

EHP-AX08EL/GT01H-P03/4556/Y/N12



High Power LED – 3 W



Data Sheet



Features

- ◆ Feature of the device: Small package with high efficiency
- ◆ Typical color temperature: 5000 K.
- ◆ Typical viewing angle: 140°
- ◆ Typical light flux output: 150 lm @700mA.
- ◆ ESD protection.
- ◆ Soldering methods: SMT
- ◆ Grouping parameter: Luminous Flux, Forward Voltage and Chromaticity.
- ◆ Optical efficiency:55 lm/W.
- ◆ Moisture Sensitivity Level: 3
- ◆ Color rendering Index: 70 (typ.)
- ◆ Thermal resistance (Junction to Heat sink): 15 °C /W
- ◆ The product itself will remain within RoHS compliant.

Applications

- ◆ Design and effect illumination
- ◆ Interior automotive lighting (e.g. dashboard backlighting)
- ◆ Room lighting (e.g. luminaries, spotlights)
- ◆ Reading light (aircraft, car, bus)
- ◆ Signal and symbol luminaries
- ◆ Marker lights (e.g. steps, exit ways, etc.)
- ◆ Architectural illumination

Materials

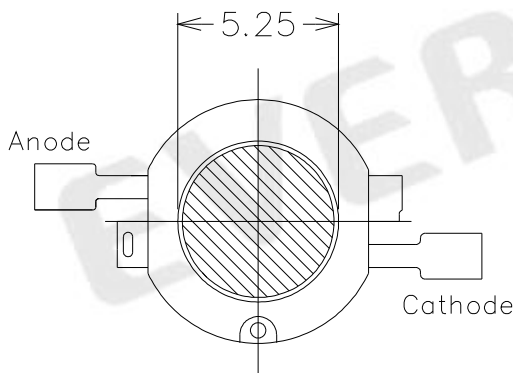
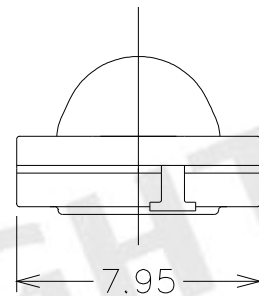
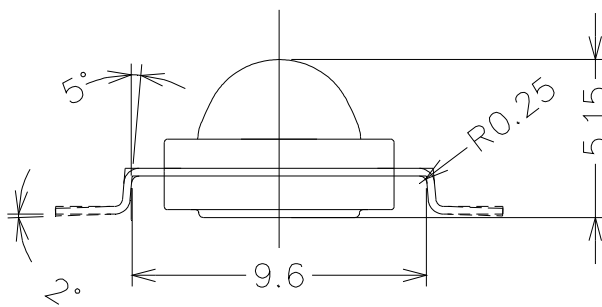
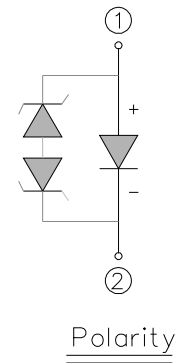
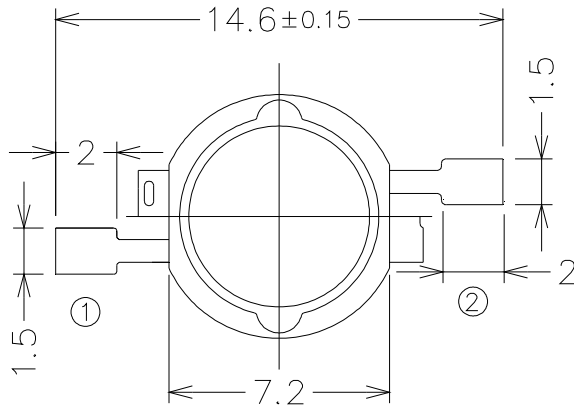
| Items | Description |
|---------------------|-------------------------|
| Housing black body | Heat resistant polymer |
| Encapsulating Resin | Silicone resin |
| Electrodes | Au plating copper alloy |
| Die attach | Silver paste |
| Chip | InGaN |

EHP-AX08EL/GT01H-P03/4556/Y/N12

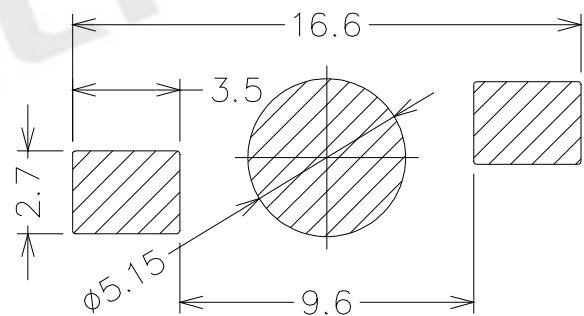
High Power LED – 3 W



Dimensions



Bot. view



Soldering patterns

Notes.

