

Technical Data Sheet

High Power LED – 1W

EHP-C04/UT01-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: 6500 K.
- ESD protection.
- Soldering methods: SMT
- Grouping parameter: total luminous flux, color coordinates.
- Typical luminous flux: 55 lm @ 500 mA.
- Optical efficiency: 37 lm/W.
- Thermal resistance (junction to sink): 37 °C/W (measured at $I_f=350$ mA DC mode).
- The product itself will remain within RoHS compliant version.



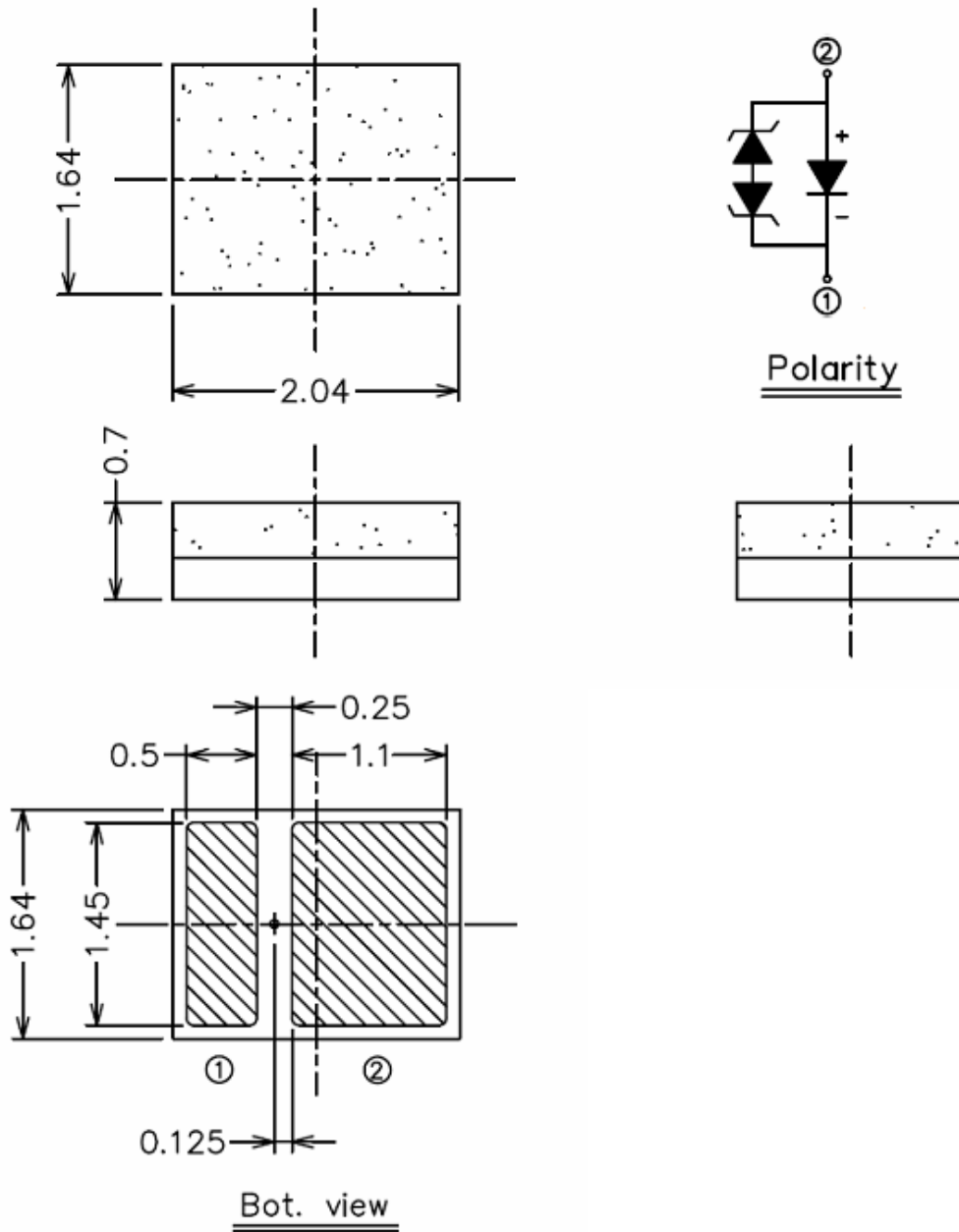
Applications

- 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

Dimensions



Notes: 1. Dimensions are in millimeters.

