

**Technical Data Sheet
High Power LED -1W**

EHP-C04/NT01H-P01/TR

Features

- Feature of the device: small package with high efficiency
- Color coordinates: $x=0.31$, $y=0.32$ according to CIE 1931
- Typical color temperature: 5700 K.
- ESD protection.
- Soldering methods: SMT
- Grouping parameter: total luminous flux, color coordinates.
- Typical luminous flux: 60 lm @ 500 mA.
- Typical optical efficiency: 40 lm/W.
- The product itself will remain within RoHS compliant version.



Applications

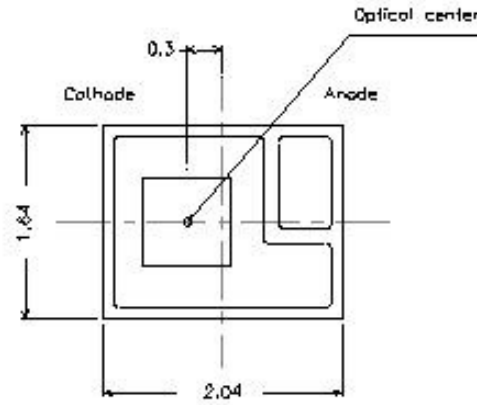
- Mobile phone flash
- Exterior and interior illumination applications
- Decorative and entertainment
- Exterior and interior automotive illumination

Materials

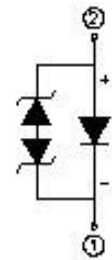
Items	Description
Substrate	Thermally conductive ceramics
Encapsulating Resin	Silicone resin with phosphor
Electrodes	Ag plating
Die attach	Silver paste
Chip	InGaN

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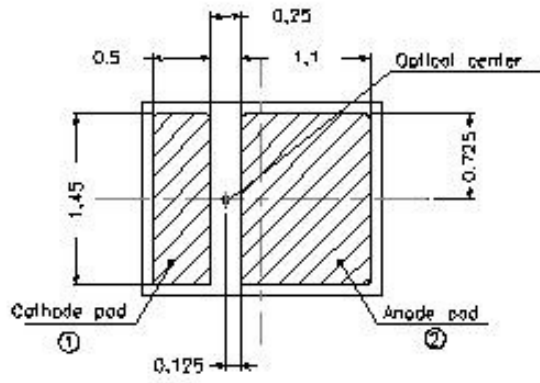
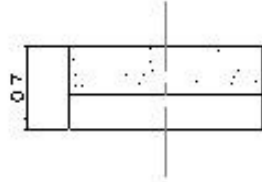
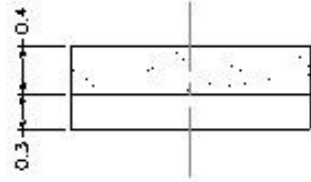
Dimensions



Chip position
Top view



Polarity



Bottom view

Notes :

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

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

Parameter	Symbol	Rating	Unit
DC Operating Current (Torch Mode)	I_F	350	mA
Pulsed Forward Current (50ms : ON , 950ms : OFF)	I_F	1000	mA
ESD Sensitivity (JEDEC 3b)	ESD	8000	V
Junction Temperature	T_j	125	$^{\circ}C$
Operating Temperature	T_{opr}	-40 ~ +85	$^{\circ}C$
Storage Temperature	T_{stg}	-40 ~ +100	$^{\circ}C$
Power Dissipation (Pulse Mode)	P_d	4.2	W
Viewing Angle ⁽²⁾	$2\theta_{1/2}$	130	deg

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 measurement tolerance $\pm 5^{\circ}$

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

Parameter	Bin	Symbol	Min	Typ.	Max	Unit	Condition
Luminous Flux ⁽¹⁾	----	Φ_V	70	85	----	lm	$I_F=500mA$
Forward Voltage ⁽²⁾	----	V_F	2.95	----	4.15	V	
Color Temperature	----	CCT	4500	----	7000	K	

Forward Voltage Binning

Parameter	Bin	Symbol	Min	Typ.	Max	Unit	Condition
Forward Voltage	S4	V_F	2.95	----	3.35	V	$I_F=500mA$
	T1		3.35	----	3.75		
	T2		3.75	----	4.15		

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Luminous Flux Binning

Parameter	Bin	Symbol	Min	Typ.	Max	Unit	Condition
Luminous Flux	K3	ϕ_v	70	----	85	lm	$I_f=500mA$
	K4		85	----	100		
	K5		100	----	130		
	N1		130	----	160		

Notes :

1. Luminous flux measurement tolerance: $\pm 10\%$
2. Forward voltage measurement tolerance: $\pm 0.1V$
3. Electric and optical data is tested at 50ms pulse condition.