1. Dimensions are in millimeters.
2. Tolerances for fixed dimensions are $\pm 0.25\text{mm}$.

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Maximum Ratings ($T_{Soldering}=25^{\circ}\text{C}$)

| Parameter | Symbol | Rating | Unit |
|--|-------------|------------|----------------------|
| DC Operating Current | I_F | 750 | mA |
| Pulsed Forward Current ⁽¹⁾ | I_{PF} | 1000 | mA |
| ESD Sensitivity | ESD | 2000 | V |
| Junction Temperature | T_j | 125 | $^{\circ}\text{C}$ |
| Operating Temperature | $T_{op.}$ | -40 ~ +85 | $^{\circ}\text{C}$ |
| Storage Temperature | $T_{stge.}$ | -40 ~ +100 | $^{\circ}\text{C}$ |
| Junction To Heat-Sink Thermal Resistance | R_{th} | 15 | $^{\circ}\text{C/W}$ |

Electro-Optical Characteristics ($T_{Soldering}=25^{\circ}\text{C}$)

| Parameter | Bin | Symbol | Min | Typ. | Max | Unit | Condition |
|--------------------------------------|------|----------|------|------|------|------|--------------------|
| Luminous Flux ⁽²⁾ | ---- | Φ_v | 140 | 150 | ---- | lm | $I_F=700\text{mA}$ |
| Forward Voltage ⁽³⁾ | V2 | V_F | 3.25 | ---- | 3.55 | V | |
| | V3 | | 3.55 | ---- | 3.85 | | |
| | V4 | | 3.85 | ---- | 4.15 | | |
| | V5 | | 4.15 | ---- | 4.45 | | |
| Color Temperature | ---- | CCT | 4500 | 5000 | 5650 | K | |
| Color Rendering Index ⁽⁴⁾ | ---- | CRI | ---- | 70 | ---- | ---- | |

Note.

1. t_p 100 μs , Duty cycle = 0.25
2. Luminous Flux measurement tolerance: $\pm 10\%$.
3. Forward Voltage measurement tolerance: $\pm 0.1\text{V}$.
4. Color Rendering Index measurement tolerance: ± 5

