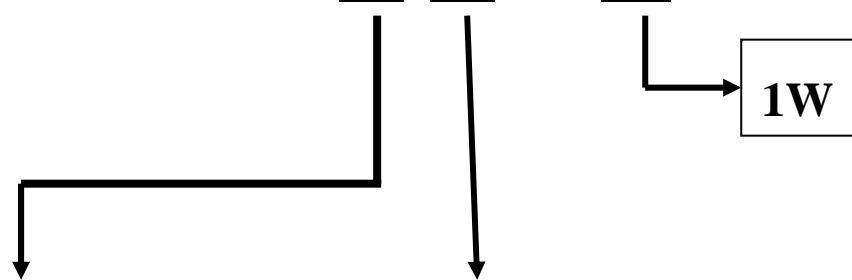


# SPECIFICATION

## HPL- H77X X 1 B A



### Lens & Assembly Type :

- N : No special Work
- S : with Star
- A : Lens 25°
- B : Lens 45°
- L : Lens 120°
- M : Lens 90°/30°
- P : Lens 100°/50°
- G : Star & Lens 25°
- H : Star & Lens 45°
- F : Star & Lens 120°
- K : Star & Lens 90°/30°
- U : Star & Lens 100°/50°

### Color :

- W : White
- S : Warm White
- R : Red
- G : Green
- B : Blue
- A : Amber
- O : Orange

1W

## Caution:

Depends on different chips structures, the thermal pad could has a polarity as Anode. To avoid the risk of circuit-fail, **It is strongly recommended to suppose the condition (Anode – thermal pad)** while designing a circuit.



## High Power Lighting Corporation

### Part Number Matrix

#### Without Star:

	Package	Lens 25°	Lens 45°	Lens 120°	Lens 90°/30°	Lens 100°/50°
White	HPL-H77NW1BA	HPL-H77AW1BA	HPL-H77BW1BA	HPL-H77LW1BA	HPL-H77MW1BA	HPL-H77PW1BA
Warm White	HPL-H77NS1BA	HPL-H77AS1BA	HPL-H77BS1BA	HPL-H77LS1BA	HPL-H77MS1BA	HPL-H77PS1BA
Red	HPL-H77NR1BA	HPL-H77AR1BA	HPL-H77BR1BA	HPL-H77LR1BA	HPL-H77MR1BA	HPL-H77PR1BA
Green	HPL-H77NG1BA	HPL-H77AG1BA	HPL-H77BG1BA	HPL-H77LG1BA	HPL-H77MG1BA	HPL-H77PG1BA
Blue	HPL-H77NB1BA	HPL-H77AB1BA	HPL-H77BB1BA	HPL-H77LB1BA	HPL-H77MB1BA	HPL-H77PB1BA
Amber	HPL-H77NA1BA	HPL-H77AA1BA	HPL-H77BA1BA	HPL-H77LA1BA	HPL-H77MA1BA	HPL-H77PA1BA
Orange	HPL-H77NO1BA	HPL-H77AO1BA	HPL-H77BO1BA	HPL-H77LO1BA	HPL-H77MO1BA	HPL-H77PO1BA

#### With Star:

	Star & Package	Star & Lens 25°	Star & Lens 45°	Star & Lens 120°	Star & Lens 90°/30°	Star & Lens 100°/50°
White	HPL-H77SW1BA	HPL-H77GW1BA	HPL-H77HW1BA	HPL-H77FW1BA	HPL-H77KW1BA	HPL-H77UW1BA
Warm White	HPL-H77SS1BA	HPL-H77GS1BA	HPL-H77HS1BA	HPL-H77FS1BA	HPL-H77KS1BA	HPL-H77US1BA
Red	HPL-H77SR1BA	HPL-H77GR1BA	HPL-H77HR1BA	HPL-H77FR1BA	HPL-H77KR1BA	HPL-H77UR1BA
Green	HPL-H77SG1BA	HPL-H77GG1BA	HPL-H77HG1BA	HPL-H77FG1BA	HPL-H77KG1BA	HPL-H77UG1BA
Blue	HPL-H77SB1BA	HPL-H77GB1BA	HPL-H77HB1BA	HPL-H77FB1BA	HPL-H77KB1BA	HPL-H77UB1BA
Amber	HPL-H77SA1BA	HPL-H77GA1BA	HPL-H77HA1BA	HPL-H77FA1BA	HPL-H77KA1BA	HPL-H77UA1BA
Orange	HPL-H77SO1BA	HPL-H77GO1BA	HPL-H77HO1BA	HPL-H77FO1BA	HPL-H77KO1BA	HPL-H77UO1BA

### 1. Features

- Dimension : 7.0mm(L)×7.0mm(W)
- 3W High Flux type
- All Metal Design Cu PCB/Al reflector
- Low thermal resistance
- The InGaN , AllnGaP Chip inside

### 2. Application

- Traffic signaling
- Backlighting
- Interior & exterior automotive lighting
- Decorative and landscape lighting
- Signage and channel letter
- Portable light source
- Decorating and entertainment lighting
- Architectural lighting

### . Absolute Maximum Ratings

(T<sub>j</sub>=25°C)

Parameter	Symbol	Rating	Unit
Power Dissipation	White	1.5	W
	Warm White	1.5	
	Red	1.05	
	Green	1.05	
	Blue	1.05	
	Amber	1.05	
	Orange	1.05	
Forward Current	I <sub>F</sub>	350	mA
Forward Pulse Current (1/10 Duty Cycle, 400msec Pulse Width)	I <sub>FP</sub>	500	mA
Thermal Resistance, Junction-Case	R <sub>th, J-C</sub> <sup>1</sup>	14	°C/W
Reverse Voltage	V <sub>R</sub>	5	V
LED Junction Temperature	T <sub>j</sub>	125	°C
Operating Temperature Range	T <sub>opr</sub>	-40°C to + 80°C	
Storage Temperature Range	T <sub>stg</sub>	-40°C to + 120°C	
Soldering Condition	T <sub>sol</sub>	260°C For 5 Seconds	

Note: 1. The thermal resistance value is measured with MCPCB (Star).

### 4. Initial Electrical/Optical Characteristics

● **Forward Voltage**

(T<sub>j</sub>=25°C)

Color	Forward Voltage					
	Symbol	MIN.	TYP.	MAX.	Test Condition	Unit
White	V <sub>F</sub>	3.03	3.80	4.23	I <sub>F</sub> = 350mA	V
Warm White	V <sub>F</sub>	3.03	3.80	4.23	I <sub>F</sub> = 350mA	V
Amber	V <sub>F</sub>	1.83	2.50	3.03	I <sub>F</sub> = 350mA	V
Orange	V <sub>F</sub>	1.83	2.50	3.03	I <sub>F</sub> = 350mA	V
Red	V <sub>F</sub>	1.83	2.50	3.03	I <sub>F</sub> = 350mA	V
Green	V <sub>F</sub>	3.03	3.80	4.23	I <sub>F</sub> = 350mA	V
Blue	V <sub>F</sub>	3.03	3.80	4.23	I <sub>F</sub> = 350mA	V

● **Reverse Current**

(T<sub>j</sub>=25°C)

Color	Reverse Current					
	Symbol	MIN.	TYP.	MAX.	Test Condition	Unit
White	I <sub>R</sub>	-	-	100	V <sub>R</sub> = 5V	μA
Warm White	I <sub>R</sub>	-	-	100	V <sub>R</sub> = 5V	μA
Amber	I <sub>R</sub>	-	-	100	V <sub>R</sub> = 5V	μA
Orange	I <sub>R</sub>	-	-	100	V <sub>R</sub> = 5V	μA
Red	I <sub>R</sub>	-	-	100	V <sub>R</sub> = 5V	μA
Green	I <sub>R</sub>	-	-	100	V <sub>R</sub> = 5V	μA
Blue	I <sub>R</sub>	-	-	100	V <sub>R</sub> = 5V	μA

● **Luminous Flux**

(T<sub>j</sub>=25°C)

Color	Luminous Flux ( With Lens / Without Lens)					
	Symbol	MIN.	TYP.	MAX.	Test Condition	Unit
White	Φ <sub>v</sub>	-	48/40	-	I <sub>F</sub> = 350mA	lm
Warm White	Φ <sub>v</sub>	-	36/30	-	I <sub>F</sub> = 350mA	lm
Amber	Φ <sub>v</sub>	-	33.6/28	-	I <sub>F</sub> = 350mA	lm
Orange	Φ <sub>v</sub>	-	38.4/32	-	I <sub>F</sub> = 350mA	lm
Red	Φ <sub>v</sub>	-	36/30	-	I <sub>F</sub> = 350mA	lm
Green	Φ <sub>v</sub>	-	58.8/49	-	I <sub>F</sub> = 350mA	lm
Blue	Φ <sub>v</sub>	-	12/10	-	I <sub>F</sub> = 350mA	lm

● **Color Temperature/Dominate wavelength**

(T<sub>j</sub>=25°C)

Color	Color Temperature / Wavelength(with & without Lens)					
	Symbol	MIN.	TYP.	MAX.	Test Condition	Unit
White	CCT	4500	5600	10000	I <sub>F</sub> = 350mA	K
Warm White	CCT	2800	3500	4500	I <sub>F</sub> = 350mA	K
Amber	λ <sub>d</sub>	585	-	595	I <sub>F</sub> = 350mA	nm
Orange	λ <sub>d</sub>	610	-	620	I <sub>F</sub> = 350mA	nm
Red	λ <sub>d</sub>	620	-	630	I <sub>F</sub> = 350mA	nm
Green	λ <sub>d</sub>	520	-	540	I <sub>F</sub> = 350mA	nm
Blue	λ <sub>d</sub>	460	-	480	I <sub>F</sub> = 350mA	nm

● **View Angle**

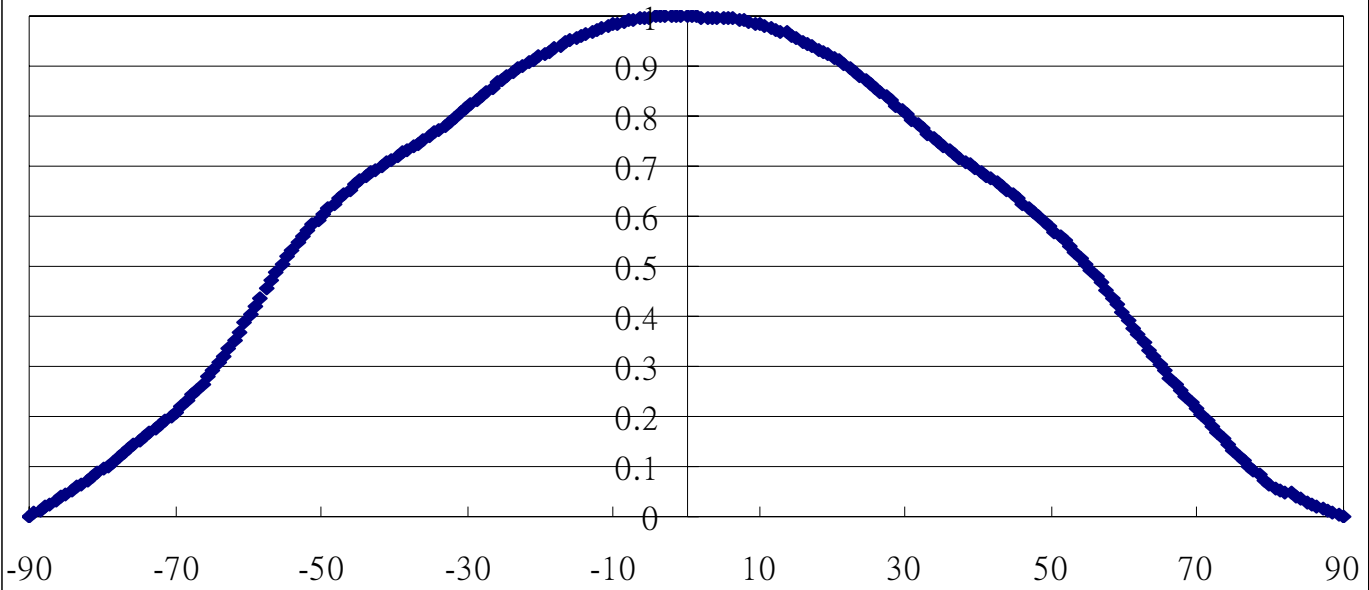
(T<sub>j</sub>=25°C)

Color	Viewing Angle (With / Without Lens)						Test Condition	Unit
	Symbol	Without Lens	120° Lens	25° Lens	45° Lens			
White	$2\theta_{1/2}$	110	120°	25°	45°	$I_F = 350\text{mA}$	degree	
Warm White	$2\theta_{1/2}$	110	120°	25°	45°	$I_F = 350\text{mA}$	degree	
Amber	$2\theta_{1/2}$	110	120°	25°	45°	$I_F = 350\text{mA}$	degree	
Orange	$2\theta_{1/2}$	110	120°	25°	45°	$I_F = 350\text{mA}$	degree	
Red	$2\theta_{1/2}$	110	120°	25°	45°	$I_F = 350\text{mA}$	degree	
Green	$2\theta_{1/2}$	110	120°	25°	45°	$I_F = 350\text{mA}$	degree	
Blue	$2\theta_{1/2}$	110	120°	25°	45°	$I_F = 350\text{mA}$	degree	

Color	Viewing Angle (With / Without Lens)				Test Condition	Unit
	Symbol	90°/30° Lens	100°/50° Lens			
White	$2\theta_{1/2}$	90°/30°	100°/50°	$I_F = 350\text{mA}$	degree	
Warm White	$2\theta_{1/2}$	90°/30°	100°/50°	$I_F = 350\text{mA}$	degree	
Amber	$2\theta_{1/2}$	90°/30°	100°/50°	$I_F = 350\text{mA}$	degree	
Orange	$2\theta_{1/2}$	90°/30°	100°/50°	$I_F = 350\text{mA}$	degree	
Red	$2\theta_{1/2}$	90°/30°	100°/50°	$I_F = 350\text{mA}$	degree	
Green	$2\theta_{1/2}$	90°/30°	100°/50°	$I_F = 350\text{mA}$	degree	
Blue	$2\theta_{1/2}$	90°/30°	100°/50°	$I_F = 350\text{mA}$	degree	

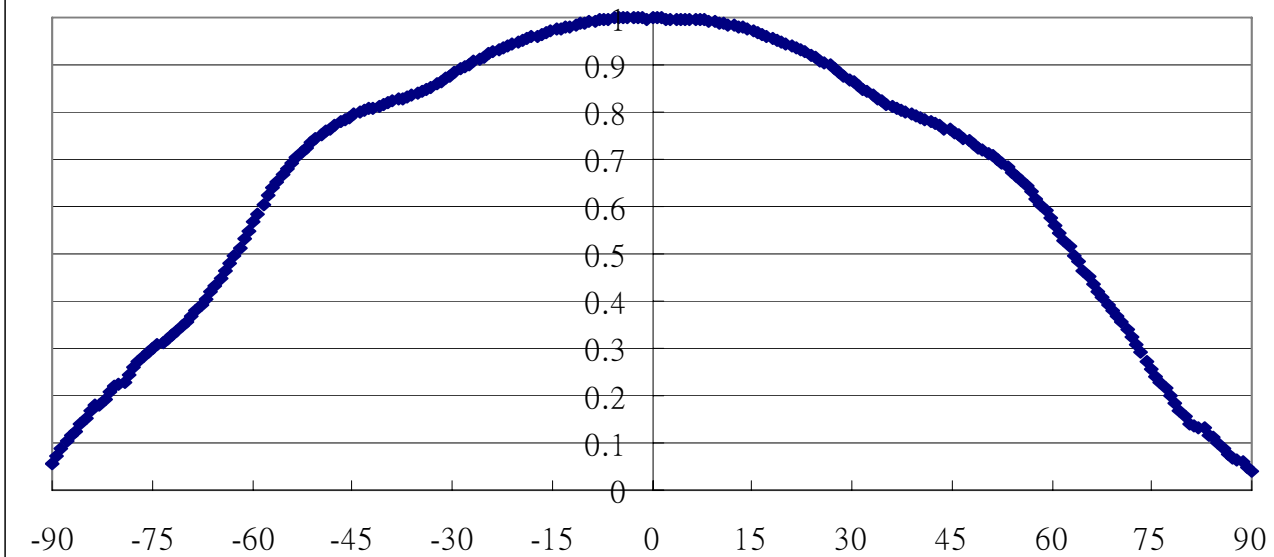
**Typical Spatial Radiation Pattern Without Lens**

Typical Spatial Radiation Pattern of Package (without Lens)



