Product Specification

Yi

5W Series

熠

"Yi [Yi] is the English translation for the Chinese word meaning Dazzling or Sparkling. This multi-chip package has the brightness to illuminate the space around it, a beacon in the dark."

Introduction

The Yi series is a high power, 4-chip device with very low thermal resistance as a result of the ceramic substrate. The 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, spot, signal, industrial and commercial lighting.

Features

- Small package with high efficiency and power
- Typical view angle:105°
- ESD protection up to 2KV
- 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
- Indoor and Outdoor Lighting
- Retrofit Bulbs
- Decorative and Entertainment Lighting
- Signal Lighting/Beacon Lighting
- Exterior and Interior Automotive Illumination

Table of Content

Product Nomenclature

The product name is designated as below:

ELYI– 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	Others

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
5	5W

4. Table of packaging types:

Symbol	Description
P	Tape
B	Tube
T	Tray

Absolute Maximum Ratings

Parameter	Symbol	Ratings	Unit
Max. DC Forward Current (mA)	I_F	800[1]	mA
Max. Peak Pulse Current (mA)	I_{Pulse}	1400	mA
Max. ESD Resistance	V_B	2000	V
Reverse Voltage	V_R	Note 2	V
Thermal Resistance	R_{th}	6	°C/W
Max. Junction Temperature	T_J	125[3]	°C
Operating Temperature	T_{Opr}	-40 ~ +90 [4] [5]	°C
Storage Temperature	T_{Stg}	-40 ~ +100	°C
Max. Soldering Temperature	T_{Sol}	260	°C
Max. Allowable Reflow Cycles	n/a	3	cycles

Notes:

1. Maximum forward current for 5W is 800mA ($T_{Thermal\ Pad}$=25℃).
2. The Yi series LEDs are not designed for reverse bias operation.
3. Maximum junction temperature is 125°C for White LEDs.
4. Maximum Operating Temperature (Thermal Pad) is 90°C for White LEDs.
5. Avoid operating Yi 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 Yi series

Color	Part Number	5W	
		Minimum Luminous Flux(lm)[1]	Drive Current (mA)
Cool White 6500	ELYI – K52C5	325	700
	ELYI – K62C5	350	700
	ELYI – K72C5	375	700
	*ELYI – K82C5	400	700
Cool White 5700	ELYI – K52C5	325	700
	ELYI – K62C5	350	700
	ELYI – K72C5	375	700
	*ELYI – K82C5	400	700
Warm White 3000	ELYI – K22M5	250	700
	ELYI – K32M5	275	700
	ELYI – K42M5	300	700
	*ELYI – K52M5	325	700

Notes:

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 Yi series: White LEDs

The table below lists part numbers for the Everlight Yi series 5W 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 variations from typical 75 to 80. These clearly listed binning options allow for proper design and implementation into lighting applications. The Order Codes below are currently available White Yi LEDs.

For Example: If you order product using P/N **ELYI-K62C5-0LPGS-P5700,** you will be specifying:

Color Variant	CRI	CCT	Forward Voltage (V)	Minimum Luminous Flux (lm)
Cool White	75	57K-1 ~ 57K-2 ~ 57K-3 ~ 57K-4	6~8	325

White, Yi series LEDs at 700mA are listed below

Color	Order Code of ELYI	Minimum Luminous Flux (lm)	CCT (K)	Forward Voltage (V)	CRI (Typical)
Cool White 6500	ELYI – K52C5 – 0LPGS – P6500	325	6500-1~6500-4	6~8	75
	ELYI – K62C5– 0LPGS – P6500	350	6500-1~6500-4	6~8	75
	ELYI – K72C5– 0LPGS – P6500	375	6500-1~6500-4	6~8	75
	*ELYI – K82C5– 0LPGS – P6500	400	6500-1~6500-4	6~8	75
Cool White 5700	ELYI – K52C5– 0LPGS – P5700	325	5700-1~5700-4	6~8	75
	ELYI – K62C5– 0LPGS – P5700	350	5700-1~5700-4	6~8	75
	ELYI – K72C5– 0LPGS – P5700	375	5700-1~5700-4	6~8	75
	*ELYI – K82C5– 0LPGS – P5700	400	5700-1~5700-4	6~8	75
Warm White 3000	ELYI – K22M5– 0LPGS – P3000	250	3000-1~3000-4	6~8	80
	ELYI – K32M5– 0LPGS – P3000	275	3000-1~3000-4	6~8	80
	ELYI – K42M5– 0LPGS – P3000	300	3000-1~3000-4	6~8	80
	*ELYI – K52M5– 0LPGS – P3000	325	3000-1~3000-4	6~8	80

Notes:

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

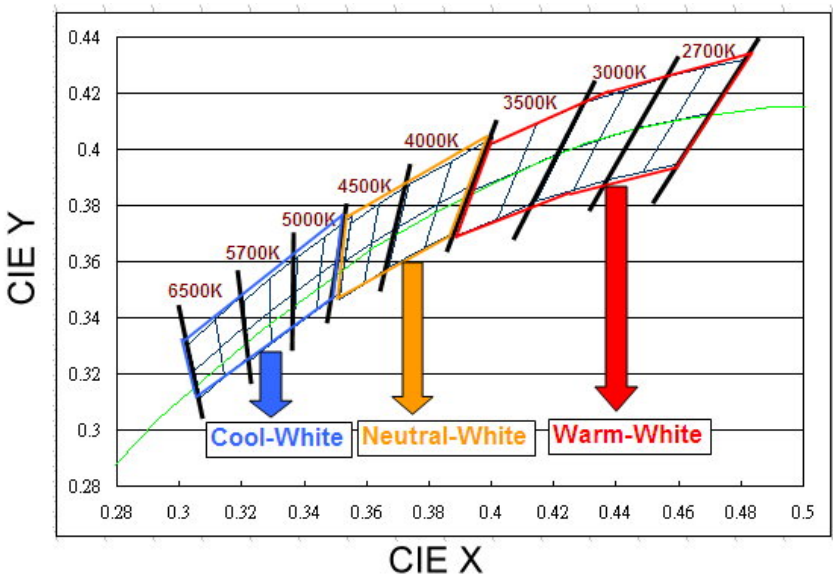
Product Binning

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
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
	5	550	575
	6	575	600
	7	600	625
	8	625	650
	9	650	675
P	1	675	700
	2	700	725
	3	725	750
	4	750	775
	5	775	800
	6	800	850
	7	850	900
	8	900	950
	9	950	1000
S	1	1000	1100
	2	1100	1200
	3	1200	1300
	4	1300	1400
	5	1400	1600
	6	1600	1800
	7	1800	2000

