# SMD ▪ B
# 19-C47/RSGHBHC-5V01/2T



## Features
- Package in 8mm tape on 7″ diameter reel.
- Compatible with automatic placement equipment.
- Compatible with infrared and vapor phase reflow solder process.
- Full-color type.
- 8 bit PWM control with 256 grayscales for each RGB chip.
- Pb-free
- The product itself will remain within RoHS compliant version.
- Compliance with EU REACH.
- Compliance Halogen Free .(Br <900 ppm ,Cl <900 ppm , Br+Cl < 1500 ppm)

## Description
- The 19-C47 SMD LED is much smaller than lead frame type components, thus enable smaller board size, higher packing density, reduced storage space and finally smaller equipment to be obtained.
- Besides, lightweight makes them ideal for miniature applications. etc.
- The 19-C47 with a 3-channels LED driver with 8 bit PWM linear control.

## Applications
- Indoor/Outdoor LED video display.
- Full color LED light strip.
- LED decorative lighting.
- Backlighting in dashboard and switch.
- Telecommunication: indicator and backlighting in telephone and fax.
- Flat backlight for LCD, switch and symbol.
- General use.

## Device Selection Guide

| Code | Chip Materials | Emitted Color | Resin Color |
|------|----------------|---------------|-------------|
| RS | AlGaInP | Brilliant Red | |
| GH | InGaN | Brilliant Green | Water Clear |
| BH | InGaN | Blue | |

## Absolute Maximum Ratings (Ta=25℃)

| Parameter | Symbol | Rating | Unit |
|-----------|--------|--------|------|
| Supply Voltage | $V_{DD}$ | +4.2~+5.5 | V |
| Input Voltage | $V_{IN}$ | -0.5~$V_{DD}$+0.5 | V |
| Electrostatic Discharge(HBM) | ESD | 2000 | V |
| Clock frequency | CLK | 800 | kbps |
| Operating Temperature | $T_{opr}$ | -20 ~ +70 | ℃ |
| Storage Temperature | Tstg | -40 ~ +90 | ℃ |
| Soldering Temperature | Tsol | Reflow Soldering : 260 ℃ for 10 sec. <br> Hand Soldering : 350 ℃ for 3 sec. | |

## Recommended Operating Condition (Ta=-20~70℃，Vss=0V)

| Parameter | Symbol | Condition | Min | Typ. | Max. | Unit |
|-----------|--------|-----------|-----|------|------|------|
| Supply Voltage | $V_{DD}$ | ----- | ----- | 5.0 | ----- | V |
| Input Voltage(High) | $V_{iH}$ | ----- | 3.3 | ----- | $V_{DD}$ | V |
| Input Voltage(Low) | $V_{IL}$ | ----- | 0 | ----- | 0.3$V_{DD}$ | V |

## DC Electrical Characteristics（Ta = 25℃，VDD = 5V，Vss = 0V）

| Characteristics | Symbol | Condition | Min | Typ. | Max. | Unit |
|-----------------|--------|-----------|-----|------|------|------|
| Input Voltage(High) | $V_{iH}$ | ----- | 3.3 | ----- | ----- | V |
| Input Voltage(Low) | $V_{IL}$ | ----- | ----- | ----- | 0.3$V_{DD}$ | V |
| Current Dissipation | IDD | OUT$_{R/G/B}$ [7:0]= 8b'00000000 @ Latch time=2ms | ----- | 2.5 | ----- | |

