Features

- 3537 with integrated high quality constant current IC and RGB LED chip.
- 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 gray level adjustments.

Description

The IN-PI33TCTPRPGPB is 3.5*3.7*1.28mm 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

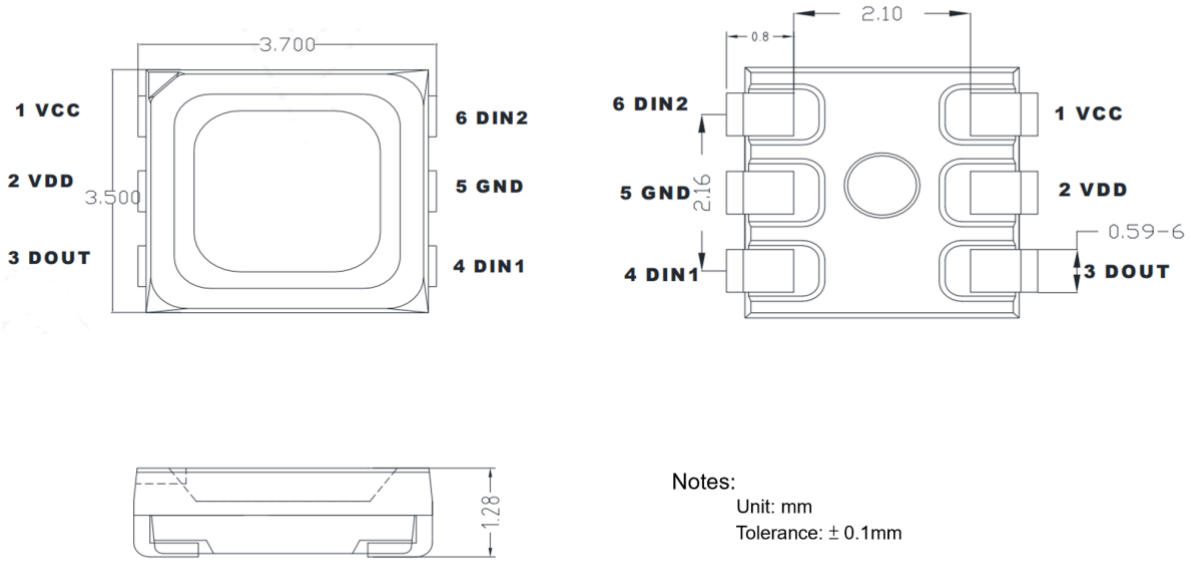


Figure 1. IN-PI33TCTPRPGPB Package Outline Dimensions

Pin Configuration

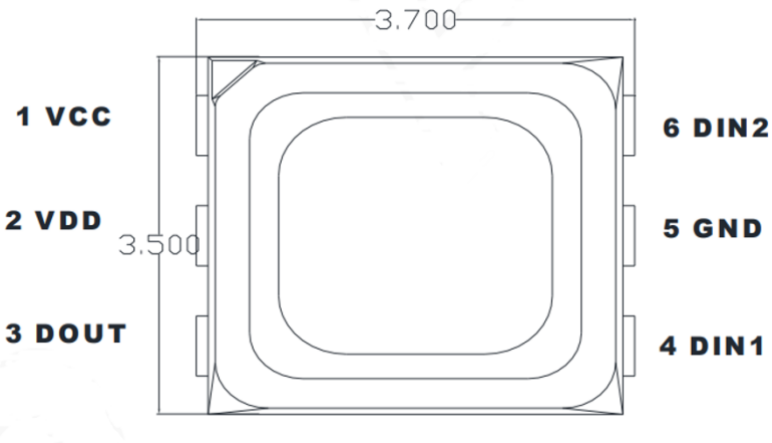
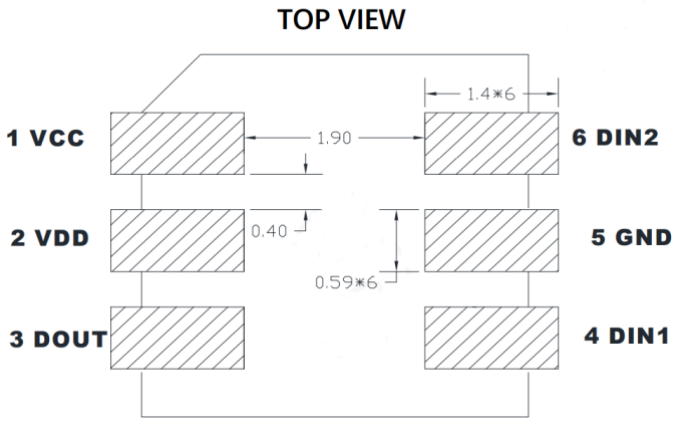


