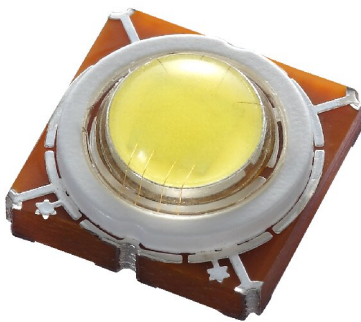




EHP-B05 series



Introduction

B05 series is a high power, multi-chip device with very low thermal resistance as a result of the PCB substrate. The series is a surface-mount high-power device featuring high brightness that is suitable for all kinds of lighting applications such as general illumination, spot, signal, industrial and commercial lighting.

Features

- ◆ Robust package with high lumens
- ◆ ESD protection up to 8KV
- ◆ Soldering method: SMT
- ◆ Moisture Sensitivity Level: 3
- ◆ RoHS compliant
- ◆ ANSI binning
- ◆ Reliability testing conforms to IESNA LM80 Lumen maintenance test method

Applications

- ◆ General Lighting
- ◆ Spot Lighting
- ◆ Signal and Symbol Luminaries for orientation marker lights (e.g. steps, exit ways, etc.)
- ◆ Industrial Lighting
- ◆ Commercial Lighting

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Product Nomenclature

The product name is designated as below:

EHP-B05MLG/GT04H-P05/50K/R11/TR

Designation:

EHP-B05=Family name

MLG = Lambertian

GT =Color Code [1]

0 _ H = Quantity of the chip [2]

P05 =Power Consumption[3]

50K = Color bin or CCT bin

R11 = min. luminous flux (lm) or radiation power (mW) performance

TR = Tape and Reel

Notes

1. Code of wavelength of the chip:

Symbol	Color	Dominant wavelength range/Peak wavelength/CCT
RB	Royal Blue	445~460nm
UB	Ultra Blue	460~470nm
SUG	Green	520~540nm
UY	Amber	580~595nm
USO	Ultra Red-Orange	610~620nm
SUR	Super ultra-Red	620~635nm
GRB	RGB full color	SUR+SUG+UB
GT	White, CRI Min 70	4745-7050K
LM	Warm White, CRI Min 70	2580-4745K
KT	White, CRI Min 80	4745-7050K
KM	Warm White, CRI Min 80	2580-4745K

2. Quantity of the chip:

Symbol	Description
2	2 chips
4	4 chips
6	6 chips
8	8 chips

3. Consume the power:

Symbol	Description
P05	5W
P07	7W
P10	10W

Materials

Items	Description
Substrate	PCB with Metal Heat Sink
Housing	Heat resistant polymer
Encapsulating Resin	Silicone resin

Maximum Ratings

Parameter	Symbol	Ratings	Unit
DC Forward Current ₍₁₎	I_F	800	mA
DC Pulse Current ₍₂₎	I_{PF}	1000	mA
ESD Sensitivity	ESD	8000	V
Junction Temperature ₍₃₎	T_j	125	°C
Operating Temperature ₍₄₎₍₅₎	$T_{op.}$	-40 ~ +85	°C
Storage Temperature	$T_{stge.}$	-40 ~ +100	°C
Junction To Heat-Sink Thermal Resistance	R_{th}	7	°C/W
Max. Solder Pad Temperature	T_{Sol}	260	°C
Max. Allowable Reflow Cycles	n/a	2	cycles

Notes:

1. Maximum forward current is 1000mA (Thermal Pad = 25°C).
2. Duty cycle = 1/10@1KHz (Thermal Pad = 25°C)
3. Maximum junction temperature is 125°C for White LEDs.
4. Maximum Operating Temperature (Thermal Pad) is 85°C for White LEDs.
5. Avoid operating LEDs at maximum operating temperature exceeding 1 hour.

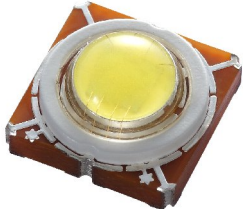
JEDEC Moisture Sensitivity

Level	Floor Life		Soak Requirements Standard	
	Time (hours)	Conditions	Time (hours)	Conditions
3	168H	30°C / 60% RH	192 (+5/-0)	30°C / 60% RH

PN of the B05 series: Typ. CRI 75 White LEDs

The table below is a list of part numbers for the EHP-B05 5W series White LED. All parts listed match ANSI binning standards. Bin offerings of 2700K to 6500K are listed and currently available. CRI is also listed with min 70 to 80. Typical view angle is 140°. These clearly listed binning options allow for proper design and implementation into lighting applications.

For Example: If you order product using EHP-B05MLG/GT04H-P05/57K/R11/TR, you will get White, EHP-B05 series LEDs at 700mA are listed below.



Color Variant	Radiation Pattern	CRI Typ	CCT	Forward Voltage (V)	Minimum Luminous Flux (lm)
Cool White	Lambertian	75	57K-1 ~ 57K-2 57K-3 ~ 57K-4	6.0~6.5(O4) 6.5~7.0(O5)	400

EHP-B05MLG represents by **

Color	Order Code of EHP-B05	Luminous Flux (lm) [1]	CCT(K)	Forward Voltage (V) [2]	CRI Typ	CRI Min [3]
Cool White 6500	**/GT04H-P05/65K/R11/TR	400-450	65K-1~65K-4	6.0 - 7.0	75	70
	**/GT14H-P05/65K/R12/TR	450-500				
Cool White 5700	**/GT04H-P05/57K/R11/TR	400-450	57K-1~57K-4	6.0 - 7.0	75	70
	**/GT14H-P05/57K/R12/TR	450-500				
Cool White 5000	**/GT04H-P05/50K/R11/TR	400-450	50K-1~50K-4	6.0 - 7.0	75	70
	**/GT14H-P05/50K/R12/TR	450-500				
Neutral White 4500	**/LM04H-P05/45K/N52/TR	375-400	45K-1~45K-4	6.0 - 7.0	75	70
		400-450				
Neutral White 4000	**/LM04H-P05/40K/N52/TR	350-400	40K-1~40K-4	6.0 - 7.0	75	70
		400-450				

Color	Order Code of EHP-B05	Luminous Flux (lm) [1]	CCT(K)	Forward Voltage (V) [2]	CRI Typ	CRI Min [3]
Warm White 3500	**/LM04H-P05/35K/N51/TR	350-400 400-450	35K-1~35K-4	6.0 - 7.0	75	70
Warm White 3000	**/LM04H-P05/30K/N51/TR	300-350 350-400	30K-1~30K-4	6.0 - 7.0	75	70
Warm White 2700	**/LM04H-P05/27K/N51/TR	300-350 350-400	27K-1~27K-4	6.0 - 7.0	75	70

