

## Features

- 0603 with integrated LED driver IC.
- Single line data transmission (return to zero code).
- Specific Shaping Transmit Technology - number of LED stacked is not restricted.
- Data transfer frequency can reach 800kbps. When there's 1024 LEDs in a single string, the refresh rate can reach 30 frames per second.
- Capacitor between Vdd and GND is not needed.
- Built-in power supply reverse connects protection module, reversed power input will not damage the IC.

## Description

The IN-PIS63BTPW is 1.6\*0.8\*0.55mm White color LED with integrated IC. It is a SMD type LED which can be used in various applications.

## Applications

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

## Package Outline Dimensions & Pin Configuration

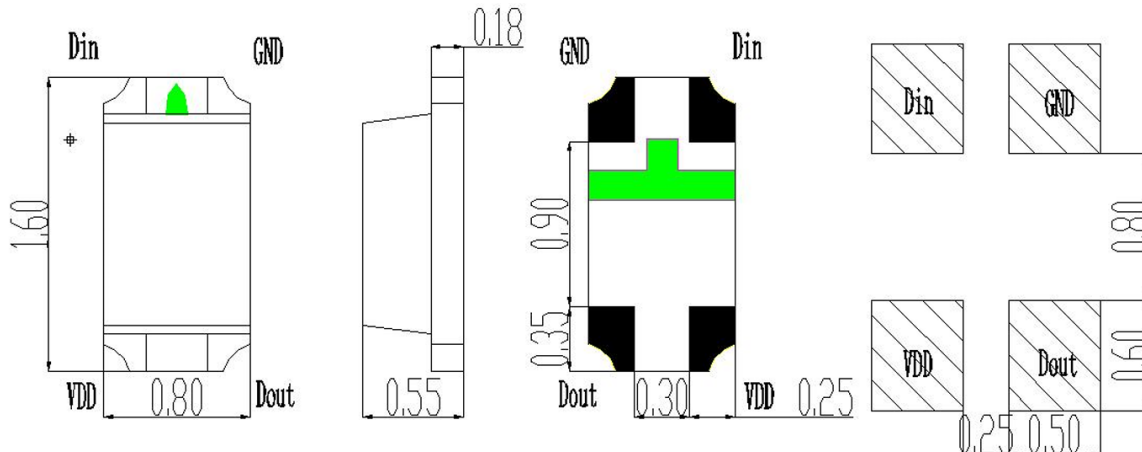


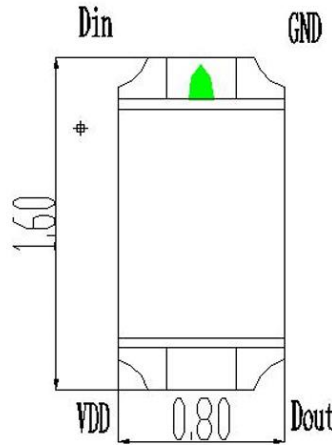
Figure 1. IN-PIS63BTPW Package Outline Dimensions

### Note:

All dimensions are in millimeters.

Tolerance is  $\pm 0.10\text{mm}$  unless otherwise note.

## Pin Configuration



**Figure 2. IN-PIS63BTPW Pin Configuration**

**Notes:**

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

| Symbol | Function Description       |
|--------|----------------------------|
| GND    | Ground                     |
| DOUT   | Control data signal output |
| DIN    | Control data signal input  |
| VDD    | Power supply               |

