

## Features

- 5050 with integrated high quality constant current IC and RGB LED chip.
- Built-in IC, with high precision of constant current and internal RGB chips spectral processing in advance.
- Single line data transmission (return to zero code).
- Specific Shaping Transmit Technology - number of LED stacked is not restricted.
- Cascading Enhancement Technology - any 2 LED spacing can be up to 10 meters
- Data transfer rate of 800 kbp/s at 30 frames per second.
- RGB output port PWM control can achieve 256 grey level adjustments.
- Upon powering up, IC performs self-inspection then lights connection on the pin B lamp.
- SA-I Anti-interference patent technology for single line data transmission.
- Built-in power supply reverse connect protection module, reversed power input will not damage the IC.

## Description

The IN-PI55TAT(X)R(X)G(X)B is 5.0\*5.0\*1.6mm RGB LED with integrated IC. It is a SMD type LED which can be used in various applications.

## Applications

- Full color LED string light
- LED full color module
- LED guardrail tube
- LED scene lighting
- LED point light
- LED pixel screen
- LED shaped screen

## Package Outline Dimensions & Pin Configuration

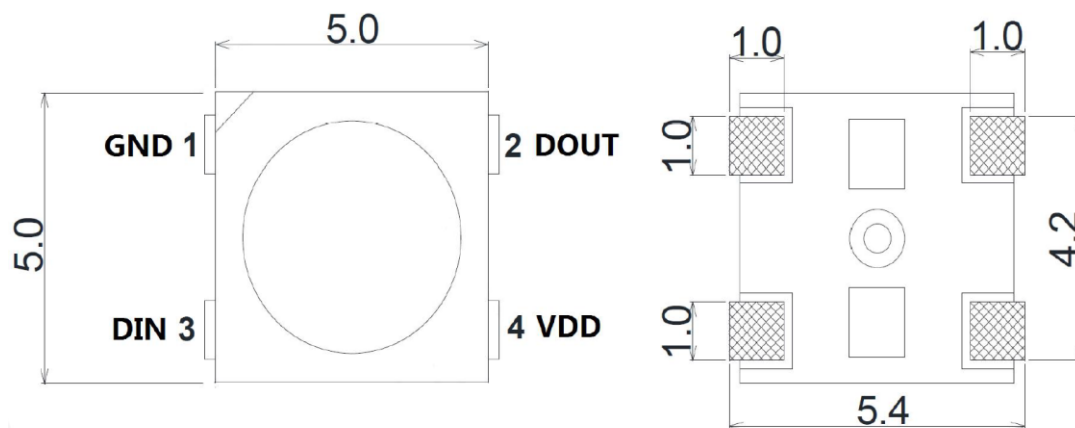


Figure 1. IN-PI55TAT(X)R(X)G(X)B Package Outline Dimensions

### Pin Configuration

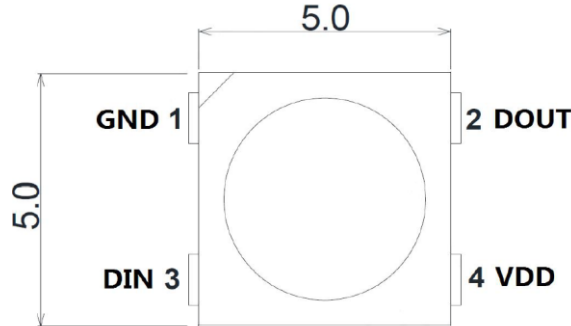


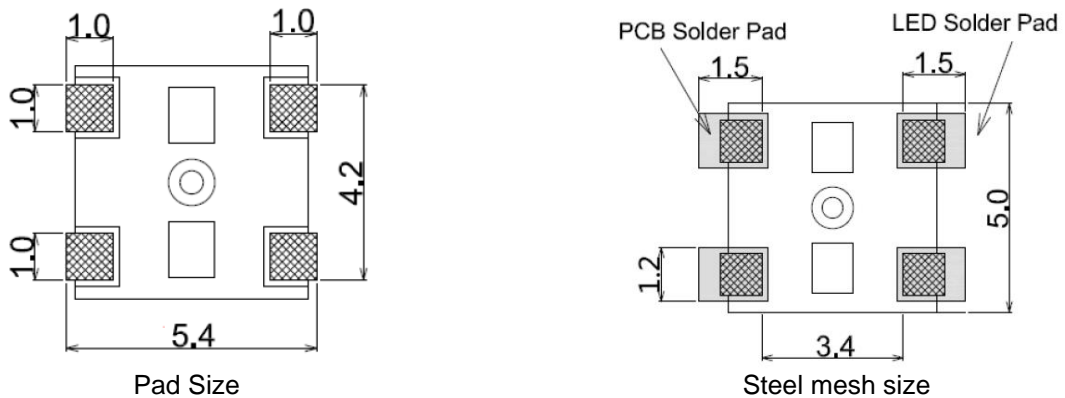
Figure 2. IN-PI55TAT(X)R(X)G(X)B Pin Configuration

