

EHP-B02/GRB03-P03/TR

High Power LED – 3W



Data Sheet



Features

- ◆ Feature of the device: Small package with high efficiency
- ◆ Typical view angle: 130°
- ◆ Typical **Green** flux output: 39 lm@350mA
- ◆ Typical **Red** flux output: 33 lm@350mA.
- ◆ Typical **Blue** flux output: 10 lm@350mA
- ◆ ESD protection.
- ◆ Soldering methods: SMT
- ◆ Grouping parameter: Brightness, Forward Voltage and Chromaticity.
- ◆ Moisture Sensitivity Level: 3
- ◆ Thermal resistance (Junction to Heat sink): 9 °C /W
- ◆ The product itself will remain within RoHS compliant version.

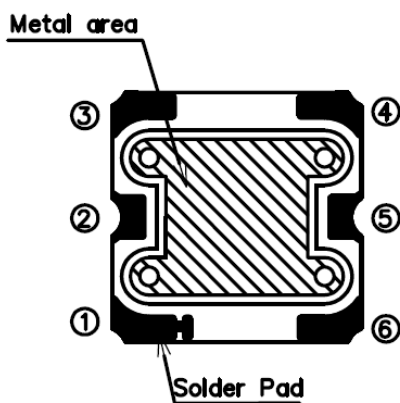
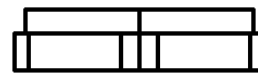
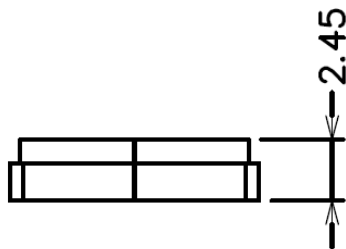
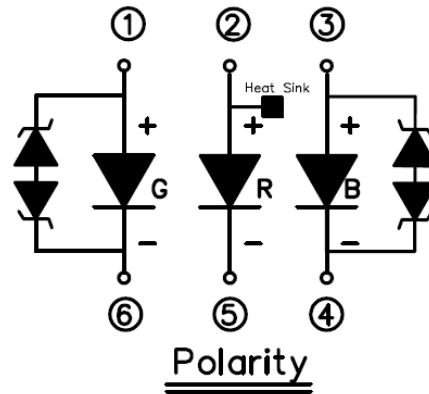
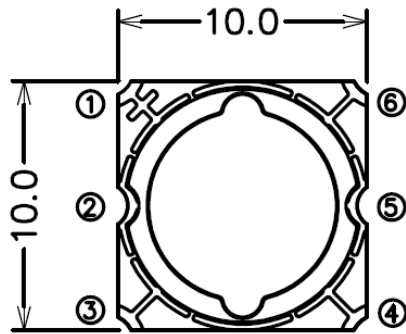
Applications

- ◆ Beacons/ Rail crossing and Wayside
- ◆ Decorative and entertainment illumination
- ◆ Indoor or Outdoor Commercial and Residential Architectura
- ◆ Uplighter/ Downlighter/ Orientation
- ◆ Street lighting

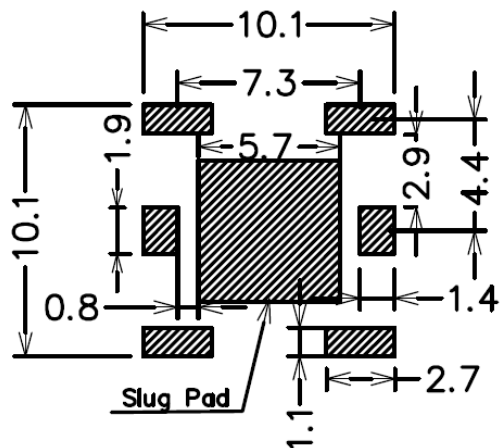
Materials

Items	Description
Substrate	PCB with Metal Heat Sink
Housing	Heat resistant polymer
Encapsulating Resin	Silicone resin
Electrodes	Au plating copper alloy
Die attach	Silver paste
Chip	Blue/Green – InGaN Red – InAlGaP

Dimensions



Bottom view



Soldering patterns

Notes.