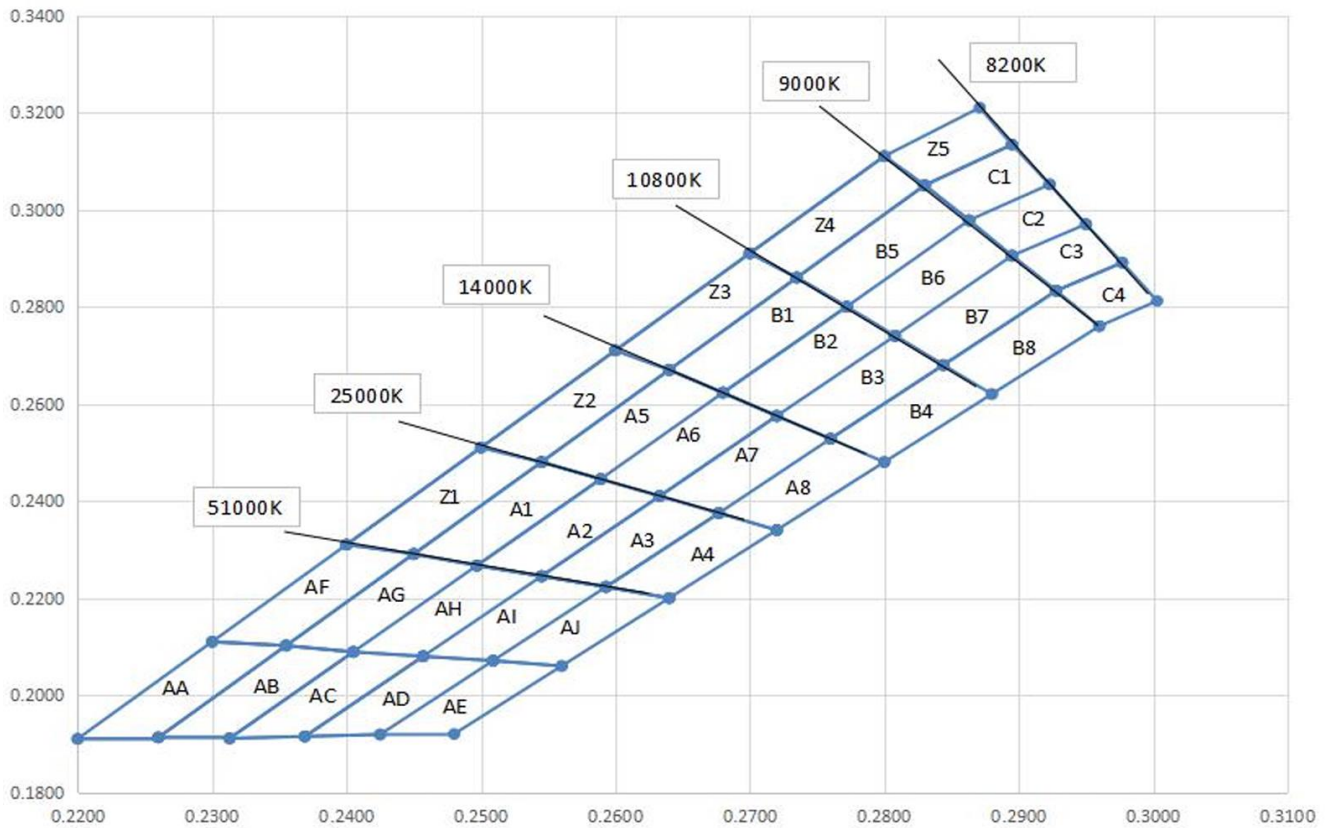
**Absolute Maximum Rating** ( $T_a = 25\text{ }^{\circ}\text{C}$ )

| Parameter             | Symbol     | Range                                          | Unit               |
|-----------------------|------------|------------------------------------------------|--------------------|
| Power supply voltage  | $V_{DD}$   | 3.0 ~ +7.5                                     | V                  |
| Logical input voltage | $V_{IN}$   | -0.5 ~ 5.5                                     | V                  |
| OUT voltage           | $BV_{OUT}$ | 9                                              | V                  |
| Operating temperature | $T_{OPT}$  | -30 ~ +85                                      | $^{\circ}\text{C}$ |
| Storage temperature   | $T_{STG}$  | -40 ~ +90                                      | $^{\circ}\text{C}$ |
| Soldering Condition   | Tsol       | Reflow soldering: 260 $^{\circ}\text{C}$ , 10s |                    |
|                       |            | Hand soldering: 300 $^{\circ}\text{C}$ , 3s    |                    |

**LED Characteristics** ( $T_a = 25^{\circ}\text{C}$ , @12mA)

| Parameter          | Symbol         | Color | Min.  | Typ. | Max | Unit | Test Condition |
|--------------------|----------------|-------|-------|------|-----|------|----------------|
| Luminous Intensity | IV             | White | -     | 300  | -   | mcd  | 12mA           |
| CIE1931Coordinate  | X              | White | 0.275 | -    | -   | -    | 12mA           |
|                    | Y              | White | 0.265 | -    | -   | -    | 12mA           |
| Color Temperature  | CCT            | 8200  | -     | -    | -   | K    | 12mA           |
| Viewing Angle      | 2 $\theta$ 1/2 | -     | -     | 120  | -   | deg  | 12mA           |

## Bin Range of CCT



| Bin Code | CIE-X  | CIE-Y  | Bin Code | CIE-X  | CIE-Y  | Bin Code | CIE-X  | CIE-Y  | Bin Code | CIE-X  | CIE-Y  |
|----------|--------|--------|----------|--------|--------|----------|--------|--------|----------|--------|--------|
| AA       | 0.22   | 0.191  | AB       | 0.226  | 0.1913 | AC       | 0.2313 | 0.1911 | AD       | 0.2369 | 0.1915 |
|          | 0.226  | 0.1913 |          | 0.2313 | 0.1911 |          | 0.2369 | 0.1915 |          | 0.2425 | 0.1919 |
|          | 0.2355 | 0.2102 |          | 0.2405 | 0.2089 |          | 0.2457 | 0.208  |          | 0.2509 | 0.2071 |
|          | 0.23   | 0.211  |          | 0.2355 | 0.2102 |          | 0.2405 | 0.2089 |          | 0.2457 | 0.208  |
| AE       | 0.2425 | 0.1919 | AF       | 0.2300 | 0.2110 | AG       | 0.2355 | 0.2102 | AH       | 0.2405 | 0.2089 |
|          | 0.2480 | 0.1920 |          | 0.2355 | 0.2102 |          | 0.2405 | 0.2089 |          | 0.2457 | 0.2080 |
|          | 0.2560 | 0.2060 |          | 0.2450 | 0.2291 |          | 0.2497 | 0.2267 |          | 0.2545 | 0.2245 |
|          | 0.2509 | 0.2071 |          | 0.2400 | 0.2310 |          | 0.2450 | 0.2291 |          | 0.2497 | 0.2267 |
| AI       | 0.2457 | 0.2080 | AJ       | 0.2509 | 0.2071 | Z1       | 0.2400 | 0.2310 | A1       | 0.2497 | 0.2267 |
|          | 0.2509 | 0.2071 |          | 0.2560 | 0.2060 |          | 0.2500 | 0.2510 |          | 0.2450 | 0.2290 |
|          | 0.2593 | 0.2223 |          | 0.2640 | 0.2200 |          | 0.2545 | 0.2480 |          | 0.2545 | 0.2480 |
|          | 0.2545 | 0.2245 |          | 0.2593 | 0.2223 |          | 0.2450 | 0.2291 |          | 0.2589 | 0.2445 |
| A2       | 0.2497 | 0.2267 | A3       | 0.2593 | 0.2223 | A4       | 0.2640 | 0.2200 | Z2       | 0.2500 | 0.2510 |
|          | 0.2589 | 0.2445 |          | 0.2677 | 0.2375 |          | 0.2593 | 0.2223 |          | 0.2600 | 0.2710 |
|          | 0.2633 | 0.2410 |          | 0.2633 | 0.2410 |          | 0.2677 | 0.2375 |          | 0.2640 | 0.2670 |
|          | 0.2545 | 0.2245 |          | 0.2545 | 0.2245 |          | 0.2720 | 0.2340 |          | 0.2545 | 0.2480 |