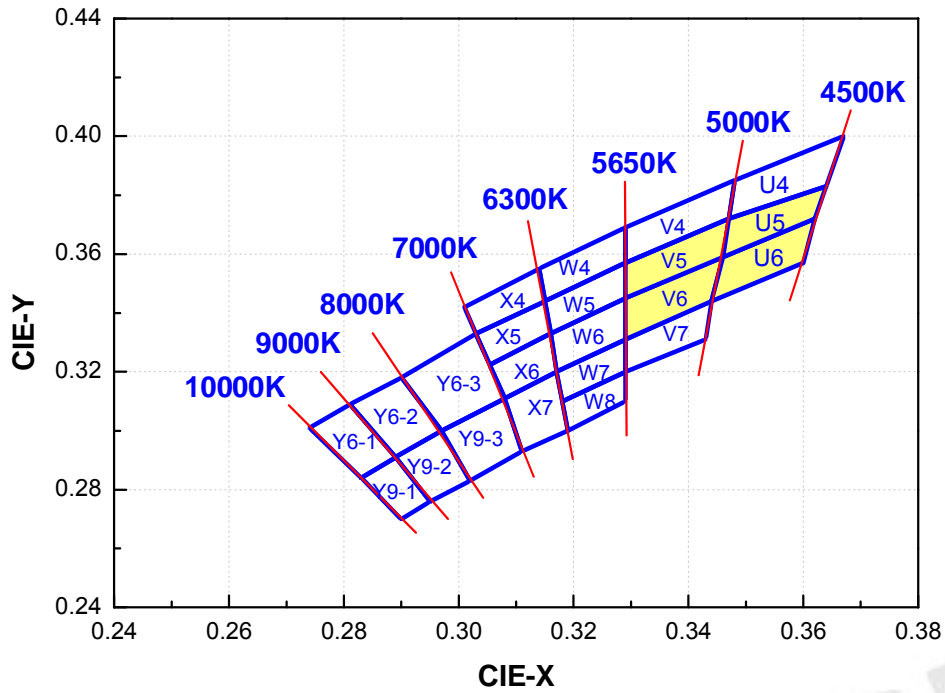
5. Brightness Bin Table

| Group | Bin | Min | Typ. | Max |
|-------|-----|-----|------|-----|
| E | 1 | 1.5 | ---- | 3 |
| | 2 | 3 | ---- | 4 |
| | 3 | 4 | ---- | 5 |
| | 4 | 5 | ---- | 6 |
| | 5 | 6 | ---- | 8 |
| F | 1 | 8 | ---- | 10 |
| | 2 | 10 | ---- | 13 |
| | 3 | 13 | ---- | 17 |
| | 4 | 17 | ---- | 20 |
| | 5 | 20 | ---- | 23 |
| J | 1 | 23 | ---- | 27 |
| | 2 | 27 | ---- | 33 |
| | 3 | 33 | ---- | 39 |
| | 4 | 39 | ---- | 45 |
| | 5 | 45 | ---- | 52 |
| K | 1 | 52 | ---- | 60 |
| | 2 | 60 | ---- | 70 |
| | 31 | 70 | ---- | 75 |
| | 32 | 75 | ---- | 80 |
| | 33 | 80 | ---- | 85 |
| | 41 | 85 | ---- | 90 |
| | 42 | 90 | ---- | 95 |
| | 43 | 95 | ---- | 100 |
| | 51 | 100 | ---- | 110 |
| | 52 | 110 | ---- | 120 |
| | 53 | 120 | ---- | 130 |

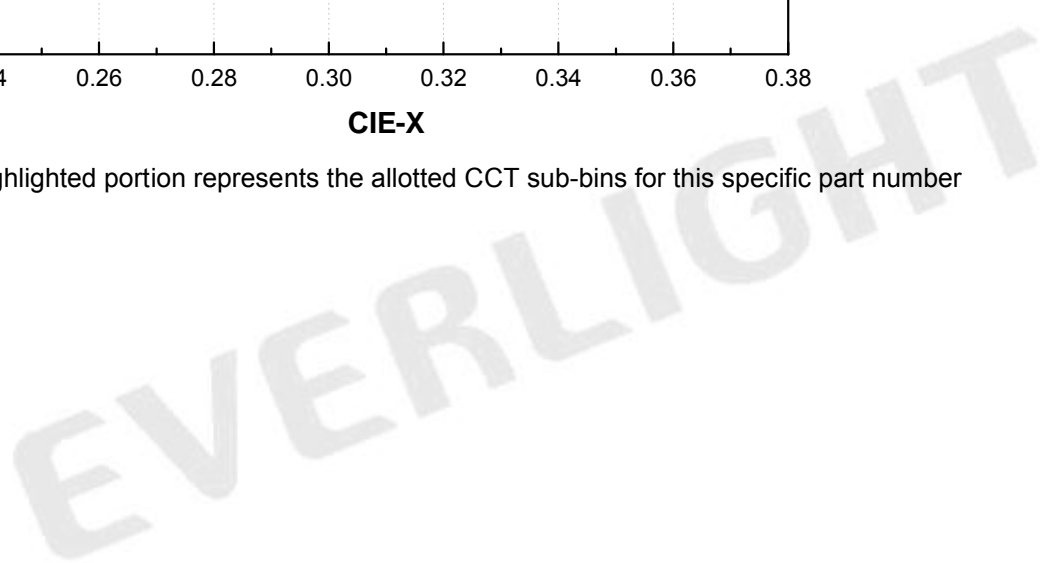
| Group | Bin | Min | Typ. | Max |
|-------|-----|------|------|------|
| N | 11 | 130 | ---- | 140 |
| | 12 | 140 | ---- | 150 |
| | 13 | 150 | ---- | 160 |
| | 21 | 160 | ---- | 180 |
| | 22 | 180 | ---- | 200 |
| | 31 | 200 | ---- | 225 |
| | 32 | 225 | ---- | 250 |
| | 41 | 250 | ---- | 275 |
| | 42 | 275 | ---- | 300 |
| | 51 | 300 | ---- | 350 |
| R | 52 | 350 | ---- | 400 |
| | 1 | 400 | ---- | 500 |
| | 2 | 500 | ---- | 600 |
| | 3 | 600 | ---- | 750 |
| | 4 | 750 | ---- | 1000 |
| | 5 | 1000 | ---- | 1300 |

White Binning Structure

Cool White



Note. The highlighted portion represents the allotted CCT sub-bins for this specific part number



Cool-White Bin Coordinates

4550

| Bin | CIE X | CIE Y |
|-----------------------------|-------|-------|
| U4 | 0.364 | 0.383 |
| | 0.367 | 0.4 |
| | 0.348 | 0.385 |
| | 0.347 | 0.372 |
| Reference Range: 4500~5000K | | |

| Bin | CIE X | CIE Y |
|-----------------------------|-------|-------|
| U5 | 0.364 | 0.383 |
| | 0.362 | 0.372 |
| | 0.346 | 0.359 |
| | 0.347 | 0.372 |
| Reference Range: 4500~5000K | | |

| Bin | CIE X | CIE Y |
|-----------------------------|-------|-------|
| U6 | 0.362 | 0.372 |
| | 0.36 | 0.357 |
| | 0.344 | 0.344 |
| | 0.346 | 0.359 |
| Reference Range: 4500~5000K | | |