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

White Bin Structure

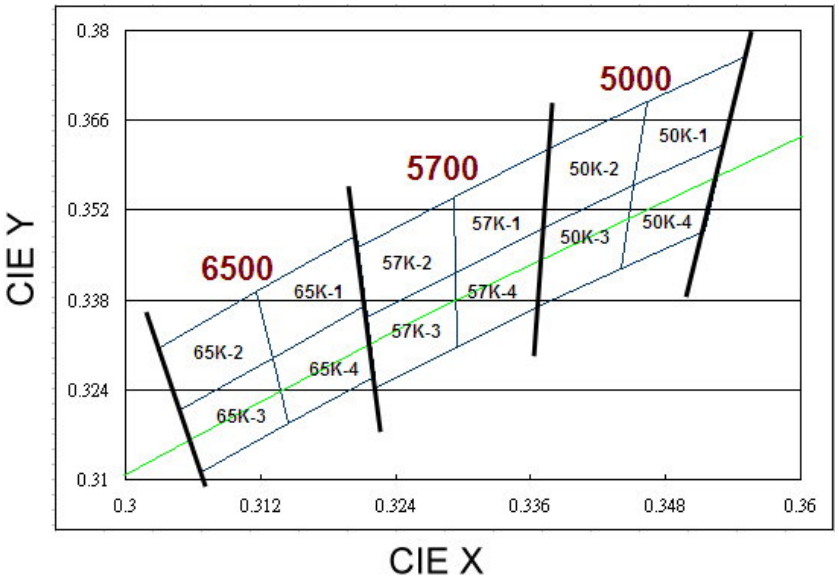


Chromaticity specification defined by ANSI

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 : ±0.01
5. Color bins are defined at I_F=700mA 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

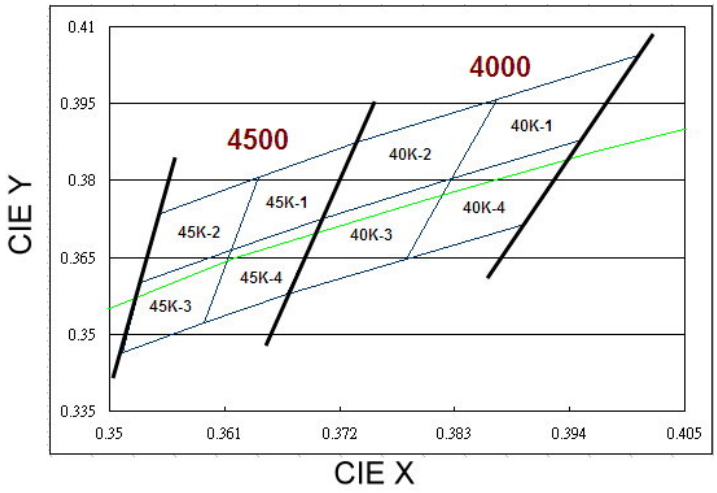
Bin	CIE X	CIE Y
65K-1	0.312	0.339
	0.313	0.329
	0.321	0.337
	0.321	0.348
Reference Range: 6020~6500K		

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

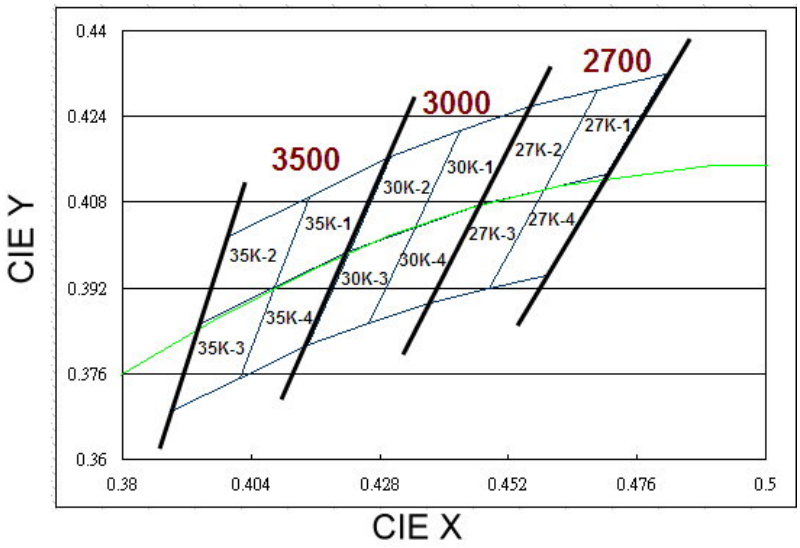
Bin	CIE X	CIE Y
45K-1	0.364	0.381
	0.362	0.366
	0.370	0.373
	0.374	0.387
Reference Range: 4260~4500K		

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
N	O4+O5+O6
O	O5+O6+O7
P	**O4+O5+O6+O7**
Q	O7+R1+R2
R	R1+R2+R3
S	R2+R3
T	R2+R3+R4

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:

1. Forward voltage measurement tolerance: ±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.

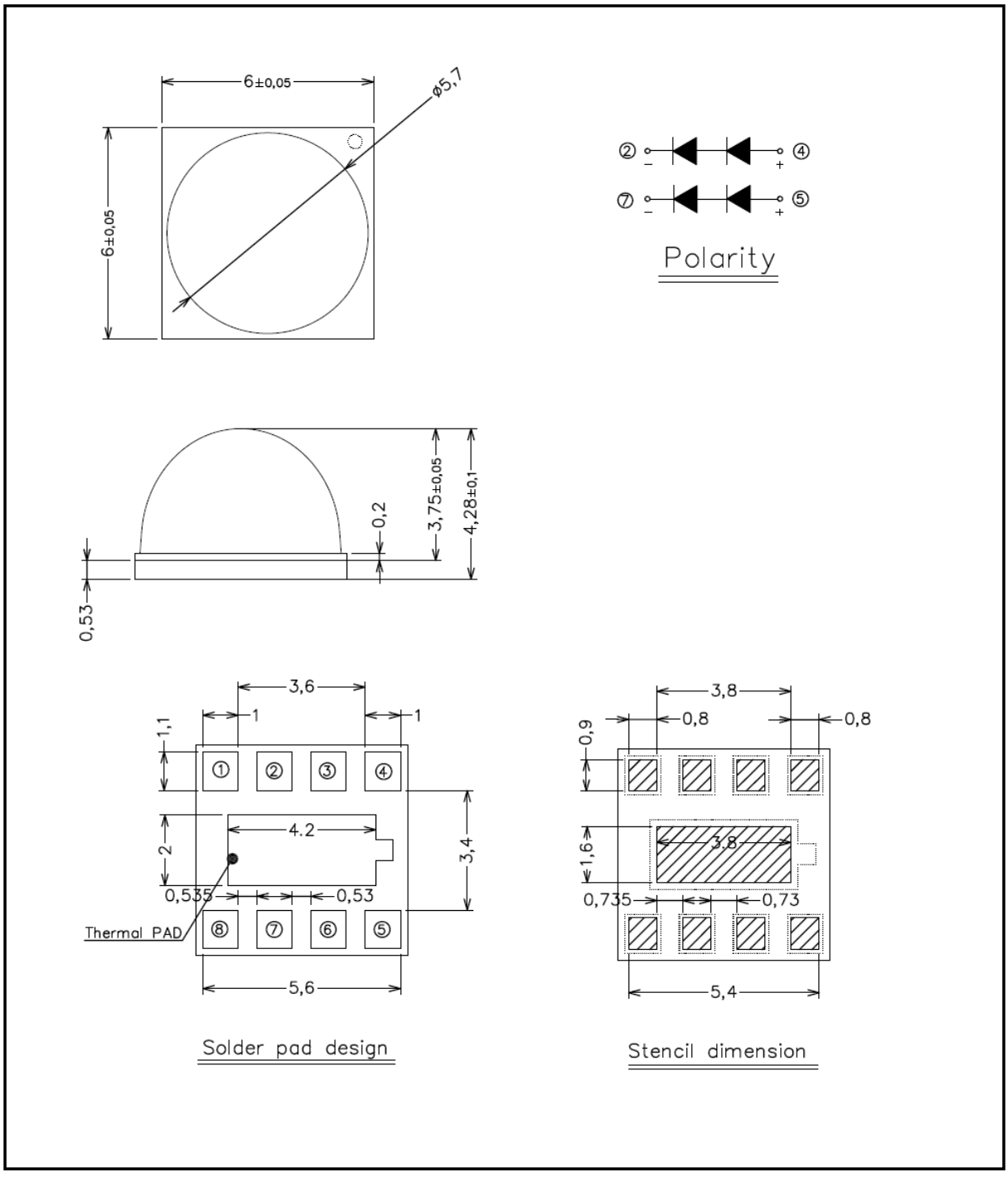
Optical Characteristics

Color	Part Number	Color Temperature CCT			Typical Viewing Angle (degrees) $2\theta_{1/2}$
		Min.	Typ.	Max.	
Cool-White	ELYI – XX2C5	4745K	5700K	7050K	105
Neutral-White	ELYI – XX2N5	3710K	4260K	4745K	105
Warm-White	ELYI – XX2M5	2580K	3000K	3710K	105

Notes:

1. The test tolerance of Everlight is ±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 LEDs are made with Indium Gallium Nitride (InGaN).

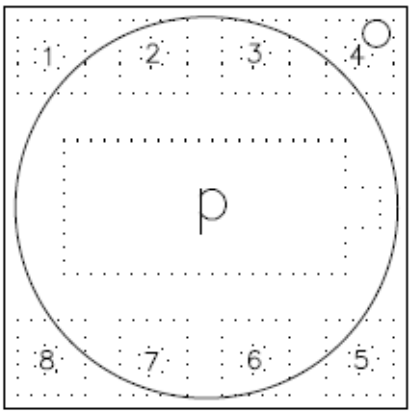
Mechanical Dimension



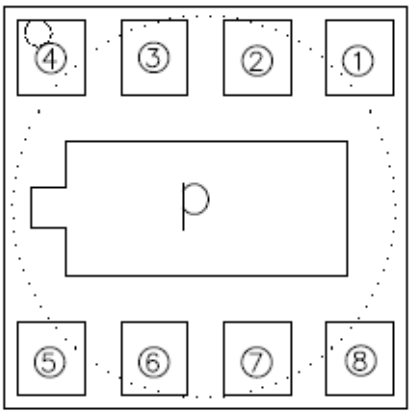
Notes:

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



Top view



Bottom view

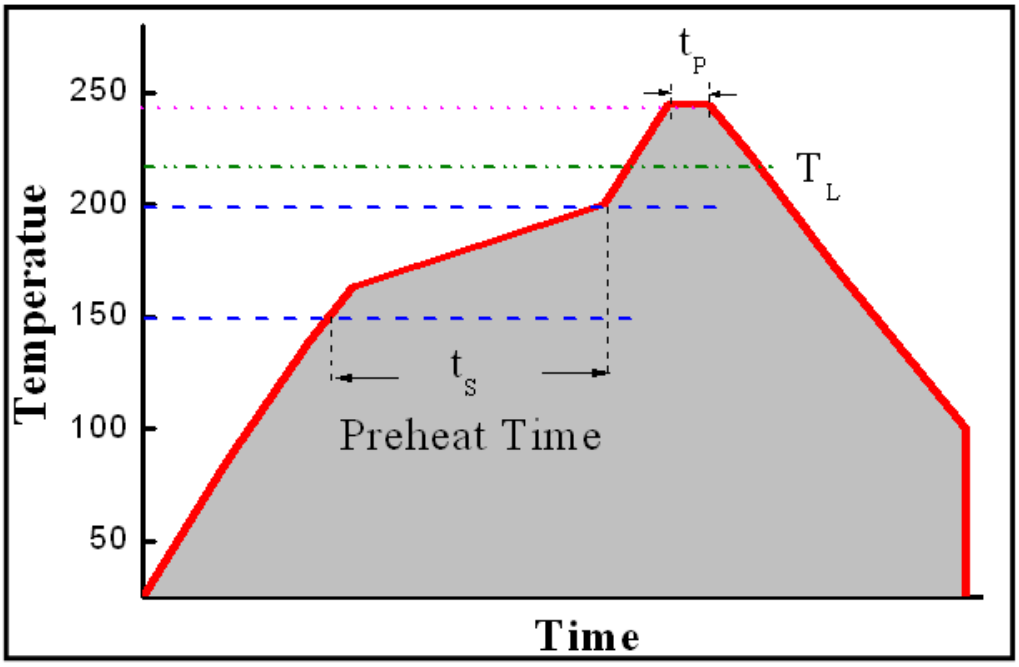
PAD	FUNCTION
4 and 5	ANODE
2 and 7	CATHODE
P	THERMAL PAD

