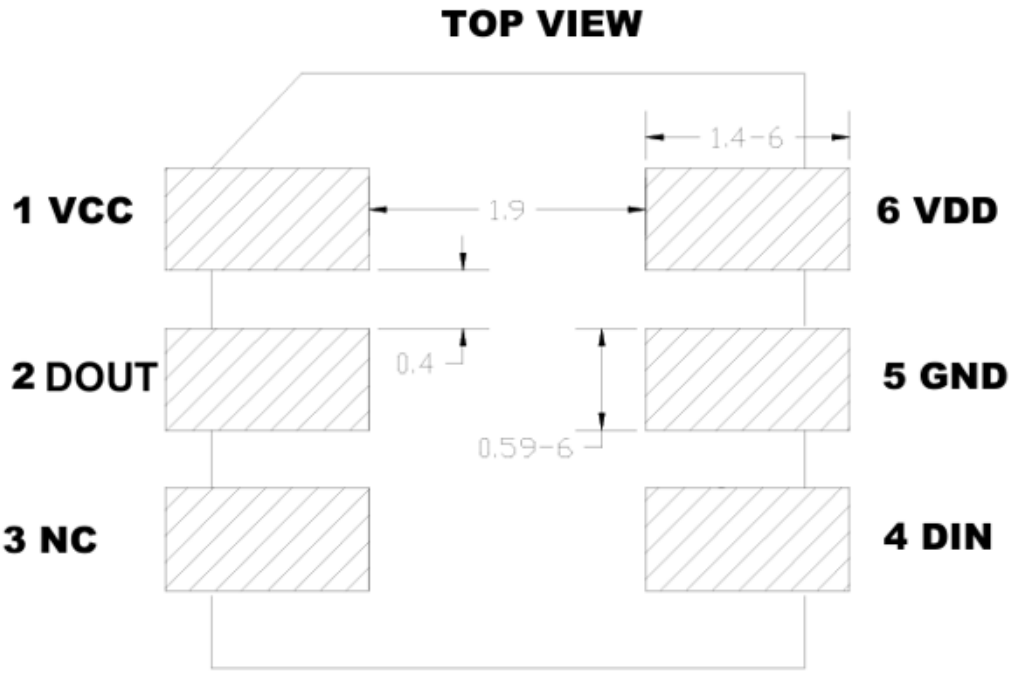


Figure 1. IN-PIH33TBT2R2G2B Package Outline Dimensions

Pin Configuration

Number	Symbol	Pin Name	Function Description
1	VCC	Power supply	RGB Power supply pin
2	DOUT	Data output	Control data signal output
3	NC	Vacant Pin	Vacant Pin
4	DIN	Data input	Control data signal input
5	GND	Ground	Power grounding
6	VDD	Power supply	IC Power supply pin

PCB recommended pad size：



Notes:
1. Dimension in millimeter, tolerance is ±0.1mm unless otherwise noted.

Absolute Maximum Rating *(Ta = 25 ℃)*

Parameter	Symbol	Range	Unit
Power supply voltage	V_{DD}	10~13.5 (VCC 12V)	V
		3.5~5.5 (VCC 12V)	
Operating temperature	T_{OPT}	−40 ~ +85	℃
Storage temperature	T_{STG}	−40 ~ +85	℃
ESD pressure (HBM)	V_{ESD}	2K	V

LED Characteristics *(T_a = 25℃)*

Color	**IN-PIH33TBT2R2G2B** (2.1mA)	
	Wavelength(nm)	Light Intensity(mcd)
Red	615-625	320-580
Green	520-530	700-1165
Blue	460-470	120-240