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Color Binning

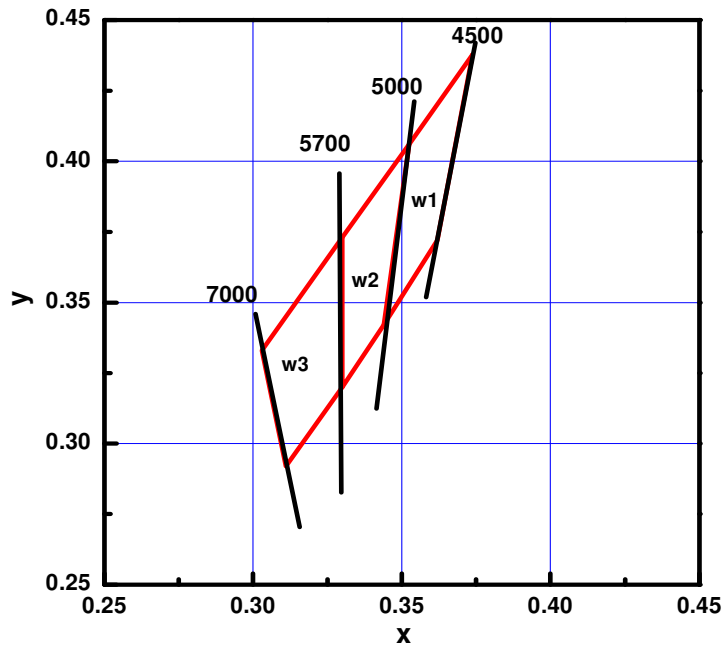
Rank W1				
x	0.3738	0.3524	0.362	0.344
y	0.4378	0.4061	0.372	0.342
Reference CCT: 4500K-5000K				
Rank W3				
x	0.303	0.311	0.330	0.33
y	0.333	0.292	0.373	0.32
Reference CCT: 5700K-7000K				

Rank W2				
x	0.330	0.3524	0.344	0.33
y	0.373	0.4061	0.342	0.32
Reference CCT: 5000K-5700K				

Notes :

1. Color coordinates measurement allowance : ± 0.01
2. Color bins are defined at $I_f=500\text{mA}$ and 50ms pulse operation condition.

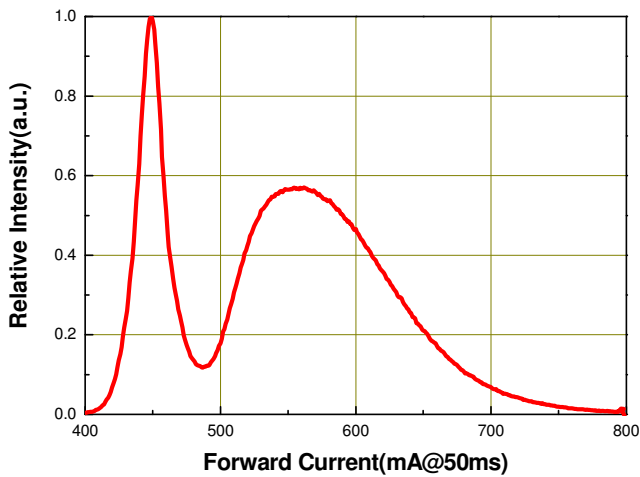
Color Binning Structure Graphic Representation