PN of the B05 series: Typ. CRI 85 White LEDs

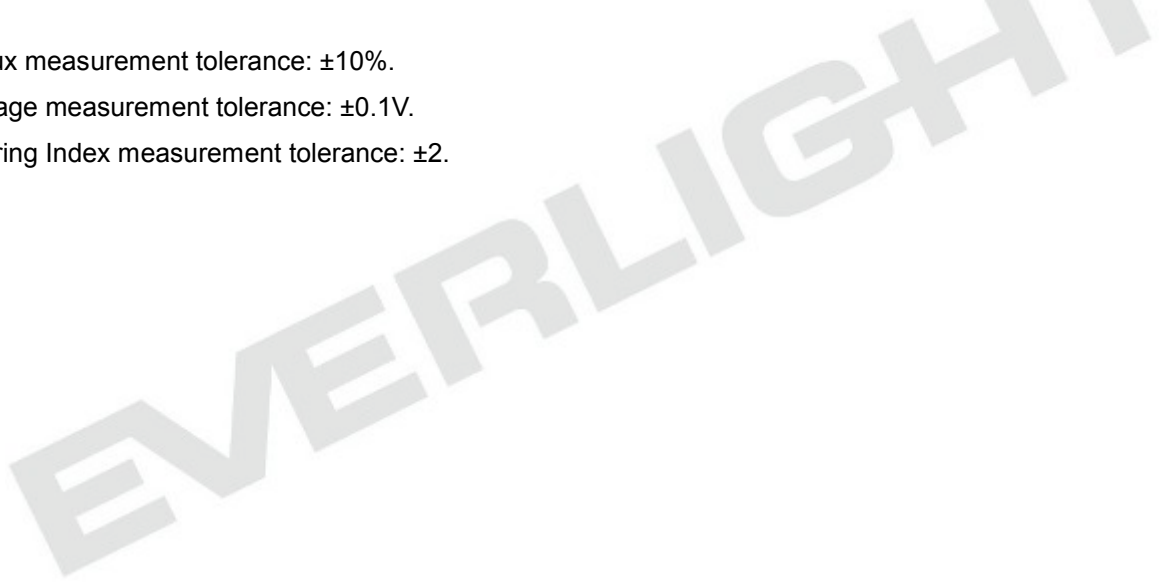
EHP-B05MLG represents by **

Color	Order Code of EHP-B05	Luminous Flux (lm) [1]	CCT(K)	Forward Voltage (V) [2]	CRI Typ	CRI Min [3]
Cool White 6500	**/KT04H-P05/65K/N52/TR	375-400 400-450	65K-1~65K-4	6.0 - 7.0	85	80
Cool White 5700	**/KT04H-P05/57K/N52/TR	375-400 400-450	57K-1~57K-4	6.0 - 7.0	85	80
Cool White 5000	**/KT04H-P05/50K/N52/TR	350-400 400-450	50K-1~50K-4	6.0 - 7.0	85	80
Neutral White 4500	**/KM04H-P05/45K/N52/TR	350-400 400-450	45K-1~45K-4	6.0 - 7.0	85	80
	**/KM14H-P05/45K/R11/TR	400-450 450-500				
Neutral White 4000	**/KM04H-P05/40K/N51/TR	325-350 350-400	40K-1~40K-4	6.0 - 7.0	85	80
	**/KM14H-P05/40K/N52/TR	375-400 400-450				

Color	Order Code of EHP-B05	Luminous Flux (lm) ^[1]	CCT(K)	Forward Voltage (V) ^[2]	CRI Typ	CRI Min ^[3]
Warm White 3500	**/KM04H-P05/35K/N51/TR	300-350	35K-1~35K-4	6.0 - 7.0	85	80
		350-400				
Warm White 3000	**/KM14H-P05/35K/N52/TR	350-400	30K-1~30K-4	6.0 - 7.0	85	80
		400-450				
Warm White 3000	**/KM04H-P05/30K/N42/TR	275-300	30K-1~30K-4	6.0 - 7.0	85	80
		300-350				
Warm White 2700	**/KM14H-P05/30K/N51/TR	325-350	27K-1~27K-4	6.0 - 7.0	85	80
		350-400				
Warm White 2700	**/KM04H-P05/27K/N42/TR	275-300	27K-1~27K-4	6.0 - 7.0	85	80
		300-350				
Warm White 2700	**/KM14H-P05/27K/N51/TR	325-350				
		350-400				

Note:

1. Luminous Flux measurement tolerance: $\pm 10\%$.
2. Forward Voltage measurement tolerance: $\pm 0.1V$.
3. Color Rendering Index measurement tolerance: ± 2 .



Product Binning
Luminous Intensity spec

Group	Bin	Minimum Photometric Flux (lm)	Maximum Photometric Flux (lm)
N	31	200	225
	32	225	250
	41	250	275
	42	275	300
	51	300	350
	52	350	400
R	11	400	450
	12	450	500
	21	500	550
	22	550	600
	31	600	650
	32	650	700
	33	700	750
	41	750	800
	42	800	850
	43	850	925
	44	925	1000
	51	1000	1075
	52	1075	1150
	53	1150	1225
54	1225	1300	

Note: Currently available brightness bins for White LEDs are highlighted and bolded.

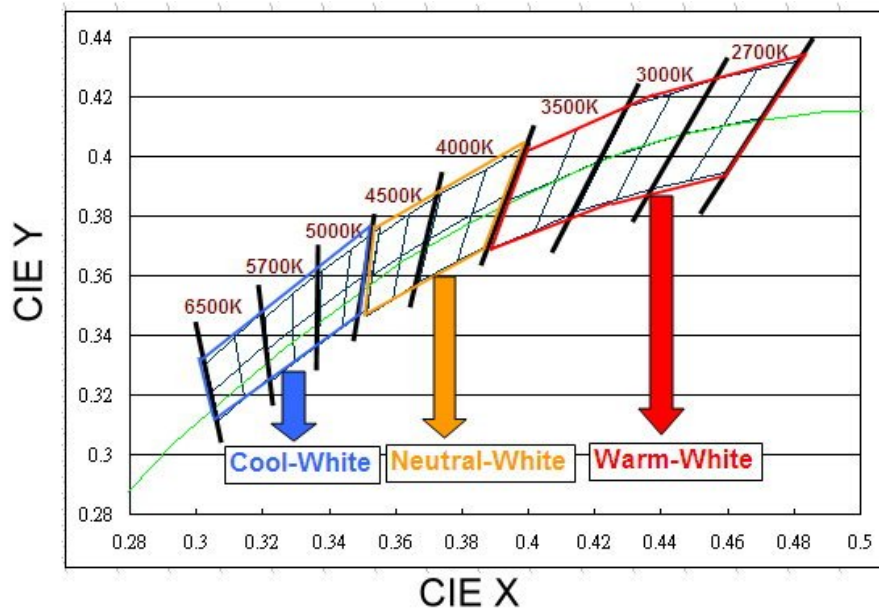
Forward Voltage Bins

Bin	Minimum Forward Voltage (V)	Maximum Forward Voltage (V)
O1	4.5	5.0
O2	5.0	5.5
O3	5.5	6.0
O4	6.0	6.5
O5	6.5	7.0
O6	7.0	7.5
O7	7.5	8.0
R1	8.0	9.0
R2	9.0	10.0
R3	10.0	11.0
R4	11.0	12.0

Notes

- Wide forward voltage 0.5V bin structure O1 ~ O7
- Wide forward voltage 1.0V bin structure R1 ~ R4

White Bin Structure

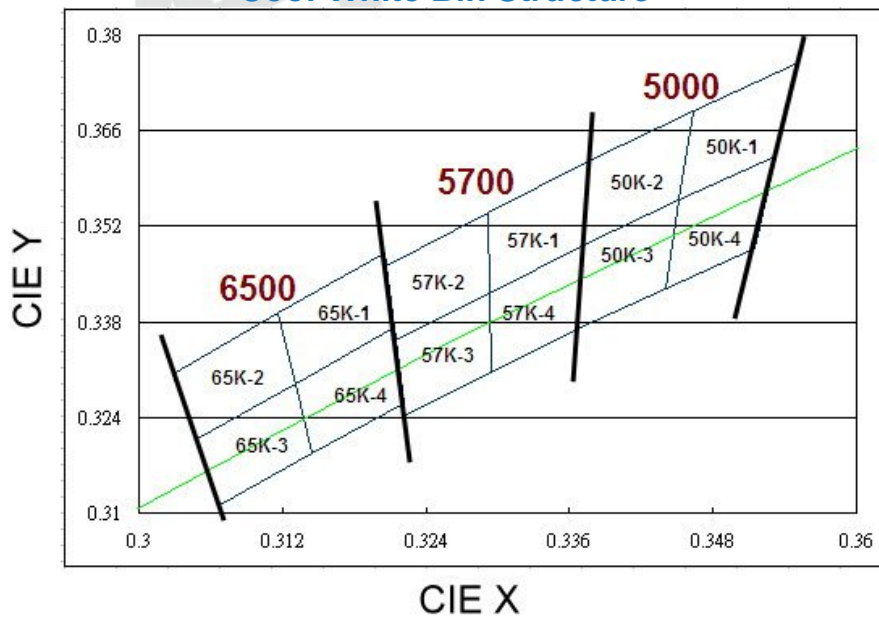


Chromaticity specification defined by ANSI

Notes:

1. The CCT range of Warm-White varies from 2580K to 3710K
2. The CCT range of Neutral-White varies from 3710K to 4745K.
3. The CCT range of Cool-White varies from 4745K to 7050K
4. Color coordinates measurement allowance : ± 0.01
5. Color bins are defined at $I_f=350\text{mA}$ operation.