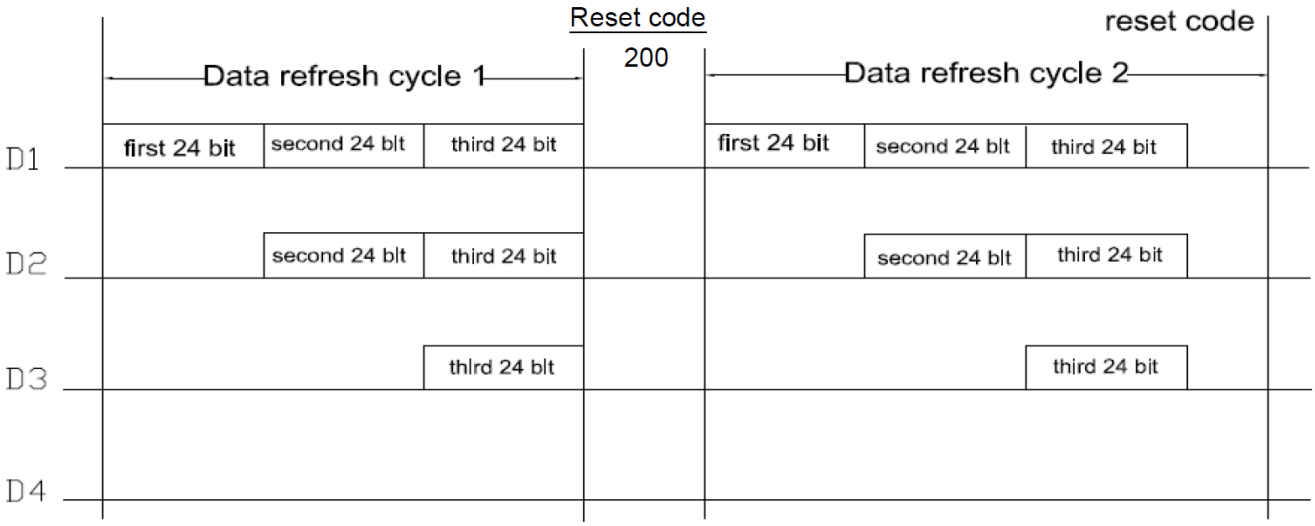
Recommended Operating Ranges *(Ta=-25℃)*

Parameter	Symbol	Min.	Typ.	Max	Unit	Test conditions
The chip input voltage	*Vcc*	10	12	13.5	V	-
Signal input flip threshold	V_{IH}	0.5*VDD	-	-	V	+VDD=5.0V
	V_{IL}	-	-	0.3*VDD	V	
R/G/B output drive current	I_{DOUT}	-	2.1	-	mA	V_{DS}=1.5V
The frequency of PWM	F_{PWM}	-	4.6	-	KHZ	-
Static power consumption	I_{DD}	-	0.17	-	mA	VDD=5V
		-	0.20	-		VDD=12V
Transfer rate	F_{DIN}	-	800	-	Kbps	-

Suggested data transmission time

Name		Min	Actual Value	Max	Unit
T	Symbol Period	1.20	-	-	μs
T0H	0 code, high level time	0.30	0.32	0.35	μs
T0L	0 code, low level time	0.80	-	-	μs
T1H	1 code, high level time	0.75	0.85	1.00	μs
T1L	1 code, low level time	0.20	-	-	μs
Trst	Reset code, low level time	>200	-	-	μs

Data transmission method（Ta=25℃）

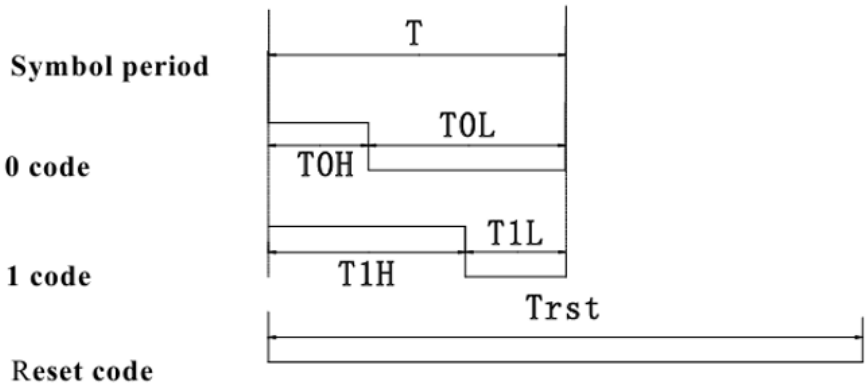


Notes:

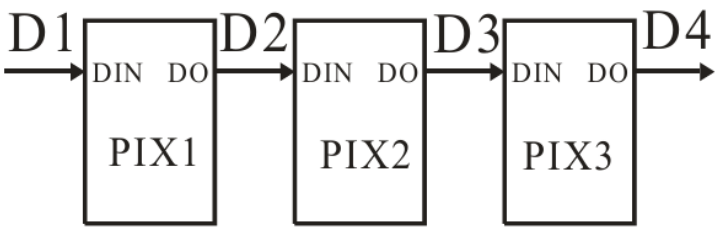
D1 is the data sent by the MCU, and D2, D3, and Dn are the data automatically shaped and forwarded by the cascade circuit.

