

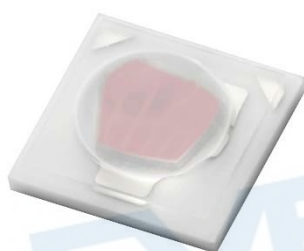
EVERLIGHT

DATASHEET

# Shwo(N) 2W(OR) Series

燦(N)

***“Shwo(N) [Shuo(N)] is the English translation for the Chinese word meaning Twinkle and is often used as a description of stars or other bright, celestial objects as seen from Earth. This word is a relevant description for this bright, compact Everlight LED package.”***



## Introduction

The Shwo(N) series is the latest version of our 3535 high-power surface-mount package, featuring an improved lens design for high brightness and photon emission.

The Shwo(N) series is one of the most efficient and competitive packages for horticultural applications.

## Features

- ◆ Small ceramic SMD package
- ◆ ESD protection up to 8KV
- ◆ Color : 660nm (Deep Red)
- ◆ Radiant Flux : Typ.1100mW @ 700mA
- ◆ Photosynthetic Photon Flux : 6.05 umole/s
- ◆ Moisture Sensitivity Level: 1
- ◆ Radiant Efficiency : 73%
- ◆ RoHS compliant
- ◆ 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)
- ◆ Compliance with EU REACH

## Applications

- ◆ Decorative and Entertainment Lighting
- ◆ Signal and Symbol Lighting
- ◆ Agriculture Lighting



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## Product Nomenclature

The product name is designated as below:

**ELSWN – ABCDE – FGHIJ – V1234**

Designation:

AB = min. luminous flux (lm) or radiation power (mW) performance

C = radiation pattern [1]

D = color [2]

E = proposed operating power [3]

F = reserved for future product offerings

G = Internal code

H = packaging type [4]

IJ = internal code

V = forward voltage bin

1234 = color bin or CCT bin

### Notes

1. Table of radiation patterns

| Symbol | Description |
|--------|-------------|
| 1      | Lambertian  |

2. Table of color offerings:

| Symbol | Color    | Dominant wavelength range |
|--------|----------|---------------------------|
| E      | Deep-Red | 650~670nm                 |

3. Table of proposed operating power:

| Symbol | Description |
|--------|-------------|
| 1      | 2W          |

4. Table of packaging types:

| Symbol | Description |
|--------|-------------|
| P      | Tape        |

## Absolute Maximum Ratings

| Parameter                    | Symbol             | Ratings    | Unit   |
|------------------------------|--------------------|------------|--------|
| Max. DC Forward Current (mA) | I <sub>F</sub>     | 700        | mA     |
| Max. Peak Pulse Current (mA) | I <sub>Pulse</sub> | 1250       | mA     |
| Max. ESD Resistance          | V <sub>B</sub>     | 8000       | V      |
| Thermal Resistance           | R <sub>th</sub>    | 8          | °C/W   |
| Max. Junction Temperature    | T <sub>J</sub>     | 125        | °C     |
| Operating Temperature        | T <sub>Opr</sub>   | -40 ~ +100 | °C     |
| Storage Temperature          | T <sub>Stg</sub>   | -40 ~ +100 | °C     |
| Max. Soldering Temperature   | T <sub>Sol</sub>   | 260        | °C     |
| Max. Allowable Reflow Cycles | n/a                | 2          | cycles |

### Notes:

1. Show(N) series Maximum forward current is 700mA (Thermal Pad=25°C)
2. Show(N) series Maximum peak pulse current is 1250mA (Duty cycle = 1/10@1KHZ)

## JEDEC Moisture Sensitivity

| Level | Floor Life   |                | Soak Requirements Standard |               |
|-------|--------------|----------------|----------------------------|---------------|
|       | Time (hours) | Conditions     | Time (hours)               | Conditions    |
| 1     | Unlimited    | ≤30°C / 85% RH | 168 (+5/-0)                | 85°C / 85% RH |

## Luminous Flux Characteristics for the Shwo(N) series

| Color    | Part Number   | 2W                                       |                    |
|----------|---------------|------------------------------------------|--------------------|
|          |               | Minimum Radiant Flux (mW) <sup>[1]</sup> | Drive Current (mA) |
| Deep-Red | ELSWN – R91EX | 900                                      | 700                |

### Notes:

1. Luminous flux measurement tolerance: ±10%.
2. The data of luminous flux measured at thermal pad=25°C
3. Typical luminous flux or light output performance is operated within the condition guided by this datasheet.

