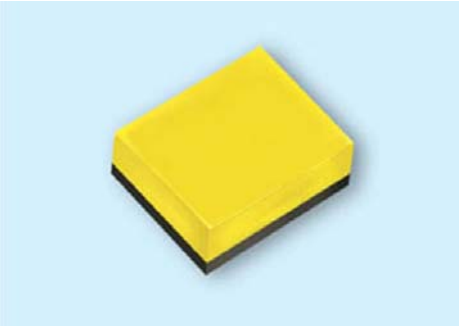
EVERLIGHT ELECTRONICS CO.,LTD.

Technical Data Sheet
High Power LED – 1W (Preliminary)

EHP-C04/UT01-P01



Features

- Feature of the device: small package with high efficiency
- Color coordinates: x=0.31, y=0.31 according to CIE 1931
- Typical color temperature: 6500 K.
- ESD protection.
- Soldering methods: SMT
- Grouping parameter: total luminous flux, color coordinates.
- Typical luminous flux: 40 lm @ 350 mA.
- Optical efficiency: 37 lm/W.
- Thermal resistance (junction to sink): 32 K/W (measured at T_j=80°C , I_F=350 mA DC mode).
- 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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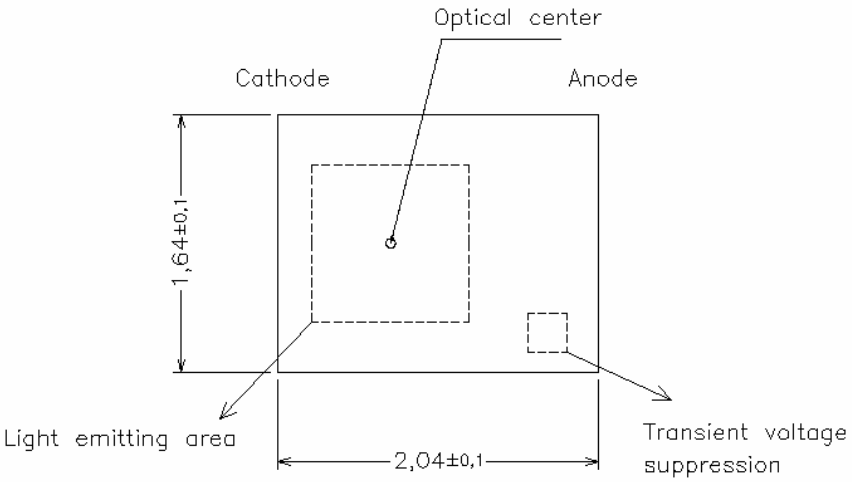
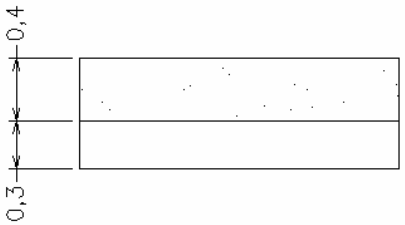
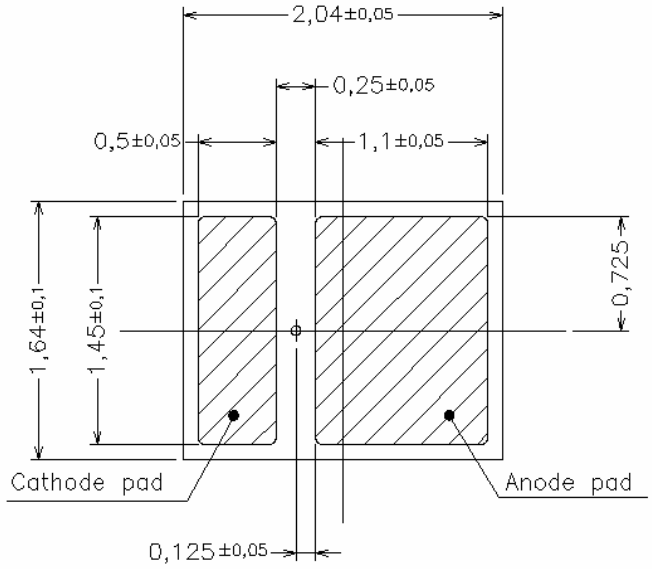
Dimensions



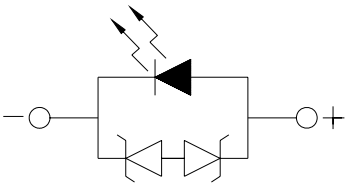
Top view



Side view



Bottom view



Notes: 1. Dimensions are in millimeters.