Time series waveform diagram

Input code type



Connection method

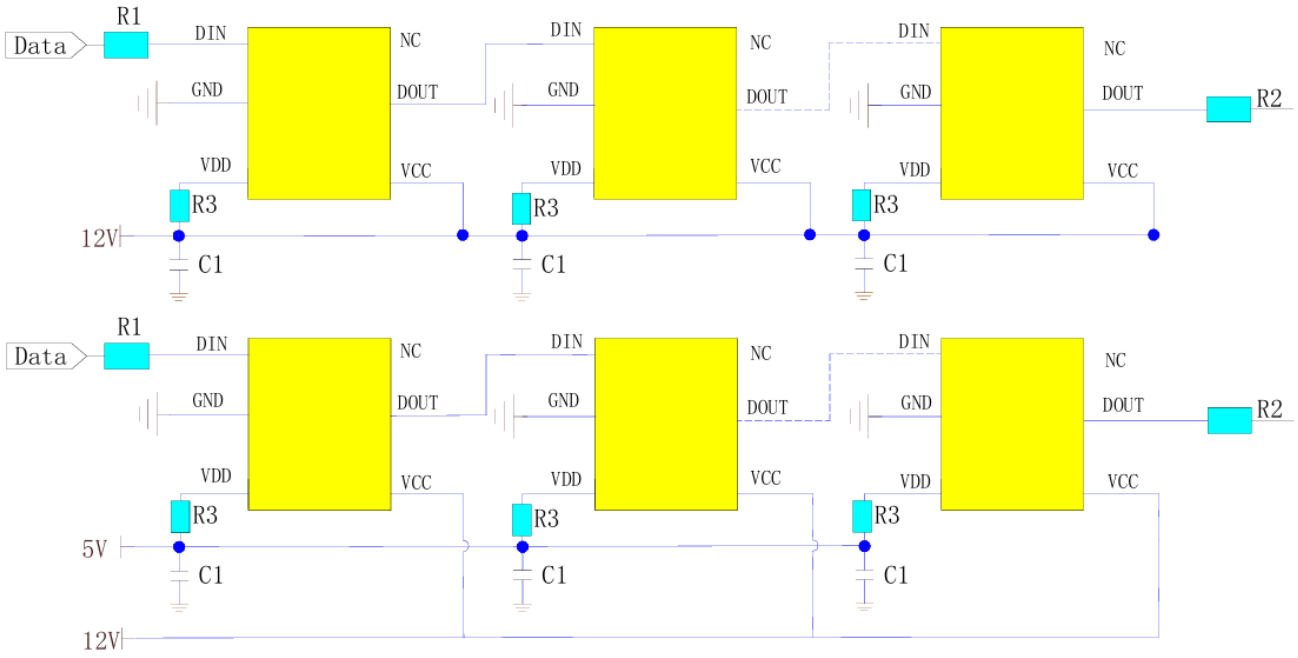


24 bits data structure:

G7	G6	G5	G4	G3	G2	G1	G0	R7	R6	R5	R4
R3	R2	R1	R0	B7	B6	B5	B4	B3	B2	B1	B0

Notes: High bit first, data is sent in the order of GRB

Principles of Applied Circuits

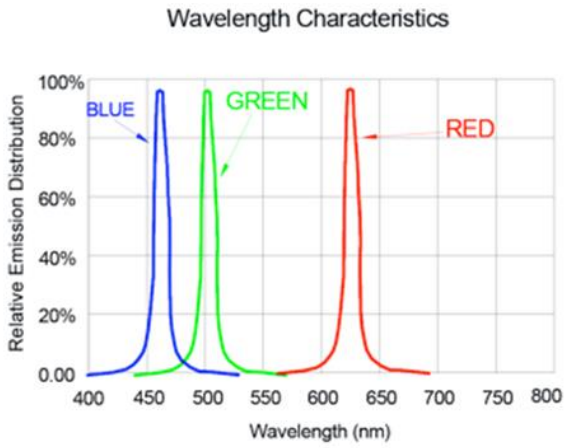


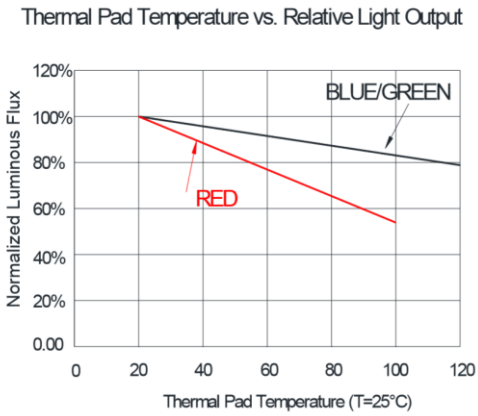
In application, to prevent the instantaneous high voltage generated by the live plugging and unplugging of the product during testing from damaging the internal signal input and output pins of the IC, a protective resistor should be connected in series at the signal input and output ends. In addition, to make the IC chips work more stably, the decoupling capacitors between the LEDs are indispensable.

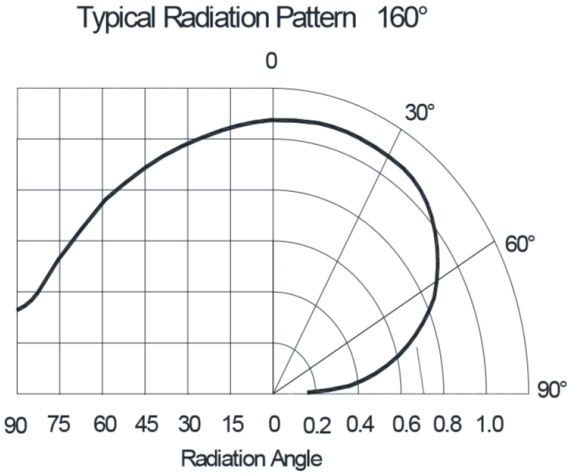
Application 1: For soft or hard light strips, the transmission distance between the LEDs is short. It is recommended to connect a protective resistor in series at the signal input and output ends, that is, R1=R2 is about 500 ohms. When the VDD is 12V, R3 is about 1KΩ; and when the VDD is 5V, R3 is about 100Ω, depending on the actual usage.

Application 2: For modules or other products, the transmission distance between the LEDs is long. Due to different wire materials and transmission distances, the protective resistors connected in series at both ends of the signal will be slightly different; depending on the actual application.

Photoelectric characteristic



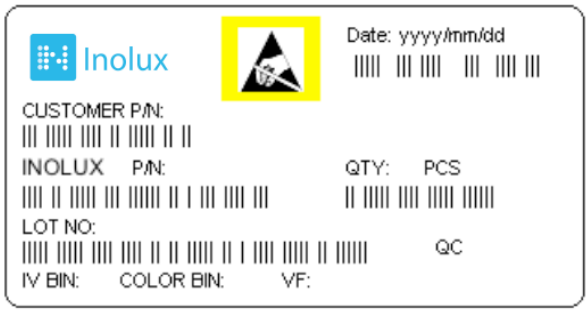




Ordering Information

Product	Emission Color	Iv(mcd)	Orderable Part Number
IN-PIH33TBT2R2G2B	R	320-580	IN-PIH33TBT2R2G2B
	G	700-1165	
	B	120-240	

