

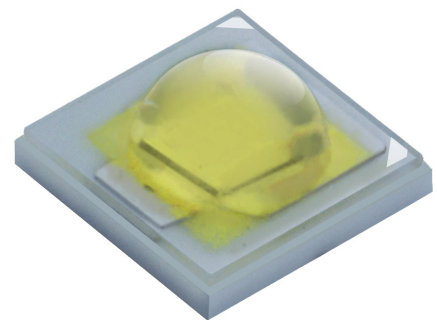
## Shwo 3W Series



***“Shwo [Shuo] is the English translation for the Chinese word meaning Twinkle and is often used as a description of stars or other bright, celestial objects as seen from Earth. This word is a relevant description for this bright, compact Everlight LED package.”***

### Introduction

The Shwo 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 Shwo 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 Luminaries
- ◆ Exterior and Interior Automotive Illumination

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## Product Nomenclature

The product name is designated as below:

# ELSW – ABCDE – FGHIJ – V1234

Designation:

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

C = radiation pattern <sup>[1]</sup>

D = color <sup>[2]</sup>

E = power consumption <sup>[3]</sup>

F = reserved for future product offerings

G = chip source <sup>[4]</sup>

H = packaging type <sup>[5]</sup>

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
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 chip sources:

Symbol	Description
L	Standard
S	Alternate Source for custom requests
C	Alternate Source for custom requests

5. Table of packaging types:

Symbol	Description
P	Tape
B	Tube

## Absolute Maximum Ratings

Parameter	Symbol	Ratings	Unit
DC Forward Current (mA)	$I_F$	750	mA
Peak Pulse Current (mA)	$I_{Pulse}$	1000	mA
ESD Resistance	$V_B$	8000	V
Reverse Voltage	$V_R$	Note 2	V
Thermal Resistance	$R_{th}$	6	°C/W
Junction Temperature	$T_J$	150 <sup>[3]</sup>	°C
Operating Temperature	$T_{Opr}$	-40 ~ +125 <sup>[4]</sup>	°C
Storage Temperature	$T_{Stg}$	-40 ~ +100	°C
Soldering Temperature	$T_{Sol}$	260	°C
Allowable Reflow Cycles	n/a	3	cycles

**Notes:**

1. Maximum forward current for 3W is 750mA ( $T_{Thermal\ Pad}=25^{\circ}C$ ).
2. The Shwo series LEDs are not designed for reverse bias operation.
3. Maximum junction temperature is 150°C for Cool-White, Neutral-White, and Warm-White LEDs.
4. Maximum Operating Temperature (Thermal Pad) is 125°C for Cool-White, Neutral-White, and Warm-White LEDs.
5. Avoid operating Shwo 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	$\leq 30^{\circ}C / 85\% RH$	168 (+5/-0)	85°C / 85% RH

## Luminous Flux Characteristics for the Shwo series

Color	Part Number	3W	
		Minimum Luminous Flux(lm) or Radiometric Power(mW) <sub>[1]</sub>	Drive Current (mA)
Cool White	ELSW – J61CX	150	700
	ELSW – J71CX	160	700
Neutral White	*ELSW – J41NX	130	700
	*ELSW – J51NX	140	700
Warm White	ELSW – J21MX	110	700
	ELSW – J31MX	120	700

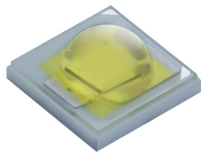
**Notes:**

1. Luminous flux measurement tolerance: ±10%.
2. The data of luminous flux measured at thermal pad=25°C
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 Shwo series: White LEDs

The table below is a list of part numbers for the Everlight Shwo 3W series White LED. All parts listed match ANSI binning standards. Bin offerings of 6500K, 5700K, 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 Shwo LEDs.

For Example: If you order product using P/N **ELSW-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, Shwo series LEDs at 700mA are listed below

Color	Order Code of ELSW	Minimum Luminous Flux (lm)	CCT (K) Wavelength (nm)	Forward Voltage (V)	CRI (Typical)
Cool White 6500	ELSW-J61C3-0LPGS-D6500	150	6500-1~6500-4	3.25~4.15	75
	ELSW-J71C3-0LPGS-D6500	160	6500-1~6500-4	3.25~4.15	75
Cool White 5700	ELSW-J61C3-0LPGS-D5700	150	5700-1~5700-4	3.25~4.15	75
	ELSW-J71C3-0LPGS-D5700	160	5700-1~5700-4	3.25~4.15	75
Warm White 3000	ELSW-J21M3-0LPGS-D3000	110	3000-1~3000-4	3.25~4.15	80
	ELSW-J31M3-0LPGS-D3000	120	3000-1~3000-4	3.25~4.15	80

**Note:** CRI measurement tolerance:  $\pm 5$ .

## 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
	<b>2</b>	<b>110</b>	<b>120</b>
	<b>3</b>	<b>120</b>	<b>130</b>
	<b>4</b>	<b>130</b>	<b>140</b>
	<b>5</b>	<b>140</b>	<b>150</b>
	<b>6</b>	<b>150</b>	<b>160</b>
	<b>7</b>	<b>160</b>	<b>180</b>
	8	180	200
	9	200	225
K	1	225	250
	2	250	275
	3	275	300
	4	300	325
	5	325	350
	6	350	375
	7	375	400
	8	400	425
	9	425	450
N	1	450	475
	2	475	500
	3	500	525

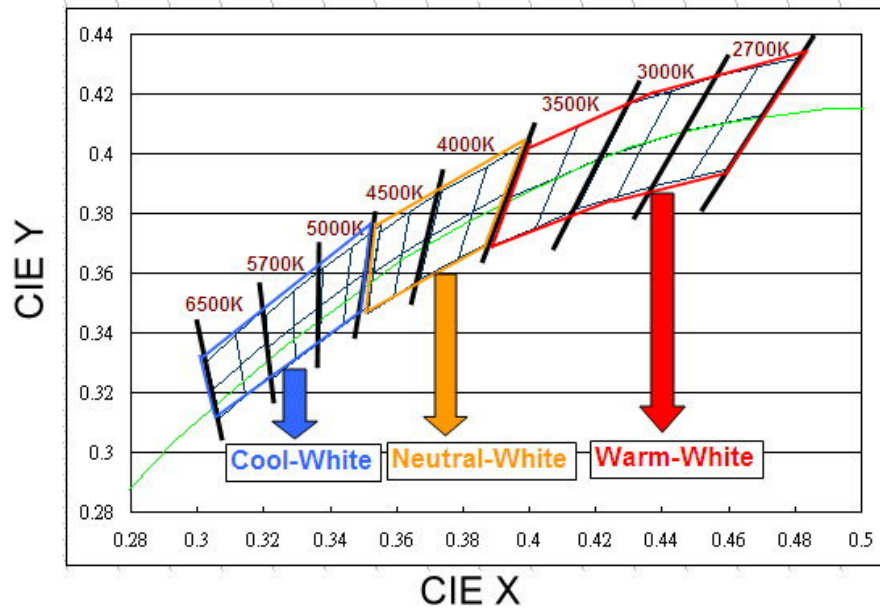
**Note:** Currently available brightness bins for White LEDs are highlighted and bolded.