5056

| Bin | CIE X | CIE Y |
|-----------------------------|-------|-------|
| V4 | 0.329 | 0.357 |
| | 0.329 | 0.369 |
| | 0.348 | 0.385 |
| | 0.347 | 0.372 |
| Reference Range: 5000~5650K | | |

| Bin | CIE X | CIE Y |
|-----------------------------|-------|-------|
| V5 | 0.329 | 0.345 |
| | 0.329 | 0.357 |
| | 0.347 | 0.372 |
| | 0.346 | 0.359 |
| Reference Range: 5000~5650K | | |

| Bin | CIE X | CIE Y |
|-----------------------------|-------|-------|
| V6 | 0.329 | 0.331 |
| | 0.329 | 0.345 |
| | 0.346 | 0.359 |
| | 0.344 | 0.344 |
| Reference Range: 5000~5650K | | |

| Bin | CIE X | CIE Y |
|-----------------------------|-------|-------|
| V7 | 0.329 | 0.331 |
| | 0.344 | 0.344 |
| | 0.343 | 0.331 |
| | 0.329 | 0.32 |
| Reference Range: 5000~5650K | | |

5663

| Bin | CIE X | CIE Y |
|-----------------------------|-------|-------|
| W4 | 0.329 | 0.369 |
| | 0.329 | 0.357 |
| | 0.315 | 0.344 |
| | 0.314 | 0.355 |
| Reference Range: 5650~6300K | | |

| Bin | CIE X | CIE Y |
|-----------------------------|-------|-------|
| W5 | 0.329 | 0.345 |
| | 0.316 | 0.333 |
| | 0.315 | 0.344 |
| | 0.329 | 0.357 |
| Reference Range: 5650~6300K | | |

| Bin | CIE X | CIE Y |
|-----------------------------|-------|-------|
| W6 | 0.329 | 0.345 |
| | 0.329 | 0.331 |
| | 0.317 | 0.32 |
| | 0.316 | 0.333 |
| Reference Range: 5650~6300K | | |

| Bin | CIE X | CIE Y |
|-----------------------------|-------|-------|
| W7 | 0.329 | 0.331 |
| | 0.329 | 0.32 |
| | 0.318 | 0.31 |
| | 0.317 | 0.32 |
| Reference Range: 5650~6300K | | |

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| Bin | CIE X | CIE Y |
|-----------------------------|-------|-------|
| W8 | 0.329 | 0.321 |
| | 0.329 | 0.31 |
| | 0.319 | 0.3 |
| | 0.318 | 0.31 |
| Reference Range: 5650~6300K | | |

6370

| Bin | CIE X | CIE Y |
|-----------------------------|-------|-------|
| X4 | 0.301 | 0.342 |
| | 0.314 | 0.355 |
| | 0.315 | 0.344 |
| | 0.303 | 0.333 |
| Reference Range: 6300~7000K | | |

| Bin | CIE X | CIE Y |
|-----------------------------|-------|-------|
| X5 | 0.305 | 0.322 |
| | 0.303 | 0.333 |
| | 0.315 | 0.344 |
| | 0.316 | 0.333 |
| Reference Range: 6300~7000K | | |

| Bin | CIE X | CIE Y |
|-----------------------------|-------|-------|
| X6 | 0.308 | 0.311 |
| | 0.305 | 0.322 |
| | 0.316 | 0.333 |
| | 0.317 | 0.32 |
| Reference Range: 6300~7000K | | |

| Bin | CIE X | CIE Y |
|-----------------------------|-------|-------|
| X7 | 0.308 | 0.311 |
| | 0.317 | 0.32 |
| | 0.319 | 0.3 |
| | 0.311 | 0.293 |
| Reference Range: 6300~7000K | | |

7080

| Bin | CIE X | CIE Y |
|-----------------------------|-------|-------|
| Y6-3 | 0.308 | 0.311 |
| | 0.297 | 0.300 |
| | 0.290 | 0.318 |
| | 0.303 | 0.333 |
| Reference Range: 7000~8000K | | |

| Bin | CIE X | CIE Y |
|-----------------------------|-------|-------|
| Y9-3 | 0.311 | 0.293 |
| | 0.302 | 0.283 |
| | 0.297 | 0.300 |
| | 0.308 | 0.311 |
| Reference Range: 7000~8000K | | |