## PN of the Shwo(N) series: Color LEDs

The table below is a list of the binning options for the Everlight Shwo(N) 2W series Color LED. Standard Everlight color bins are listed according to wavelength and represent the standard primary colors of the spectrum. Typical view angle is 120°. These clearly listed binning options allow for proper design and implementation into lighting applications. The Order Codes below are currently available Color Shwo(N) LEDs. For Example: If you order product using P/N **ELSWN-R91E2-5EPNM-AD3D8(OR)**, you will be specifying:



| Color Variant | Radiation Pattern | Peak Wavelength (nm)                                     | Forward Voltage (V)              | Minimum Radiant Flux (mW) |
|---------------|-------------------|----------------------------------------------------------|----------------------------------|---------------------------|
| Deep Red      | Lambertian        | 650~655(D4)<br>655~660(D5)<br>660~665(D6)<br>665~670(D7) | 1.75~2.05 (U1)<br>2.05~2.35 (U2) | 900                       |

Color, Shwo(N) series LEDs at 700mA are listed below.

| Color     | Order Code of ELSWN         | Minimum Radiant Flux (mW) | Typ. Radiant Flux (mW) | Typ. Peak Wavelength (nm) | PPF (umole/s) | PPE (umole/J) | Typ. Forward Voltage(V) |
|-----------|-----------------------------|---------------------------|------------------------|---------------------------|---------------|---------------|-------------------------|
| Deep -Red | ELSWN-R91E2-5EPNM-AD3D8(OR) | 900                       | 1100                   | 660                       | 6.05          | 4.02          | 2.15                    |

## Product Binning

### Radiant flux Bins

| Group | Bin | Minimum Radiant Flux (mW) | Maximum Radiant Flux (mW) |
|-------|-----|---------------------------|---------------------------|
| R     | 9   | 900                       | 1000                      |
| S     | 1   | 1000                      | 1100                      |
|       | 2   | 1100                      | 1200                      |
|       | 3   | 1200                      | 1300                      |

## Forward Voltage Bins

| Group Name | Bins  |
|------------|-------|
| A          | U1+U2 |

| Group Name | Bin | Minimum Forward Voltage (V) | Maximum Forward Voltage (V) |
|------------|-----|-----------------------------|-----------------------------|
| A          | U1  | 1.75                        | 2.05                        |
|            | U2  | 2.05                        | 2.35                        |

**Notes:**

1. Forward voltage measurement tolerance:  $\pm 0.1V$ .
2. Forward voltage bins are defined at  $I_F=700mA$  operation.

## Color Bins

| Color           | Bin | Minimum Peak Wavelength (nm) | Maximum Peak Wavelength (nm) |
|-----------------|-----|------------------------------|------------------------------|
| D<br>(Deep-Red) | 4   | 650                          | 655                          |
|                 | 5   | 655                          | 660                          |
|                 | 6   | 660                          | 665                          |
|                 | 7   | 665                          | 670                          |