Cool-White Bin Structure



Cool-White Bin Coordinates

5000K

Bin	CIE X	CIE Y
50K-1	0.346	0.369
	0.345	0.356
	0.353	0.362
	0.355	0.376
Reference Range: 4745~5000K		

Bin	CIE X	CIE Y
50K-2	0.338	0.362
	0.337	0.349
	0.345	0.356
	0.346	0.369
Reference Range: 5000~5310K		

Bin	CIE X	CIE Y
50K-4	0.345	0.356
	0.344	0.343
	0.352	0.349
	0.353	0.362
Reference Range: 4745~5000K		

Bin	CIE X	CIE Y
50K-3	0.337	0.349
	0.337	0.337
	0.344	0.343
	0.345	0.356
Reference Range: 5000~5310K		

5700K

Bin	CIE X	CIE Y
57K-1	0.329	0.354
	0.329	0.342
	0.337	0.349
	0.338	0.362
Reference Range: 5310~5700K		

Bin	CIE X	CIE Y
57K-2	0.321	0.346
	0.322	0.335
	0.329	0.342
	0.329	0.354
Reference Range: 5700~6020K		

Bin	CIE X	CIE Y
57K-4	0.329	0.342
	0.329	0.331
	0.337	0.337
	0.337	0.349
Reference Range: 5310~5700K		

Bin	CIE X	CIE Y
57K-3	0.322	0.335
	0.322	0.324
	0.329	0.331
	0.329	0.342
Reference Range: 5700~6020K		

6500K

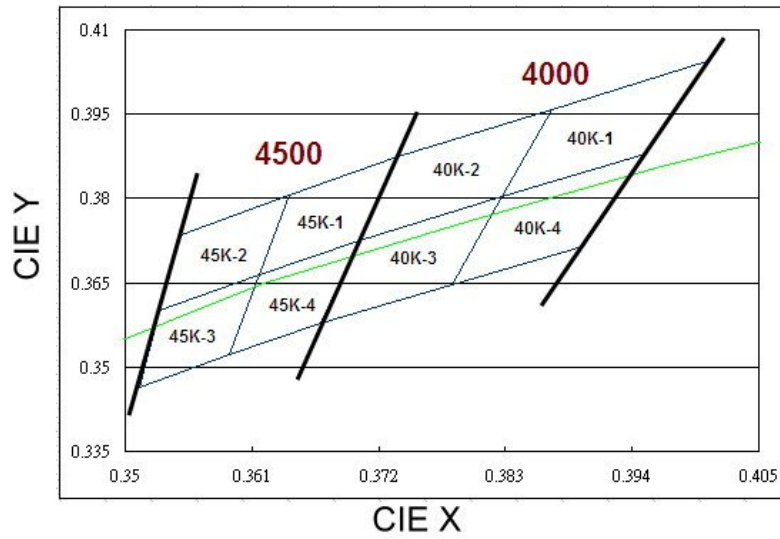
Bin	CIE X	CIE Y
65K-1	0.312	0.339
	0.313	0.329
	0.321	0.337
	0.321	0.348
Reference Range: 6020~6500K		

Bin	CIE X	CIE Y
65K-2	0.303	0.330
	0.305	0.321
	0.313	0.329
	0.312	0.339
Reference Range: 6500~7050K		

Bin	CIE X	CIE Y
65K-4	0.313	0.329
	0.315	0.319
	0.322	0.326
	0.321	0.337
Reference Range: 6020~6500K		

Bin	CIE X	CIE Y
65K-3	0.305	0.321
	0.307	0.311
	0.315	0.319
	0.313	0.329
Reference Range: 6500~7050K		

Neutral-White Bin Structure



Neutral-White Bin Coordinates

4000K

Bin	CIE X	CIE Y
40K-1	0.387	0.396
	0.383	0.380
	0.395	0.388
	0.401	0.404
Reference Range: 3710~4000K		

Bin	CIE X	CIE Y
40K-2	0.374	0.387
	0.370	0.373
	0.383	0.380
	0.387	0.396
Reference Range: 4000~4260K		

Bin	CIE X	CIE Y
40K-4	0.383	0.380
	0.378	0.365
	0.390	0.372
	0.395	0.388
Reference Range: 3710~4000K		

Bin	CIE X	CIE Y
40K-3	0.370	0.373
	0.367	0.358
	0.378	0.365
	0.383	0.380
Reference Range: 4000~4260K		

4500K

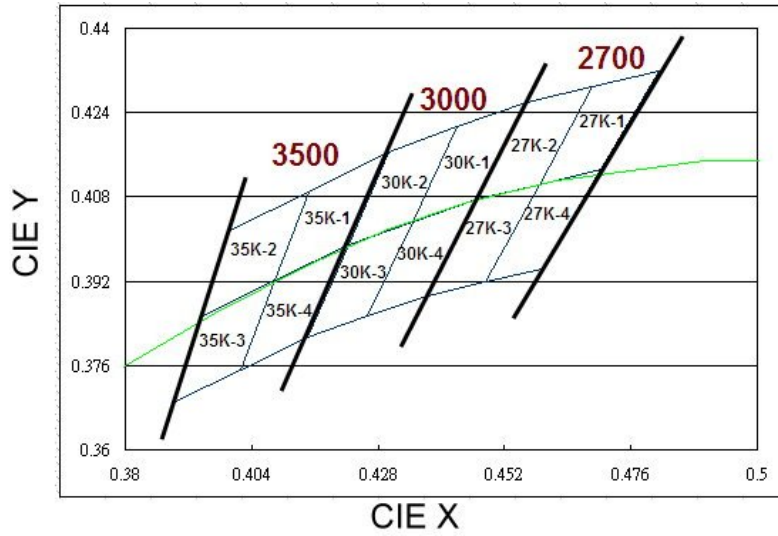
Bin	CIE X	CIE Y
45K-1	0.364	0.381
	0.362	0.366
	0.370	0.373
	0.374	0.387
Reference Range: 4260~4500K		

Bin	CIE X	CIE Y
45K-2	0.355	0.374
	0.353	0.360
	0.362	0.366
	0.364	0.381
Reference Range: 4500~4745K		

Bin	CIE X	CIE Y
45K-4	0.362	0.366
	0.359	0.352
	0.367	0.358
	0.370	0.373
Reference Range: 4260~4500K		

Bin	CIE X	CIE Y
45K-3	0.353	0.360
	0.351	0.347
	0.359	0.352
	0.362	0.366
Reference Range: 4500~4745K		

Warm-White Bin Structure



Warm-White Bin Coordinates

2700K

Bin	CIE X	CIE Y
27K-1	0.469	0.429
	0.459	0.410
	0.470	0.413
	0.481	0.432
Reference Range: 2580~2700K		

Bin	CIE X	CIE Y
27K-2	0.456	0.426
	0.447	0.408
	0.459	0.410
	0.469	0.429
Reference Range: 2700~2870K		

Bin	CIE X	CIE Y
27K-4	0.459	0.410
	0.448	0.392
	0.459	0.394
	0.470	0.413
Reference Range: 2580~2700K		

Bin	CIE X	CIE Y
27K-3	0.447	0.408
	0.437	0.389
	0.448	0.392
	0.459	0.410
Reference Range: 2700~2870K		

3000K

Bin	CIE X	CIE Y
30K-1	0.443	0.421
	0.435	0.403
	0.447	0.408
	0.456	0.426
Reference Range: 2870~3000K		

Bin	CIE X	CIE Y
30K-2	0.430	0.417
	0.422	0.399
	0.435	0.403
	0.443	0.421
Reference Range: 3000~3220K		

Bin	CIE X	CIE Y
30K-4	0.435	0.403
	0.426	0.385
	0.437	0.389
	0.447	0.408
Reference Range: 2870~3000K		

Bin	CIE X	CIE Y
30K-3	0.422	0.399
	0.415	0.381
	0.426	0.385
	0.435	0.403
Reference Range: 3000~3220K		

3500K

Bin	CIE X	CIE Y
35K-1	0.415	0.409
	0.408	0.392
	0.422	0.399
	0.430	0.417
Reference Range: 3220~3500K		

Bin	CIE X	CIE Y
35K-2	0.400	0.402
	0.394	0.385
	0.408	0.392
	0.415	0.409
Reference Range: 3500~3710K		

