

## *EL ALFS series*

**Preliminary**

### **ALFS4BD-C010001L1-AM**

#### **Features**

- Package : Cool White LEDs on Ceramic substrate
- Typ. Color Temperature : 5180K ~ 6680K
- Typ. Luminous Flux : 1080 lm @ 1000mA
- Viewing angle : Cold White 120°
- ESD up to 8KV
- MSL Level 2
- Preconditioning; According to JEDEC J-STD 020D Level 1.
- Qualifications; According to AEC-Q101
- Compliance with RoHS & REACH

#### **Applications**

- Automotive Exterior Lighting, Headlamp, Fog lamp

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# 1. Characteristics

Parameter		Symbol	Min.	Typ.	Max.	Unit	Condition
Luminous Flux <sup>[2][3][4]</sup>	Cool White	$\Phi_v$	980	1080	1400	lm	$I_F=1000\text{mA}$
Forward Voltage <sup>[5]</sup>	Cool White	$V_F$	12	13.5	15	V	$I_F=1000\text{mA}$
Viewing Angle	Cool White	$\phi$	---	120	---	deg	$I_F=1000\text{mA}$
Color	Cool White CCT	K	5180	---	6680	K	$I_F=1000\text{mA}$
Thermal Resistance (Junction to Solder)	Real	$R_{th\ JS\ real}$	---	TBD	---	K/W	$I_F=1000\text{mA}$
	Electrical	$R_{th\ JS\ el}$	---	TBD	---		

## Notes:

1. Forward condition by each of LED.
2. Luminous flux measurement tolerance:  $\pm 8\%$ .
3. The data of luminous flux measured at thermal pad=25°C
4. Typical luminous flux or light output performance is operated within the condition guided by this datasheet.
5. Forward voltage measurement tolerance:  $\pm 0.05\text{V}$
6. The  $V_f$  range shown in the table above indicates 99% output.

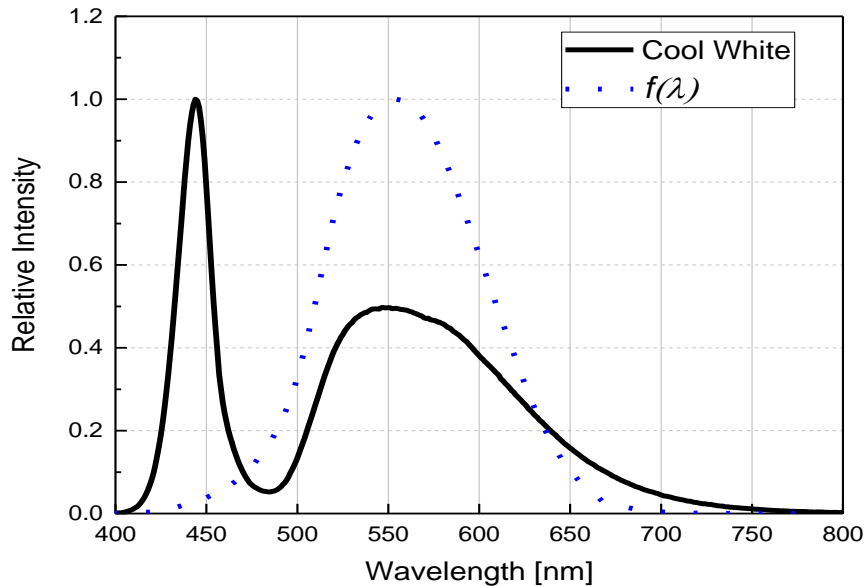
## 2. Absolute Maximum Ratings

Parameter	Symbol	Ratings	Unit
Reverse Voltage	$V_R$	Not designed for reverse operation	V
Power Dissipation	$P_d$	22.5	W
Forward Current	$I_F$	50 ~ 1500	mA
Junction Temperature	$T_J$	150	°C
Operating Temperature	$T_{opr}$	-40 ~ +125	°C
Storage Temperature	$T_{stg}$	-40 ~ +125	°C
ESD Sensitivity (R=1.5kΩ, C= 100pF)	$ESD_{HBM}$	8	KV
Soldering Temperature	Reflow	260	°C

### 3. Characteristics Graph

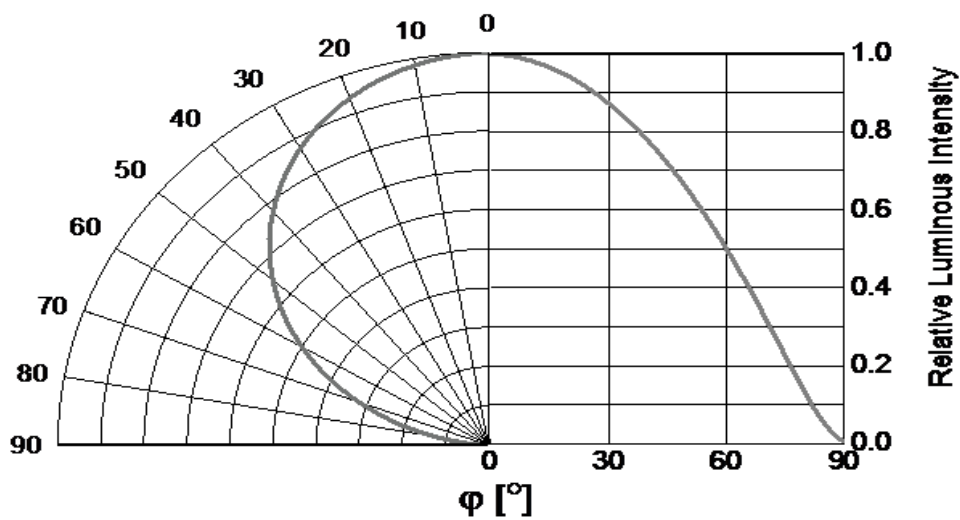
#### Wavelength Characteristics Relative Spectral Distribution @ Solder Pad Temperature = 25°C (CW)