2. Tolerances unless dimensions $\pm 0.1\text{mm}$.

EHP-C04/UT01-P01/TR
Maximum Ratings ($T_{Ambient}=25^{\circ}C$)

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	$^{\circ}C$
Operating Temperature	T_{opr}	-40 ~ +85	$^{\circ}C$
Storage Temperature	T_{stg}	-40 ~ +120	$^{\circ}C$
Power Dissipation (Pulse Mode)	P_d	4.9	W
Dynamic Resistance	R_D	0.5	Ω
Temp. Coefficient of Forward Voltage	$\Delta V_F/\Delta T_j$	-2.1	mV/ $^{\circ}C$
Junction to Heat-Sink Thermal Resistance ⁽¹⁾	R_{th}	37	$^{\circ}C/W$

Note. 1. Thermal resistance, junction to sink, is measured at $I_F=350$ mA DC mode when room temp. is $25^{\circ}C$.

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

Parameter	Bin	Symbol	Min	Typ.	Max	Unit	Condition
Luminous Flux ⁽¹⁾	J4	Φ_v	39	----	45	lm	$I_F=500mA$
	J5		45	----	52		
	K1		52	----	60		
	K2		60	----	70		
Viewing Angle ⁽²⁾	----	$2\theta_{1/2}$	----	130	----	deg	
Forward Voltage ⁽³⁾	S4	V_F	2.95	----	3.35	V	
	T1		3.35	----	3.75		
Color Temperature	----	CCT	5000	6500	10000	K	

Note. 1. Luminous flux measurement tolerance: $\pm 10\%$

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: $\pm 0.1V$

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

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Color Binning

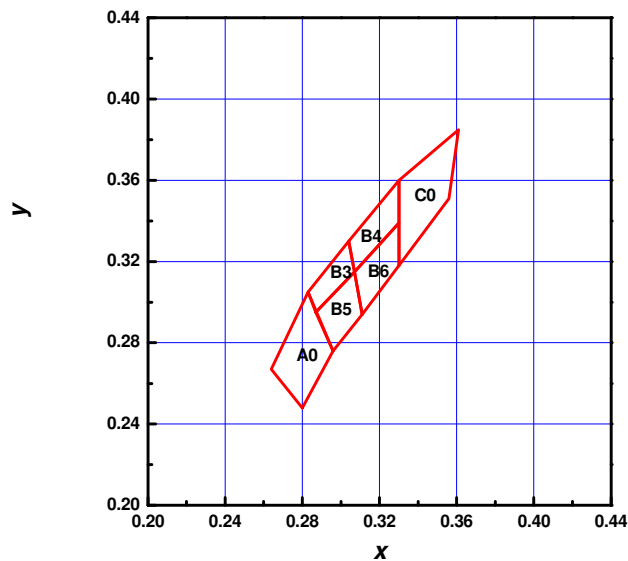
Rank A0				
x	0.280	0.264	0.283	0.296
y	0.248	0.267	0.305	0.276
Reference CCT: 9000K-15000K				
Rank B4				
x	0.307	0.304	0.330	0.330
y	0.315	0.330	0.360	0.339
Reference CCT: 6200K-7000K				
Rank B6				
x	0.311	0.307	0.330	0.330
y	0.294	0.315	0.339	0.318
Reference CCT: 5600K-7000K				