|    |        |        |    |        |        |    |        |        |    |        |        |
|----|--------|--------|----|--------|--------|----|--------|--------|----|--------|--------|
| A5 | 0.2545 | 0.2480 | A6 | 0.2589 | 0.2445 | A7 | 0.2677 | 0.2375 | A8 | 0.2720 | 0.2340 |
|    | 0.2589 | 0.2445 |    | 0.2633 | 0.2410 |    | 0.2633 | 0.2410 |    | 0.2677 | 0.2375 |
|    | 0.2680 | 0.2623 |    | 0.2720 | 0.2575 |    | 0.2720 | 0.2575 |    | 0.2760 | 0.2528 |
|    | 0.2640 | 0.2670 |    | 0.2680 | 0.2623 |    | 0.2760 | 0.2528 |    | 0.2800 | 0.2480 |
| Z3 | 0.2600 | 0.2710 | B1 | 0.2640 | 0.2670 | B2 | 0.2720 | 0.2575 | B3 | 0.2720 | 0.2575 |
|    | 0.2700 | 0.2910 |    | 0.2680 | 0.2623 |    | 0.2680 | 0.2623 |    | 0.2760 | 0.2528 |
|    | 0.2735 | 0.2860 |    | 0.2772 | 0.2800 |    | 0.2772 | 0.2800 |    | 0.2844 | 0.2680 |
|    | 0.2640 | 0.2670 |    | 0.2735 | 0.2860 |    | 0.2808 | 0.2740 |    | 0.2808 | 0.2740 |
| B4 | 0.2760 | 0.2528 | Z4 | 0.27   | 0.291  | B5 | 0.2735 | 0.2860 | B6 | 0.2772 | 0.2800 |
|    | 0.2844 | 0.2680 |    | 0.28   | 0.311  |    | 0.2772 | 0.2800 |    | 0.2808 | 0.2740 |
|    | 0.2880 | 0.2620 |    | 0.283  | 0.305  |    | 0.2863 | 0.2978 |    | 0.2895 | 0.2905 |
|    | 0.2800 | 0.2480 |    | 0.2735 | 0.286  |    | 0.2830 | 0.3050 |    | 0.2863 | 0.2978 |
| B7 | 0.2808 | 0.2740 | B8 | 0.2844 | 0.2680 | Z5 | 0.2800 | 0.3110 | C1 | 0.2830 | 0.3050 |
|    | 0.2844 | 0.2680 |    | 0.2928 | 0.2833 |    | 0.2871 | 0.3210 |    | 0.2863 | 0.2978 |
|    | 0.2928 | 0.2833 |    | 0.2960 | 0.2760 |    | 0.2895 | 0.3134 |    | 0.2923 | 0.3052 |
|    | 0.2895 | 0.2905 |    | 0.2880 | 0.2620 |    | 0.2830 | 0.3050 |    | 0.2895 | 0.3134 |
| C2 | 0.2863 | 0.2978 | C3 | 0.2895 | 0.2905 | C4 | 0.2928 | 0.2833 |    |        |        |
|    | 0.2895 | 0.2905 |    | 0.2928 | 0.2833 |    | 0.2977 | 0.2891 |    |        |        |
|    | 0.2950 | 0.2970 |    | 0.2977 | 0.2891 |    | 0.3003 | 0.2812 |    |        |        |
|    | 0.2923 | 0.3052 |    | 0.2950 | 0.2970 |    | 0.2960 | 0.2760 |    |        |        |

