

## EL Mini TOP VIEW LED 1608-SR0100M-AM



### Features

- Package : PLCC 2 package
- Color : Super Red
- Typ. Luminance Intensity : 210 mcd @ 10mA
- Viewing angle : 120°
- ESD : 2KV
- MSL : 3
- Qualified AEC-Q102
- Corrosion Robustness Class B1
- 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)

### Application

- Automotive Interior lighting.

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# 1. Characteristics

| Parameter                                  |            | Symbol                  | Min. | Typ. | Max. | Unit | Condition            |
|--------------------------------------------|------------|-------------------------|------|------|------|------|----------------------|
| Forward Current                            |            | I <sub>F</sub>          | 2    | 10   | 20   | mA   | ---                  |
| Luminous Intensity                         |            | I <sub>v</sub>          | 150  | 210  | 330  | mcd  | I <sub>F</sub> =10mA |
| Forward Voltage                            |            | V <sub>F</sub>          | 1.5  | 2.1  | 2.5  | V    | I <sub>F</sub> =10mA |
| Viewing Angle                              |            | φ                       | ---  | 120  | ---  | deg  | I <sub>F</sub> =10mA |
| Dominant Wavelength                        |            | λ <sub>d</sub>          | 624  | 630  | 639  | nm   | I <sub>F</sub> =10mA |
| Thermal Resistance<br>(Junction to Solder) | Real       | R <sub>th JS real</sub> | ---  | 150  | ---  | K/W  | I <sub>F</sub> =10mA |
|                                            | Electrical | R <sub>th JS el</sub>   | ---  | 120  | ---  | K/W  | I <sub>F</sub> =10mA |

**Notes:**

1. Luminous Flux measurement tolerance: ±8%.
2. The data of Luminous Flux measured at thermal pad=25°C.
3. Forward voltage measurement tolerance: ±0.05V.
4. Tolerance of Dominant Wavelength: ±1nm.

## 2. Absolute Maximum Ratings

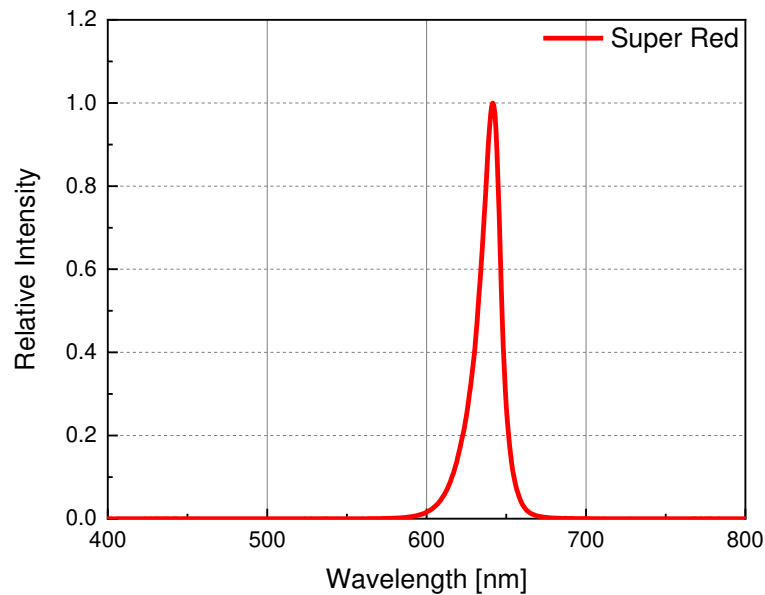
| Parameter                                                             | Symbol      | Ratings                            | Unit       |
|-----------------------------------------------------------------------|-------------|------------------------------------|------------|
| Power Dissipation                                                     | $P_d$       | 50                                 | mW         |
| Forward Current                                                       | $I_F$       | 20                                 | mA         |
| Surge Current<br>( $t \leq 10 \mu s$ ; $D=0.005$ ; $T_s=25^\circ C$ ) | $I_{FM}$    | 50                                 | mA         |
| Reverse Voltage                                                       | $V_R$       | Not designed for reverse operation | V          |
| Junction Temperature                                                  | $T_J$       | 125                                | $^\circ C$ |
| Operating Temperature                                                 | $T_{opr}$   | $-40 \sim +110$                    | $^\circ C$ |
| Storage Temperature                                                   | $T_{stg}$   | $-40 \sim +110$                    | $^\circ C$ |
| ESD Sensitivity<br>( $R=1.5k\Omega$ , $C=100pF$ )                     | $ESD_{HBM}$ | 2                                  | kV         |
| Soldering Temperature                                                 | Reflow      | $260^\circ C$ for 30sec            | $^\circ C$ |