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

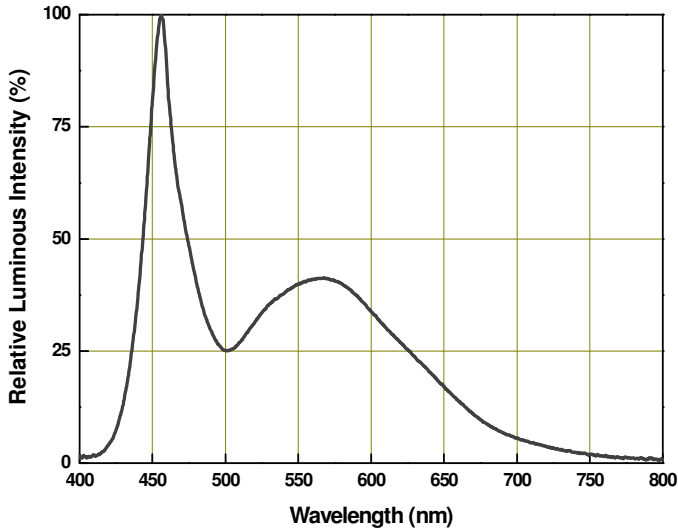
2. Color bins are defined at $I_f=500$ mA

Color Binning Structure Graphic Representation

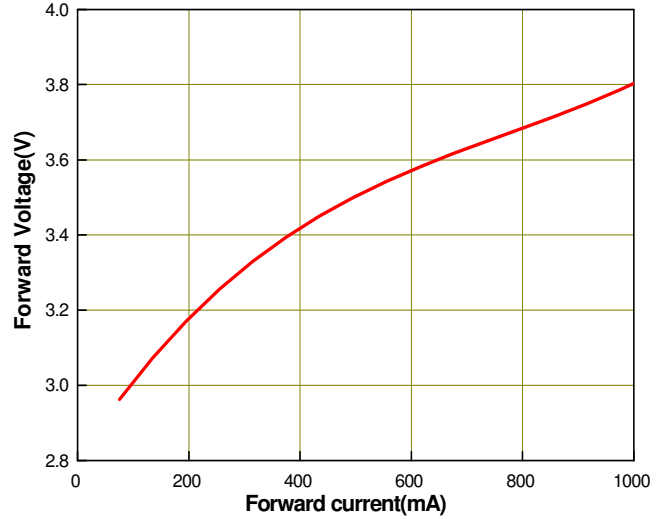


Typical Electro-Optical Characteristics Curves

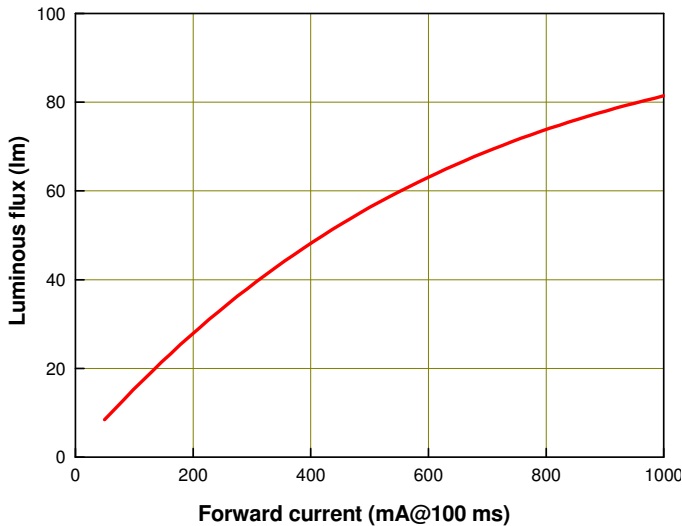
Relative Spectral Distribution,
 $I_F=500\text{mA}$, $T_{\text{Ambient}}=25^\circ\text{C}$