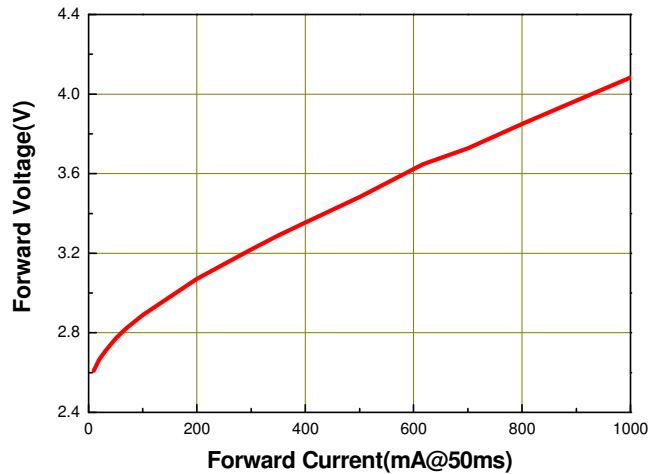
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Typical Electro-Optical Characteristics Curves

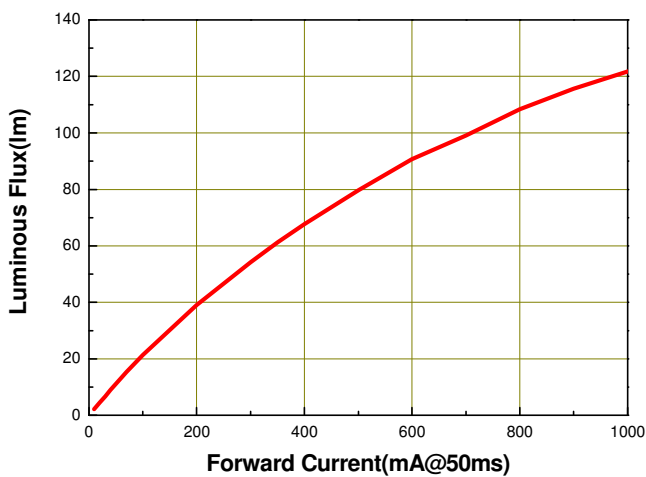
Relative Spectral Distribution,
 $I_f=350\text{mA}@50\text{ms}$, $T_{\text{soldering}}=25^\circ\text{C}$



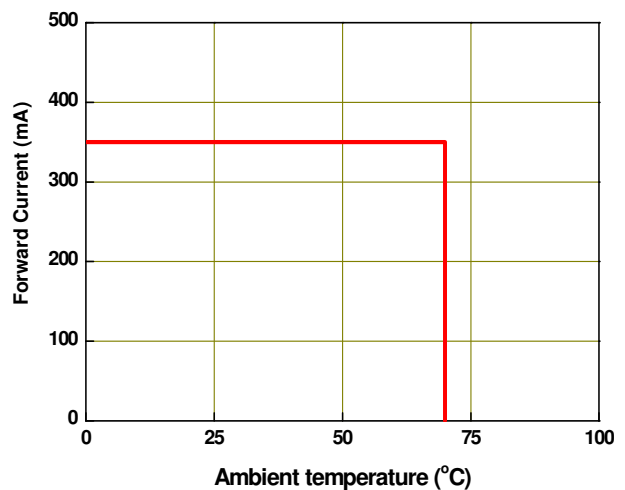
Forward Voltage vs. Forward Current,
 $T_{\text{soldering}}=25^\circ\text{C}$



Luminous Flux vs. Forward Current,
 $T_{\text{soldering}}=25^\circ\text{C}$

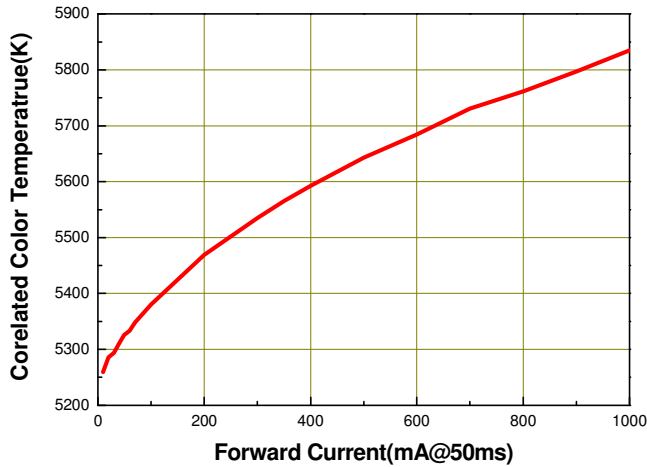


Forward Current Derating Curve,
Derating based on $T_{\text{JMAX}}=125^\circ\text{C}$ at torch mode