Figure 2. IN- PI33TCTPRPGPB Pin Configuration

Notes:
1. All dimensions are in millimeters.
2. Tolerance is ±0.1mm unless otherwise noted

Number	Symbol	Function Description
1	VCC	Power supply LED
2	VDD	Power supply LED
3	DOUT	Control data signal output
4	DIN1	Control data signal input
5	GND	Ground
6	DIN2	Control data signal input

Soldering Pad Size



Absolute Maximum Rating *(Ta = 25 ℃, VSS=0V)*

Parameter	Symbol	Range	Unit
Logic supply voltage	V_{DD}	+3.7～+5.5	V
Logic input voltage	V_{IN}	-0.5 ~VDD+0.5	V
Operating temperature	T_{OPT}	−40 ~ +85	°C
Storage temperature	T_{STG}	−40 ~ +85	°C
ESD pressure(HBM)	V_{ESD}	2K	V
ESD pressure(MM)	V_{ESD}	200	V

LED Characteristics *(Ta = 25℃)*

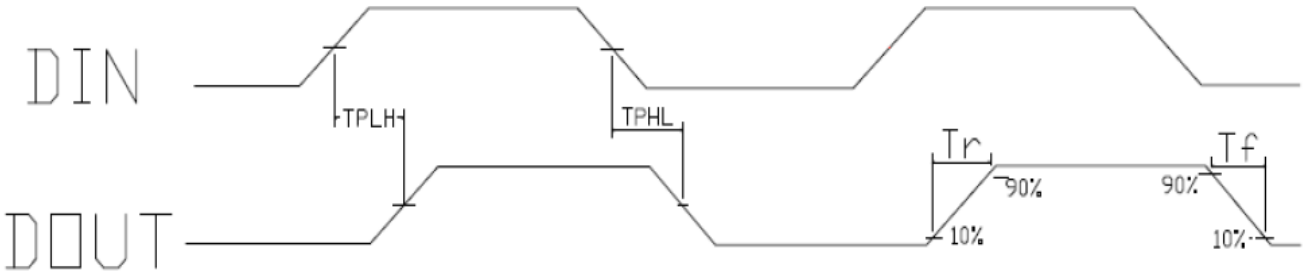
Color	12mA	
	Wavelength(nm)	Light Intensity(mcd)
Red	615-625	400-700
Green	520-530	1000-1500
Blue	460-470	200-400

Recommended Operating Ranges

Parameter	Symbol	Min.	Typ.	Max	Unit	Test conditions
Supply voltage	V_{DD}	3.7	5.0	5.5	V	-
R/G/B port pressure	$V_{DS,\ MAX}$	-	-	-	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
The frequency of PWM	F_{PWM}	-	4.0	-	KHZ	-
Static power consumption	I_{DD}	-	0.35	-	mA	-
Transfer rate	F_{DIN}	-	800	-	Kbps	

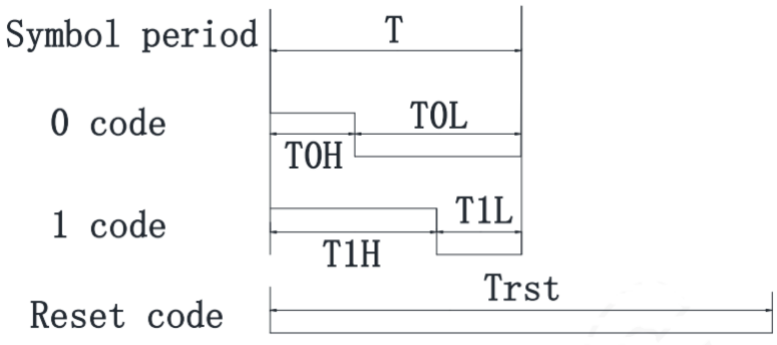
Switching Characteristics *(unless otherwise specified, Ta=25 ℃)*