Notes:

1. Dimension in millimeter, tolerance is  $\pm 0.1\text{mm}$  unless otherwise noted.

Number	Symbol	Function Description
1	GND	Ground
2	DOUT	Control data signal output
3	DIN	Control data signal input
4	VDD	Power supply LED

### Soldering Pad Size



Notes:

1. Dimension in millimeter, tolerance is  $\pm 0.1\text{mm}$  unless otherwise noted.

**Absolute Maximum Rating** ( $T_a = 25\text{ }^\circ\text{C}$ ,  $V_{SS}=0V$ )

Parameter	Symbol	Range	Unit
Logic supply voltage	$V_{DD}$	+3.7~+5.4	V
Logic input voltage	$V_{IN}$	-0.4 ~VDD+0.4	V
OUT R/G/B port withstand voltage	$BV_{OUT}$	16	V
Operating temperature	$T_{OPT}$	-30 ~ +85	$^\circ\text{C}$
Storage temperature	$T_{STG}$	-40 ~ +90	$^\circ\text{C}$
ESD pressure(HBM)	$V_{ESD}$	4K	V
ESD pressure(DM)	$V_{ESD}$	200	V

**LED Characteristics** ( $T_a = 25^\circ\text{C}$ )

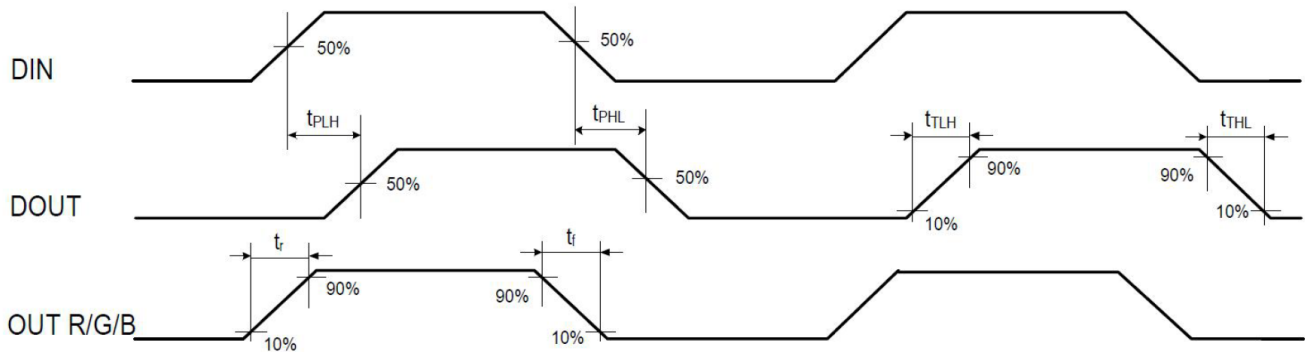
Color	IN-PI55TAT5R5G5B (5mA Max. per LED Chip)		IN-PI55TATPRPGPB (12mA Max. per LED Chip)	
	Wavelength(nm)	Light Intensity(mcd)	Wavelength(nm)	Light Intensity(mcd)
Red	620-630	100-200	620-630	400-700
Green	520-535	400-700	520-535	1000-1500
Blue	460-475	50-100	460-475	200-400

**Recommended Operating Ranges** (unless otherwise specified,  $T_a = -20 \sim +70 \text{ }^\circ\text{C}$ ,  $V_{DD} = 4.5 \sim 5.5\text{V}$ ,  $V_{SS} = 0\text{V}$ )