Reflow Soldering Characteristics

For Reflow Process

a. ELYI 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 ℃/S
Preheat Temperature	150-200 ℃
Preheat Time (t_S)	60-120 S
Liquid Temperature (T_L)	217 ℃
Time maintained above T_L	60-90 S
Peak Temperature (T_P)	240±5 ℃
Peak Time (t_P)	Max 20 S
Ramp-Down Rate	3-5 ℃/S

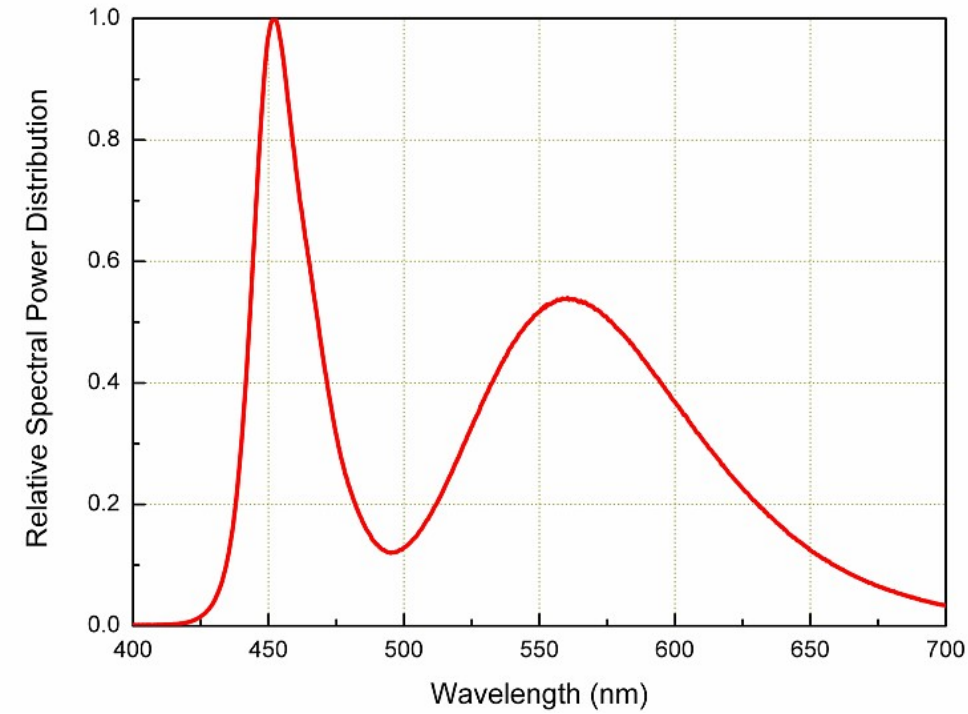
c. Reflow soldering should not be done more than twice.

d. In soldering process, stress on the LEDs during heating should be avoided.

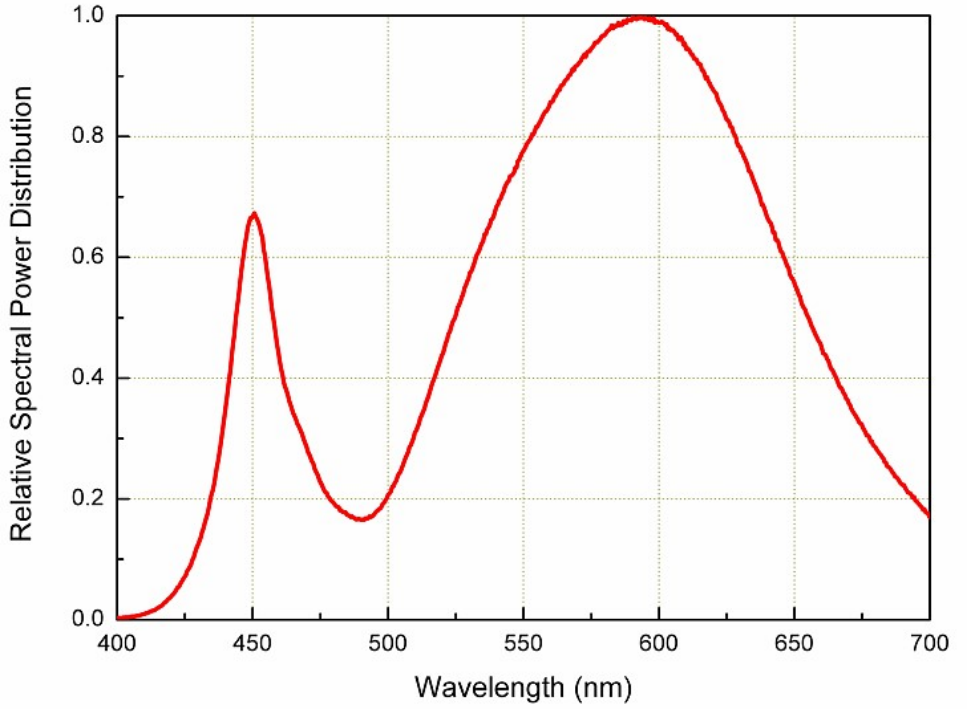
e. After soldering, do not bend the circuit board.