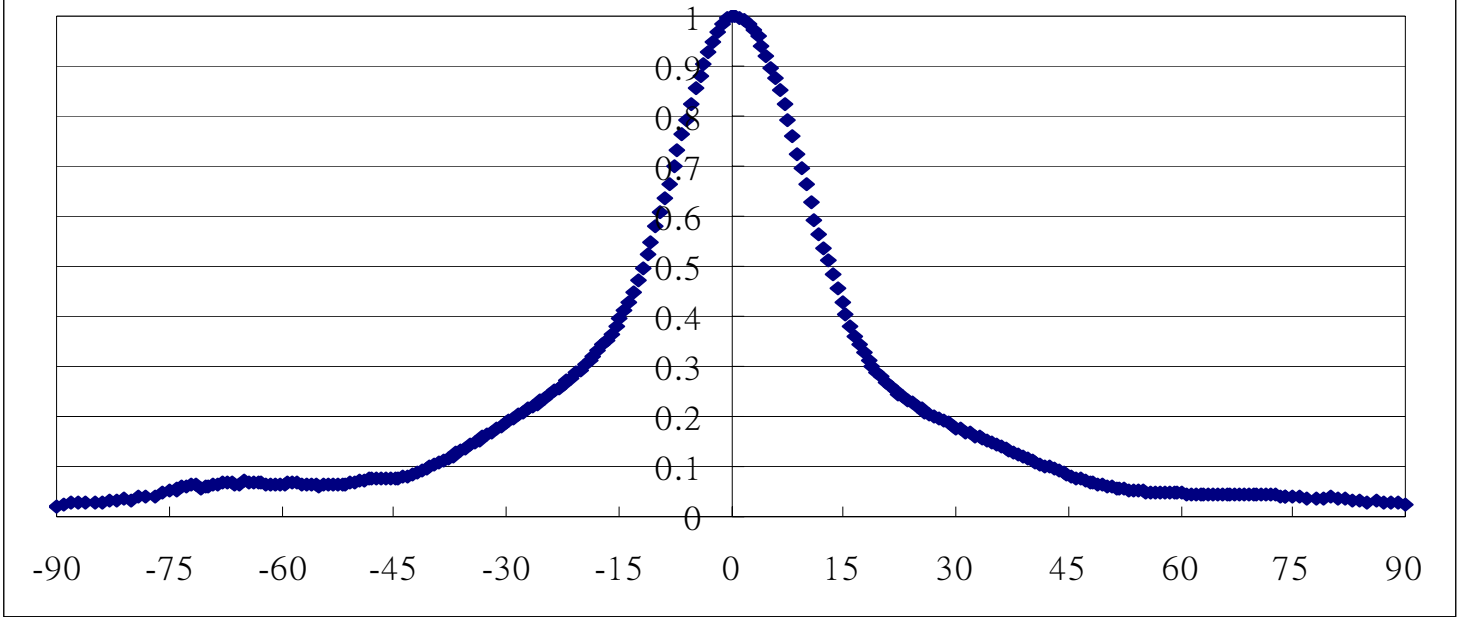
**Typical Spatial Radiation Pattern With 120° Lens**

Typical Spatial Radiation Pattern of 120 degree Lens



**Typical Spatial Radiation Pattern With 25° Lens**

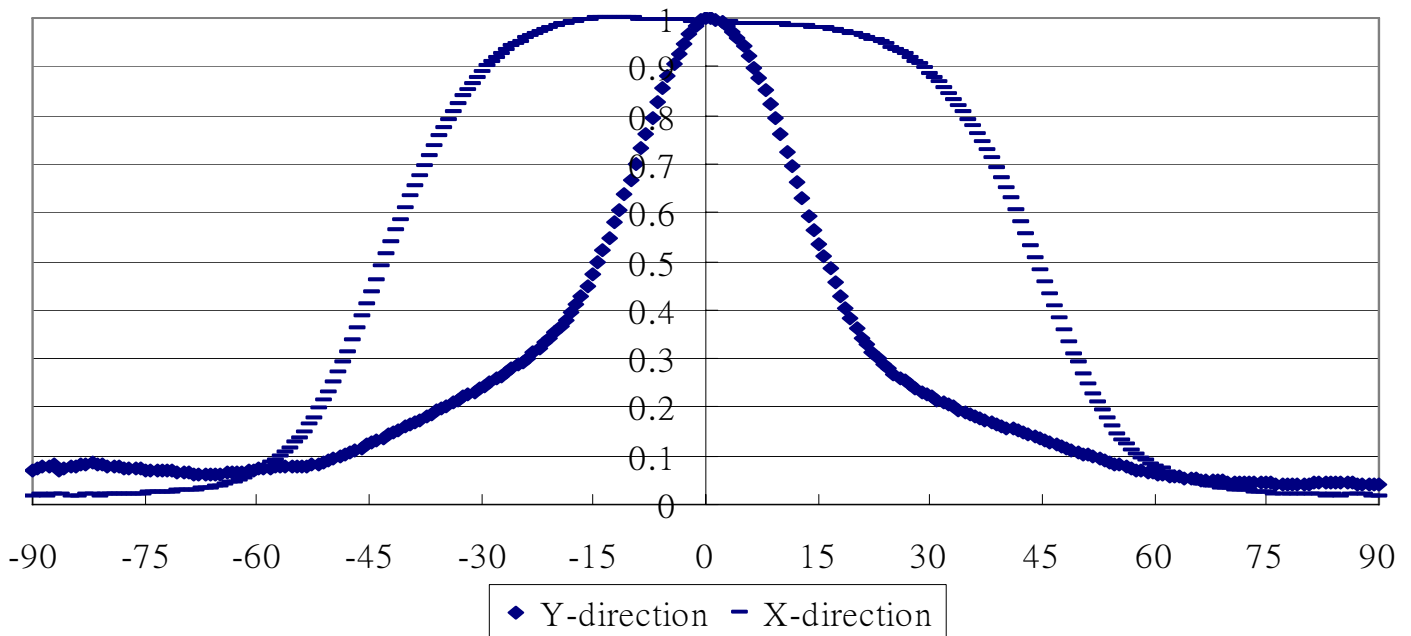
Typical Spatial Radiation Pattern of 25 degree Lens



**Typical Spatial Radiation Pattern With 90° /30° Lens**

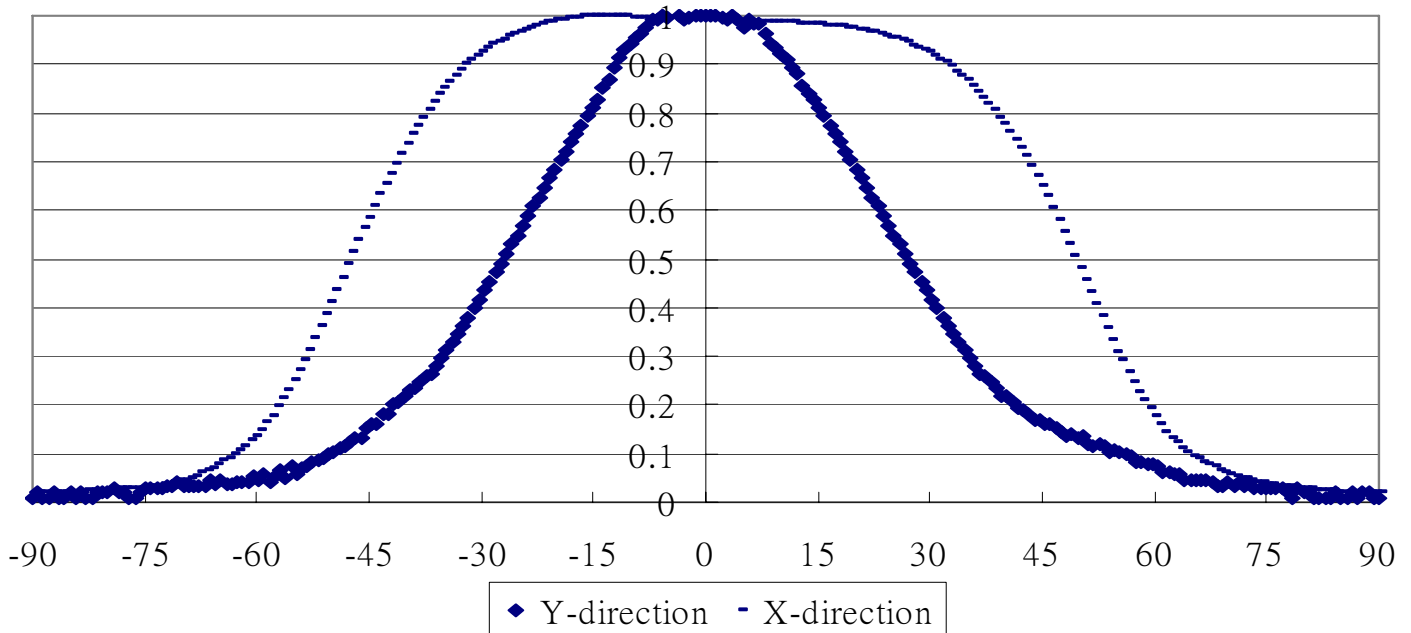


Typical spatial radiation pattern of 90/30 degree lens



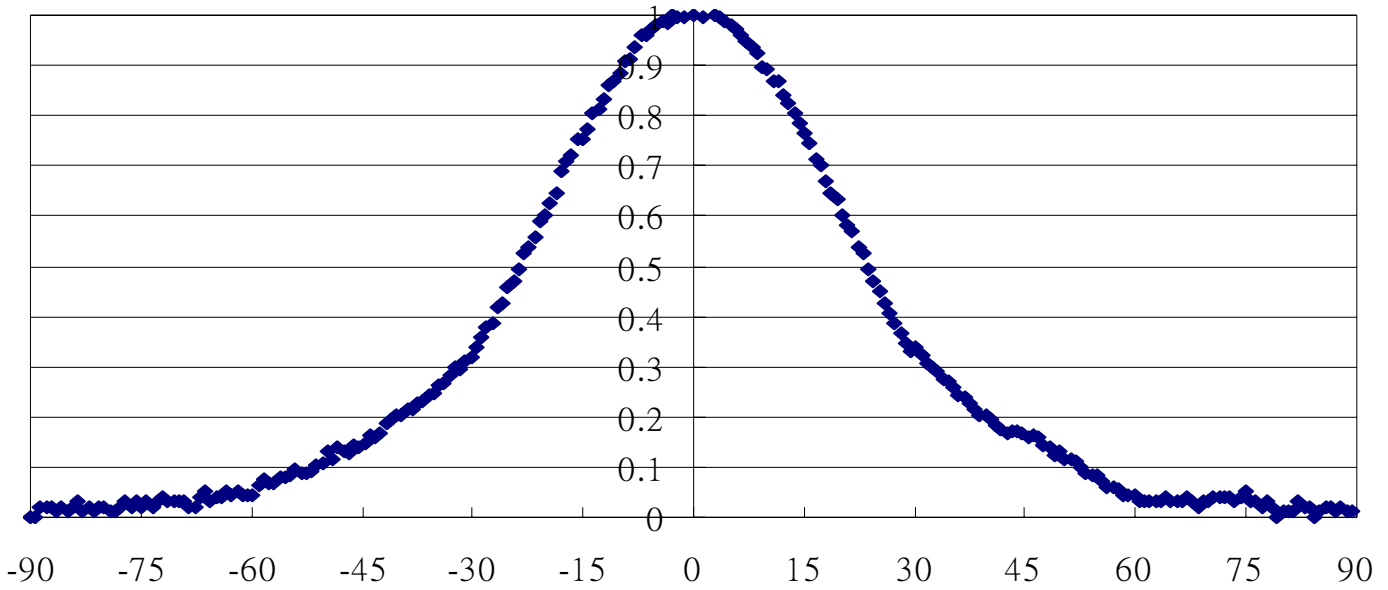
Typical Spatial Radiation Pattern With 100° /50° Lens

Typical spatial radiation pattern of 100/50 degree lens



**Typical Spatial Radiation Pattern With 45° Lens**

Typical Spatial Radiation Pattern of 45 degree Lens



● **Chromaticity Coordinates / Dominate Wavelength** (T<sub>j</sub>=25°C)

Color	Chromaticity Coordinates / Spectra half-width (with & withour Lens)					
	Symbol	MIN.	TYP.	MAX.	Test Condition	Unit
White	x	-	0.33	-	I <sub>F</sub> = 350mA	-
	y	-	0.32	-		
Warm White	x	-	0.42	-	I <sub>F</sub> = 350mA	-
	y	-	0.40	-		
Amber	Δλ	-	15	-	I <sub>F</sub> = 350mA	nm
Orange	Δλ	-	18	-	I <sub>F</sub> = 350mA	nm
Red	Δλ	-	20	-	I <sub>F</sub> = 350mA	nm
Green	Δλ	-	30	-	I <sub>F</sub> = 350mA	nm
Blue	Δλ	-	30	-	I <sub>F</sub> = 350mA	nm

● **Optical Efficiency** (T<sub>j</sub>=25°C)

Color	Optical Efficiency(with/without Lens)					
	Symbol	MIN.	TYP.	MAX.	Test Condition	Unit
White	η <sub>opt</sub>	-	37.2/31	-	I <sub>F</sub> = 350mA	
Warm White	η <sub>opt</sub>	-	25/20	-	I <sub>F</sub> = 350mA	
Amber	η <sub>opt</sub>	-	30/25	-	I <sub>F</sub> = 350mA	
Orange	η <sub>opt</sub>	-	30/25	-	I <sub>F</sub> = 350mA	
Red	η <sub>opt</sub>	-	30/25	-	I <sub>F</sub> = 350mA	
Green	η <sub>opt</sub>	-	38.4/32	-	I <sub>F</sub> = 350mA	
Blue	η <sub>opt</sub>	-	9/7.5	-	I <sub>F</sub> = 350mA	

● **Bin Code List for Reference**

(T<sub>j</sub>=25°C)

Item	Bin Code	Symbol	Condition	Min.	Max.	Unit
Forward Voltage <sup>1</sup>	C	V <sub>F</sub>	I <sub>F</sub> = 350 [mA]	1.83	2.07	V
	D			2.07	2.31	
	E			2.31	2.55	
	F			2.55	2.79	
	G			2.79	3.03	
	H			3.03	3.27	
	J			3.27	3.51	
	K			3.51	3.75	
	L			3.75	3.99	
Luminous Flux <sup>2</sup>	M	Φ <sub>V</sub>	I <sub>F</sub> = 350 [mA]	3.99	4.23	lm
	K			6.3	8.2	
	L			8.2	10.7	
	M			10.7	13.9	
	N			13.9	18.1	
	O			18.1	23.5	
	P			23.5	30.6	
	Q			30.6	39.8	
	R			39.8	51.7	
	S			51.7	67.2	
	T			67.2	87.4	
	U			87.4	114	
V	114	148				
W	148	192				

## Hue Bin Specification for White

Bin Code		CIE 1931 x, y Range				Typical CCT (K)	
UO	x	0.362	0.360	0.344	0.346	4750	
	y	0.372	0.357	0.344	0.359		
UN	x	0.364	0.362	0.346	0.347		
	y	0.383	0.372	0.359	0.372		
UM	x	0.367	0.364	0.347	0.348		
	y	0.400	0.383	0.372	0.385		
P	x	0.344	0.343	0.329	0.329		
	y	0.344	0.331	0.320	0.331		
VO	x	0.346	0.344	0.329	0.329		5300
	y	0.359	0.344	0.331	0.345		
VN	x	0.347	0.346	0.329	0.329		
	y	0.372	0.359	0.345	0.357		
VM	x	0.348	0.347	0.329	0.329		
	y	0.385	0.372	0.357	0.369		
WQ	x	0.329	0.329	0.319	0.318		
	y	0.320	0.310	0.297	0.309		
WP	x	0.329	0.329	0.318	0.317		
	y	0.331	0.320	0.309	0.320		
WO	x	0.329	0.329	0.317	0.316	6000	
	y	0.345	0.331	0.320	0.333		
WN	x	0.329	0.329	0.316	0.315		
	y	0.357	0.345	0.333	0.344		
WM	x	0.329	0.329	0.315	0.314		
	y	0.369	0.357	0.344	0.355		