Parameter	Symbol	Min.	Typ.	Max	Unit	Test conditions
Supply voltage	$V_{DD}$	-	5.0	-	V	-
High level input voltage	$V_{IH}$	0.7*VDD	-		V	VDD=5.0V
Low level input voltage	$V_{IL}$	-	-	0.3*VDD	V	VDD=5.0V
DOUT output current	$I_{OH}$	-	-40	-		DOUT output is high, and 10 $\Omega$ resistance is connected in series to GND
DOUT perfusion current	$I_{OL}$	-	40	-		The output of DOUT is low, and the power supply injects current to DOUT
OUT R/G/B constant current knee point voltage	$V_{DS\_S}$	-	0.7	-		$I_{out} = 12\text{mA}$
OUT R/G/B output current	$I_{OUT\_R}$	-	12	-		$V_{DS\_R} = 1\text{V}$
The frequency of PWM	$F_{PWM}$	-	1.2	-	KHZ	-
Static power consumption	$I_{DD}$	-	0.5	-	mA	VDD=4.5V Iout "OFF"

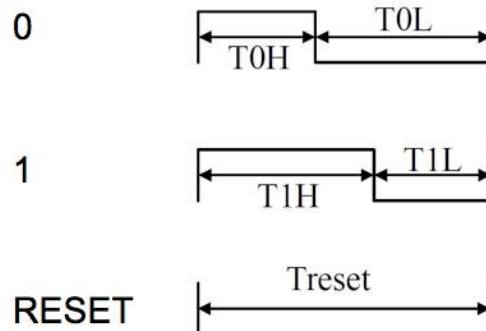
**Switching Characteristics** (unless otherwise specified,  $T_a=25\text{ }^\circ\text{C}$ )

Parameter	Symbol	Min.	Typ.	Max	Unit	Test conditions
The speed of data transmission	$f_{DIN}$	-	800	-	KHZ	The duty ratio of 67% (data 1)
DOUT transmission delay	$T_{PLH}$	-	80	-	ns	The earth load capacitance of the dout port is 30pf.
	$T_{PHL}$	-	80	-	ns	
$I_{OUT}$ Rise/Drop Time	$T_r$	-	50	-	ns	$I_{OUT} R/G/B = 12\text{mA}$ , out port is connected with $200\ \Omega$ resistor to VDD in series, and the load capacitance to ground is 15pf
	$T_f$	-	100	-	ns	



**Timing Waveforms**

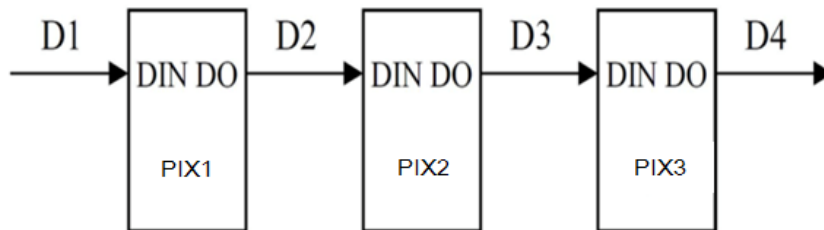
1. Input Code



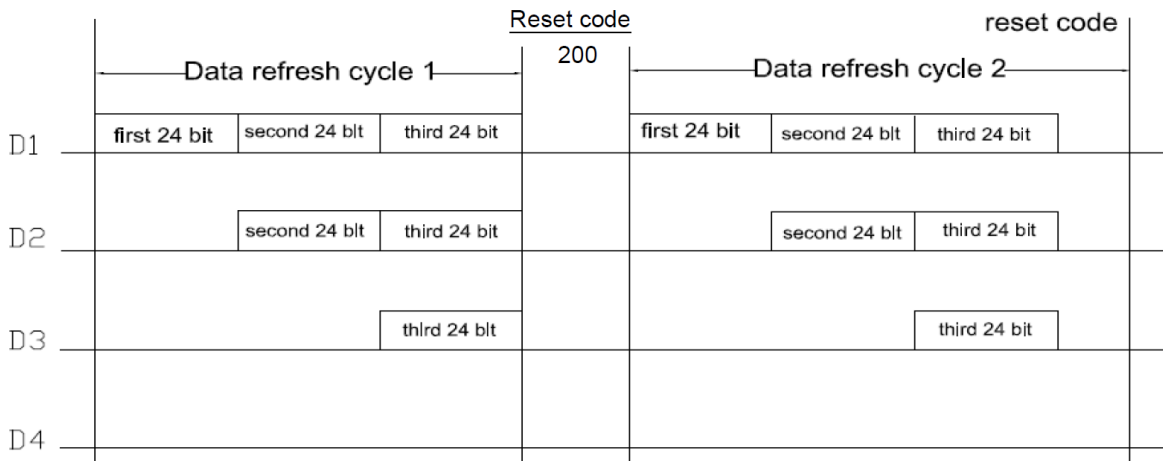
2. The data transmission time:

Name	Description	Min.	Typ.	Max.	Unit
T0H	0 code, high level time	-	0.3μs	-	μs
T0L	0 code, low level time	-	0.9μs	-	μs
T1H	1 code, high level time	-	0.6μs	-	μs
T1L	1 code, low level time	-	0.6μs	-	μs
Trst	Reset code, low level time	200	-	-	μs

3. Connection Scheme



4. Data Transfer Format



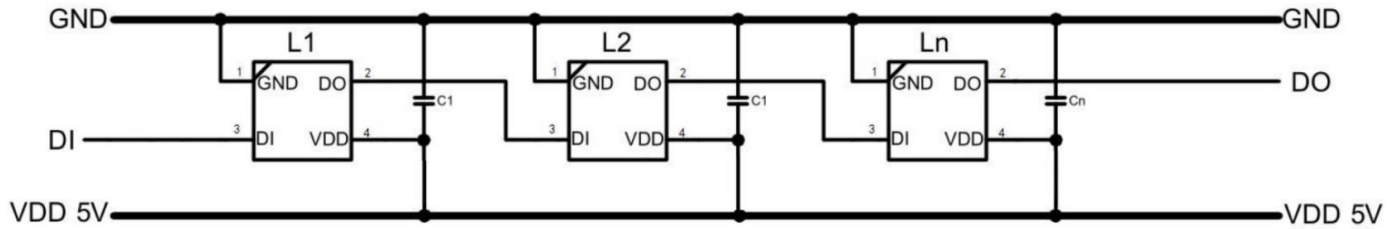
Note: the D1 sends data for MCU, D2, D3, D4 for data forwarding automatic shaping cascade circuit.