2. Tolerances unless dimensions ±0.1mm.

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Maximum Ratings ($T_{Ambient}$=25ºC)

Parameter	Symbol	Rating	Unit
DC Operating Current	I_F	350	mA
Pulsed Forward Current	I_F	1000	mA
ESD Sensitivity (JEDEC 3b)	ESD	8000	V
Junction Temperature	T_j	125	°C
Operating Temperature	T_{opr}	-40 ~ +85	°C
Storage Temperature	T_{stg}	-40 ~ +100	°C
Power Dissipation (Pulse Mode)	P_d	4.9	W
Junction To Heat-Sink Thermal Resistance	R_{th}	32	K/W

Electro-Optical Characteristics ($T_{Ambient}$=25ºC)

Parameter	Bin	Symbol	Min	Typ.	Max	Unit	Condition
Luminous Flux(1)	----	Φ_v	30	----	50	lm	I_F=350mA
Viewing Angle(2)	----	$2\theta_{1/2}$	----	130	----	deg	
Forward Voltage(3)	----	V_F	3.0	3.3	3.6	V	
Color Temperature	----	CCT	4600	----	15000	K	

Parameter	Bin	Symbol	Min	Typ.	Max	Unit	Condition
Luminous Flux(1)	----	Φ_v	60	----	80	lm	I_F=1000mA
Viewing Angle(2)	----	$2\theta_{1/2}$	----	130	----	deg	
Forward Voltage(3)	----	V_F	3.6	3.9	4.2	V	
Color Temperature	----	CCT	4600	----	15000	K	

Note. 1. Luminous flux measurement tolerance: ±10%

2. $2\theta_{1/2}$ is the off axis angle from lamp centerline where the luminous intensity is 1/2 of the peak value.

3. Forward voltage measurement tolerance: ±0.1V

4. Electric and optical data is tested at 100 ms pulse condition.

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Color Binning

Rank A0				
x	0.280	0.264	0.283	0.296
y	0.248	0.267	0.305	0.276
Reference CCT: 9000K-15000K				

Rank B3				
x	0.287	0.283	0.304	0.307
y	0.295	0.305	0.330	0.315
Reference CCT: 7000K-8700K				

Rank B4				
x	0.307	0.304	0.330	0.330
y	0.315	0.330	0.360	0.339
Reference CCT: 6200K-7000K				

Rank B5				
x	0.296	0.287	0.307	0.311
y	0.276	0.295	0.315	0.294
Reference CCT: 7000K-9000K				

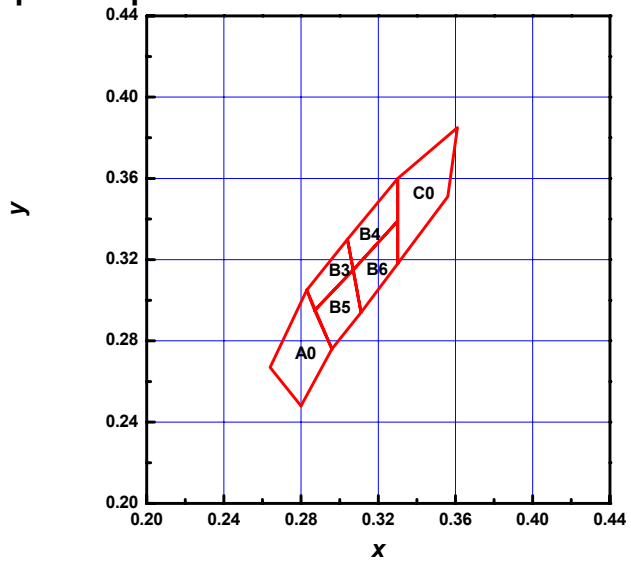
Rank B6				
x	0.311	0.307	0.330	0.330
y	0.294	0.315	0.339	0.318
Reference CCT: 5600K-7000K				

Rank C0				
x	0.330	0.330	0.361	0.356
y	0.318	0.360	0.385	0.351
Reference CCT: 4600K-5600K				