### Radiometric Power Bins

Group	Bin	Minimum Radiometric Power(mW)	Maximum Radiometric Power(mW)
Q	1	0	25
	2	25	50
	3	50	75
	4	75	100
	5	100	125
	6	125	175
	7	175	225
	8	225	275
	9	275	350

Group	Bin	Minimum Radiometric Power(mW)	Maximum Radiometric Power(mW)
R	1	350	425
	2	425	500
	3	500	600
	4	600	700
	5	700	800
	6	800	900
	7	900	1000
	8	1000	1300
	9	1300	1600

### White Bin Structure

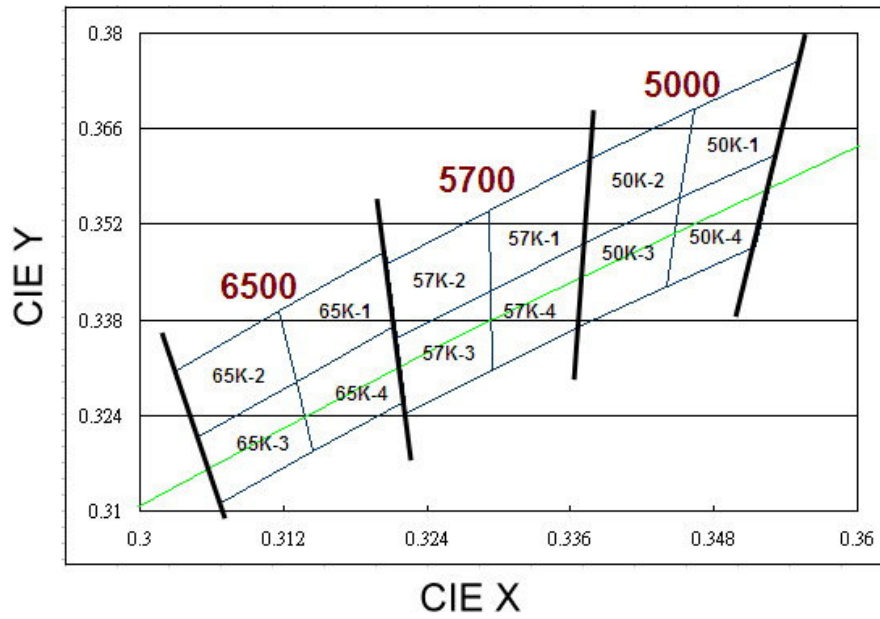


Chromaticity specification defined by ANSI

**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 :  $\pm 0.01$
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

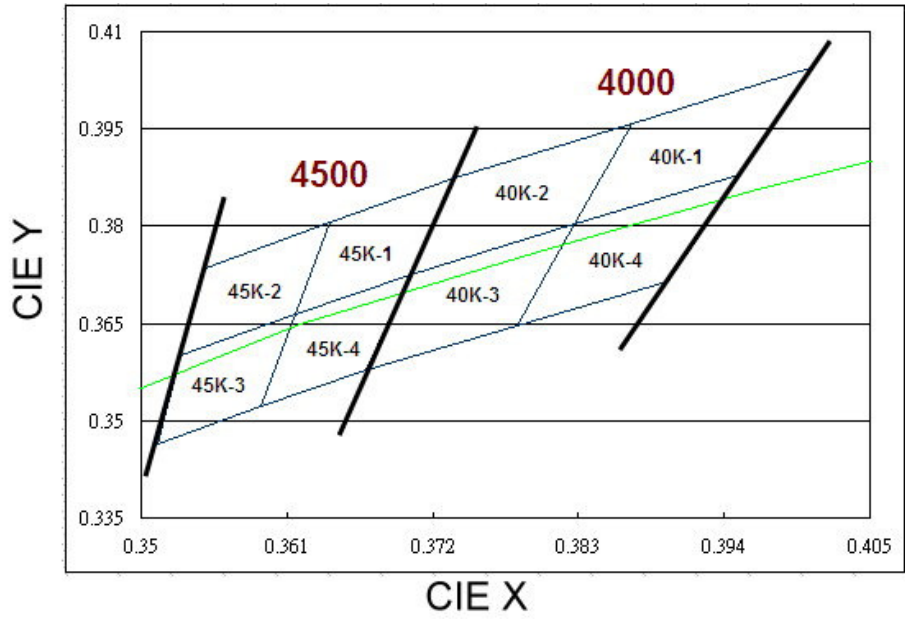
Bin	CIE X	CIE Y
65K-1	0.312	0.339
	0.313	0.329
	0.321	0.337
	0.321	0.348
Reference Range: 6020~6500K		

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

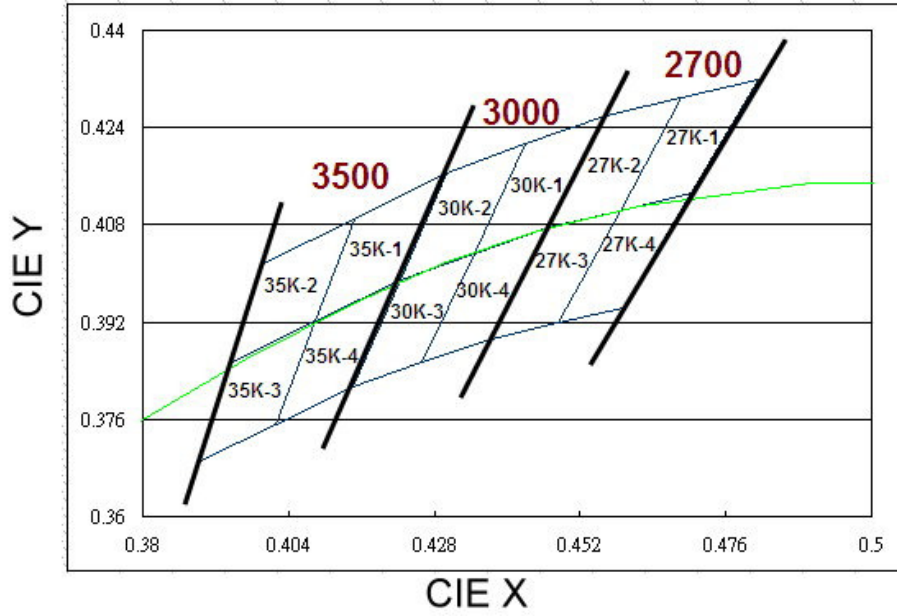
Bin	CIE X	CIE Y
45K-1	0.364	0.381
	0.362	0.366
	0.370	0.373
	0.374	0.387
Reference Range: 4260~4500K		

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		

#### Notes:

1. Currently available typical CCT ranges are 3000K, 5700K, and 6500K CCT.
2. Other CCT ranges available upon request. Please contact your local Everlight sales office.