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## Timing Wave Form
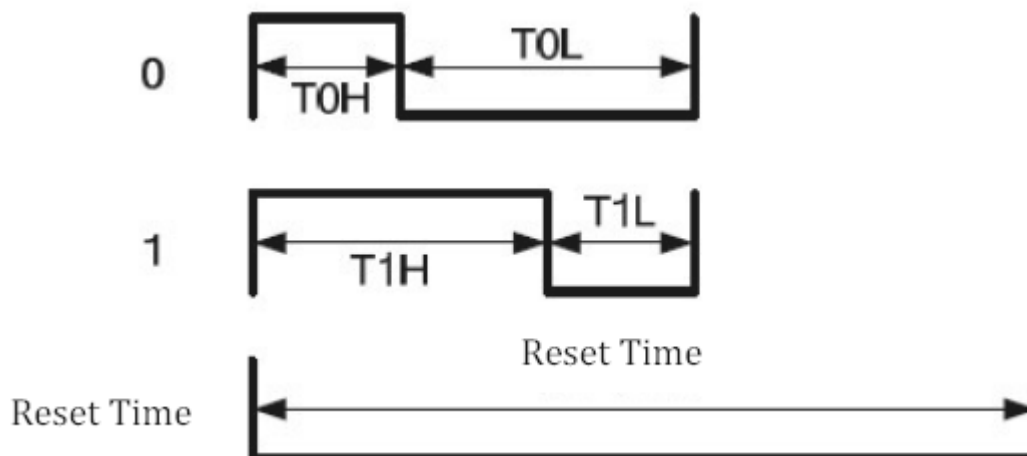


## High Speed mode

| Item | Description | Typical | Allowance |
|------|-------------|---------|-----------|
| $T_{0H}$ | 0 code・High-level time | 300ns | ±80ns |
| $T_{0L}$ | 0 code・Low-level time | 900ns | ±80ns |
| $T_{1H}$ | 1 code・High-level time | 900ns | ±80ns |
| $T_{1L}$ | 1 code・Low-level time | 300ns | ±80ns |
| RES | Reset time | >50us | |

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## Data Communication

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **D1** | 1st 24bit | 2nd 24bit | 3rd 24bit | Reset 50us | 1st 24bit | 2nd 24bit | 3rd 24bit |

| | | | | | |
|---|---|---|---|---|---|
| **D2** | 2nd 24bit | 3rd 24bit | Reset 50us | 2nd 24bit | 3rd 24bit |

| | | | |
|---|---|---|---|
| **D3** | 3rd 24bit | Reset 50us | 3rd 24bit |
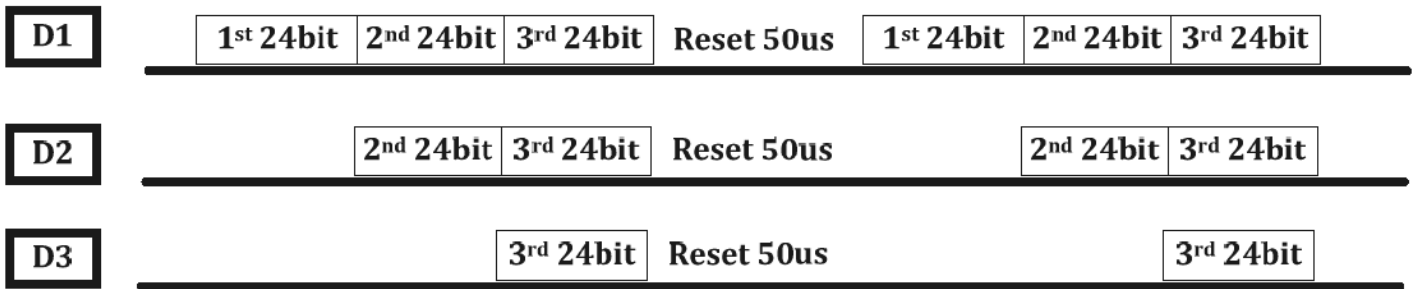
## Single Data in 24bit for RGB

| OUTR[7] | OUTR[6] | OUTR[5] | OUTR[4] | OUTR[3] | OUTR[2] | OUTR[1] | OUTR[0] | OUTG[7] | OUTG[6] | OUTG[5] |
|---|---|---|---|---|---|---|---|---|---|---|

| OUTG[4] | OUTG[3] | OUTG[2] | OUTG[1] | OUTG[0] | OUTB[7] | OUTB[6] | OUTB[5] | OUTB[4] | OUTB[3] | OUTB[2] |
|---|---|---|---|---|---|---|---|---|---|---|