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

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

Parameter		Symbol	Rating	Unit
DC Operating Current		I_F	400	mA
DC Pulse current ₍₁₎	Green	I_{PF}	500	mA
	Red		550	
	Blue		500	
ESD Sensitivity		ESD	8	kV
Junction Temperature		T_j	125	°C
Operating Temperature		$T_{op.}$	-40 ~ +85	°C
Storage Temperature		$T_{stge.}$	-40 ~ +100	°C
Maximum Pulse Power Dissipation		P_d	5	W
Junction To Heat-Sink Thermal Resistance		R_{th}	9	°C /W

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

Parameter	Bin	Symbol	Min	Typ.	Max	Unit	Condition
Brightness ₍₂₎	R	Φ_v	----	33	----	lm	$I_F=350mA$
	G		----	39	----		
	B		----	10	----		
Forward Voltage ₍₃₎	R	V_F	----	2.3	----	V	
	G		----	3.7	----		
	B		----	3.4	----		
Wavelength ₍₄₎	R	λ_D	----	625	----	nm	
	G		----	525	----		
	B		----	462	----		

Note.

1. $t_p \leq 100 \mu s$, Duty cycle = 0.25
2. Luminous Flux measurement tolerance: $\pm 10\%$.
3. Forward Voltage measurement tolerance: $\pm 0.1V$.
4. Wavelength measurement tolerance : $\pm 1nm$

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

Group	Bin	Min	Typ.	Max
K	1	52	----	60
	2	60	----	70
	3	70	----	85
	4	85	----	100
	5	100	----	130
N	1	130	----	160
	2	160	----	200
	3	200	----	250
	4	250	----	300
	5	300	----	400
R	1	400	----	500
	2	500	----	600
	3	600	----	750
	4	750	----	1000
	5	1000	----	1300

Forward Voltage Bin Table – Fine Range

Group	Bin	Min	Typ.	Max
U1	1	1.75	----	1.85
	2	1.85	----	1.95
	3	1.95	----	2.05
U2	1	2.05	----	2.15
	2	2.15	----	2.25
	3	2.25	----	2.35
U3	1	2.35	----	2.45
	2	2.45	----	2.55
	3	2.55	----	2.65
U4	1	2.65	----	2.75
	2	2.75	----	2.85
	3	2.85	----	2.95

Group	Bin	Min	Typ.	Max
V1	1	2.95	----	3.05
	2	3.05	----	3.15
	3	3.15	----	3.25
V2	1	3.25	----	3.35
	2	3.35	----	3.45
	3	3.45	----	3.55
V3	1	3.55	----	3.65
	2	3.65	----	3.75
	3	3.75	----	3.85
V4	1	3.85	----	3.95
	2	3.95	----	4.05
	3	4.05	----	4.15
V5	1	4.15	----	4.25
	2	4.25	----	4.35
	3	4.35	----	4.45

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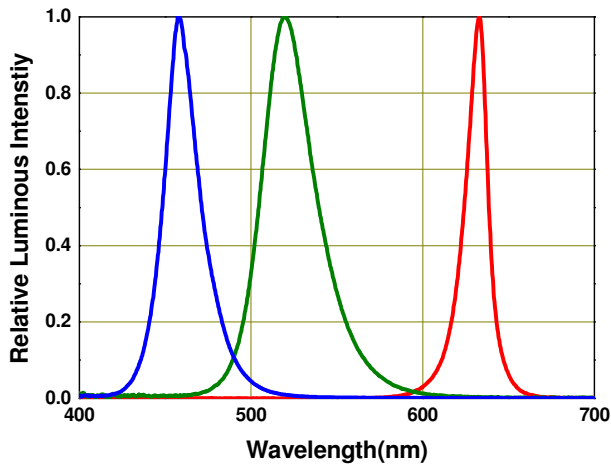
Wavelength Bin Table

Group	Bin	Min	Typ.	Max
B	3	440	----	445
	4	445	----	450
	5	450	----	455
	6	455	----	460
	7	460	----	465
	8	465	----	490
C	1	490	----	495
	2	495	----	500
	3	500	----	505
	4	505	----	510
	5	510	----	515
	6	515	----	520
G	1	520	----	525
	2	525	----	530
	3	530	----	535
	4	535	----	540
	5	540	----	545
	6	545	----	550