8090

| Bin | CIE X | CIE Y |
|-----------------------------|-------|-------|
| Y6-2 | 0.289 | 0.291 |
| | 0.281 | 0.309 |
| | 0.290 | 0.318 |
| | 0.297 | 0.300 |
| Reference Range: 8000~9000K | | |

| Bin | CIE X | CIE Y |
|-----------------------------|-------|-------|
| Y9-2 | 0.295 | 0.276 |
| | 0.289 | 0.291 |
| | 0.297 | 0.300 |
| | 0.302 | 0.283 |
| Reference Range: 8000~9000K | | |

90100

| Bin | CIE X | CIE Y |
|------------------------------|-------|-------|
| Y6-1 | 0.283 | 0.284 |
| | 0.274 | 0.301 |
| | 0.281 | 0.309 |
| | 0.289 | 0.291 |
| Reference Range: 9000~10000K | | |

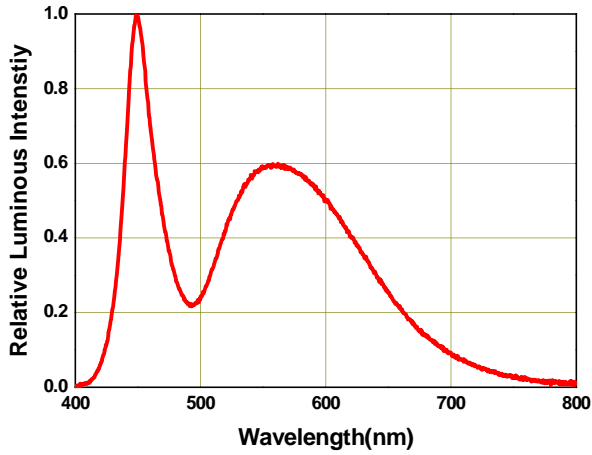
| Bin | CIE X | CIE Y |
|------------------------------|-------|-------|
| Y9-1 | 0.290 | 0.270 |
| | 0.283 | 0.284 |
| | 0.289 | 0.291 |
| | 0.295 | 0.276 |
| Reference Range: 9000~10000K | | |

Note.

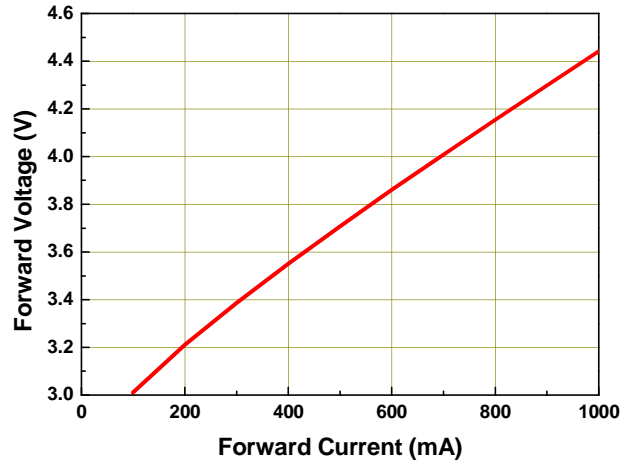
X, Y color coordinates measurement tolerance: ± 0.01 .

Typical Electro-Optical Characteristics Curves

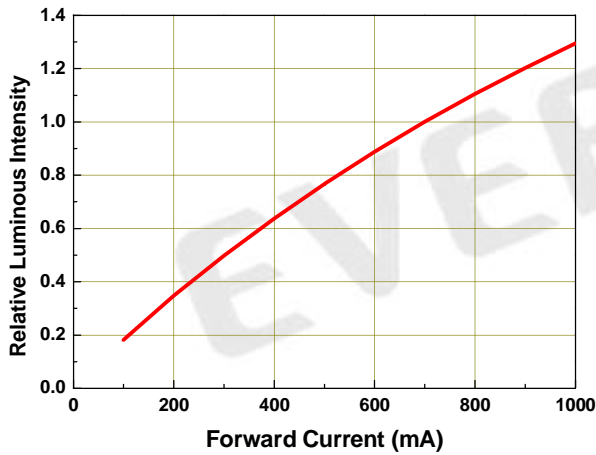
Relative Spectral Distribution,
 $I_F=700\text{mA}$, $T_{\text{Soldering}}=25^\circ\text{C}$