Parameter	Symbol	Min.	Typ.	Max	Unit	Test conditions
The speed of data transmission	*fDIN*	-	800	1100	KHZ	The duty ratio of 67% (data 1)
DOUT transmission delay	T_{PLH}	-	-	500	ns	DIN→DOUT
	T_{PHL}	-	-	500	ns	
I_{OUT} Rise/Drop Time	T_r	-	100	-	ns	V_{DS}=1.5 I_{OUT}=13mA
	T_f	-	100	-	ns	



Timing Waveforms

1. Input Code



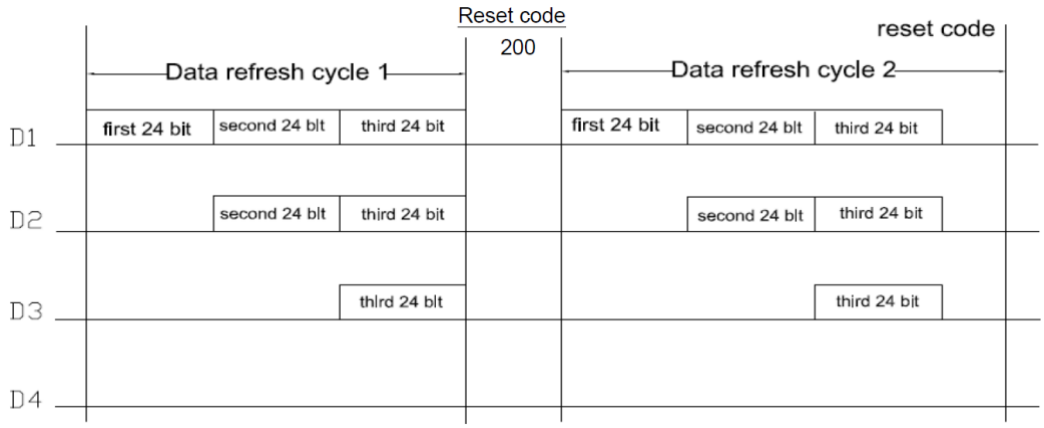
2. The data transmission time:

Name	Description	Min.	Standard Value	Max.	Unit
T	Code Period	1.2	-	-	μs
T0H	0 code, high level time	0.2	0.32	0.4	μs
T0L	0 code, low level time	0.8	–	-	μs
T1H	1 code, high level time	0.58	0.64	1.0	μs
T1L	1 code, low level time	0.2	–	-	μs
Trst	Reset code, low level time	>80	–	-	μs

Note:

1. The protocol adopts unipolar zeroing code, and each symbol must have a low level. Each symbol in this protocol starts with a high level, and the duration of the high level determines the "0" or "1" code.
2. When writing a program, the minimum required code period is1.2μs.
3. The high-level time of "0" and "1" codes should be within the specified range in the table above, and the low-level time of "0" and "1" codes should be less than 20μs.

3. Data Transfer Format



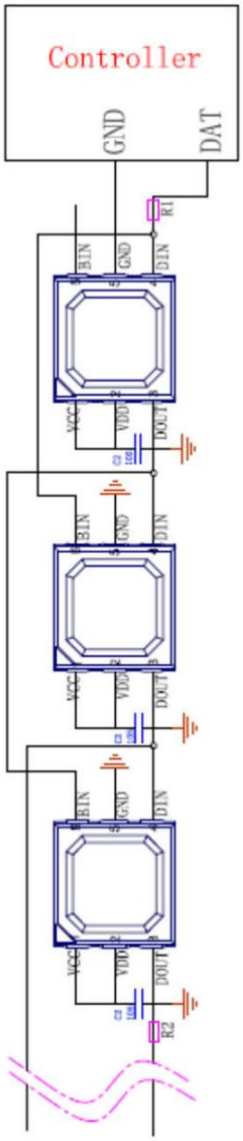
Note: D1 is the data sent by the MCU end, and D2, D3, and D4 are the data automatically shaped and forwarded by the cascaded circuit.