$$\Phi_V / \Phi_V (Max.) = f(\lambda)$$



#### Typical Diagram Characteristics of Radiation (CW)

$$\Phi_V / \Phi_V (0^\circ) = f(\varphi)$$

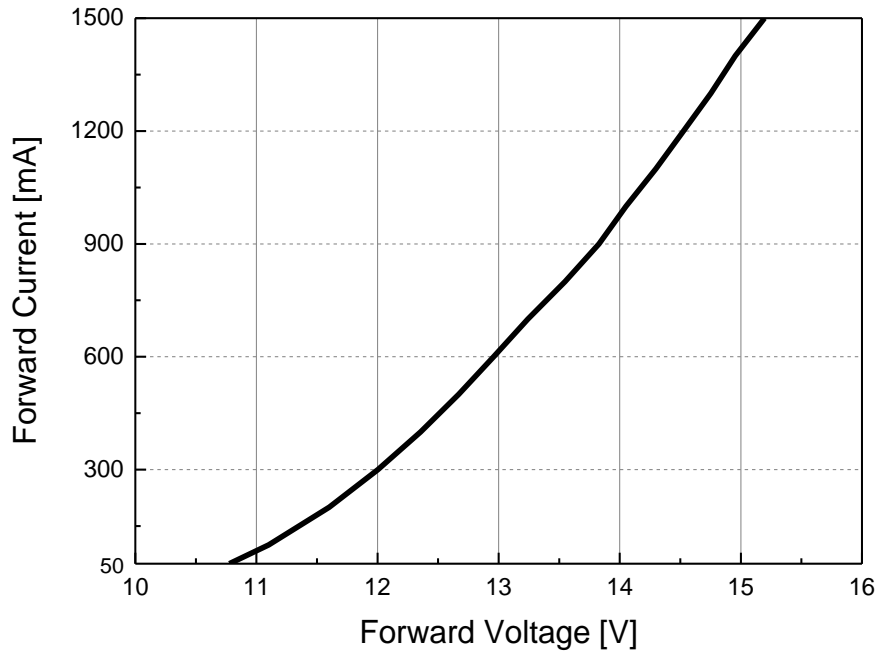


**Notes:**

1.  $\varphi$  is the off axis angle from lamp centerline where the luminous intensity is 1/2 of the peak value.
2. View angle tolerance is  $\pm 5^\circ$

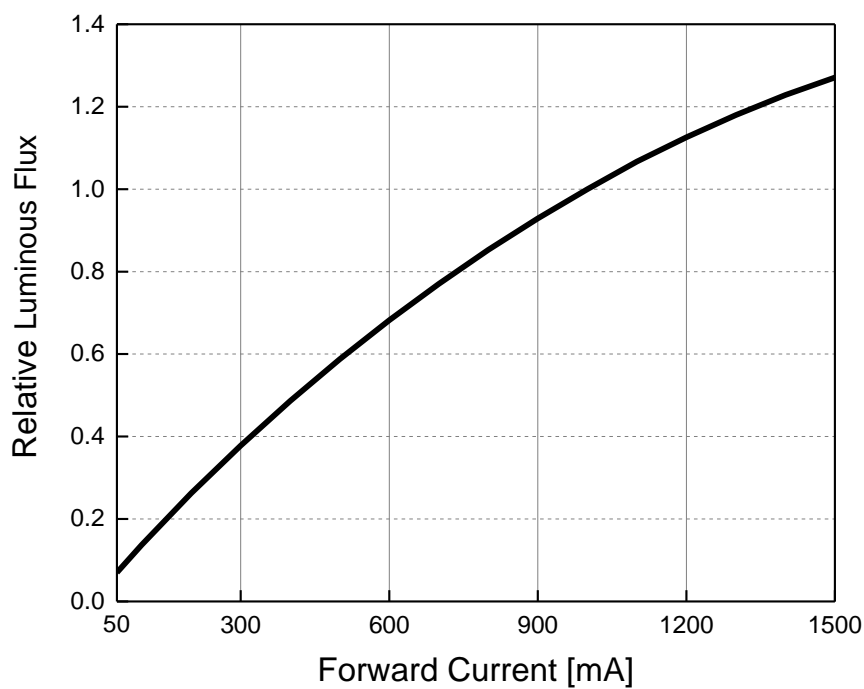
**Forward Current vs. Forward Voltage  
@ Solder Pad Temperature = 25°C**

$$I_F = f(V_F)$$



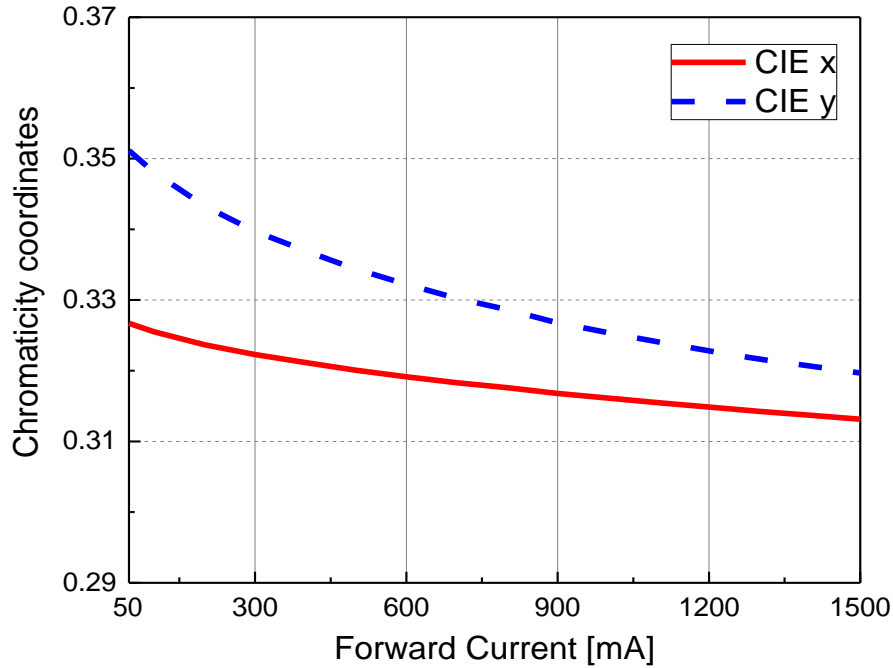
**Relative Luminous Flux vs. Forward Current  
@Solder Pad Temperature = 25°C**