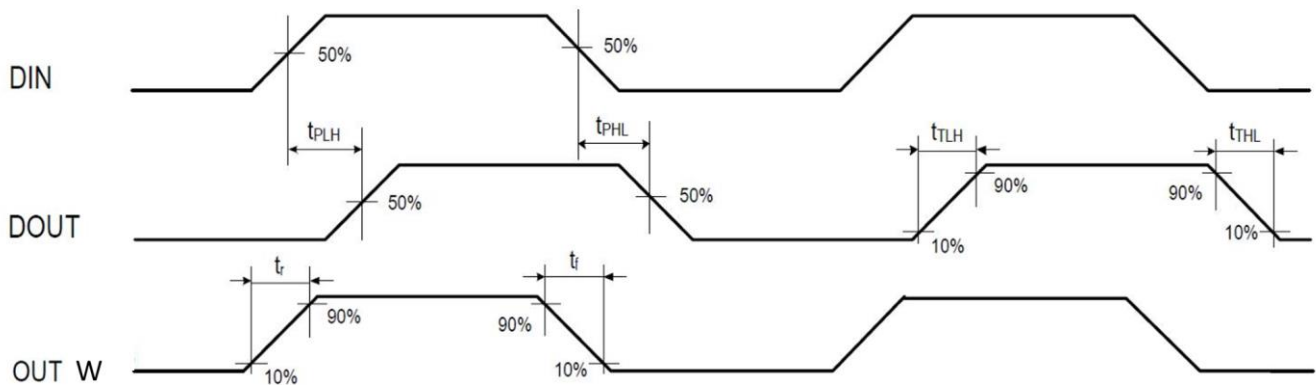
Notes: Tolerance of the CIE X,Y : +/-0.005

**Recommended Operating Ranges** (unless otherwise specified,  $T_a = 25\text{ }^{\circ}\text{C}$ )

| Parameter                | Symbol    | Min.               | Typ. | Max                | Unit | Test conditions           |
|--------------------------|-----------|--------------------|------|--------------------|------|---------------------------|
| Input voltage            | $V_{DD}$  | -                  | 5.0  | -                  | V    | -                         |
| High level input voltage | $V_{IH}$  | $0.7 \cdot V_{DD}$ | -    |                    | V    | DIN High level            |
| Low level input voltage  | $V_{IL}$  | -                  | -    | $0.3 \cdot V_{DD}$ | V    | DIN Low level             |
| DOUT sourcing current    | $I_{DO}$  |                    | 15   |                    | mA   | $V_{DD}=5V$ , $V_{DO}=1V$ |
| DOUT sink current        | $I_{DO}$  |                    | 30   |                    | mA   | $V_{DD}=5V$ , $V_{DO}=1V$ |
| The frequency of PWM     | $F_{PWM}$ | -                  | 4    | -                  | KHZ  | -                         |
| Static power consumption | $I_{DD}$  | 0.4                | 0.65 | 0.9                | mA   | Iout" OFF"                |

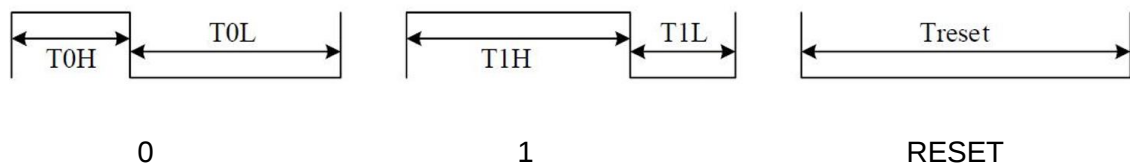
**Switching Characteristics** (unless otherwise specified,  $T_a=25\text{ }^{\circ}\text{C}$ ,  $V_{DD}=4.5\text{--}7.5\text{V}$ )

| Parameter                      | Symbol    | Min. | Typ. | Max  | Unit | Test conditions                               |
|--------------------------------|-----------|------|------|------|------|-----------------------------------------------|
| DOUT transmission delay        | $t_{PZL}$ | -    | -    | 200  | ns   | DIN $\rightarrow$ DOUT                        |
| The speed of data transmission | $f_{DIN}$ | -    | 800  | 1100 | KHZ  |                                               |
| $I_{OUT}$ Rise/Drop Time       | $T_r$     | -    | 800  | 400  | ns   | $V_{ds}=1.5\text{V}$<br>$I_o = 12\text{mA}$ , |
|                                | $T_f$     | -    | -    | 400  | ns   |                                               |