5. 24-bit data format



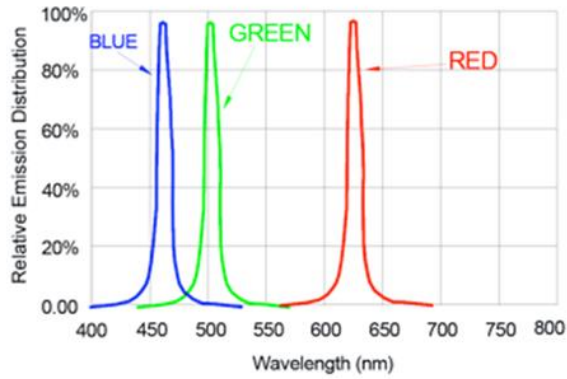
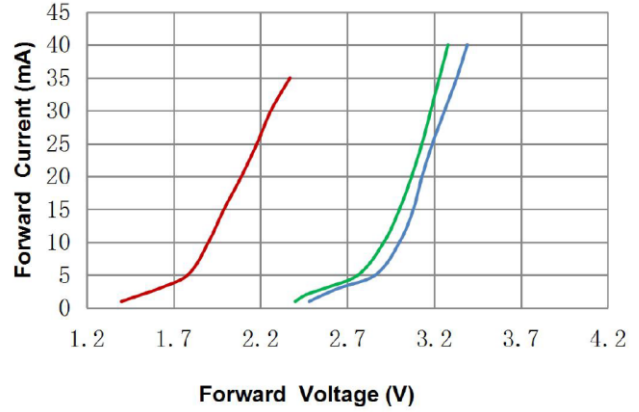
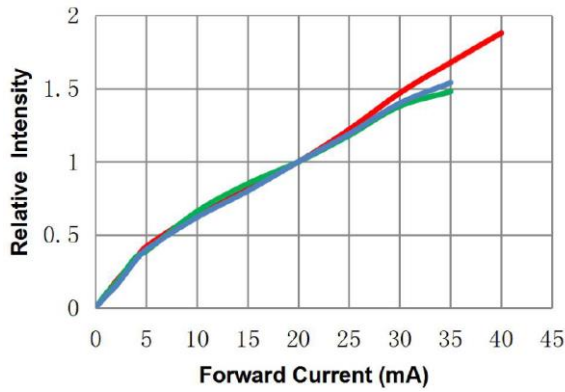
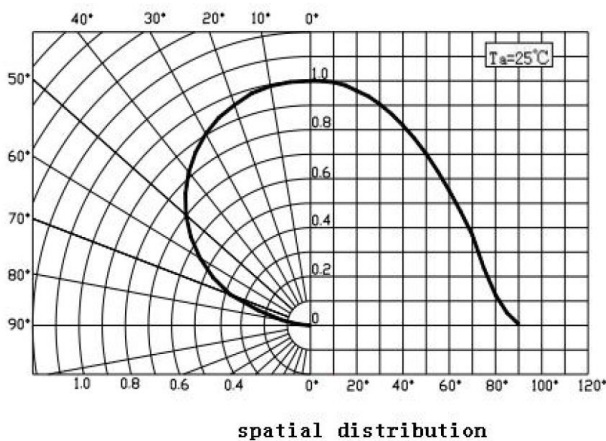
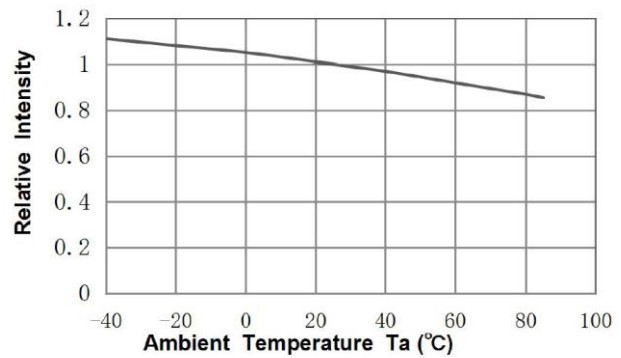
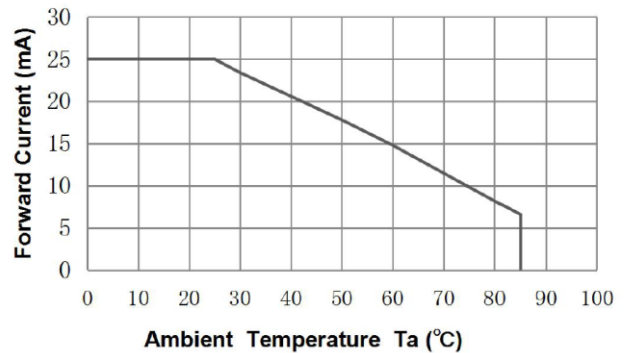
Note: high starting, in order to send data (G7 - G6 - ..... ..B0)

## Typical Application Circuit



Note: C1 is the filter capacitor of LED VDD pin, the general value is 100nf

## LED Performance Graph

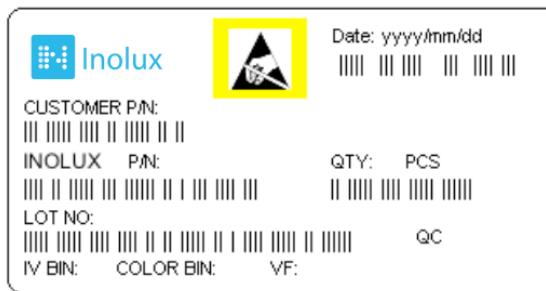
**Wavelength Characteristics**

**Forward Current VS. Forward Voltage (Ta=25°C)**

**Relative Intensity VS. Forward Current (Ta=25°C)**

**Relative Intensity VS. Ambient Temperature (Ta=25°C)**

**Maximum Forward Current VS. Ambient temperature**




### Ordering Information

Product	Emission Color	IV(mcd)	Orderable Part Number
IN-PI55TAT5R5G5B	R	100-200	IN-PI55TAT5R5G5B
	G	400-700	
	B	50-100	
IN-PI55TATPRPGPB	R	400-700	IN-PI55TATPRPGPB
	G	1000-1500	
	B	200-400	