4. 24-bit data format

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

Note: The high bit is sent first, and the data is sent in the order of GRB. (G7 - G6 - ....B0)

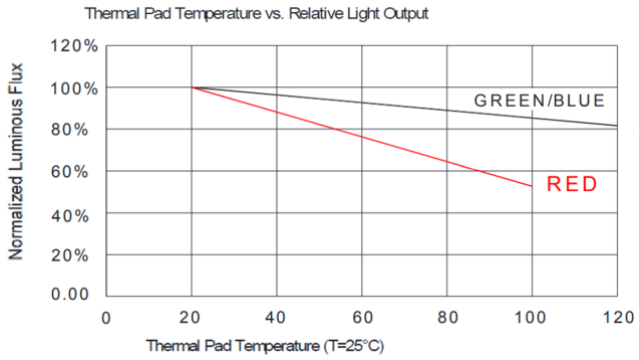
Typical Application Circuit

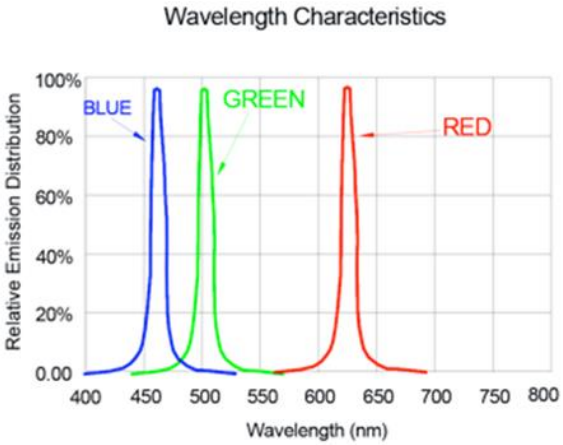


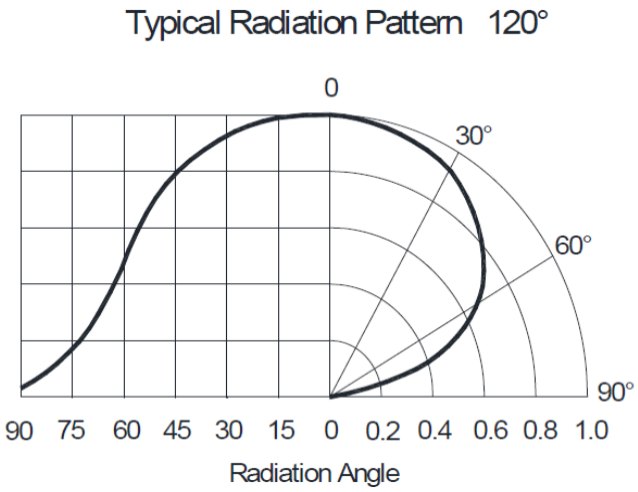
In practical application circuits, to prevent instantaneous high voltage damage to the internal signal input and output pins of the IC caused by live plugging and unplugging during testing, protective resistors should be connected in series at the signal input and output terminals. In addition, in order to ensure more stable operation between IC chips, the decoupling capacitance between each LED is essential.

Application 1: For soft or hard light strips with short transmission distance between lamp beads, it is recommended to connect protective resistors in series at the signal input and output terminals, R1, R2, about 500 ohms.
Application 2: Used for modules or general shaped products. The transmission distance between lamp beads is long. Due to different wire materials and transmission distances, the protective resistance of the signal line connected in series at both ends will be slightly different; Based on actual usage.

LED Performance Graph



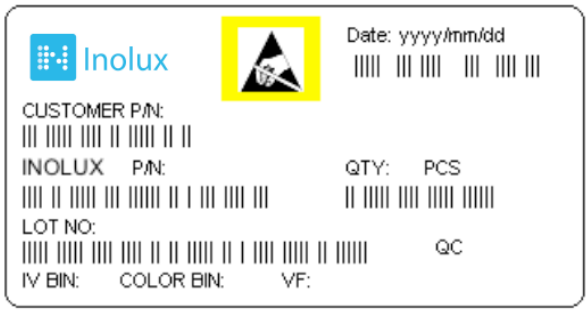




Ordering Information

Product	Emission Color	IV(mcd)	Orderable Part Number
IN-PI33TCTPRPGPB	R	400-700	IN-PI33TCTPRPGPB
	G	1000-1500	
	B	200-400	