| OUTB[1] | OUTB[0] |
|---|---|
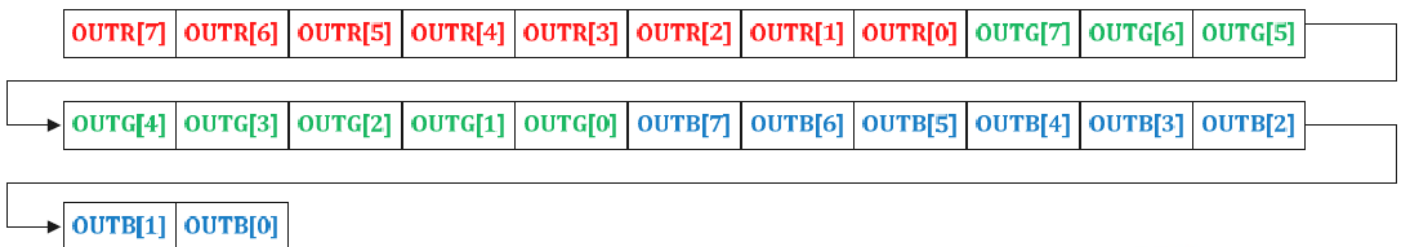
## Time Interval between 24 bits signal

Latch time — 1st 24bits — >1.2us~<3.6us — 2nd 24bits — >1.2us~<3.6us — 3rd 24bits — Latch time

## Cascading connection

VDD

MCU or Controller — RC Filter — R1 — 19-C47 (DIN, DOUT, GND, VDD) — 0.1uF — 19-C47 (DIN, DOUT, GND, VDD) — 0.1uF — 19-C47 (DIN, DOUT, GND, VDD) — 0.1uF

GND
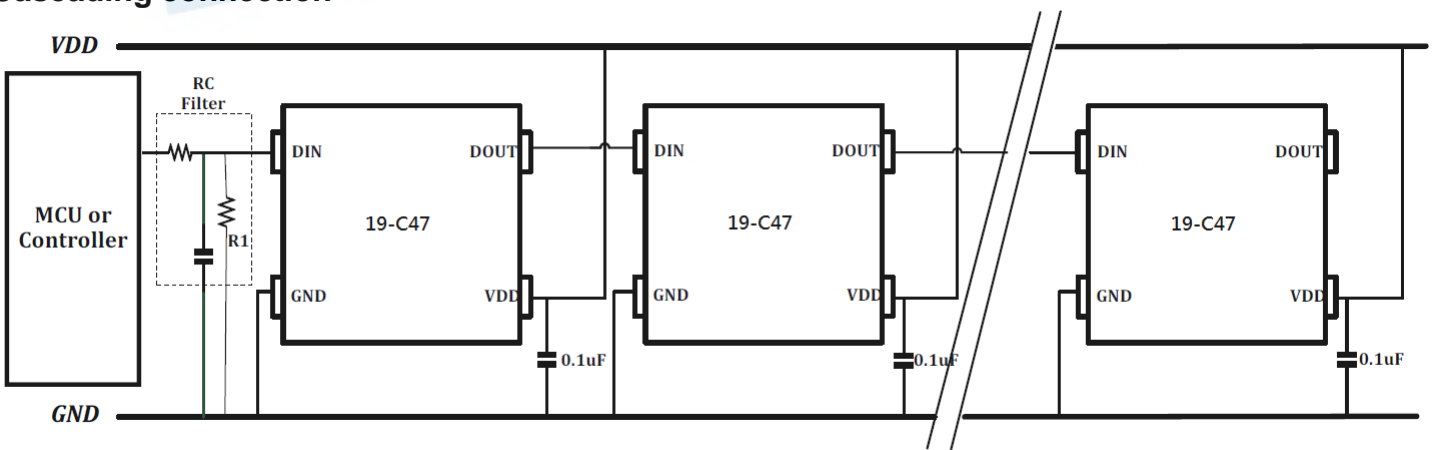
Note1: RC Filter and R1 must be added or reserved on the board for better waveform of signals in different applications.
   The suggested value of R1 is 10K ~100K . The value is subject to the practical system environment.
Note2: The by-pass capacitor of VDD pin is necessary to be added on the board for the stability of chip operation.
   The suggested value of capacitor is 0.1uF.
Note3: More note of layout and control, please ask for document.