### 3. Characteristics Graph

#### Wavelength Characteristics Relative Spectral Distribution

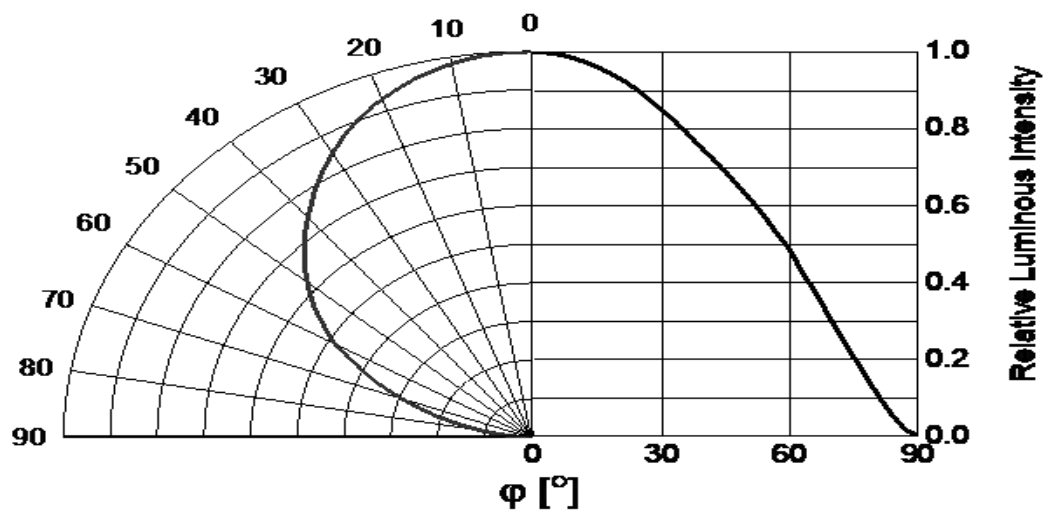
@ Ts = 25°C, If=10mA

$$\Phi_v / \Phi_v (Max.) = f(\lambda)$$



#### Typical Diagram Characteristics of Radiation

$$\Phi_v / \Phi_v (0^\circ) = f(\varphi)$$



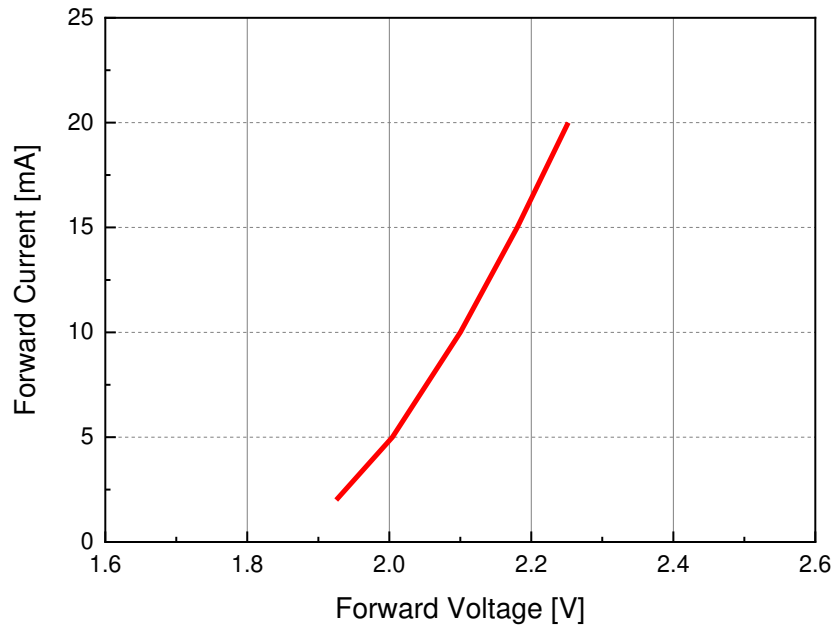
**Notes:**

1. φ is the off axis angle from lamp centerline where the luminous intensity is 1/2 of the peak value.
2. View angle tolerance is ± 5°.