**Notes:**

1. Peak wavelength measurement tolerance:  $\pm 1.5nm$ .
2. Peak wavelength bins are defined at  $I_F=700mA$  operation.

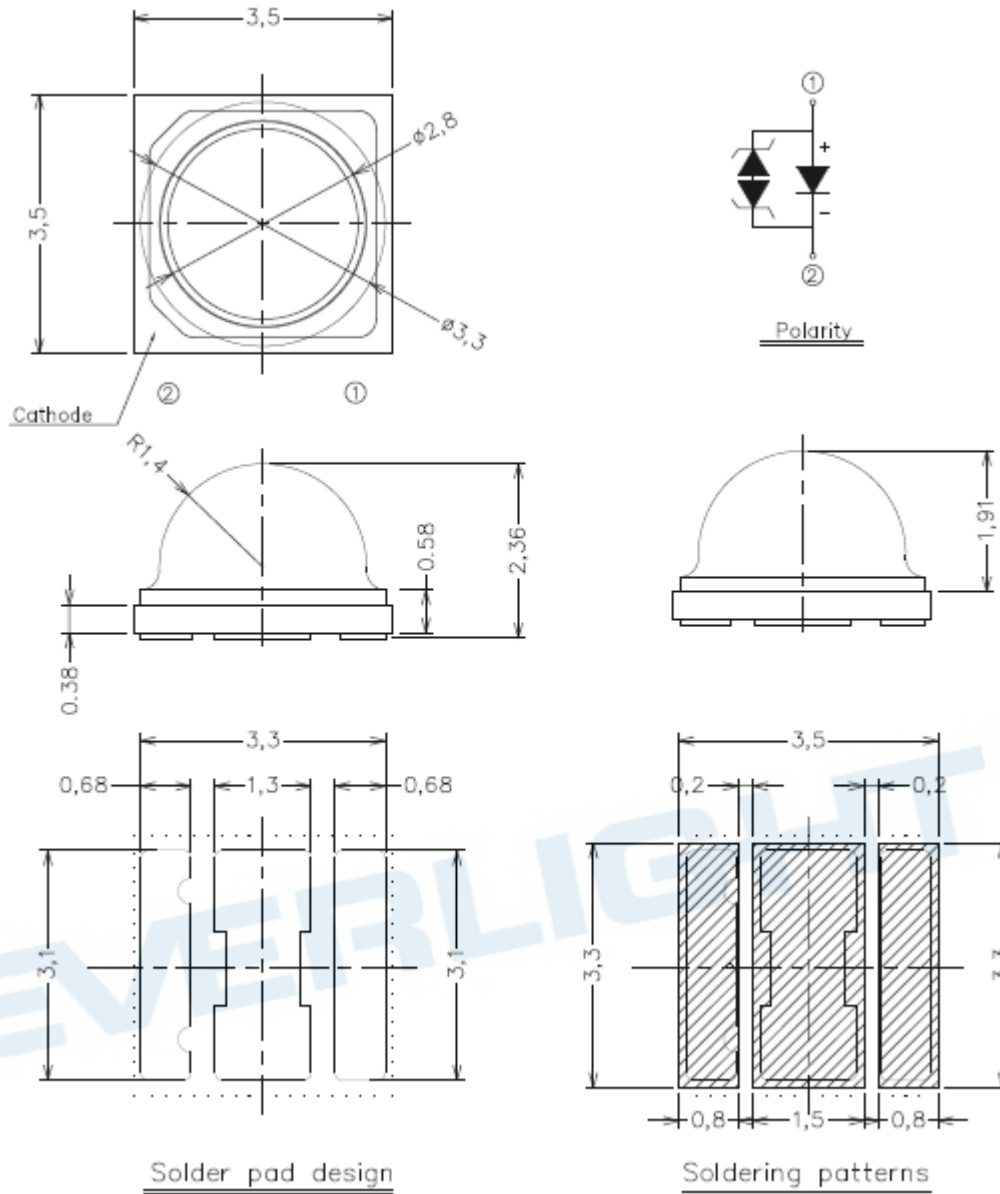
## Optical Characteristics

| Color    | Part Number   | Peak Wavelength $\lambda_P$ |      |      | Typical Temperature Coefficient of Peak Wavelength (nm/°C) $(\Delta\lambda_D/\Delta T_J)$ | Typical Viewing Angle (degrees) $2\theta_{1/2}$ |
|----------|---------------|-----------------------------|------|------|-------------------------------------------------------------------------------------------|-------------------------------------------------|
|          |               | Min.                        | Typ. | Max. |                                                                                           |                                                 |
| Deep-Red | ELSWN – XX1EX | 650                         | 660  | 670  | 0.08                                                                                      | 120                                             |

**Notes:**

1. The test tolerance of Everlight is  $\pm 1.5nm$  for peak wavelength,  $\pm 5\%$  for CCT.
2. Viewing angle is the width of half the light output intensity in all directions of  $180^\circ$ .

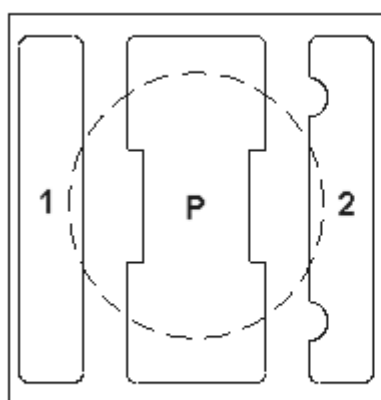
## Mechanical Dimension



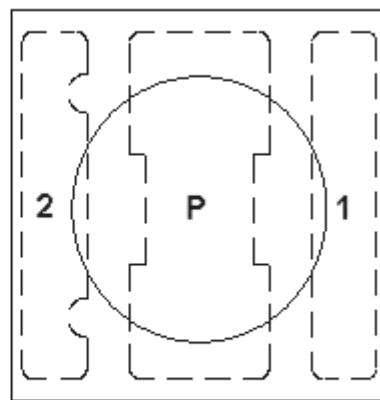
### Notes:

1. Dimensions are in millimeters.
2. Tolerances unless mentioned are  $\pm 0.15$ mm.
3. The thermal pad is electrically isolated from the Anode and Cathode contact pads.
4. Do not handle the device by the lens. Incorrect force applied to the lens may lead to the failure of devices.

