

Shuen

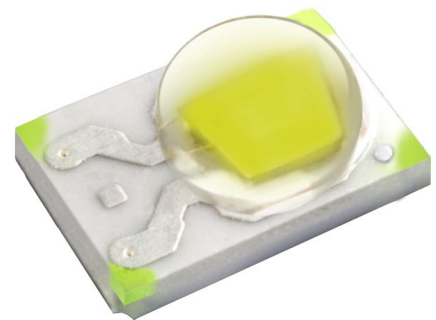
3W Series

炫

“Shuen [Xuan] is the English translation for the Chinese word meaning Bright and Shiny. Both words are relevant descriptions of this Everlight LED series. The modern, adaptive Chinese definition of the word represents that which is New, Extravagant, and Highly Sought After.”

Introduction

The Shuen series is a surface-mount high-power device featuring high brightness combined with a compact size that is suitable for all kinds of lighting applications such as general illumination, flash, spot, signal, industrial and commercial lighting. The thermal pad of this device is electrically isolated providing convenience in thermal and electrical design. The Shuen series is one of the most promising devices in Everlight's high power product offering and is ready to face the challenges of today's Solid-State Lighting requirements.



Features

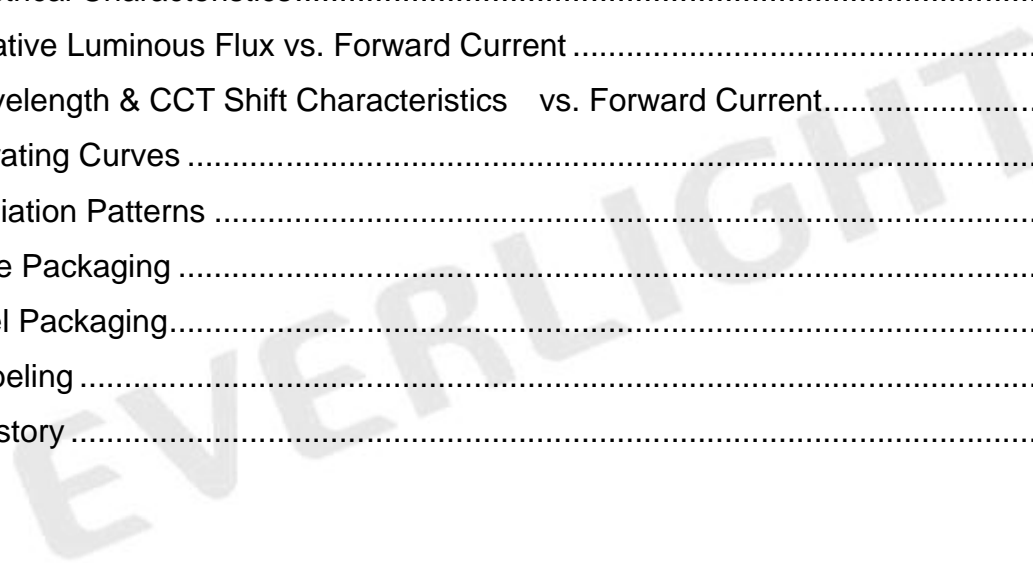
- ◆ Small package with high efficiency
- ◆ ESD protection up to 8KV
- ◆ Soldering method: SMT
- ◆ Binning Parameters: Brightness, Forward Voltage, Wavelength and Chromaticity
- ◆ Moisture Sensitivity Level: 1
- ◆ RoHS compliant
- ◆ Matches ANSI binning
- ◆ Reliability testing conforms to IESNA LM80 Lumen maintenance test method

Applications

- ◆ General Lighting
- ◆ Decorative and Entertainment Lighting
- ◆ Signal and Symbol
- ◆ Exterior and Interior Automotive Illumination

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Product Nomenclature

The product name is designated as below:

ELSH – ABCDE – FGHIJ – V1234

Designation:

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

C = radiation pattern ^[1]

D = color ^[2]

E = power consumption ^[3]

F = reserved for future product offerings

G = internal coding

H = packaging type ^[4]

IJ = internal coding

V = forward voltage bin

1234 = color bin or CCT bin

Notes

1. Table of radiation patterns

Symbol	Description
1	Lambertian

2. Table of color offerings:

Symbol	Color	Dominant wavelength range
R	Red	620~635nm
Y	Amber	580~595nm
G	Green	520~550nm
B	Blue	450~470nm
C	Cool-White	4745~7050K
N	Neutral-White	3710~4745K
M	Warm-White	2580~3710K

3. Table of power consumptions:

Symbol	Description
3	3W

4. Table of packaging types:

Symbol	Description
P	Tape
B	Tube

Absolute Maximum Ratings

Parameter	Symbol	Ratings	Unit
Max. DC Forward Current (mA)	I_F	750 ^[1]	mA
Max. Peak Pulse Current (mA)	I_{Pulse}	1000	mA
Max. ESD Resistance	V_B	8000	V
Reverse Voltage	V_R	Note 2	V
Thermal Resistance	R_{th}	6 ^[3]	°C/W
Max. Junction Temperature	T_J	125 ^[4]	°C
Operating Temperature	T_{Opr}	-40 ~ +85 ^[5]	°C
Storage Temperature	T_{Stg}	-40 ~ +100	°C
Max. Soldering Temperature	T_{Sol}	260	°C
Allowable Reflow Cycles	n/a	2	cycles

Notes:

1. Maximum forward current for 3W is 750mA ($T_{Thermal\ Pad}=25^{\circ}C$).
2. The Shuen series LEDs are not designed for reverse bias used.
3. Thermal Resistance is 6°C/W for Cool-White, Neutral-White, and Warm-White LEDs.
4. Maximum junction temperature of Cool-White, Neutral-White, and Warm-White LEDs is 125°C.
5. Maximum Operating Temperature (Thermal Pad) of Cool-White, Neutral-White, and Warm-White LEDs is 85°C.
6. Avoid operating Shuen LEDs at maximum operating temperature exceeding 1 hour.

JEDEC Moisture Sensitivity

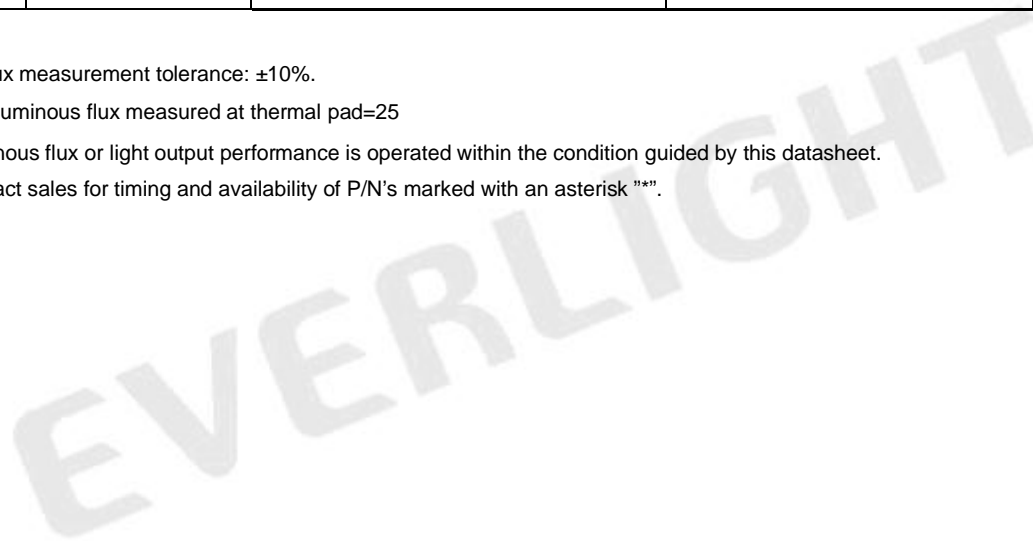
Level	Floor Life		Soak Requirements Standard	
	Time (hours)	Conditions	Time (hours)	Conditions
1	unlimited	30°C / 85% RH	168 (+5/-0)	85°C / 85% RH

Luminous Flux Characteristics for the Shuen series

Color	Part Number	3W	
		Minimum Luminous Flux(lm) or Radiometric Power(mW) ^[1]	Drive Current (mA)
Cool White	ELSH – J61CX	150	700
	*ELSH – J71CX	160	700
Neutral White	*ELSH – J61NX	150	700
	*ELSH – J71NX	160	700
Warm White	ELSH – J21MX	110	700
	*ELSH – J31MX	120	700
Red	ELSH – F81RX	80	700
Amber	ELSH – F81YX	80	700
Green	ELSH – F91GX	90	700
Blue	ELSH – E81BX	20	700

Note:

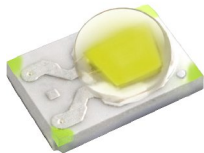
1. Luminous flux measurement tolerance: ±10%.
2. The data of luminous flux measured at thermal pad=25
3. Typical luminous flux or light output performance is operated within the condition guided by this datasheet.
4. Please contact sales for timing and availability of P/N's marked with an asterisk "**".