## Forward Current vs. Forward Voltage

@ Ts = 25°C

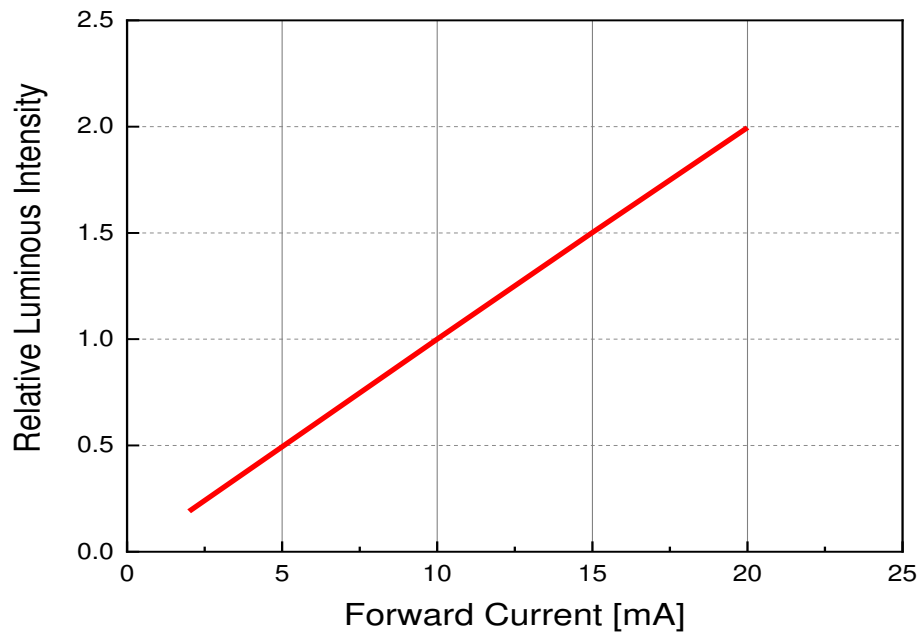
$$I_F = f(V_F)$$



## Relative Luminous Intensity vs. Forward Current

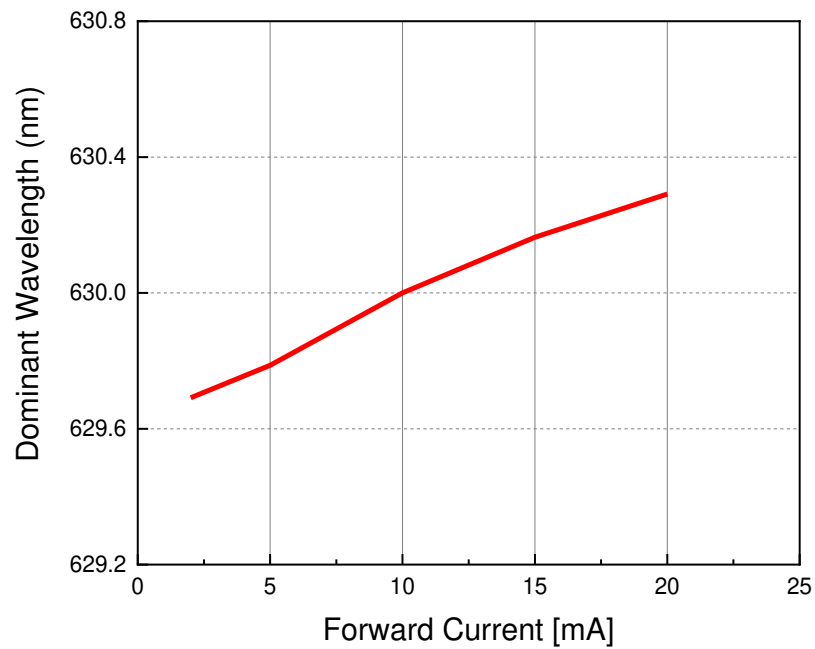
@ Ts = 25°C

$$\Phi_V / \Phi_V(10mA) = f(I_F)$$



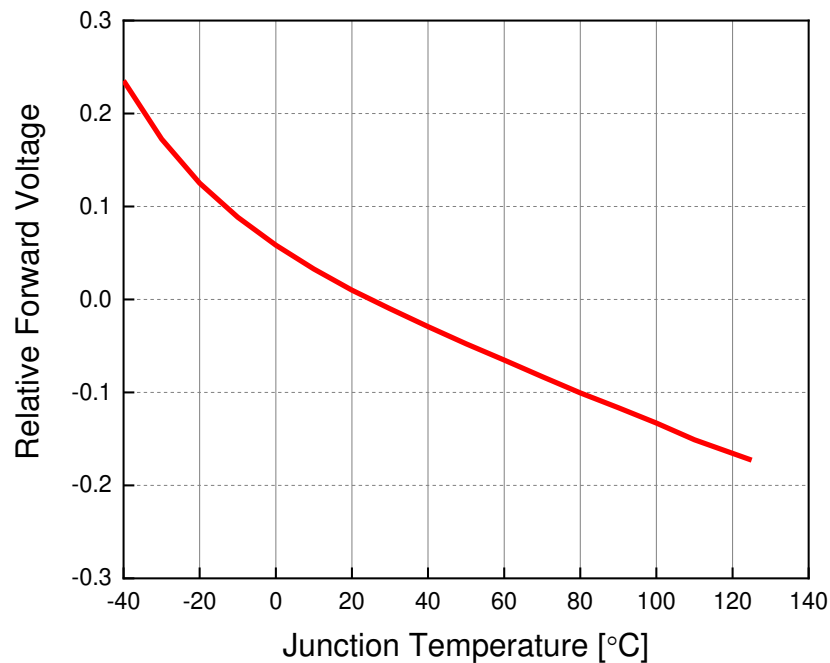
## Dominant Wavelength vs. Forward Current @ $T_s = 25^\circ\text{C}$

$$\lambda_d = f(I_F)$$



## Relative Forward Voltage vs. Junction Temperature @ $I_F = 10\text{mA}$

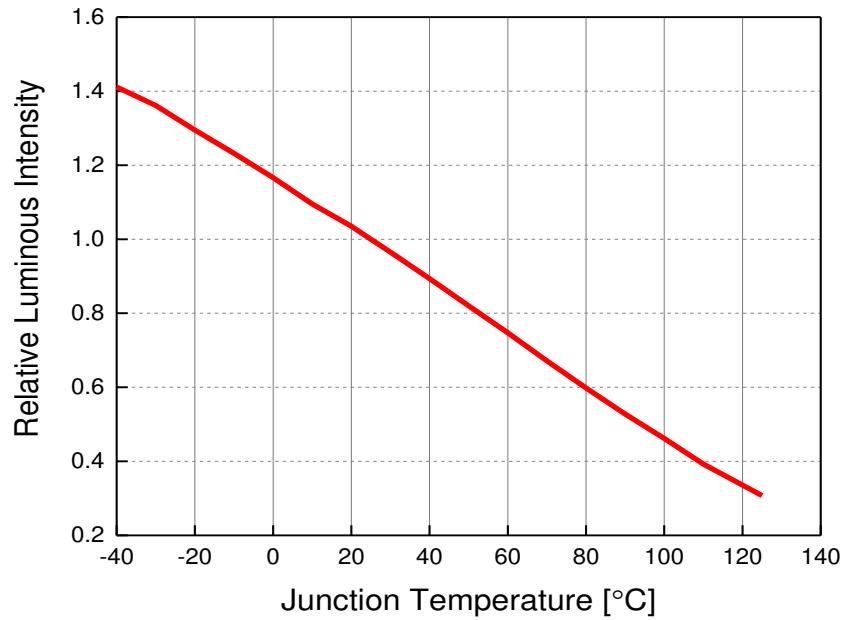
$$\Delta V_F = V_F - V_F(25^\circ\text{C}) = f(T_j)$$