Label Specifications



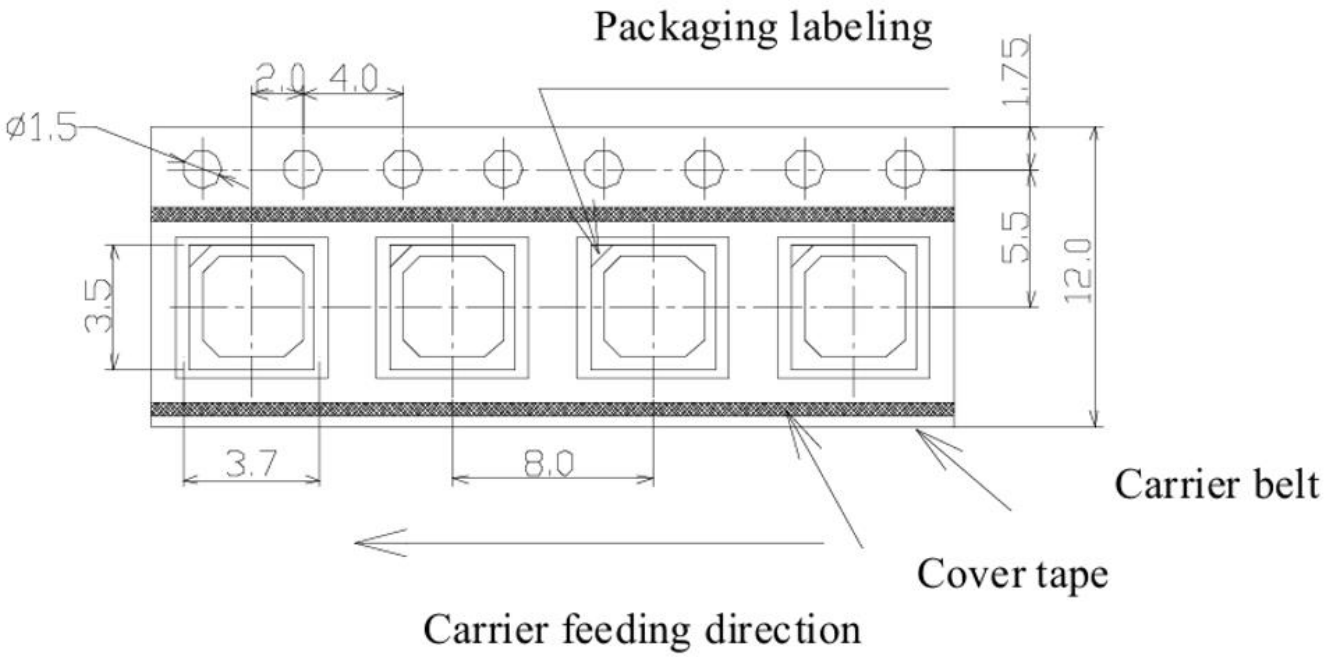
Inolux P/N:

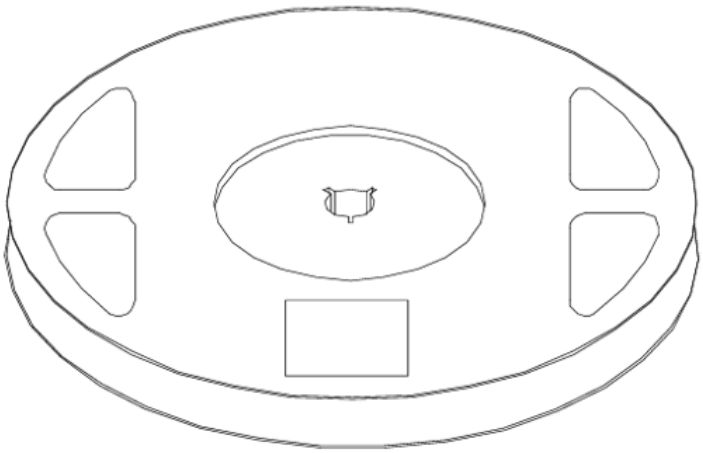
I	N	PIH	-	33	T	B	T	2	R	2	G	2	B	-	X	X	X	X
Inolux		Product		Package	Die Qty.	Variation	Orientation	Current	Color	Current	Color	Current	Color		Customized Stamp-off			
		PI- Single trace IC H- High voltage		33TBT = 3.7 x 3.5 x 1.28 mm, (6 pins)			T = Top Mount	2 = 2mA	R = 624 nm	2 = 2mA	G = 520 nm	2 = 2mA	B = 470 nm					

Lot No.:

Z	2	0	1	7	01	24	001
Internal Tracker	Year (2017, 2018, ...)				Month	Date	Serial

Packaging standards





(178x12mm)

Precautions

Please read the following notes before using the product:

1. Storage

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

1.2 Before opening the package, the LEDs should be kept at 30℃ or less and 80%RH or less.

1.3 The LEDs should be used within a year.

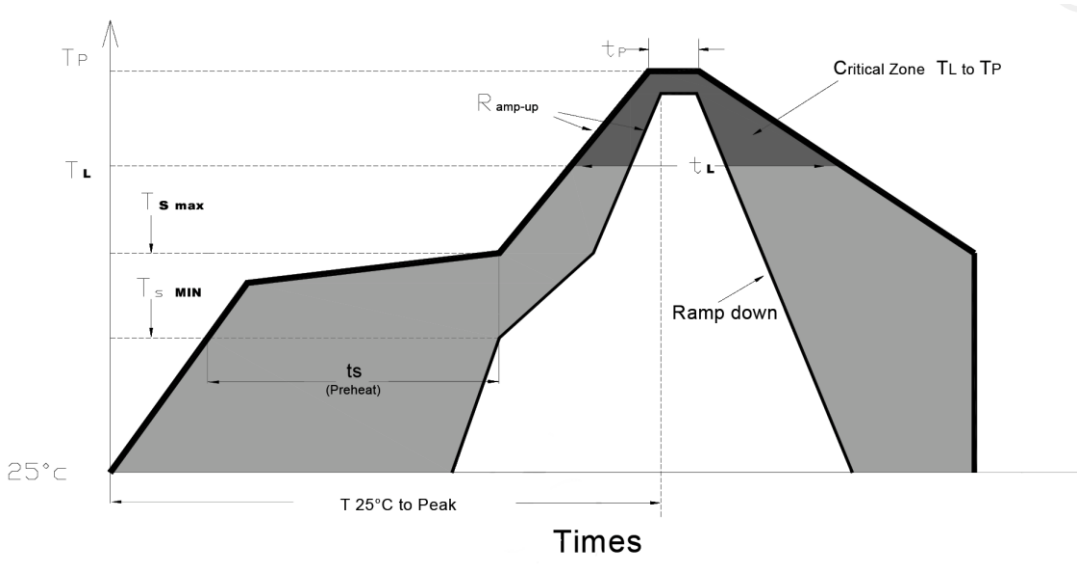
1.4 After opening the package, the LEDs should be kept at 30℃ or less and 60%RH or less.

1.5 The LEDs should be used within 24 hours after opening the package.

1.6 If the moisture adsorbent material has fabled away or the LEDs have exceeded the storage time, baking treatment should be performed using the following conditions. Baking treatment: 60±5℃ for 24 hours.

2. Soldering Condition

Recommended soldering conditions:



Profile Feature	Lead-Free Solder
Average Ramp-Up Rate (Ts_{max} to Tp)	3℃/second max.
Preheat: Temperature Min (Ts_{min})	150℃
Preheat: Temperature Min (Ts_{max})	200℃
Preheat: Time (ts_{min} to ts_{max})	60-180 seconds
Time Maintained Above: Temperature (T_L)	217 ℃
Time Maintained Above: Time (t_L)	60-150 seconds
Peak/Classification Temperature (T_P)	240 ℃
Time Within 5℃ of Actual Peak Temperature (tp)	<10 seconds
Ramp-Down Rate	6℃/second max.
Time 25 ℃ to Peak Temperature	<6 minutes max.

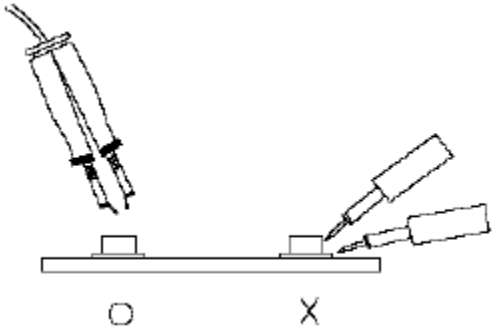
Note: Excessive soldering temperature and / or time might result in deformation of the LED lens or catastrophic failure of the LED.

3. Soldering Iron

Each terminal is to go to the tip of soldering iron temperature less than 260℃ for 5 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.

4. 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.



5. Caution in ESD

Static Electricity and surge damages the LED. It is recommended to use a wristband or anti-electrostatic glove when handling the LED. All devices, equipment and machinery must be properly grounded.

Revision History

Changes since last revision	Page	Version No.	Revision Date
Initial Release		1.0	04-22-2025

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