

Shwo(D) 爍 (D)

1W Series

“Shwo(D) [Shuo](D) 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(D) 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(D) 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 for orientation marker lights (e.g. steps, exit ways, etc.)
- ◆ Exterior and Interior Automotive Illumination
- ◆ Agriculture Lighting

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Product Nomenclature

The product name is designated as below:

ELSWD – 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 code

H = packaging type ^[4]

IJ = internal code

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	620~630nm
O	Orange	610~620nm
Y	Amber	585~595nm
G	Green	520~535nm
B	Blue	460~470nm
C	Cool-White	4745~7050K
N	Neutral-White	3710~4745K
M	Warm-White	2580~3710K

3. Table of power consumptions:

Symbol	Description
1	1W

4. Table of packaging types:

Symbol	Description
P	Tape

Absolute Maximum Ratings

Parameter	Symbol	Ratings	Unit
Max. DC Forward Current (mA)	I_F	600 _[1]	mA
Max. Peak Pulse Current (mA)	I_{Pulse}	1000 _[2]	mA
Max. ESD Resistance	V_B	8000	V
Reverse Voltage	V_R	Note 3	V
Thermal Resistance	R_{th}	10 ~ 12 _[4]	°C/W
Max. Junction Temperature	T_J	125 _[5]	°C
Operating Temperature	T_{Opr}	-40 ~ +100 _[6]	°C
Storage Temperature	T_{Stg}	-40 ~ +100	°C
Max. Soldering Temperature	T_{Sol}	260	°C
Max. Allowable Reflow Cycles	n/a	2	cycles

Notes:

1. Maximum forward current for 1W is 600mA (Thermal Pad=25°C).
2. Duty cycle = 1/10@1KHZ
3. The Shwo(D) series LEDs are not designed for reverse bias use.
4. Thermal Resistance is 10°C/W for Cool-White, and Warm-White LEDs,
5. Maximum junction temperature of Cool-White, Warm-White is 125°C.
6. Maximum Operating Temperature (Thermal Pad) of Cool-White, Warm-White LEDs is 100°C.

JEDEC Moisture Sensitivity

Level	Floor Life		Soak Requirements Standard	
	Time (hours)	Conditions	Time (hours)	Conditions
1	Unlimited	$\leq 30^\circ\text{C} / 85\% \text{ RH}$	168 (+5/-0)	85°C / 85% RH

Luminous Flux Characteristics for the Shwo(D) series

Color	Part Number	1W	
		Minimum Luminous Flux(lm) or Radiometric Power(mW) _[1]	Drive Current (mA)
Cool White	ELSWD – J21CX	110	350
Warm White	ELSWD– F81MX	80	350

Notes:

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

PN of the Shwo(D) series: White LEDs

The table below is a list of part numbers for the Everlight Shwo(D) 1W series White LED. All parts listed match ANSI binning standards. Bin offerings of 5700 and 3000K are listed and currently available. CRI is also listed with min 70 to 80. Typical view angle is 120°. These clearly listed binning options allow for proper design and implementation into lighting applications. The Order Codes below are currently available White Shwo(D) LEDs.

For Example: If you order product using P/N **ELSWD-J21C1-0LPGE-C5700**, you will be specifying:



Color	Radiation Pattern	CR I(Min.)	CCT	Forward Voltage (V)	Minimum Luminous Flux (lm)
Cool White	Lambertian	70	57K-1 ~ 57K-2 ~ 57K-3 ~ 57K-4	2.95~3.25(V1) 3.25~3.55(V2) 3.55~3.85(V3)	110

White, Shwo(D) series LEDs at 350mA are listed below

Color	Order Code of ELSWD	Minimum Luminous Flux (lm)	Typical Luminous Flux (lm)	CCT (K) Wavelength (nm)	Forward Voltage (V)	CRI (Min.)	CRI (Typ.)
Cool-White 5700K	ELSWD-J21C1-0LPGE-C5700	110	118	57K-1~57K-4	2.95~3.85	70	75
Warm-White 3000K	ELSWD-F81M1-0LPHE-C3000	80	88	30K-1~30K-4	2.95~3.85	80	83

Notes:

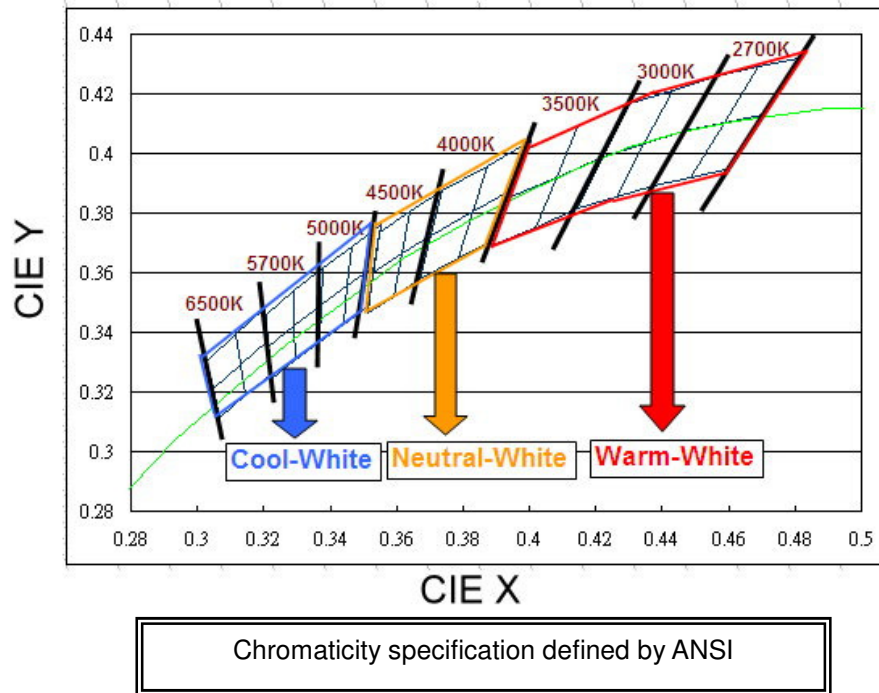
1. CRI measurement tolerance: ± 2 .
2. Each 1W white PN is based on the min. bin, and includes two adjacent bins

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	350
	6	350	375
	7	375	400
	8	400	425
	9	425	450
N	1	450	475
	2	475	500
	3	500	525
	4	525	550