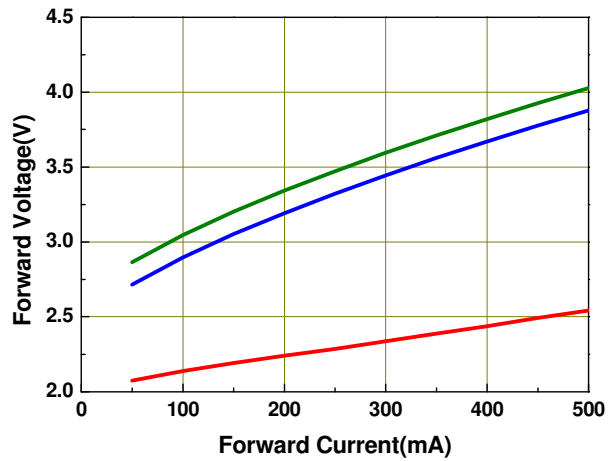
Group	Bin	Min	Typ.	Max
A	1	580	----	582.5
	2	582.5	----	585
	3	585	----	587.5
	4	587.5	----	590
	5	590	----	592.5
	6	592.5	----	610
R	3	610	----	615
	4	615	----	620
	5	620	----	625
	6	625	----	630
	7	630	----	635
	8	635	----	640

Typical Electro-Optical Characteristics Curves

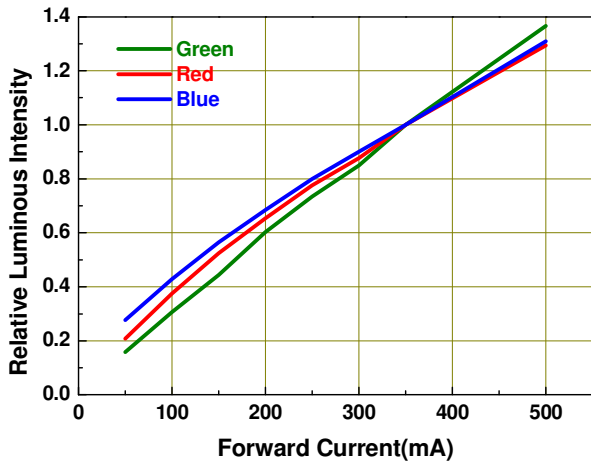
Relative Spectral Distribution,
 $I_F=350\text{mA}$, $T_{\text{Soldering}}=25^\circ\text{C}$



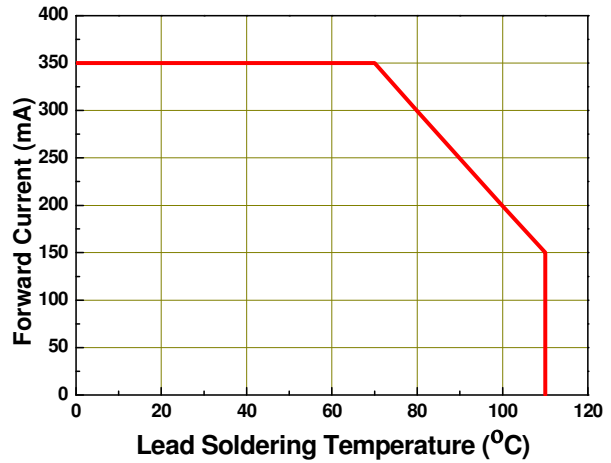
Forward Voltage vs Forward Current,
 $T_{\text{Soldering}}=25^\circ\text{C}$



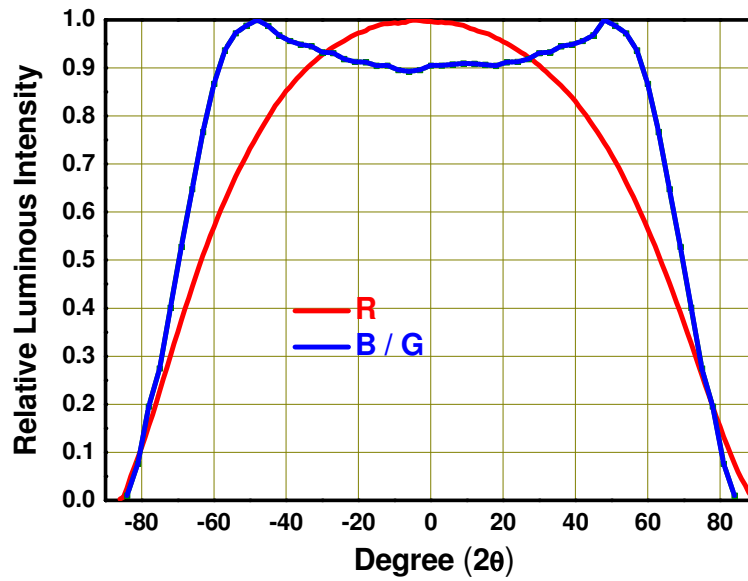
Relative Luminous Intensity vs Forward Current,
 $T_{\text{Soldering}}=25^\circ\text{C}$