PN of the Shuen series: White LEDs

The table below is a list of part numbers for the Everlight Shuen 3W series White LED. All parts listed match ANSI binning standards. Bin offerings of 5700K, 6500K, and 3000K are listed and currently available. CRI is also listed with a typical 75. These clearly listed binning options allow for proper design and implementation into lighting applications. The Order Codes below are currently available White Shuen LEDs.

For Example: If you order product using P/N **ELSH-J61C3-0LPGS-D5700**, you will get



Color	Radiation Pattern	CRI	CCT	Forward Voltage (V)	Minimum Luminous Flux (lm)
Cool White	Lambertian	75	57K-1 ~ 57K-2 ~ 57K-3 ~ 57K-4	3.25~3.55(V2) 3.55~3.85(V3) 3.85~4.15(V4)	150

White, Shuen series LEDs at 700mA are listed below

Color	Order Code of ELSH	Minimum Luminous Flux (lm)	CCT (K) Wavelength (nm)	Forward Voltage (V)	CRI (Typical)[1]
Cool White 6500	ELSH-J61C3-0LPGS-D6500	150	6500-1~6500-4	3.25~4.15	75
	*ELSH-J71C3-0LPGS-D6500	160	6500-1~6500-4	3.25~4.15	75
Cool White 5700	ELSH-J61C3-0LPGS-D5700	150	5700-1~5700-4	3.25~4.15	75
	*ELSH-J71C3-0LPGS-D5700	160	5700-1~5700-4	3.25~4.15	75
Warm White 3000	ELSH-J21M3-0LPGS-D3000	110	3000-1~3000-4	3.25~4.15	75
	*ELSH-J31M3-0LPGS-D3000	120	3000-1~3000-4	3.25~4.15	75

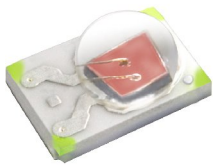
Note:

1. CRI measurement tolerance: ± 5 .
2. Please contact sales for timing and availability of P/N's marked with an asterisk "*".

PN of the Shuen series: Color LEDs

The table below is a list of part numbers for the Everlight Shuen series Color LED. Standard Everlight color bins are listed according to wavelength and represent the standard primary colors of the spectrum. These clearly listed binning options allow for proper design and implementation into lighting applications.

For Example: If you order product using P/N **ELSH-F81R3-0LPNM-BR4R6**, you will get



Color Variant	Radiation Pattern	Dominant Wavelength (nm)	Forward Voltage (V)	Minimum Luminous Flux (lm)
Red	Lambertian	615~620(R4) 620~625(R5) 625~630(R6)	2.05~2.35(U2) 2.35~2.65(U3) 2.65~2.95(U4)	80

Color, Shuen series LEDs at 700mA are listed below.

Color	Order Code of ELSH	Minimum Luminous Flux (lm)	Wavelength (nm)	Forward Voltage(V)
Red	ELSH-F81R3-0LPNM-BR4R6	80	615~630	2.05~2.95
Amber	ELSH-F81Y3-0LPNM-BA3A5	80	585~592.5	2.05~2.95
Green	ELSH-F91G3-0LPNM-DG1G3	90	520~535	3.25~4.15
Blue	ELSH-E81B3-0LPNM-DB6B8	20	455~470	3.25~4.15

Note:

1. Please contact sales for timing and availability of P/N's marked with an asterisk "**".

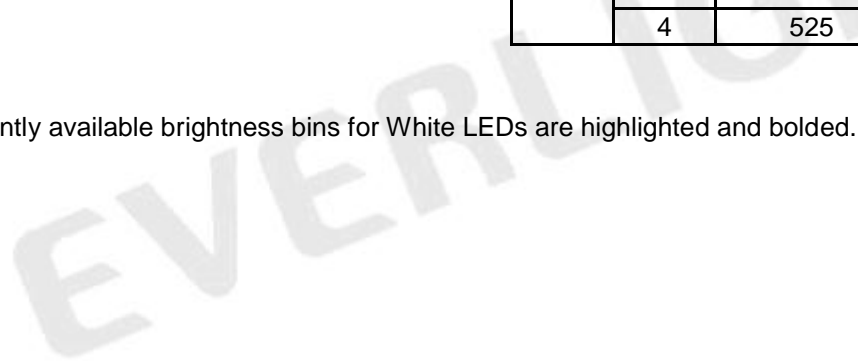
Product Binning

Luminous Flux Bins

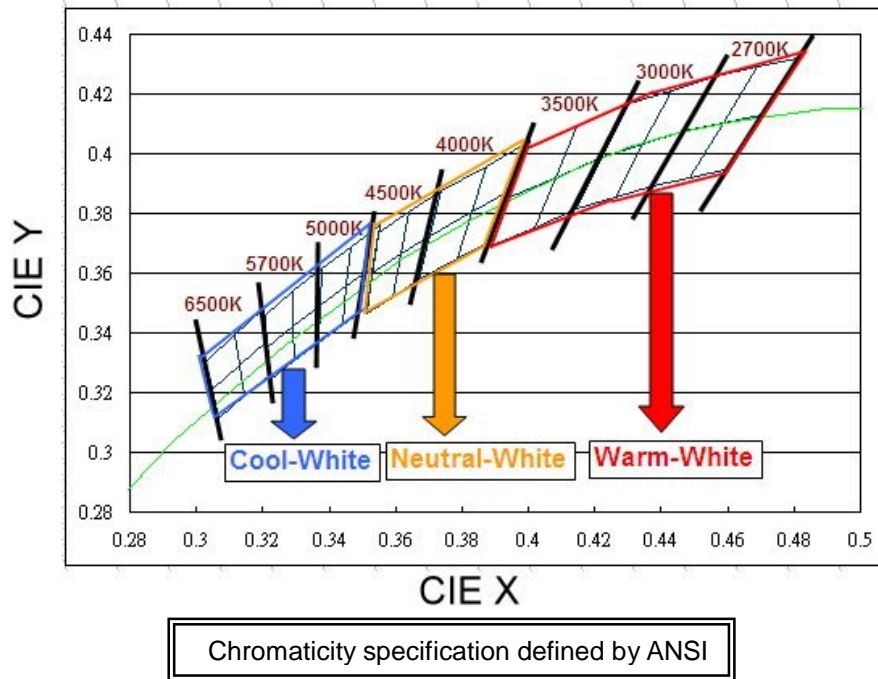
Group	Bin	Minimum Photometric Flux (lm)	Maximum Photometric Flux (lm)
E	1	4	5
	2	5	6
	3	6	8
	4	8	10
	5	10	13
	6	13	17
	7	17	20
	8	20	23
	9	23	27
F	1	27	33
	2	33	39
	3	39	45
	4	45	52
	5	52	60
	6	60	70
	7	70	80
	8	80	90
	9	90	100

Group	Bin	Minimum Photometric Flux (lm)	Maximum Photometric Flux (lm)
J	1	100	110
	2	110	120
	3	120	130
	4	130	140
	5	140	150
	6	150	160
	7	160	180
	8	180	200
	9	200	225
K	1	225	250
	2	250	275
	3	275	300
	4	300	325
	5	325	150
	6	150	375
	7	375	400
	8	400	425
	9	425	450
N	1	450	475
	2	475	500
	3	500	525
	4	525	550

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



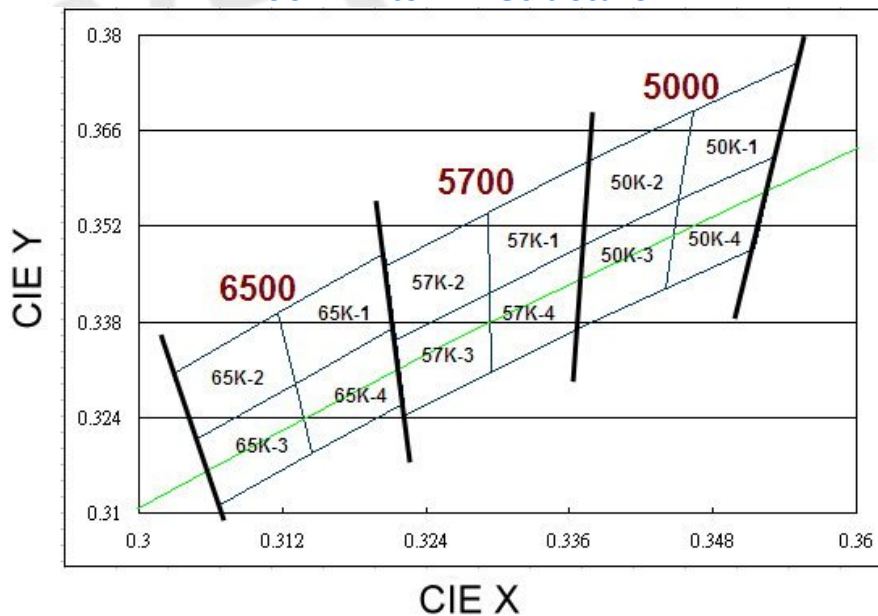
White Bin Structure



Notes:

1. The CCT range of Cool-White varies from 4745K to 7050K.
2. The CCT range of Neutral-White varies from 3710K to 4745K.
3. The CCT range of Warm-White varies from 2580K to 3710K
4. Color coordinates measurement allowance : ± 0.01
5. Color bins are defined at $I_f=700\text{mA}$ 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
	0.321	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	0.321	0.335
	0.322	0.324
	0.329	0.331
	0.329	0.342
Reference Range: 5700~6020K		

6500K

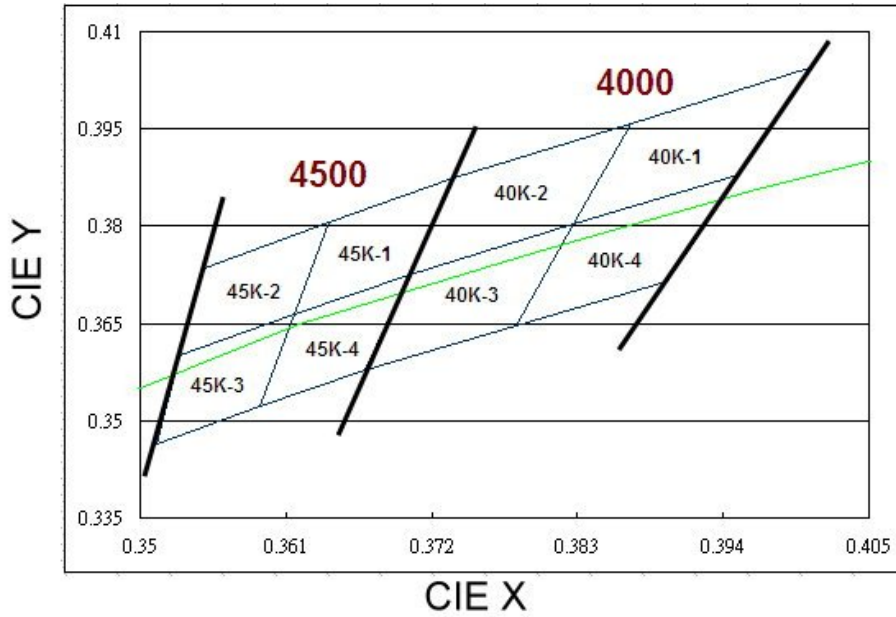
Bin	CIE X	CIE Y
65K-1	0.312	0.339
	0.313	0.329
	0.321	0.337
	0.321	0.348
Reference Range: 6020~6500K		

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
	0.314	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
	0.314	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

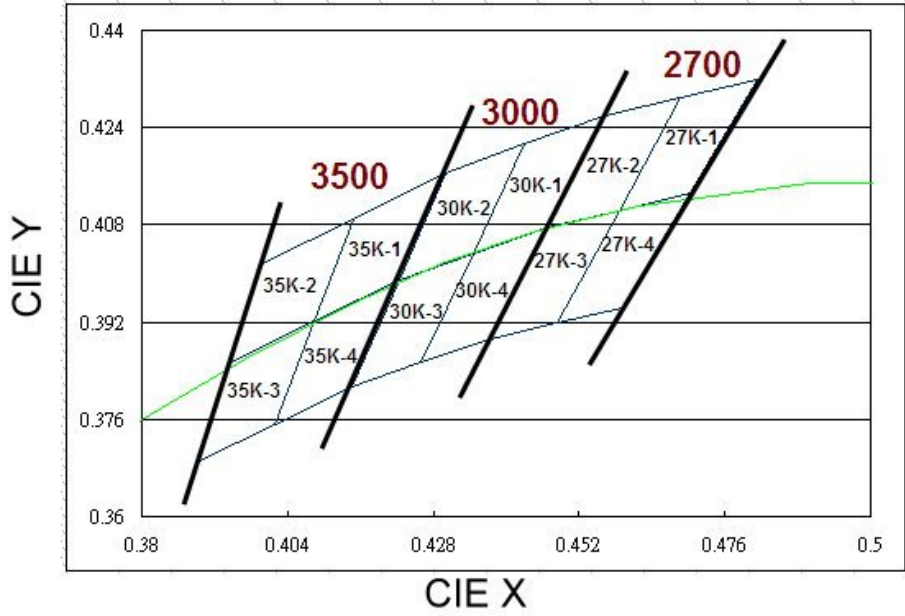
Bin	CIE X	CIE Y
45K-1	0.364	0.381
	0.362	0.366
	0.370	0.373
	0.374	0.387
Reference Range: 4260~4500K		

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		

Forward Voltage Bins

Group Name	Bins
A	U1+U2+U3
B	U2+U3+U4
C	V1+V2+V3
D	V2+V3+V4
E	V3+V4+V5
F	V1+V2
G	V1
H	U3+U4

Bin	Minimum Forward Voltage (V)	Maximum Forward Voltage (V)
U1	1.75	2.05
U2	2.05	2.35
U3	2.35	2.65
U4	2.65	2.95
V1	2.95	3.25
V2	3.25	3.55
V3	3.55	3.85
V4	3.85	4.15
V5	4.15	4.45

Notes:

- Forward voltage measurement tolerance: $\pm 0.1V$.
- Forward voltage bins are defined at $I_f=700$ mA operation.

Optical Characteristics

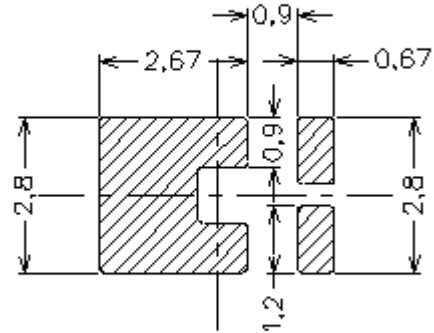
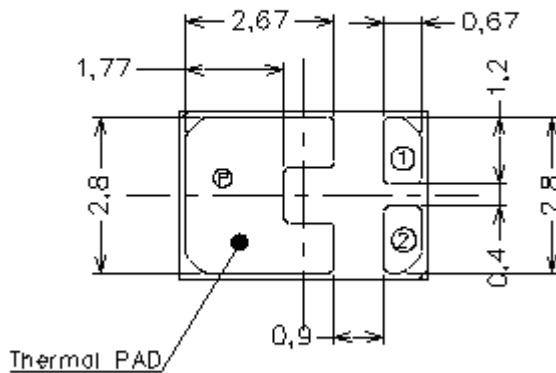
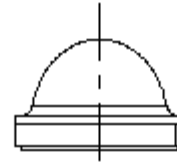
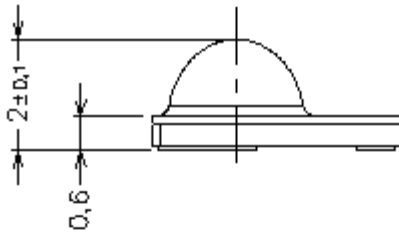
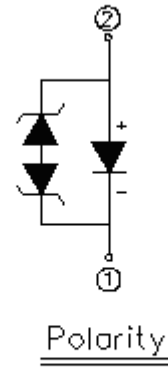
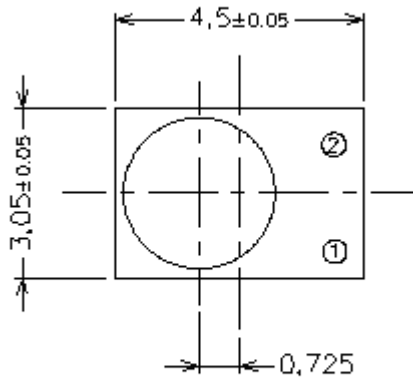
Color	Part Number	Part Number Dominant Wavelength λ_D Peak Wavelength λ_P Color Temperature CCT			Typical Temperature Coefficient of Dominant Wavelength (nm/)-(λ_D / T_J)	Typical Viewing Angle (degrees) $2\theta_{1/2}$
		Min.	Typ.	Max.		
Cool-White	ELSH – XX1CX	4745K	5700K	7050K	---	120
Neutral-White	ELSH – XX1NX	3710K	4260K	4745K	---	120
Warm-White	ELSH – XX1MX	2580K	3000K	3710K	---	120
Red	ELSH – XX1RX	615nm	---	630nm	0.05	120
Amber	ELSH – XX1YX	585nm	---	595nm	0.1	120
Green	ELSH – XX1GX	520nm	---	535nm	0.05	120
Blue	ELSH – XX1BX	455nm	---	470nm	0.05	120

Notes:

1. The test tolerance of Everlight is $\pm 1\text{nm}$ for dominant wavelength, $\pm 5\%$ for CCT.
2. Viewing angle is the width of half the light output intensity in all directions of 180° .
3. All Cool-White, Neutral-White, Warm-White are made with Indium Gallium Nitride (InGaN).