Wavelength Characteristics

For Cool-White, @ Thermal Pad Temperature = 25℃

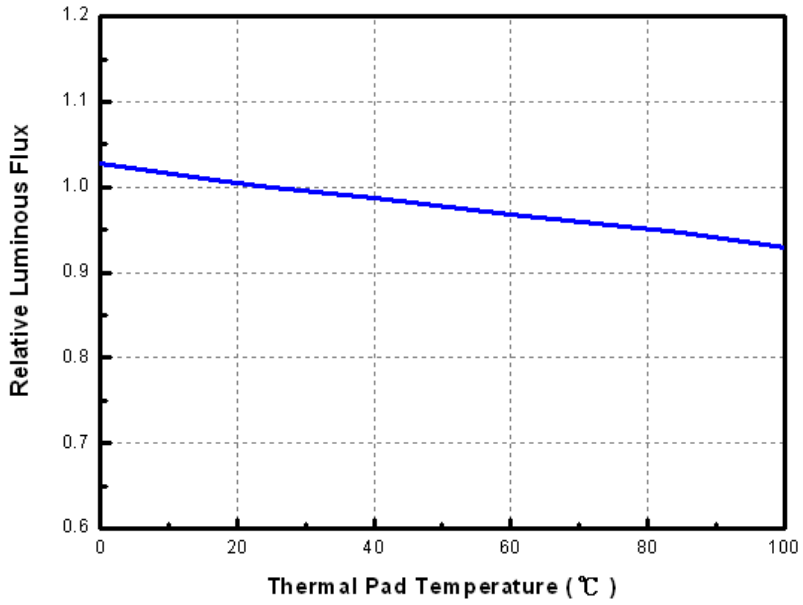


For Warm-White, @ Thermal Pad Temperature = 25℃



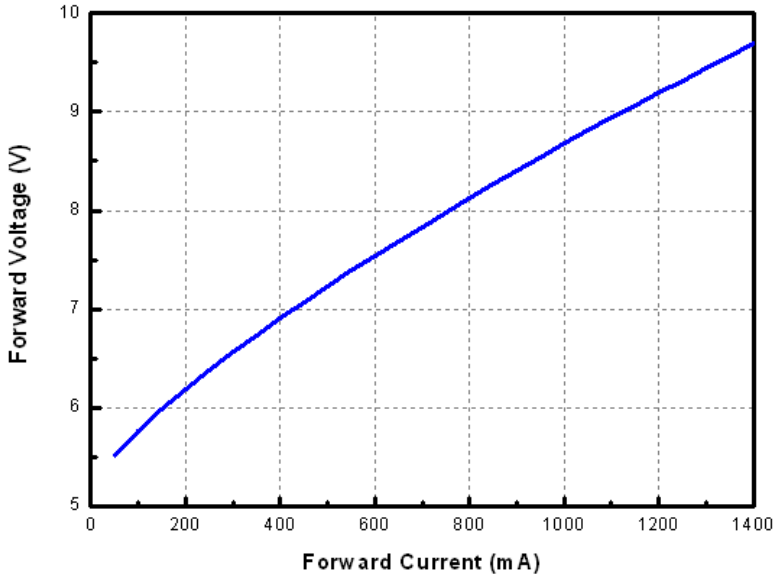
Typical Light Output Characteristic vs. Thermal Pad Temperature

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



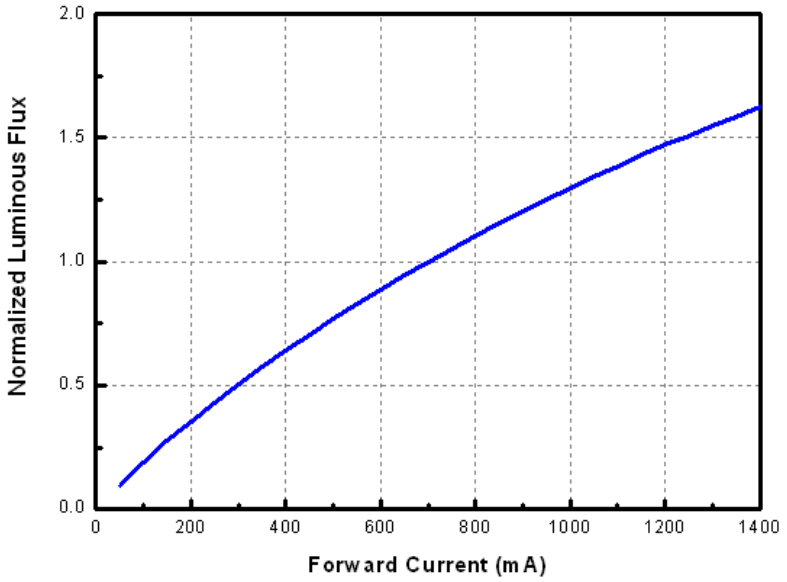
Typical Electrical Characteristics

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



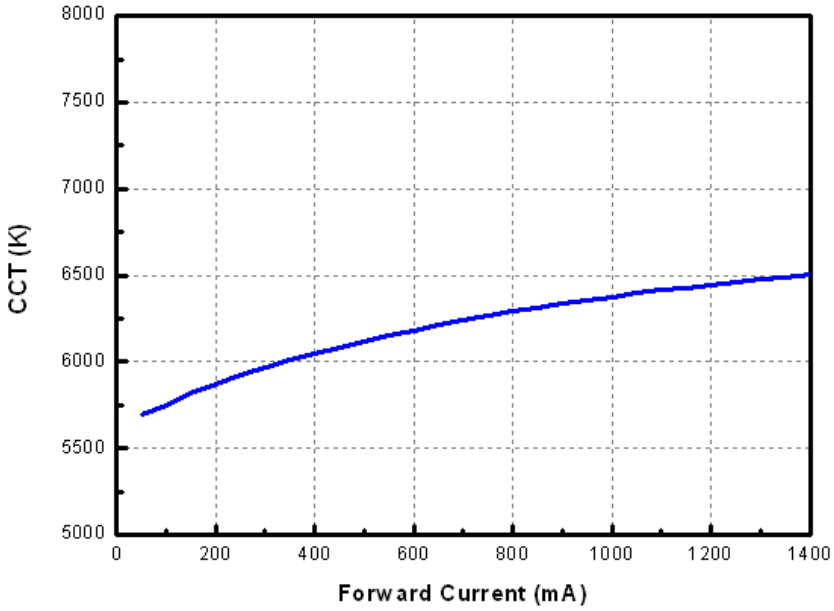
Typical Relative Luminous Flux vs. Forward Current