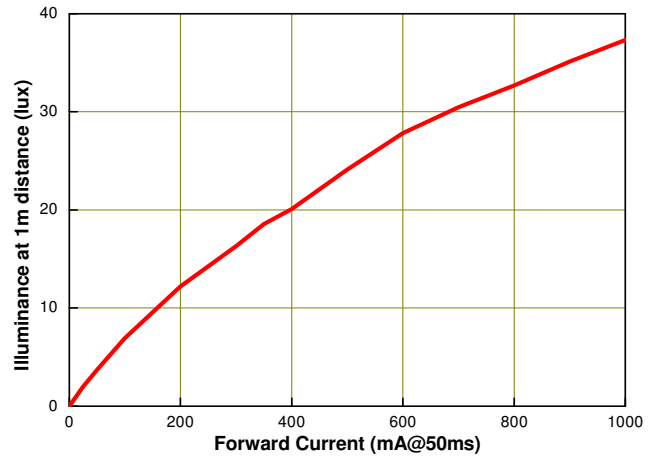


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Correlated Color Temperature (CCT) vs. Forward Current

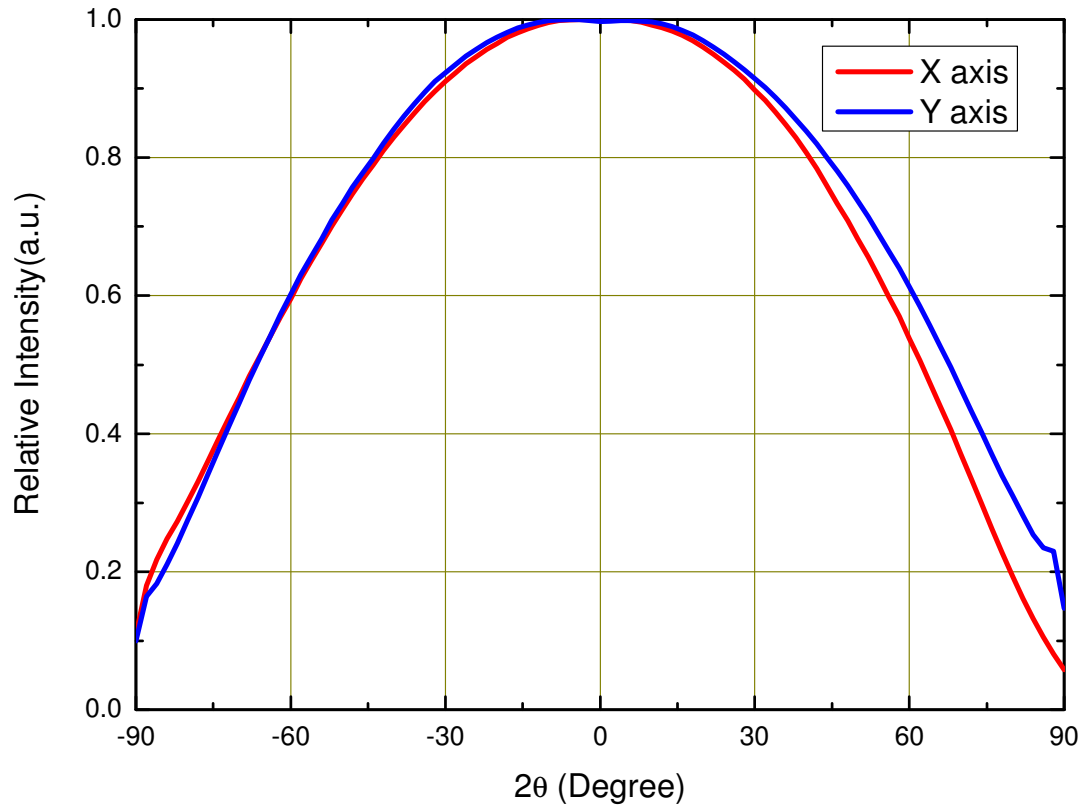


Axial Illuminance (lux) vs. Drive Current



Notes : All correlation data is tested under superior thermal management with 1" x 1" MCPCB.