## Electro-Optical Characteristics (Ta=25℃)

| Parameter | Symbol | Code | Min. | Typ. | Max. | Unit | Condition |
|---|---|---|---|---|---|---|---|
| Luminous Intensity | Iv | RS | 28.5 | 70 | 180 | mcd | |
| | | GH | 140 | 180 | 360 | | |
| | | BH | 28.5 | 40 | 72.0 | | |
| Viewing Angle | $2\theta_{1/2}$ | | ----- | 120 | ----- | Deg | |
| Peak Wavelength | $\lambda p$ | RS | ----- | 632 | ----- | nm | $I_F=5mA$ |
| | | GH | ----- | 518 | ----- | | |
| | | BH | ----- | 468 | ----- | | |
| Dominant Wavelength | $\lambda d$ | RS | 617.5 | ----- | 629.5 | nm | |
| | | GH | 525 | ----- | 540 | | |
| | | BH | 465 | ----- | 475 | | |
| Spectrum Radiation Bandwidth | $\triangle \lambda$ | RS | ----- | 20 | ----- | nm | |
| | | GH | ----- | 35 | ----- | | |
| | | BH | ----- | 25 | ----- | | |

Note:
1. Tolerance of Luminous Intensity: ±11%
2. Tolerance of Dominant Wavelength: ±1nm

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## RS
## Bin Range of Luminous Intensity

| Bin Code | Min. | Max. | Unit | Condition |
|----------|------|------|------|-----------|
| N | 28.5 | 45 | | |
| P | 45 | 72 | | |
| Q | 72 | 112 | mcd | I$_F$=5mA |
| R | 112 | 180 | | |

## GH
## Bin Range of Luminous Intensity

| Bin Code | Min. | Max. | Unit | Condition |
|----------|------|------|------|-----------|
| R2 | 140 | 180 | | |
| S1 | 180 | 225 | | |
| S2 | 225 | 285 | mcd | I$_F$=5mA |
| T1 | 285 | 360 | | |

## BH
## Bin Range of Luminous Intensity

| Bin Code | Min. | Max. | Unit | Condition |
|----------|------|------|------|-----------|
| N | 28.5 | 45 | mcd | I$_F$=5mA |
| P | 45 | 72 | | |

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Ver.:5    Release Date:10/29/2019    共核准.Approved(王英俊)
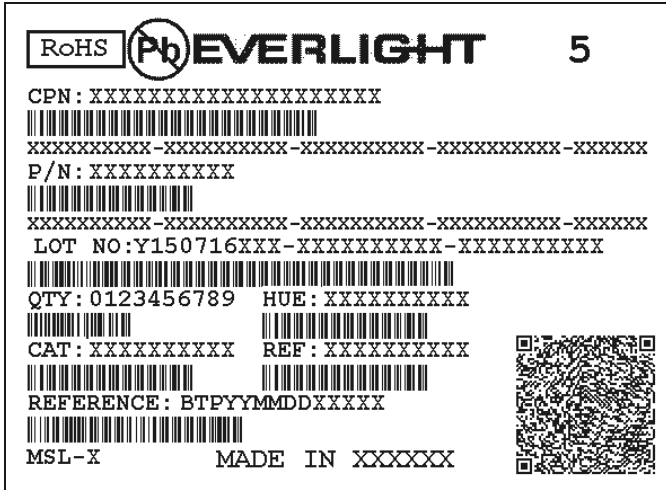
## Package Dimension