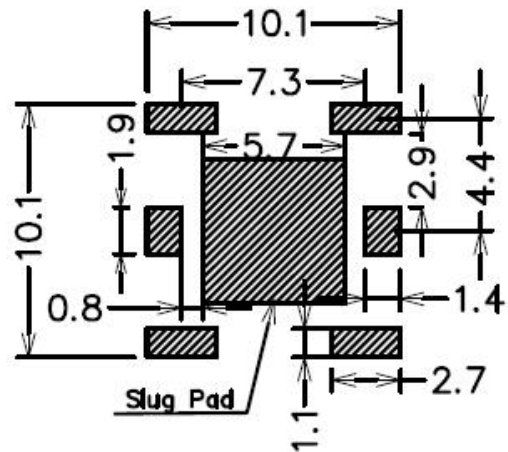
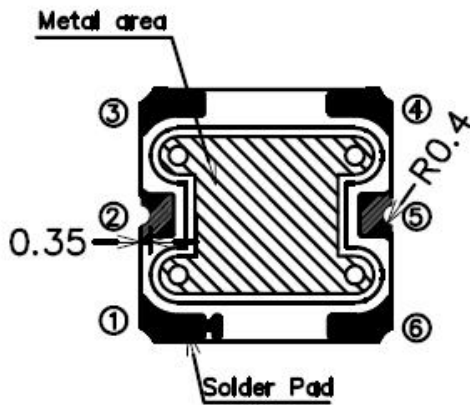
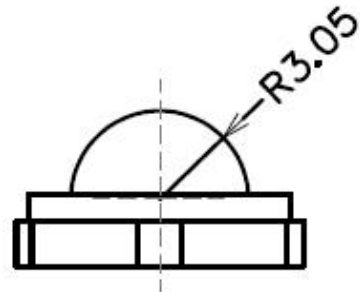
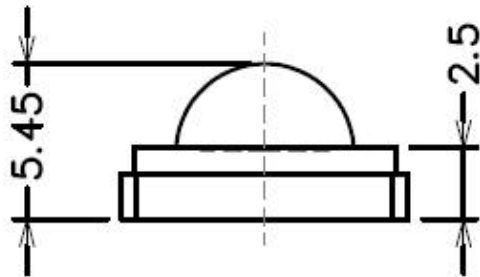
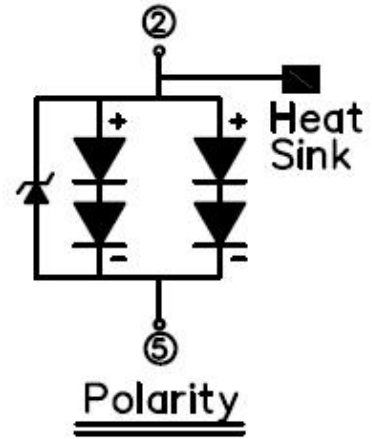
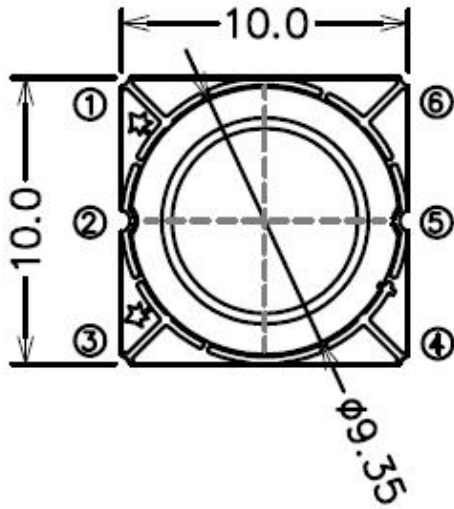
Bin	CIE X	CIE Y
35K-4	0.408	0.392
	0.402	0.375
	0.415	0.381
	0.422	0.399
Reference Range: 3220~3500K		

Bin	CIE X	CIE Y
35K-3	0.394	0.385
	0.389	0.369
	0.402	0.375
	0.408	0.392
Reference Range: 3500~3710K		

Note: Currently available typical CCT ranges are 3000K, 5700K, and 6500K CCT



Dimensions



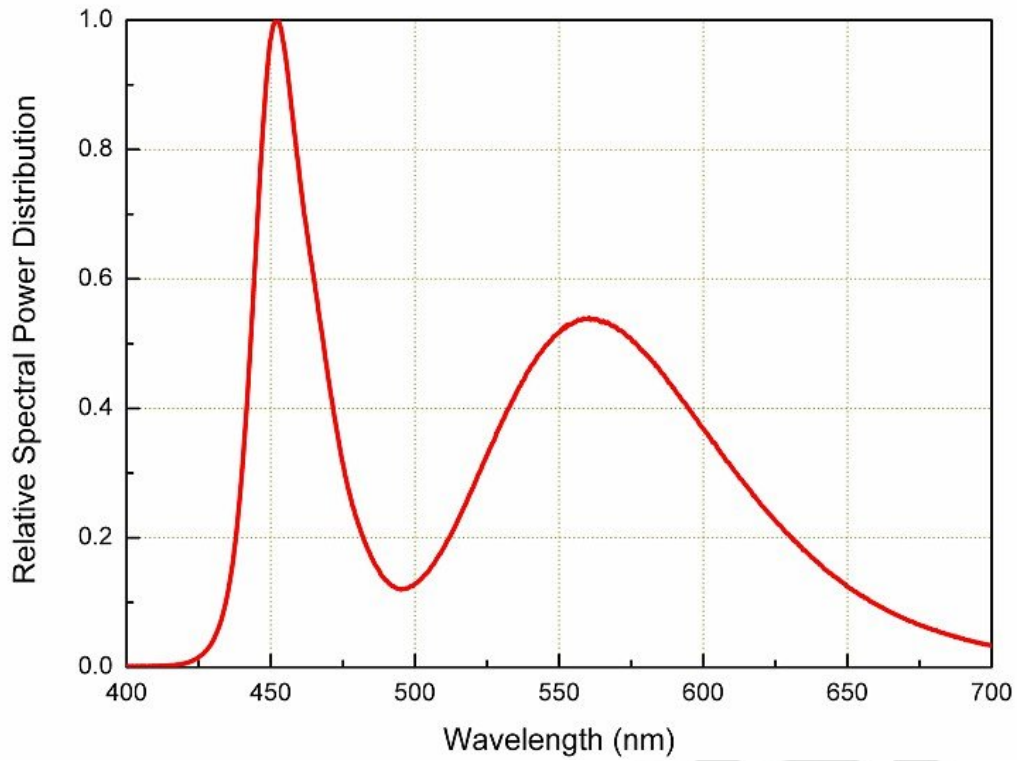
Soldering patterns

Notes.

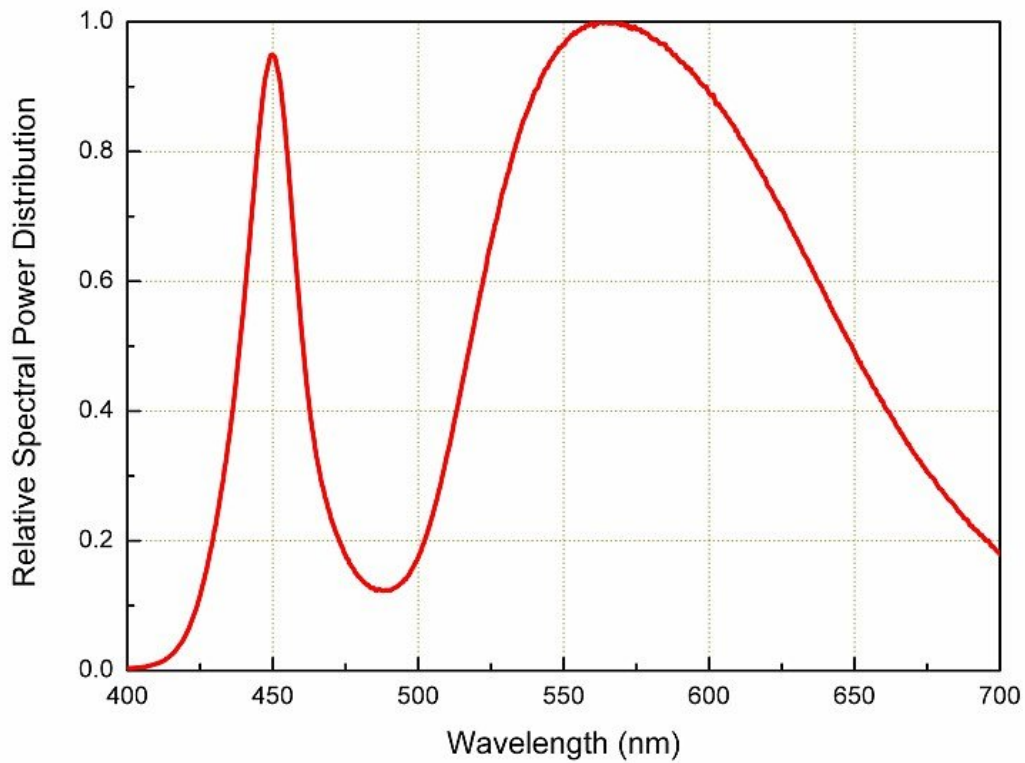
1. Dimensions are in millimeters.
2. Tolerances for fixed dimensions are $\pm 0.25\text{mm}$.