## Pad Configuration



BOTTOM VIEW



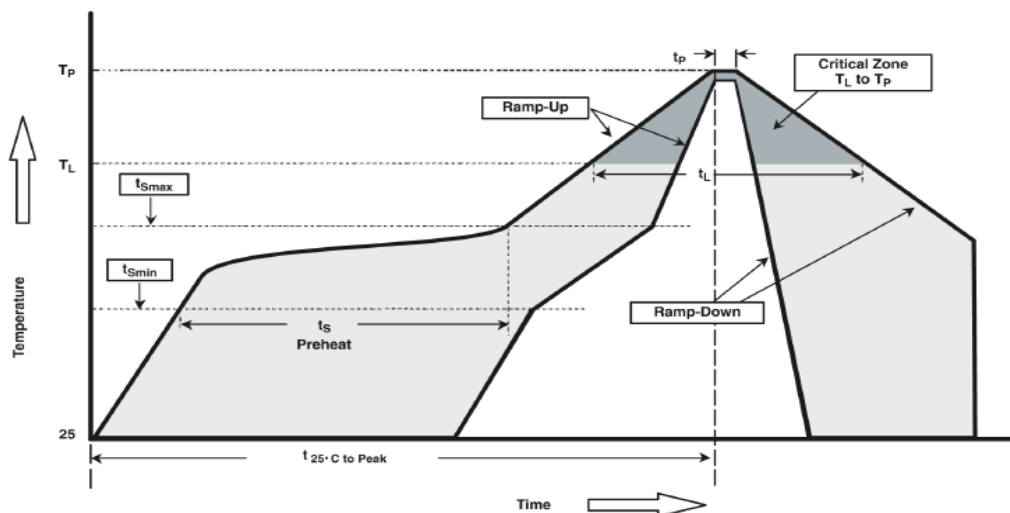
TOP VIEW

| PAD | FUNCTION    |
|-----|-------------|
| 1   | ANODE       |
| 2   | CATHODE     |
| P   | THERMAL PAD |

## Reflow Soldering Characteristics

### For Reflow Process

- Shwo(N) series are suitable for SMT processes.
- Curing of glue in oven must be according to standard operation flow processes.

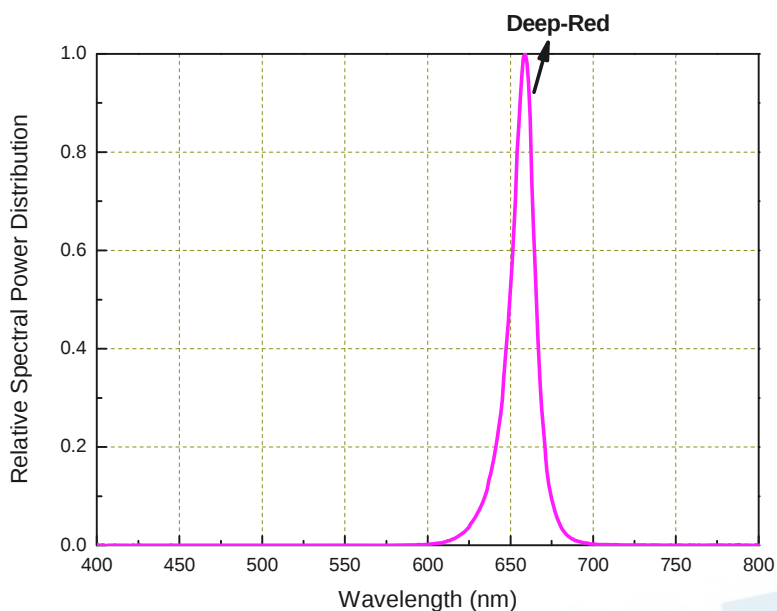


| Profile Feature                            | Pb-Free Assembly | Unit Einheit |
|--------------------------------------------|------------------|--------------|
| Average Ramp-up Rate<br>25 °C to 150 °C    | 2-3              | °C /sec      |
| Preheat Temperature Min.                   | 150              | sec          |
| Preheat Temperature Max.                   | 200              | sec          |
| Preheat Time                               | 60-120           | sec          |
| Time Maintained Above Temperature          | 217              | °C           |
| Time Maintained Above Time                 | 60-90            | sec          |
| Peak Temperature (max.)                    | 260              | °C           |
| Time within 5°C of Actual Peak temperature | 20-40            | sec          |
| Ramp-down Rate (max.)                      | 3-5              | °C /sec      |

- Reflow soldering should not be done more than twice.
- In soldering process, stress on the LEDs during heating should be avoided.
- After soldering, do not bend the circuit board