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. View angle tolerance is $\pm 5^\circ$.

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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

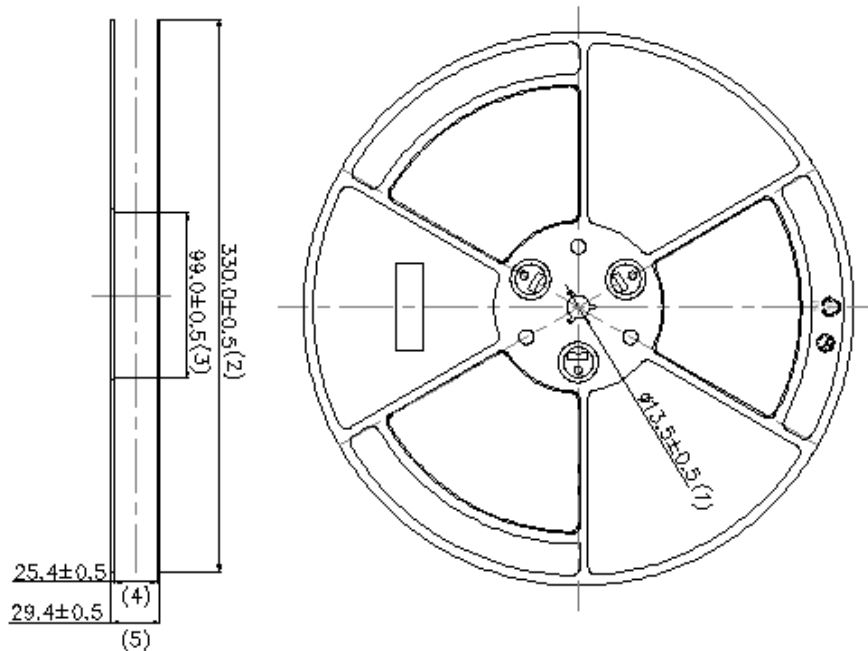
REF: Rank of Forward Voltage

LOT No: Lot Number

MADE IN TAIWAN: Production Place



Reel Dimensions



Note.

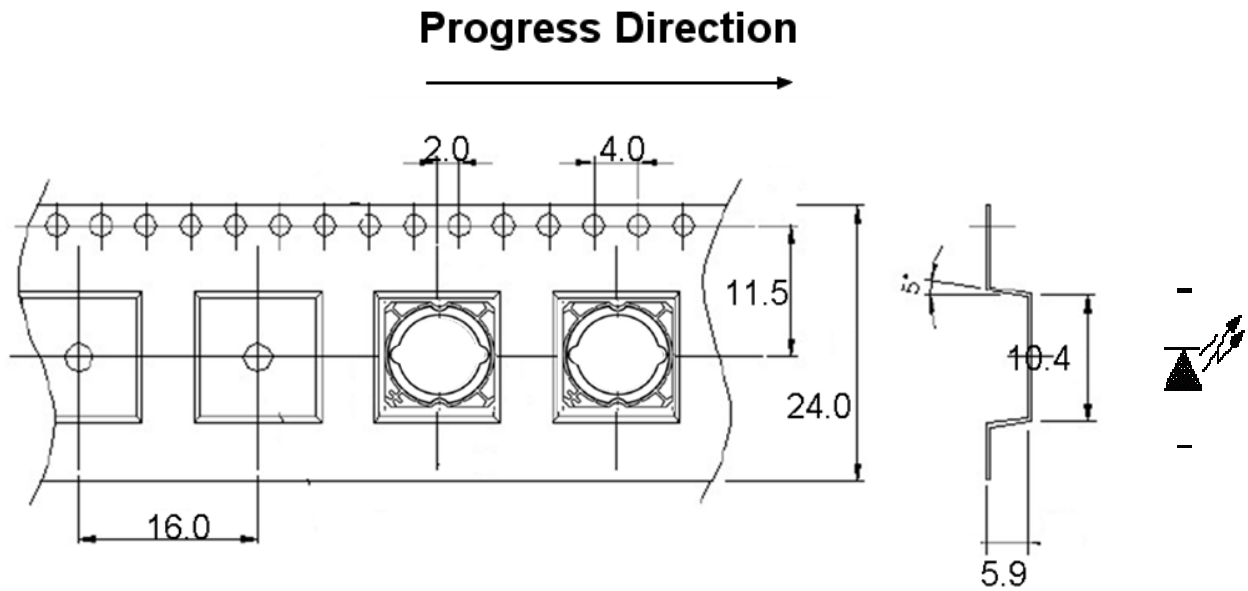
- 1. Dimensions are in millimeters.
- 2. Tolerances for fixed dimensions are ± 0.1 mm.