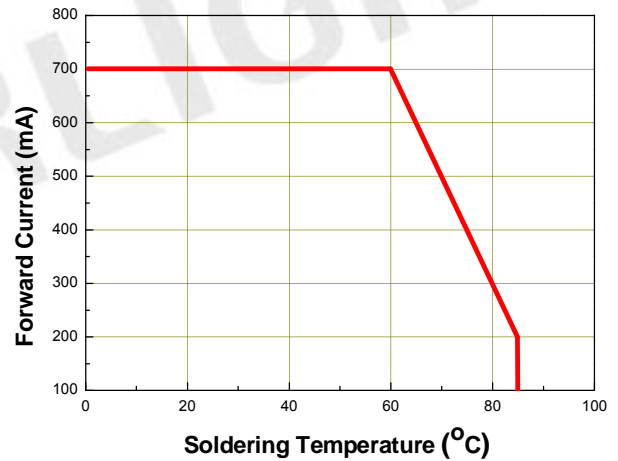
Forward Voltage vs. Forward Current,
 $T_{\text{Soldering}}=25^\circ\text{C}$



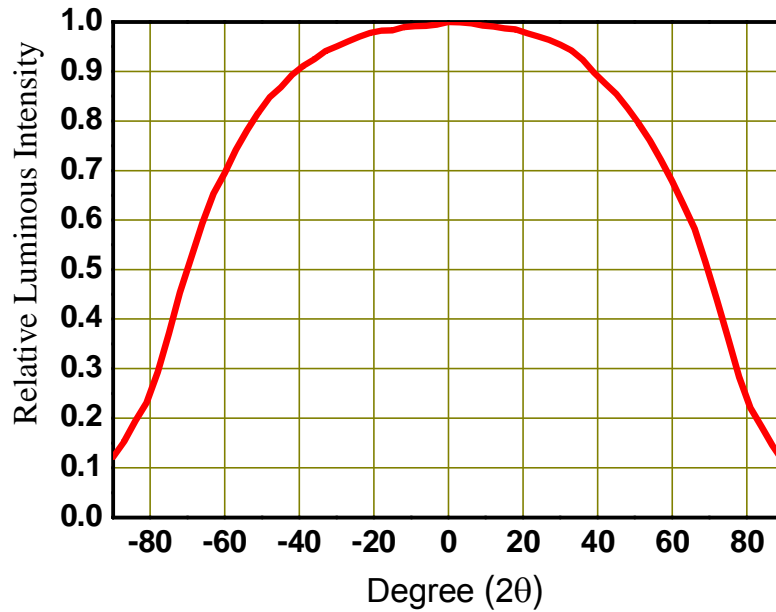
Relative Luminous Intensity vs. Forward Current, $T_{\text{Soldering}}=25^\circ\text{C}$



Forward Current Derating Curve,
Derating based on $T_{\text{JMAX}}=125^\circ\text{C}$

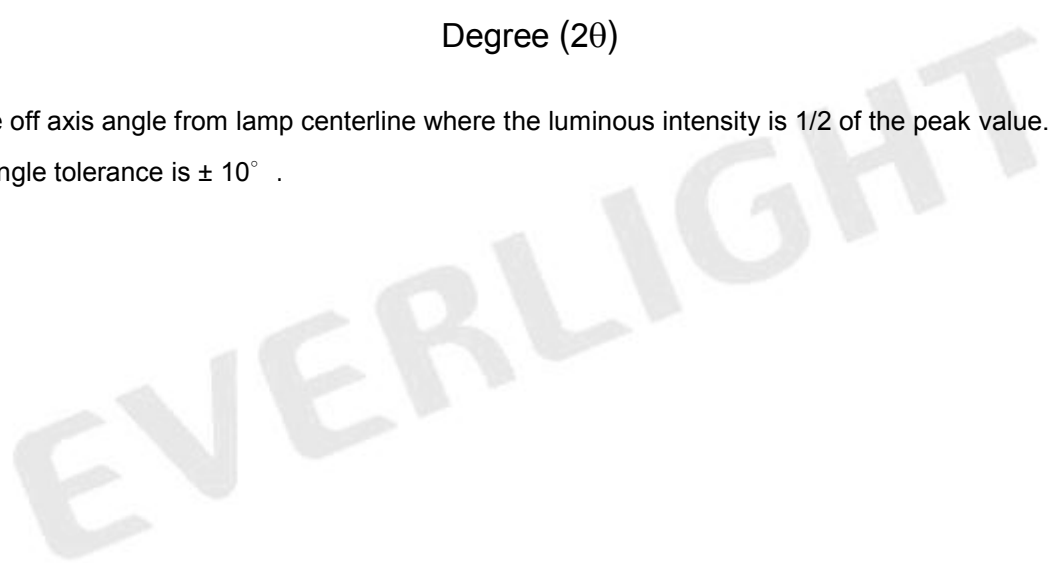


Typical Representative Spatial Radiation Pattern



Note.

- 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. Viewing angle tolerance is $\pm 10^\circ$.