Wavelength Characteristics

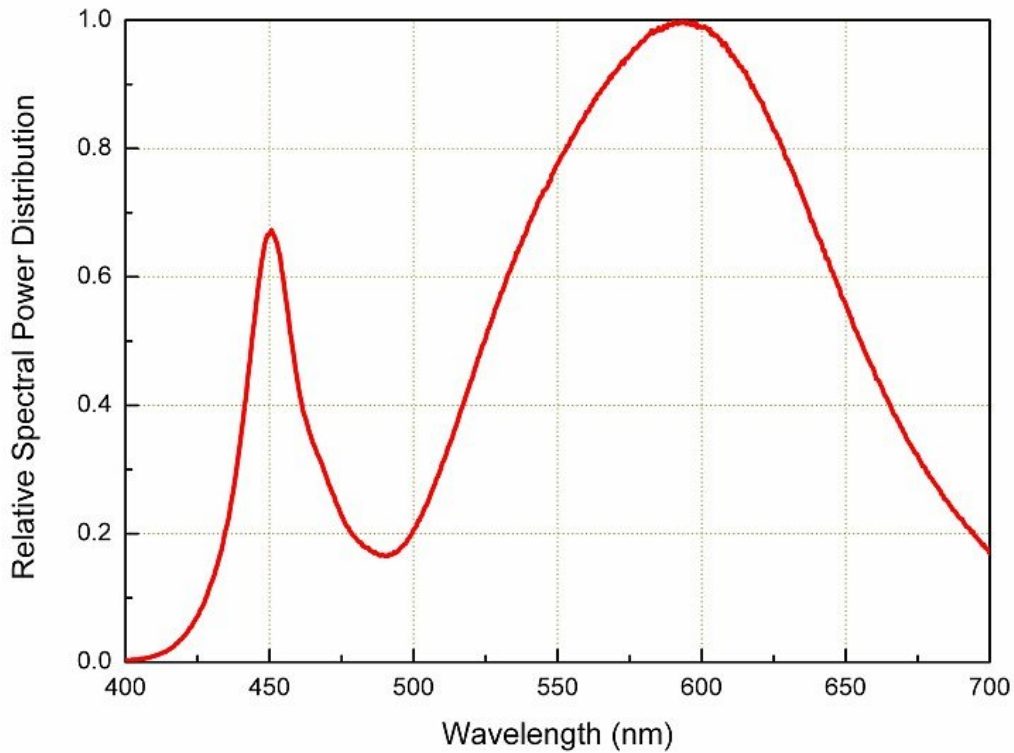
For Cool-White, @ Solder Pad Temperature = 25