### Forward Voltage Bins

Group Name	Bins
A	U1+U2+U3
B	U2+U3+U4
C	V1+V2+V3
<b>D</b>	<b>V2+V3+V4</b>
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
<b>V2</b>	<b>3.25</b>	<b>3.55</b>
<b>V3</b>	<b>3.55</b>	<b>3.85</b>
<b>V4</b>	<b>3.85</b>	<b>4.15</b>
V5	4.15	4.45

#### Notes:

1. Forward voltage measurement tolerance:  $\pm 0.1V$ .
2. Forward voltage bins are defined at  $I_f=700$  mA operation.
3. Currently available Forward Voltage bins for White LEDs are highlighted and bolded.
4. Other Forward Voltage bins for White LEDs available upon request. Please contact your local Everlight sales office.

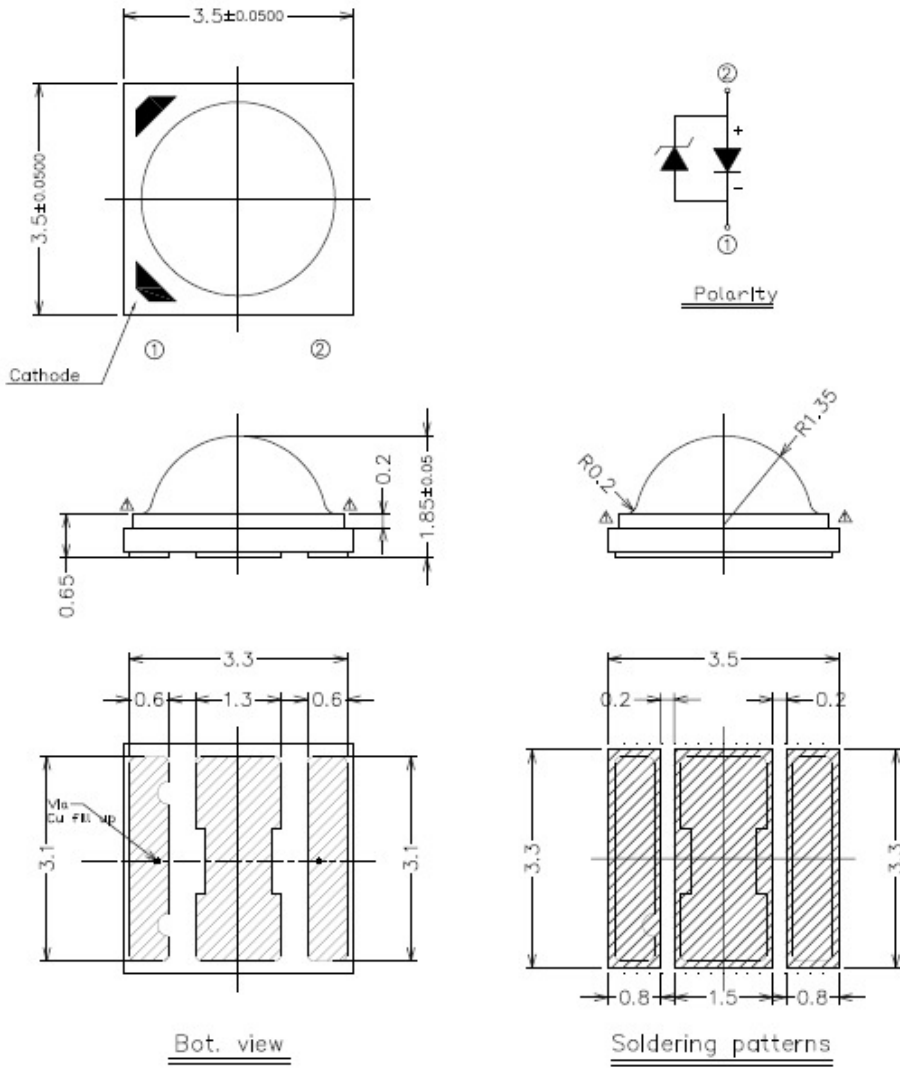
## Optical Characteristics

Color	Part Number	Part Number Dominant Wavelength $\lambda_D$ Peak Wavelength $\lambda_P$ Color Temperature CCT			Typical Viewing Angle (degrees) $2\theta_{1/2}$
		Min.	Typ.	Max.	
		Cool-White	ELSW – XX1CX	4745K	
Neutral-White	ELSW – XX1NX	3710K	4260K	4745K	130
Warm-White	ELSW – XX1MX	2580K	3000K	3710K	130

**Notes:**

1. The test tolerance of Everlight is  $\pm 0.5\text{nm}$  for dominant wavelength,  $\pm 5\%$  for CCT.
2. Viewing angle is the width of half the light output intensity in all directions of  $180^\circ$ .

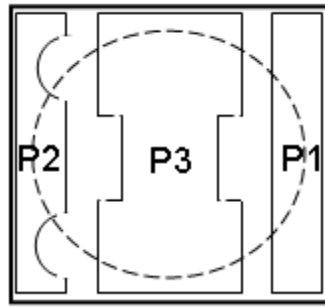
## Mechanical Dimension



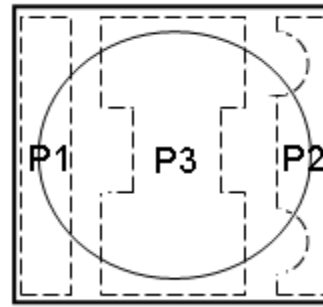
### Notes:

1. Dimensions are in millimeters.
2. Tolerances unless mentioned are  $\pm 0.1$ mm.
3. Do not handle the device by the lens. Incorrect force applied to the lens may lead to the failure of devices.
4. The thermal pad is electrically isolated from the Anode and Cathode contact pads.