$$\Phi_V / \Phi_V (1000mA) = f(I_F)$$



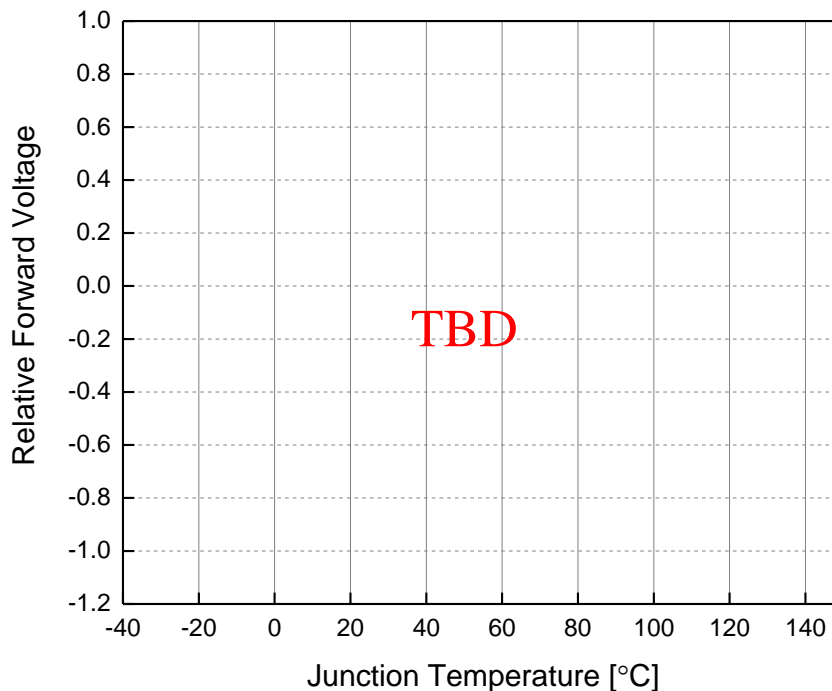
**Chromaticity Coordinates vs. Forward Current  
@Solder Pad Temperature = 25°C**

$$CIE\ x, CIE\ y = f(I_F)$$



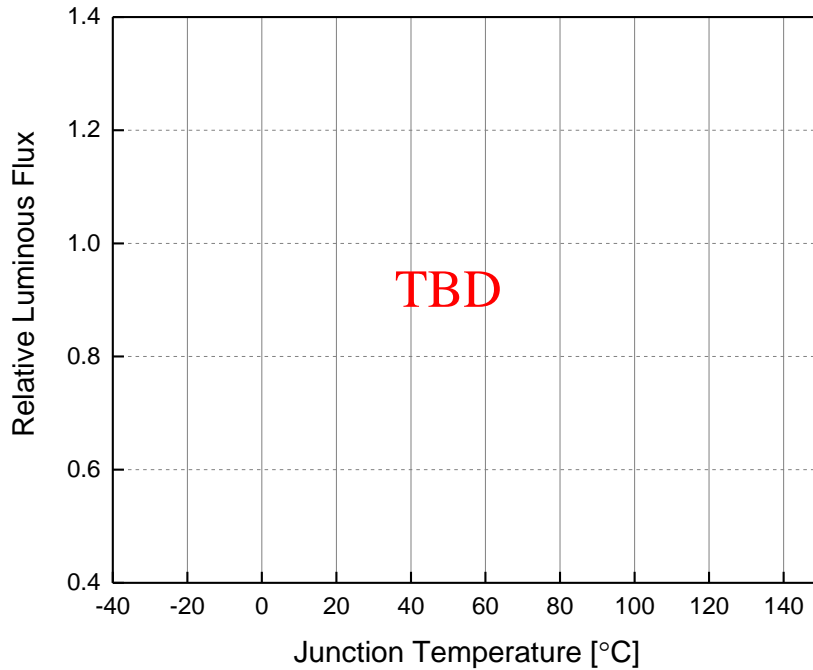
**Relative Forward Voltage vs. Junction Temperature  
@Forward Current = 1000mA**

$$\Delta V_F = V_F - V_F(25^\circ C) = f(T_j)$$



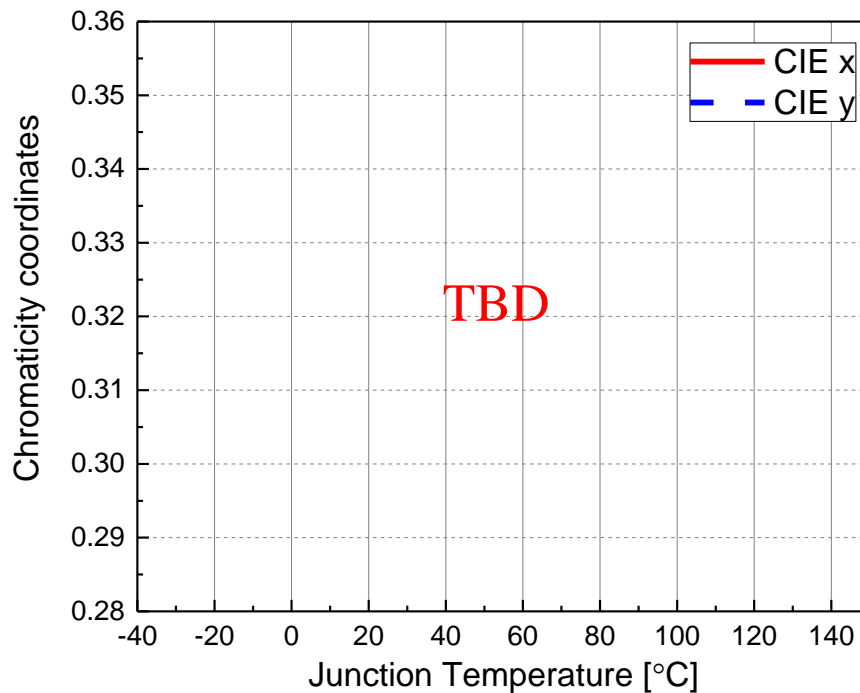
**Relative Luminous Flux vs. Junction Temperature  
@Forward Current = 1000mA**