For Neutral-White, @ Solder Pad Temperature = 25

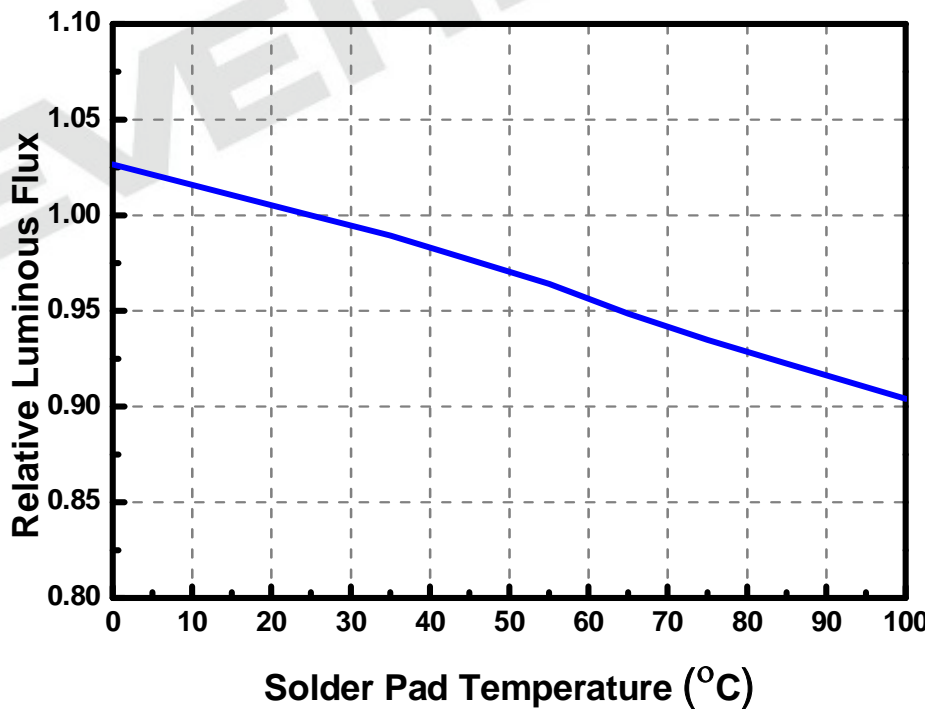


For Warm-White, @ Solder Pad Temperature = 25

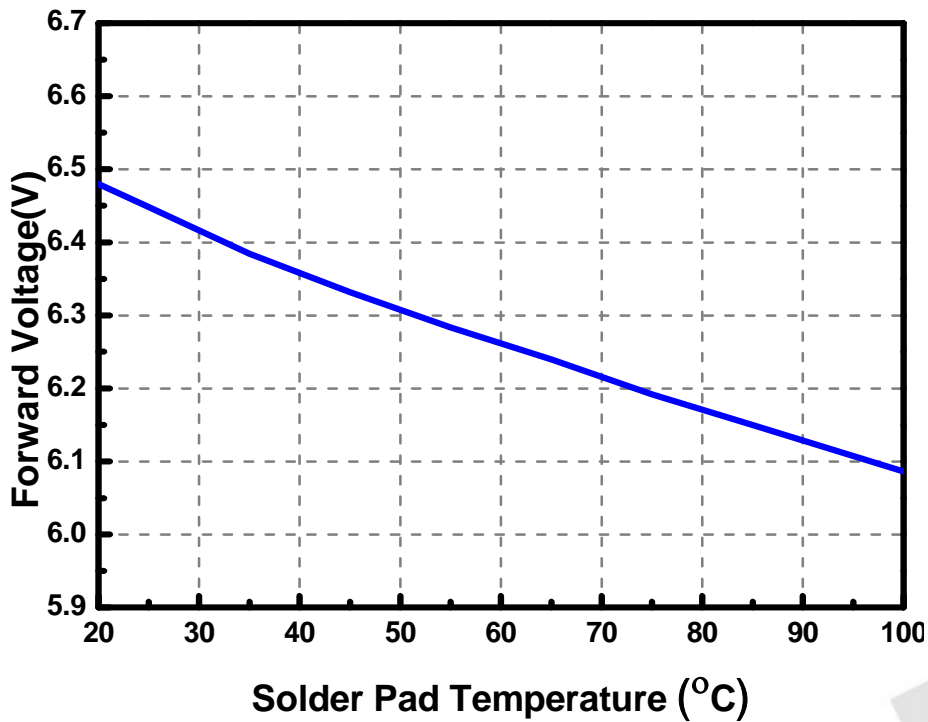


Typical Light Output Characteristic vs. Solder Pad Temperature

Cool-White, Neutral-White, Warm-White for 700mA Drive Current

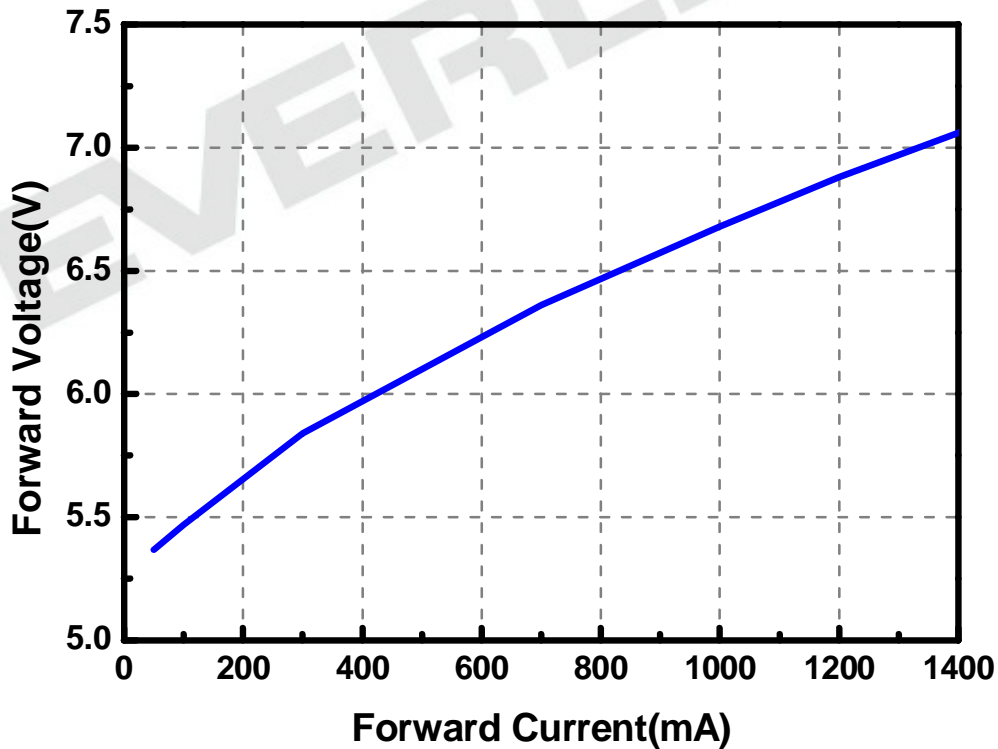


Typical Forward Voltage vs. Solder Pad Temperature @ 700mA Drive Current



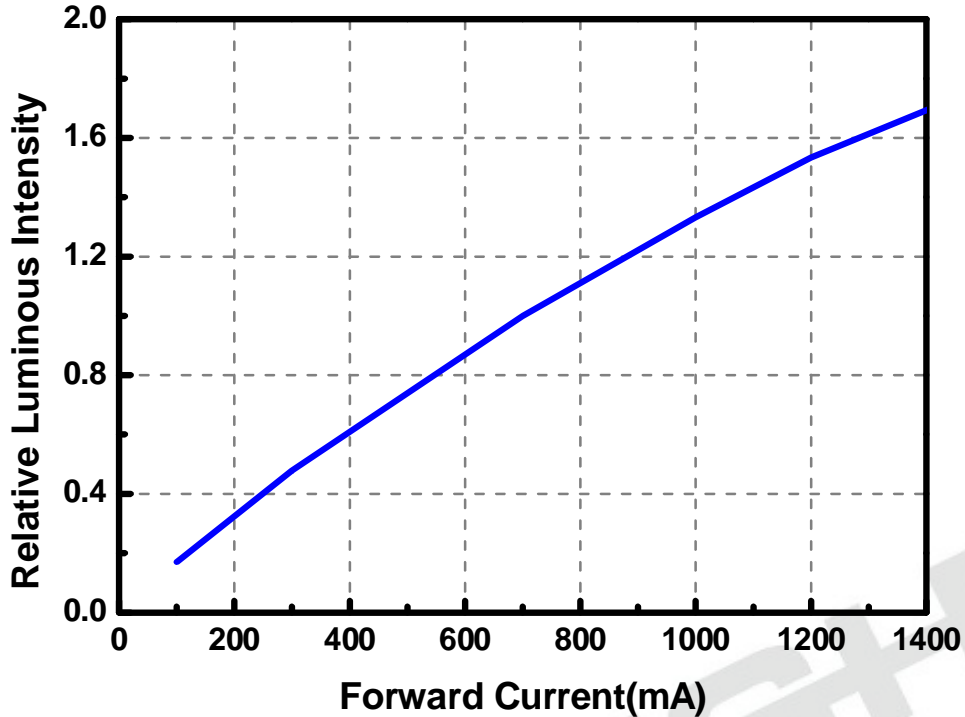
Typical Electrical Characteristics

For Cool-White, Neutral-White, Warm-White
@ Solder Pad Temperature = 25



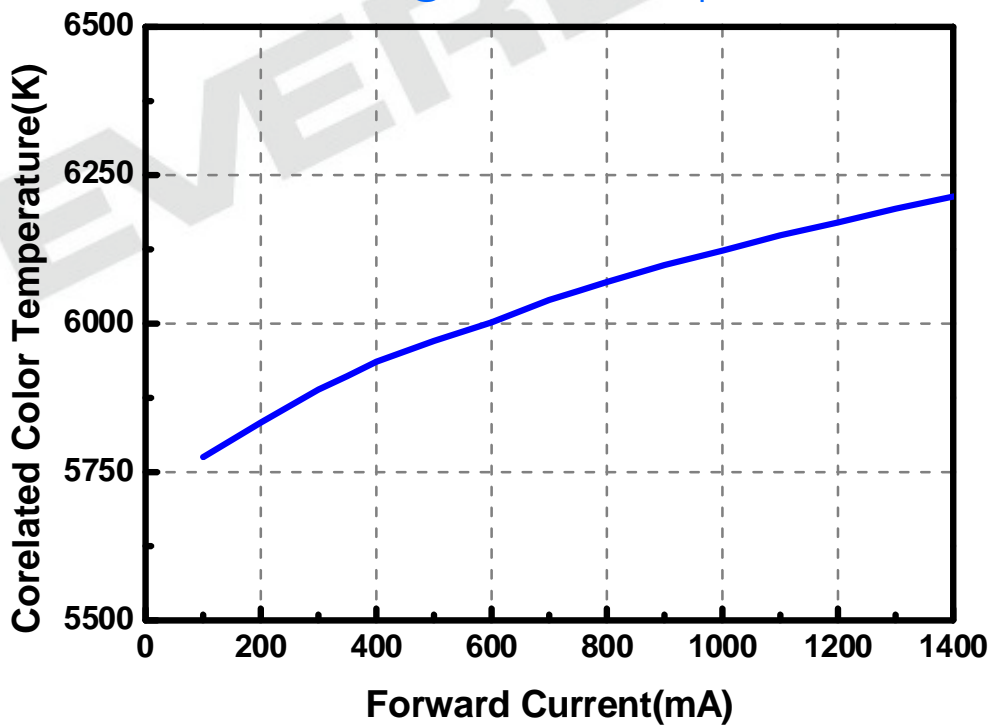
Typical Relative Luminous Flux vs. Forward Current