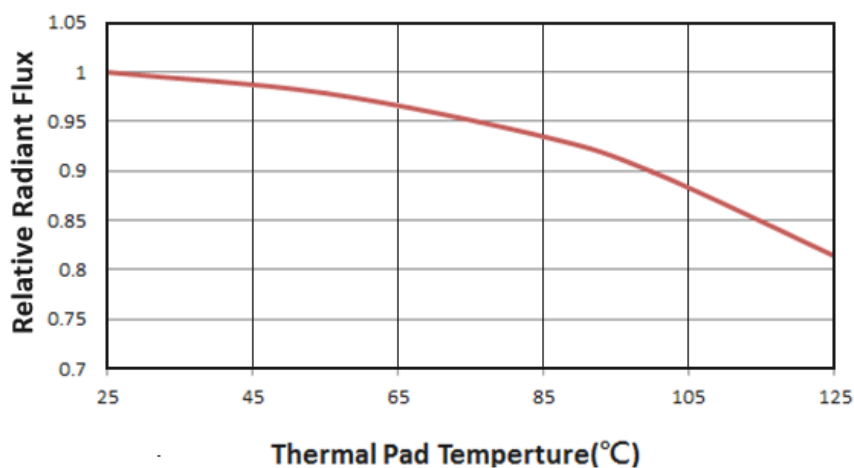
## Wavelength Characteristics

For Deep-Red @ Thermal Pad Temperature = 25°C



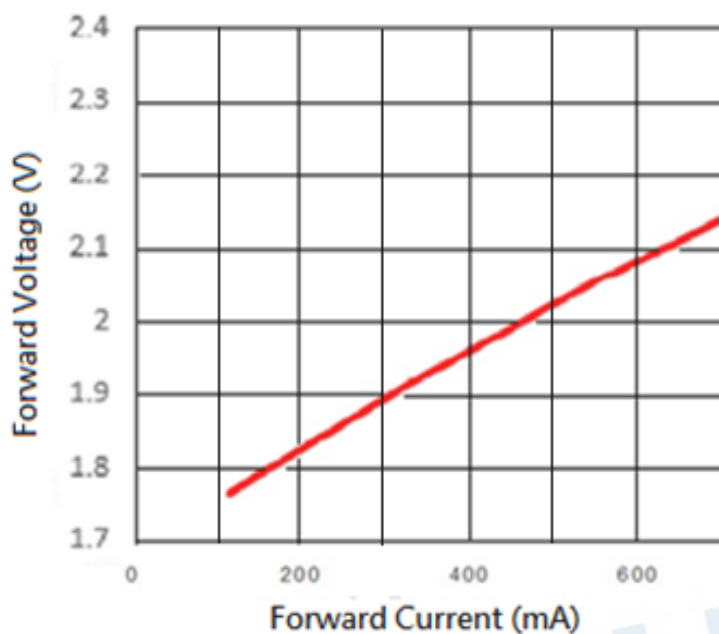
## Typical Light Output Characteristic V.S. Thermal Pad Temperature

Deep-Red for 700mA Drive Current



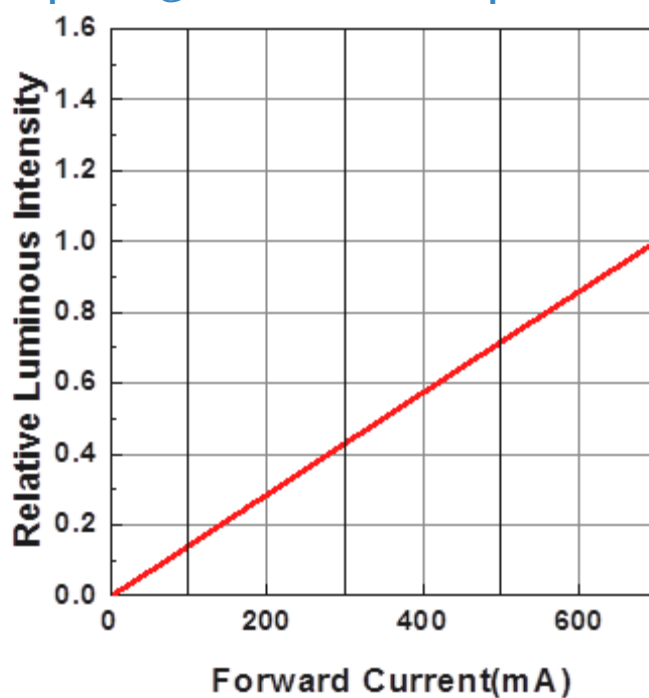
## Typical Electrical Characteristics

For Deep-Red @ Thermal Pad Temperature = 25°C



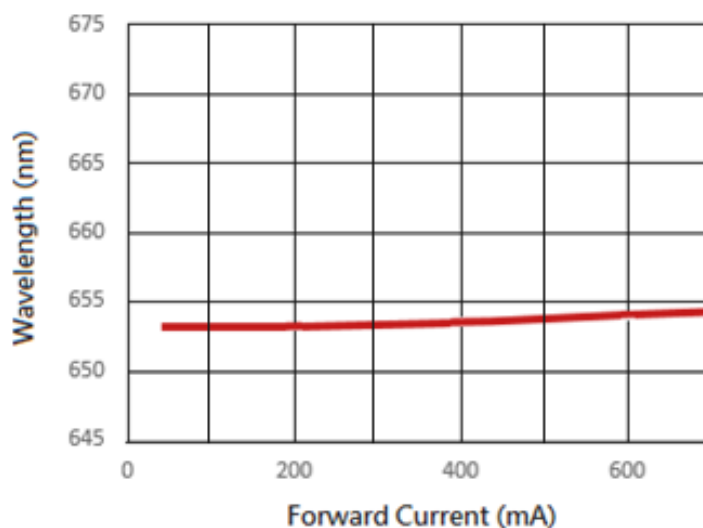
## Typical Relative Radiant Flux V.S. Forward Current