$$\Phi_v / \Phi_v(25^\circ C) = f(T_j)$$



**Chromaticity Coordinates Shift CIE X/Y vs. Junction Temperature  
@Forward Current = 1000mA**

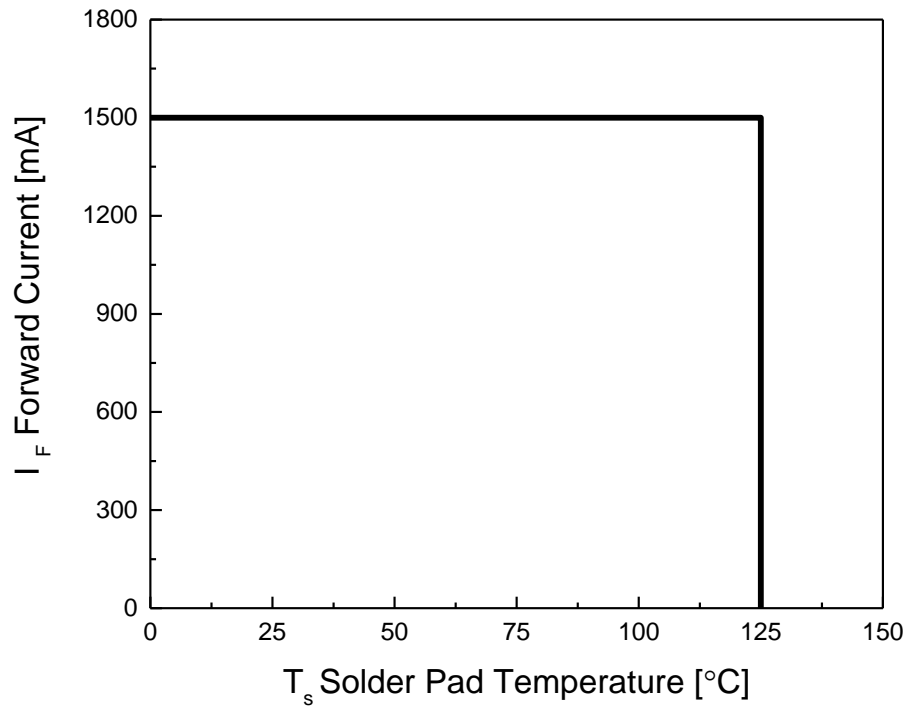
$$CIE\ x, CIE\ y = f(T_j)$$





### Forward Current Derating Curve @ Soldering Temperature

$$I_F = f(T_S)$$



## 4. Binning Information

### Luminous Intensity Bins

[ Cool White ]			
Group	Bin	Minimum Photometric Flux (lm)	Maximum Photometric Flux (lm)
E	4	980	1040
	5	1040	1100
F	1	1100	1160
	2	1160	1240
	3	1240	1320
	4	1320	1400

#### Notes:

1. Luminous flux measurement tolerance:  $\pm 8\%$ .
2. Highlighted Black Box is available bins.

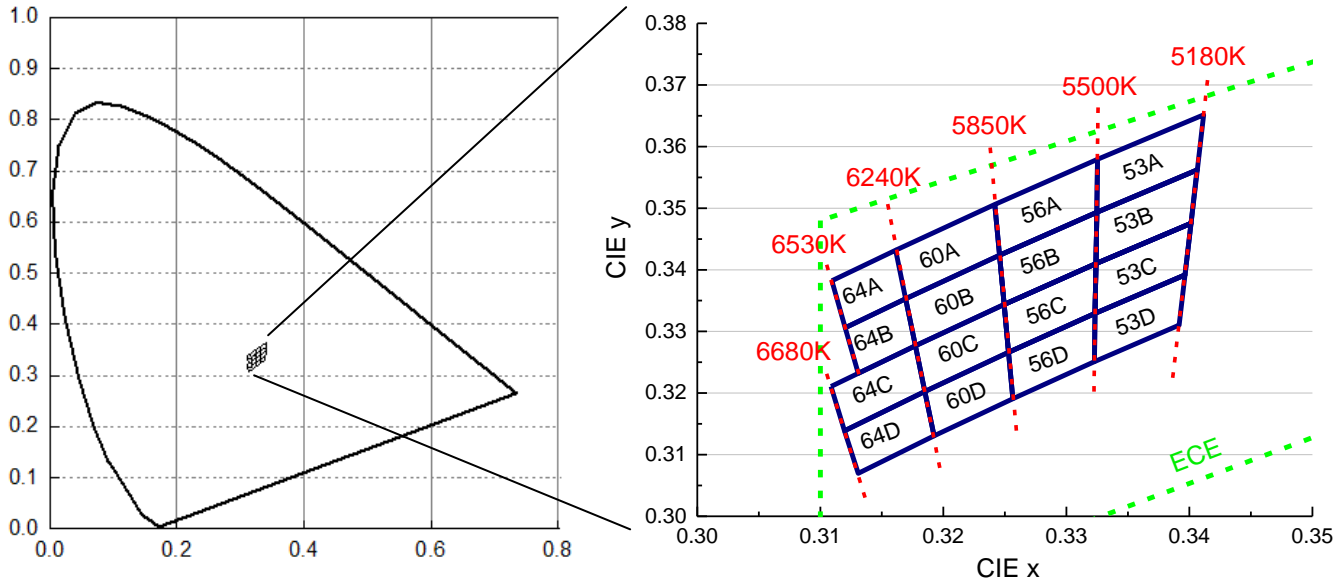
### Forward Voltage Bins

Group	Minimum Forward Voltage(V)	Maximum Forward Voltage(V)
4A	12.00	13.00
4B	13.00	14.00
4C	14.00	15.00