### Label Specifications

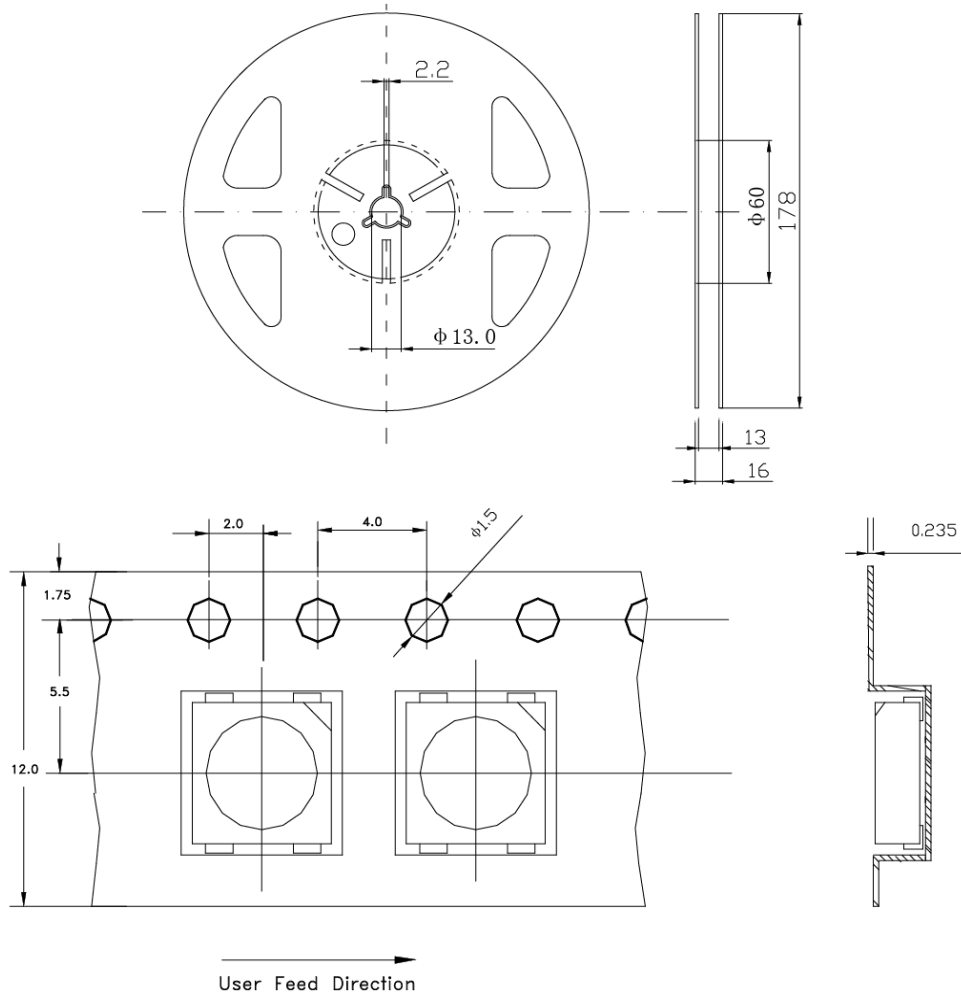


### Inolux P/N:

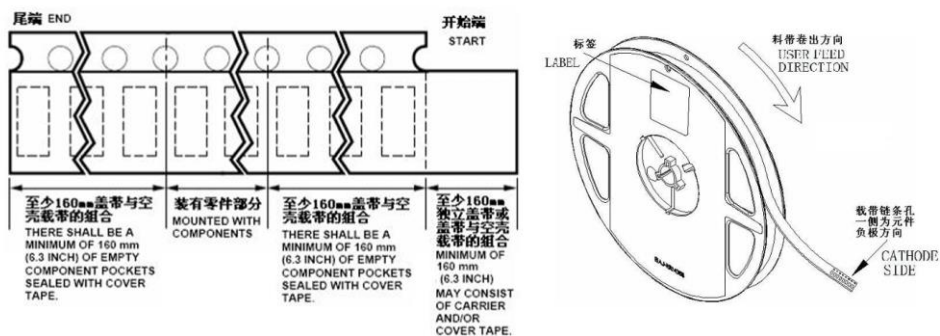
I	N	PI	-	55	T	A	T	(X)	R	(X)	G	(X)	B	-	X	X	X	X
Product		Package	Die Qty.	Variation	Orientation	Current	Color	Current	Color	Current	Color	Color	Customized Stamp-off					
Inolux	PI- Single trace IC PC- Clock Function IC	55TA = 5.0 x 5.0 x 1.6 mm (4 pins)			T = Top Mount	P=12mA 5 = 5mA	R = 624 nm	P=12mA 5 = 5mA	G = 520 nm	P=12mA 5 = 5mA	B = 470 nm							