## Pad Configuration



BOTTOM VIEW



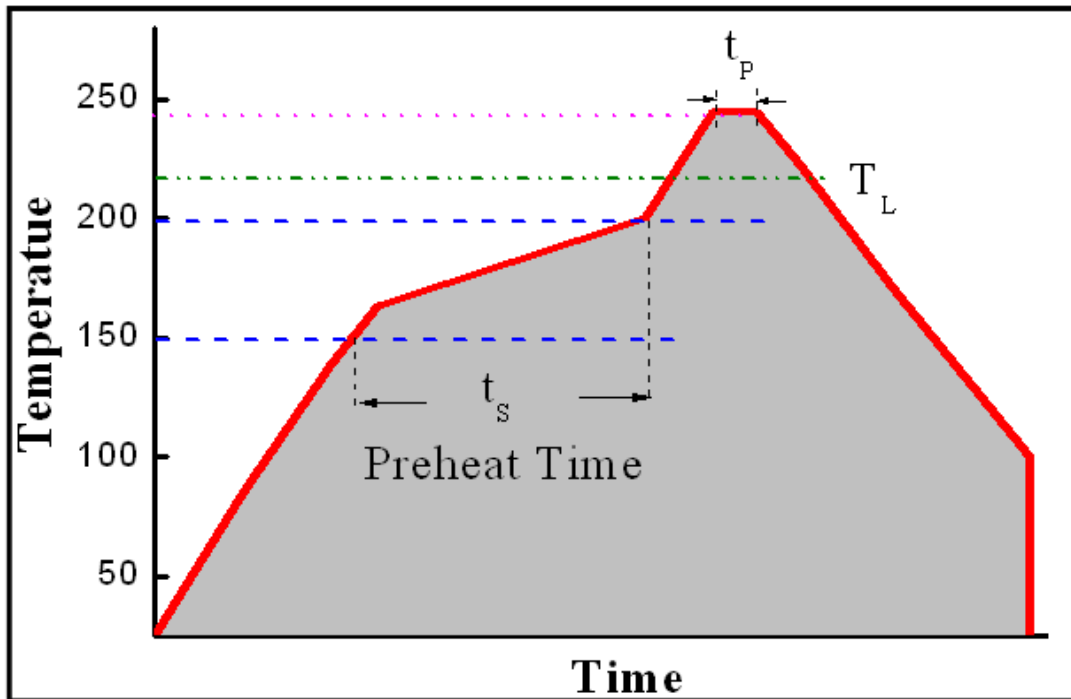
TOP VIEW

PAD	FUNCTION
P1	ANODE
P2	CATHODE
P3	THERMAL PAD

## Reflow Soldering Characteristics

### For Reflow Process

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

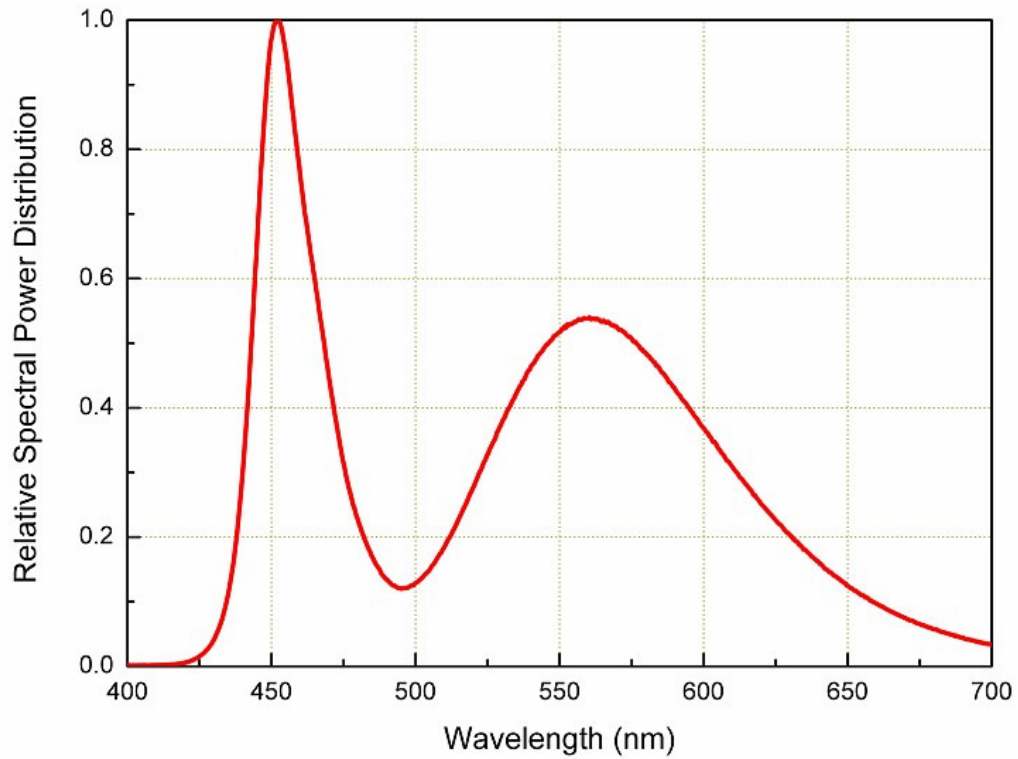


Profile Feature	Lead Free Assembly
Ramp-Up Rate	2-3 °C/S
Preheat Temperature	150-200 °C
Preheat Time ( $t_s$ )	60-120 S
Liquid Temperature ( $T_L$ )	217 °C
Time maintained above $T_L$	60-90 S
Peak Temperature ( $T_p$ )	240±5 °C
Peak Time ( $t_p$ )	Max 20 S
Ramp-Down Rate	3-5 °C/S

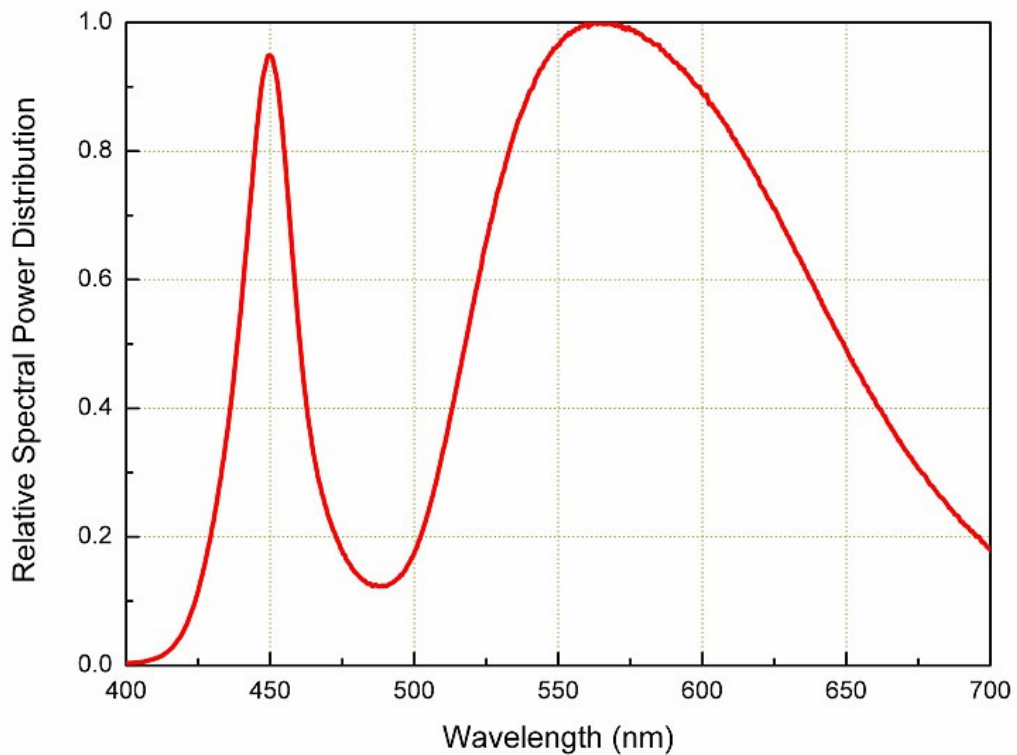
- c. Reflow soldering should not be done more than twice.
- d. In soldering process, stress on the LEDs during heating should be avoided.
- e. After soldering, do not bend the circuit board.