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

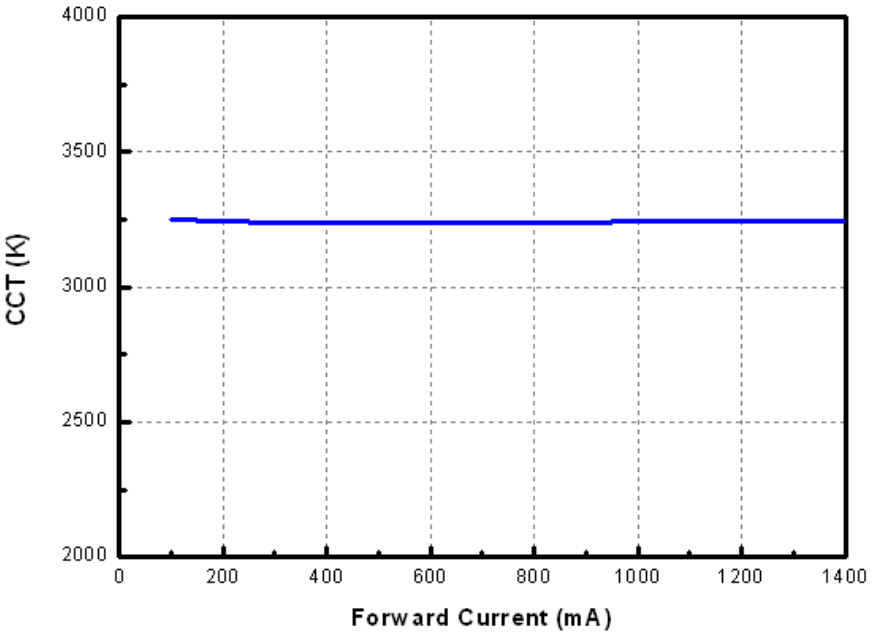


Typical Wavelength & CCT Shift Characteristics vs. Forward Current

For Cool-White @ Thermal Pad Temperature = 25℃

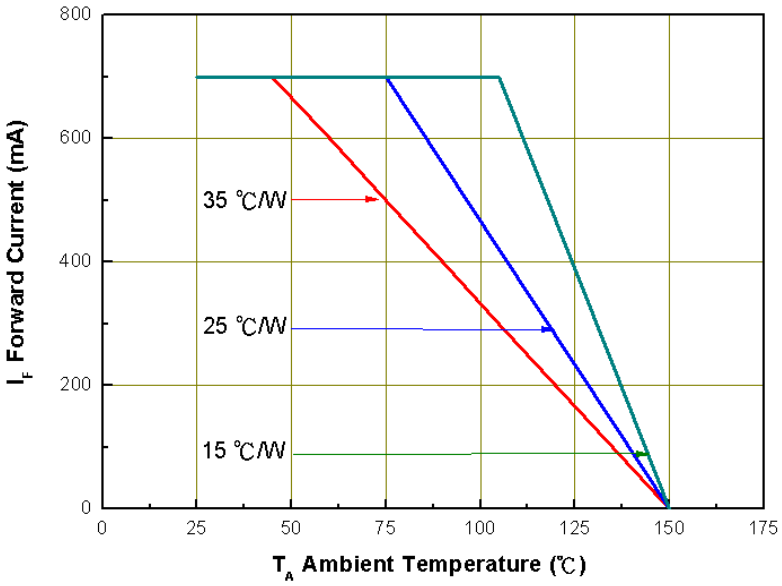


For Warm-White @ Thermal Pad Temperature = 25℃



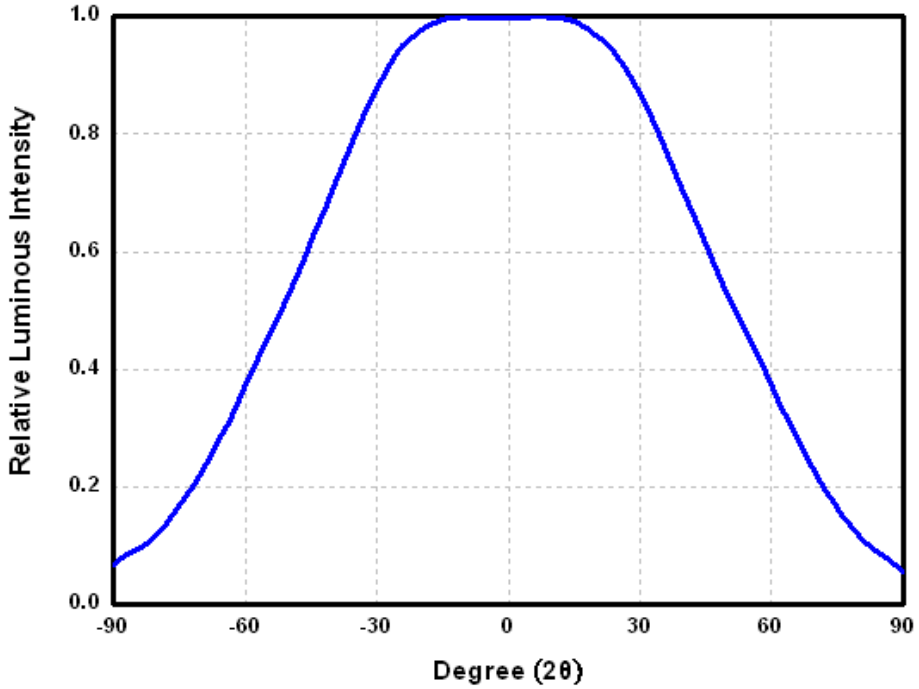
Current Derating Curves

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