## Timing Waveforms

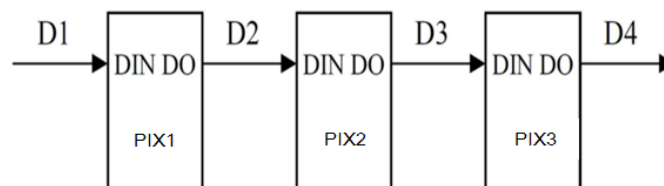
### 1. Input Code



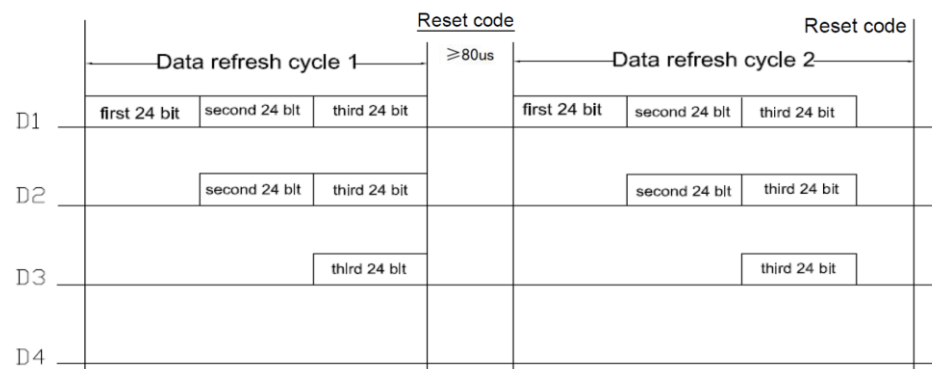
### 2. The data transmission time:

| Name | Description                | Min. | Typ.        | Max. | Unit    |
|------|----------------------------|------|-------------|------|---------|
| T0H  | 0 code, high level time    | -    | 0.3 $\mu$ s | -    | $\mu$ s |
| T0L  | 0 code, low level time     | -    | 0.6 $\mu$ s | -    | $\mu$ s |
| T1H  | 1 code, high level time    | -    | 0.6 $\mu$ s | -    | $\mu$ s |
| T1L  | 1 code, low level time     | -    | 0.3 $\mu$ s | -    | $\mu$ s |
| Trst | Reset code, low level time | 80   | -           | -    | $\mu$ s |

### 3. Connection Scheme

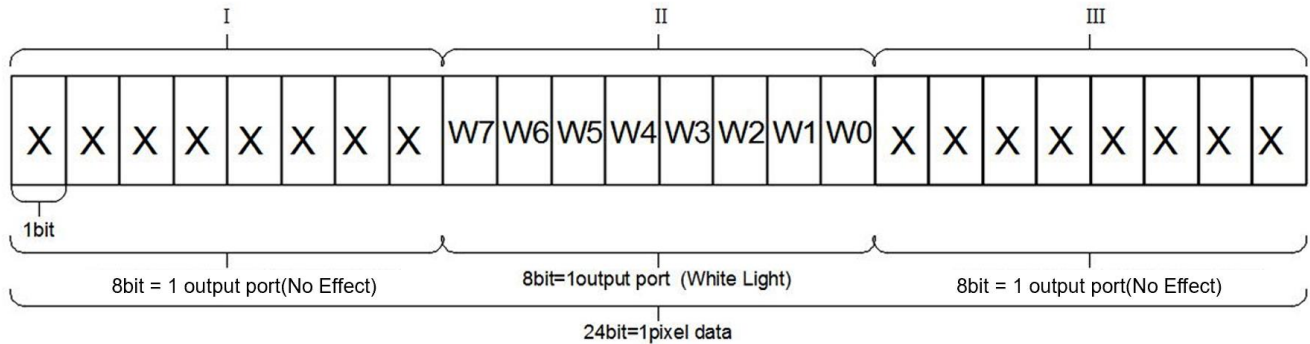


### 4. Data Transfer Format



Note: The data of D1 is send by MCU, and D2, D3, through IC internal reshaping amplification to transmit.

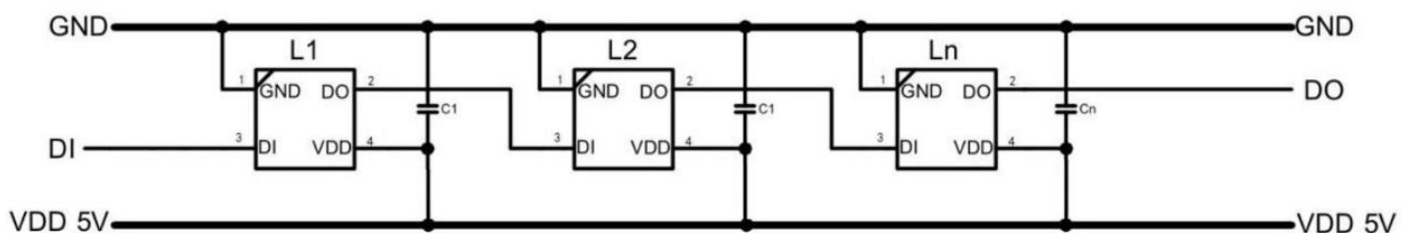
5. 8bit grayscale data structure: high-order bit first, send data in the order of W



The driver IC used in the LED utilizes single-wire communication protocol and uses return-to-zero (RZ) method to send signals. After the driver IC is powered on and resets, it receives data from the DIN terminal. After receiving enough data (24 bits), the DOUT port begins to forward next 24bits data to provide input data for the next LED. Before forwarding signal to the next LED, the DOUT port is always pulled at low level. At this time, the driver IC chip will retain the 24bits data received and will not receive new input data; once DIN receives “RESET signal”, the corresponding internal port for the white LED die will send out internal signals based on the received 8bit of 24bit data (middle 8 bit) to the white LED die - and the LED turns On. The LED internal signal PWM frequency is set at 4KHz and the data transmission speed is set at 800kHz.