## Relative Luminous Intensity vs. Junction Temperature

@  $I_F=10\text{mA}$

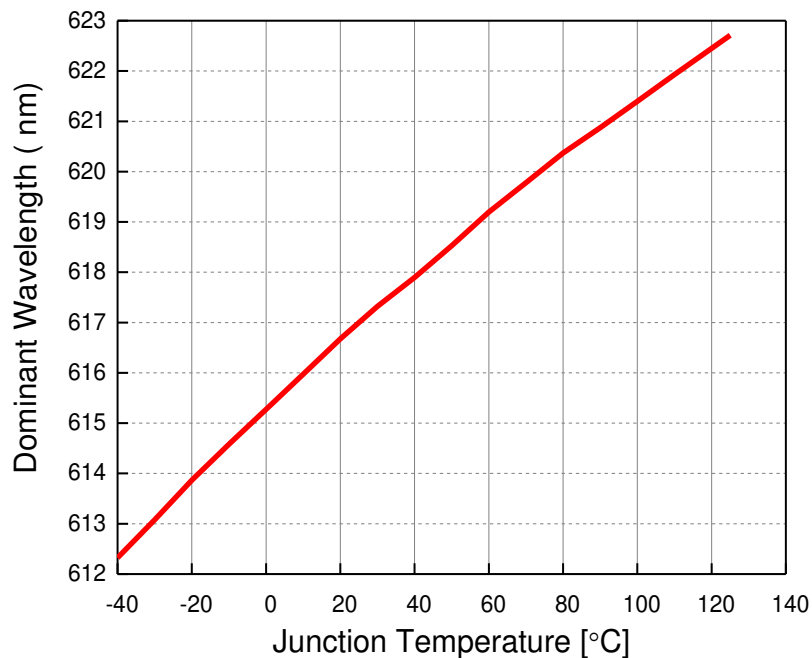
$$\Phi_V / \Phi_V(25^\circ\text{C}) = f(T_j)$$

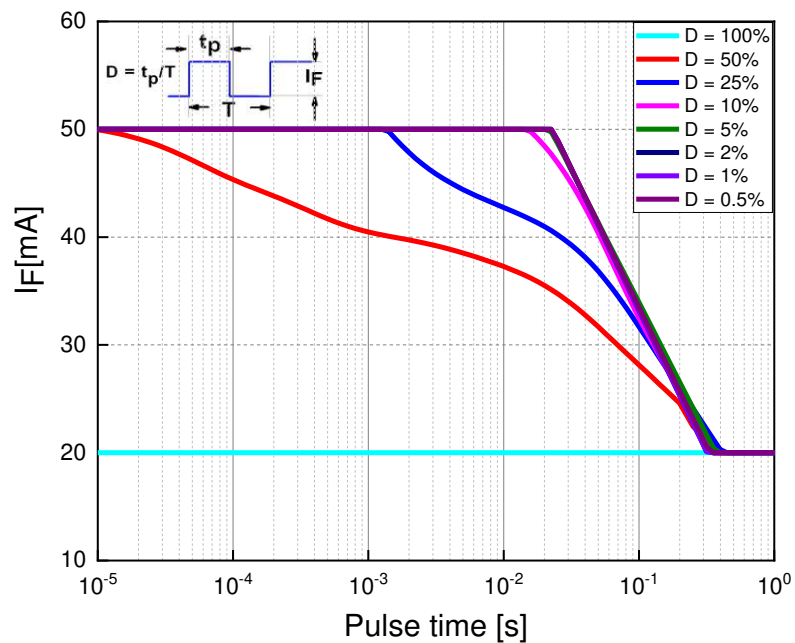


## Relative Wavelength Shift vs. Junction Temperature

@  $I_F=10\text{mA}$

$$\Delta\lambda_d = \lambda_d - \lambda_d(25^\circ\text{C}) = f(T_j)$$





4. Binning Information

| Luminous Intensity Bins |     |                                  |                                  |
|-------------------------|-----|----------------------------------|----------------------------------|
| Group                   | Bin | Minimum Luminous Intensity (mcd) | Maximum Luminous Intensity (mcd) |
| Q                       | X   | 71                               | 82                               |
|                         | Y   | 82                               | 97                               |
|                         | Z   | 97                               | 112                              |
| R                       | X   | 112                              | 130                              |
|                         | Y   | 130                              | 150                              |
|                         | Z   | 150                              | 180                              |
| S                       | X   | 180                              | 210                              |
|                         | Y   | 210                              | 240                              |
|                         | Z   | 240                              | 280                              |
| T                       | X   | 280                              | 330                              |
|                         | Y   | 330                              | 390                              |
|                         | Z   | 390                              | 450                              |
| U                       | X   | 450                              | 520                              |
|                         | Y   | 520                              | 610                              |
|                         | Z   | 610                              | 710                              |
| V                       | X   | 710                              | 820                              |
|                         | Y   | 820                              | 970                              |
|                         | Z   | 970                              | 1120                             |
| A                       | X   | 1120                             | 1300                             |
|                         | Y   | 1300                             | 1500                             |
|                         | Z   | 1500                             | 1800                             |
| B                       | X   | 1800                             | 2100                             |
|                         | Y   | 2100                             | 2400                             |
|                         | Z   | 2400                             | 2800                             |