Typical Radiation Patterns

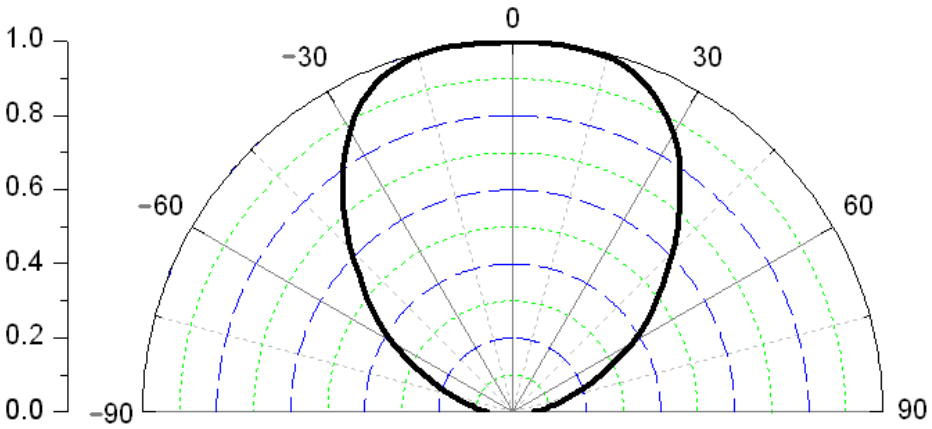
Typical Spatial Radiation Pattern for Cool-White, Neutral-White, Warm-White



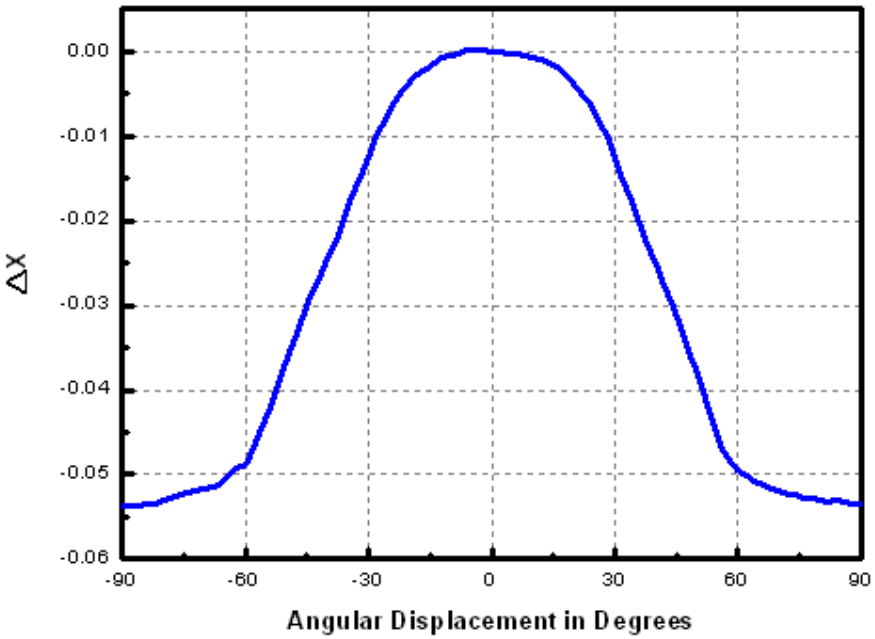
Notes:

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 ± 5° .

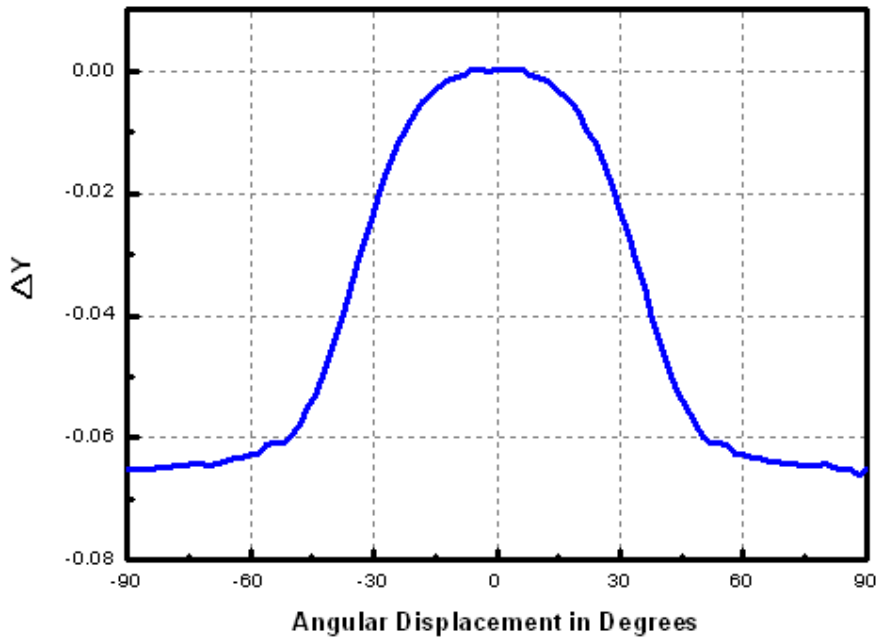
Typical Polar Radiation Pattern for Cool-White, Neutral-White, Warm-White