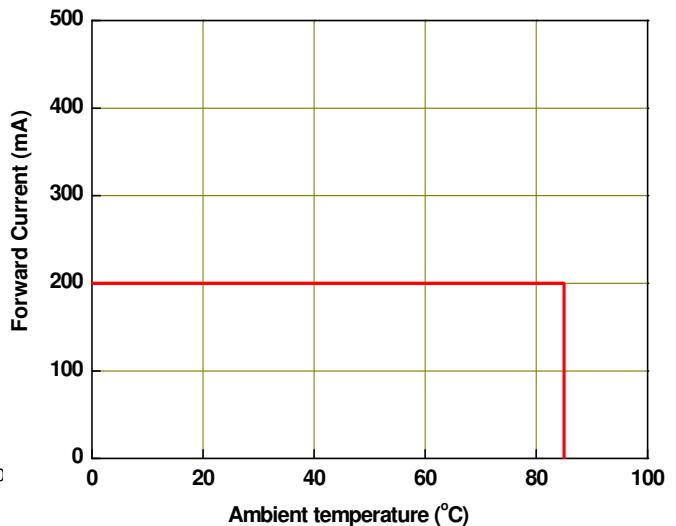
Forward Voltage vs Forward Current,
 $T_{\text{Ambient}}=25^\circ\text{C}$



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

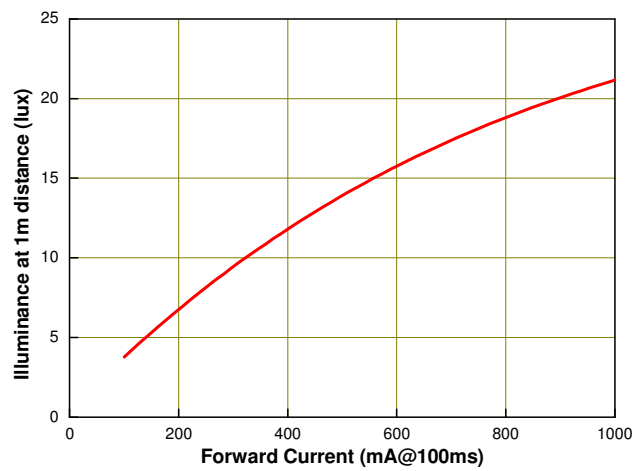
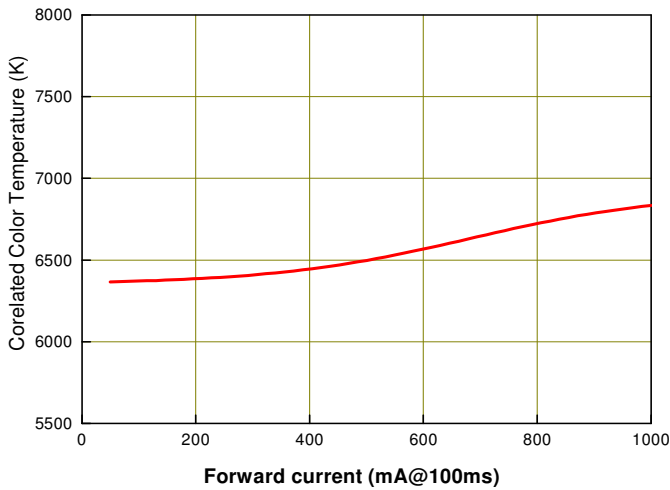


Forward Current Derating Curve,
 Derating based on $T_{j\text{MAX}}=125^\circ\text{C}$ at torch mode