Note. 1. Color coordinates measurement allowance : ±0.01

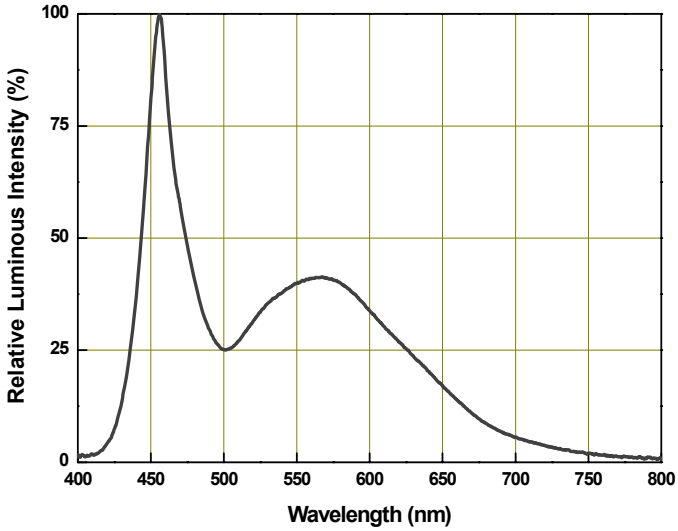
2. Color bins are defined at I_F=350 mA

Color Binning Structure Graphic Representation

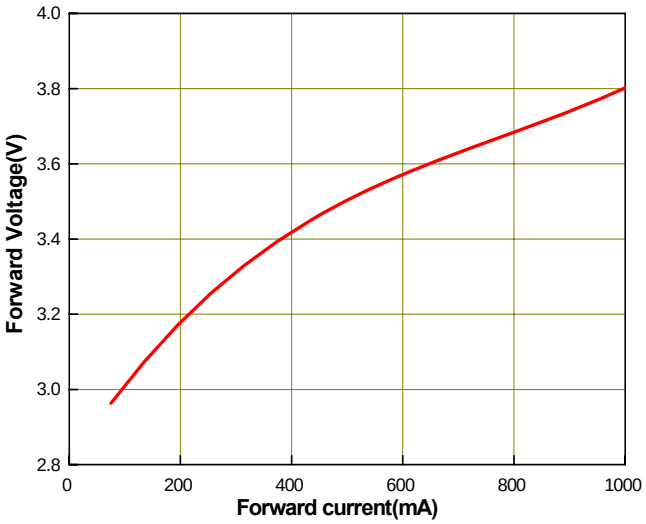


Typical Electro-Optical Characteristics Curves

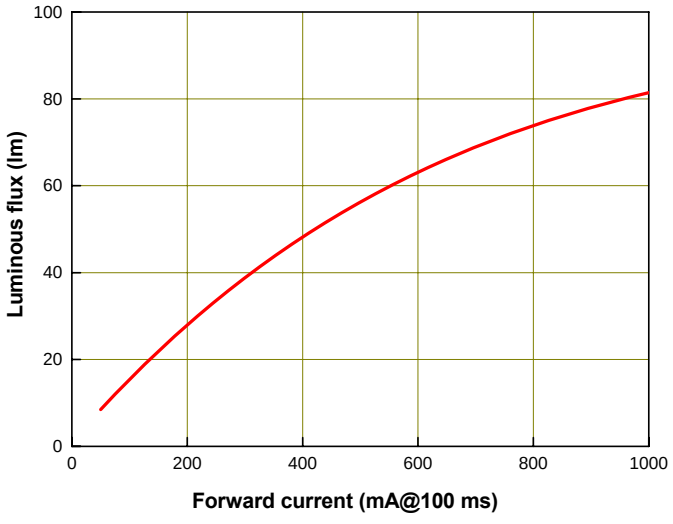
Relative Spectral Distribution,
I_F=500mA, $T_{Ambient}$=25ºC



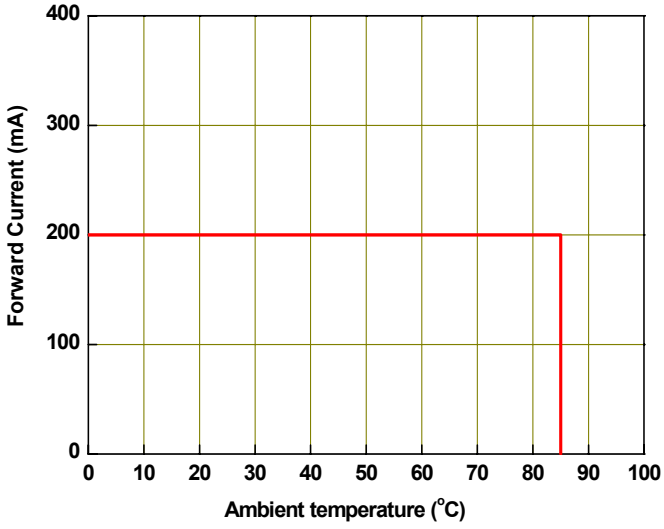
Forward Voltage vs Forward Current,
$T_{Ambient}$=25ºC