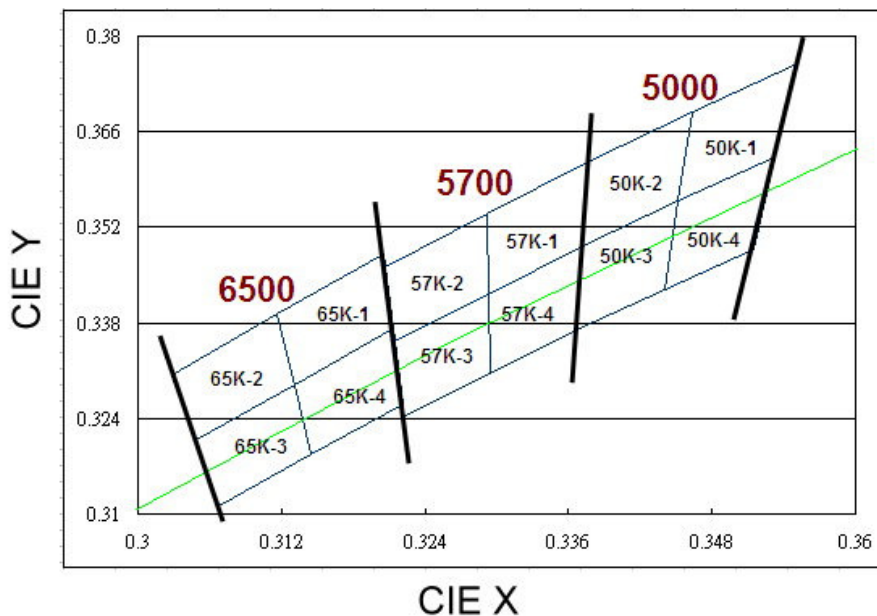
White Bin Structure



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 $I_F=350\text{mA}$ operation

Cool-White Bin Structure



Cool-White Bin Coordinates

5700K

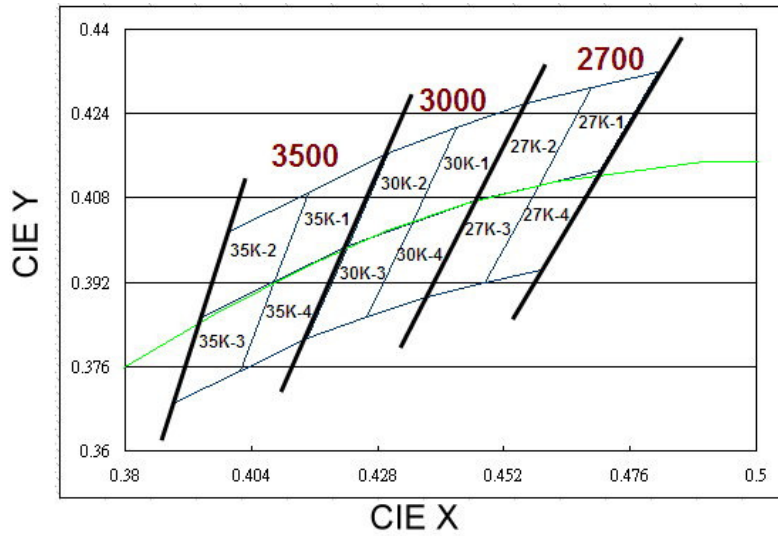
Bin	CIE X	CIE Y
57K-1	0.329	0.354
	0.329	0.342
	0.337	0.349
	0.338	0.362
Reference Range: 5310~5700K		

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		

Warm-White Bin Structure



Warm-White Bin Coordinates

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		

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

Forward Voltage Bins

Group Name	Bins
A	U1+U2+U3+U4
B	U2+U3+U4+V1
C	V1+V2+V3
D	V1+V2+V3+V4

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

Notes:

1. Forward voltage measurement tolerance: $\pm 0.1V$.
2. Forward voltage bins are defined at $I_f=350mA$ operation.
3. Other Forward Voltage bins for White LEDs available upon request. Please contact your local Everlight sales office.