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Label explanation

CPN: Customer's Production Number

P/N : Production Number

QTY: Packing Quantity

CAT: Rank of Luminous Flux

HUE: Color Rank

REF: Rank of Forward Voltage

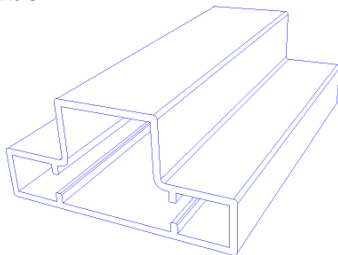
LOT No: Lot Number

MADE IN TAIWAN: Production Place

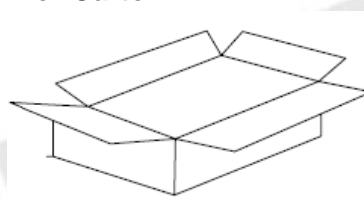


Tube Packing Specifications

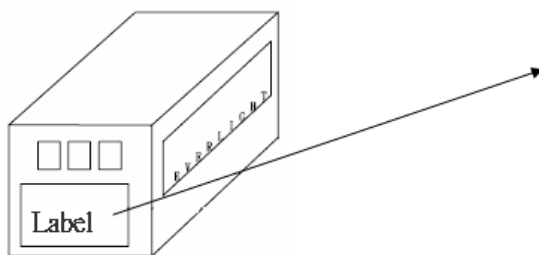
1. Tube



2. Inner Carton



3. Outside Carton



- **Packing Quantity**
 1. 50 Pcs / Per Tube
 2. 20 Tubes / Inner Carton
 3. 12 Inner Cartons / Outside Carton



Reliability Data

| Stress Test | Stress Condition | Stress Duration |
|-------------------------------------|---|-----------------|
| Reflow | Tsol=260 , 10sec, 6min | 3 times |
| Thermal Shock | H : + 100 20min. ┆ 10sec. L : - 10 20min. | 300 Cycles |
| Temperature Cycle | H : + 85 30min. ┆ 5min. L : - 40 30min. | 300 Cycles |
| High Temperature/Humidity Operation | Ta=85 , RH=60%, IF=500mA | 1000hours |
| Room Temperature Operation Life | Ta=25 , IF=700mA | 1000hours |
| High Temperature Operation Life #1 | Ta=55 , IF=600mA | 1000hours |
| High Temperature Operation Life #2 | Ta=85 , IF=500mA | 1000hours |
| Low Temperature Operation Life | Ta=-40 , IF=700mA | 1000hours |

Failure Criteria:

1. LEDs are open or shorted
2. Im: luminous flux attenuate difference(1000hrs)>50%
3. VF: forward voltage difference(1000hrs)>20%

Precautions For Use

Over-current-proof

Although the EHP-AX08 series has a conductive ESD protection mechanism, customer must not use the device in reverse and should apply resistors for extra protection. Otherwise, slight voltage shifts may cause significant current change resulting in burn out failure.

1. Storage

- i. Do not open the packaging bag before the devices are ready to use.
- ii. Before the package is opened, LEDs should be stored at temperatures less than 30 and humidity less than 50%.
- iii. LEDs may be stored for 6 months. When the storage time has reached more than 6 months, LEDs should be stored in a sealed container filled with the Nitrogen gas.
- iv. After the package is opened, LEDs should be stored at temperatures less than 30 and humidity less than 30%.
- v. LEDs should be used within 168 hours (7 days) after the package is opened.
- vi. Before using LEDs, baking treatment should be implemented based on the following conditions: pre-curing at 60±5 for 24 hours.

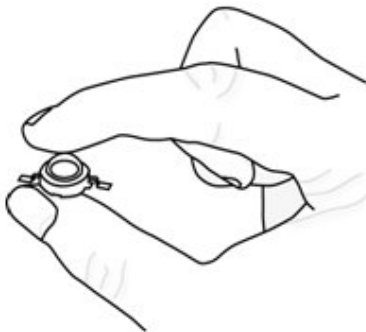
2. Thermal Management

- i. For maintaining the high flux output and achieving maximum reliability, EHP-AX08 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 3W of thermal energy at 700mA operation.
- ii. Heat dissipation or thermal conduction design is strongly recommended on PCB or MCPCB for reflow soldering purposes. Please refer to soldering patterns on Page 2.
- iii. Sufficient thermal management must be implemented. Please refer to the graph "Forward Current Derating Curve " on Page 8. The soldering temperature must be kept under 60 at the driving current 700mA. Otherwise, the junction temperature of die may exceed over the limit at high current driving conditions and the LEDs' lifetime may be decrease dramatically.
- iv. 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.
- v. 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.

3. Proper Handling

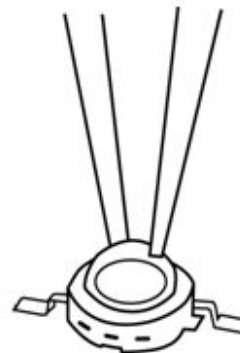
To avoid contamination of materials, damage of internal components, and shortening of LED lifetime, do not subject LEDs to conditions as those listed below.