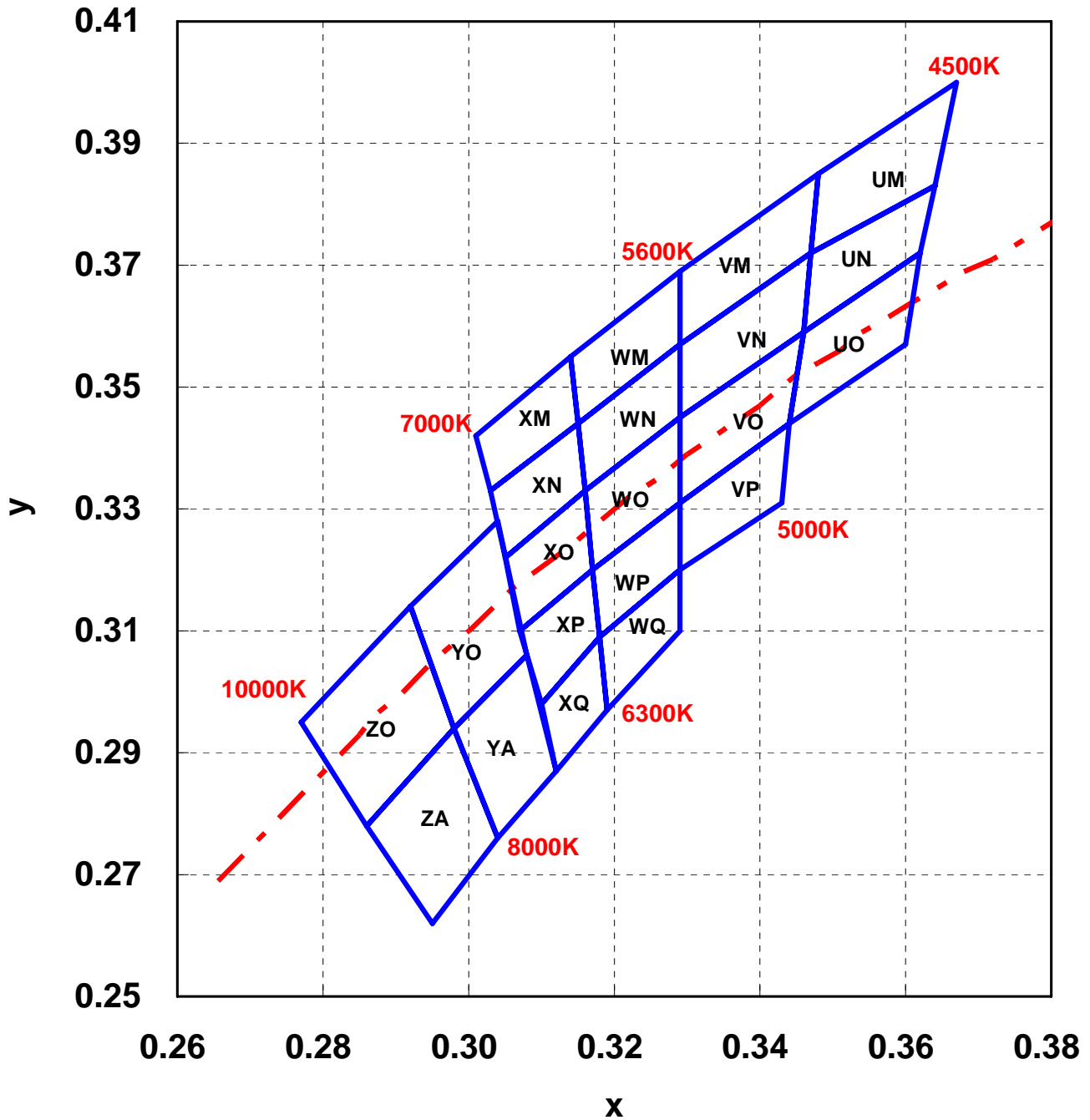
Bin Code		CIE 1931 x, y Range				Typical CCT (K)	
XQ	x	0.318	0.319	0.312	0.310	6700	
	y	0.309	0.297	0.287	0.298		
XP	x	0.317	0.318	0.310	0.307		
	y	0.320	0.309	0.298	0.310		
XO	x	0.316	0.317	0.307	0.305		
	y	0.333	0.320	0.310	0.322		
XN	x	0.315	0.316	0.305	0.303		
	y	0.344	0.333	0.322	0.333		
XM	x	0.314	0.315	0.303	0.301		
	y	0.355	0.344	0.333	0.342		
YA	x	0.308	0.312	0.304	0.298		7500
	y	0.306	0.287	0.276	0.294		
YO	x	0.304	0.308	0.298	0.292		
	y	0.328	0.306	0.294	0.314		
ZA	x	0.298	0.304	0.295	0.286		
	y	0.294	0.276	0.262	0.278		
ZO	x	0.292	0.298	0.286	0.277	9000	
	y	0.314	0.294	0.278	0.295		

Note: 1. Forward voltage measurement allowance is  $\pm 0.1V$ .

2. Luminous flux measurement allowance is  $\pm 10\%$ .

3. The CIE1931 x, y color coordinates measurement allowance is  $\pm 0.01$ .

CIE 1931 Diagram Hue Bin Specification for White



### Hue Bin Specification for Warm White

Bin Code		CIE 1931 x, y Range				Typical CCT (K)			
SM	x	0.367	0.402	0.392	0.362	4150			
	y	0.400	0.423	0.391	0.372				
SO	x	0.362	0.392	0.387	0.360				
	y	0.372	0.391	0.374	0.357				
SA	x	0.360	0.387	0.383	0.358				
	y	0.357	0.374	0.360	0.345				
RM	x	0.402	0.438	0.424	0.392		3525		
	y	0.423	0.440	0.406	0.391				
RA	x	0.387	0.416	0.410	0.383				
	y	0.374	0.389	0.374	0.360				
RO	x	0.392	0.409	0.402	0.387			3645	
	y	0.391	0.399	0.382	0.374				
QO	x	0.409	0.424	0.416	0.402				
	y	0.399	0.406	0.389	0.382				
PM	x	0.438	0.454	0.438	0.424	3150			
	y	0.440	0.446	0.412	0.406				
PO	x	0.424	0.438	0.429	0.416				
	y	0.406	0.412	0.394	0.389				
NM	x	0.454	0.471	0.453	0.438				2950
	y	0.446	0.451	0.416	0.412				
NO	x	0.438	0.453	0.444	0.429				
	y	0.412	0.416	0.399	0.394				

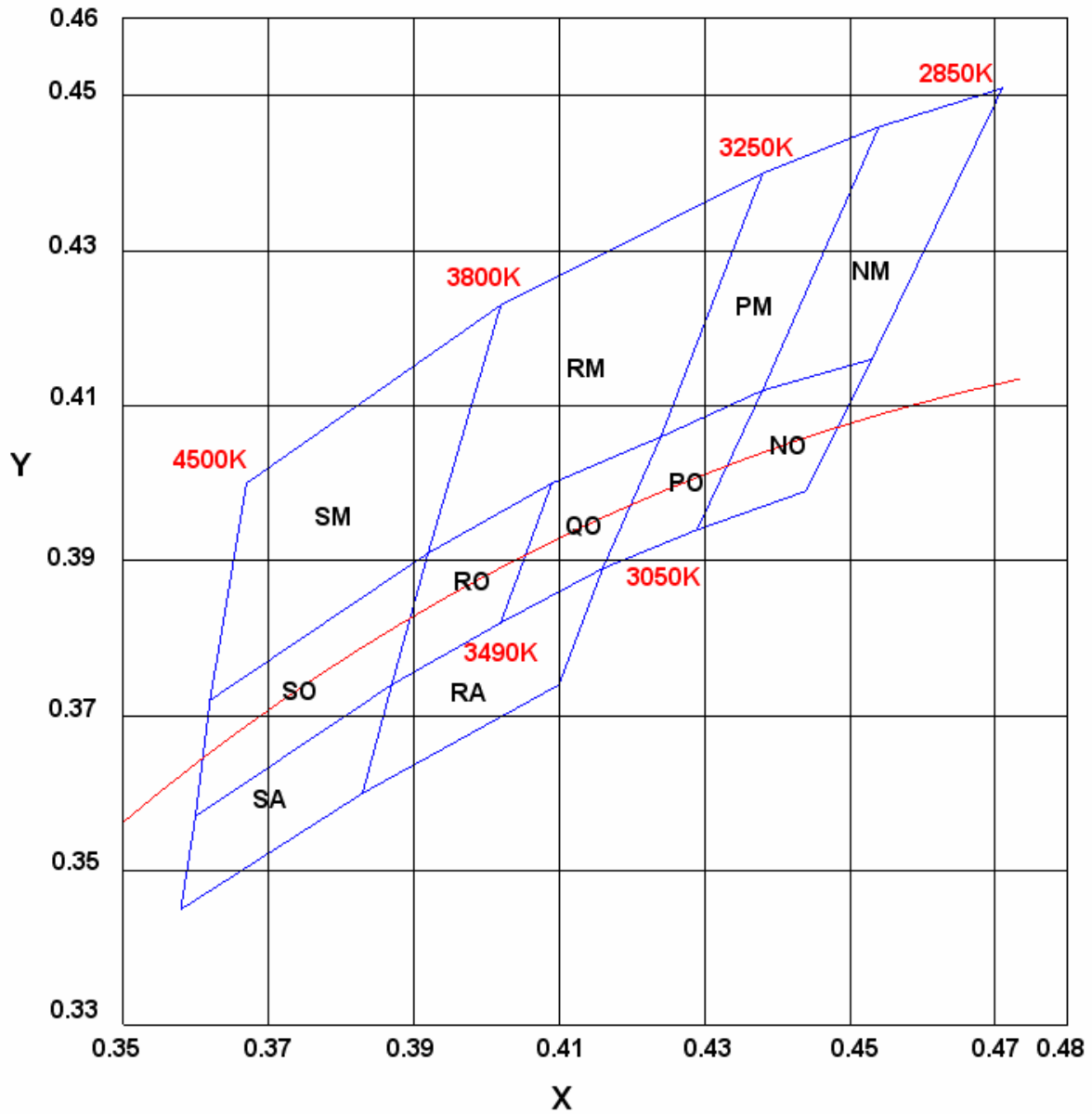
Note: 1. Forward voltage measurement allowance is  $\pm 0.1V$ .

2. Luminous flux measurement allowance is  $\pm 10\%$ .

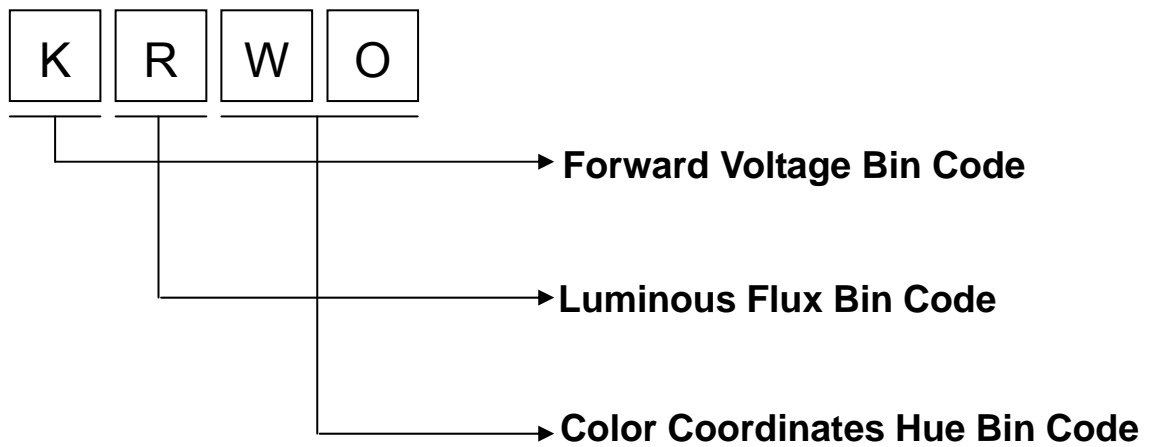
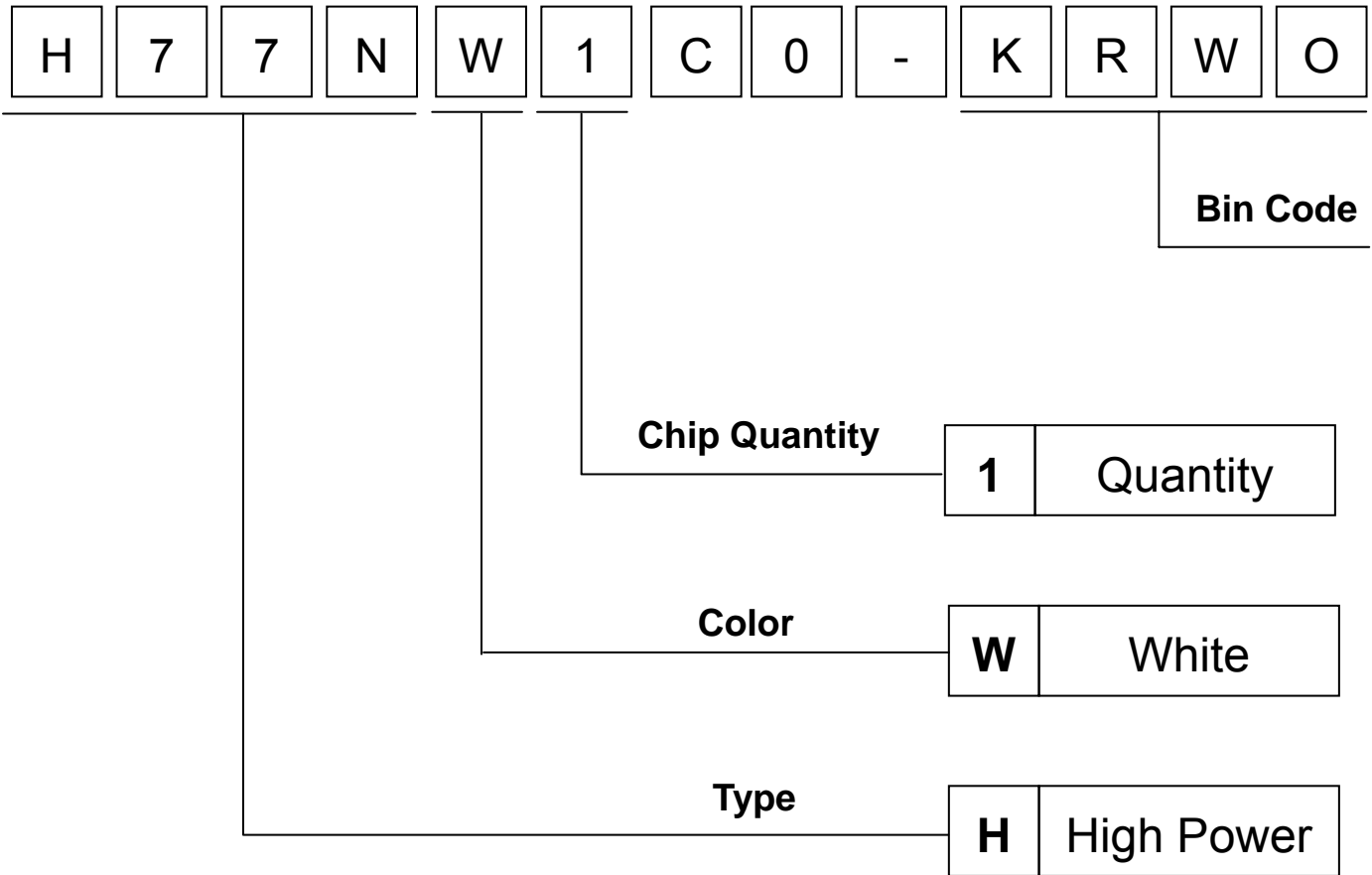
3. The CIE1931 x, y color coordinates measurement allowance is  $\pm 0.01$ .