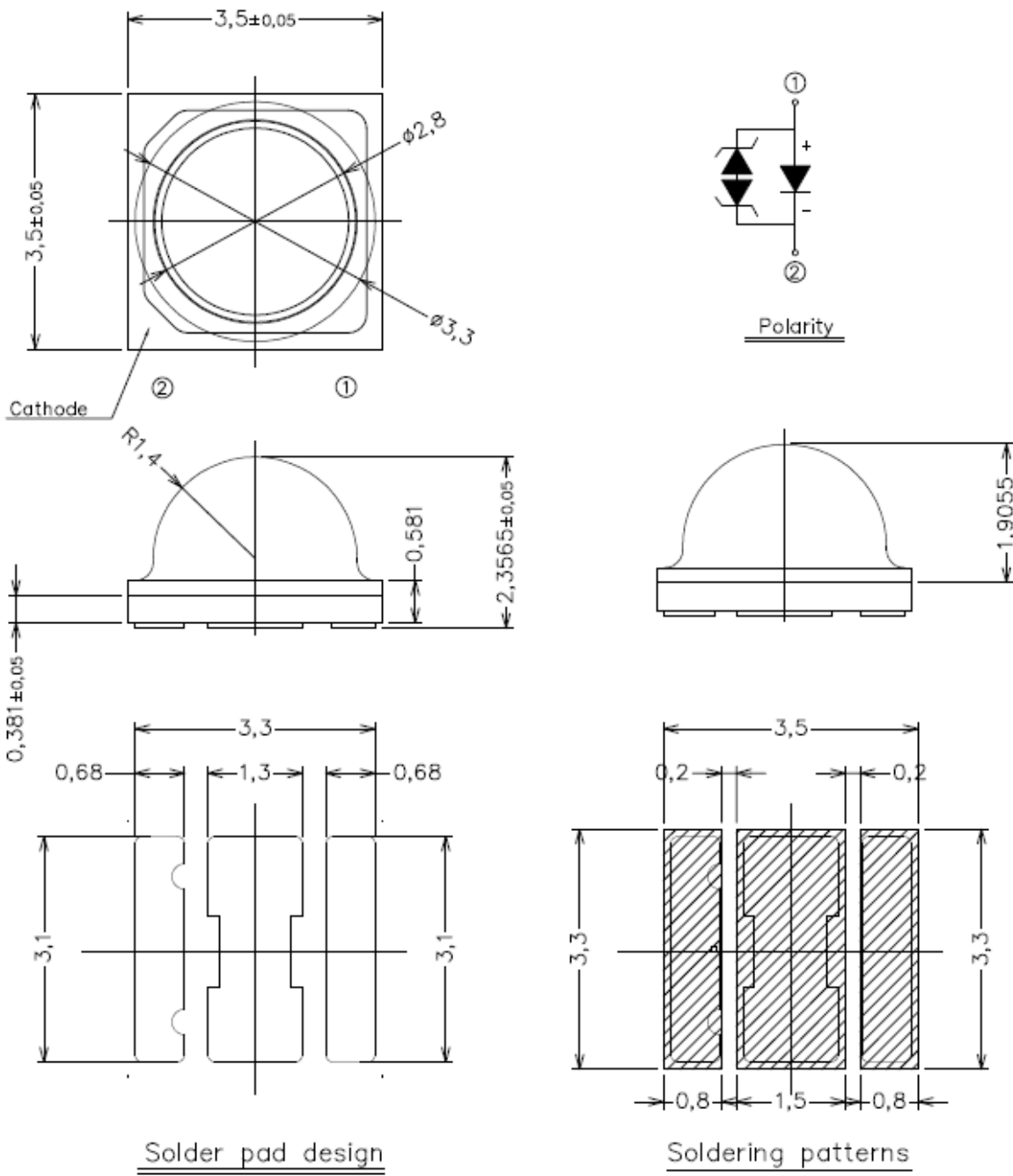
Optical Characteristics

Color	Part Number	Dominant Wavelength λ_D Peak Wavelength λ_P Color Temperature CCT			Typical Temperature Coefficient of Dominant Wavelength (nm/°C)-($\Delta\lambda_D/\Delta T_J$)	Typical Viewing Angle (degrees) $2\theta_{1/2}$
		Min.	Typ.	Max.		
Cool-White	ELSWD – XX1CX	4745K	5700K	7050K	---	120
Warm-White	ELSWD– XX1MX	2580K	3000K	3710K	---	120

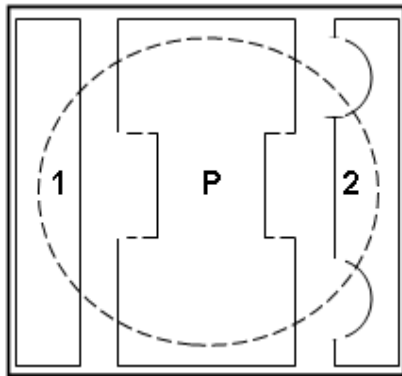
Notes:

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° .
3. All Cool-White, Warm-White, and dominant wavelength below 550nm LEDs are made with Indium Gallium Nitride (InGaN).

