

# EHP-AX08EL/GT01H-P03/5670/Y/N21



High Power LED – 3 W



## Data Sheet



### Features

- ◆ Feature of the device: Small package with high efficiency
- ◆ Typical color temperature: 6300 K.
- ◆ Typical viewing angle: 140°
- ◆ Typical light flux output: 180 lm @700mA.
- ◆ ESD protection.
- ◆ Soldering methods: SMT
- ◆ Grouping parameter: Luminous Flux, Forward Voltage and Chromaticity.
- ◆ Optical efficiency:66 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

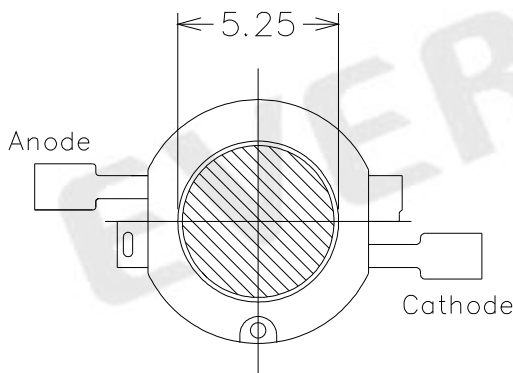
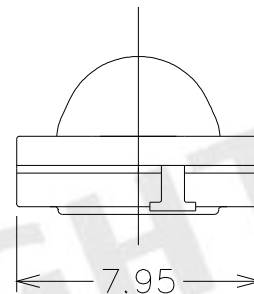
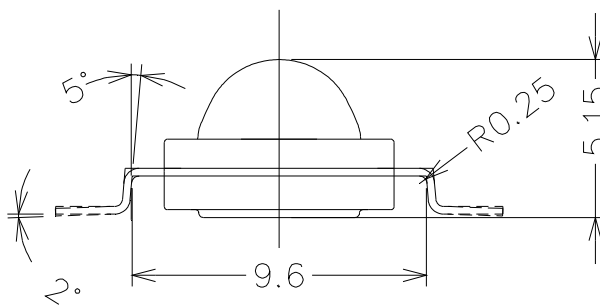
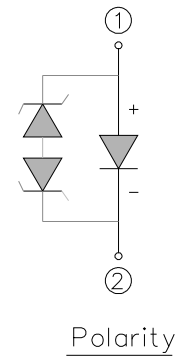
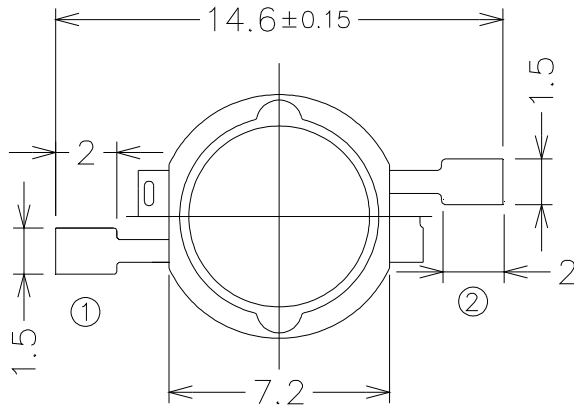
Items	Description
Housing black body	Heat resistant polymer
Encapsulating Resin	Silicone resin
Electrodes	Au plating copper alloy
Die attach	Silver paste
Chip	InGaN

# EHP-AX08EL/GT01H-P03/5670/Y/N21

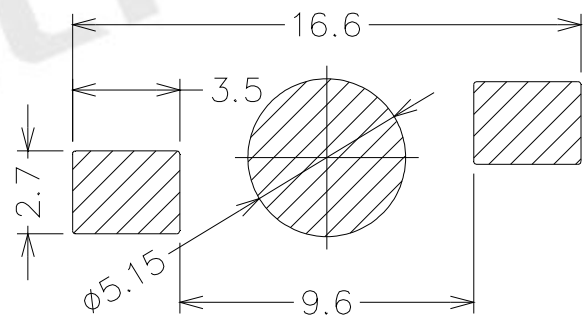
High Power LED – 3 W



## Dimensions



Bot. view



Soldering patterns

### Notes.

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

# EHP-AX08EL/GT01H-P03/5670/Y/N21

High Power LED – 3 W



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

Parameter	Symbol	Rating	Unit
DC Operating Current	$I_F$	750	mA
Pulsed Forward Current <sup>(1)</sup>	$I_{PF}$	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 ( $T_{\text{Soldering}}=25^{\circ}\text{C}$ )