Luminous Flux vs Forward Current,
$T_{Ambient}$=25ºC



Forward Current Derating Curve,
Derating based on T_{jMAX}=125°C at torch mode



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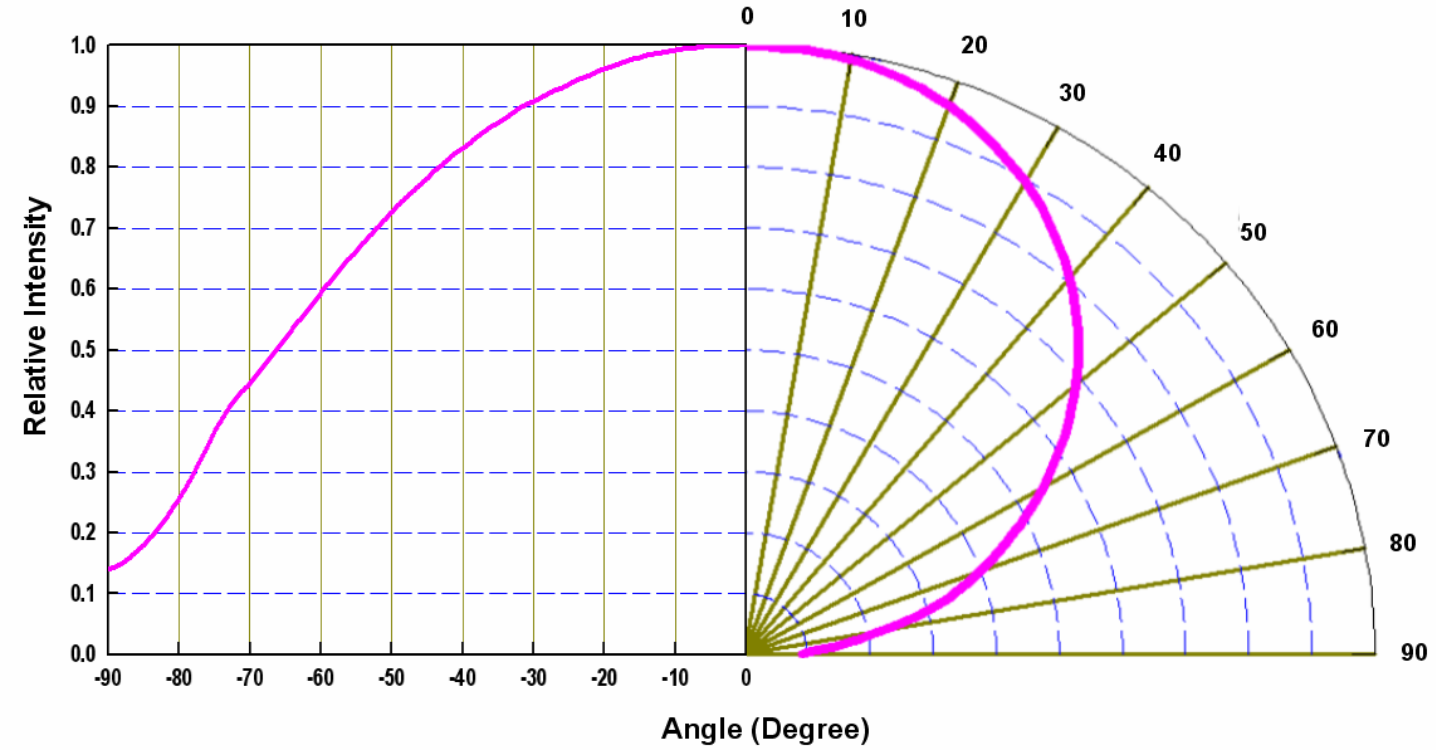
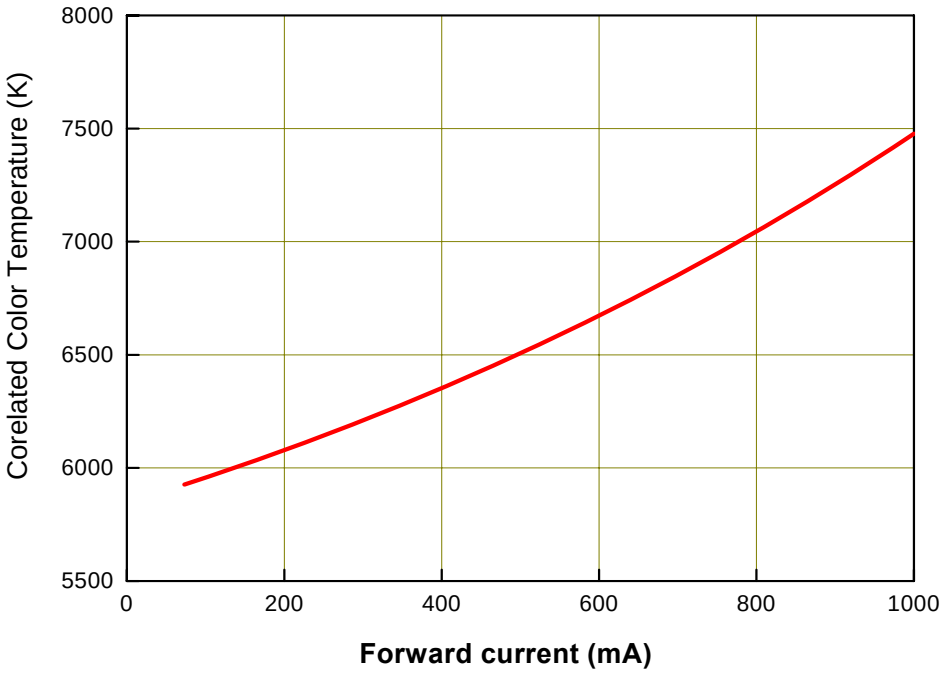
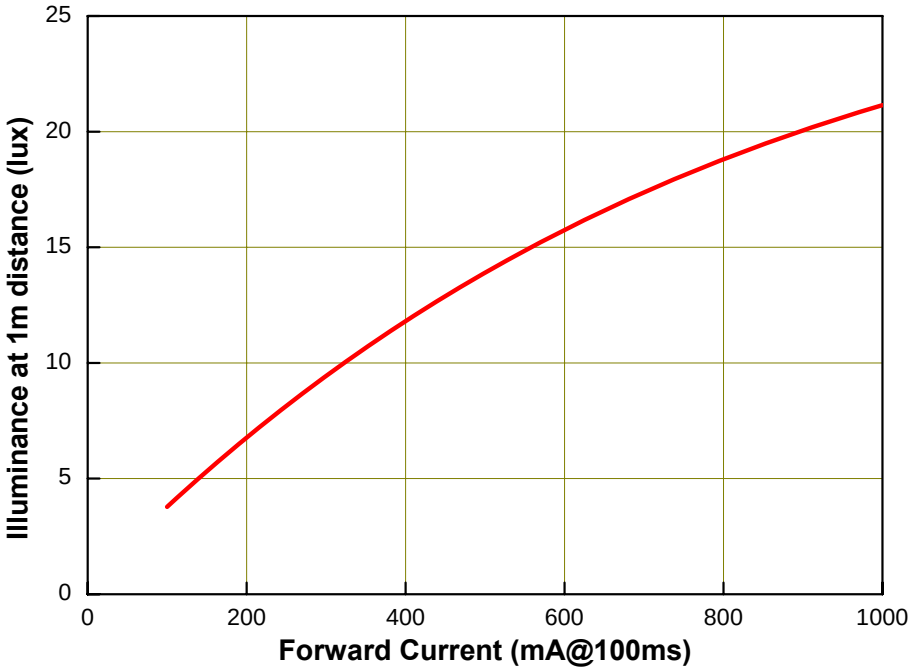
Typical Representative Spatial Radiation Pattern