## CIE 1931 Diagram Hue Bin Specification for Warm white



## 5. Part Number Formation



### 6. Characteristic Diagram

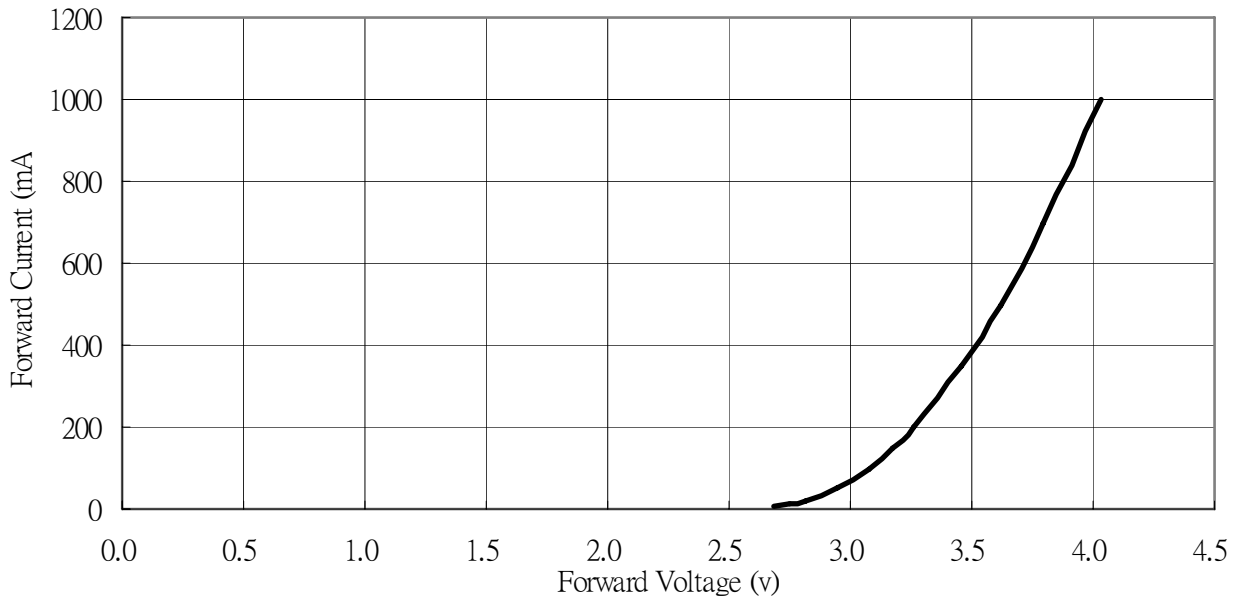


Fig. 1-A Forward Current vs. Forward Voltage: White/ Warm White/ Blue/ Green color