Parameter	Bin	Symbol	Min	Typ.	Max	Unit	Condition
Luminous Flux <sup>(2)</sup>	----	$\Phi_v$	160	180	----	lm	$I_F=700\text{mA}$
Forward Voltage <sup>(3)</sup>	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	----	$CCT$	5650	6300	7000	K	
Color Rendering Index <sup>(4)</sup>	----	$CRI$	----	70	----	----	

### Note.

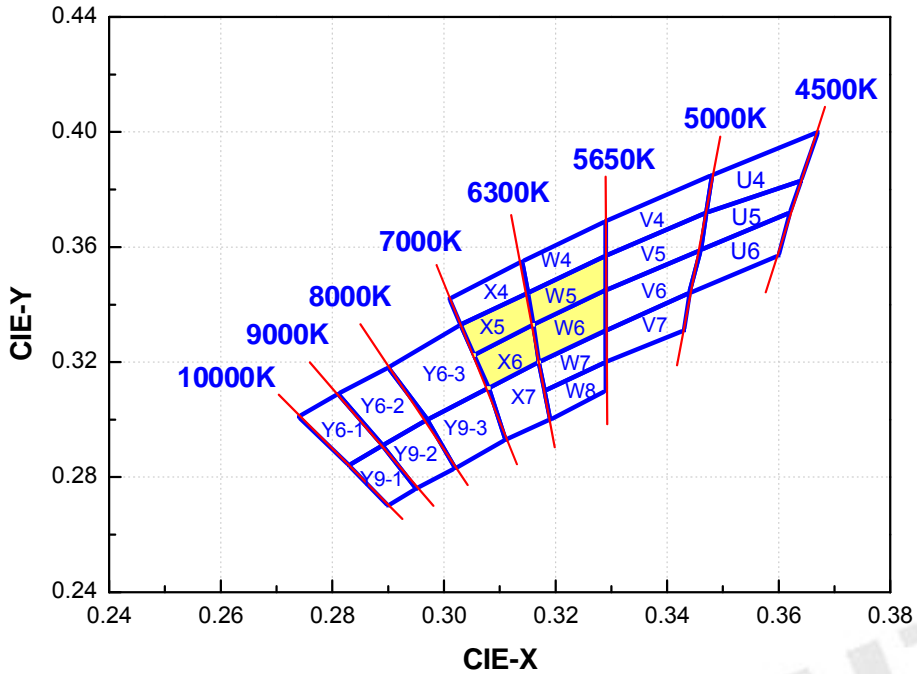
1.  $t_p$  100  $\mu\text{s}$ , Duty cycle = 0.25
2. Luminous Flux measurement tolerance:  $\pm 10\%$ .
3. Forward Voltage measurement tolerance:  $\pm 0.1\text{V}$
4. Color Rendering Index measurement tolerance:  $\pm 5$