\*Only when DIN receives input signal of “RESET signal”, the driver IC will begin to display the data received (LED On). The LED will then begin to receive new data-stream after the previous data-stream ends. After receiving the next first 24bit data, it will forward the next set of data through the DOUT port. The LED will maintain the original display output before receiving the “Reset Signal”. Only after receiving the low-level RESET code of  $\geq 80\mu s$  low, the driver IC will send the updated internal signal of the 8 bit of 24bit data (middle 8 bit) to the white LED for updated LED on.

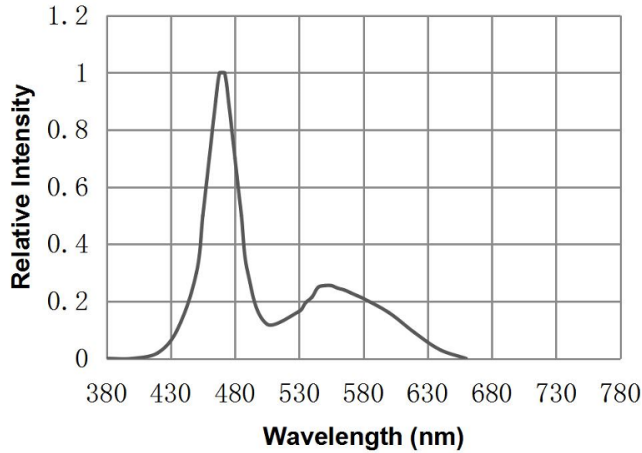
## Typical Application Circuit



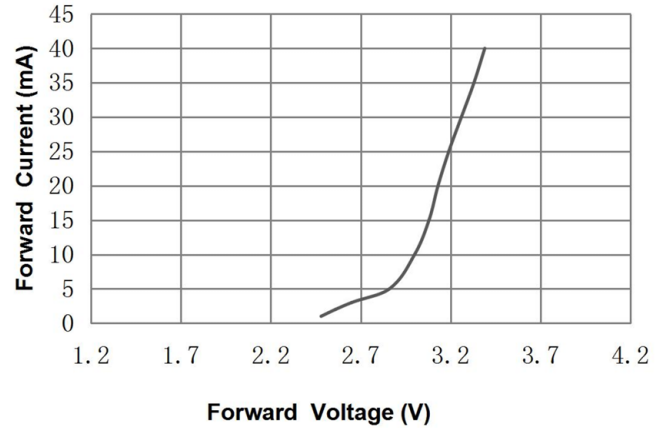
Note: C1 is the optional filter capacitor of LED VDD pin, the general value is 100nf.

## LED Performance Graph

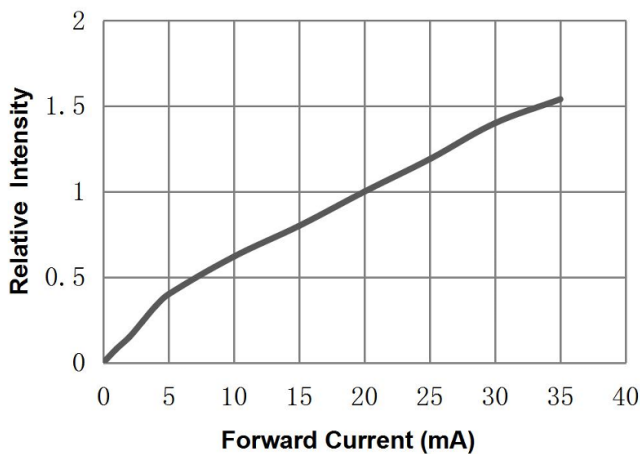
**Spectrum Distribution (Ta=25°C)**



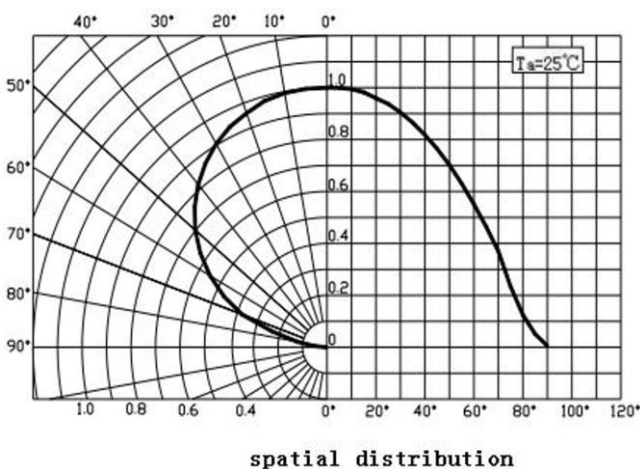
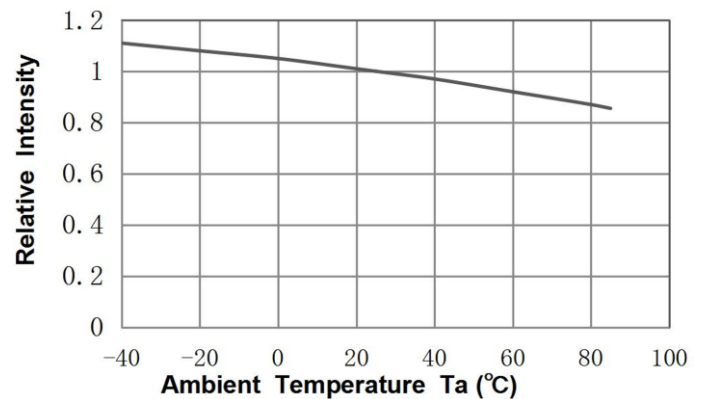
**Forward Current VS. Forward Voltage (Ta=25°C)**