EVERLIGHT

Mechanical Dimension



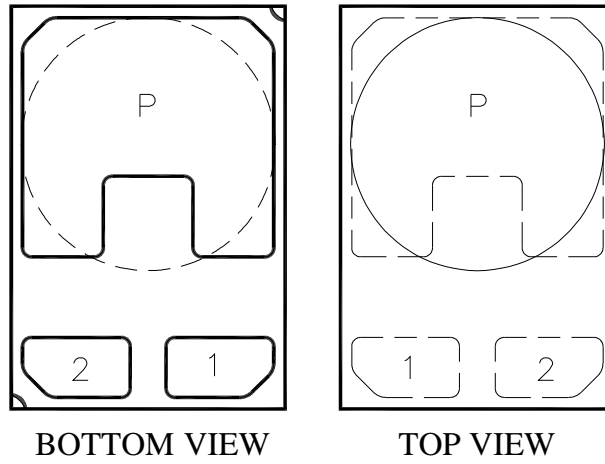
Bot. view

Soldering patterns

Notes.

1. Dimensions are in millimeters.
2. Tolerances unless mentioned are ± 0.1 mm.
3. Do not handle the device by the lens. Incorrect force applied to the lens may lead to the failure of devices.

Pad Configuration



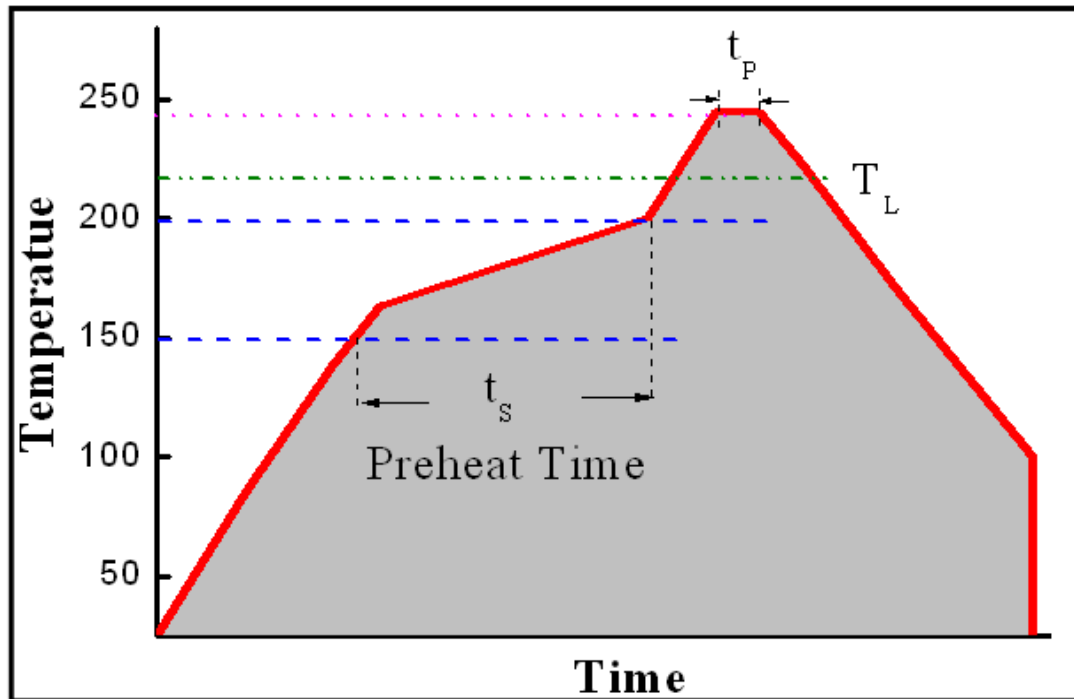
PAD	FUNCTION
1	CATHODE
2	ANODE
P	THERMAL PAD

EVERLIGHT

Reflow Soldering Characteristics

For Reflow Process

- ELSH series are suitable for SMT processes.
- Curing of glue in oven must be according to standard operation flow processes.

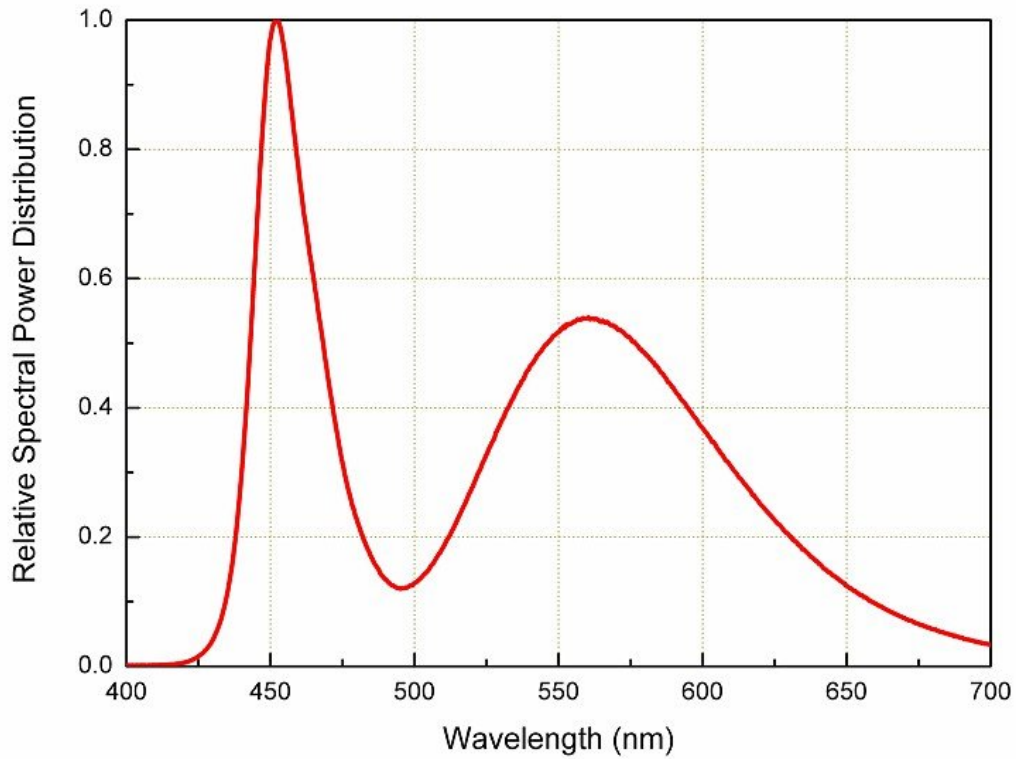


Profile Feature	Lead Free Assembly
Ramp-Up Rate	2-3 °C/S
Preheat Temperature	150-200 °C
Preheat Time (t_s)	60-120 S
Liquid Temperature (T_L)	217 °C
Time maintained above T_L	60-90 S
Peak Temperature (T_P)	240±5 °C
Peak Time (t_p)	Max 20 S
Ramp-Down Rate	3-5 °C/S