1:DOUT
2:AVDD
3:DIN
4:GND
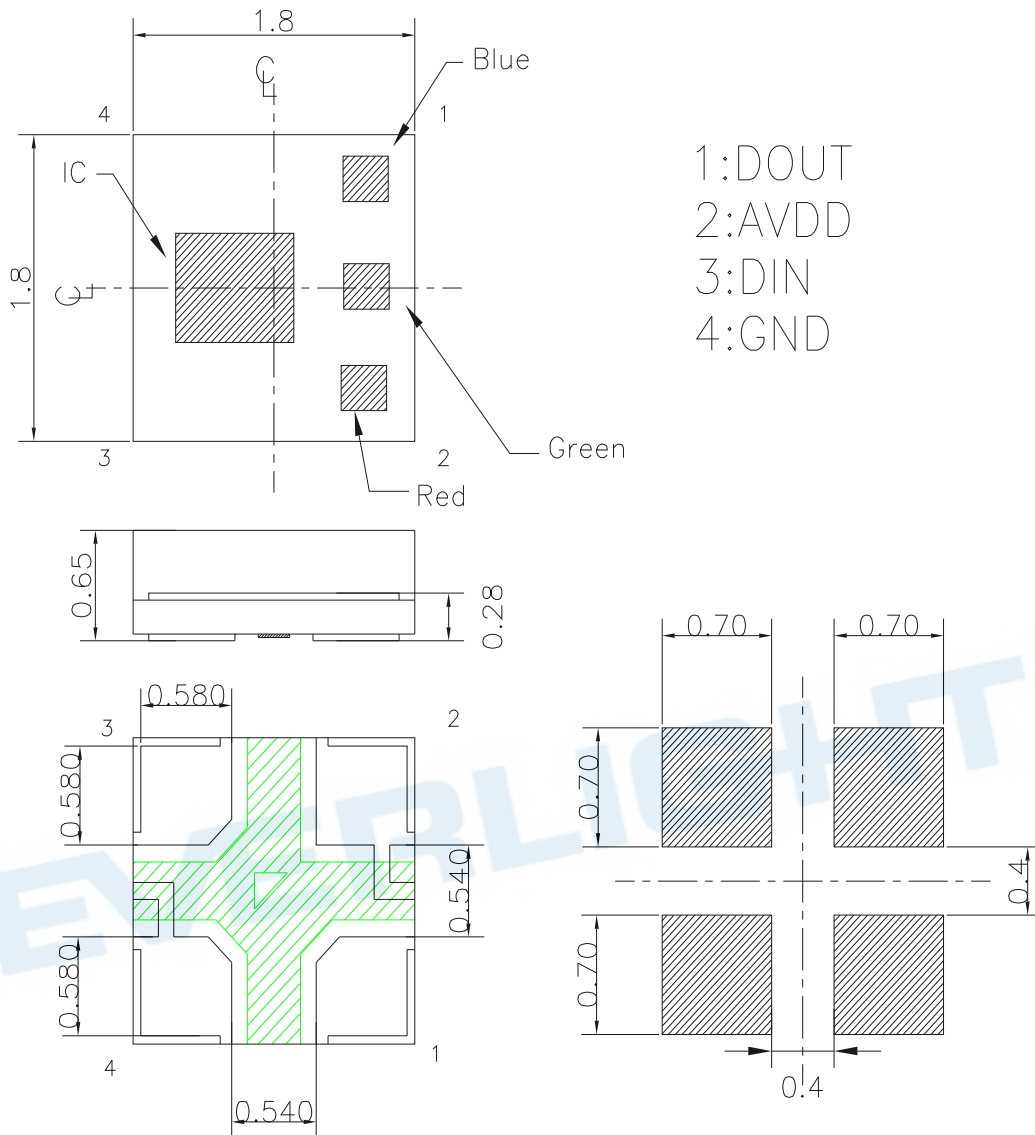
Suggested pad dimension is just for reference only.
Please modify the pad dimension based on individual need.