**Notes:**

1. Forward Voltage measurement tolerance:  $\pm 0.1V$ .

### Color Bin Structure ECE White Bin Structure



### Cool-White Bin Coordinates

Bin	CIE x	CIE y
64A	0.3109	0.3382
	0.3161	0.3432
	0.3169	0.3353
	0.3120	0.3306
Reference Range: 6240~6530K		

Bin	CIE x	CIE y
64B	0.3120	0.3306
	0.3169	0.3353
	0.3177	0.3277
	0.3131	0.3232
Reference Range: 6240~6530K		

Bin	CIE x	CIE y
64C	0.3109	0.3211
	0.3177	0.3277
	0.3185	0.3203
	0.3120	0.3139
Reference Range: 6240~6680K		

Bin	CIE x	CIE y
64D	0.3120	0.3139
	0.3185	0.3203
	0.3192	0.3131
	0.3131	0.3070
Reference Range: 6240~6680K		

Bin	CIE x	CIE y
60A	0.3161	0.3432
	0.3242	0.3506
	0.3246	0.3424
	0.3169	0.3353
Reference Range: 5850~6240K		

Bin	CIE x	CIE y
60B	0.3169	0.3353
	0.3246	0.3424
	0.3249	0.3344
	0.3177	0.3277
Reference Range: 5850~6240K		

Bin	CIE x	CIE y
60C	0.3177	0.3277
	0.3249	0.3344
	0.3253	0.3266
	0.3185	0.3203
Reference Range: 5850~6240K		

Bin	CIE x	CIE y
60D	0.3185	0.3203
	0.3253	0.3266
	0.3256	0.3191
	0.3192	0.3131
Reference Range: 5850~6240K		

Bin	CIE x	CIE y
56A	0.3242	0.3506
	0.3325	0.3579
	0.3325	0.3493
	0.3246	0.3424
Reference Range: 5500~5850K		

Bin	CIE x	CIE y
56B	0.3246	0.3424
	0.3325	0.3493
	0.3324	0.3410
	0.3249	0.3344
Reference Range: 5500~5850K		

Bin	CIE x	CIE y
56C	0.3249	0.3344
	0.3324	0.3410
	0.3323	0.3329
	0.3253	0.3266
Reference Range: 5500~5850K		

Bin	CIE x	CIE y
56D	0.3253	0.3266
	0.3323	0.3329
	0.3323	0.3251
	0.3256	0.3191
Reference Range: 5500~5850K		

Bin	CIE x	CIE y
53A	0.3325	0.3579
	0.3412	0.3652
	0.3406	0.3562
	0.3325	0.3493
Reference Range: 5180~5500K		

Bin	CIE x	CIE y
53B	0.3325	0.3493
	0.3406	0.3562
	0.3401	0.3476
	0.3324	0.3410
Reference Range: 5180~5500K		

Bin	CIE x	CIE y
53C	0.3324	0.3410
	0.3401	0.3476
	0.3396	0.3392
	0.3323	0.3329
Reference Range: 5180~5500K		

Bin	CIE x	CIE y
53D	0.3323	0.3329
	0.3396	0.3392
	0.3392	0.3310
	0.3323	0.3251
Reference Range: 5180~5500K		

**Notes:**

1. Color coordinates measurement allowance:  $\pm 0.005$ .

## 5. Part Number

### ALFS4BD-C010001L1-AM

Part number is designated with below details.

ALFS = product family name.

4 = chip number

B = Product type

D = Device

C0= color <sup>[1]</sup>

1000 = test current [mA]

1 = internal code

L1 = Brightness Level

AM = automotive application

#### Note

<sup>[1]</sup> Color :

Symbol	Description
C0	No CRI restriction
PA	PC Amber

## 6. Ordering Information

### ALFS4BD-C010001L1- **ABCDEFGHIJKLMN-OP-AM**

Order code contains information with below details :