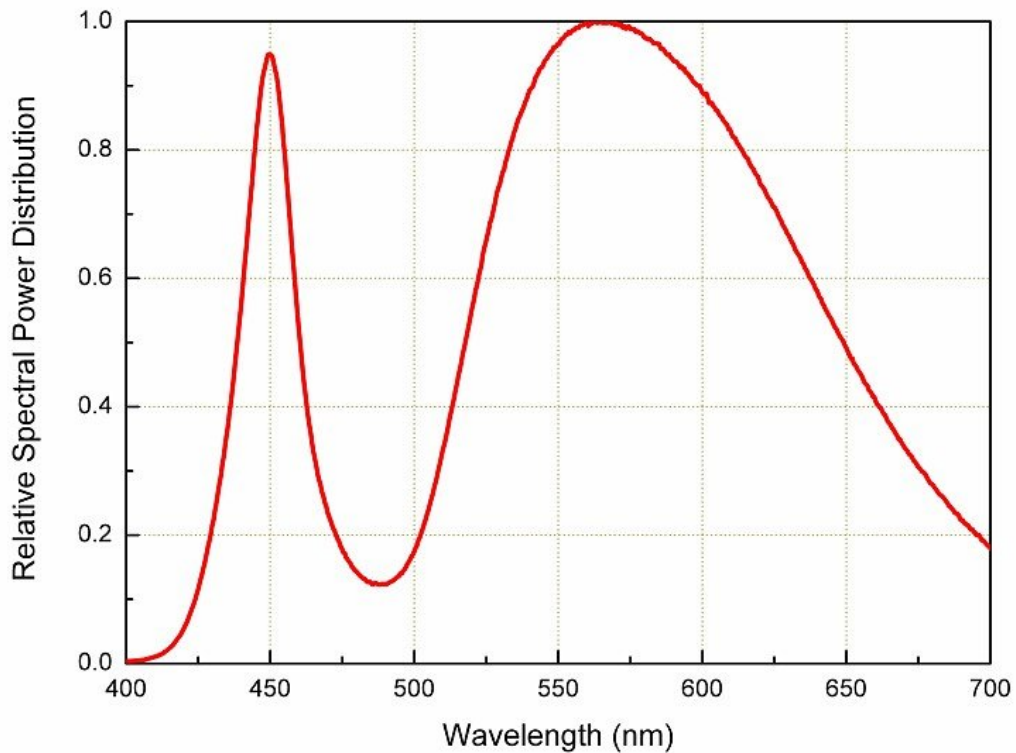
- Reflow soldering should not be done more than twice.
- In soldering process, stress on the LEDs during heating should be avoided.
- After soldering, do not bend the circuit board.

Wavelength Characteristics

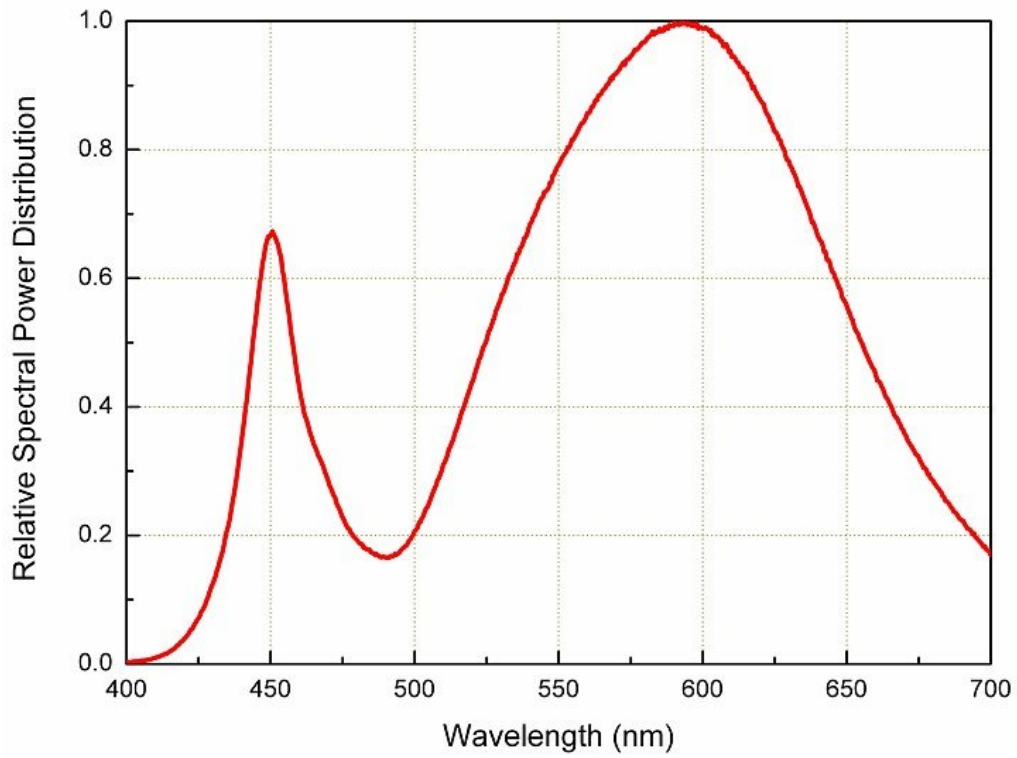
For Cool-White, @ Thermal Pad Temperature = 25



For Neutral-White, @ Thermal Pad Temperature = 25



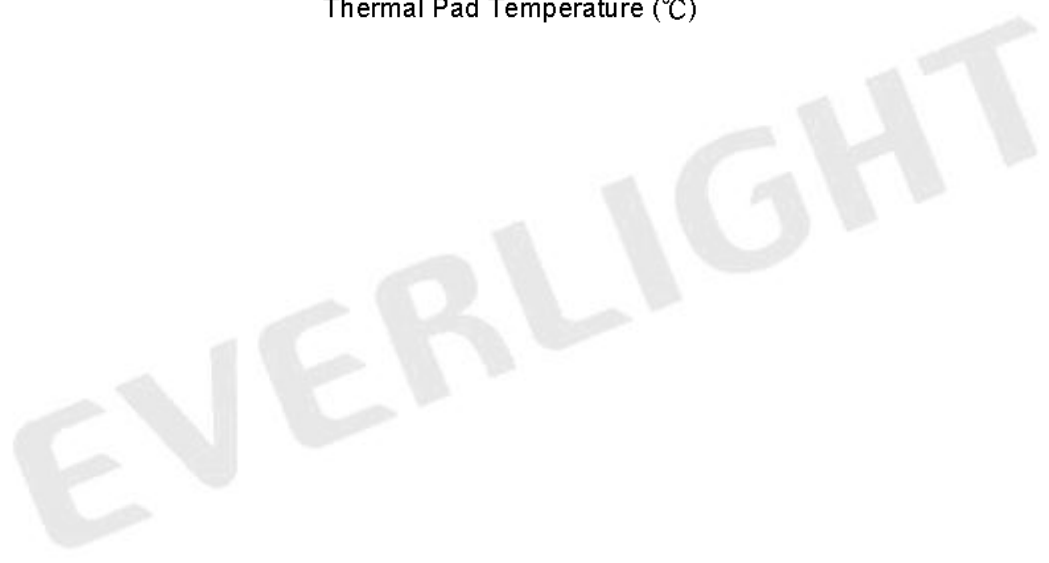
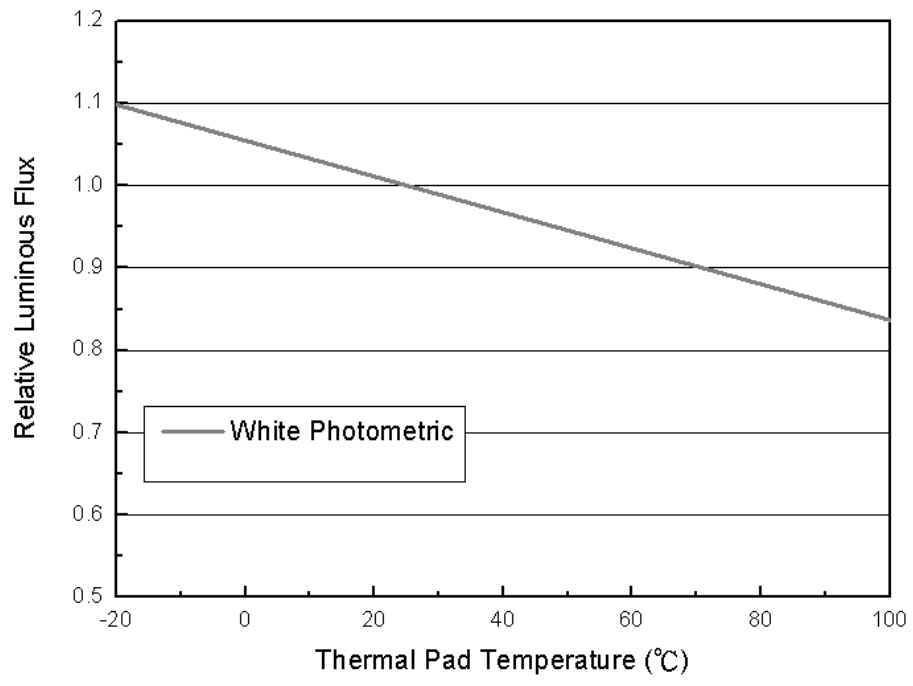
For Warm-White, @ Thermal Pad Temperature = 25