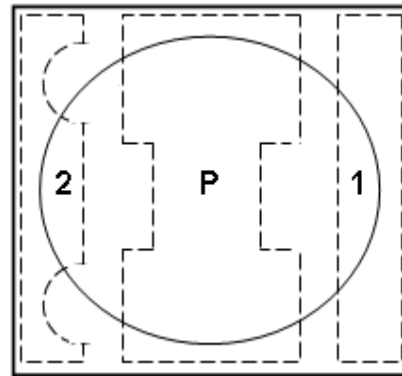
Mechanical Dimension



Pad Configuration



BOTTOM VIEW



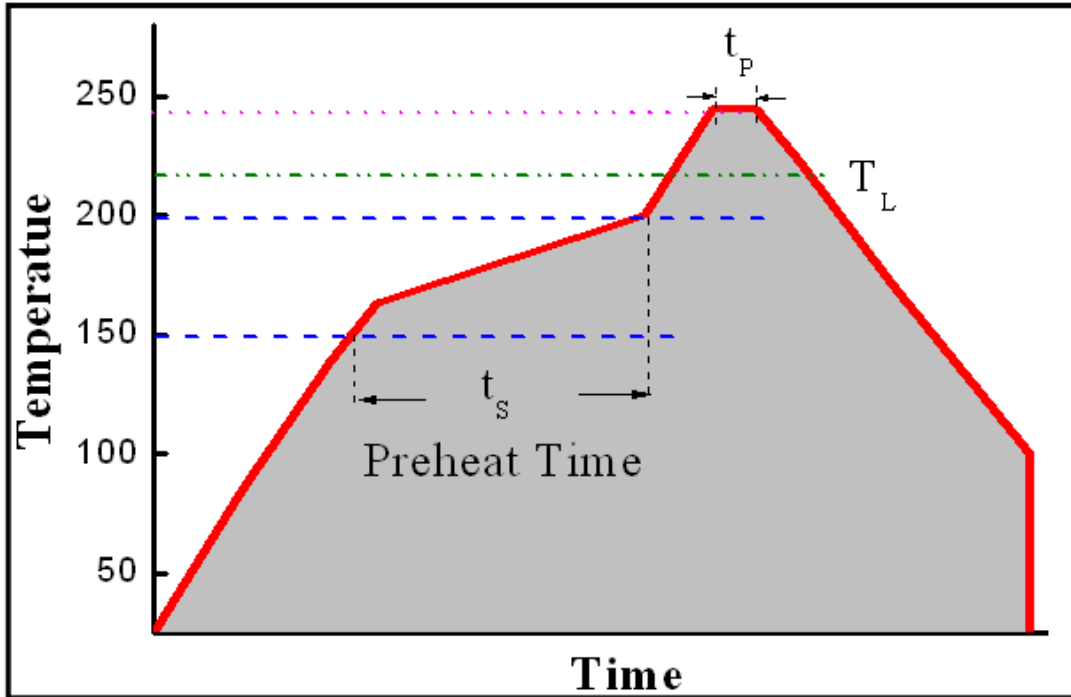
TOP VIEW

PAD	FUNCTION
1	ANODE
2	CATHODE
P	THERMAL PAD

Reflow Soldering Characteristics

For Reflow Process

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

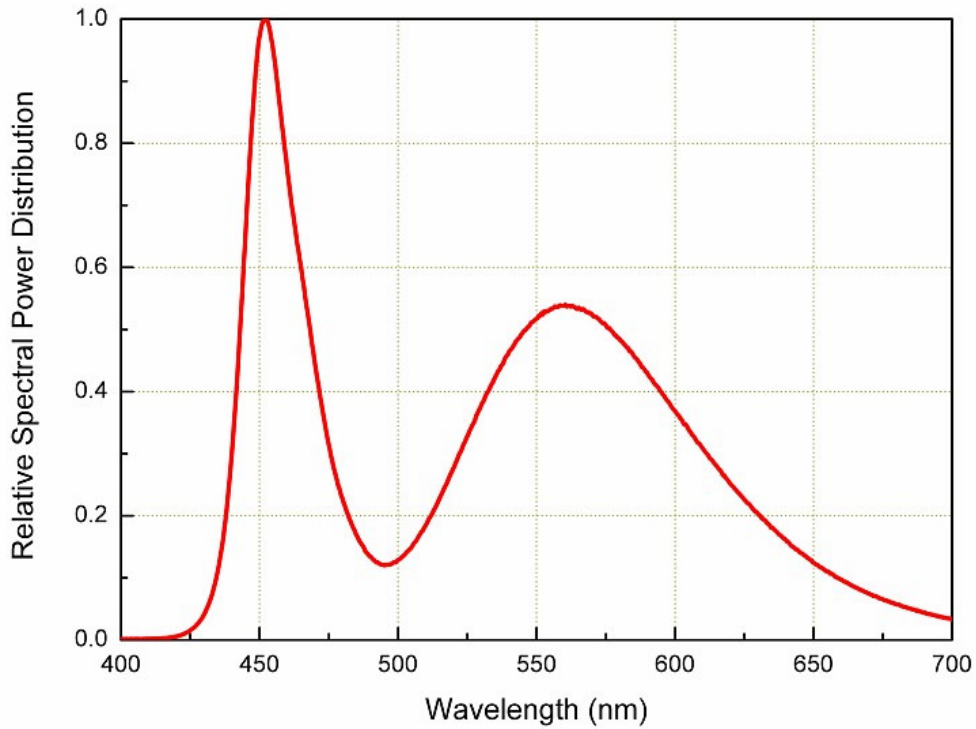


Profile Feature	Lead Free Assembly
Ramp-Up Rate	2-3 °C/S
Preheat Temperature	150-200 °C
Preheat Time (t_s)	60-120 S
Liquid Temperature (T_L)	217 °C
Time maintained above T_L	60-90 S
Peak Temperature (T_p)	240±5 °C
Peak Time (t_p)	Max 20 S
Ramp-Down Rate	3-5 °C/S

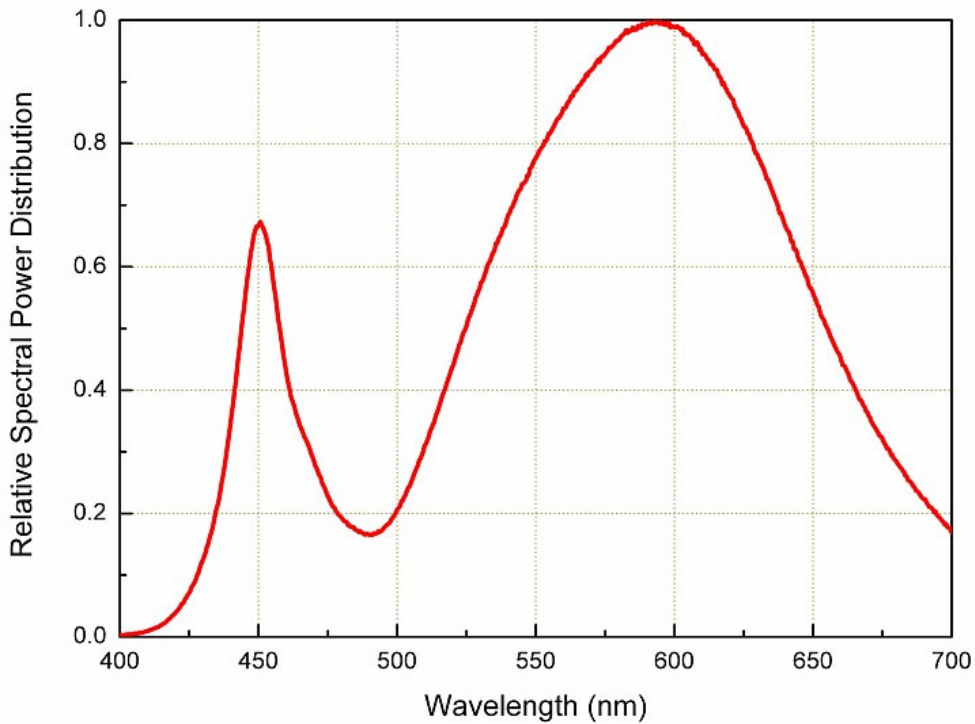
- Reflow soldering should not be done more than twice.
- In soldering process, stress on the LEDs during heating should be avoided.
- After soldering, do not bend the circuit board.