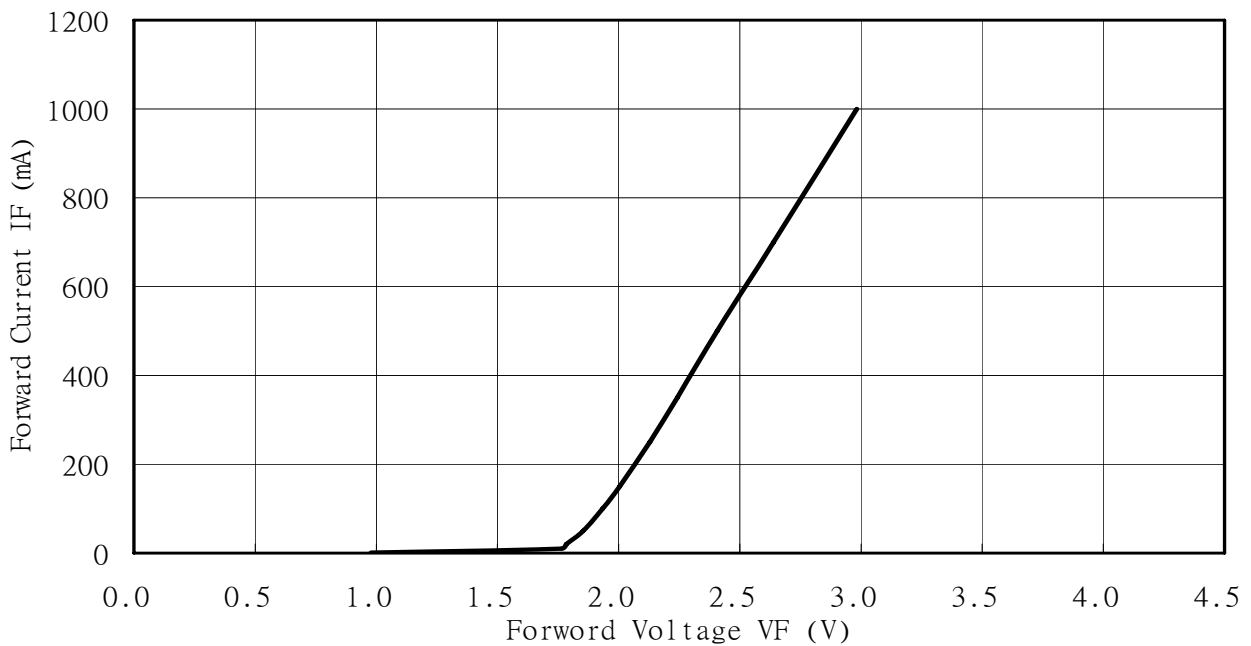


Fig. 1-B Forward Current vs. Forward Voltage: Red/ Orange/ Amber color

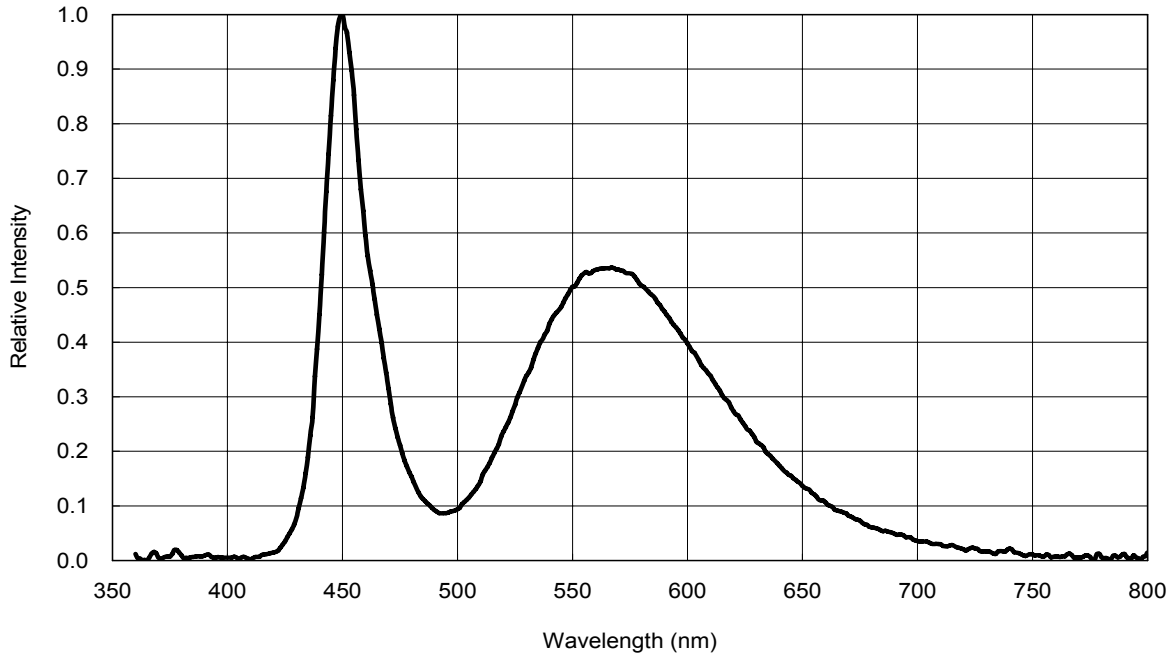


Fig. 2-A Relative Intensity vs. Wavelength: White

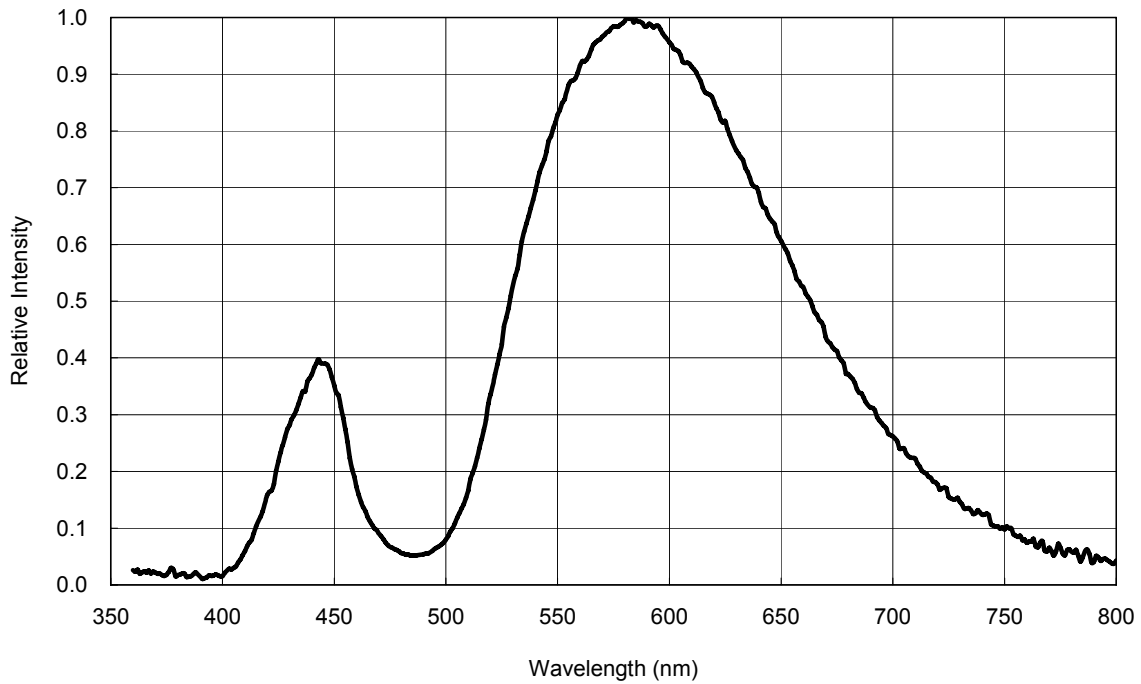


Fig. 2-B Relative Intensity vs. Wavelength: Warm White

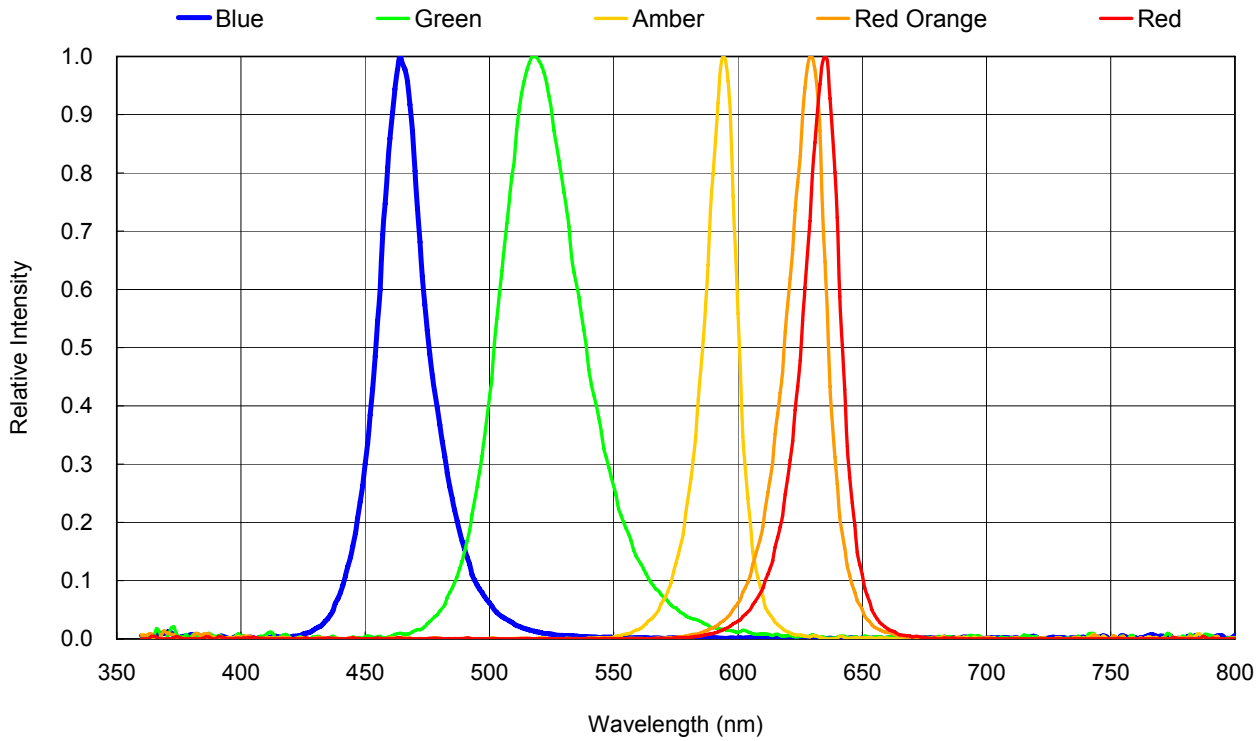


Fig. 2-C Relative Intensity vs. Wavelength: Single Color

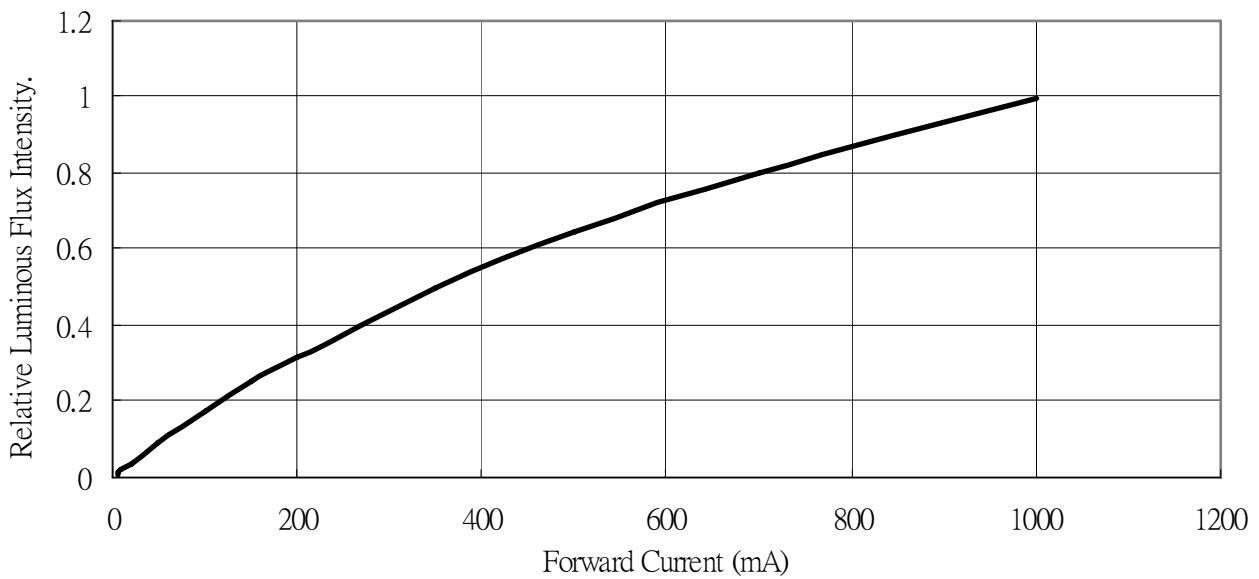


Fig. 3 Relative Intensity VS Forward Current

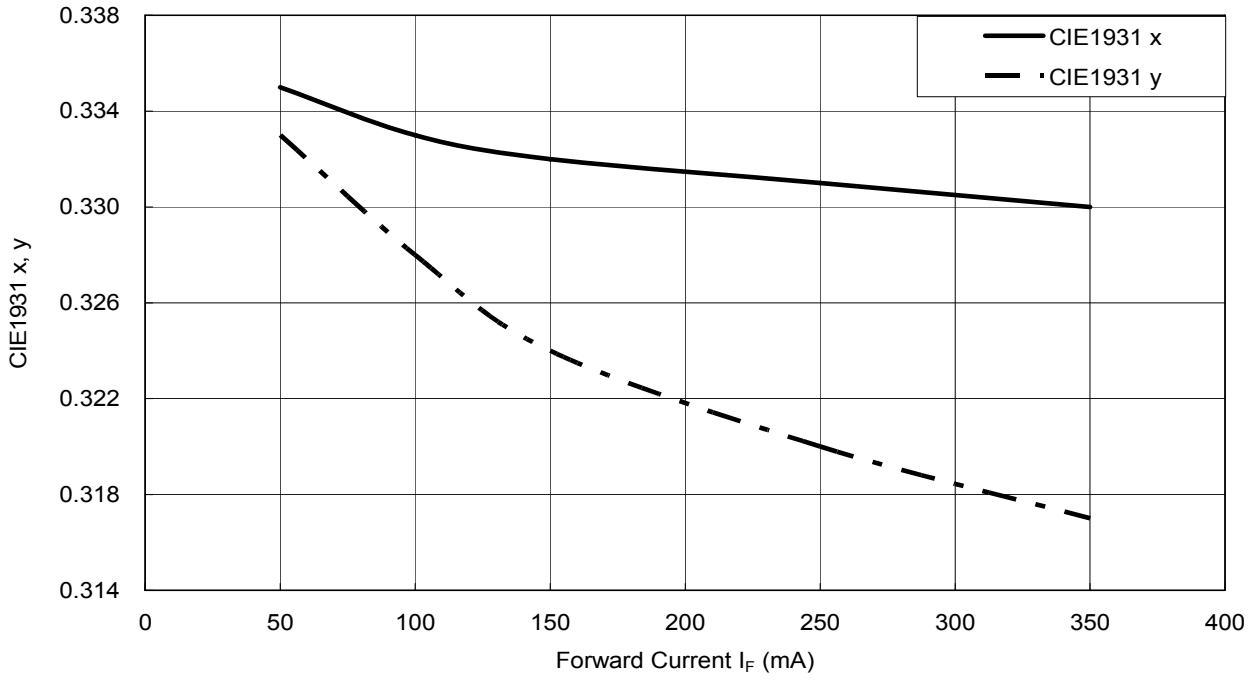
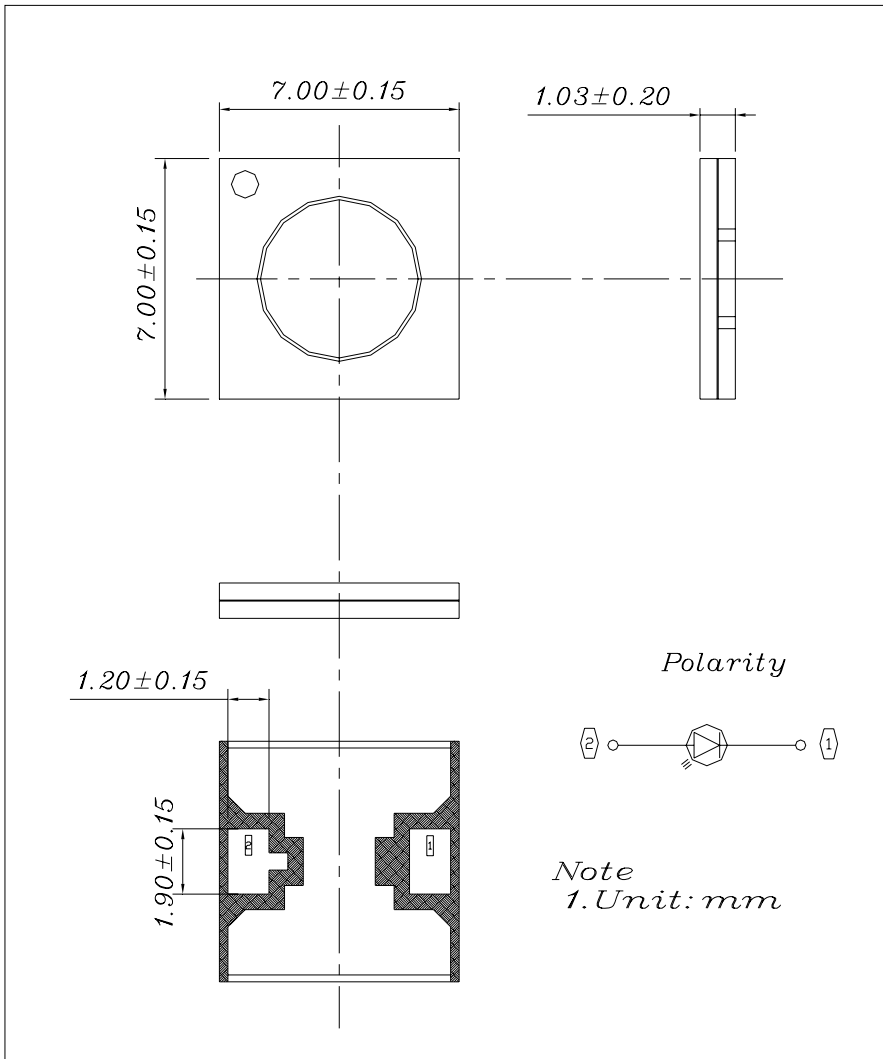