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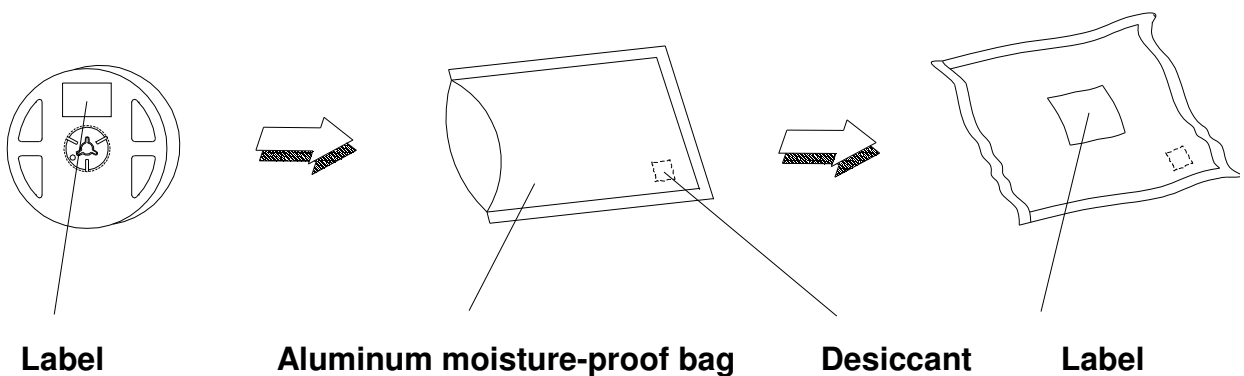
Carrier Tape Dimensions: Loaded quantity 300 PCS per reel



Note.

1. Dimensions are in millimeters.
2. Tolerances for fixed dimensions are ± 0.1 mm.

Moisture Resistant Packaging



Reliability Data

Stress Test	Stress Condition	Stress Duration
Reflow	Tsol=260°C, 10sec, 6min	3 times
Thermal Shock	H : +100°C 20min. ↓ 20sec. 'L : -10°C 20min.	200 Cycles
Temperature Cycle	H : +100°C 30min. ↓ 5min. 'L : -40°C 30min.	200 Cycles
Power Temperature Cycle	H : +85°C 15min. ↓ 5min. 'L : -40°C 15min. IF= 400 mA, 2min on/off	200 Cycles
High Temperature/Humidity Storage	Ta=85°C, RH=85%	1000hours
High Temperature/Humidity Operation	Ta=85°C, RH=85%, IF=225mA	1000hours
Low Temperature Operation Life	Ta= -40°C, IF=350mA	1000hours
High Temperature Operation Life #1	Ta=25°C, IF=350mA	1000hours
High Temperature Operation Life #2	Ta=55°C, IF=350mA	1000hours
High Temperature Operation Life #3	Ta=85°C, IF=225mA	1000hours
High Temperature Storage	Ta= 110°C	1000hours
Low Temperature Storage	Ta= -40°C	1000hours
ESD Human Body Model	2000V, Interval : 0.5sec	3 times
ESD Machine Model	200V, Interval : 0.5sec	3 times

*Im: BRIGHTNESS ATTENUATE DIFFERENCE(1000hrs) < 30%

*VF: FORWARD VOLTAGE DIFFERENCE < 20%

Precautions For Use

1. Over-current-proof

Although the EHP-B02 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.