**ABCDEF** = min/max wavelength or CCT

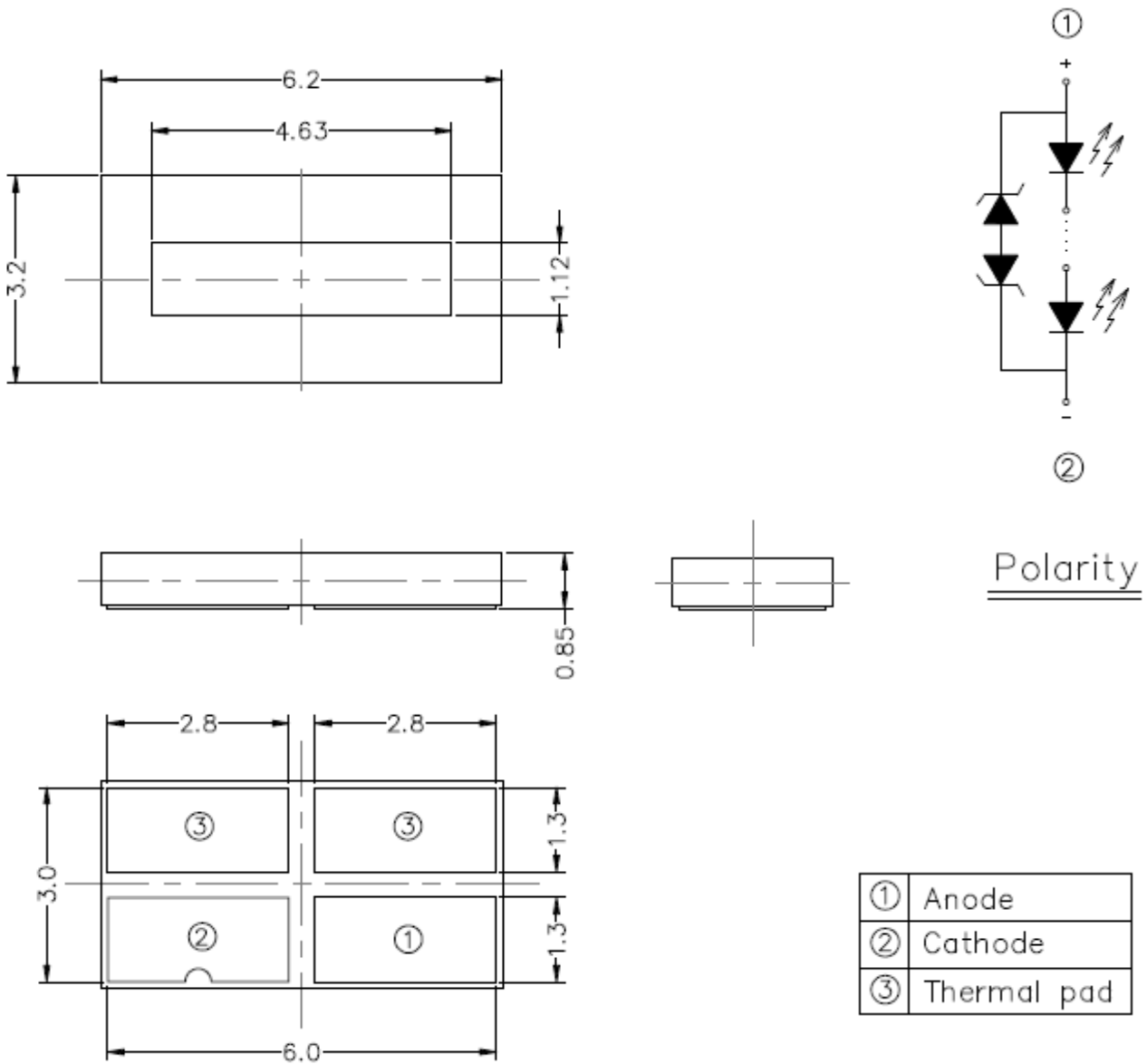
**GHIJ** = min./max. luminous flux in [lm] or luminous intensity in [mcd]

**KLMN** = min./max. Forward Voltage

**OP** = Packing quantity (Minimum package)

Part Number of the ALFS	Order Code
ALFS4BD-C010001L1-AM	ALFS4BD-C010001L1-64D53AE4F44A4C-2T-AM

## 7. Mechanical Dimension

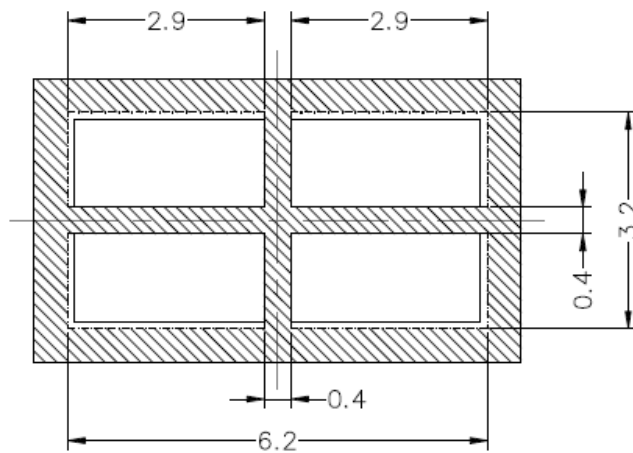
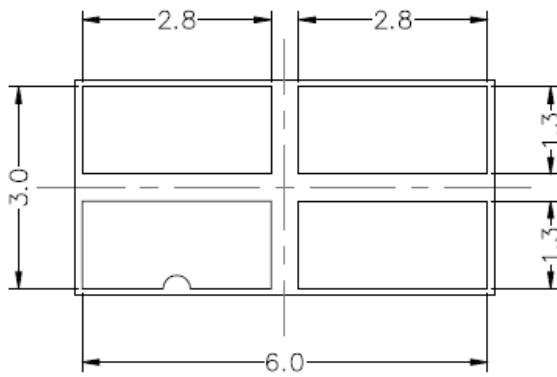


### Notes:

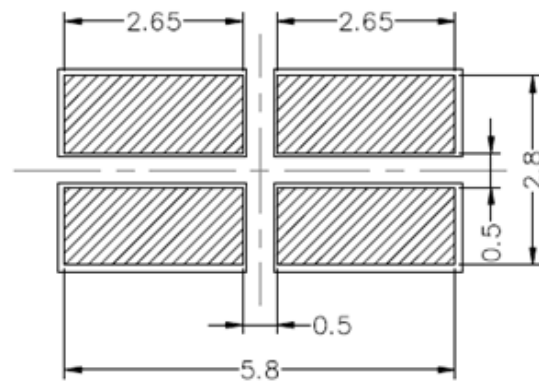
1. Dimensions are in millimeters.
2. Tolerances unless mentioned are  $\pm 0.1$ mm.
3. The thermal pad is electrically connected to the Anode soldering pad.