Corelated Color Temperature(CCT) vs. Forward Current

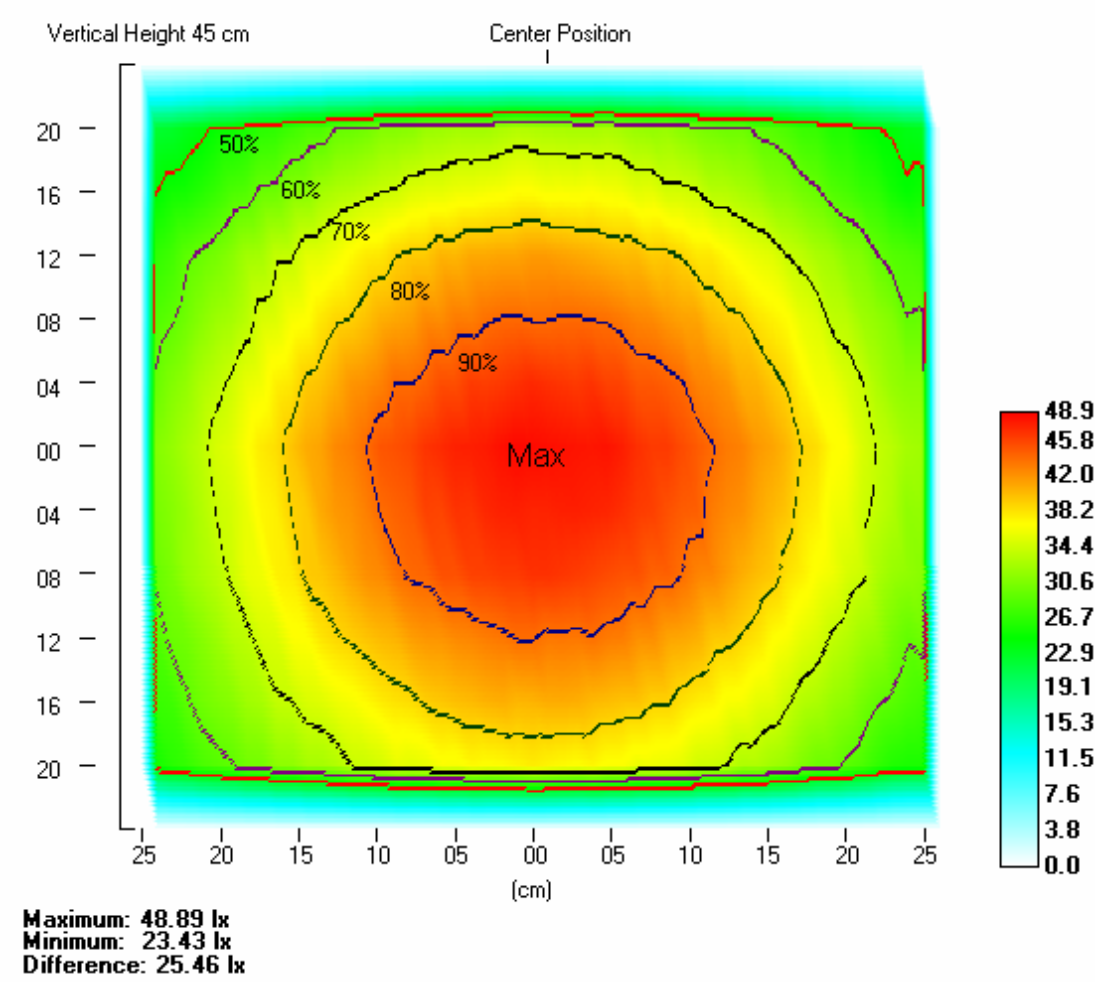


Axial Illuminance (lux) vs. Drive Current



Notes: All correlation data is tested under superior thermal management with 2 x 2 cm^2 MCPCB.