Notes:

1. Luminous flux measurement tolerance: ±8%.
2. Highlighted Black Box is possible output bins.

## Dominant Wavelength Bins

| Group Bin | Minimum<br>Dominant Wavelength<br>[nm] | Maximum<br>Dominant Wavelength<br>[nm] |
|-----------|----------------------------------------|----------------------------------------|
| 5963      | 459                                    | 463                                    |
| 6367      | 463                                    | 467                                    |
| 6771      | 467                                    | 471                                    |
| 7175      | 471                                    | 475                                    |
| 1015      | 510                                    | 515                                    |
| 1520      | 515                                    | 520                                    |
| 2025      | 520                                    | 525                                    |
| 2530      | 525                                    | 530                                    |
| 3035      | 530                                    | 535                                    |
| 5861      | 558                                    | 561                                    |
| 6164      | 561                                    | 564                                    |
| 6467      | 564                                    | 567                                    |
| 6770      | 567                                    | 570                                    |
| 7073      | 570                                    | 573                                    |
| 7376      | 573                                    | 576                                    |
| 7679      | 576                                    | 579                                    |
| 7982      | 579                                    | 582                                    |
| 8285      | 582                                    | 585                                    |
| 8588      | 585                                    | 588                                    |
| 8891      | 588                                    | 591                                    |
| 9194      | 591                                    | 594                                    |
| 9497      | 594                                    | 597                                    |
| 9700      | 597                                    | 600                                    |
| 0003      | 600                                    | 603                                    |
| 0306      | 603                                    | 606                                    |
| 0609      | 606                                    | 609                                    |
| 0912      | 609                                    | 612                                    |
| 1215      | 612                                    | 615                                    |
| 1518      | 615                                    | 618                                    |
| 1821      | 618                                    | 621                                    |
| 2124      | 621                                    | 624                                    |
| 2427      | 624                                    | 627                                    |
| 2730      | 627                                    | 630                                    |
| 3033      | 630                                    | 633                                    |
| 3336      | 633                                    | 636                                    |
| 3639      | 636                                    | 639                                    |

### Notes:

1. Tolerance of Dominant Wavelength:  $\pm 1\text{nm}$ .
2. Highlighted Black Box is possible output bins.

## Forward Voltage Bins

| Bin code | Min Forward Voltage [V] | Max Forward Voltage [V] |
|----------|-------------------------|-------------------------|
| 1012     | 1.00                    | 1.25                    |
| 1215     | 1.25                    | 1.50                    |
| 1517     | 1.50                    | 1.75                    |
| 1720     | 1.75                    | 2.00                    |
| 2022     | 2.00                    | 2.25                    |
| 2225     | 2.25                    | 2.50                    |
| 2527     | 2.50                    | 2.75                    |
| 2730     | 2.75                    | 3.00                    |
| 3032     | 3.00                    | 3.25                    |
| 3235     | 3.25                    | 3.50                    |
| 3537     | 3.50                    | 3.75                    |
| 3740     | 3.75                    | 4.00                    |
| 4042     | 4.00                    | 4.25                    |
| 4245     | 4.25                    | 4.50                    |
| 4547     | 4.50                    | 4.75                    |
| 4750     | 4.75                    | 5.00                    |
| 5052     | 5.00                    | 5.25                    |
| 5255     | 5.25                    | 5.50                    |
| 5557     | 5.50                    | 5.75                    |
| 5760     | 5.75                    | 6.00                    |
| 6062     | 6.00                    | 6.25                    |
| 6265     | 6.25                    | 6.50                    |
| 6567     | 6.50                    | 6.75                    |
| 6770     | 6.75                    | 7.00                    |

### Notes:

1. Forward voltage measurement tolerance:  $\pm 0.05V$ .
2. Forward voltage bins are defined at  $I_F = 10mA$  operation.
3. Highlighted Black Box is possible output bins.

# 5. Part Number

## 1608-SR0100M-AM

Part number is designated with below details.

1608 = Product family name.