Label Specifications



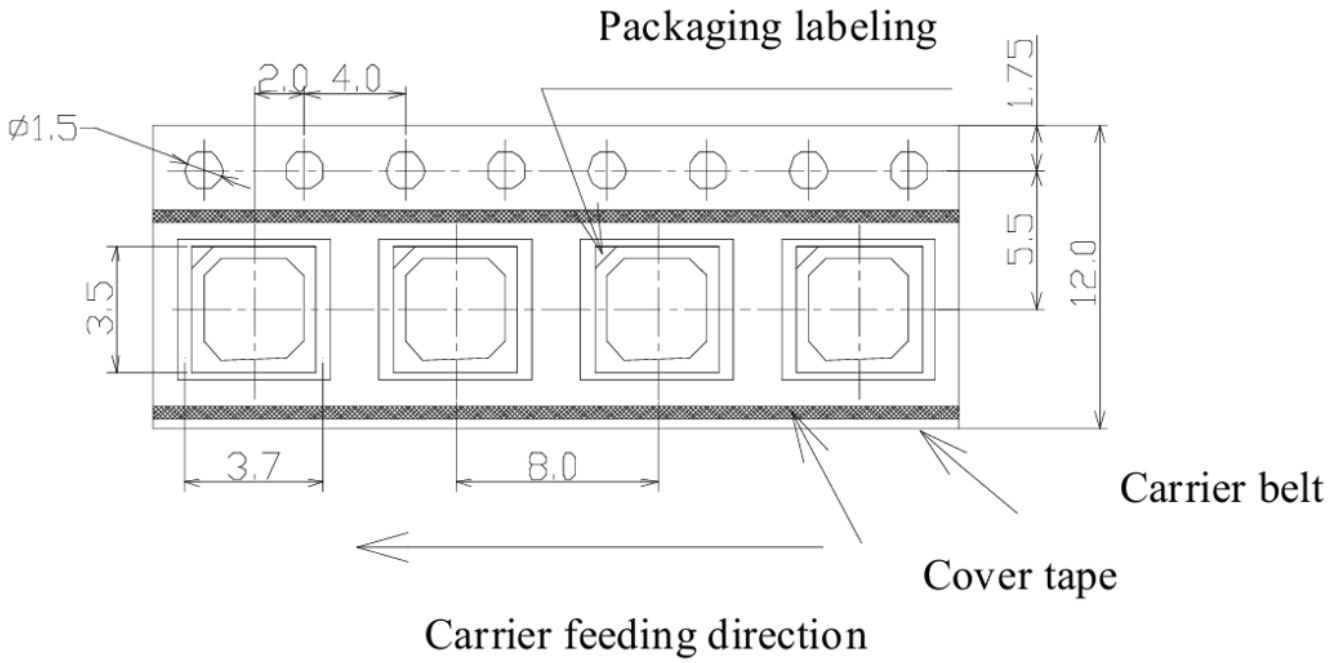
Inolux P/N:

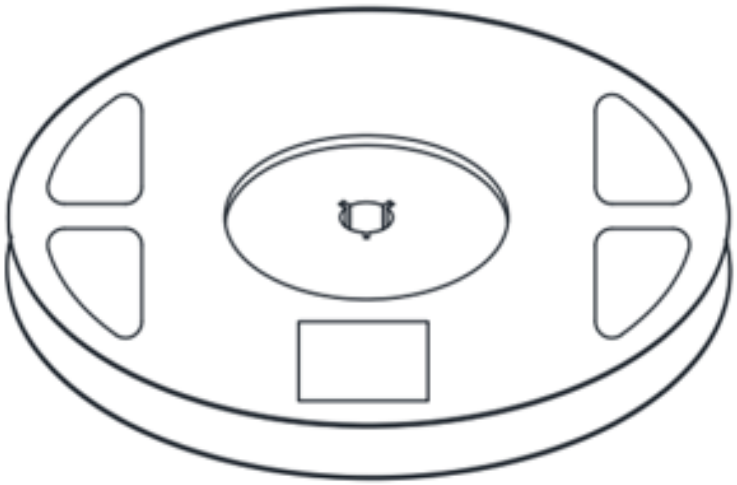
I	N	PI	-	33	T	C	T	P	R	P	G	P	B	-	X	X	X	X
		Product		Package	Die Qty.	Variation	Orientation	Current	Color	Current	Color	Current	Color		Customized Stamp-off			
Inolux		PI- Single trace IC PC- Clock Function IC		33TC = 3.5 x 3.7 x 1.28 mm			T = Top Mount	P=12mA	R = 620 nm	P=12mA	G = 520 nm	P=12mA	B = 470 nm					