## 8. Recommended Soldering Pad

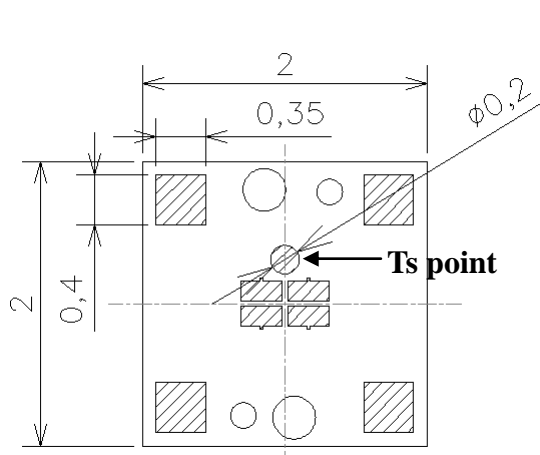


 **solder resist**

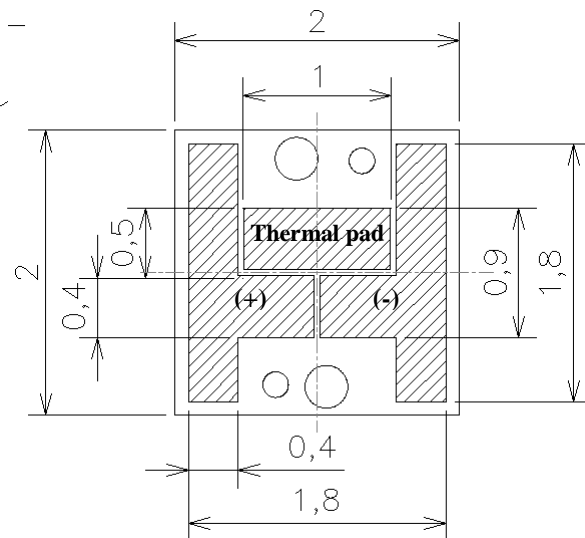


 **solder stencil**

We recommend Cu area like below drawing. You can use this recommendation when you draw your module design.  
(MCPCB information; Cu thickness 35um, dielectric layer 100um, 2W/mK, Al thickness 1.5mm)



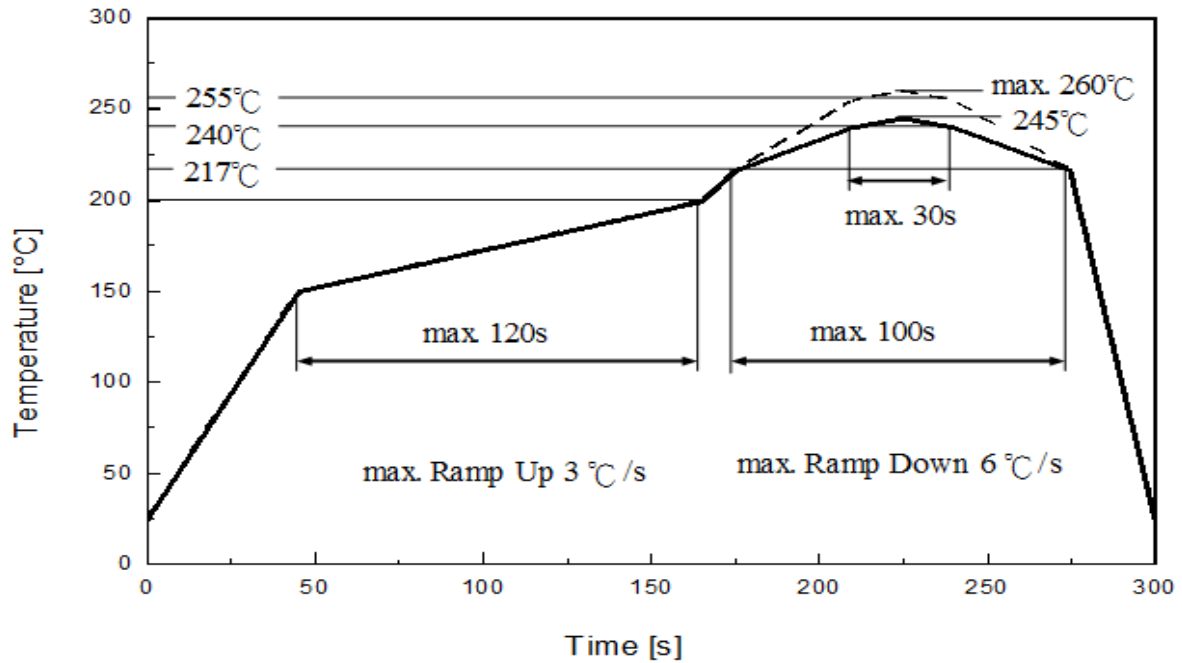
**Cu open area**



**Cu pattern**

## 9. Reflow Soldering Profile

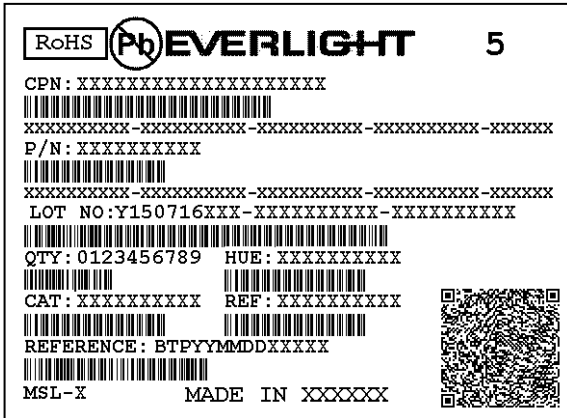
Soldering Condition (Reference: IPC/JEDEC J-STD-020D)



Profile Feature	Pb-Free Assembly	Unit Einheit
Ramp-up rate to preheat 25 °C to 150 °C	3	°C /sec
Time of soaking zone 150 °C to 200 °C	120	sec
Ramp-up rate to peak	3	°C /sec
Liquidus temperature	217	°C
Time above liquidus temperature	100	sec
Peak temperature (max.)	260	°C
Time within 5°C of the specified peak temperature	30	sec
Ramp-down Rate (max.)	6	°C /sec