### Lot No.:

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

**Packaging**

**Notes:**

1. All dimensions are in millimeters.
2. Tolerance is  $\pm 0.1$  mm unless otherwise noted.



## Precautions

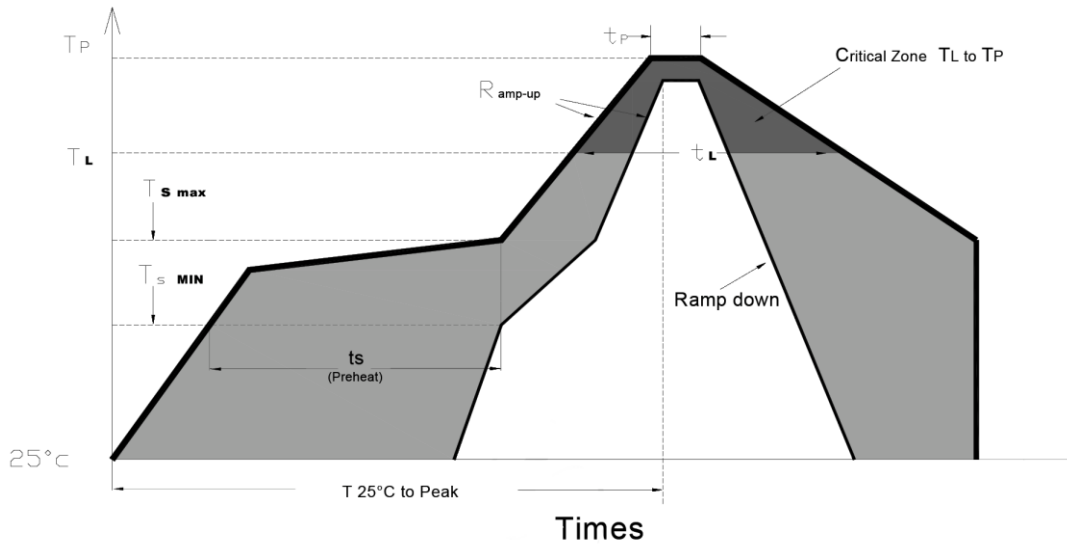
Please read the following notes before using the product:

### 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°C 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°C or less and 60%RH or less.
- 1.5 The LEDs should be used within 24 hours (1 days) 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°C for 24 hours.

## 2. Soldering Condition

Recommended soldering conditions:



Profile Feature	Lead-Free Solder
Average Ramp-Up Rate ( $T_{s \max}$ to $T_p$ )	3°C/second max.
Preheat: Temperature Min ( $T_{s \min}$ )	150°C
Preheat: Temperature Min ( $T_{s \max}$ )	200°C
Preheat: Time ( $t_{s \min}$ to $t_{s \max}$ )	60-180 seconds
Time Maintained Above: Temperature ( $T_L$ )	217 °C
Time Maintained Above: Time ( $t_L$ )	60-150 seconds
Peak/Classification Temperature ( $T_p$ )	240 °C
Time Within 5°C of Actual Peak Temperature ( $t_p$ )	<10 seconds
Ramp-Down Rate	6°C/second max.
Time 25 °C to Peak Temperature	<6 minutes max.

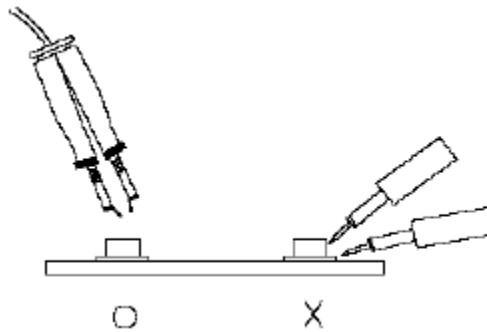
Note: Excessive soldering temperature and / or time might result in deformation of the LED lens or catastrophic failure of the LED.

### 3. Soldering Iron

Each terminal is to go to the tip of soldering iron temperature less than 260°C 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	05-31-2018
Format Adjustment		1.1	07-01-2018
Format Adjustment		1.2	08-07-2018
Revise the Spec.	P3	1.3	12-25-2018
Revise the Drawing and Spec.	P1-P8	1.4	02-04-2021
Revise the Wording	P6	1.5	01-03-2023
Revise the Drawing.	P7	1.6	07-26-2023
Add packaging information	P10	1.7	03-05-2024-

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