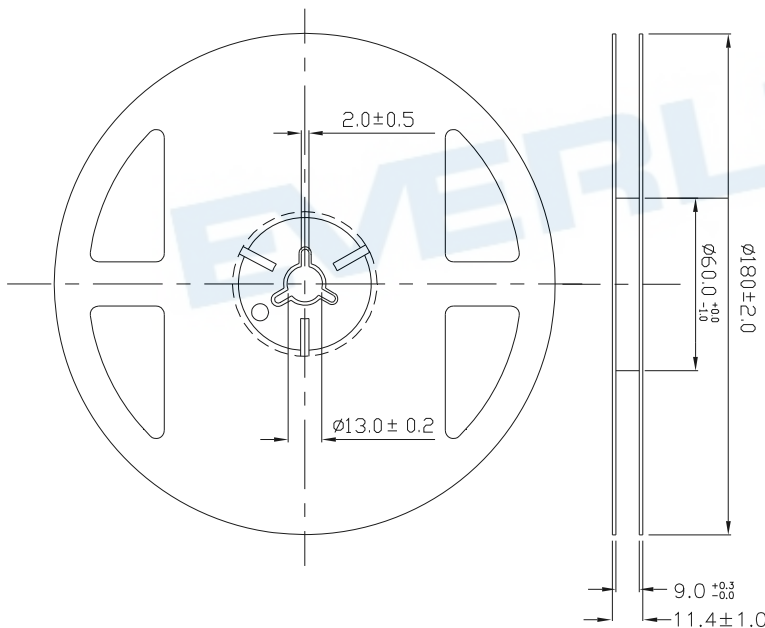Note: Tolerances unless mentioned ±0.1mm. Unit = mm

## PIN Function

| NO. | Symbol | PIN | Function description |
|-----|--------|-----|----------------------|
| 1 | DOUT | DATA OUT | Control data signal output |
| 2 | VDD | POWER VOLTAGE | Power Voltage, connect to "+5V" |
| 3 | DIN | DATA IN | Control data signal input |
| 4 | GND | GROUND | Data & Power Grounding |

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## Moisture Resistant Packing Materials
## Label Explanation

```
┌─────────────────────────────────────────┐
│ ┌──────┐  ╔═╗                         5  │
│ │ RoHS │ (Pb) EVERLIGHT                  │
│ └──────┘                                 │
│ CPN:XXXXXXXXXXXXXXXXXXXX                  │
│ ▌║▌║▌║▌║▌║▌║▌║▌║▌║▌║                       │
│ XXXXXXXXX-XXXXXXXXX-XXXXXXXXX-XXXXXXXXX-XXXXX │
│ P/N:XXXXXXXXXX                           │
│ ▌║▌║▌║▌║▌║▌║                              │
│ XXXXXXXXX-XXXXXXXXX-XXXXXXXXX-XXXXXXXXX-XXXXX │
│ LOT NO:Y150716XXX-XXXXXXXXXX-XXXXXXXXXX   │
│ ▌║▌║▌║▌║▌║▌║▌║▌║▌║▌║                       │
│ QTY:0123456789  HUE:XXXXXXXXXX    ▣▣▣    │
│ ▌║▌║▌║▌║▌║▌║     ▌║▌║▌║▌║▌║        ▣▣▣    │
│ CAT:XXXXXXXXXX  REF:XXXXXXXXXX    ▣▣▣    │
│ ▌║▌║▌║▌║▌║▌║     ▌║▌║▌║▌║▌║               │
│ REFERENCE:BTPYYMMDDXXXXX                  │
│ ▌║▌║▌║▌║▌║▌║▌║                            │
│ MSL-X        MADE IN XXXXXX               │
└─────────────────────────────────────────┘
```