Bare Hand



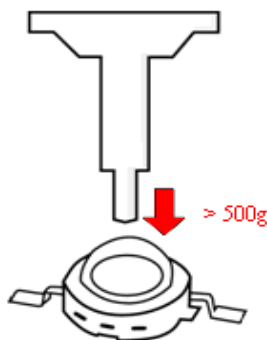
When handling the product, do not apply direct pressure on the resin.

Tweezers



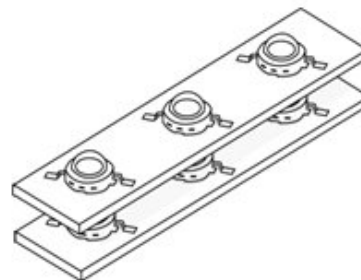
Do not touch the resin to avoid scratching or other damage.

Pick and Place Nozzle for Surface Mount Assembly.



Avoid directly contacting the lens with downward force of more than 500g.

During Module Assembly



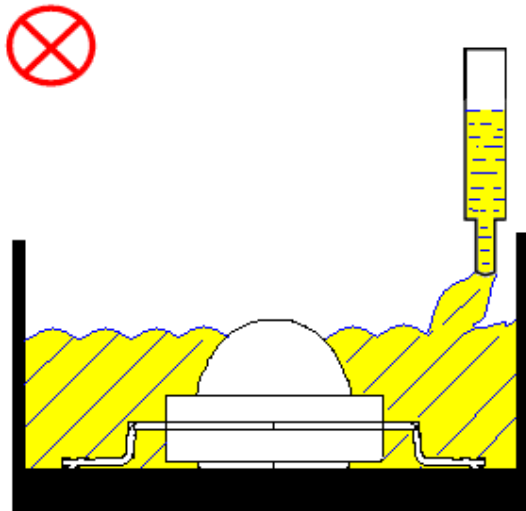
Do not stack the modules together, it could damage the resin or scratch the lens.

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During Module Assembly



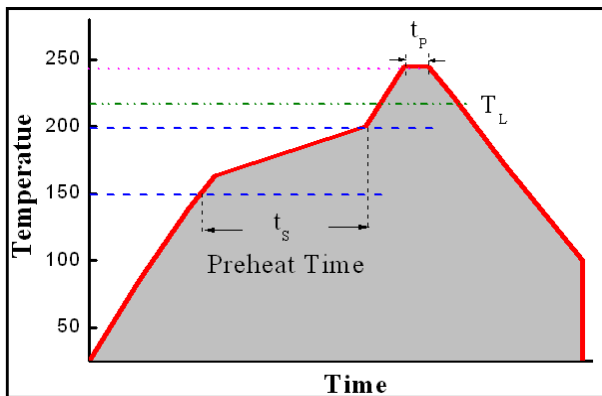
Sealing process with water-proof silicone is not suitable for EHP-AX08 Products.

EVERLIGHT

4. Soldering Iron

i. For Reflow Process

- a. EHP-AX08 series are suitable for SMT process.
- b. Curing of glue in oven according to standard operation flow processes.



| Profile Feature | Lead Free Assembly |
|--------------------------|--------------------|
| Ramp-Up Rate | 2-3 °C/S |
| Preheat Temperature | 150-200 °C |
| Preheat Time (ts) | 60-120 S |
| Liquid Temperature (TL) | 217 °C |
| Time maintained above TL | 60-90 S |
| Peak Temperature (Tp) | 240±5 °C |
| Peak Time (tp) | Max 20 S |
| Ramp-Down Rate | 3-5 °C/S |

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

ii. For Manual Soldering Process

- a. For prototype builds or small series production runs it is possible to place and solder the LED by hand.
- b. Dispense thermal conductive glue or grease on the substrates and follow its curing specifications. Gently press LED housing to closely connect LED and substrate.
- c. It is recommended to hand solder the leads with a solder tip temperature of 280°C for less than 3 second, at a time with a soldering iron of less than 25W. Solder at intervals of two seconds or more.
- d. Take caution and be aware that damaged products are often a result of improper hand soldering technique.



Revision History

| Page | Subjects(major change in previous version) | Date of change |
|------|--|----------------|
| 13 | Change Proper Handling | 2010/08/11 |
| | | |
| | | |
| | | |

■ Prepared date: 11- Aug-2010 ■ Device No.: DHE-0001189
 ■ Created by: Iris Yeh ■ Rev.: 2

For product information and a complete list of distributors, please go to our web site : www.everlight.com

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