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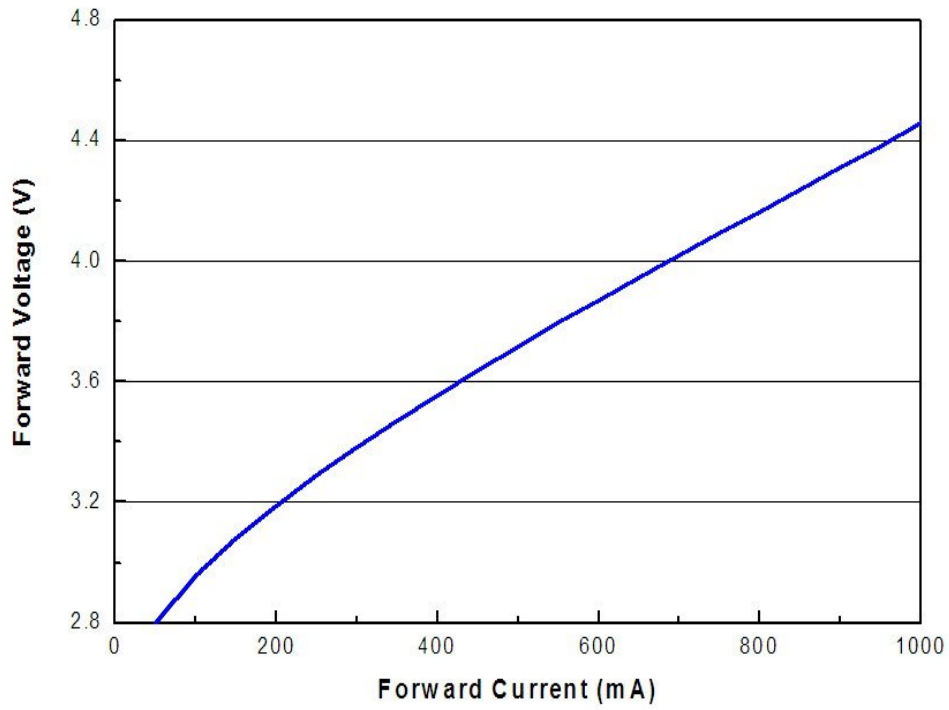
Typical Light Output Characteristic vs. Thermal Pad Temperature

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



Typical Electrical Characteristics

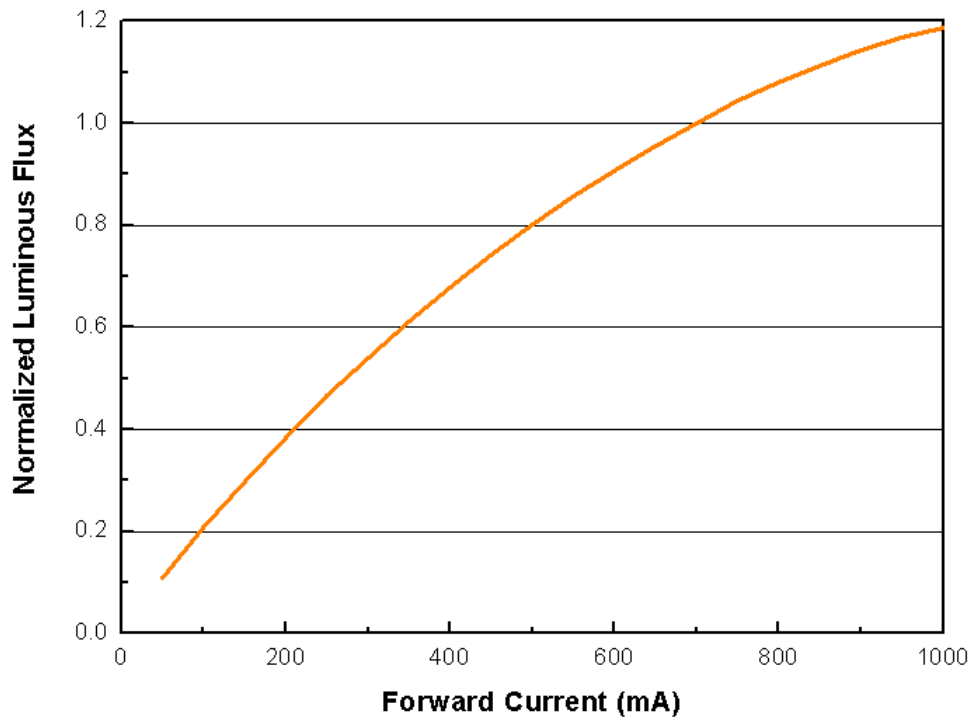
For Cool-White, Neutral-White, Warm-White, Green, Cyan, Blue, Royal-Blue
@ Thermal Pad Temperature = 25



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Typical Relative Luminous Flux vs. Forward Current

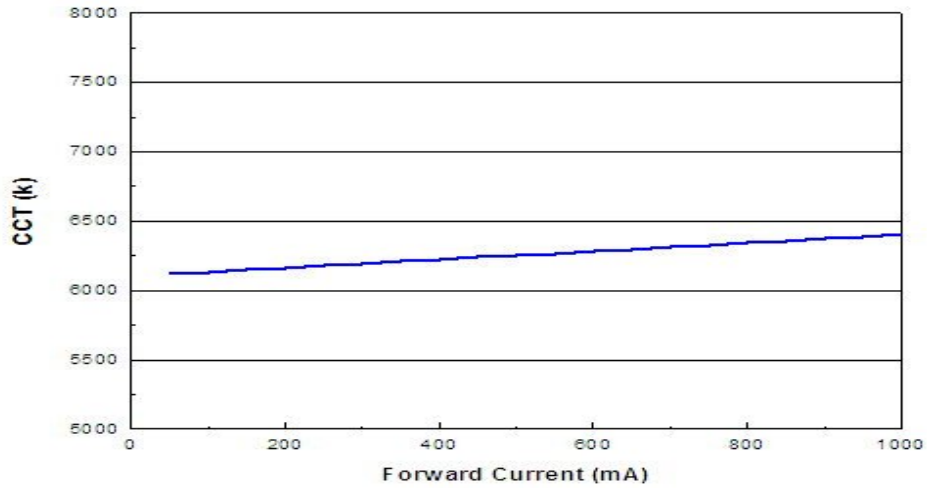
For Cool-White, Neutral-White, Warm-White
@ Thermal Pad Temperature = 25



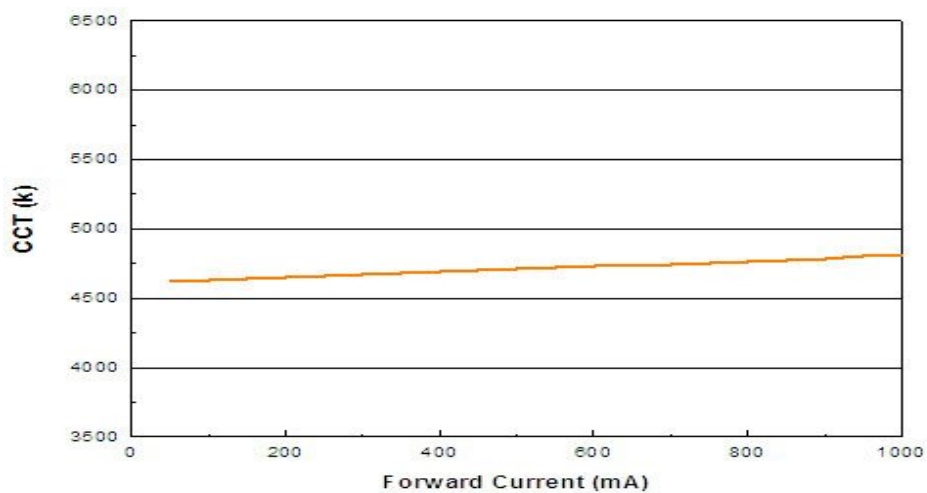
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Typical Wavelength & CCT Shift Characteristics vs. Forward Current

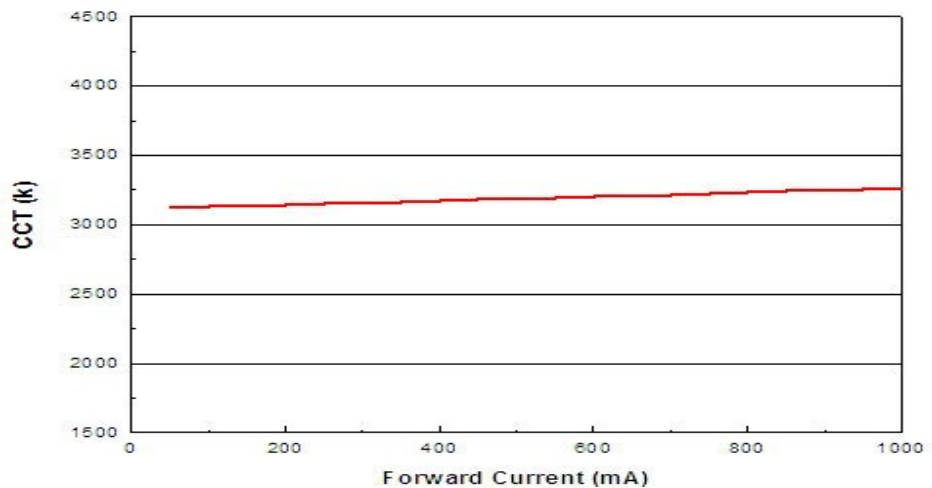
For Cool-White @ Thermal Pad Temperature = 25