- CPN: Customer's Product Number
- P/N: Product Number
- QTY: Packing Quantity
- CAT: Luminous Intensity Rank
- HUE: Chromaticity Coordinates & Dom. Wavelength Rank
- REF: Forward Voltage Rank
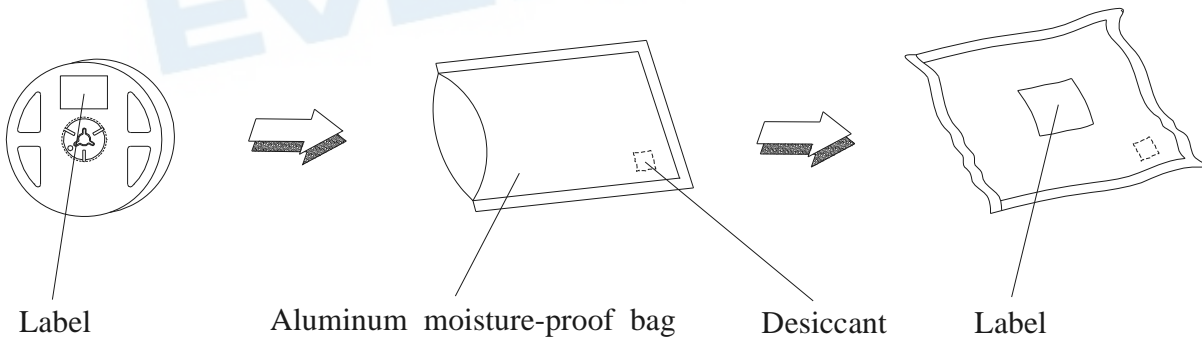- LOT No: Lot Number

## Reel Dimensions



Note: The tolerances unless mentioned is ±0.1mm ,Unit = mm

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## Carrier Tape Dimensions: Loaded quantity 2000 PCS per reel

Progressive direction

2.0   4.0   ∅1.5

1.75

3.50

8.0±0.3

0.2

0.85

1:DOUT
2:AVDD
3:DIN
4:GND

4   1
3   2

4.0
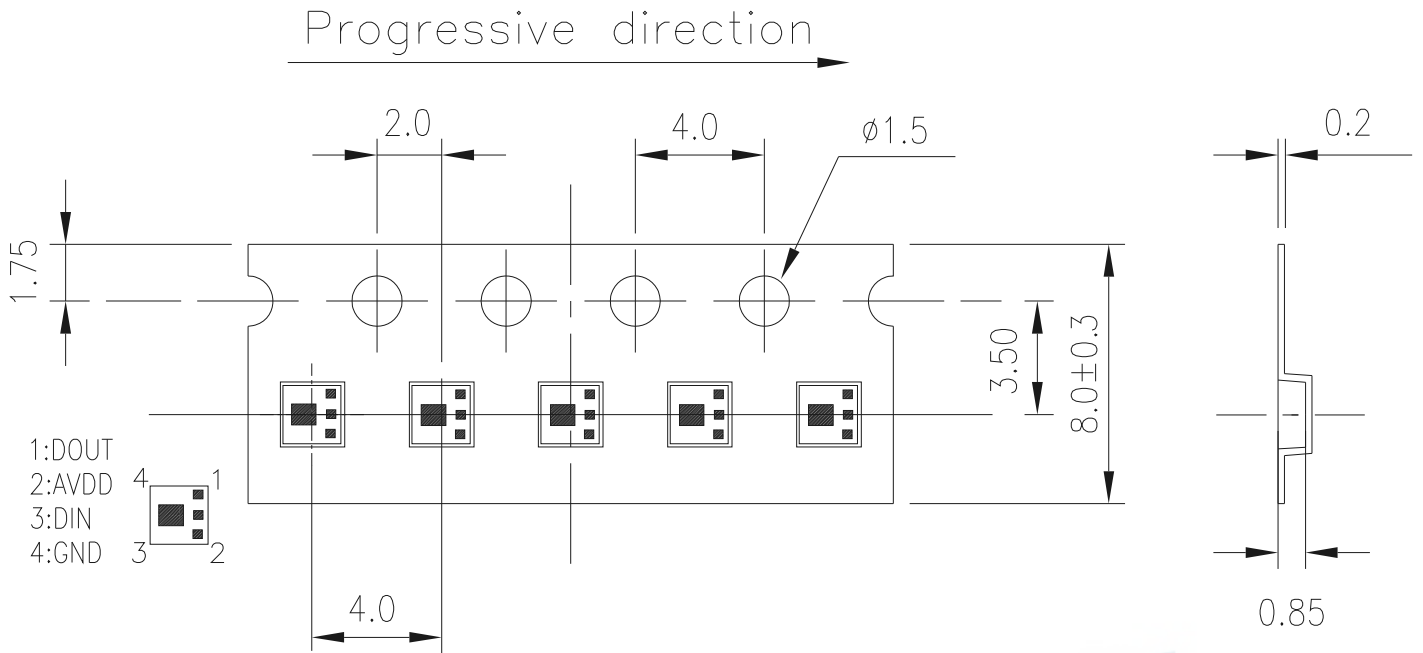
Note: The tolerances unless mentioned is ±0.1mm ,Unit = mm