## Wavelength Characteristics

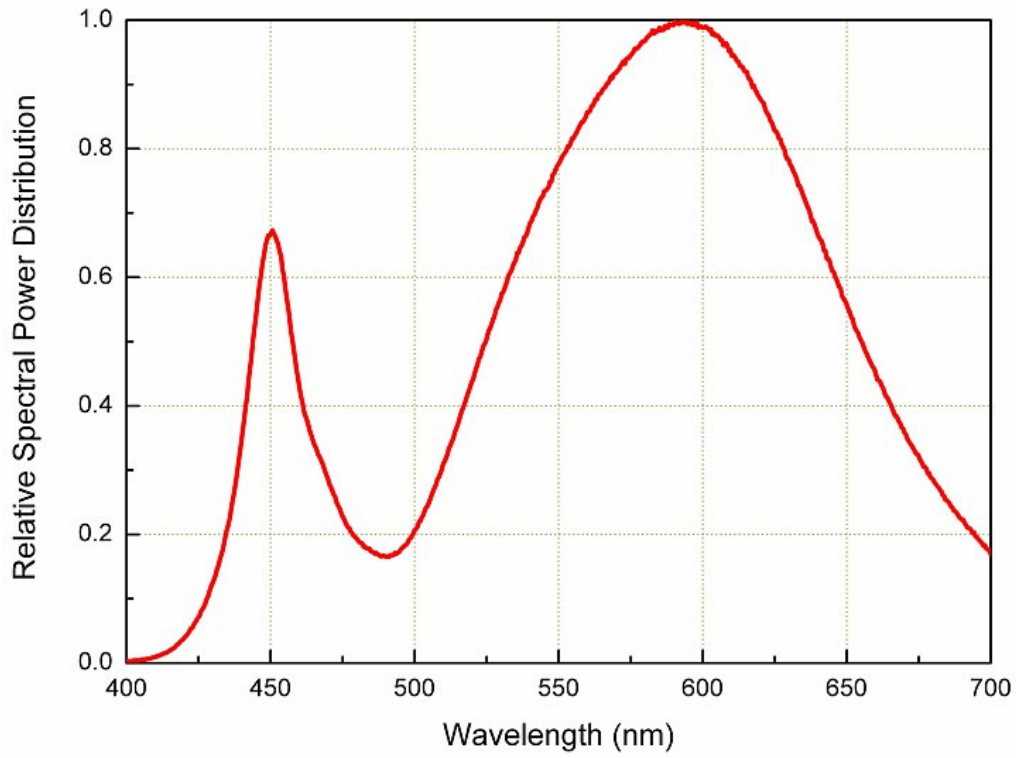
For Cool-White, @ Thermal Pad Temperature = 25°C



For Neutral-White, @ Thermal Pad Temperature = 25°C

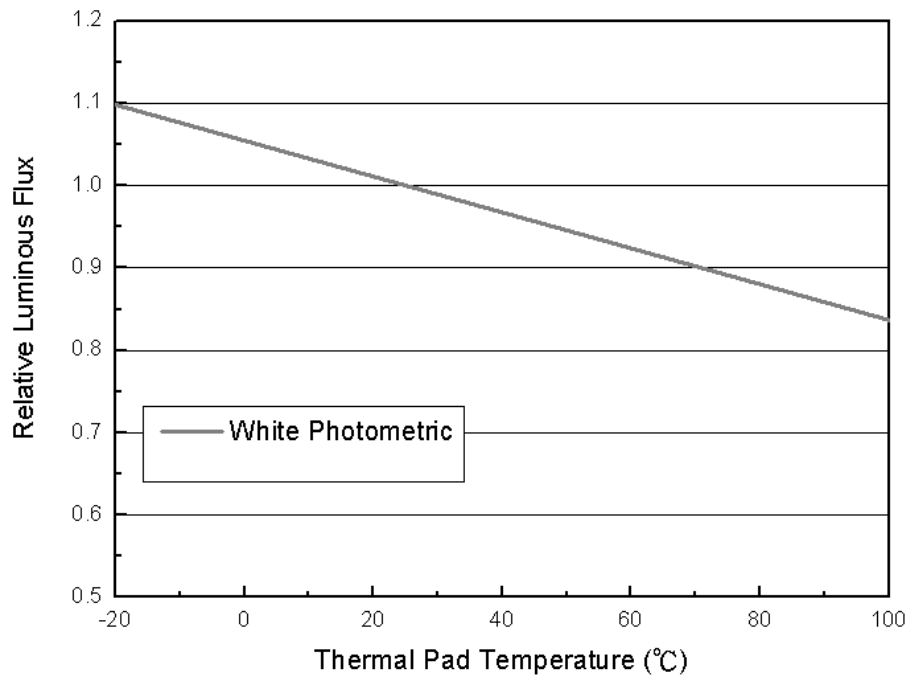


For Warm-White, @ Thermal Pad Temperature = 25°C



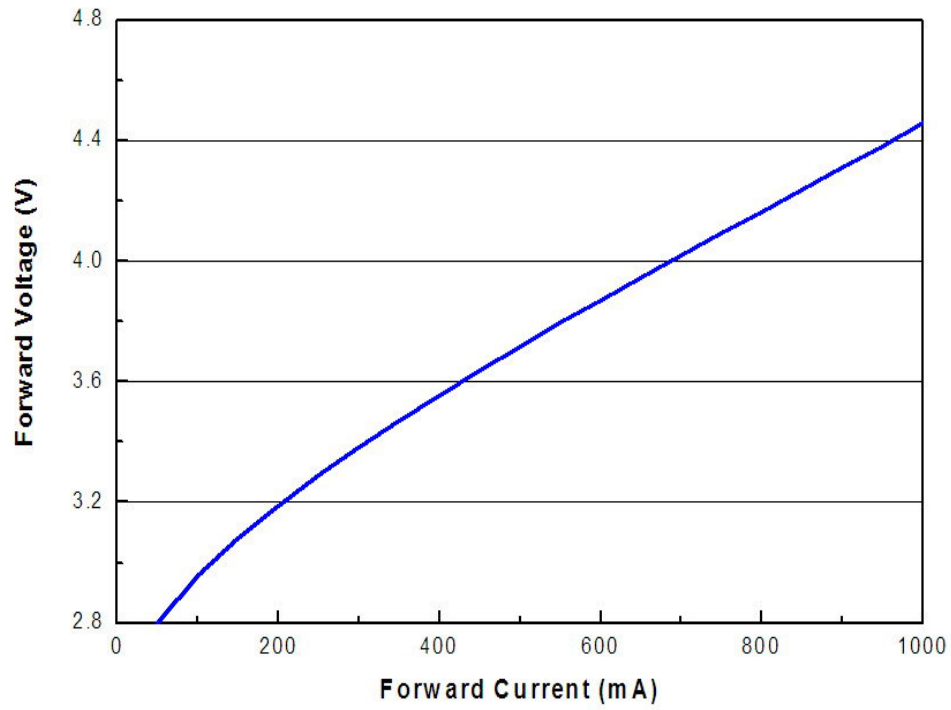
## Typical Light Output Characteristic vs. Thermal Pad Temperature