Illuminance Uniformity (@ 50 cm, I_F=350 mA)



Notes: 1. The illuminance measurement area is 50 x 45 cm^2.

2. The measurement data is tested under superior thermal management with 2 x 2 cm^2 MCPCB.

Label Explanation

CPN: Customer's Production Number

P/N : Production Number

QTY: Packing Quantity

CAT: Luminous Flux

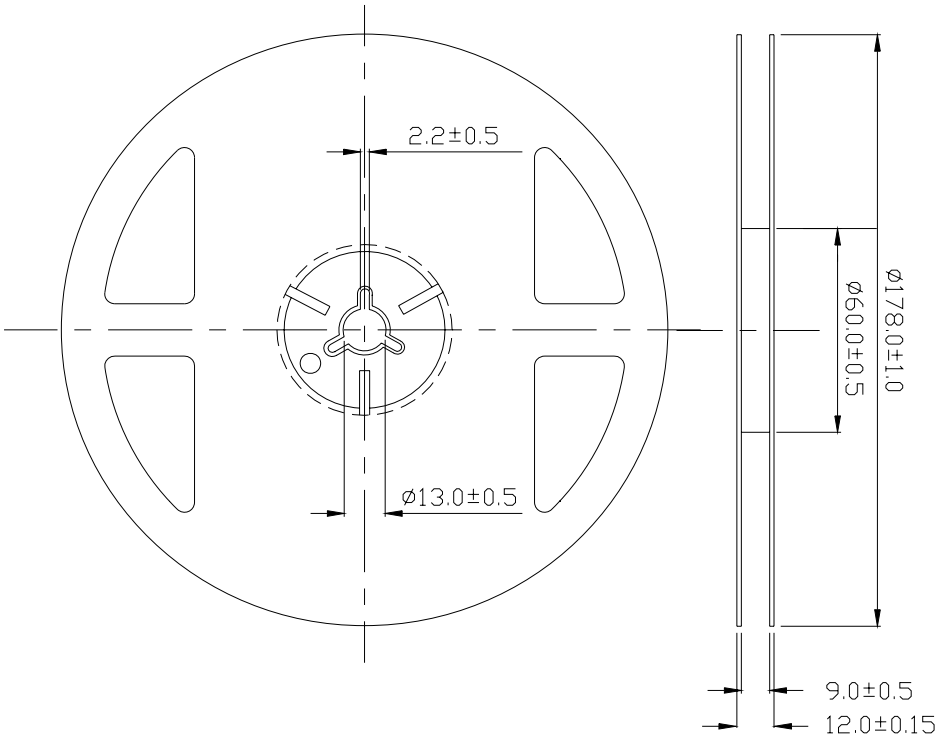
HUE: Chromaticity Coordinates