For Neutral-White @ Thermal Pad Temperature = 25

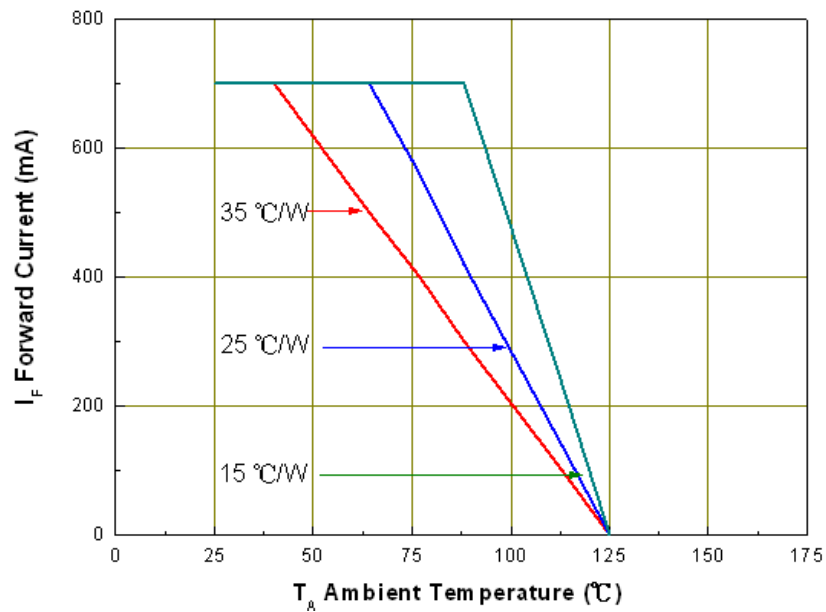


For Warm-White @ Thermal Pad Temperature = 25



Current Derating Curves

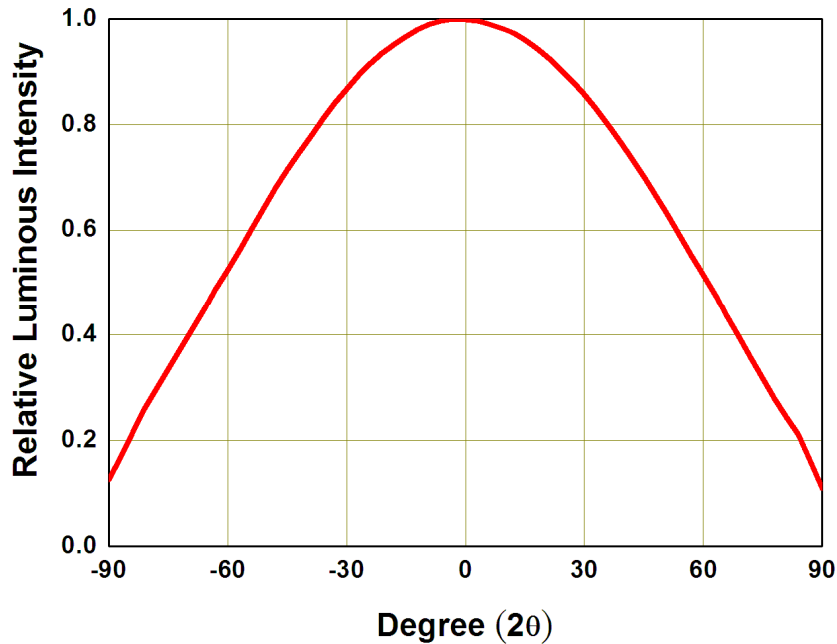
**Current Derating Curve for 700mA Drive Current
Cool-White, Neutral-White, Warm-White**



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Typical Radiation Patterns

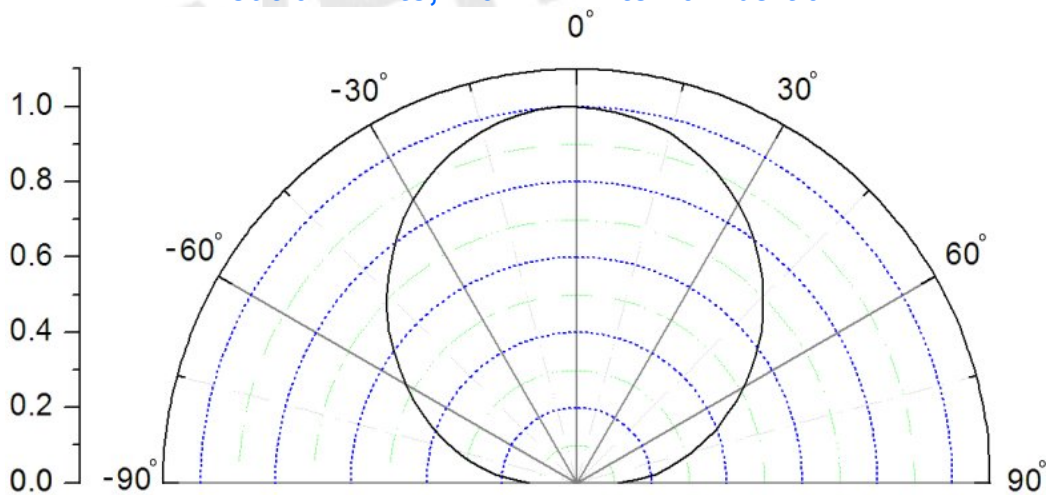
Typical Spatial Radiation Pattern for Cool-White, Neutral-White, Warm-White Lambertian



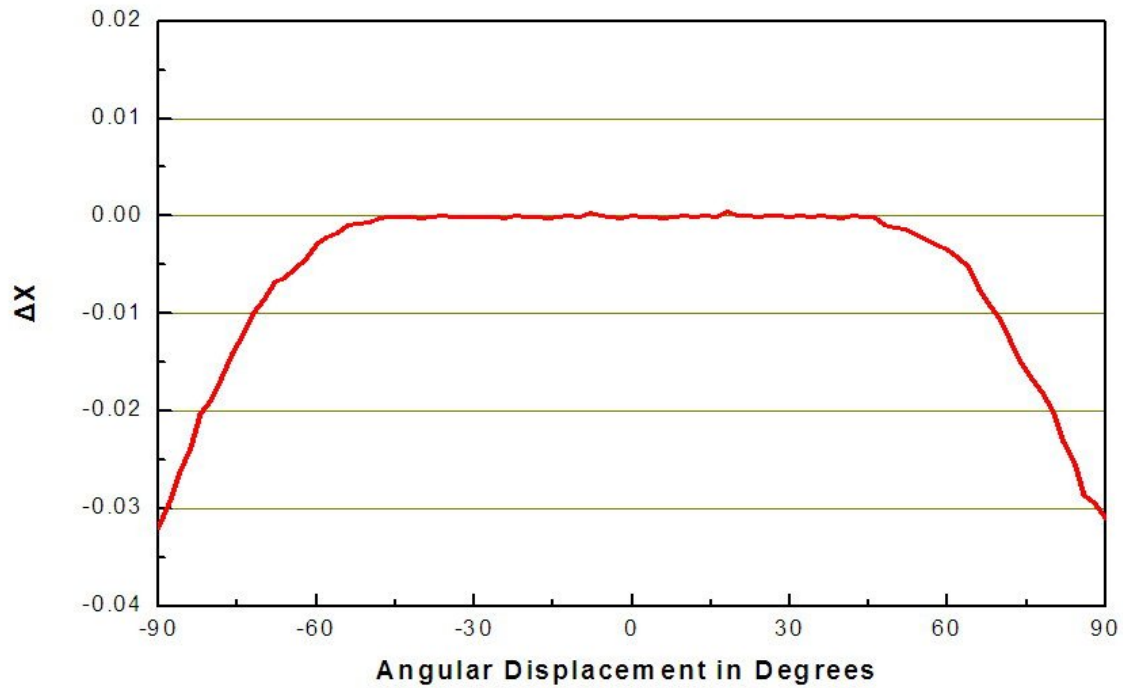
Notes.

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 tolerance is $\pm 5^\circ$.