SR = Color [1]

010 = Test current [mA]

0M = Internal Code

AM = Automotive application

Note

[1] Color :

| Symbol | Description                     |
|--------|---------------------------------|
| B      | Cool White                      |
| C      | Cool White                      |
| N      | Neutral White                   |
| W      | Warm White                      |
| PA     | Phosphor Converted Amber        |
| PR     | Phosphor Converted Red          |
| UB     | Blue                            |
| IB     | Ice Blue                        |
| SB     | Sky Blue                        |
| UP     | Purple                          |
| UG     | Green                           |
| UY     | Yellow                          |
| UYG    | Brilliant Yellow Green          |
| UPG    | Pale Green                      |
| UA     | Amber                           |
| UR     | Red                             |
| SR     | Super Red                       |
| RGB    | RGB-Color                       |
| PYG    | Phosphor Converted Yellow Green |

## 6. Ordering Information

**1608-SR0100M-ABCDEFGHIJKLM-NO-AM**

| Part Number of the 1608 | Order Code                       |
|-------------------------|----------------------------------|
| 1608-SR0100M-AM         | 1608-SR0100M-ABCDEFGHIJKLM-NO-AM |

Order code contains information with below details :

ABCD = min/max wavelength or CCT

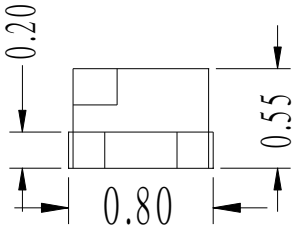
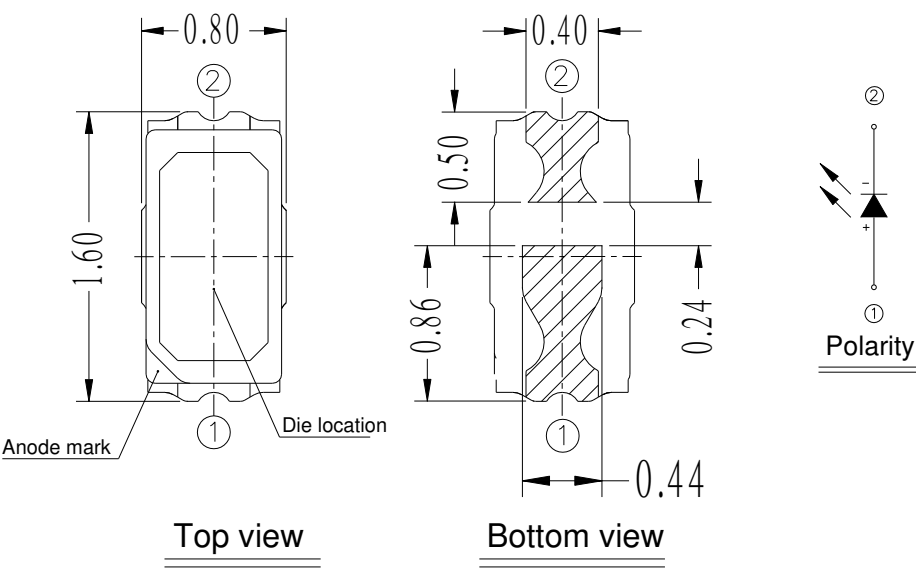
EFGH = min./max. luminous flux in [lm] or luminous intensity in [mcd]

JKLM = min./max. forward voltage

NO = internal code

AM = Automotive Application

# 7. Mechanical Dimension

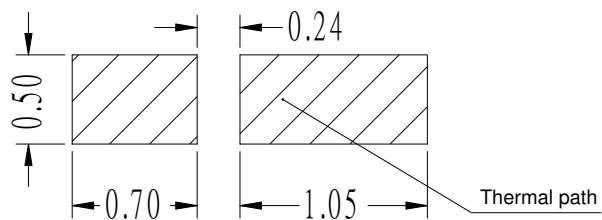


|   |                |
|---|----------------|
| ① | Anode          |
| ② | Cathode        |
| ▨ | Lead finish Ag |

**Notes:**

- 1. Dimensions are in millimeters.
- 2. Tolerances unless mentioned are ± 0.1mm.

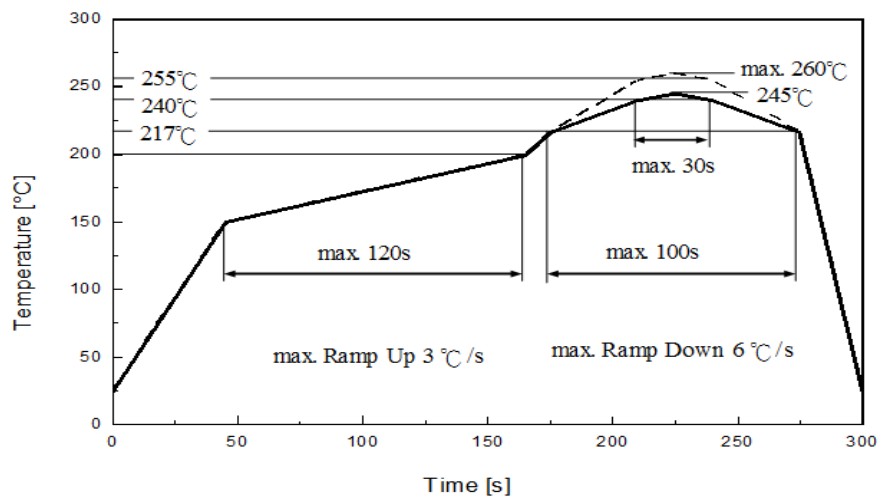
8. Recommended Soldering Pad



Soldering Pad

9. Reflow Soldering Profile

Soldering Condition (Reference: IPC/JEDEC J-STD-020D)



| Profile Feature                                      | Pb-Free Assembly | Unit    |
|------------------------------------------------------|------------------|---------|
|                                                      | Recommendation   |         |
| Ramp-up rate to preheat<br>25 °C to 150 °C           | 3                | °C /sec |
| Time of soaking zone<br>150 °C to 200 °C             | 120              | sec     |
| Ramp-up rate to peak                                 | 3                | °C /sec |
| Liquidus temperature                                 | 217              | °C      |
| Time above liquidus temperature                      | 100              | sec     |
| Peak temperature (max.)                              | 260              | °C      |
| Time within 5°C of the specified peak<br>temperature | 30               | sec     |
| Ramp-down Rate (max.)                                | 6                | °C /sec |