Typical Difference of CIE X of Cool-White versus Angle

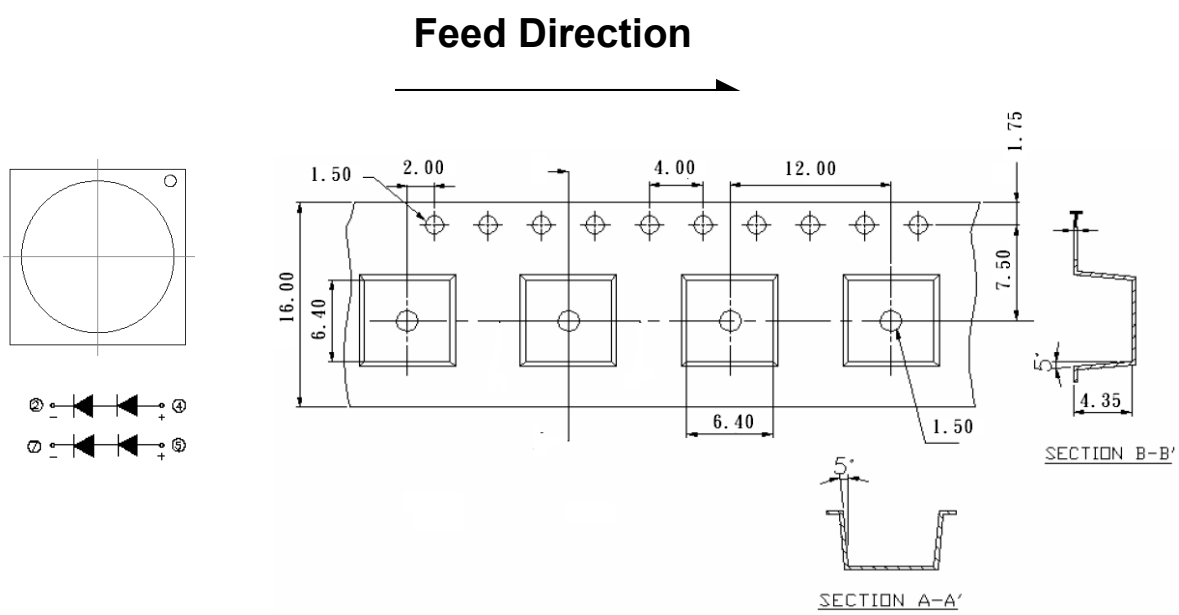


Typical Difference of CIE Y of Cool-White versus Angle



Emitter Tape Packaging

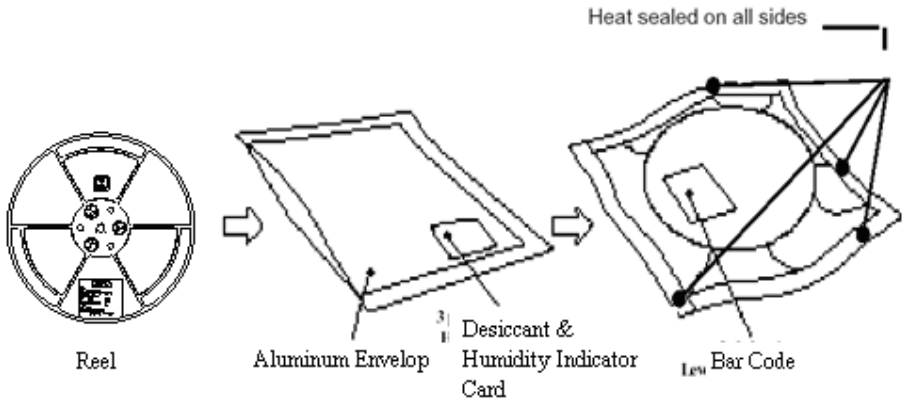
Carrier Tape Dimensions: Loaded quantity 250 PCS per reel



Notes:

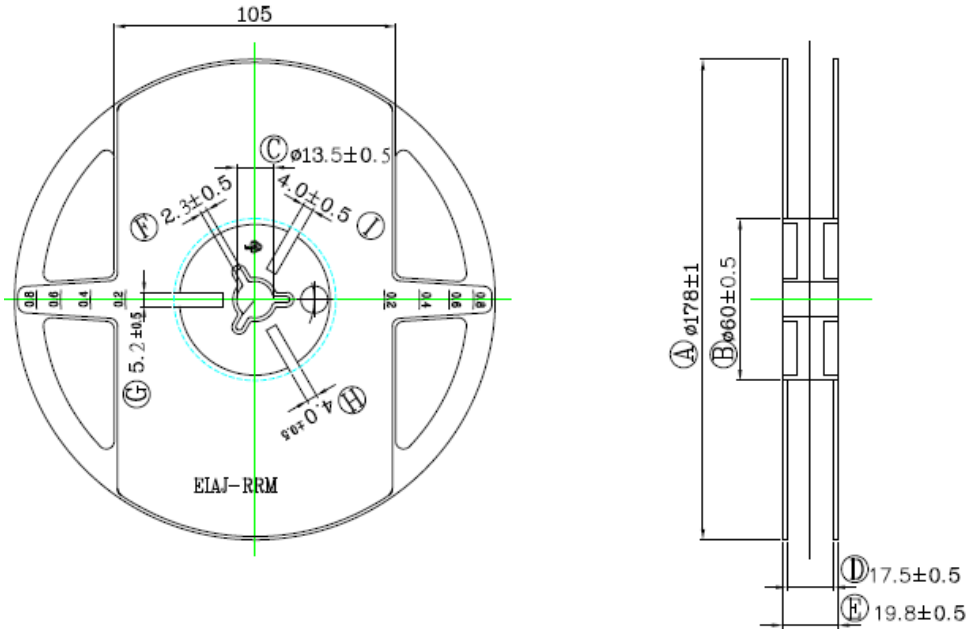
1. Dimensions are in millimeters.
2. Tolerances for fixed dimensions are ±0.1mm.

Moisture Resistant Packaging



Emitter Reel Packaging

Reel Dimensions



Notes:

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

Product Labeling

Label Explanation

CPN: Customer Specification (when required)

P/N: Everlight Production Number

QTY: Packing Quantity

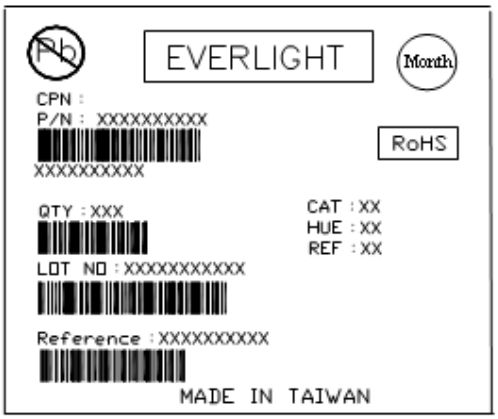
CAT: Luminous Flux (Brightness) Bin

HUE: Color Bin

REF: Forward Voltage Bin

LOT No: Lot Number

MADE IN TAIWAN: Production Place



Revision History

Current version: **2010/08/27**
Previous version: N/A

Device No. DHE-0001157
Rev. Ver. 4

Page	Subjects (major change in previous version)	Date of change
14	In the mechanical dimension, the polarity is changed.	2010/05/30
23	In the emitter tape packaging, the polarity is changed.	2010/05/30
14	In the mechanical dimension, the polarity is changed.	2010/06/04
15	In the pad configuration, the polarity is changed.	2010/06/04
3	In the product nomenclature, the designation is changed.	2010/08/27
4	In the absolute maximum ratings, the parameter is changed.	2010/08/27
23	In the emitter tape packaging, the diagram is changed.	2010/08/27