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



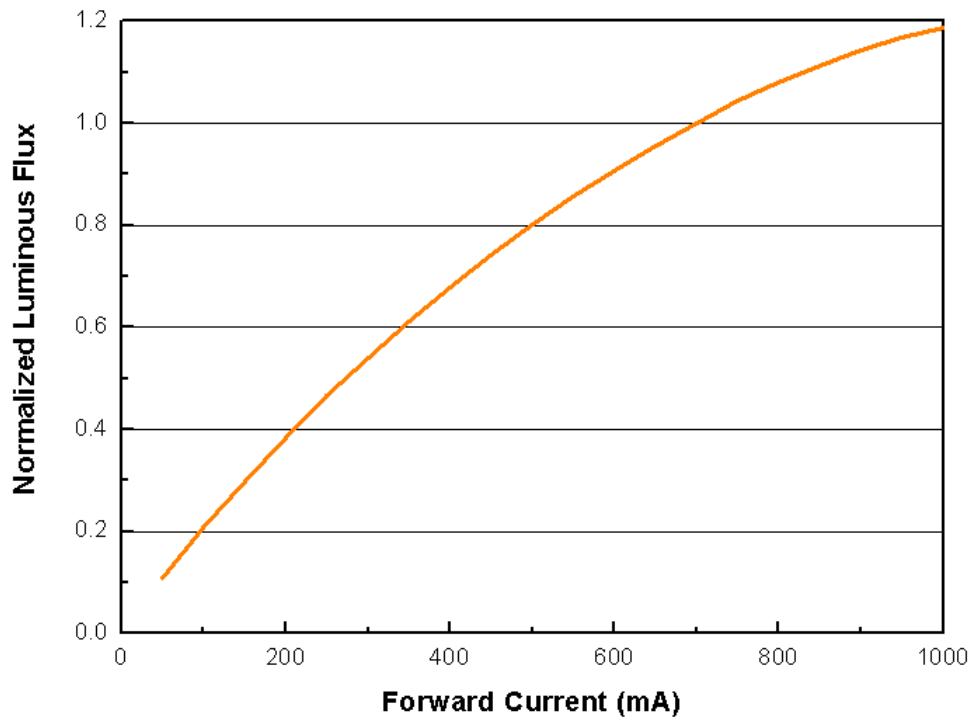
## Typical Electrical Characteristics

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



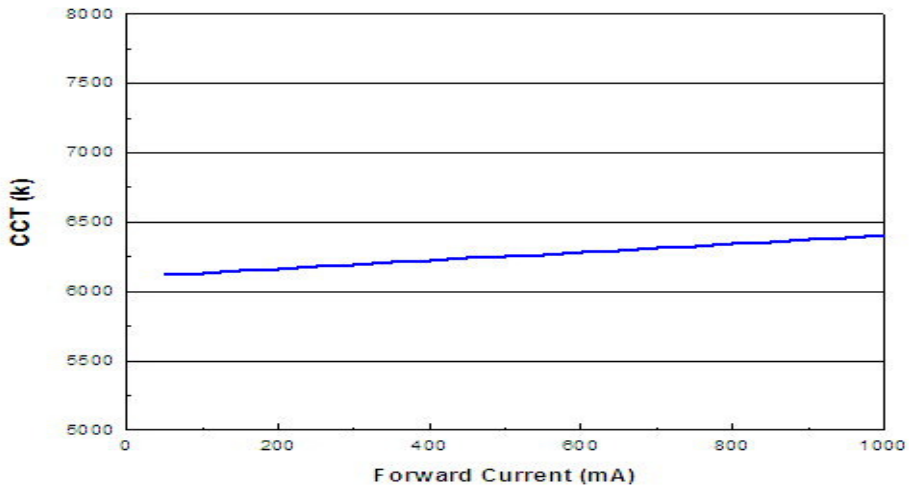
## Typical Relative Luminous Flux vs. Forward Current

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

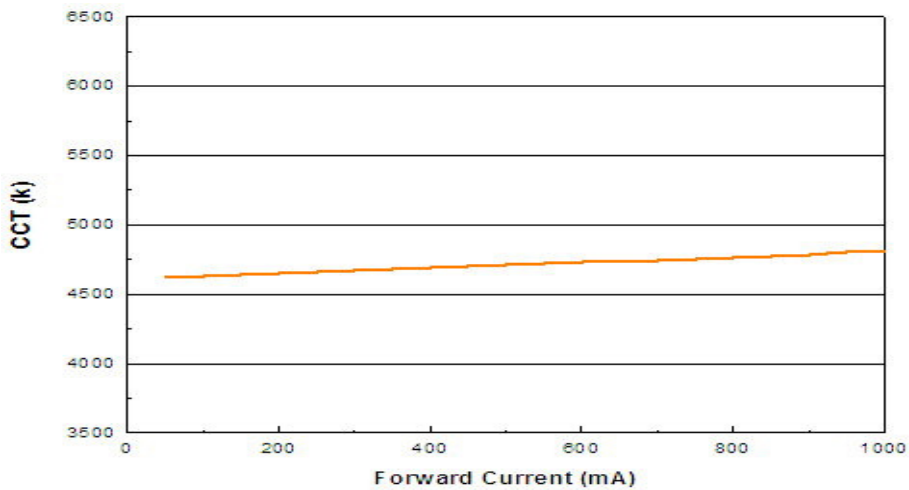


## Typical Wavelength & CCT Shift Characteristics vs. Forward Current

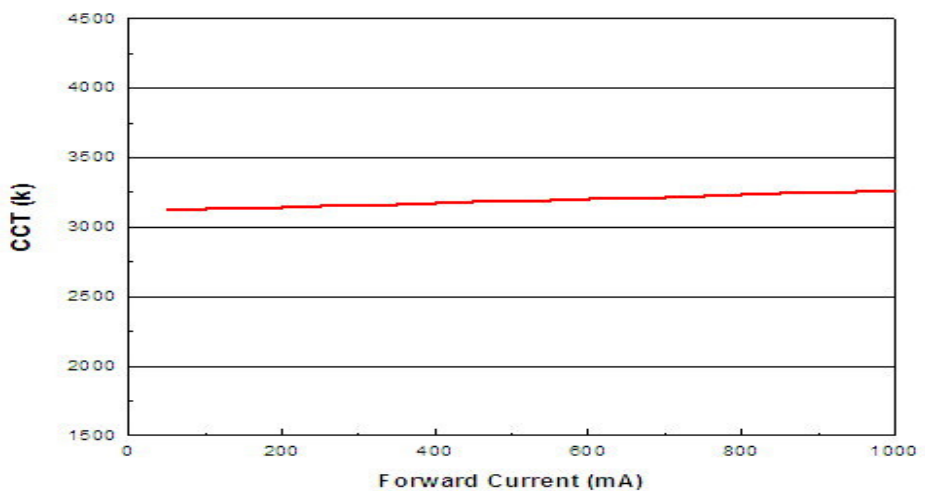
For Cool-White @ Thermal Pad Temperature = 25°C