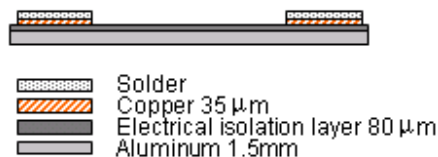
2. Storage

- i. Do not open the moisture proof bag before the devices are ready to use.
- ii. Before the package is opened, LEDs should be stored at temperatures less than 30°C and humidity less than 90%.
- iii. LEDs should be used within a year.
- iv. After the package is opened, LEDs should be stored at temperatures less than 30°C and humidity less than 60%.
- v. LEDs should be used within 168 hours (7 days) after the package is opened.
- vi. If the moisture absorbent material (silicone gel) has faded away or LEDs have exceeded the storage time, baking treatment should be implemented based on the following conditions: pre-curing at **80±5°C for 24 hours**.

3. Thermal Management

- i. For maintaining the high flux output and achieving reliability, EHP-B02 series LED package should be mounted on a metal core printed circuit board (MCPCB) with proper thermal connection to dissipate approximately 5W of thermal energy under 700mA operation.

MCPCB structure



Recommend:

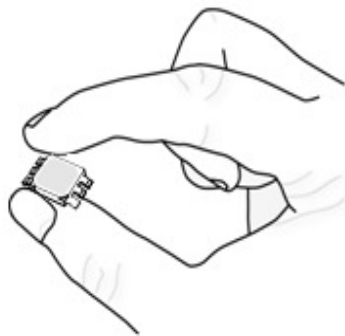
$$\text{Max } T_{\text{Slug}} = 70^{\circ}\text{C}$$

- ii. 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.
- iii. 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.

4. 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



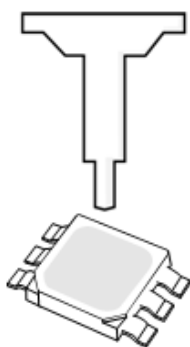
When handling the product, do not apply direct pressure on the resin.

Tweezers



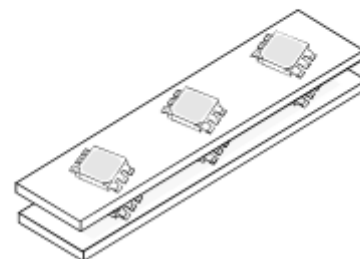
Do not touch the resin to avoid scratching or other damage.

Pick and Place Nozzle for Surface Mount Assembly.



Avoid directly contacting with nozzle.

During Module Assembly

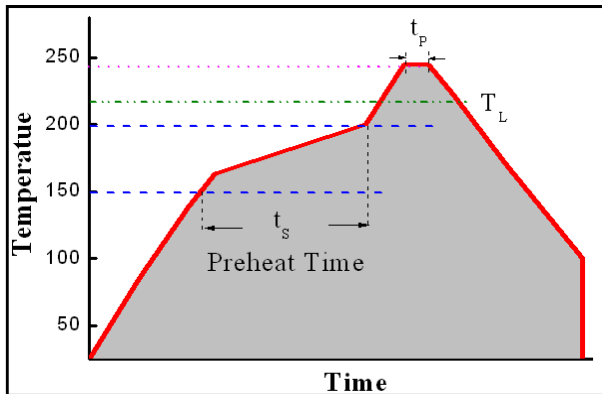


Do not stack the modules together, it could damage the resin or scratch the lens.

5. Soldering Iron

i. For Reflow Process

- a. EHP-B02 series are suitable for SMT
- 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.



Revision History

Current version: **2009/07/16**

Previous version: **4**

Page	Subjects(major change in previous version)	Date of change
2	Revised pattern of soldering	2009.07.16
3	Revised operating condition T_{ambient} to $T_{\text{soldering}}$	2009.07.16
7	Revised operating condition T_{ambient} to $T_{\text{soldering}}$	2009.07.16

■ Prepared date: 2009.07.16 ■ Device No.: DHE-0000123

■ Created by: Brady Chou ■ Rev.: 5.0

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

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