## Moisture Resistant Packaging

Label          Aluminum moisture-proof bag          Desiccant          Label

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Ver..5   Release Date:10/29/2019   承認.Approved(許承/勞行)

## 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℃ or less and 90%RH or less.
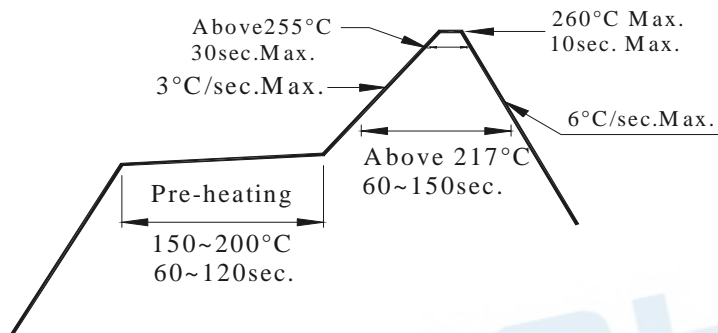  2.3 After opening the package: The LED's floor life is 168hrs under 30℃ or less and 60% RH or less.
If unused LEDs remain, it should be stored in moisture proof packages.
  2.4 If the moisture absorbent material (silica gel) has faded away or the LEDs have exceeded the storage time, baking treatment should be performed using the following conditions.
Baking treatment : 60±5℃ for 24 hours.

3. Soldering Condition
  3.1 Pb-free solder temperature profile

```
Above255°C          260°C Max.
30sec.Max.          10sec. Max.

3°C/sec.Max.                  6°C/sec.Max.

                    Above 217°C
                    60~150sec.
Pre-heating
150~200°C
60~120sec.
```

  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℃ 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.
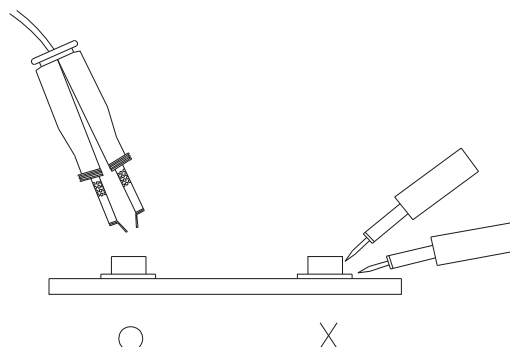
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## Application Restrictions

High reliability applications such as military/aerospace, automotive safety/security systems, and medical equipment may require different product. If you have any concerns, please contact Everlight before using this product in your application. This specification guarantees the quality and performance of the product as an individual component. Do not use this product beyond the specification described in this document.

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2. The product meets EVERLIGHT published specification for a period of twelve (12) months from date of shipment.
3. The graphs shown in this datasheet are representing typical data only and do not show guaranteed values.
4. When using this product, please observe the absolute maximum ratings and the instructions for using outlined in these specification sheets. EVERLIGHT assumes no responsibility for any damage resulting from the use of the product which does not comply with the absolute maximum ratings and the instructions included in these specification sheets.
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