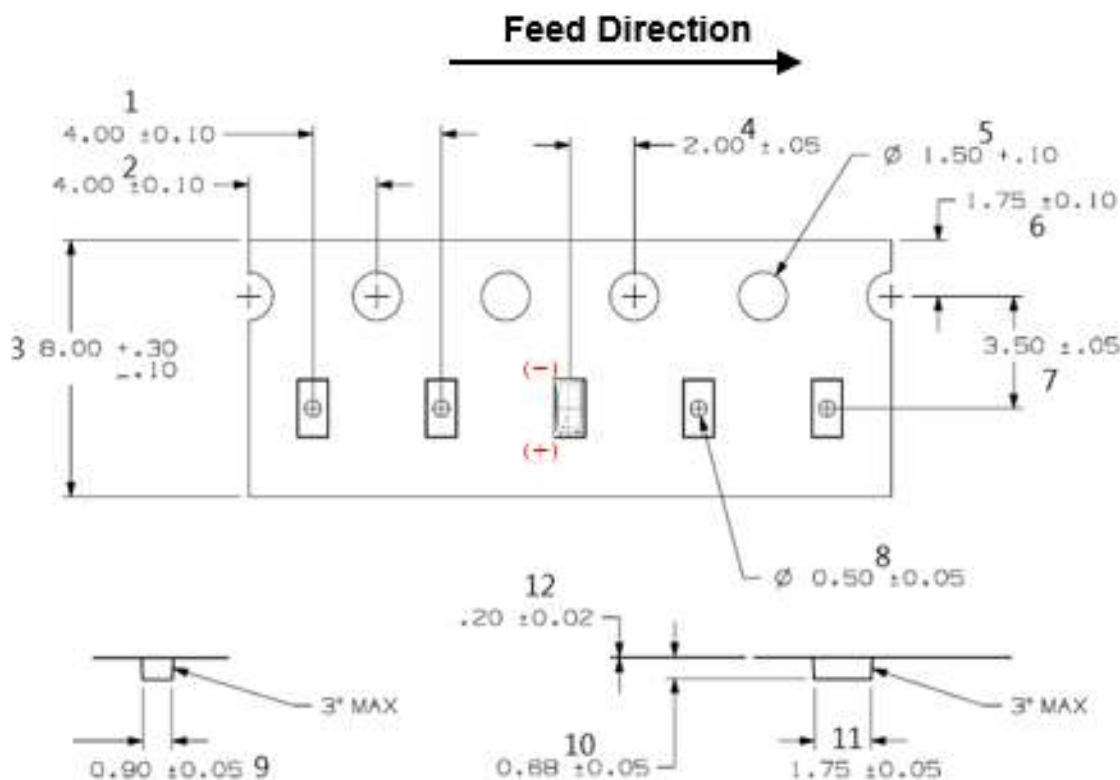
## 10. Packaging Information

### ● Product Labeling



- CPN : Customer's Product Number
- P/N : Everlight Part Number
- QTY : Packing Quantity
- CAT : Luminous Flux (Brightness) Bin
- HUE : Color Bin
- REF : Forward Voltage Bin
- LOT No : Lot Number

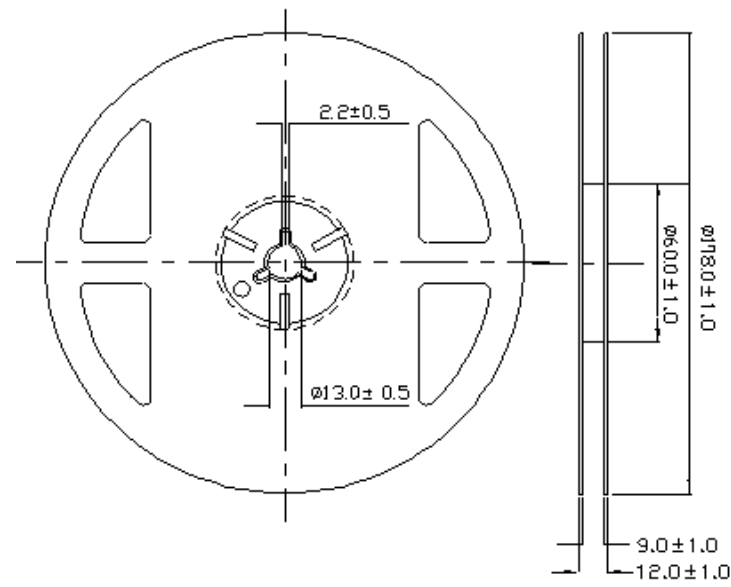
### ● Packing: Loaded Quantity 2000 pcs Per Reel