Typical Representative Spatial Radiation Pattern



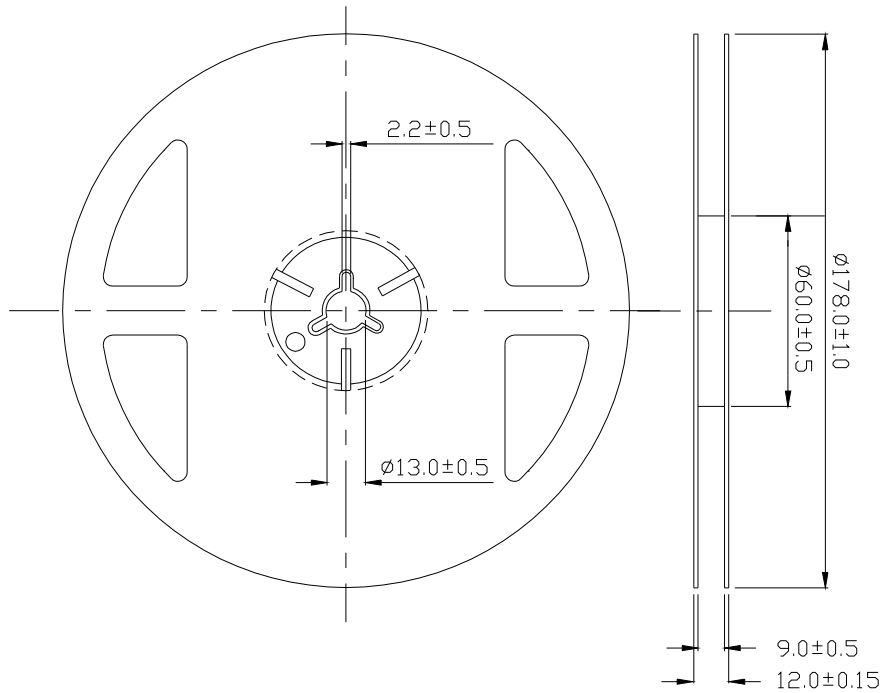
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Label Explanation

- CPN: Customer's Production Number**
- P/N : Production Number**
- QTY: Packing Quantity**
- CAT: Luminous Flux**
- HUE: Chromaticity Coordinates**
- REF: Forward Voltage**
- LOT No: Lot Number**
- MADE IN TAIWAN: Production Place**