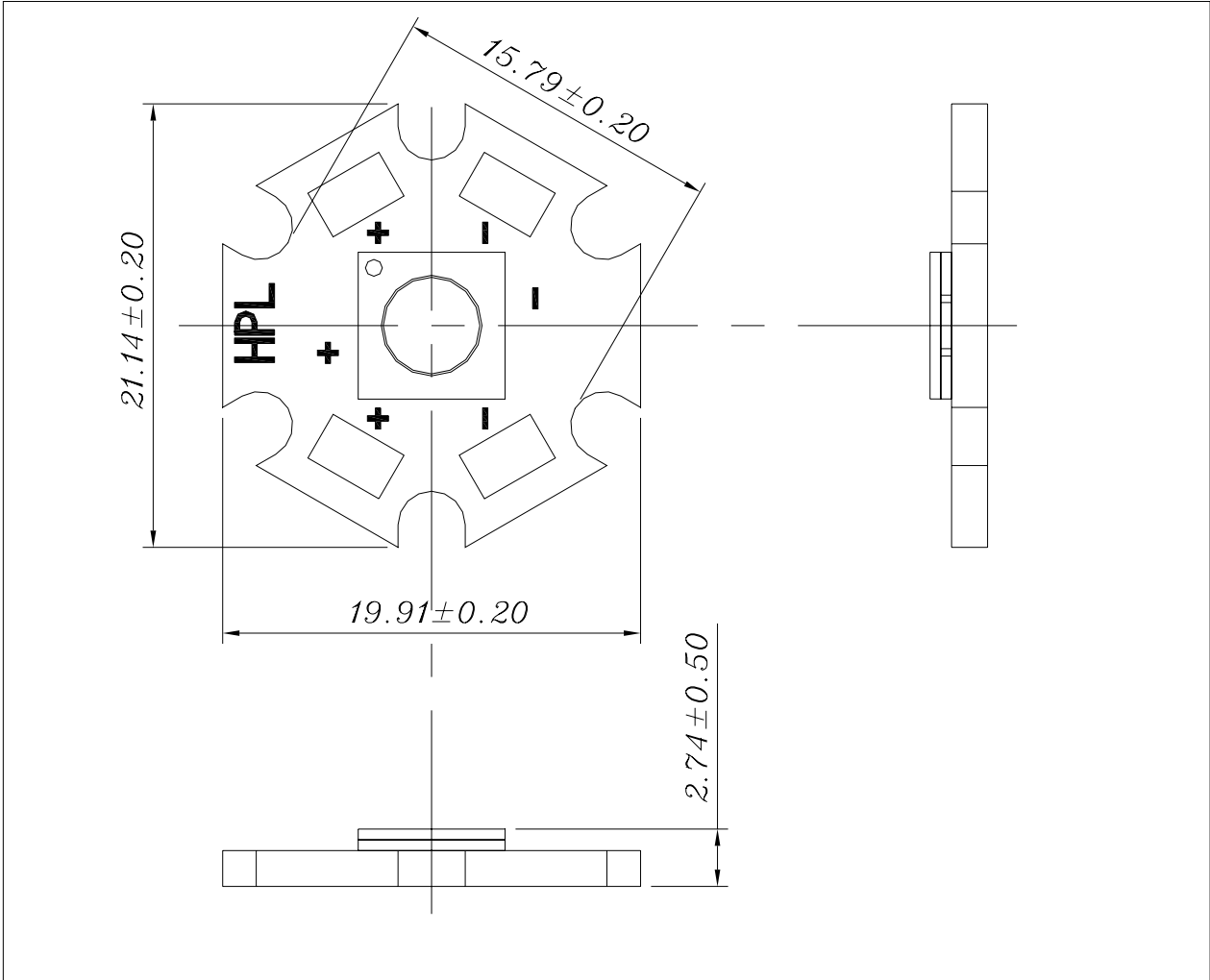
Fig. 4 Forward Current VS CIE1931 x, y

## 7. Outline Dimension

### Without Lens

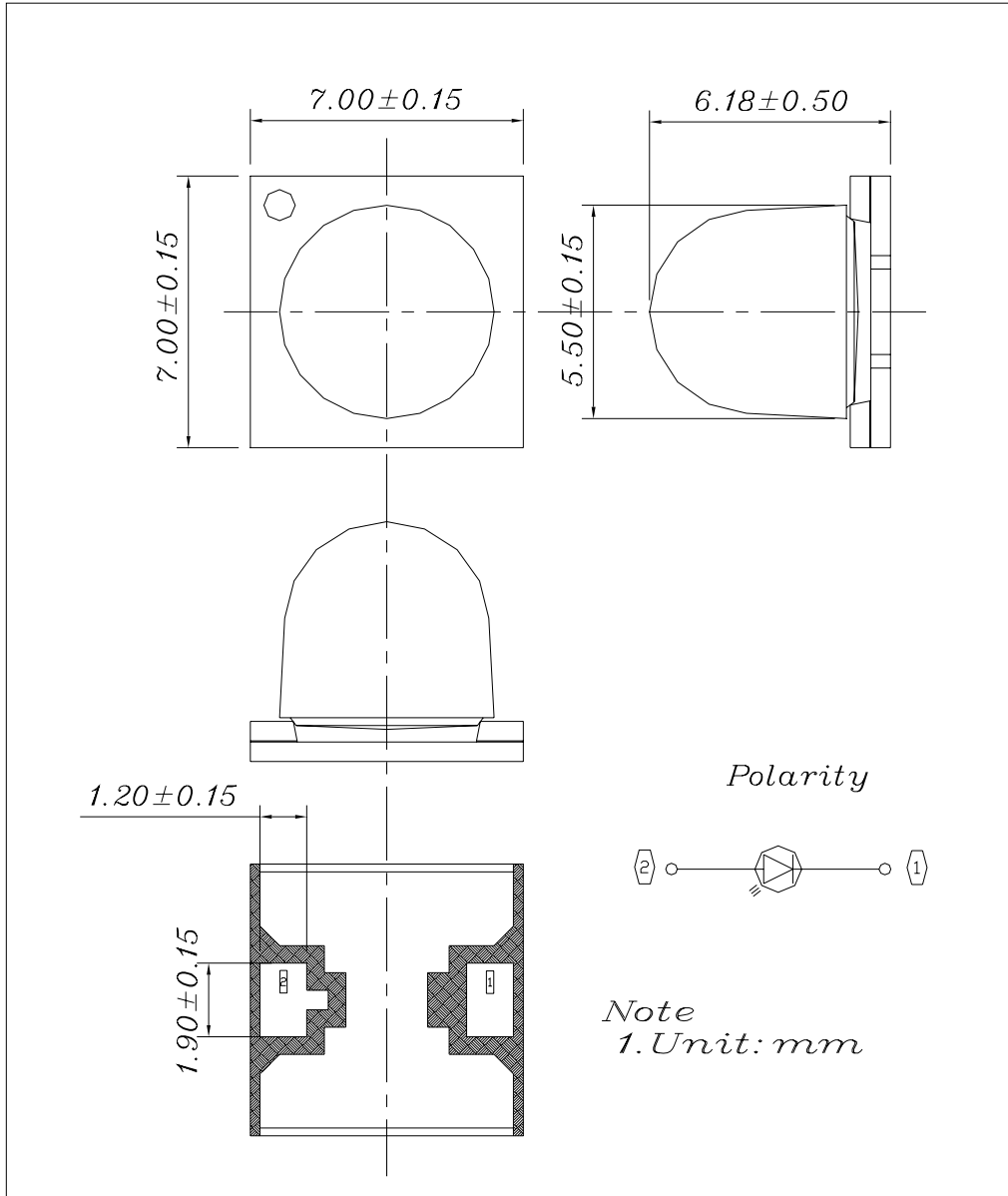


**Star Without Lens**

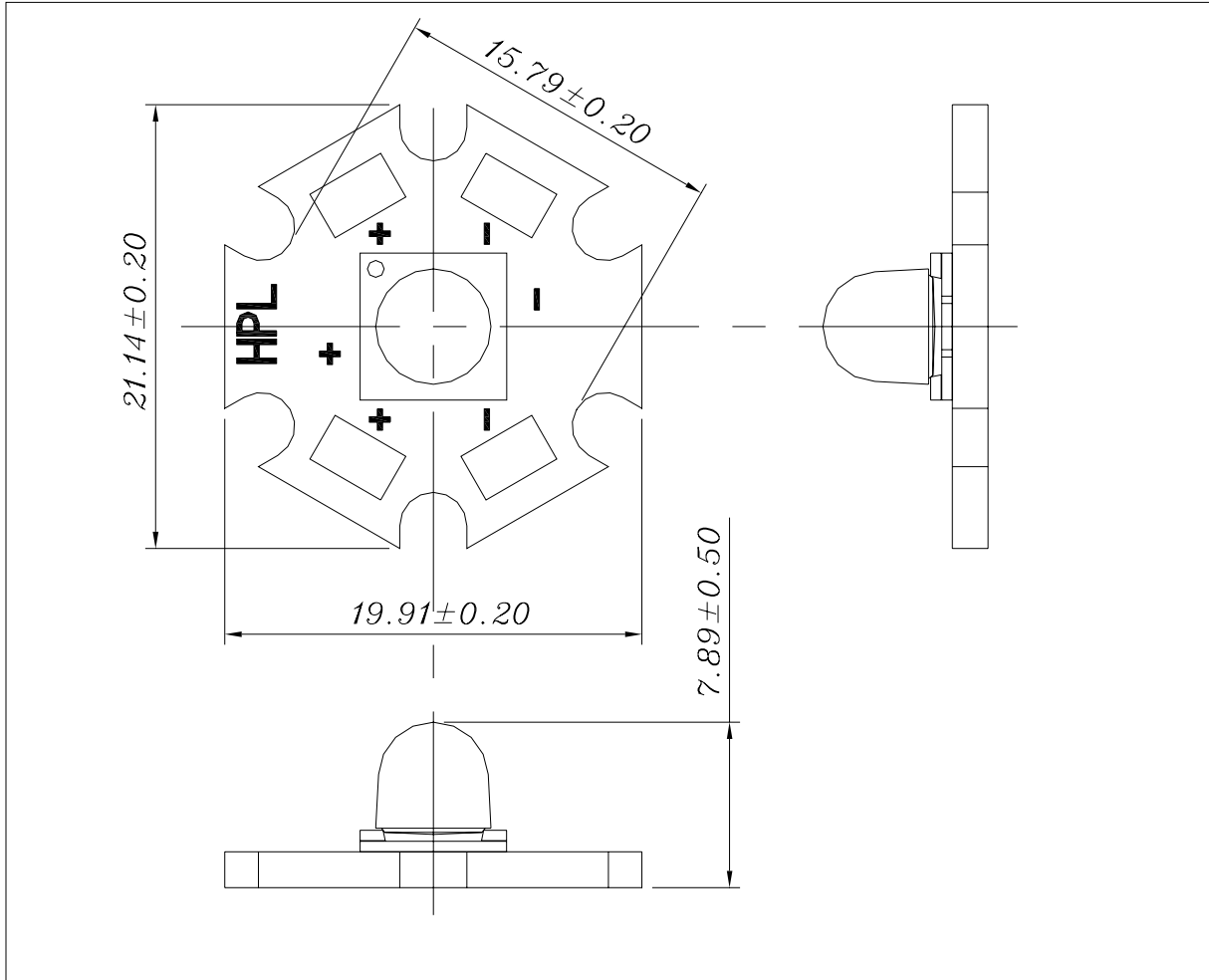




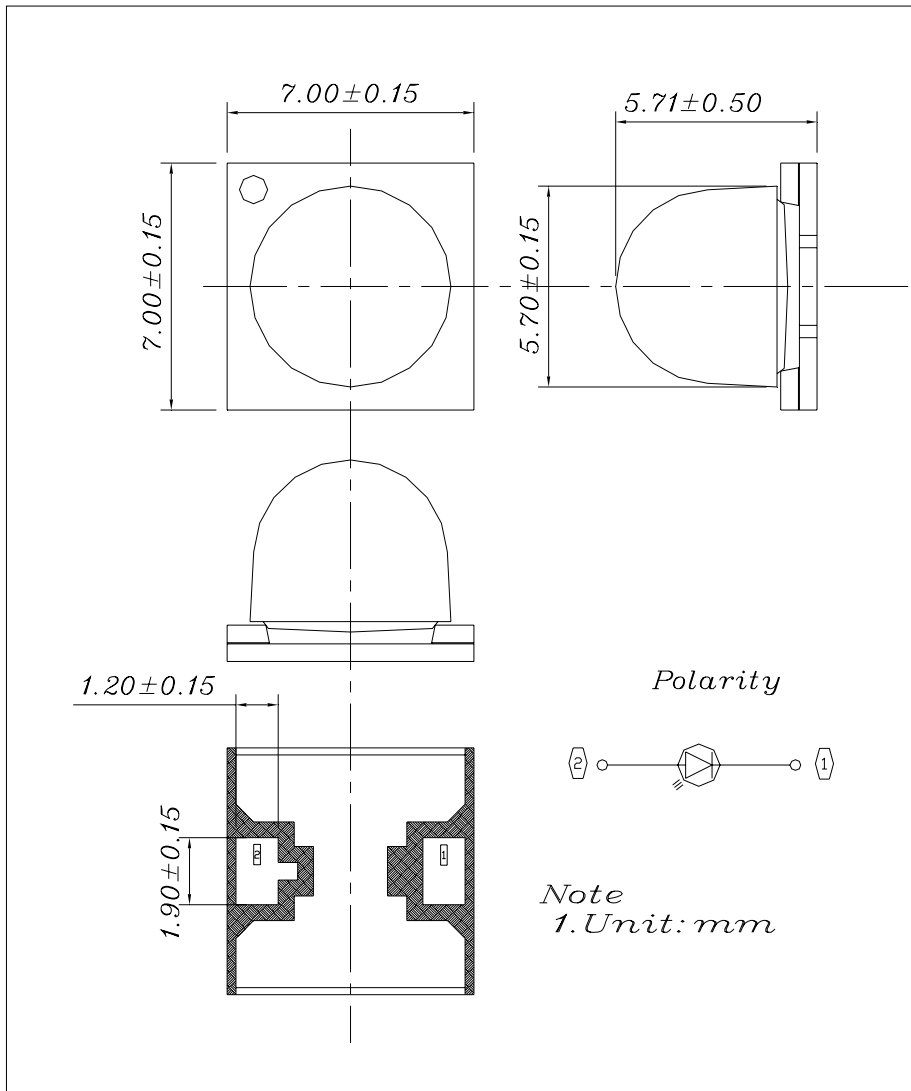
**With 25° Lens**



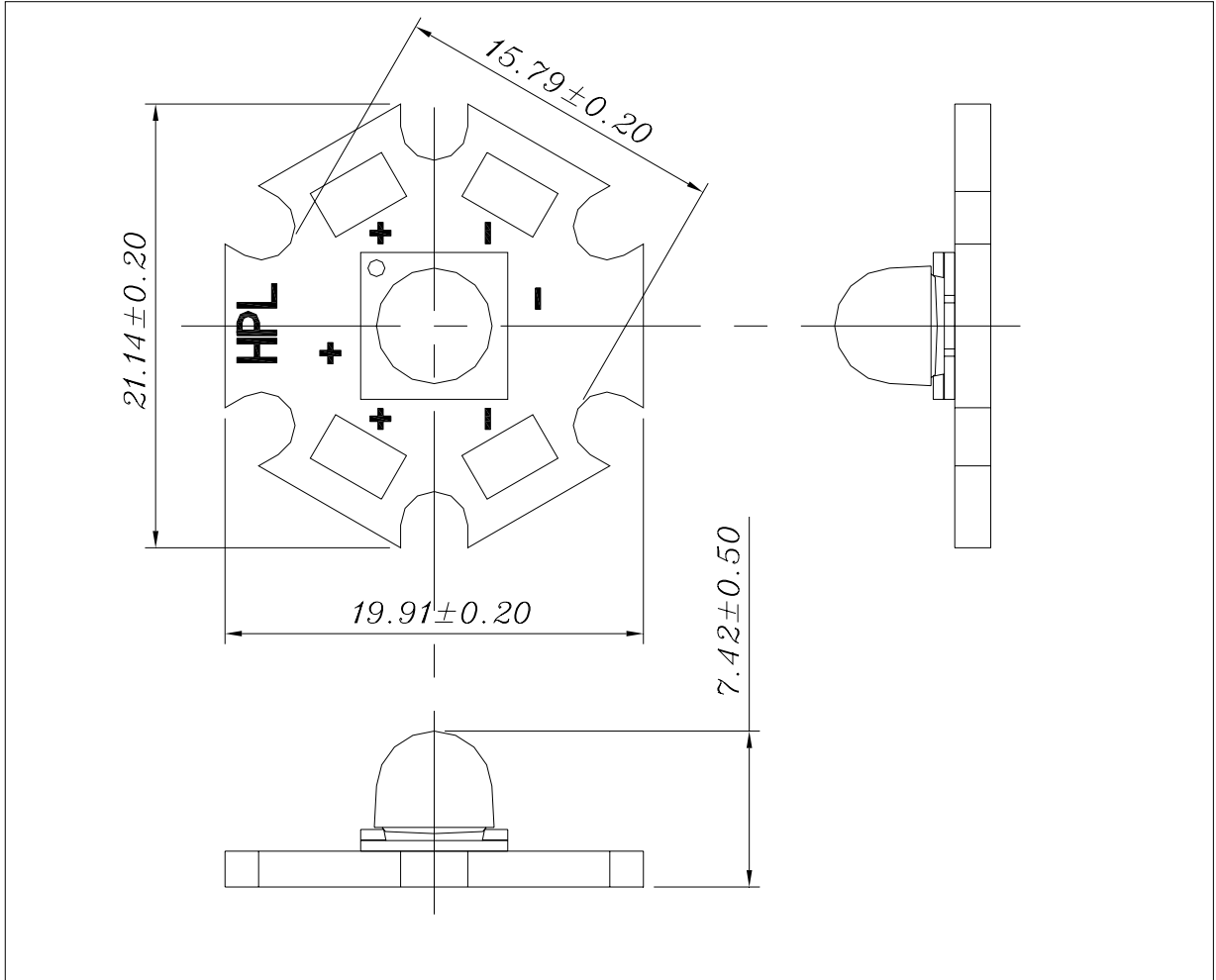
**Star With 25° Lens**



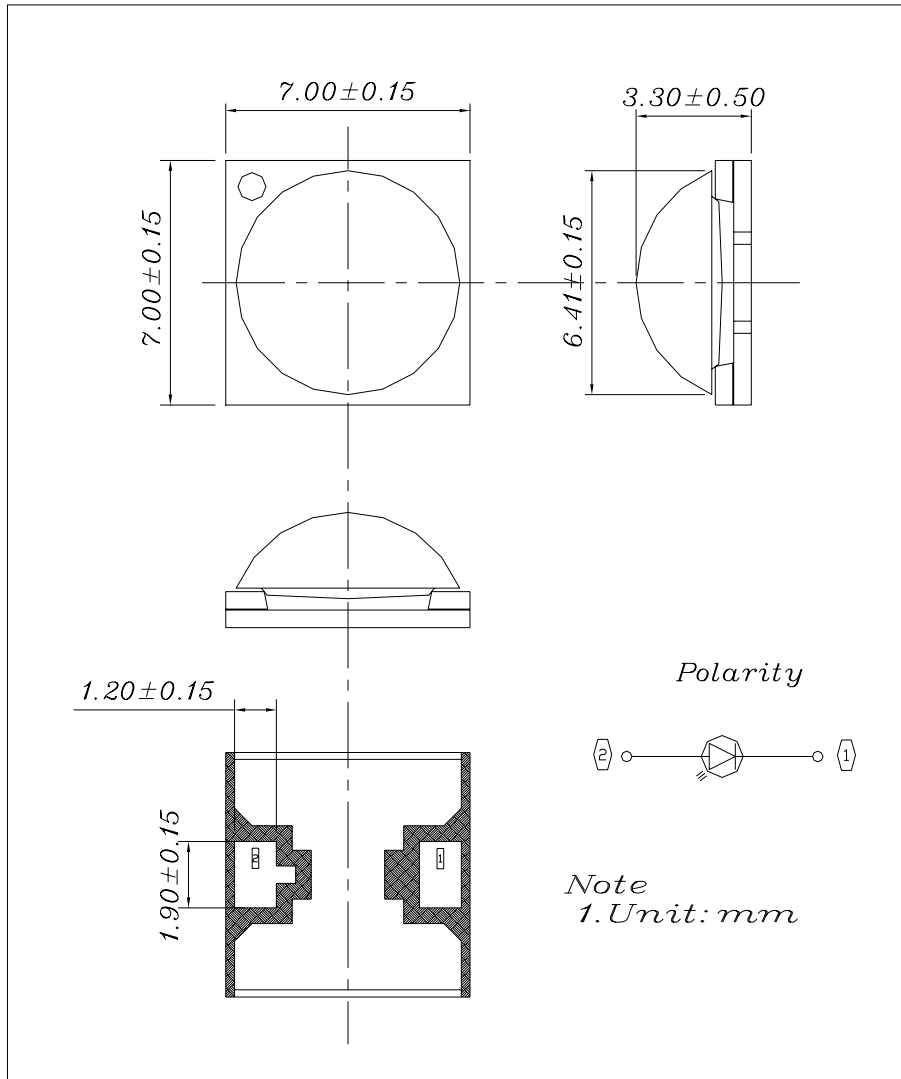
**With 45° Lens**



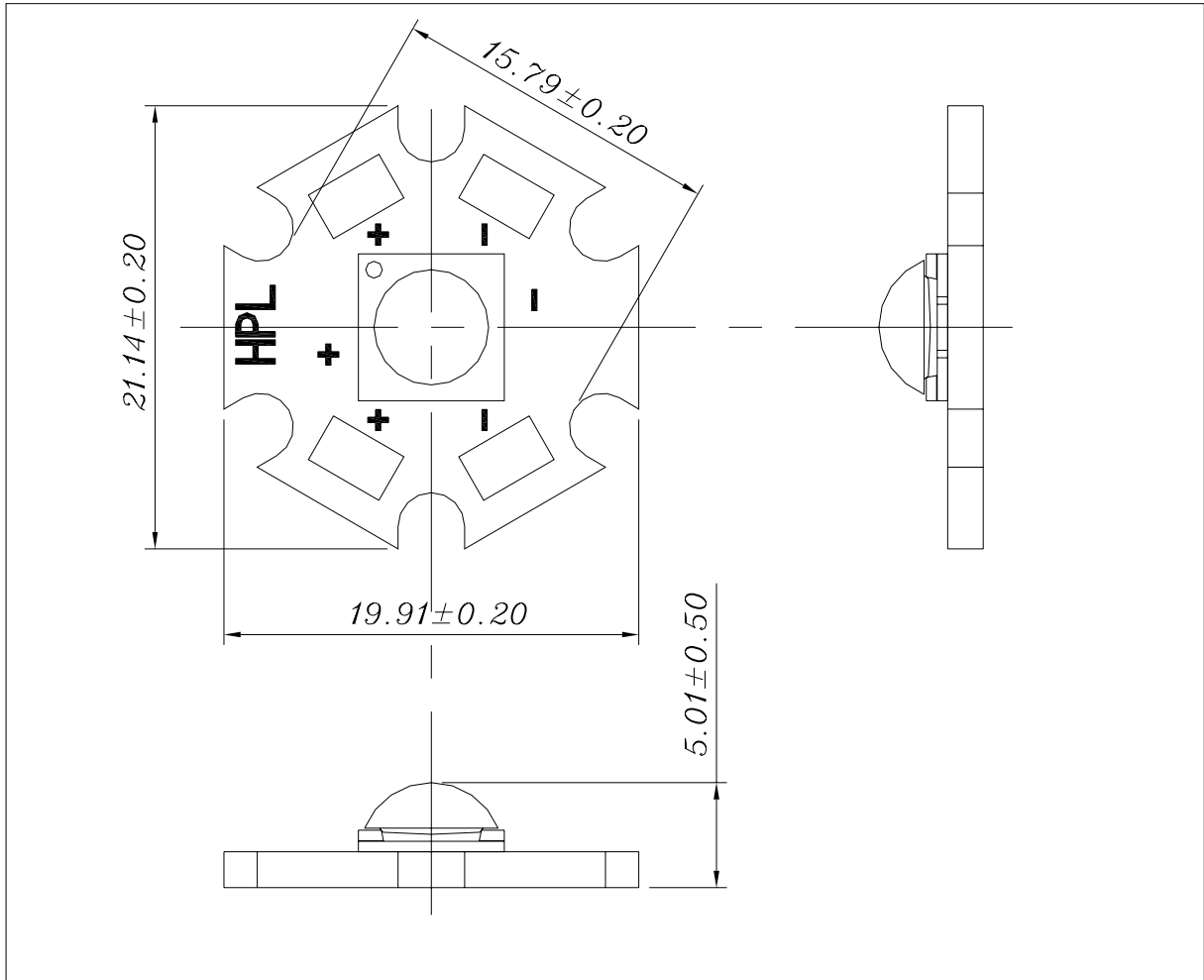
**Star With 45° Lens**



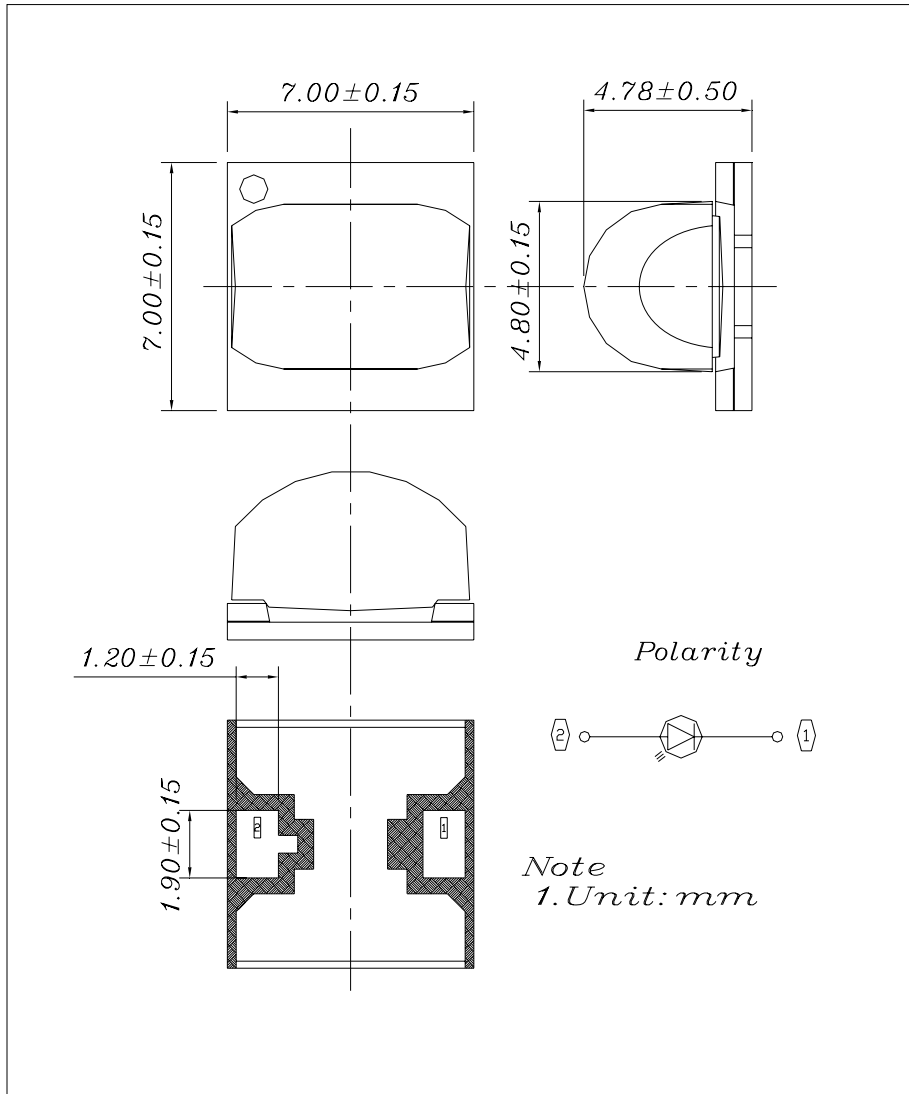
**With 120° Lens**



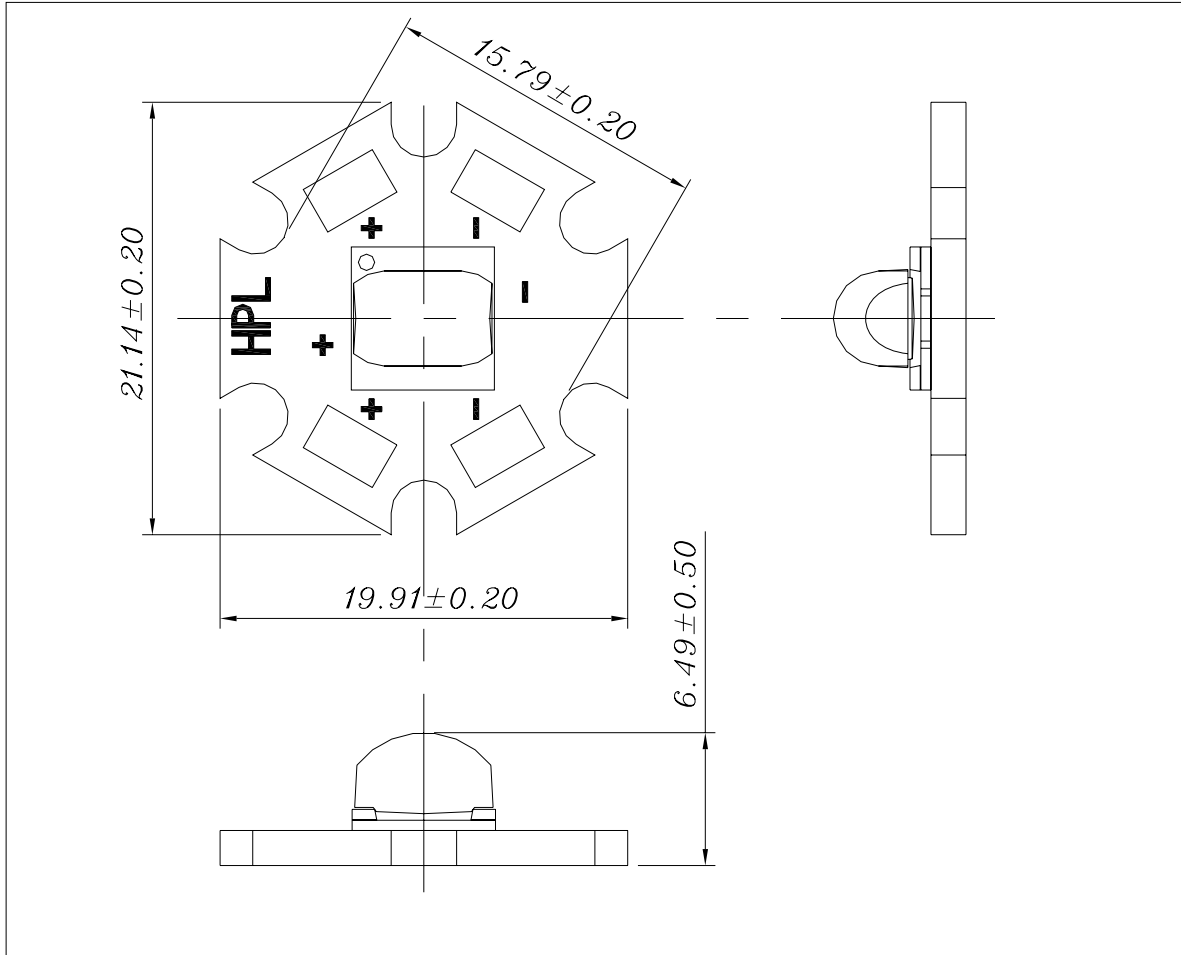
**Star With 120° Lens**



**With 90°/30° Lens**

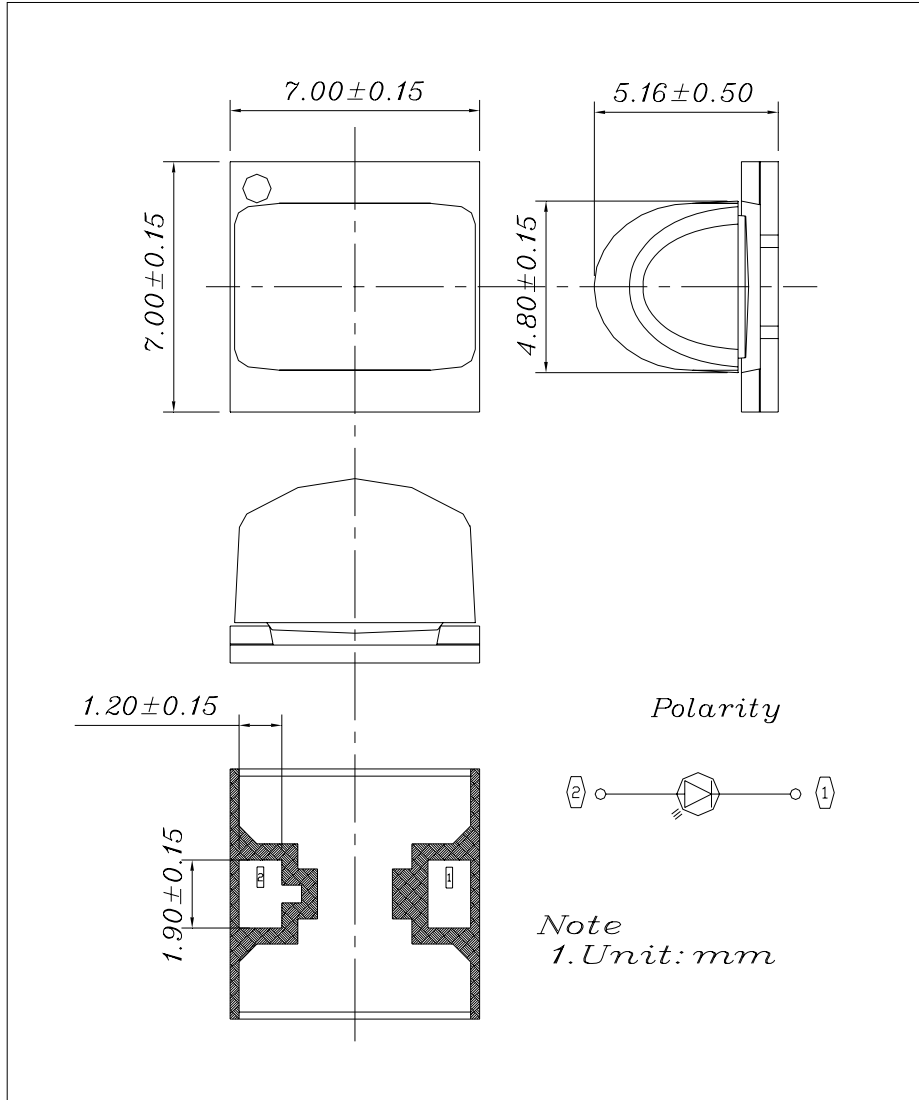