5. Luminous Flux Bin Table

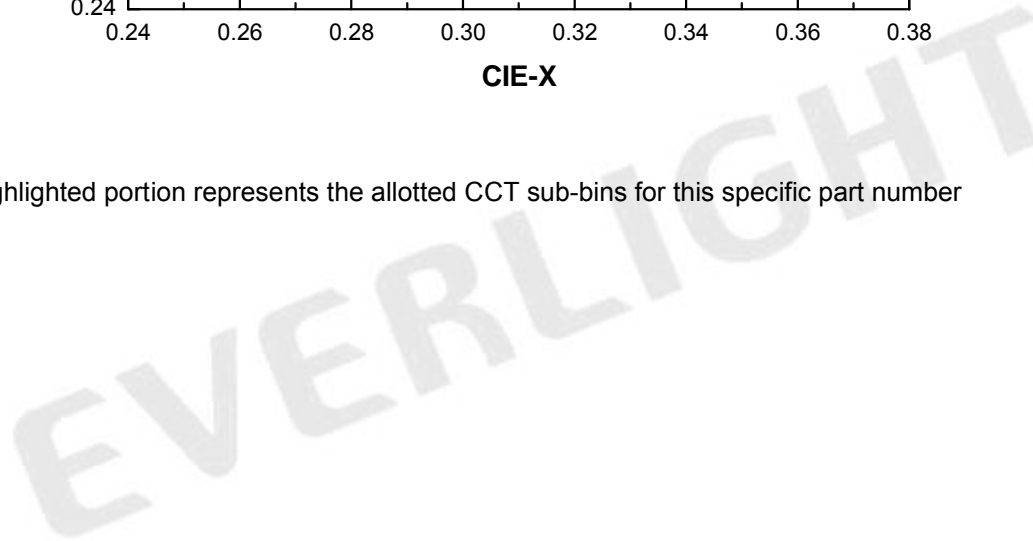
Group	Bin	Min	Typ.	Max
E	1	1.5	----	3
	2	3	----	4
	3	4	----	5
	4	5	----	6
	5	6	----	8
F	1	8	----	10
	2	10	----	13
	3	13	----	17
	4	17	----	20
	5	20	----	23
J	1	23	----	27
	2	27	----	33
	3	33	----	39
	4	39	----	45
	5	45	----	52
K	1	52	----	60
	2	60	----	70
	31	70	----	75
	32	75	----	80
	33	80	----	85
	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



# EHP-AX08EL/GT01H-P03/5670/Y/N21

High Power LED – 3 W



## 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		

# EHP-AX08EL/GT01H-P03/5670/Y/N21

High Power LED – 3 W



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		

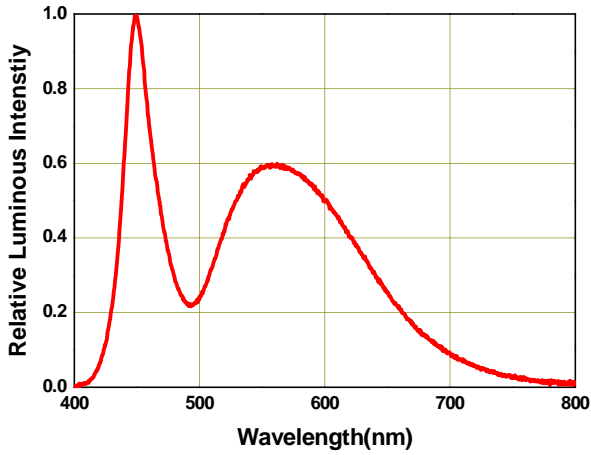
Bin	CIE X	CIE Y
Y9-1	0.290	0.270
	0.283	0.284
	0.289	0.291
	0.295	0.276
Reference Range: 9000~10000K		

### Note.

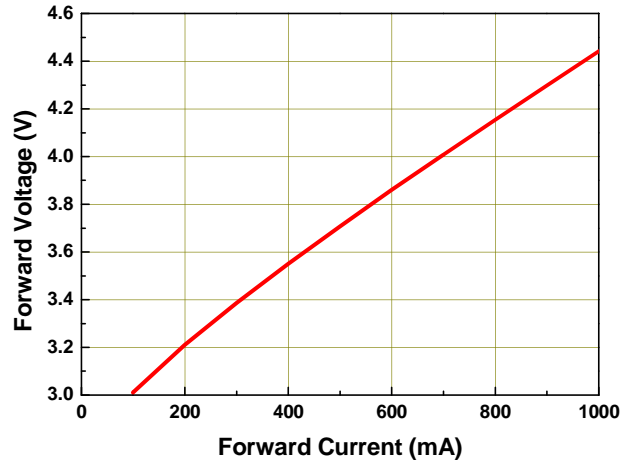
1. X, Y color coordinates measurement tolerance:  $\pm 0.01$ .