Wavelength Characteristics

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

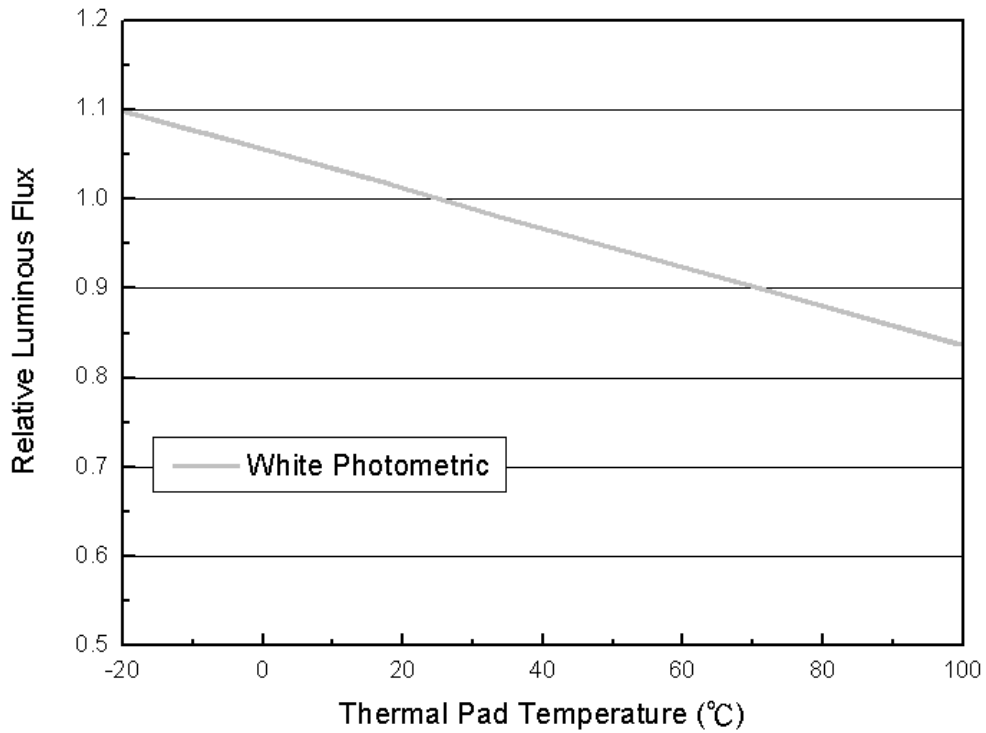


For Warm-White, @ Thermal Pad Temperature = 25°C



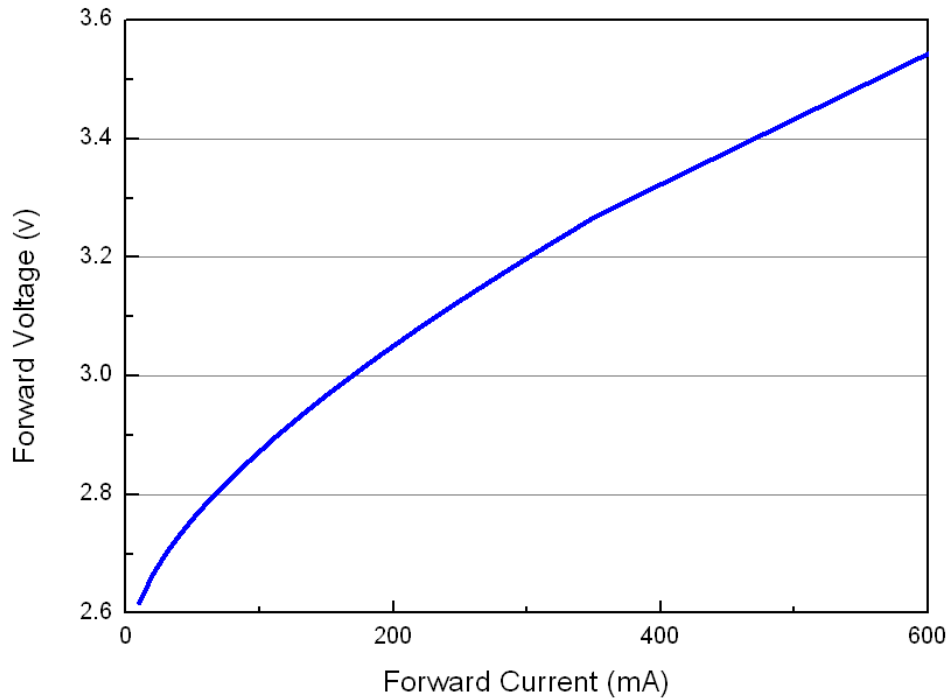
Typical Light Output Characteristic V.S. Thermal Pad Temperature