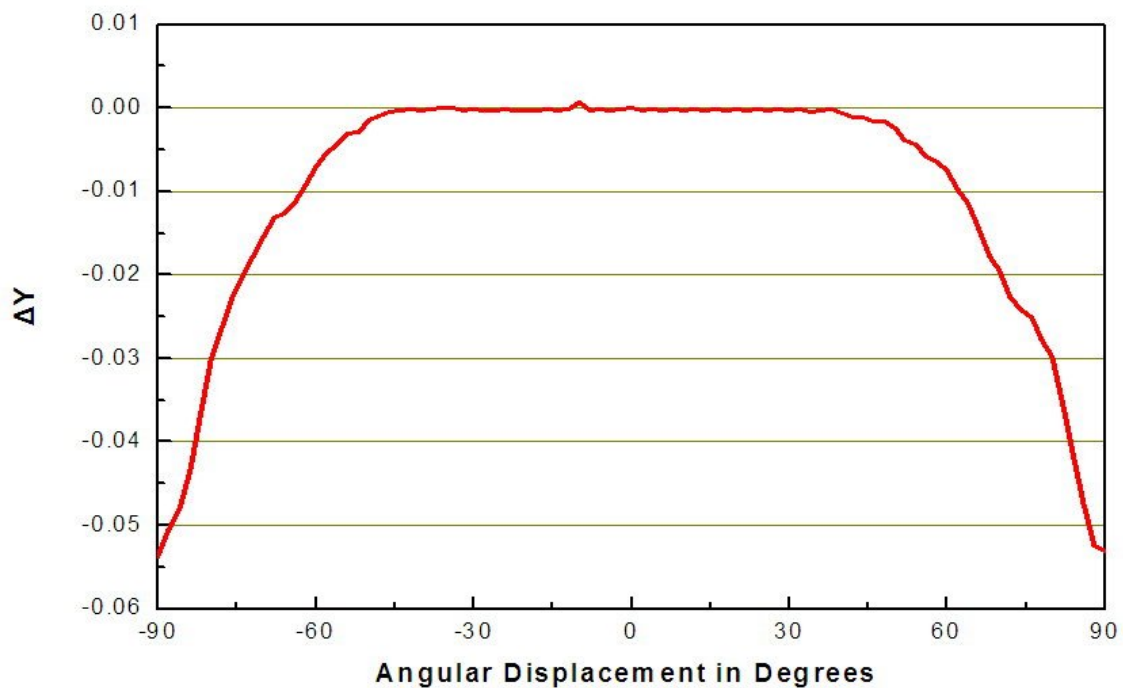
Typical Polar Radiation Pattern for Cool-White, Neutral-White, Warm-White Lambertian



Typical Difference of CIE X of Cool-White Versus Angle

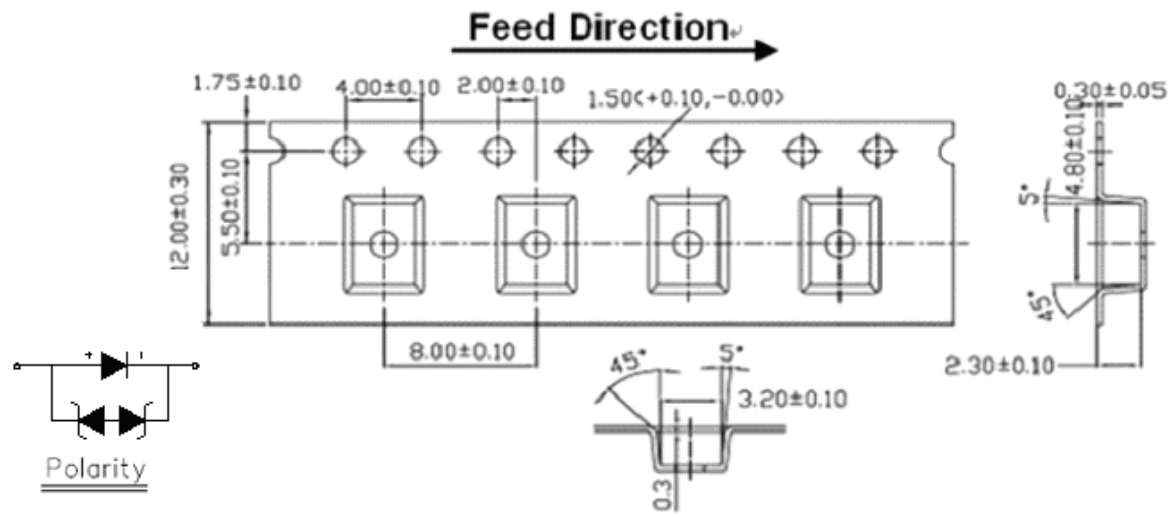


Typical Difference of CIE Y of Cool-White Versus Angle



Emitter Tape Packaging

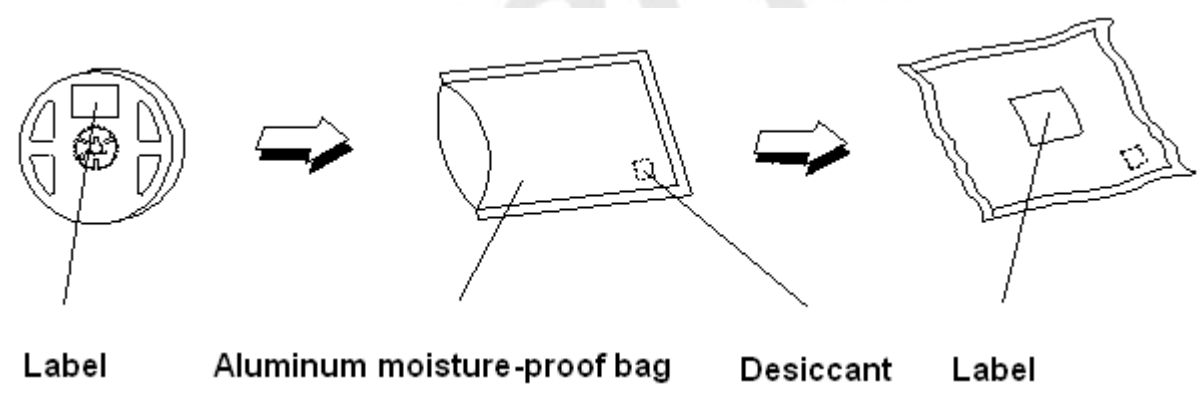
Carrier Tape Dimensions: Loaded quantity 400 PCS per reel



Notes.

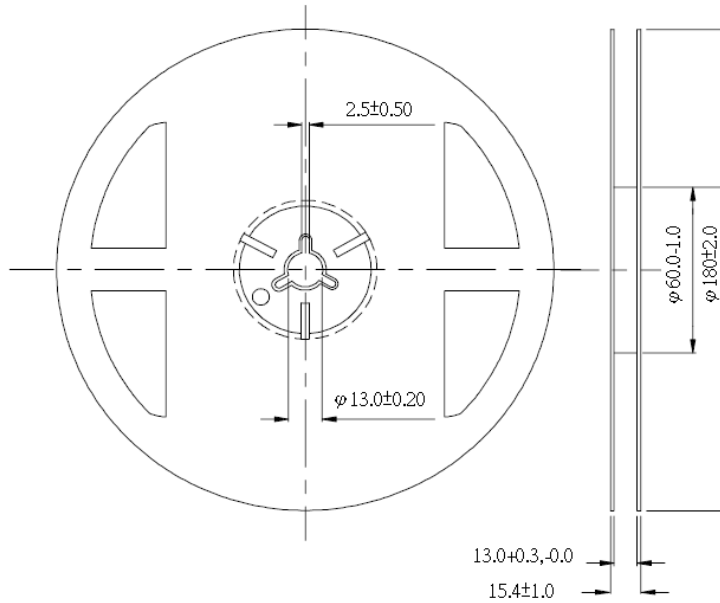
1. Dimensions are in millimeters.
2. Tolerances for fixed dimensions are ± 0.1 mm.

Moisture Resistant Packaging



Emitter Reel Packaging

Reel Dimensions



Notes :

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

Product Labeling

Label Explanation

CPN: Customer Specification (when required)

P/N : Everlight Production Number

QTY: Packing Quantity

CAT: Luminous Flux (Brightness) Bin

HUE: Color Bin

REF: Forward Voltage Bin

LOT No: Lot Number

MADE IN TAIWAN: Production Place



Revision History

Current version: **2010/10/11**
 Device No. DHE-0001163
 Version.2.0

Page	Subjects (major change in previous version)	Date of change
3、 4、 7	Modify Product Nomenclature、 Absolute Maximum Ratings and remove color LEDs.	2010/08/30
5、 7、 14	Add R,G,B,Y color LEDs.	2010/10/11