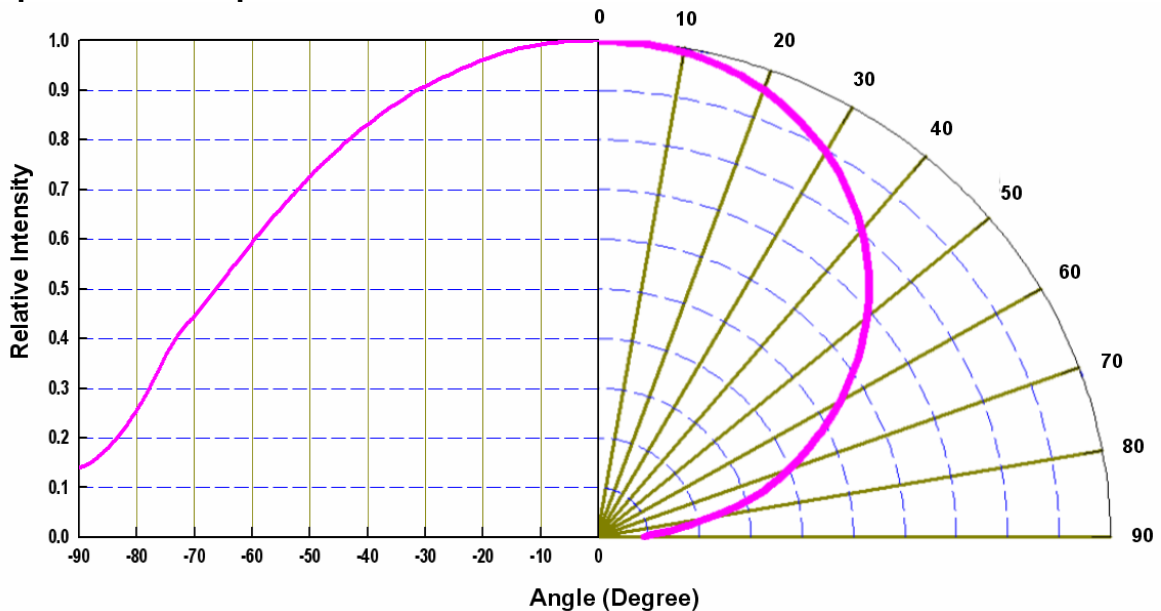
Corelated Color Temperature(CCT) vs. Forward Current