REF: Forward Voltage

LOT No: Lot Number

MADE IN TAIWAN: Production Place

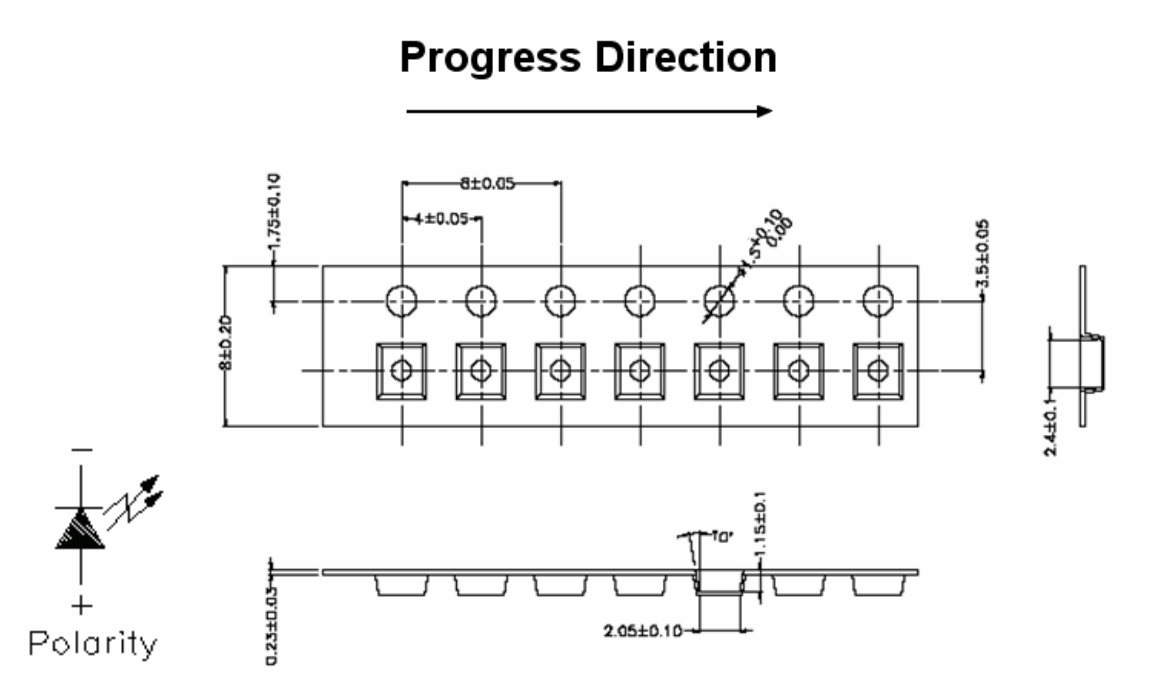
Reel Dimensions



Note: 1. Dimensions are in millimeters.

2. The tolerances unless mentioned is ±0.1mm.

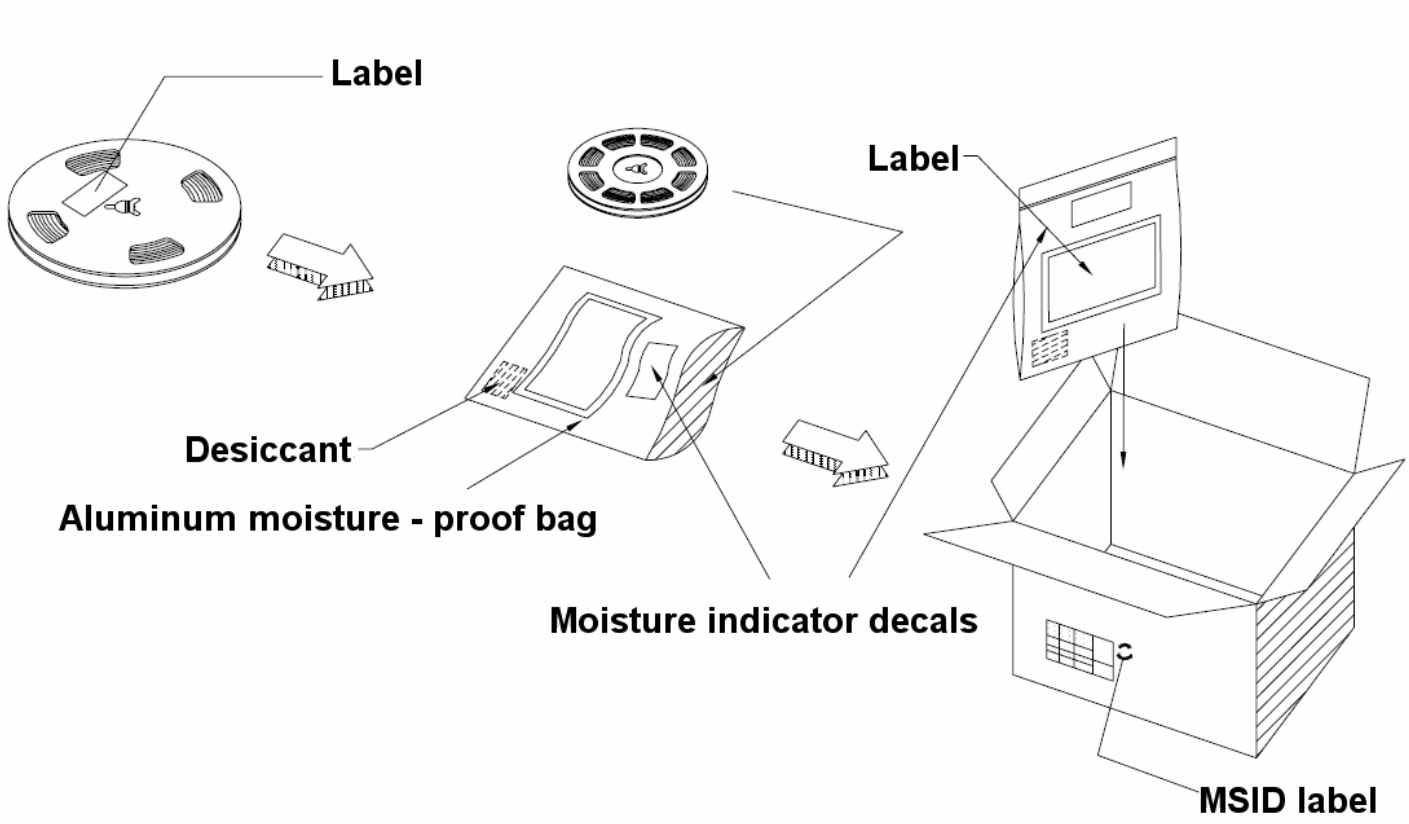
Carrier Tape Dimensions: Loaded quantity 2000 PCS per reel



Note: 1. Dimensions are in millimeters.