Cool-White, Warm-White
for 350mA Drive Current



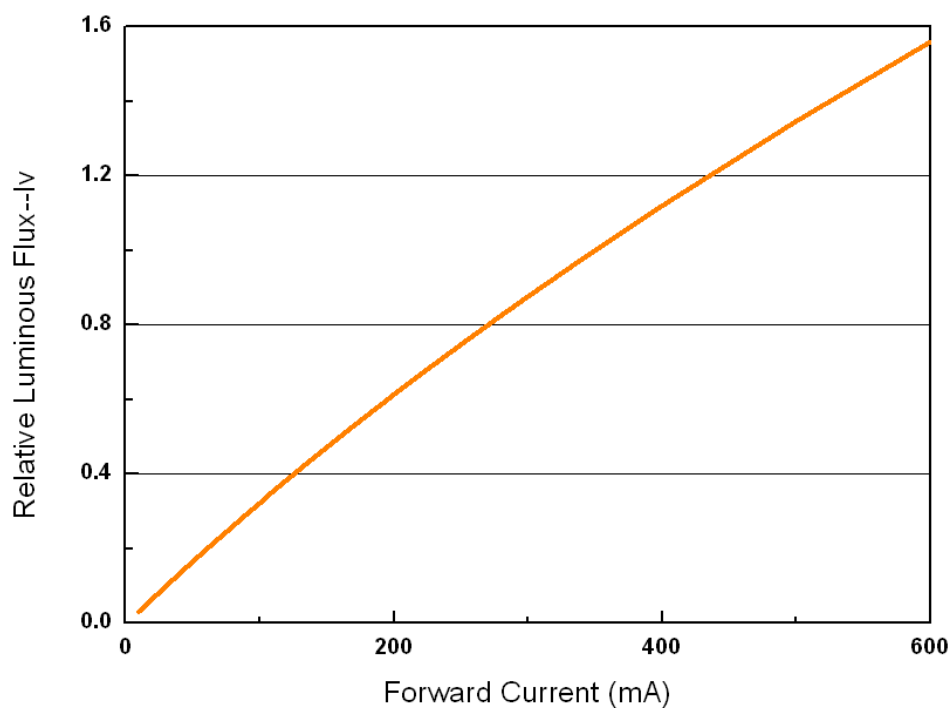
Typical Electrical Characteristics

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



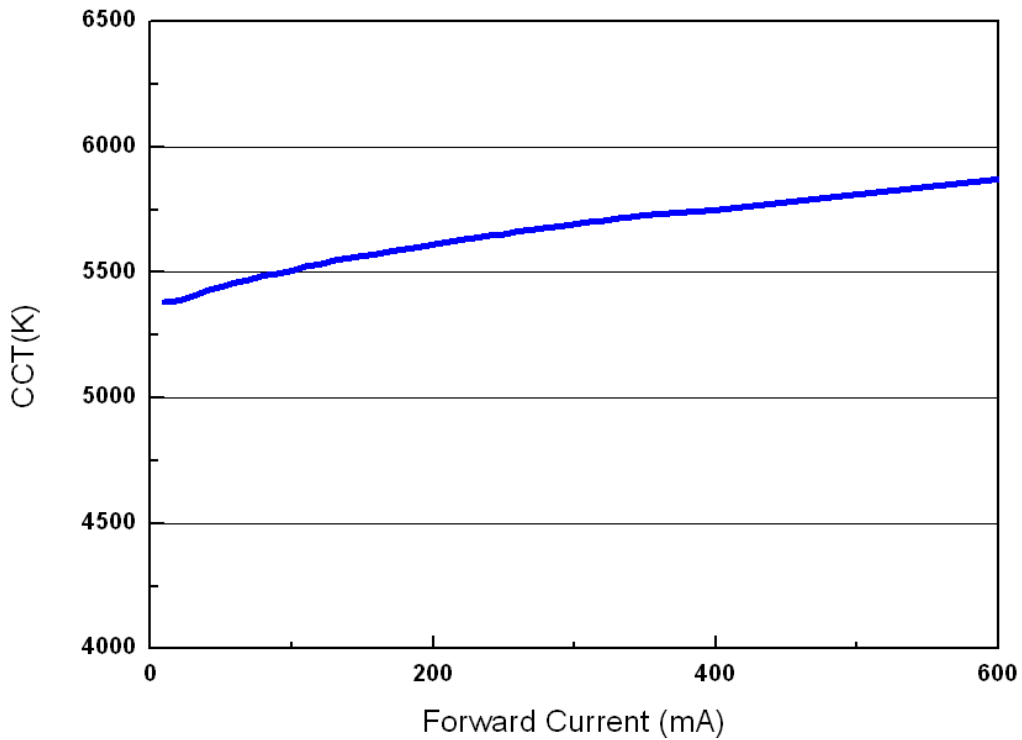
Typical Relative Luminous Flux V.S. Forward Current

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

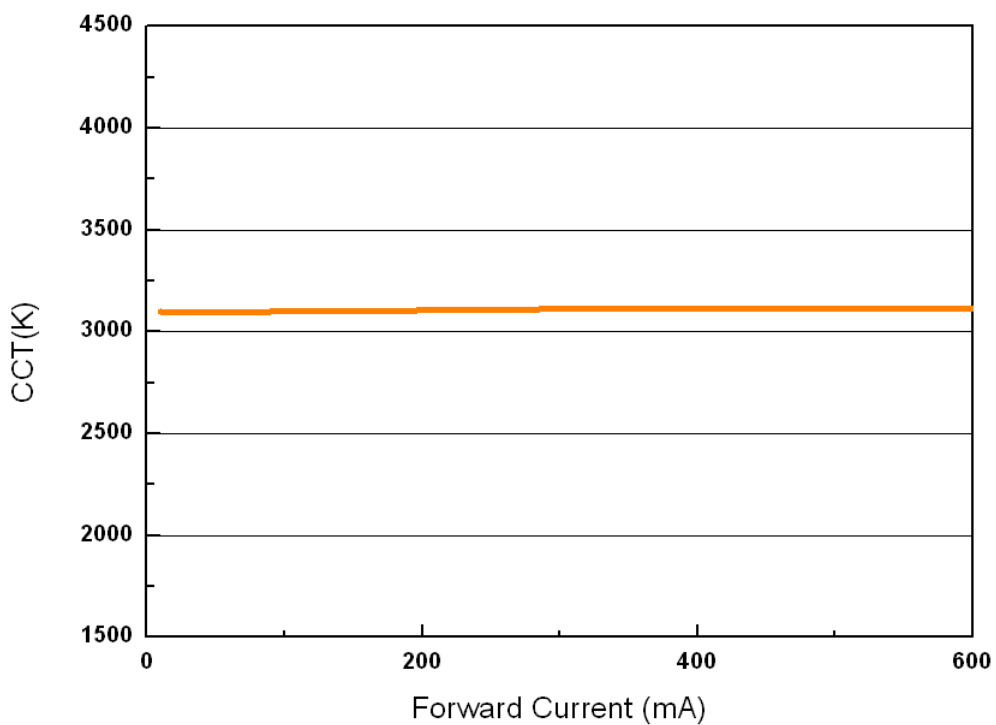


Typical Wavelength & CCT Shift Characteristics V.S. Forward Current

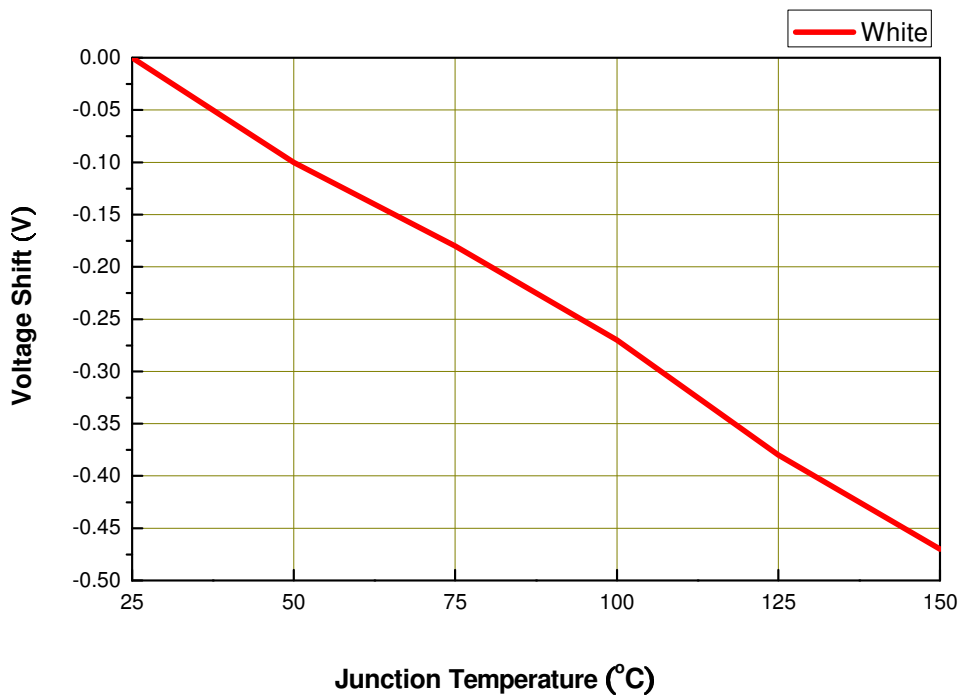
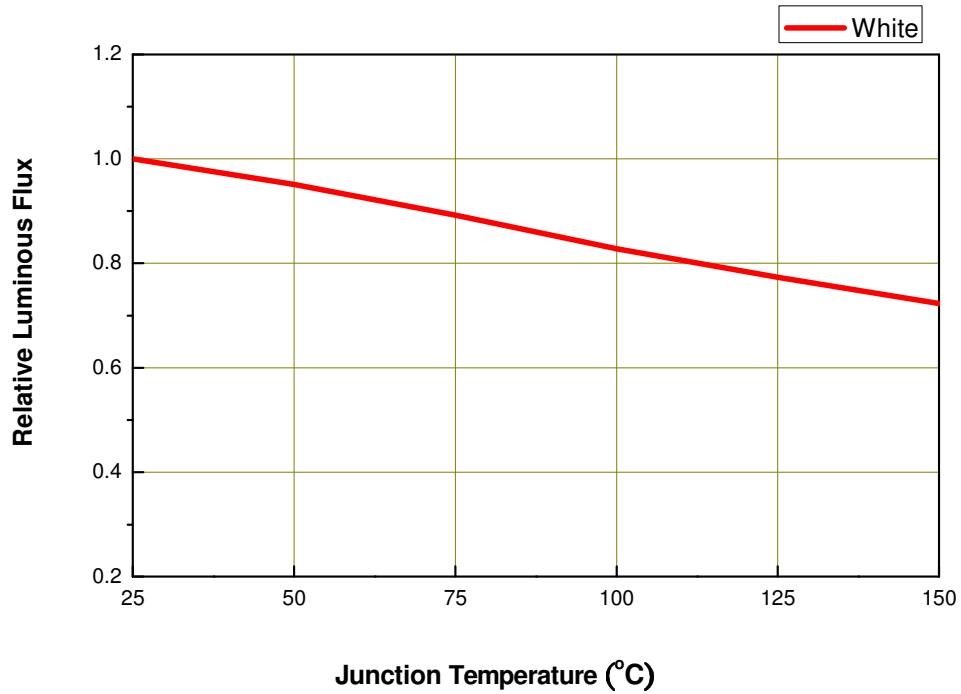
For Cool-White @ Thermal Pad Temperature = 25°C