#### Notes:

1. Dimensions are in millimeters.

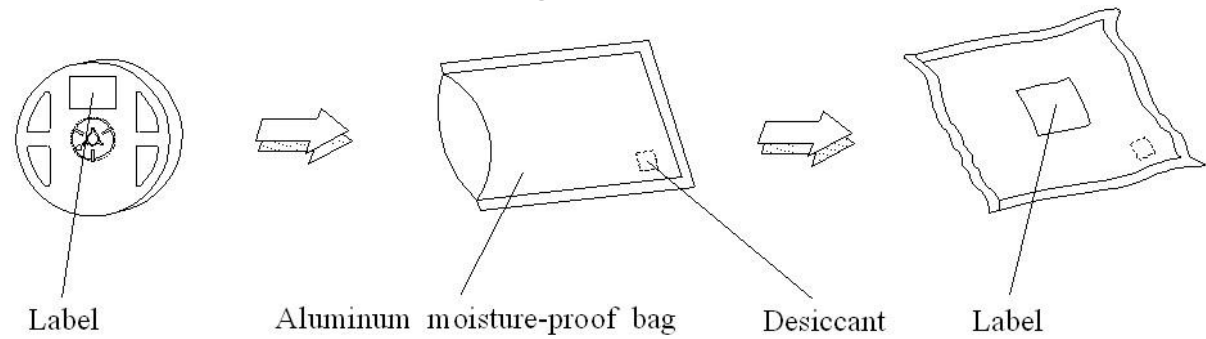
# ● Reel Dimensions



## Notes:

1. Dimensions are in millimeters.
2. Tolerances unless mentioned are  $\pm 0.2\text{mm}$ .

# ● Moisture Resistant Packing Process



## Notes:

1. Dimensions are in millimeters.
2. Tolerances unless mentioned are  $\pm 0.2\text{mm}$ .

## 11. Precaution 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. Assemblies

Do not stack assemblies containing LEDs to prevent damage to the optical surface of LEDs. Forces applied to the optical surface may result in the surface being damaged.

### 3. Soldering Condition

3.1 When soldering, do not put stress on the LEDs during heating.

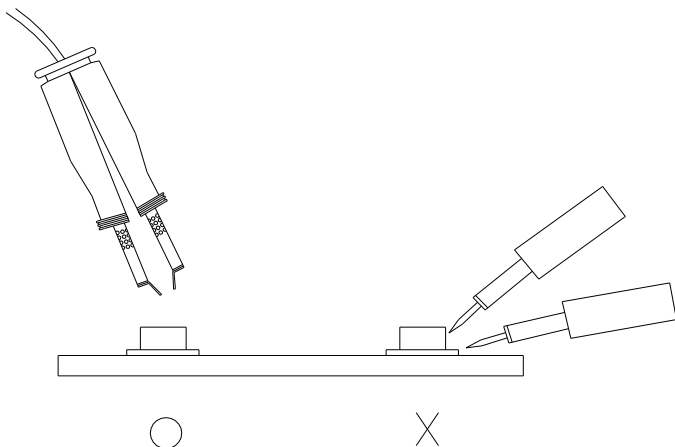
3.2 After soldering, do not warp the circuit board.

### 4. Soldering Iron

Each terminal is to go to the tip of soldering iron temperature less than  $350^{\circ}\text{C}$  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.



## 12. Sulfur Test Criteria

| Products                   | Failure Criteria                                                                                                                                                                                       |
|----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Exterior Lighting products | Luminous Flux +/-20%, forward voltage +/-10%, color coordinates x,y +/-0.01, color wavelength +/- 2 nm<br>Visual defect issue following Everlight's inspection criteria                                |
| Interior lighting products | Luminous Flux +/-30% or +/-50% for some application, forward voltage +/-10%, color coordinates x,y +/-0.02, color wavelength +/- 2 nm<br>Visual defect issue following Everlight's inspection criteria |

| H2S test | Grade A0                                                                 | Grade A1                                                                                                             | Grade B0                                                                 | Grade B1                                                                                                             |
|----------|--------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|
| Class A  | Pass $\Delta IV$ , $\Delta Color$ , $\Delta VF$ criteria<br>No Corrosion | Pass $\Delta IV$ , $\Delta Color$ , $\Delta VF$ criteria<br>Corrosion without the impact on reliability and lifetime |                                                                          |                                                                                                                      |
| Class B  |                                                                          |                                                                                                                      | Pass $\Delta IV$ , $\Delta Color$ , $\Delta VF$ criteria<br>No Corrosion | Pass $\Delta IV$ , $\Delta Color$ , $\Delta VF$ criteria<br>Corrosion without the impact on reliability and lifetime |

| Condition for H2S and FMG | Description                                    |                                                                                                                                                       |
|---------------------------|------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|
|                           | H2S                                            | FMG                                                                                                                                                   |
| Class A                   | 15 ppm with duration 336 h at 40 °C and 90% RH | Duration 500 h at 25 °C and 75% RH.<br>H2S concentration: 10ppb<br>SO2 concentration: 200ppb<br>NO2 concentration: 200ppb<br>Cl2 concentration: 10ppb |
| Class B                   | 10 ppm with duration 500 h at 25 °C and 75% RH |                                                                                                                                                       |

| Grade for H2S Test | Description                                              |
|--------------------|----------------------------------------------------------|
| 0                  | No Corrosion                                             |
| 1                  | Corrosion without the impact on reliability and lifetime |