For Deep-Red @ Thermal Pad Temperature = 25°C



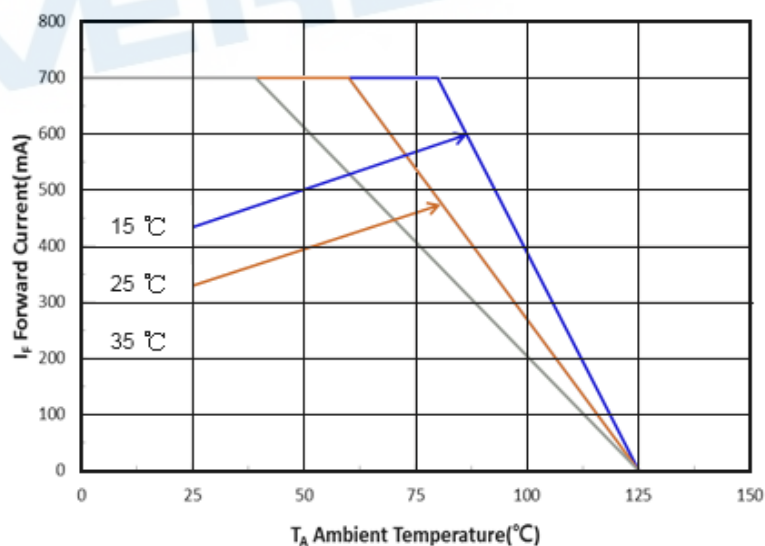
## Typical Wavelength & Forward Current

For Deep-Red @ Thermal Pad Temperature = 25°C



## Current Derating Curves

Current Derating Curve for 700mA Drive Current Deep-Red

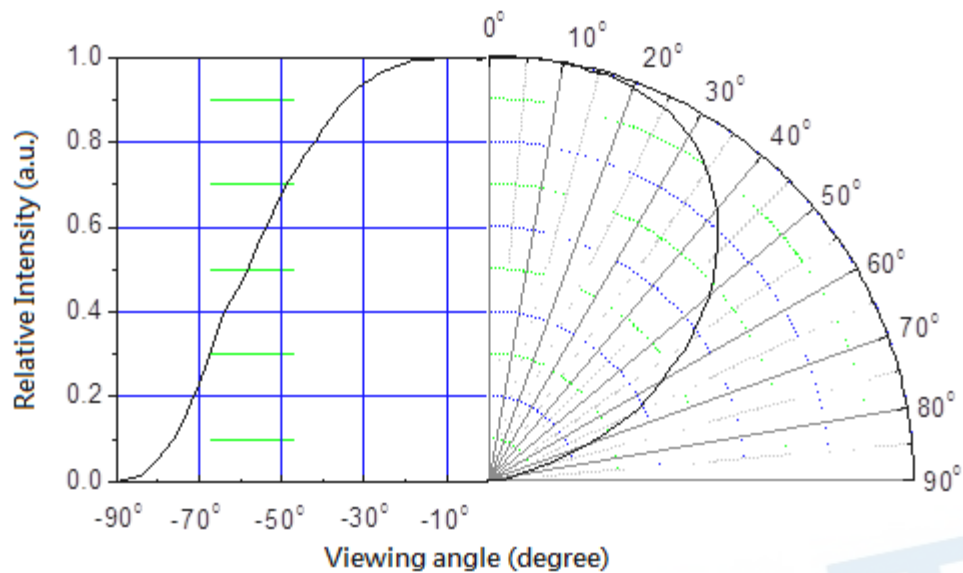


### Note:

The current derating curves are depending on the thermal resistance between the junction to the soldering pad.

## Typical Radiation Patterns

### Shwo(N) series: Typical Diagram Characteristics of Radiation



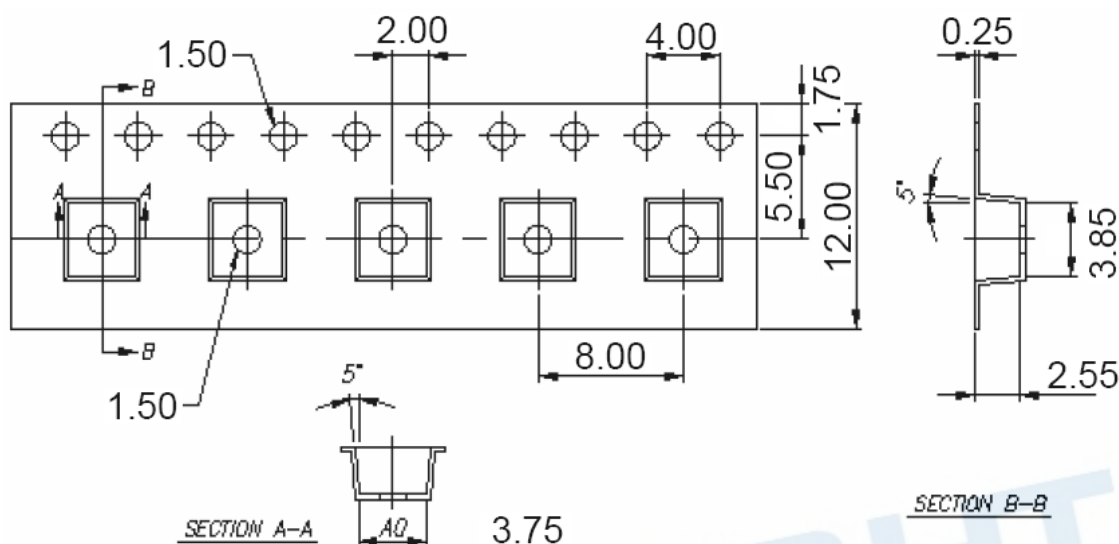
#### Notes:

1.  $2\theta_{1/2}$  is the off axis angle from lamp centerline where the luminous intensity is 1/2 of the peak value.
2. View angle tolerance is  $\pm 5^\circ$ .

## Emitter Tape Packaging

Carrier Tape Dimensions as the following:

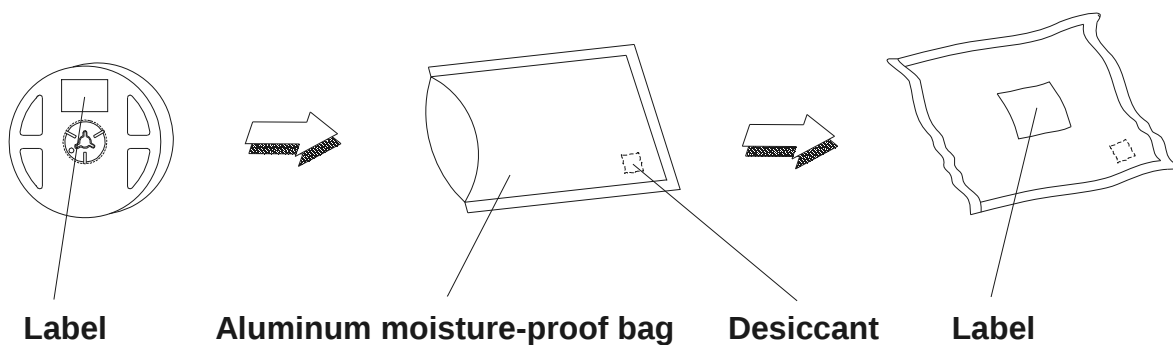
MPQ: 4000pcs per reel.



### Notes:

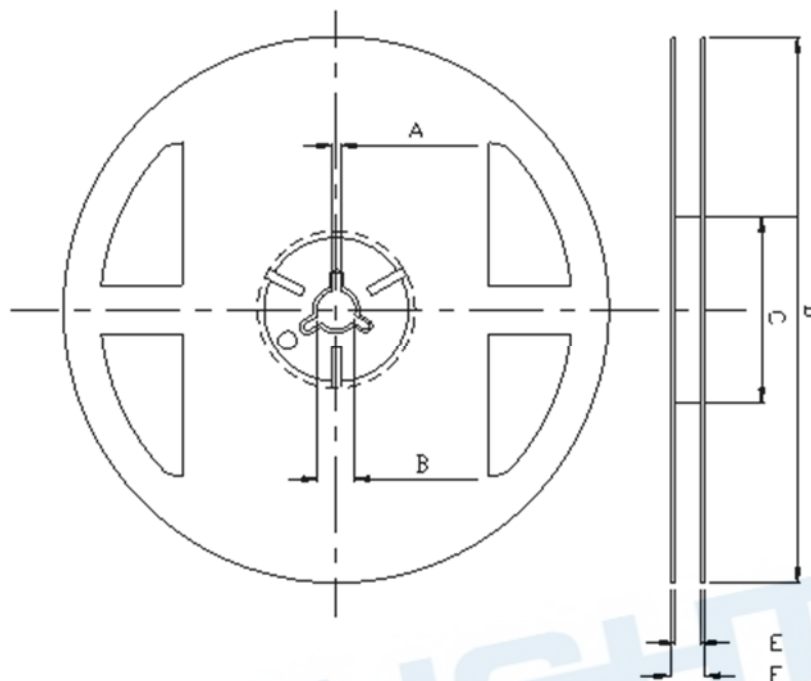
1. Dimensions are in millimeters.
2. Tolerances for fixed dimensions are  $\pm 0.1\text{mm}$ .