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

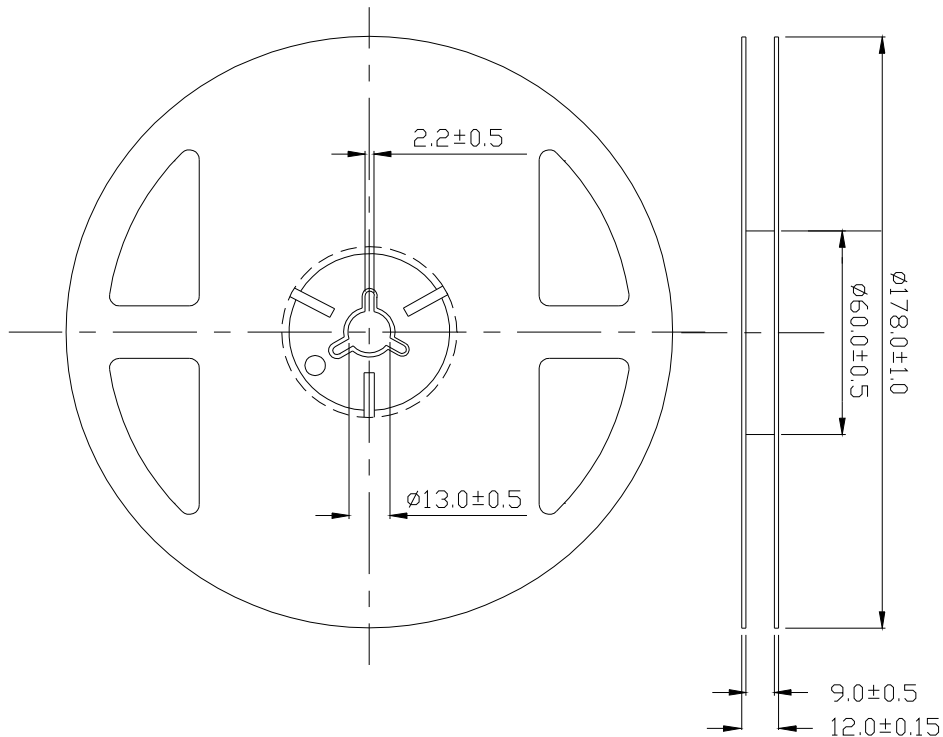


Label Explanation

- 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

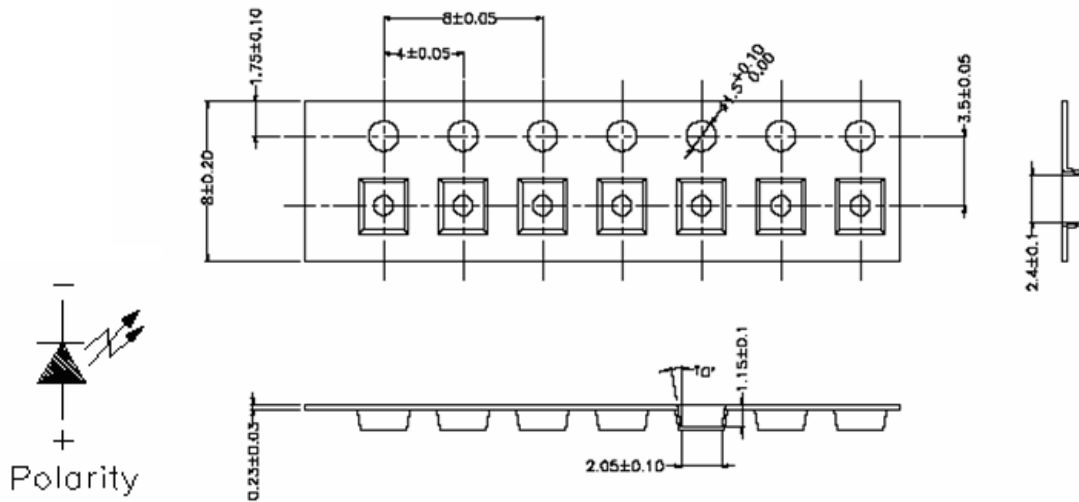


- Note: 1. Dimensions are in millimeters.**
- 2. The tolerances unless mentioned is ±0.1mm.**

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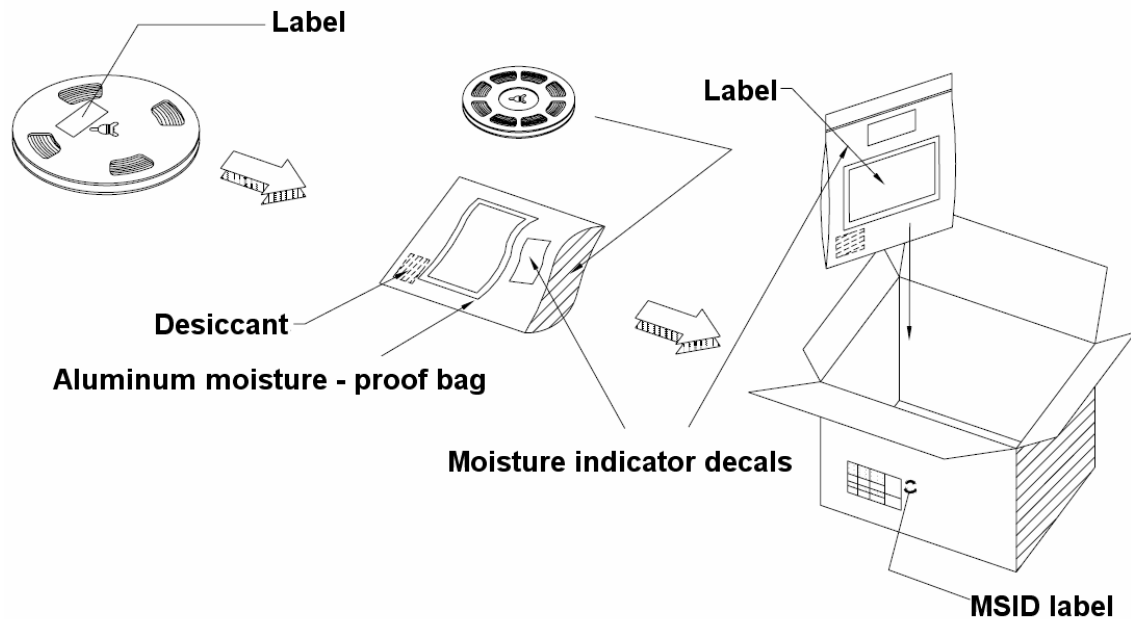
Carrier Tape Dimensions: Loaded quantity 2000 PCS per reel