Typical Electro-Optical Characteristics Curves

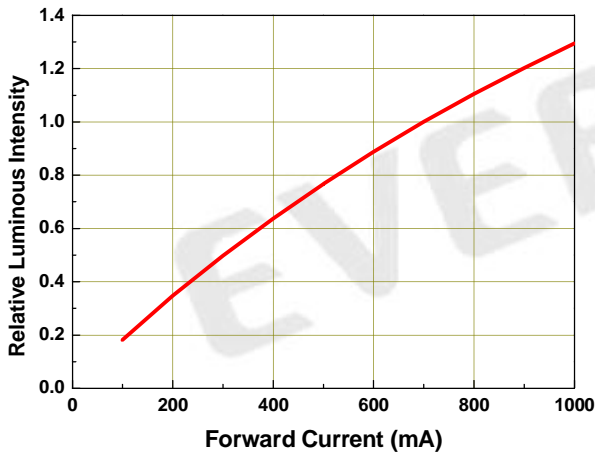
Relative Spectral Distribution,  
 $I_F=700\text{mA}$ ,  $T_{\text{Soldering}}=25^\circ\text{C}$



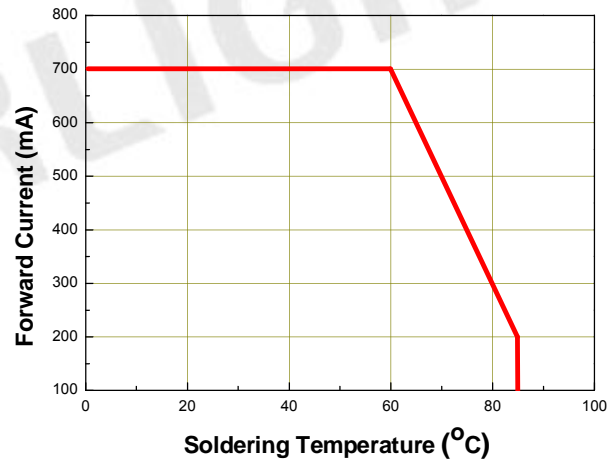
Forward Voltage vs. Forward Current,  
 $T_{\text{Soldering}}=25^\circ\text{C}$



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

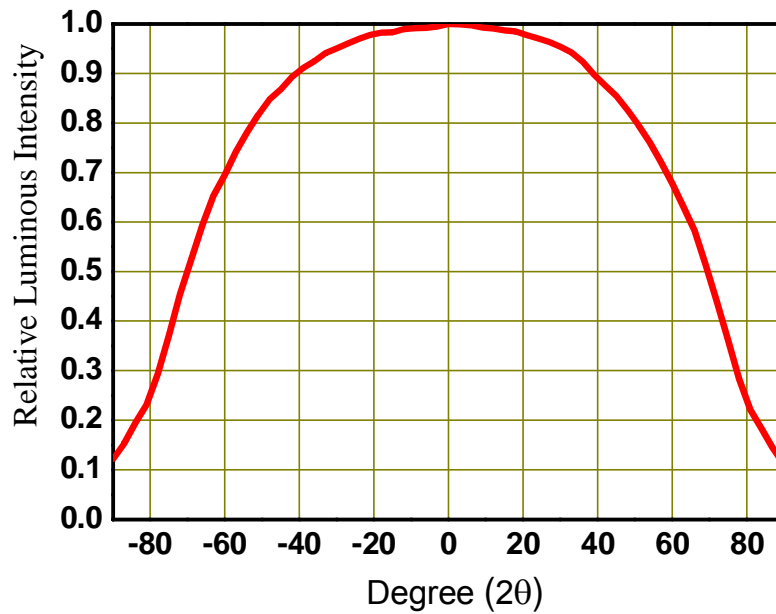


Forward Current Derating Curve,  
Derating based on  $T_{\text{JMAX}}=125^\circ\text{C}$





### 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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# EHP-AX08EL/GT01H-P03/5670/Y/N21