For Cool-White, Neutral-White, Warm-White
@ Solder Pad Temperature = 25

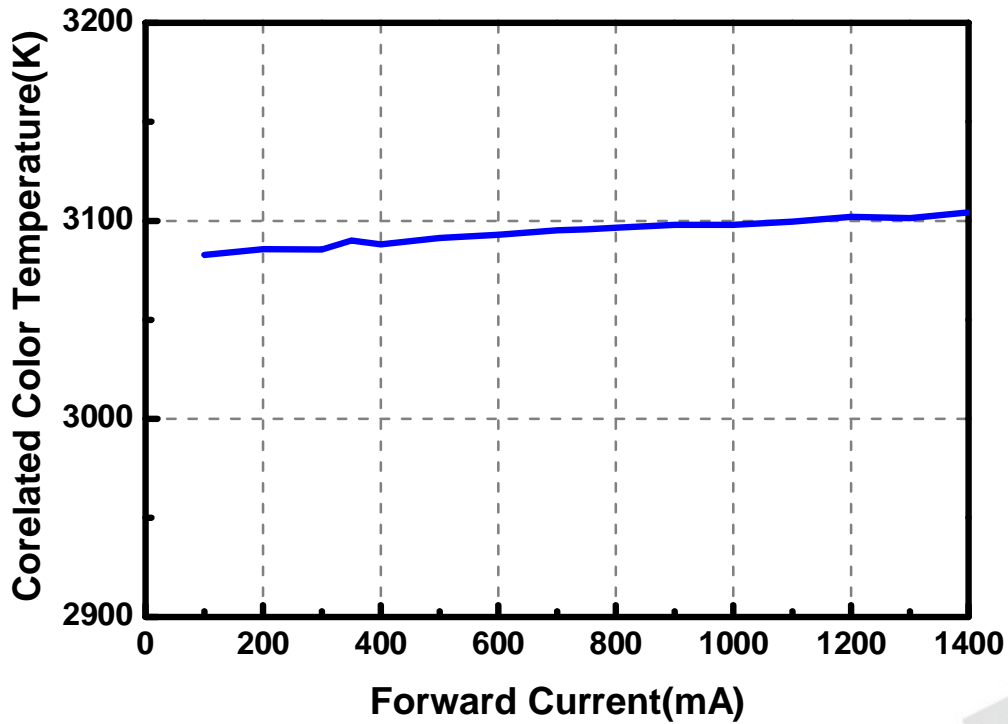


Typical CCT Shift Characteristics vs. Forward Current

For Cool-White @ Solder Pad Temperature = 25

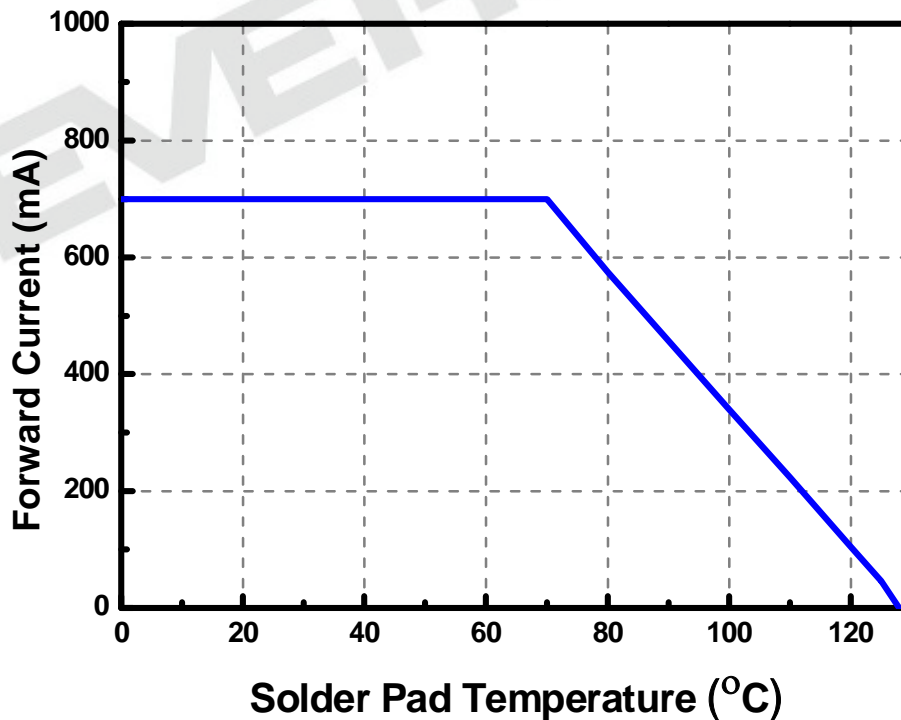


For Warm-White @ Solder Pad Temperature = 25

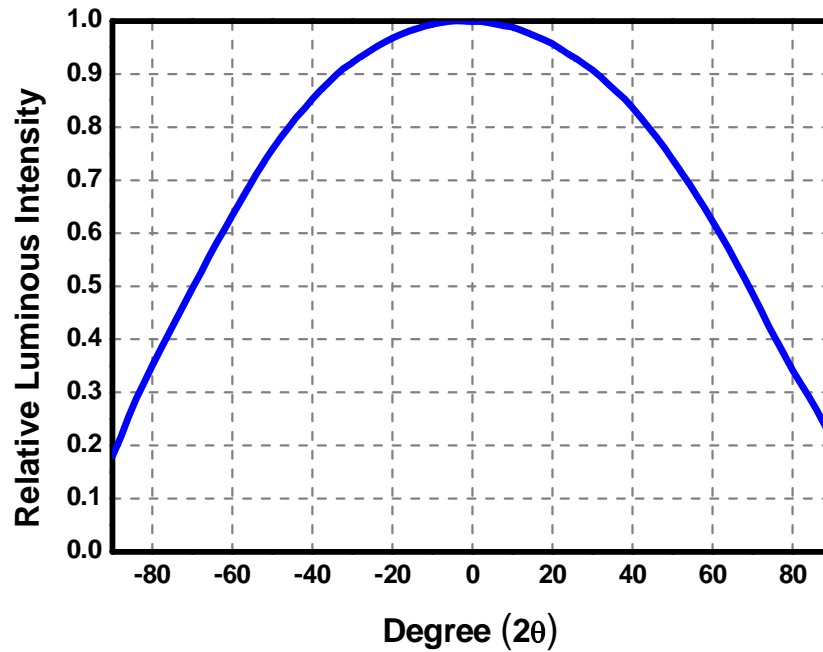


Current Derating Curves

Current Derating Curve for 700mA Drive Current
Cool-White, Neutral-White, Warm-White



Typical 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 $\pm 5^\circ$.

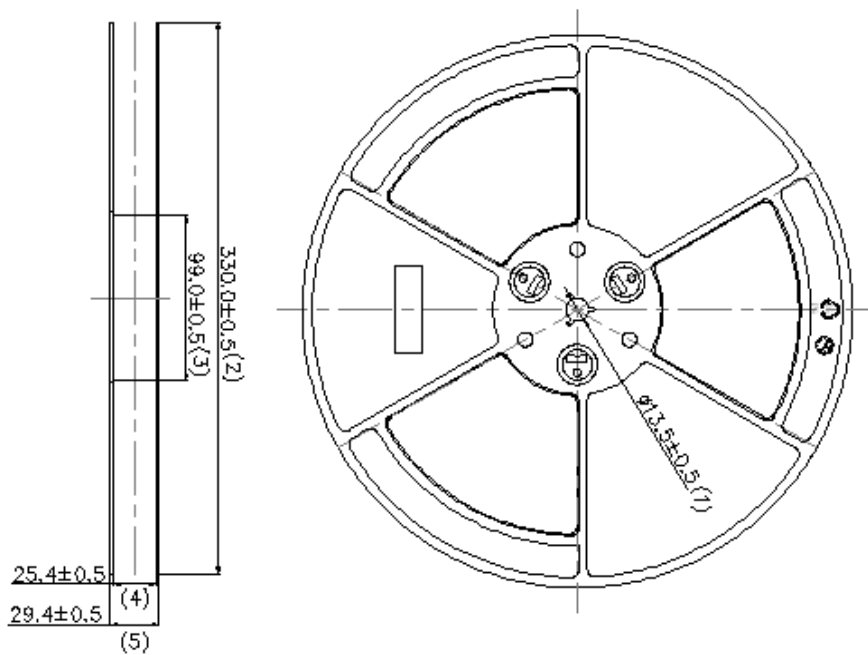
EVERLIGHT

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



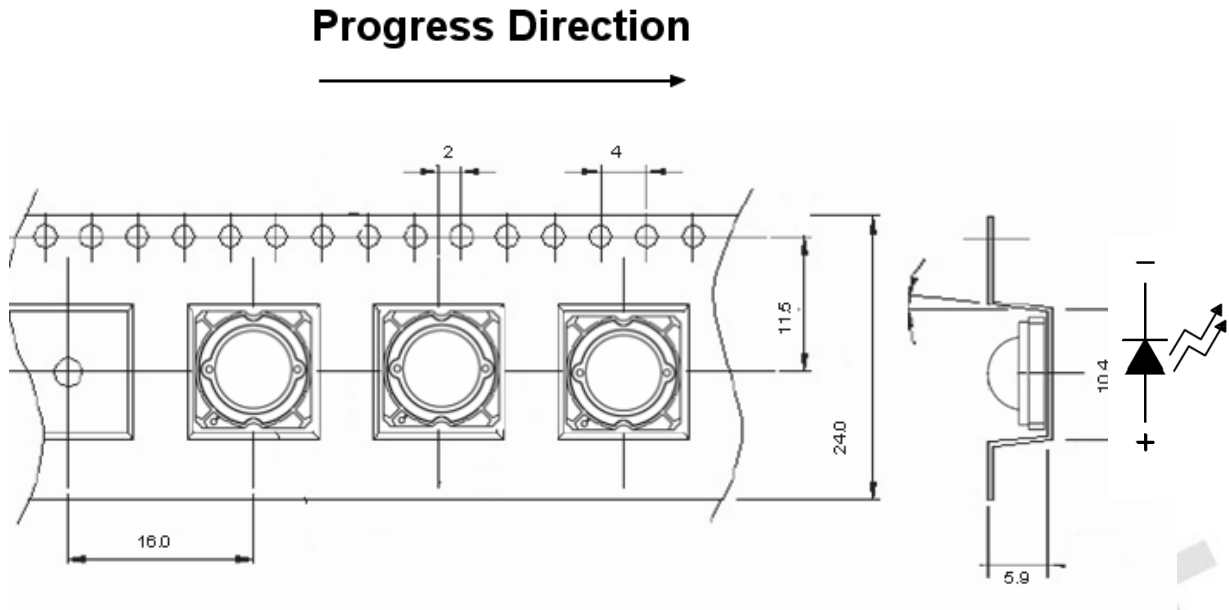
Reel Dimensions



Note.