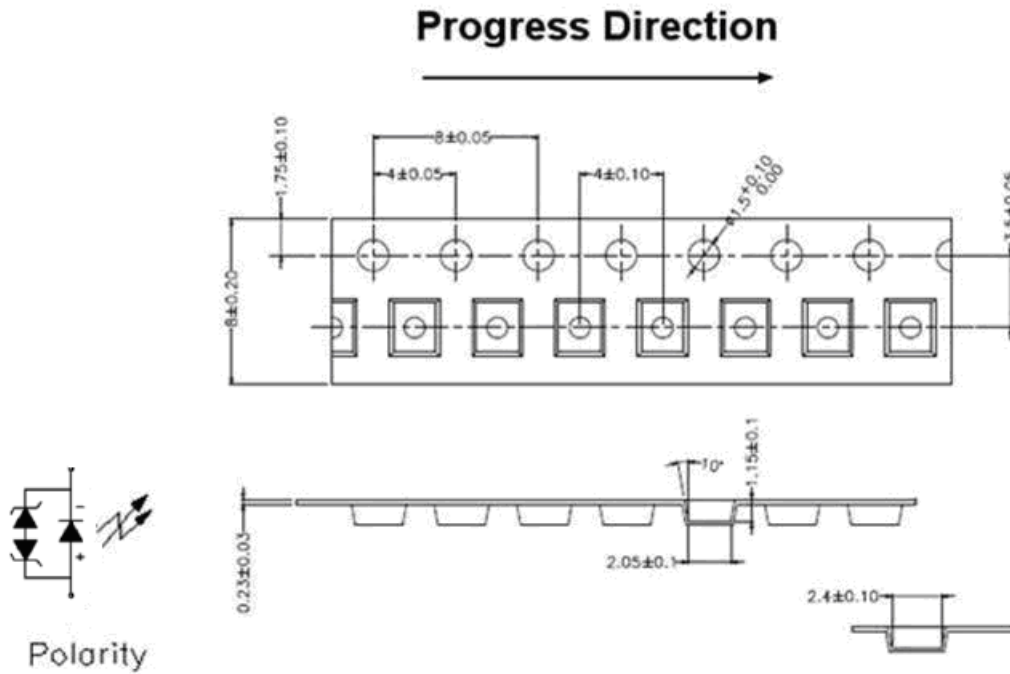
Reel Dimensions



- Note: 1. Dimensions are in millimeters.**
- 2. The tolerances unless mentioned is ±0.1mm.**

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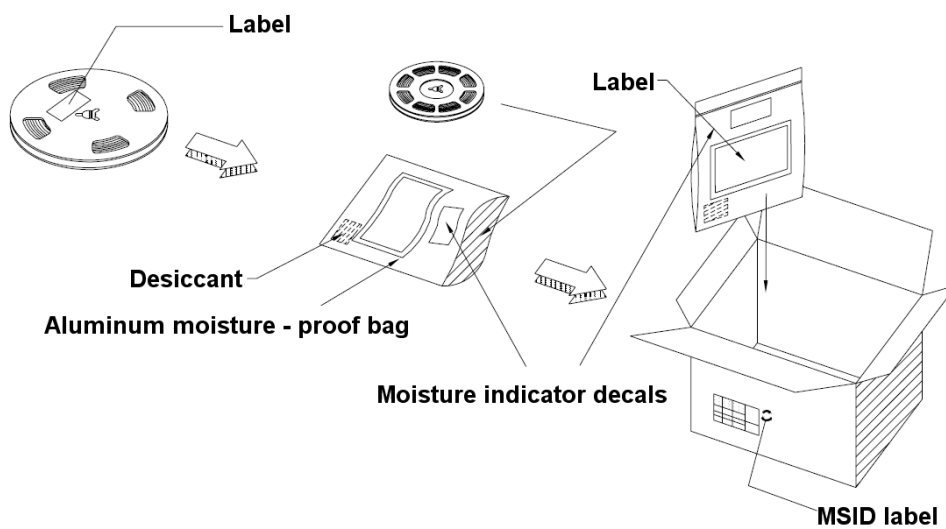
Carrier Tape Dimensions: Loaded quantity 2000 PCS per reel



Notes :

1. Dimensions are in millimeters.
2. The tolerances unless mentioned is ± 0.1 mm.

Moisture Resistant Packaging



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Reliability Test Items

Stress Test	Stress Condition	Stress Duration
Reflow	$T_{sol}=260^{\circ}\text{C}$, 10sec, 6min	3 times
DC Operating Life	$T_a=25^{\circ}\text{C}$, $I_F=350\text{mA}$	1000 hours
Thermal Shock	H : $+100^{\circ}\text{C}$ 20min. 'J 10sec. 'L : -40°C 20min.	500 Cycles
Temperature Cycle	H : $+100^{\circ}\text{C}$ 30min. 'J 5min. 'L : -40°C 30min.	1000 Cycles
High Temperature/Humidity	$T_a=85^{\circ}\text{C}$, RH=85%	1000 hours
High Temperature Storage	$T_a=100^{\circ}\text{C}$	1000 hours
Low Temperature Storage	$T_a=-40^{\circ}\text{C}$	1000 hours
Pulse Test	$T_a=25^{\circ}\text{C}$, $I_F=1000\text{mA}$ 400ms on/ 3600ms off	30000 times
High Temperature /Humidity Operation Life	$T_a=85^{\circ}\text{C}$, RH=85%,	1000 hours
ESD Human Body Model	8000V, Interval:0.5sec	3 times

* I_m : Brightness attenuate difference(1000hrs) $< 50\%$

* V_F : Forward voltage difference $< 20\%$

Notes: All reliability items are tested under superior thermal management with 1" x 1" MCPCB.

Precautions for Use

1. Over-current-proof

Though EHP-C04 has conducted ESD protection mechanism, customers must not use the device in reverse and should apply resistors for extra protection. Otherwise, slight voltage shift may cause enormous current shift and burn out failure would happen.