High Power LED – 3 W



## 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

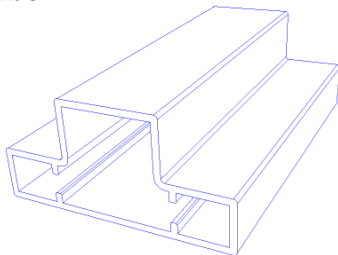
LOT No: Lot Number

MADE IN TAIWAN: Production Place

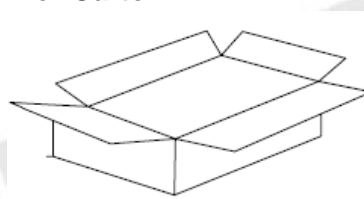


## Tube Packing Specifications

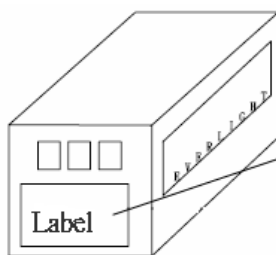
### 1. Tube



### 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.

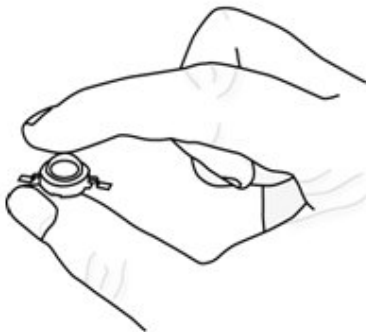
### 2. Thermal Management

- 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

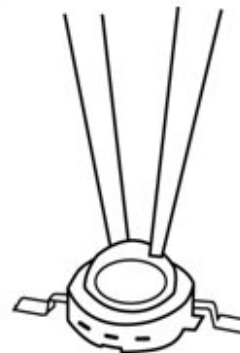
To avoid contamination of materials, damage of internal components, and shortening of LED lifetime, do not subject LEDs to conditions as those listed below.

Bare Hand



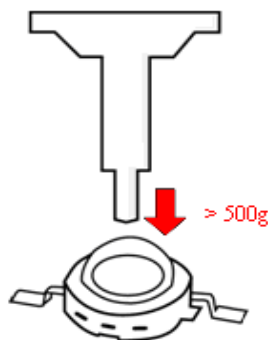
When handling the product, do not apply direct pressure on the resin.

Tweezers



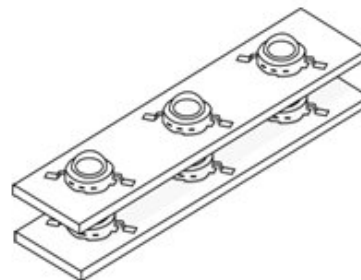
Do not touch the resin to avoid scratching or other damage.

Pick and Place Nozzle for Surface Mount Assembly.



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

During Module Assembly



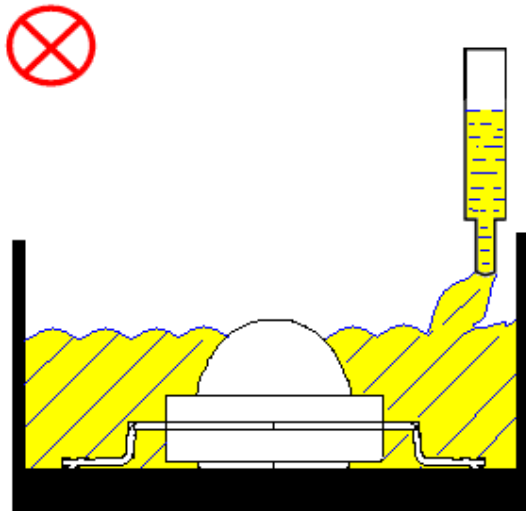
Do not stack the modules together, it could damage the resin or scratch the lens.

# EHP-AX08EL/GT01H-P03/5670/Y/N21

High Power LED – 3 W



During Module Assembly



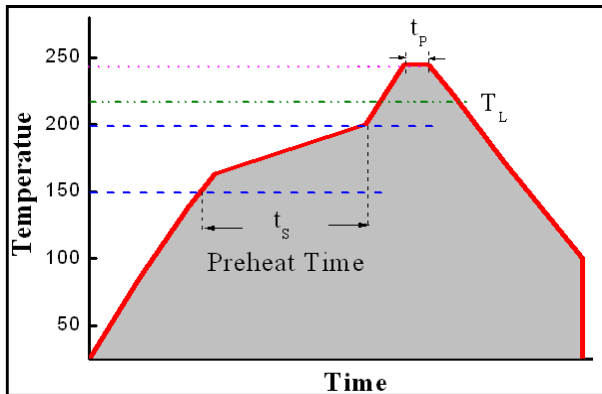
Sealing process with water-proof silicone is not suitable for EHP-AX08 Products.

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**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.

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High Power LED – 3 W



## Revision History

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

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■ Prepared date:	11-Aug-2010	■ Device No.:	DHE-0001190
■ Created by:	Iris Yeh	■ Rev.:	2

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