For Neutral-White @ Thermal Pad Temperature = 25°C

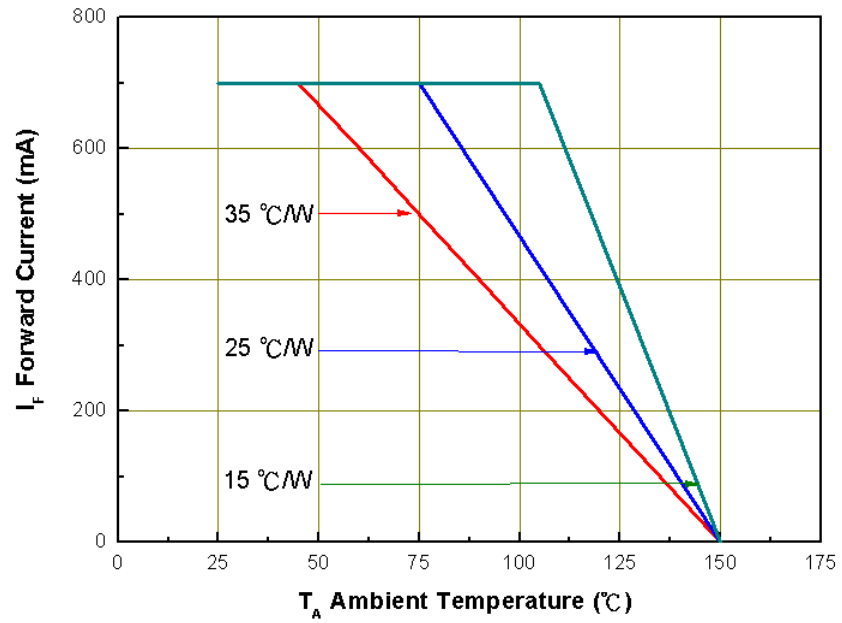


For Warm-White @ Thermal Pad Temperature = 25°C



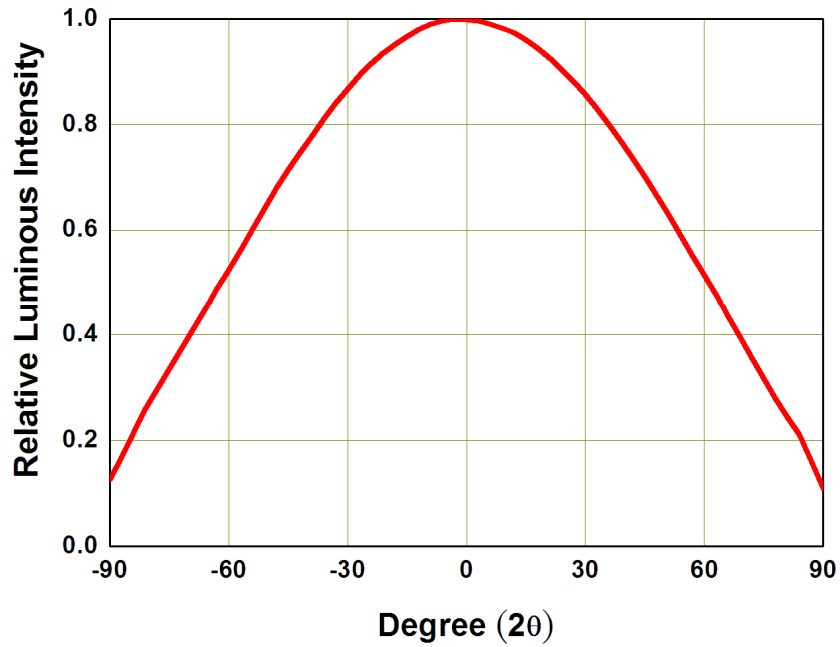
## Current Derating Curves

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



## Typical Radiation Patterns

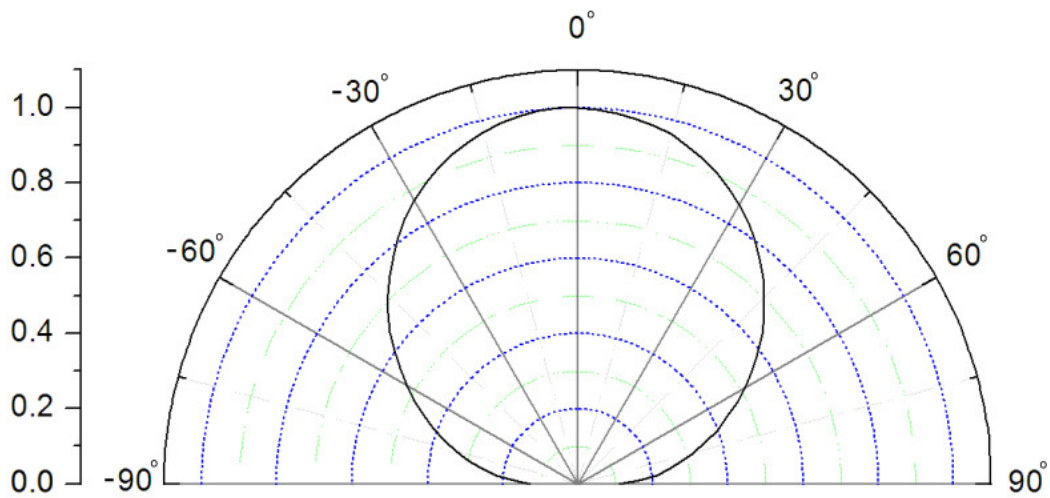
### Typical Spatial Radiation Pattern for Cool-White, Neutral-White, Warm-White Lambertian