## Moisture Resistant Packaging



## Emitter Reel Packaging

### Reel Dimensions



| Dimension No.            | A       | B         | C          | D          | E        | F        |
|--------------------------|---------|-----------|------------|------------|----------|----------|
| Std. Dimension Tolerance | 2.0±0.5 | ψ13.0±0.2 | ψ100.0±1.0 | ψ330.0±2.0 | 13.0±0.3 | 17.4±1.0 |

#### Notes:

1. Dimensions are in millimeters.

## Product Labeling

### Label Explanation

CPN: Customer Specification (when required)

P/N : Everlight Production Number

QTY: Packing Quantity

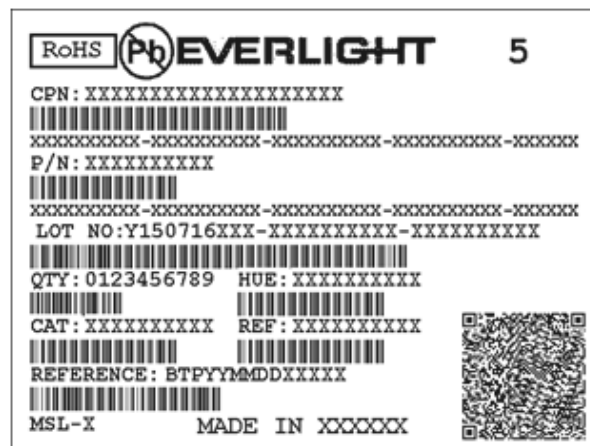
CAT: Radiant flux Bin

HUE: Color Bin

REF: Forward Voltage Bin

LOT No: Lot Number

MADE IN TAIWAN: Production Place



## Reliability Test Items and Conditions

The reliability of products shall be satisfied with items listed below.

| No. | Items                            | Stress Condition                 | Test Hours/Cycles | Sample Size |
|-----|----------------------------------|----------------------------------|-------------------|-------------|
| 1   | Resistance to Solder Heat        | Level 1 / Reflow / 260°C / 10sec | 3 times           | 8 PCS       |
| 2   | Solderability                    | Reflow / 245°C/ 10sec            | 1 times           | 8 PCS       |
| 3   | Thermal Shock                    | -40°C~100°C / Dwell time 20min   | 300 Cycles        | 8 PCS       |
| 4   | Power Temperature Cycle          | -40°C~100°C / Dwell time 15min   | 300 Cycles        | 8 PCS       |
| 5   | Temperature Cycle                | -40°C~100°C / Dwell time 30min   | 300 Cycles        | 8 PCS       |
| 6   | High Temperature / Humidity Life | Ta=85°C, 85%RH                   | 1000hours         | 8 PCS       |
| 7   | Low Temperature Life             | Ta= -40°C, IF=700mA              | 1000hours         | 8 PCS       |
| 8   | High Temperature Life #1         | Ta=60°C, IF=700mA                | 3000hours         | 8 PCS       |
| 9   | High Temperature Life #2         | Ta=85°C, IF=600mA                | 3000hours         | 8 PCS       |
| 10  | Pulse                            | ON 30ms / OFF 2500ms             | 30000 Cycles      | 8 PCS       |
| 11  | High Temperature Life            | 100°C, 168H                      | 168HRS            | 8 PCS       |

### Failure Criteria:

1. LEDs are open or short.
2. Im: luminous flux attenuate difference(1000hrs)>±10%
3. VF: forward voltage difference(1000hrs)>±10%
4. CIE-X&Y: coordinates measurement allowance (1000hrs) >±0.02 / Wd±2nm

## Storage Conditions

- Recommended to operate in accordance with the following conditions, increased LED life.
- Before the package is opened. The LEDs should be stored at 30°C or less and 85%RH or less after being shipped from Everlight and the storage life limits are 1 year. The LEDs can be stored up to 3 years If in a sealed container with a nitrogen atmosphere and moisture absorbent material.
- After opening the package: The LED's floor life is 1 year under 30°C or less and 60%RH or less. The LED should be soldered with 168hrs (7days) after opening the package. If unused LEDs remain, it should be stored in moisture proof packages.
- 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°C for 24 hours.

## Thermal Management

- Recommended to operate in accordance with the following conditions, increased LED life.
- For maintaining the high flux output and achieving maximum reliability, EHP-C19 flashlight series LEDs should be mounted on a metal core printed circuit board (MCPCB) or other kinds of heat sink with proper thermal connection to dissipate approximately 1W of thermal energy at 350mA operation.
- Sufficient thermal management must be implemented. Please refer to the graph "Forward Current Derating Curve" on Page 20. The soldering temperature must be kept under 60°C at the driving current 350mA. Otherwise, the junction temperature of die may exceed over the limit at high current driving conditions and the LEDs' lifetime may be decrease dramatically.
- Special thermal designs are also recommended to take in outer heat sink design, such as FR4 PCB on Aluminum with thermal vias or FPC on Aluminum with thermal conductive adhesive, etc.
- Sufficient thermal management must be conducted, or the die junction temperature will be over the limit under large electronic driving and LED lifetime will decrease critically.

## Revision History

Current version: 2020/02/19

Device No: DHE-0003592

Version. 3.0

| Page     | Subjects (major change in previous version)                    | Date of change |
|----------|----------------------------------------------------------------|----------------|
| 1        | Add UL                                                         | 2019/03/25     |
| 3.5.6.17 | Revise Peak Wavelength & Reliability Test Items and Conditions | 2020/02/19     |
|          |                                                                |                |

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