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

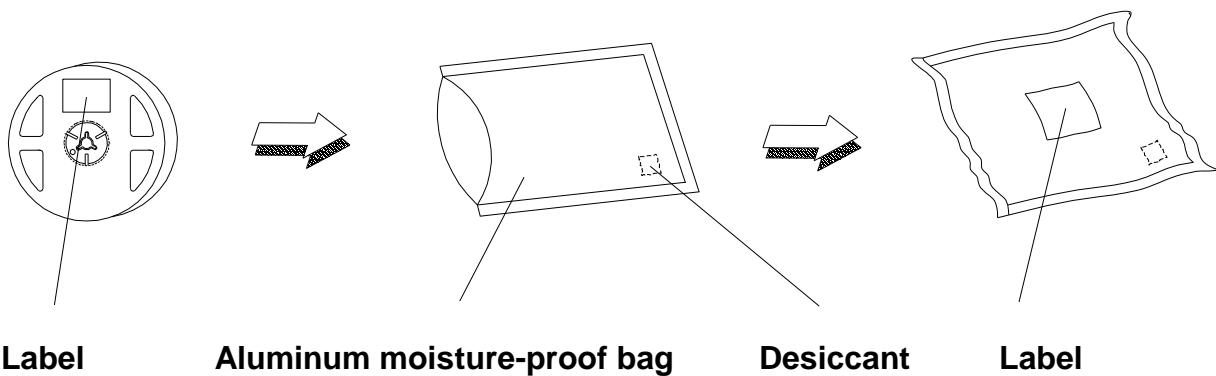
Carrier Tape Dimensions: Loaded quantity 300 PCS per reel



Note.

1. Dimensions are in millimeters.
2. Tolerances for fixed dimensions are $\pm 0.1\text{mm}$.

Moisture Resistant Packaging



**Reliability Data
(EHP-B05 Series-5W)**

Stress Test	Stress Condition	Stress Duration
Reflow	Tsol=260 , 10sec, 6min	3 times
Thermal Shock	H : + 100 20min. 20sec. 'L : - 10 20min.	500 Cycles
Power Temperature Cycle	H : + 100 15min. 5min. 'L : - 40 15min. IF= 300 mA , 2min on/off	500 Cycles
High Temperature/Humidity Storage	Ta=85 , RH=85%	1000hours
High Temperature/Humidity Operation	Ta=85 , RH=85% , IF=400mA	1000hours
Low Temperature Operation Life	Ta= -40 , IF=700mA	1000hours
High Temperature Operation Life #1	Ta=25 , IF=700mA	1000hours
High Temperature Operation Life #2	Ta=55 , IF=700mA	1000hours
High Temperature Operation Life #3	Ta=85 , IF=400mA	1000hours
High Temperature Storage	Ta= 110	1000hours
Low Temperature Storage	Ta= -40	1000hours

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

*VF: FORWARD VOLTAGE DIFFERENCE<20%

Precautions For Use

1. Over-current-Protection

Though the EHP-B05 series has an 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 changes and may cause failure.

2. Storage

- i. Do not open the moisture proof bag before the devices are ready to use
- ii. Before the package is opened: The LEDs should be stored at temperatures 30 °C or less and humidity 50% or less.
- 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 Nitrogen gas.
- iv. After the package is opened: The LEDs should be stored at temperatures under 30 °C or less and humidity 30% or less.
- v. LEDs should be used within 168 hours (7 days) after the package is opened.
- vi. Before using LEDs: The LEDs should be baked under the following conditions: pre-curing at 60±5 °C for 24 hours.

3. Thermal Management

- i. For maintaining high flux output and achieving maximum reliability, EHP-B05 series LEDs 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.
- ii. Special thermal designs are also recommended to take into account outer heat sink design, such as FR4 PCB on Aluminum with thermal vias or FPC on Aluminum with thermal conductive adhesive, etc.

MCPCB structure



Recommend:

$$\text{Max } T_{\text{slug}} = 70$$

- iii. Sufficient thermal management must be implemented, or the die junction temperature may exceed the limit and LED lifetime will decrease critically.

4. Proper Handling

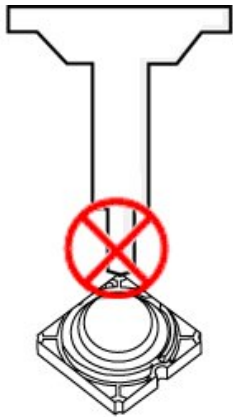
To avoid contamination of materials, damage of internal components, and shortening of LED lifetime, do not subject LEDs to conditions as those listed below.

Bare Hand



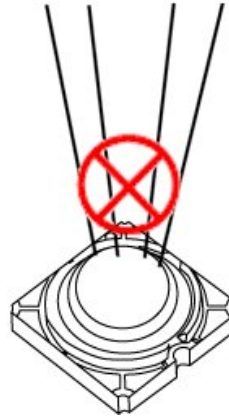
When handling the product, do not apply direct pressure to the optical surface.

Pick and Place Nozzle for Surface Mount Assembly.



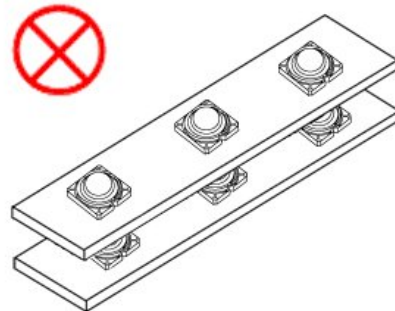
Avoid directly contacting with nozzle.

Tweezers



Do not touch the resin with tweezers to avoid scratching or other damage the optical surface.

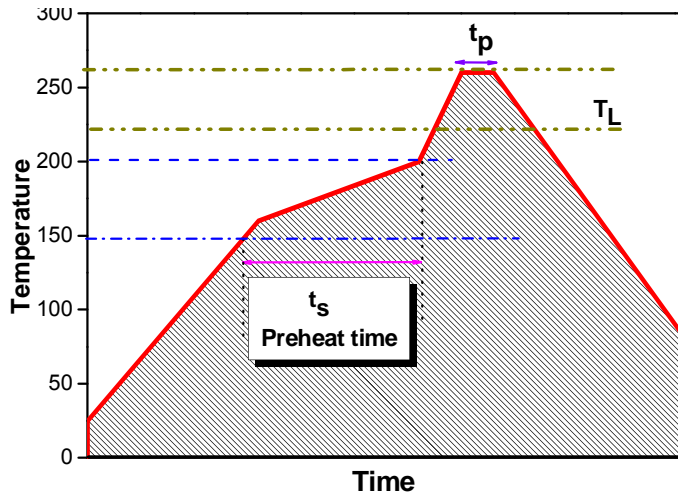
During Module Assembly



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

5. Reflow Soldering Process

- a. EHP-B05 series are suitable for SMT process
- b. Curing of glue in oven according to standard operation flow processes.



Profile Feature	Parameter
Ramp-UP Rate	2-3 /S
Preheat Temperature	150-200
Preheat Time(t_s)	60~120s
Liquid Temperature(T_L)	217
Time above T_L	60-90s
Peak Temperature(T_P)	260±5 (Varied with the solder material)
Peak Time(t_p)	Max 20s
Ramp-Down Rate	3-5 /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 : **2012/03/15**

Previous version : **2011/12/30**

Device No. : DHE-0001726

Rev. Ver. : 3

Page	Subjects(major change in previous version)	Date of change
9	Revised Cool-White Bin 5700K Coordinates	2011/12/30
5 16 17	P05.Revised Typ.CRI 75 White LEDs & Typ.CRI 85 White LEDs(Added Higher Level Products) P16.Revised Typ. Light Output Characteristic vs. Solder Pad Temperature P17.Add Typical Relative Forward Voltage vs. Solder Pad Temperature	2012/03/15