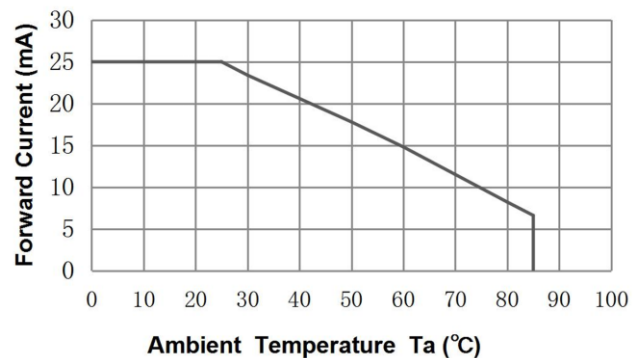
**Relative Intensity VS. Forward Current (Ta=25°C)**



**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-PIS63BTPW | White          | 300     | IN-PIS63BTPW          |

## Label Specifications

**Inolux**

CUSTOMER P/N:  
||||| ||||| || ||||| || ||

**INOLUX** P/N: QTY: PCS  
|||| | ||||| || | ||||| || |||||

LOT NO: QC  
|||| | ||||| || ||||| || | ||||| || |||||

IV BIN: COLOR BIN: VF:

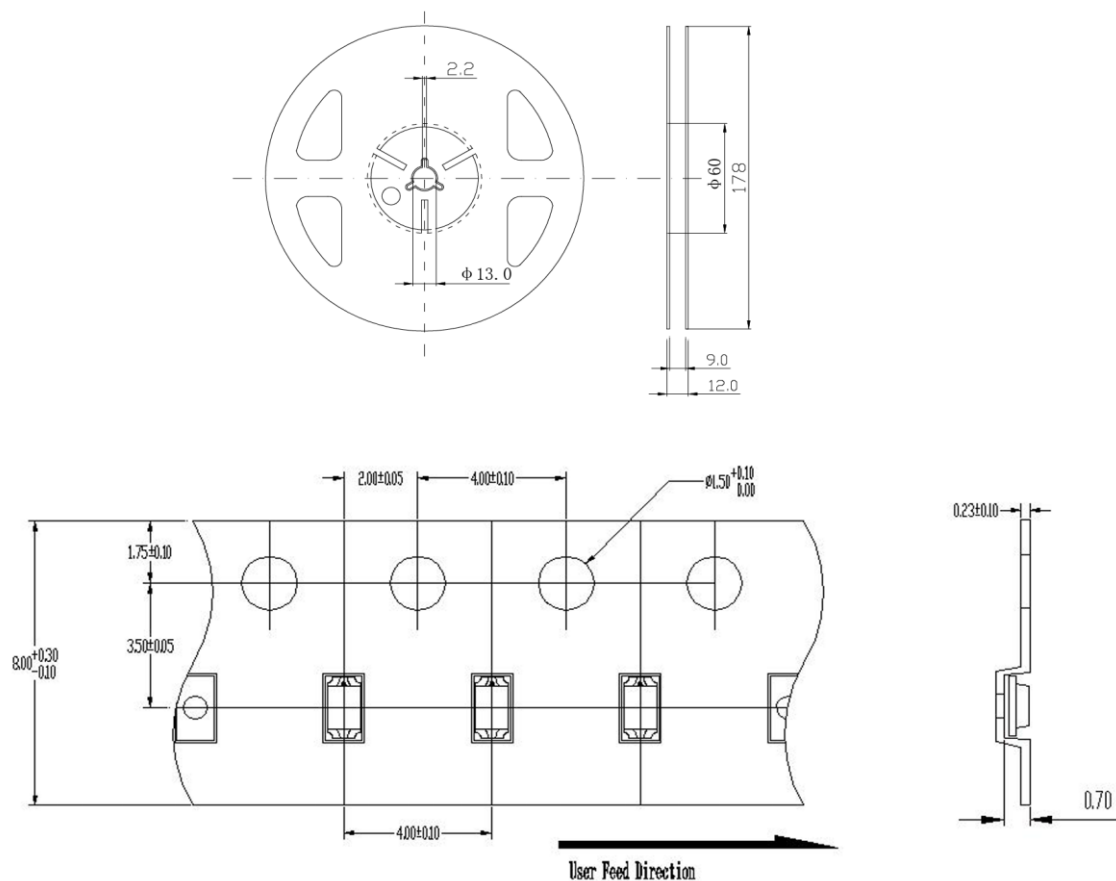
**Inolux P/N:**

|        |   |                                        |                                       |           |               |         |                                             |   |   |                      |   |   |   |
|--------|---|----------------------------------------|---------------------------------------|-----------|---------------|---------|---------------------------------------------|---|---|----------------------|---|---|---|
| I      | N | -                                      | PIS                                   | 63        | B             | T       | P                                           | W | - | X                    | X | X | X |
| Inolux | - | Product                                | Package                               | Variation | Orientation   | Current | Color                                       |   |   | Customized Stamp-off |   |   |   |
|        | - | PI- Single trace IC<br><br>S: PCB type | 63B = 1.6 x 0.8 x 0.55 mm<br>(4 pins) |           | T = Top Mount | P=12mA  | W (X:0.275<br>Y: 0.265)<br>CCT:8200K<br>min |   |   |                      |   |   |   |