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

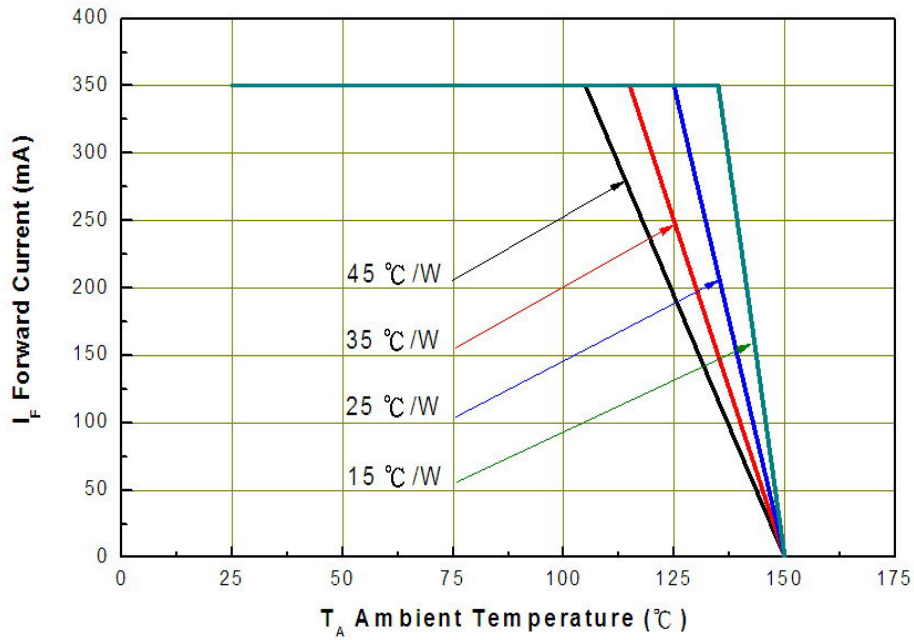


Relative Flux and Forward Voltage V.S. Junction Temperature (IF = 350 mA)



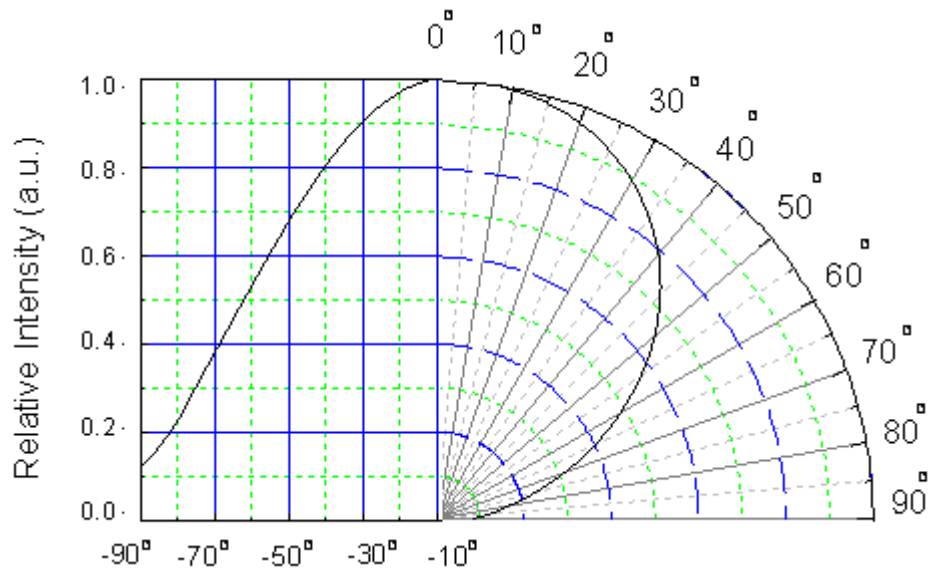
Current Derating Curves

Current Derating Curve for 350mA Drive Current
Cool-White, Warm-White



Typical Radiation Patterns

Shwo(D) series: Typical Diagram Characteristics of Radiation for Cool-White, Warm-White