**Star With 90°/30° Lens**

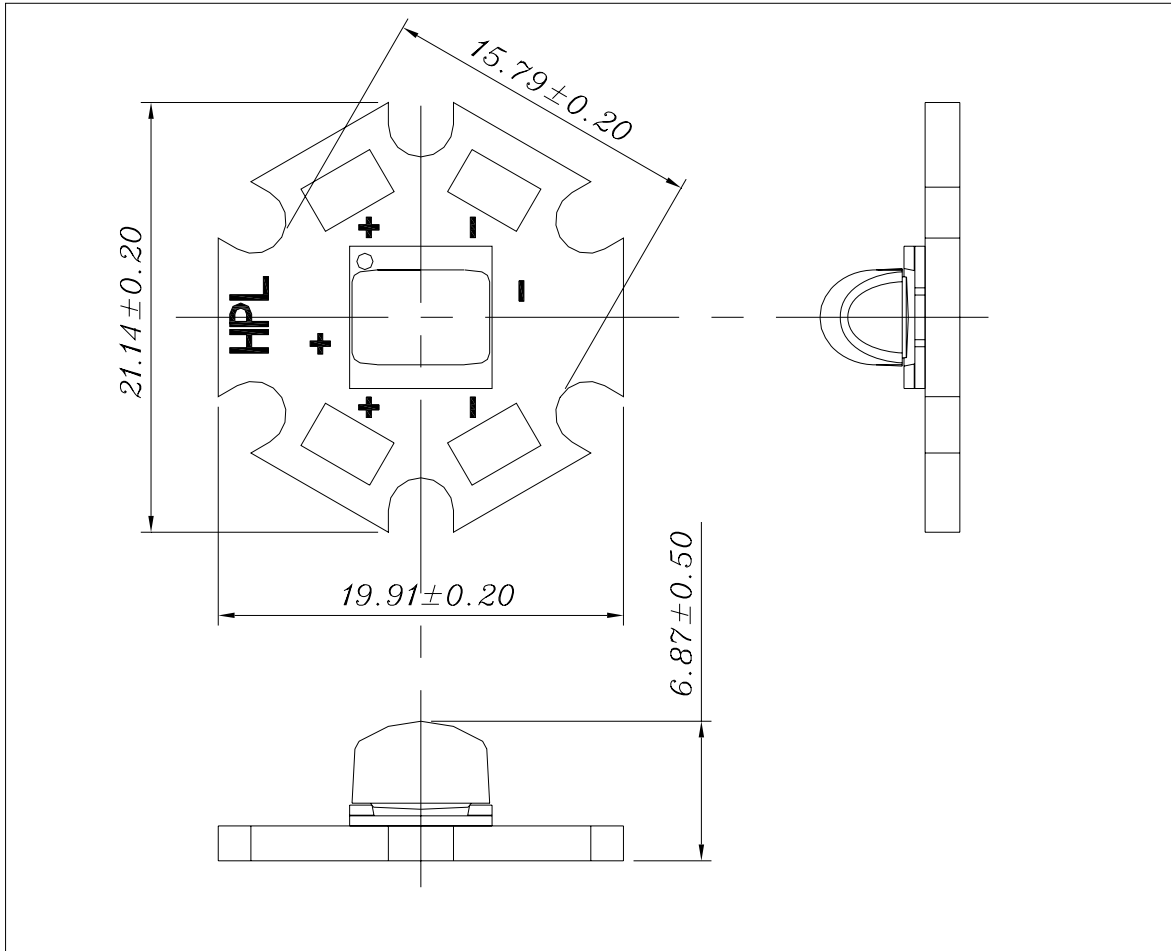




**With 100°/50° Lens**



**Star With 100°/50° Lens**

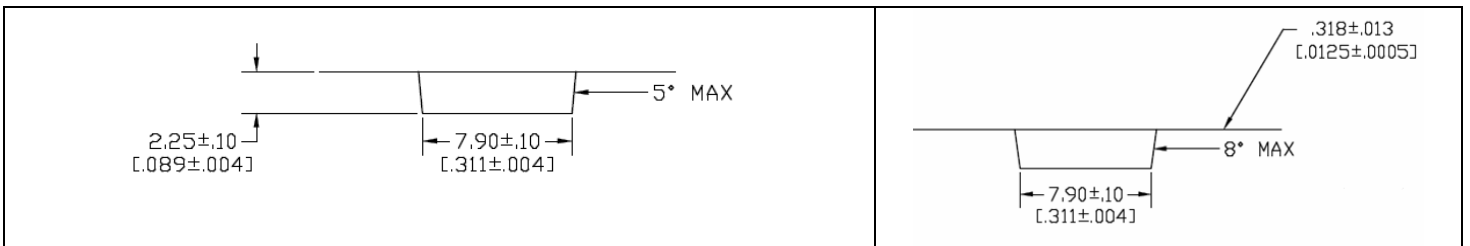
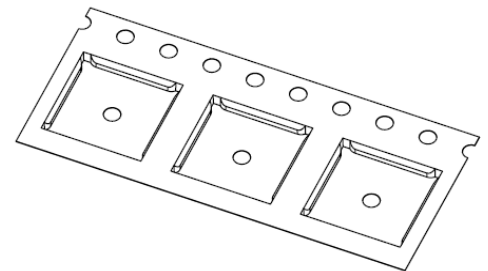
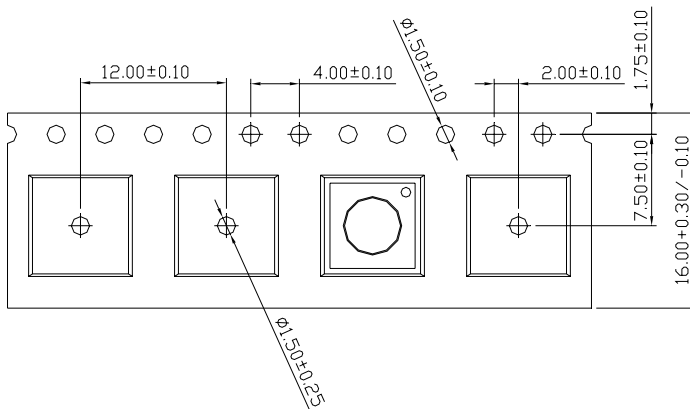


## 8. Shipping Package Style

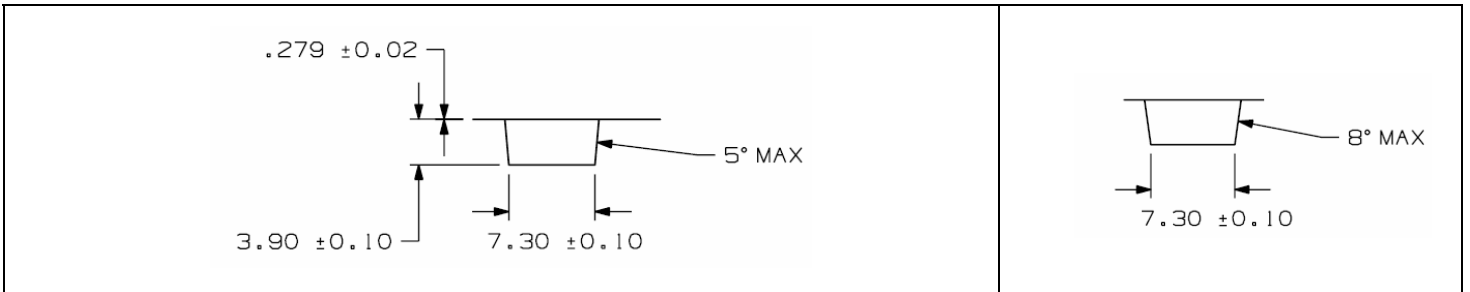
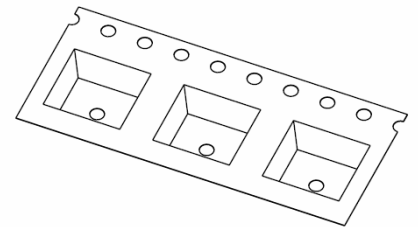
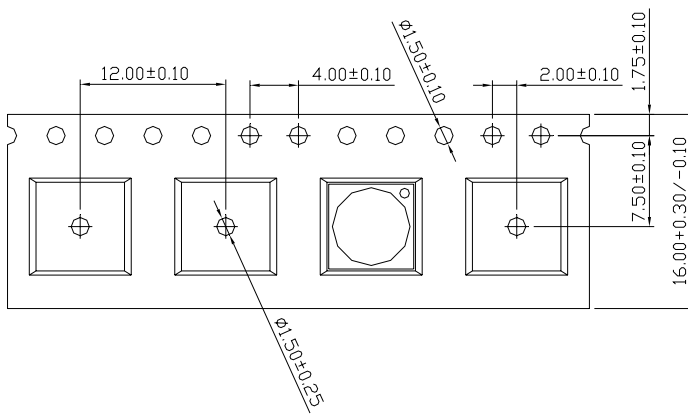
### (1) Tapping Dimension Packaging Specification

● Without Lens:

- Moisture proof bag.
- 1 Reel/bag.
- Q'ty: 500(MAX)/Reel.

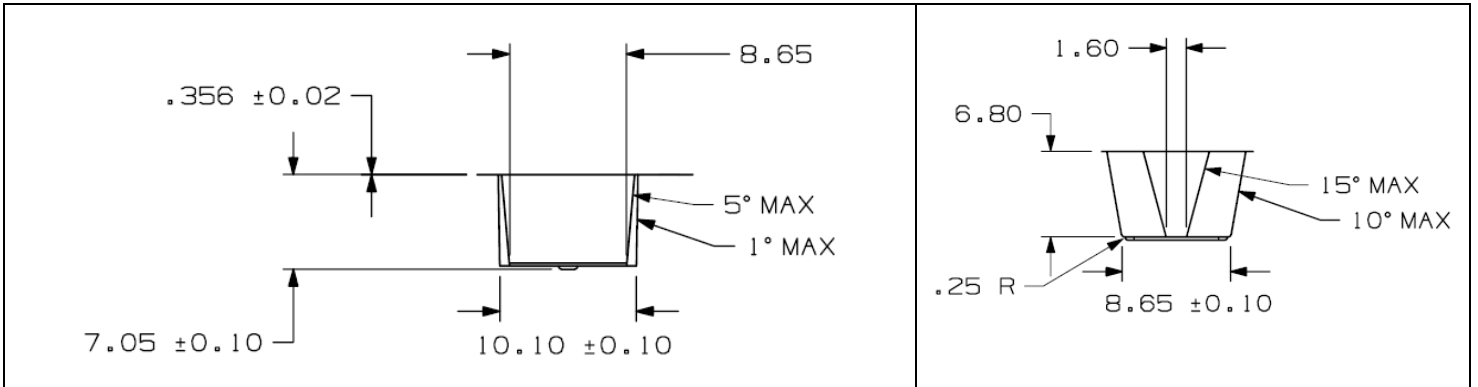
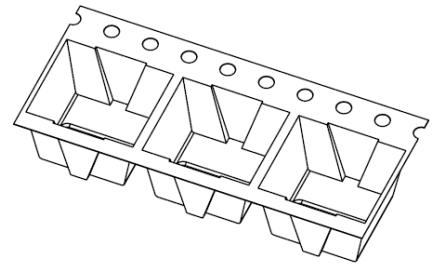
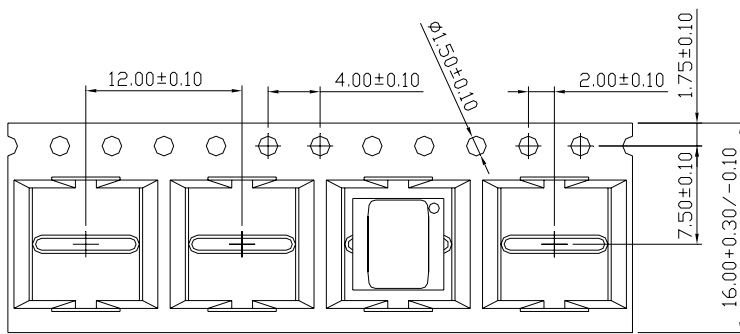