Progress Direction



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

Moisture Resistant Packaging



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 : $+110^{\circ}\text{C}$ 20min. ↓ 10sec. L : -40°C 20min.	500 Cycles
Temperature Cycle	H : $+100^{\circ}\text{C}$ 30min. ↓ 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 Operation Life #1	$T_a=55^{\circ}\text{C}$, $I_F=350\text{mA}$	1000 hours
High Temperature Operation Life #2	$T_a=85^{\circ}\text{C}$, $I_F=200\text{mA}$	1000 hours
High Temperature /Humidity Operation Life	$T_a=85^{\circ}\text{C}$, RH=60%, $I_F=200\text{mA}$	1000 hours
ESD Human Body Model	8000V, Interval:0.5sec	3 times

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

* 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

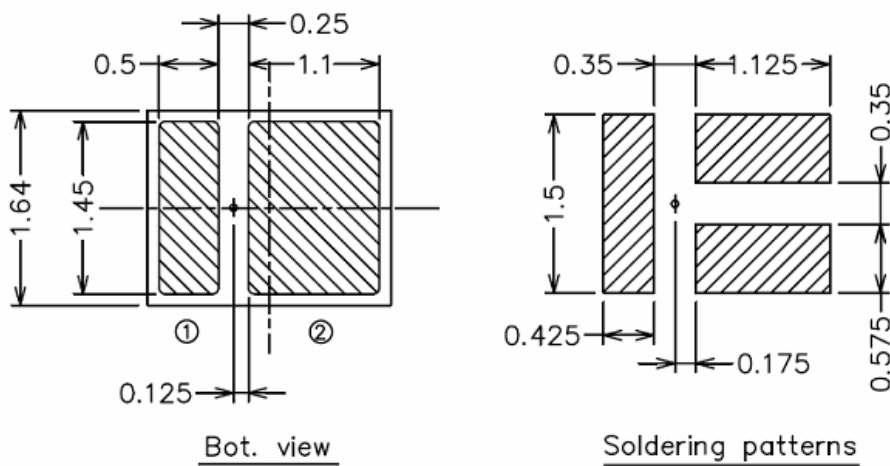
Though EHP-C04 has conducted ESD protection mechanism, customers must not use the device in reverse and should apply resistors for extra protection. Otherwise, slight voltage shift may cause enormous current shift and burn out failure would happen.

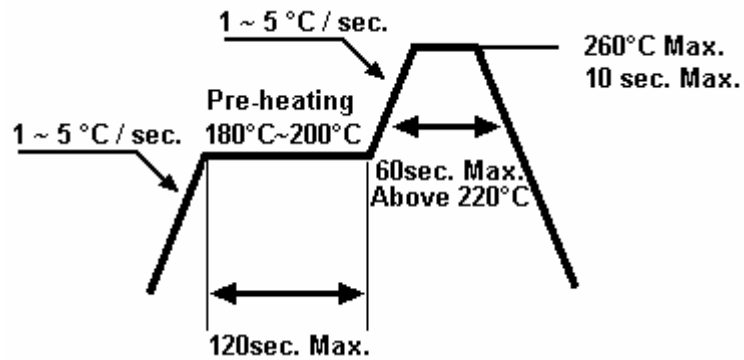
2. Storage

- 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.
- 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.**