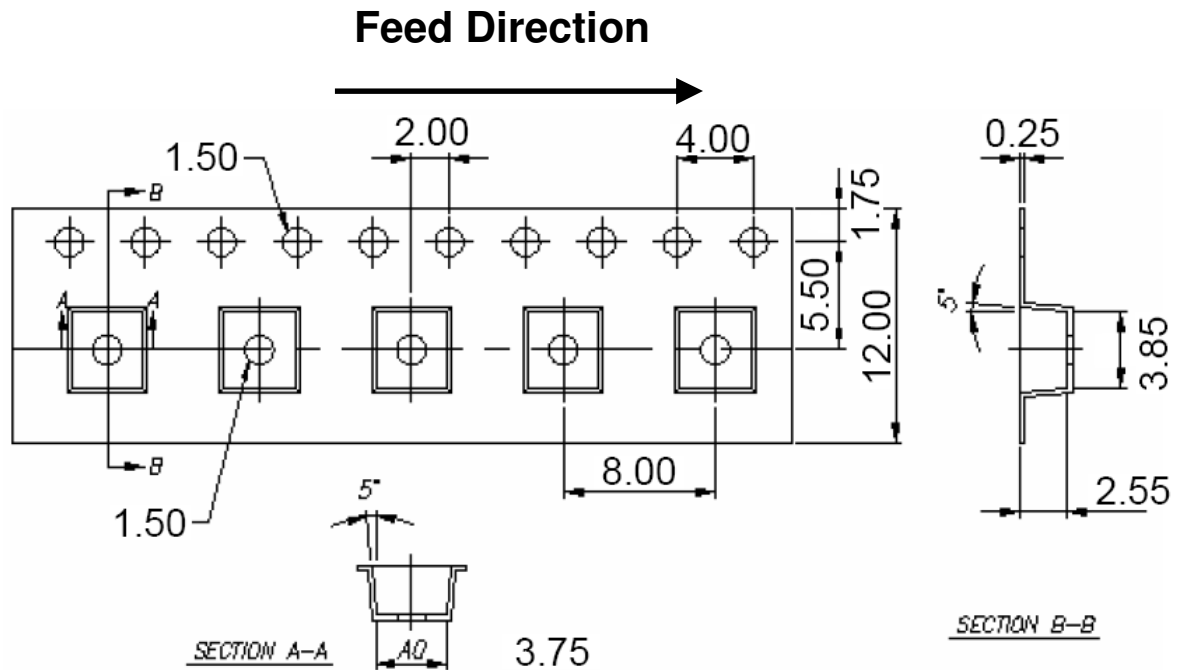
Notes:

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 $\pm 5^\circ$.

Emitter Tape Packaging

Carrier Tape Dimensions as the following:

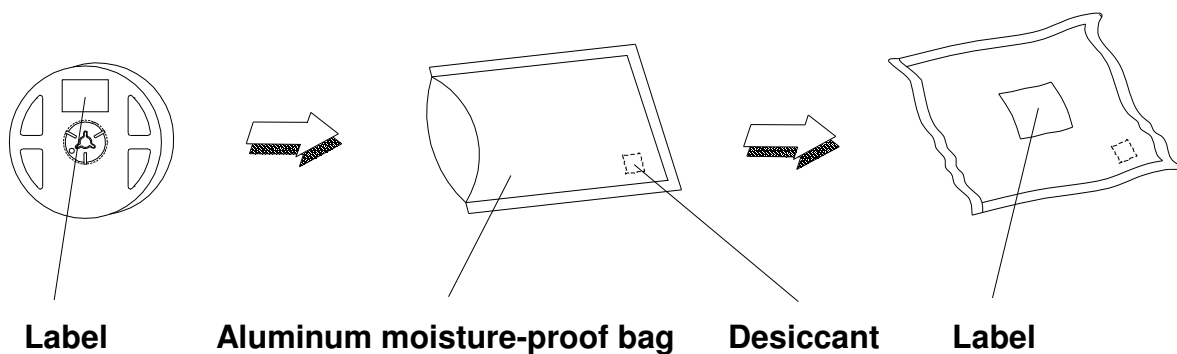
Reel: 400pcs, MOQ_≥ 2Kpcs(has to be a multiple of 400pcs)



Notes:

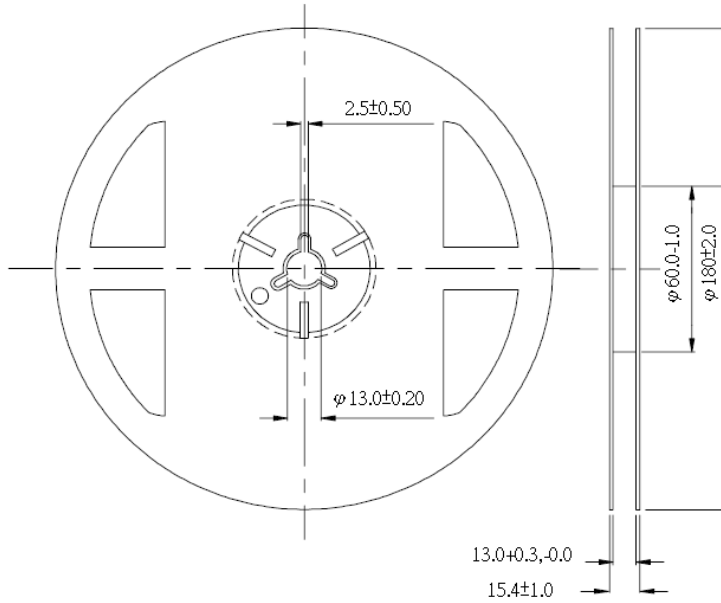
1. Dimensions are in millimeters.
2. Tolerances for fixed dimensions are $\pm 0.1\text{mm}$.

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



Storage Conditions

- Before the package is opened. The LEDs should be stored at 30°C or less and 85%RH or less after being shipped from Everlight and the storage life limits are 1 year. The LEDs can be stored up to 3 years If in a sealed container with a nitrogen atmosphere and moisture absorbent material.
- After opening the package: The LED's floor life is 1 year under 30°C or less and 60%RH or less. The LED should be soldered with 168hrs (7days) after opening the package. If unused LEDs remain, it should be stored in moisture proof packages.
- If the moisture absorbent material (silica gel) has faded away or the LEDs have exceeded the storage time, baking treatment should be performed using the following conditions. Baking treatment: 60±5°C for 24 hours.

Revision History

Current version: **2012/02/22**
Previous version: **N/A**

Device No. DHE-0001766
Rev. Ver. 2

Page	Subjects (major change in previous version)	Date of change
6	The order code is changed.	2012/02/22