2. Storage

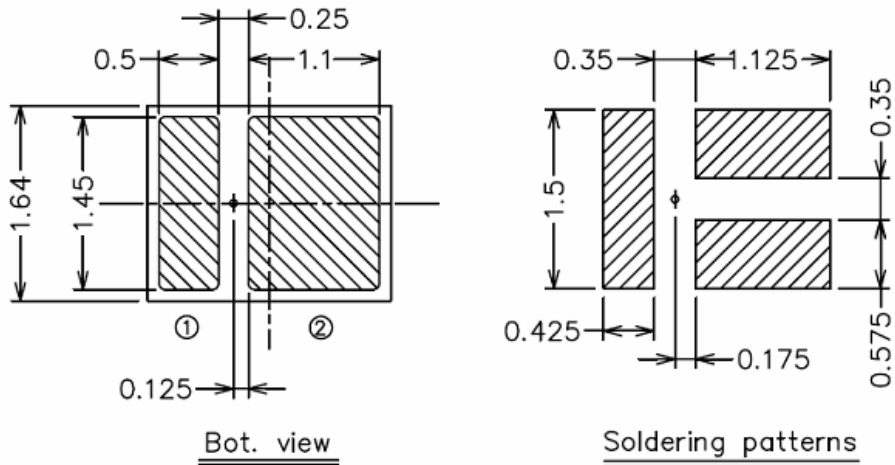
- i. Do not open moisture proof bag before the products are ready to use.
- ii. Before opening the package, the LEDs should be stored at temperature less than 30°C and less and relative humidity less than 90%.
- iii. The LEDs should be used within a year with completely package.
- iv. After opening the package, the LEDs should be stored at temperature less than 30°C and relative humidity less than 70%.
- v. The LEDs should be used within 168 hours (7 day) after the package was opened.
- vi. If the moisture absorbent material (silicone gel) has faded away or the LEDs have exceeded the storage time, baking treatment should be implemented based on the following conditions: Pre-curing at 60±5°C for 24 hours.

3. Thermal Management

- i. For maintaining the high flux output and achieving reliability, EHP-C04 series LEDs should be mounted on a metal core printed circuit board (MCPCB), with proper thermal connection to dissipate approximately 1W to 5W of thermal energy under normal operation.
- ii. Sufficient thermal management must be conducted, or the die junction temperature will be over the limit under large electronic driving and LEDs lifetime will decrease critically.

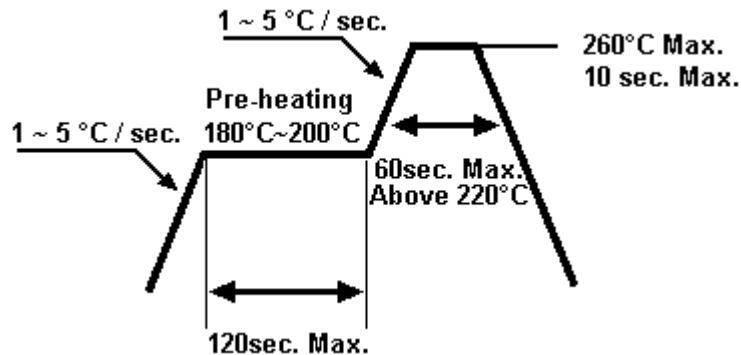
4. Soldering Condition

4-1. Soldering pad



4-2. For Reflow Process

i. Lead reflow soldering temperature profile



- ii. Reflow soldering should not be done more than two times.
- iii. While soldering, do not put stress on the LEDs during heating.
- iv. After soldering, do not warp the circuit board.

5. Soldering Iron

- i. For prototype builds or small series production runs it is possible to place and solder the LED by hand.
- ii. Dispensing thermal conductive glue or grease on the substrates and follow its curing spec. Press LED housing to closely connect LED and substrate.
- iii. It is recommended to hand solder the leads with a solder tip temperature of 280 °C for less than 3 seconds within once in less than the soldering iron capacity 25W. Leave two seconds and more intervals, and do soldering of each terminal.
- iv. Be careful because the damage of the product is often started at the time of the hand solder.