Lot No.:

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

Packaging standards





REEL(178x12mm)

Precautions

Please read the following notes before using the product:

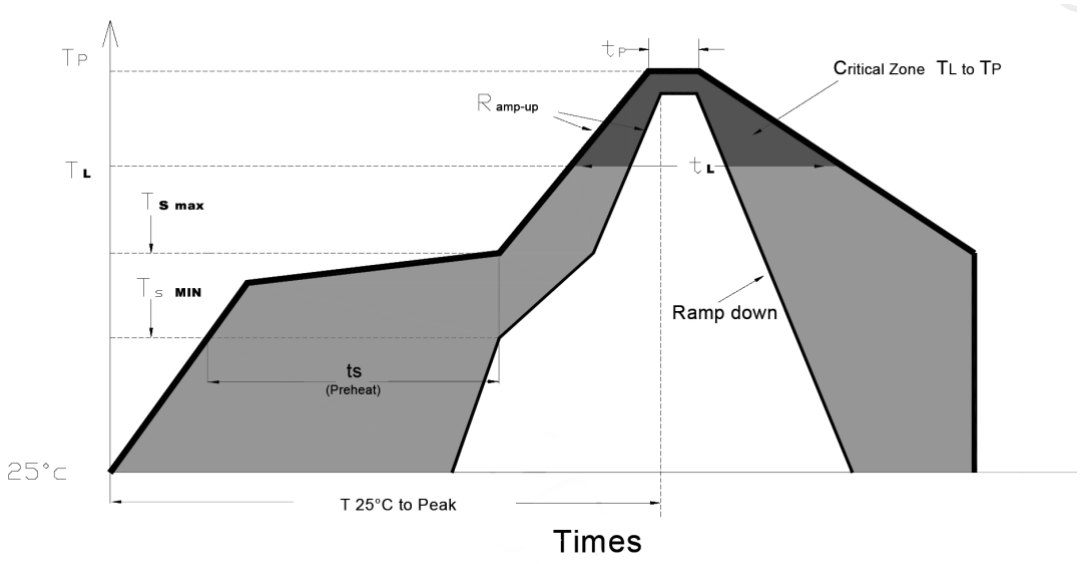
1. Storage

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 remaining LEDs should be kept in a resealed bag.
1.5 The LEDs require mandatory baking before usage. Baking treatment listed below.
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℃ for24 hours.

2. Soldering Condition

Recommended soldering conditions:



Profile Feature	Lead-Free Solder
Average Ramp-Up Rate ($T_{s\ max}$ to Tp)	3℃/second max.
Preheat: Temperature Min ($T_{s\ min}$)	150℃
Preheat: Temperature Min ($T_{s\ max}$)	200℃
Preheat: Time ($t_{s\ min}$ to $t_{s\ max}$)	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.

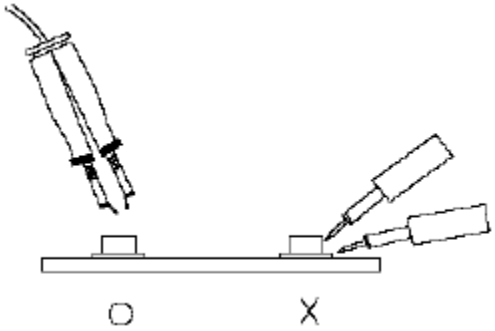
Note: Excessive soldering temperature and / or time might result in deformation of the LED lens or catastrophic failure of the LED.

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	12-13-2018
Revise precautions	11	1.1	07-31-2019
Correct typo	2	1.2	02-04-2021
Product Upgrade	1, 2, 3, 4, 9	1.3	08-22-2022
Adjust the parameter	9	1.4	02-18-2025

DISCLAIMER

INOLUX reserves the right to make changes without further notice to any products herein to improve reliability, function or design. INOLUX does not assume any liability arising out of the application or use of any product or circuit described herein; neither does it convey any license under its patent rights, nor the rights of others.

LIFE SUPPORT POLICY

INOLUX's products are not authorized for use as critical components in life support devices or systems without the express written approval of the President of INOLUX or INOLUX CORPORATION. As used herein:
1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, and (c) whose failure to perform when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in a significant injury of the user.
2. A critical component in any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.