**Lot No.:**

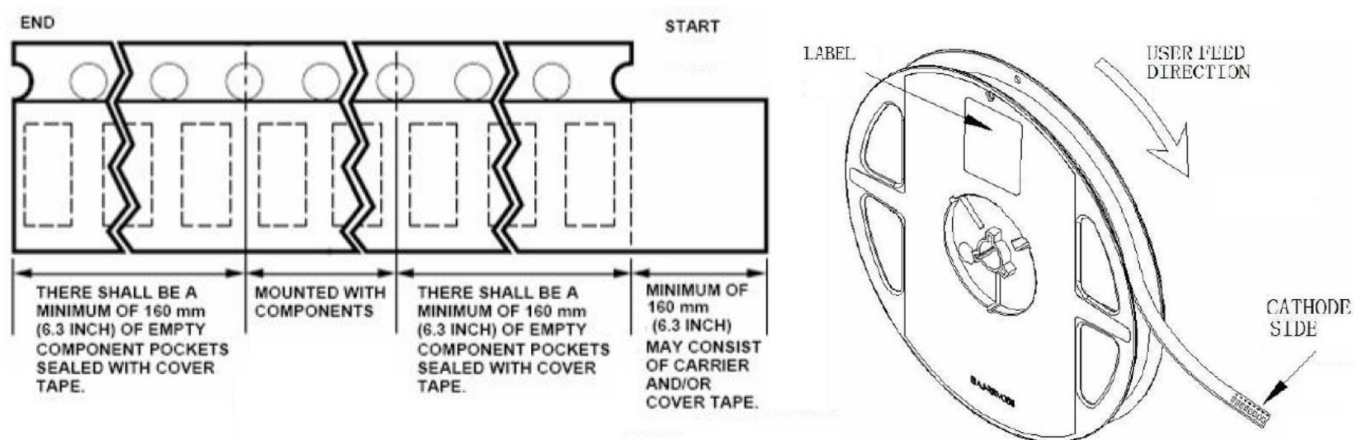
|                  |                          |   |   |   |       |      |        |
|------------------|--------------------------|---|---|---|-------|------|--------|
| Z                | 2                        | 0 | 1 | 7 | 01    | 24   | 001    |
| Internal Tracker | Year (2017, 2018, .....) | 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

## Packaging



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

- 4kpcs/reel



## Precautions

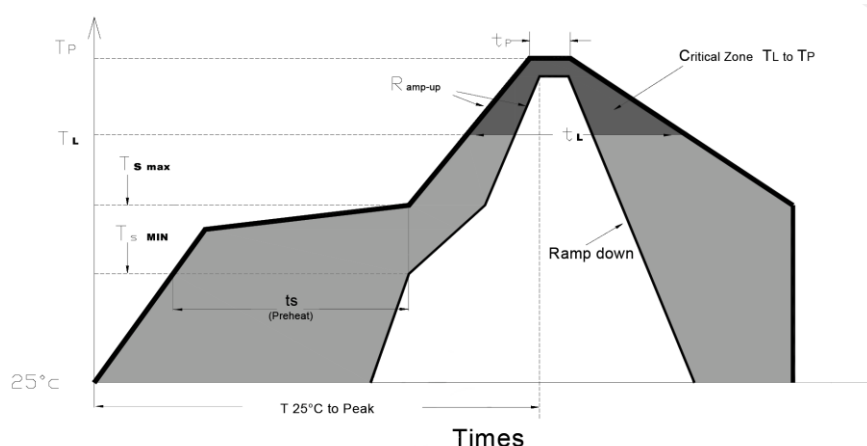
Please read the following notes before using the product:

### 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.  |

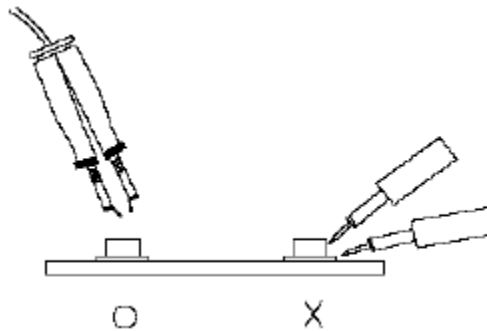
Note: Excessive soldering temperature and / or time might result in deformation of the LED lens or catastrophic failure of the LED.

### 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         | 03-15-2024    |
| Revise the drawing          | 7    | 1.1         | 05-06-2024    |
|                             |      |             |               |
|                             |      |             |               |
|                             |      |             |               |
|                             |      |             |               |
|                             |      |             |               |
|                             |      |             |               |
|                             |      |             |               |

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