2. The tolerances unless mentioned is ±0.1mm.

Moisture Resistant Packaging



Reliability Test Items

Stress Test	Stress Condition	Stress Duration
Reflow	T_{sol}=260°C, 10sec, 6min	3 times
DC Operating Life	T_a=25°C , I_F=350mA	1000 hours
Thermal Shock	H：＋110°C 20min. '∫ 10sec. 'L：－40°C 20min.	500 Cycles
Temperature Cycle	H：＋100°C 30min. '∫ 5min. 'L：－40°C 30min.	1000 Cycles
High Temperature/Humidity	T_a=85°C , RH=85%	1000 hours
High Temperature Storage	T_a=100°C	1000 hours
Low Temperature Storage	T_a=-40°C	1000 hours
Pulse Test	T_a=25°C, I_F=1000mA 400ms on/ 3600ms off	30000 times
High Temperature Operation Life #1	T_a=55°C, I_F=350mA	1000 hours
High Temperature Operation Life #2	T_a=85°C, I_F=200mA	1000 hours
High Temperature /Humidity Operation Life	T_a=85°C, RH=60%, I_F=200mA	1000 hours
ESD Human Body Model	8000V, Interval:0.5sec	3 times

*Im: Brightness attenuate difference(1000hrs)＜30%

*V_F: Forward voltage difference＜20%

Notes: All reliability items are tested under superior thermal management with 2 x 2 cm^2 MCPCB.

Precautions For Use

1. **Over-current-proof**

   Though EHP-C04 has conducted ESD protection mechanism, customer must not use the device in reverse and should apply resistors for extra protection. Otherwise slight voltage shift may cause enormous current change 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 kept at 30°C or less and 90%RH or less.

   iii. The LEDs should be used within a year.

   iv. After opening the package, the LEDs should be kept at 30°C or less and 70%RH or less.

   v. The LEDs should be used within 24 hours (1 day) after opening the package.

   vi. If the moisture absorbent material (silicone gel) has faded away or the LEDs have exceeded the storage time, baking treatment should be performed using the following conditions.

   vii. Pre-curing treatment : 60±5°C for 24 hours.

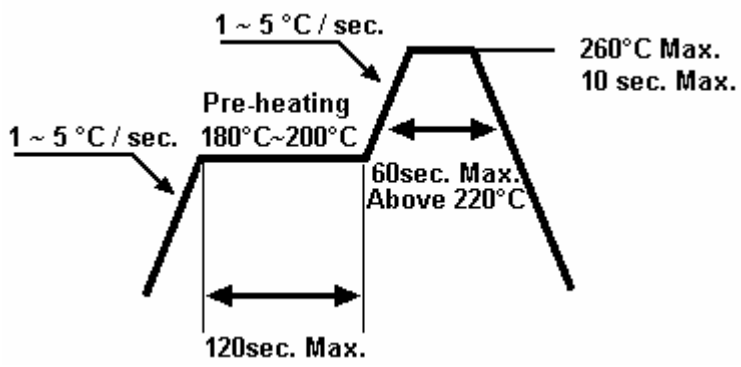
3. **Thermal Management**

   i. For maintaining the high flux output and achieving reliability, EHP-C04 series LED package 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 LED lifetime will decrease critically.

4. **Assembly process flow**

   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.

Summary of the laser and LED safety classification:

Classes	Potential hazard / meaning	Example for maximum output power in the visible range *)
Class 1	Eye safe – for longer (intentional) exposure and for exposure when using loupes or telescopes too.	40 µW for blue spectral region, 400 µW for red spectral region
	Enclosed laser with high power. Due to the entire protective housing any emission is prevented.	No radiation emission, not even for any single fault
Class 1M	Eye safe for the un-aided eye, for longer (intentional) exposure also; possible eye injury for exposures when using loupes or telescopes.	like class 1, but different measurement regulation
Class 2	Visible laser radiation, eye safe for short exposure, even when using loupes or telescopes.	1 mW (measurement aperture for loupes or telescopes)
Class 2M	Visible laser radiation, eye safe for the un-aided eye for short exposure, possible eye injury for exposures when using loupes or telescopes.	like class 2, but different measurement regulation
Class 3R	Practically no eye hazard for short and unintentional exposure, but dangerous for improper use by untrained personal.	5 mW
Class 3B	Hazardous for eyes by direct beam and specular reflections. Chance for slight skin injury for beam powers near the upper limit.	500 mW
Class 4	Hazardous for eyes by direct and diffuse reflected beam, hazardous for the skin; fire hazard.	More than 500 mW

Note. EHP-C04/UT01-P01 Series product has radiation flux less than 500mW and is classified as Class 3B.