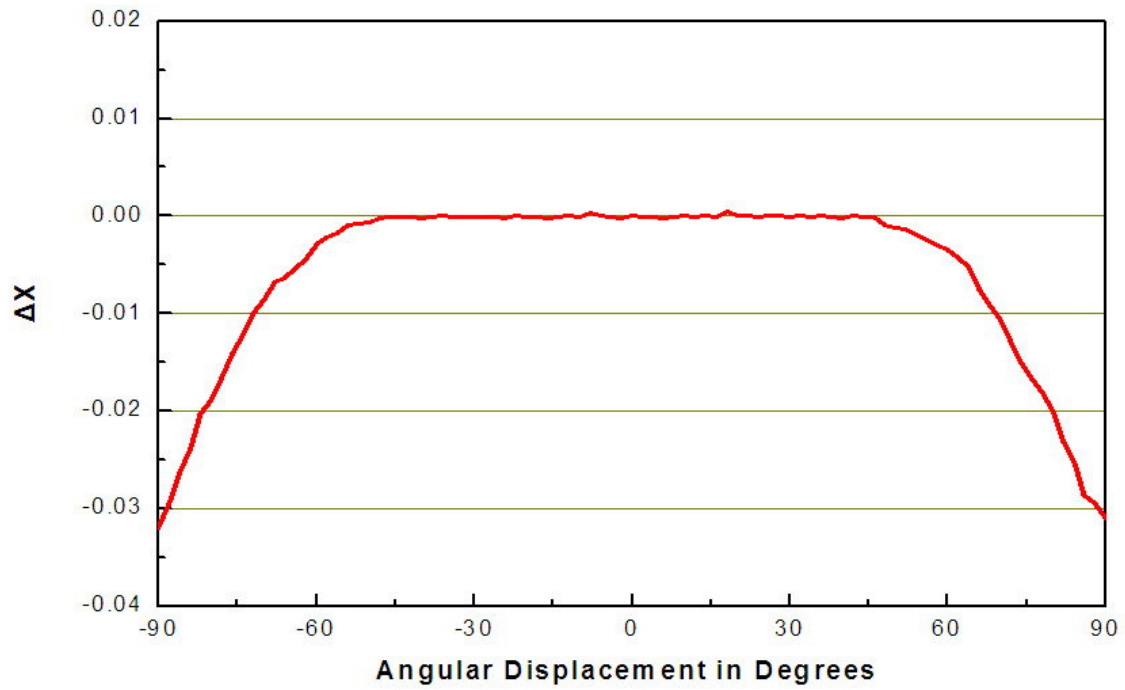
**Notes:**

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  $\pm 5^\circ$ .

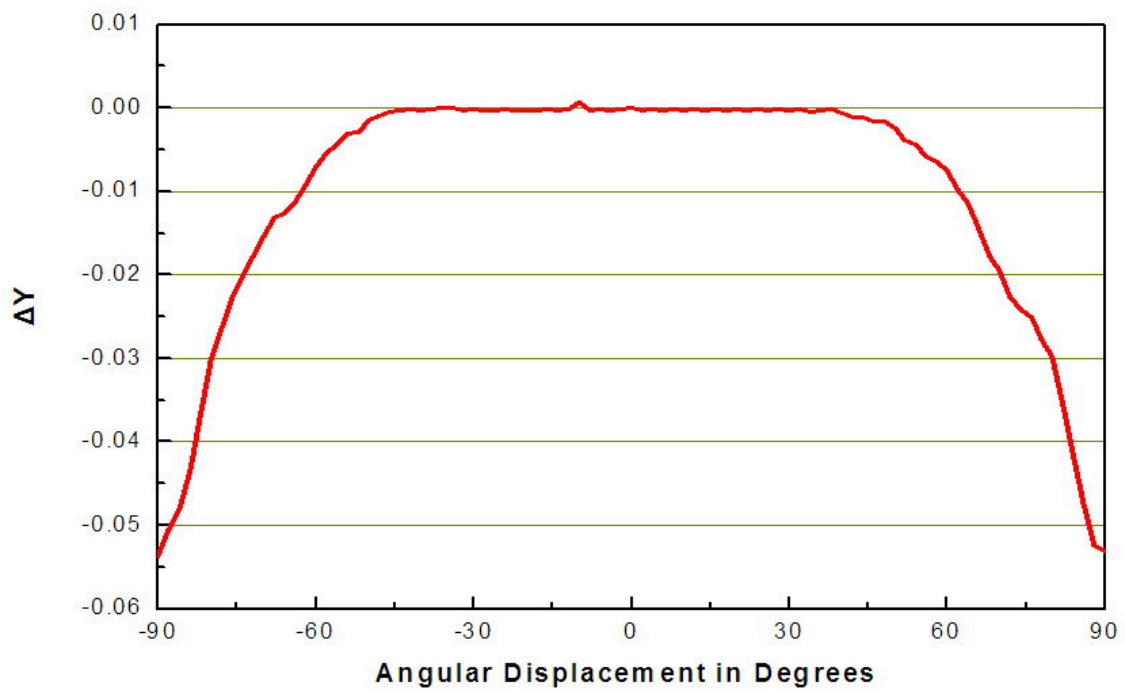
### Typical Polar Radiation Pattern for Cool-White, Neutral-White, Warm-White Lambertian



### Typical Difference of CIE X of Cool-White vs. Angle



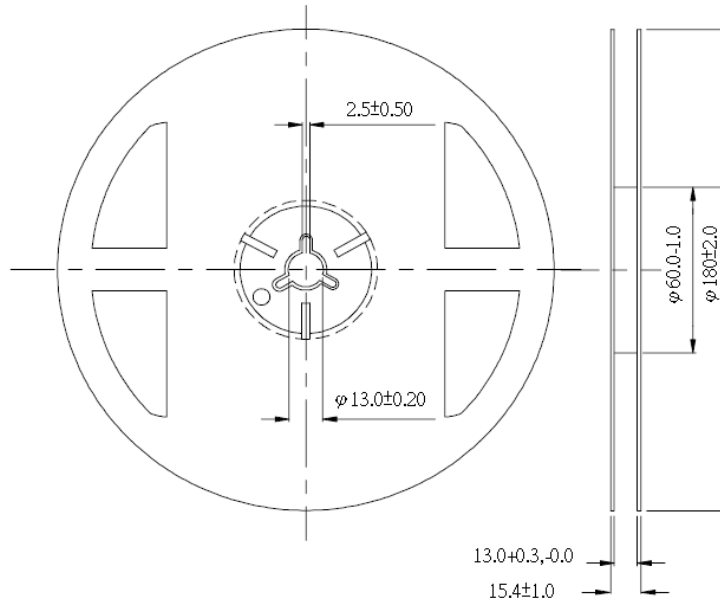
### Typical Difference of CIE Y of Cool-White vs. Angle





## Emitter Reel Packaging

### Reel Dimensions



#### Notes:

1. Dimensions are in millimeters.
2. Tolerances unless mentioned are  $\pm 0.1$  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: **2010/05/11**  
Previous version: **N/A**

Device No. DHE-0001159  
Rev. Ver. 1

Page	Subjects (major change in previous version)	Date of change