- **With 120 degree Lens:**
  - Moisture proof bag.
  - 1 Reel/bag.
  - Q'ty: **200(MAX)/Reel.**



● With 25, 45, 100/50, 90/30 degree Lens:

- Moisture proof bag.
- 1 Reel/bag.
- Q'ty: **150(MAX)/Reel.**

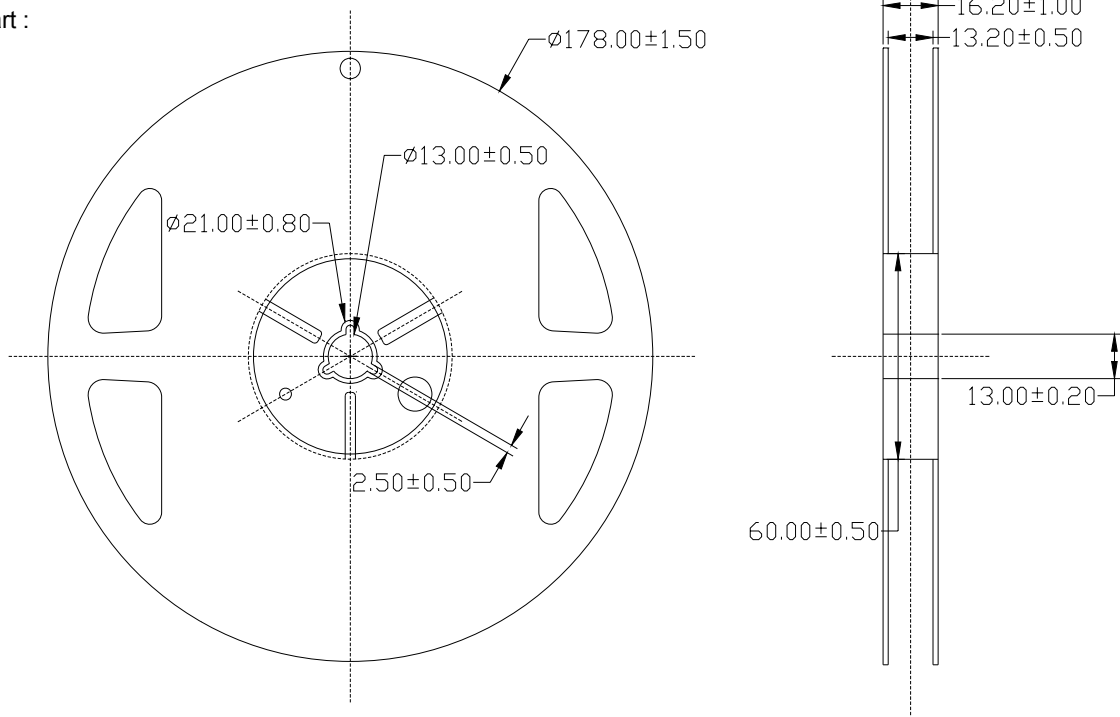


## (2) Package

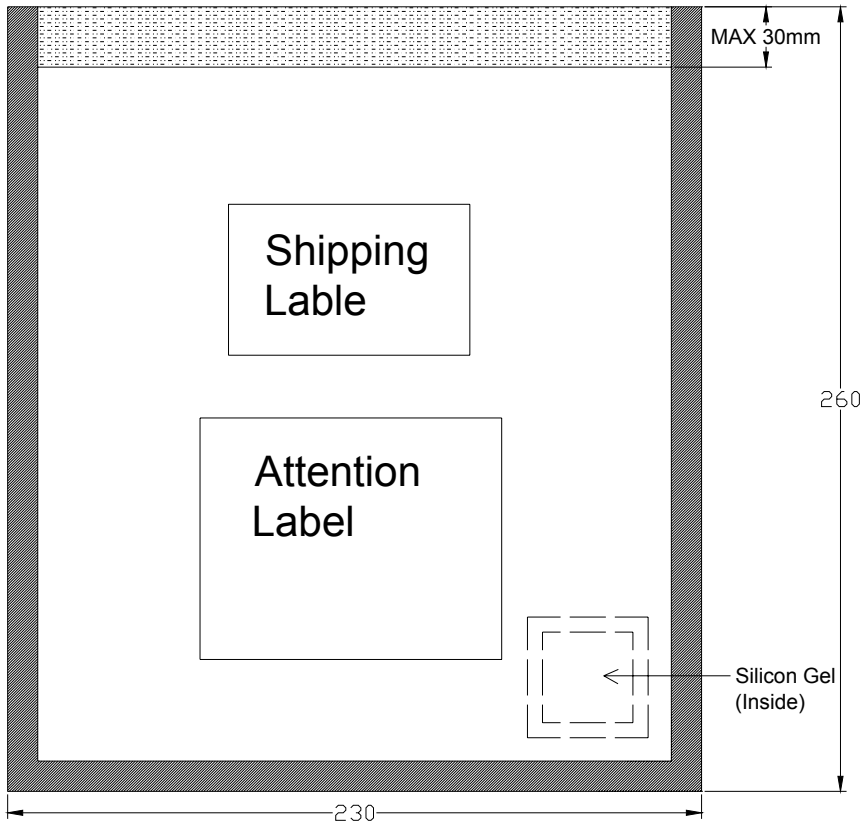
Box Type	Dimensions (mm)	Reel/Box
Small Box (S)	230 × 85 × 265	4 Reel/Box
Middle Box (M)	470 × 265 × 270	24 Reel/Box
Large Box (L)	470 × 435 × 270	40 Reel/Box

## Reel Packaging

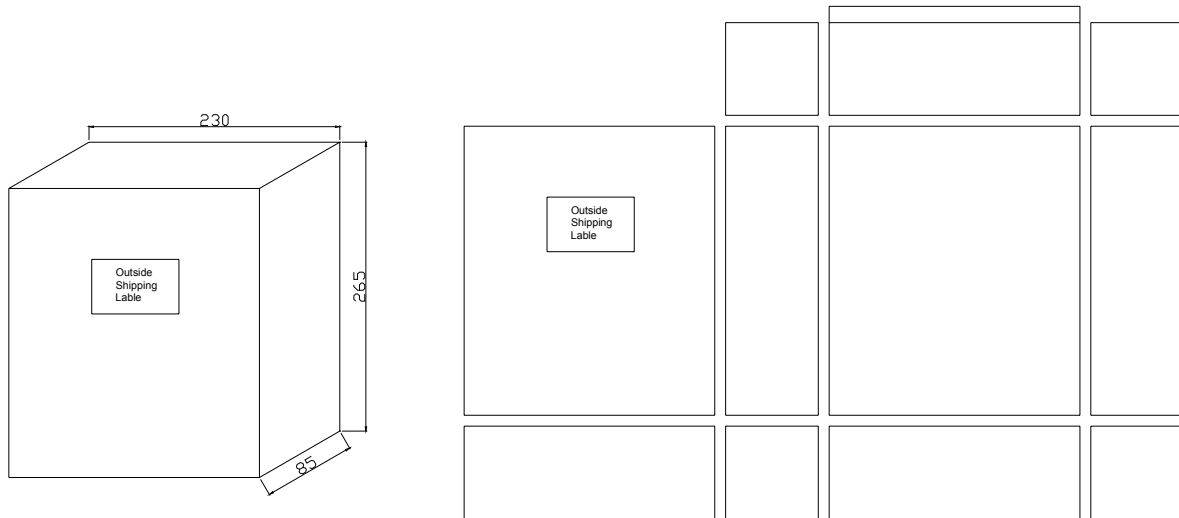
Reel Part :



Anti Statics Bag :

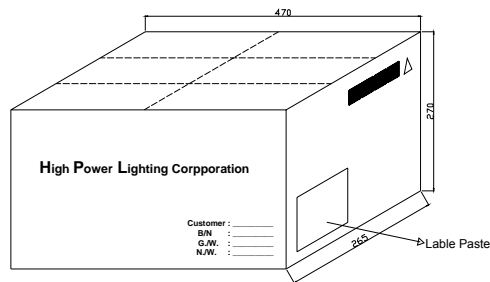
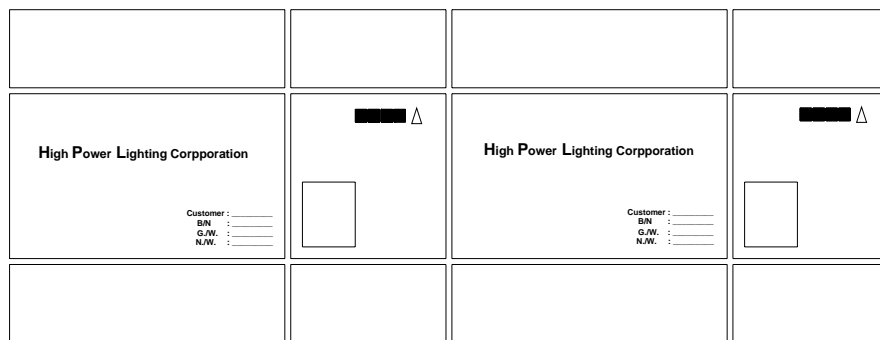


## Small Box



White Carton (Small Package)  
230(L)mm x 85(T)mm x 265(H)mm  
5 Reels inside per carton

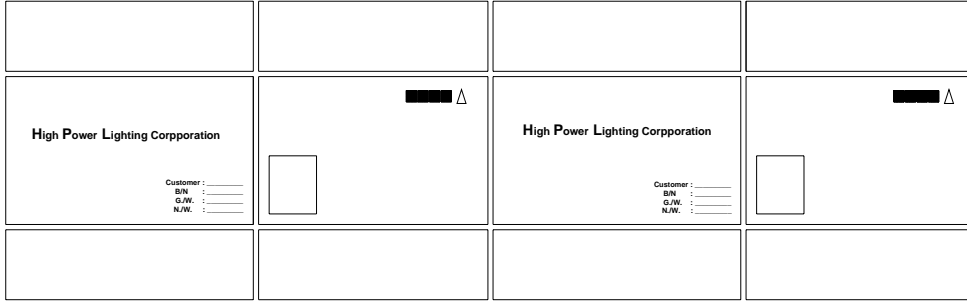
## Middle Box



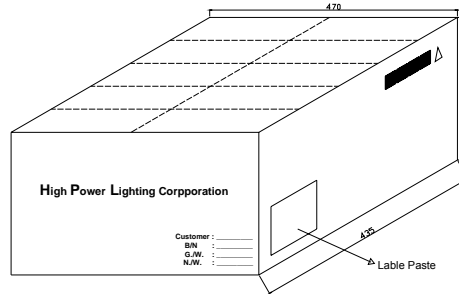
M size Carton (Middle Package)  
470(L)mm x 265(T)mm x 270(H)mm  
6 white box inside per M-carton  
30 Reels inside per M-carton



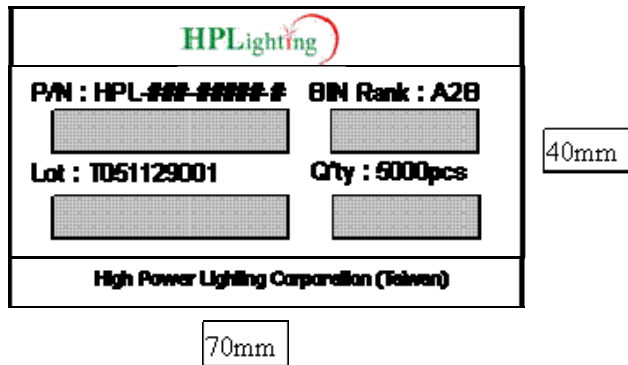
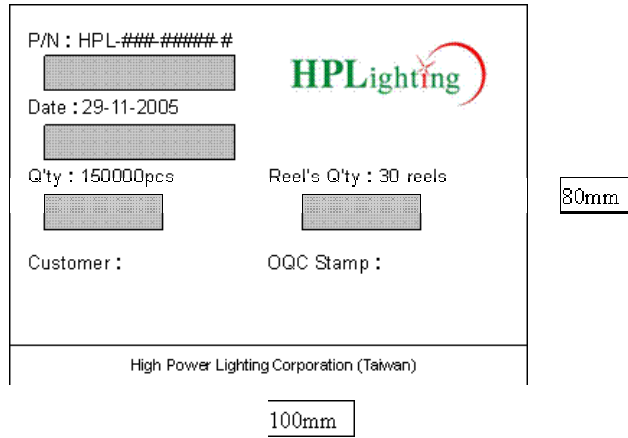
## Large Box



L size Carton (Large Package)  
 470(L)mm x 435(T)mm x 270(H)mm  
 10 white box inside per L-carton  
 50 Reels inside per L-carton



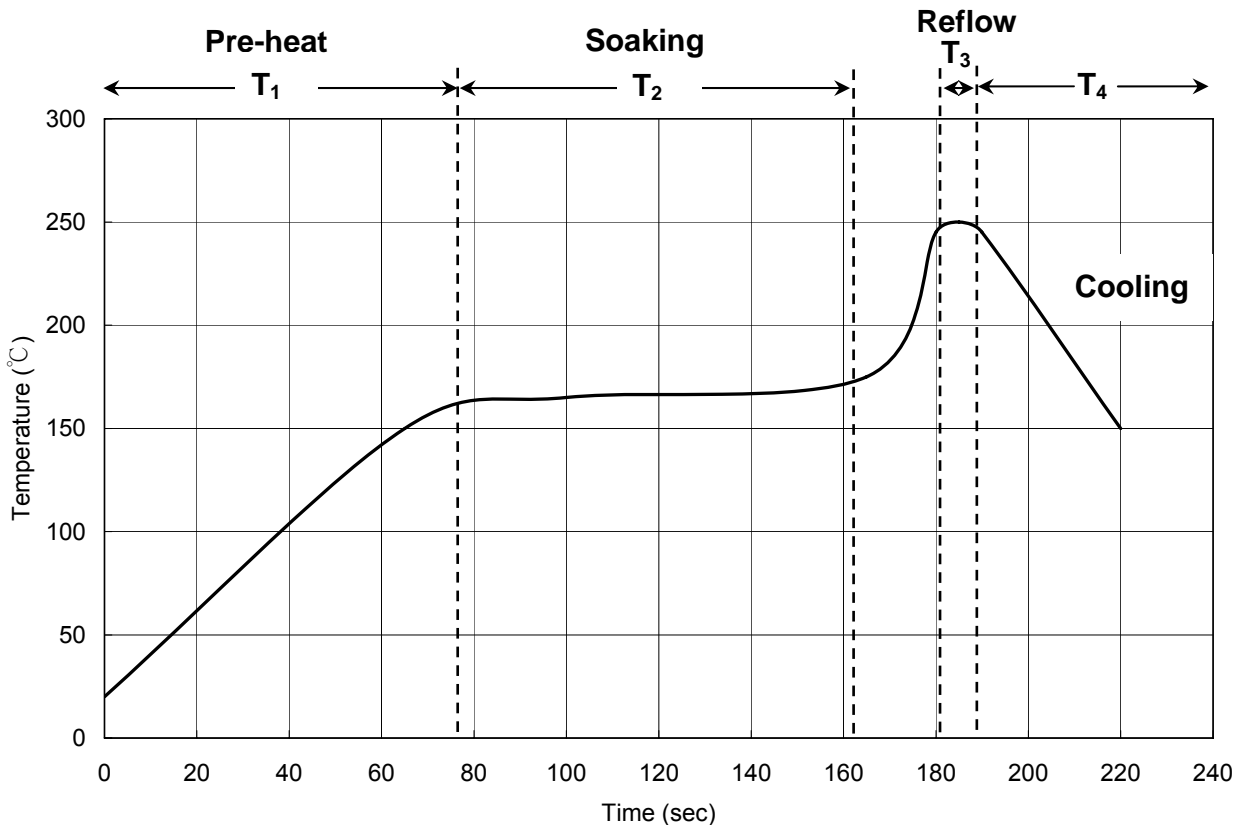
## (3) Label Formation



## 9. Recommended Solder profile

### Soldering

Recommended soldering conditions:



T <sub>1</sub>	Ramp up rate	1.0 ~ 3.0 °C/sec
	Pre-heat time	50 ~ 80 sec
T <sub>2</sub>	Soaking temperature	155 ~ 185 °C
	Dwell time during soaking	60 ~ 120 sec
T <sub>3</sub>	Reflow temperature	240 ~ 250 °C
	Reflow time	Max 10 sec
	Ramp up rate during reflow	1.2 ~ 2.3 °C/sec
T <sub>4</sub>	Cooling	1.0 ~ 6.0 °C/sec

Note: Suggest using Sn96Ag3Cu0.5 lead free solder.

### Cleaning

Use alcohol-based cleaning solvents such as isopropyl alcohol to clean the LED if necessary.