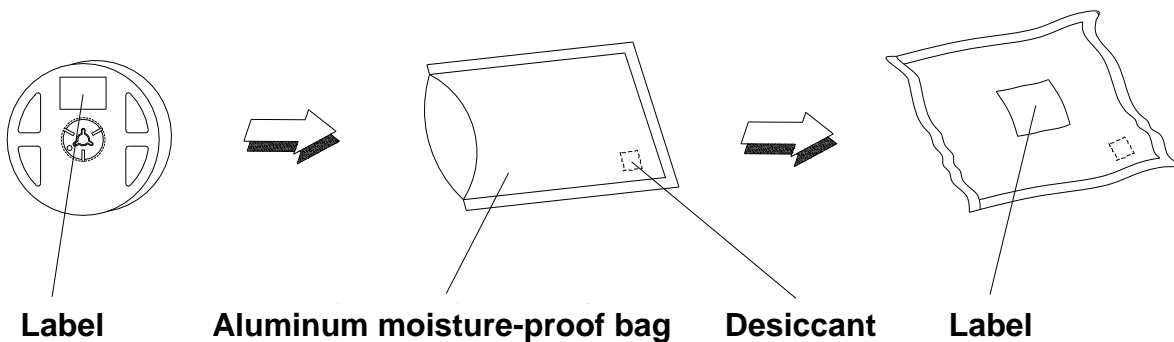
## 10. Packaging Information

### • Product Labeling



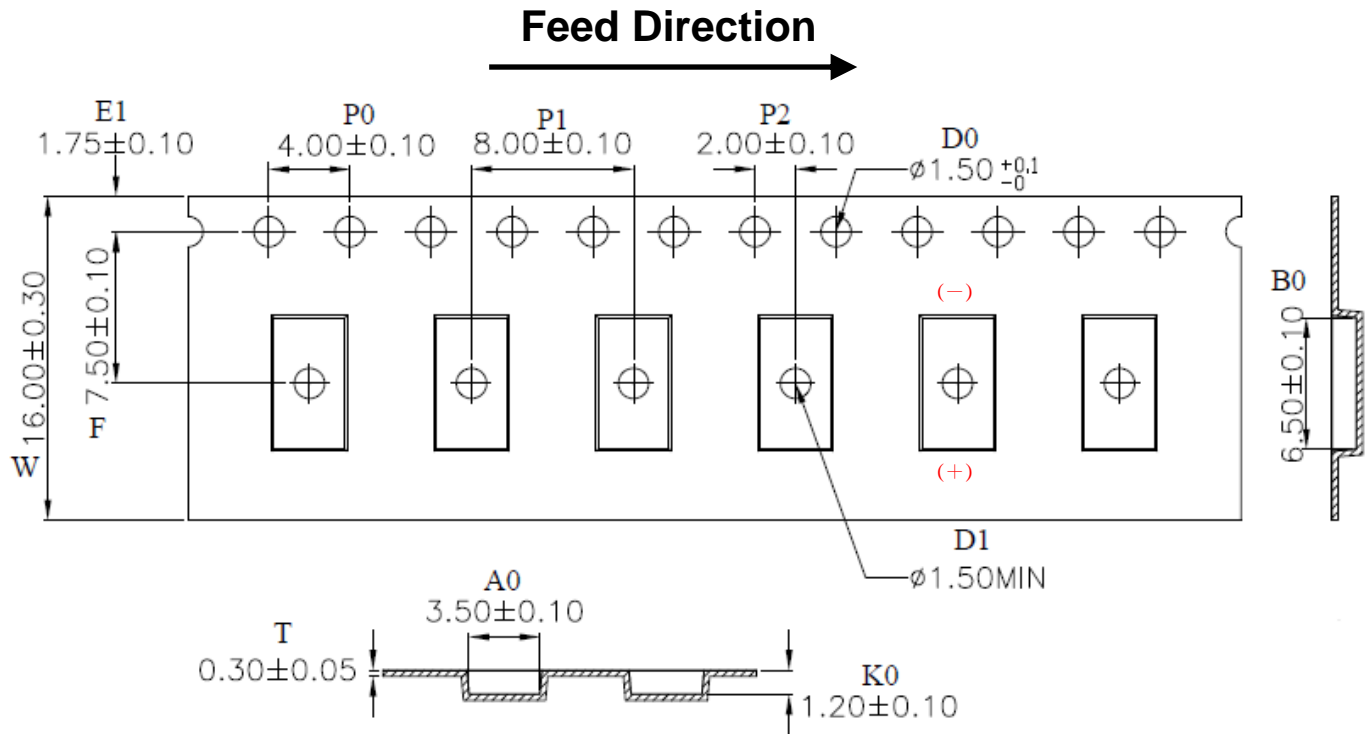
- CPN : Customer's Product Number
- P/N : Everlight Part Number
- LOT NO : Lot Number
- QTY : Packing Quantity
- HUE : Color Bin
- CAT : Luminous Flux (Brightness) Bin
- REF : Forward Voltage Bin

### • Moisture Resistant Packing Process

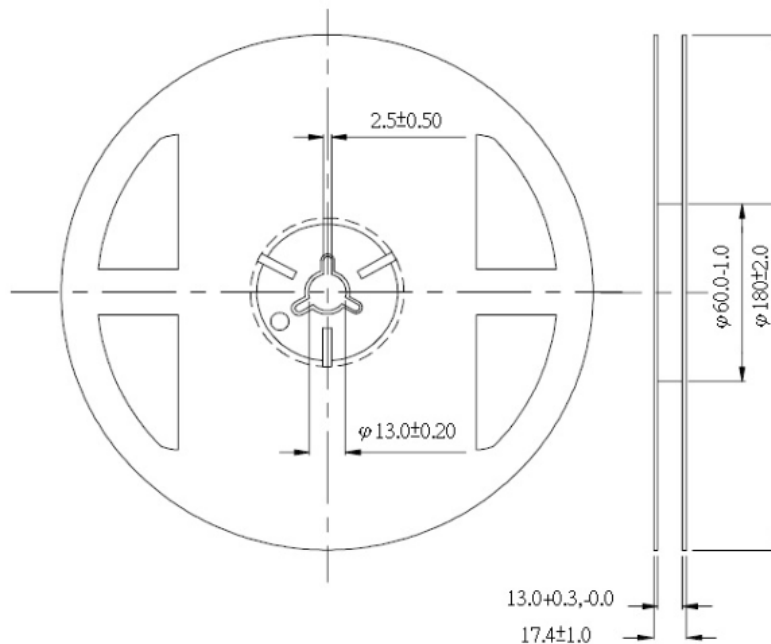


**Carrier Tape Dimensions as the following:**

Reel: 1000pcs, MOQ<sub>≥</sub> 100pcs (has to be a multiple of 100pcs)



**Reel Dimensions**

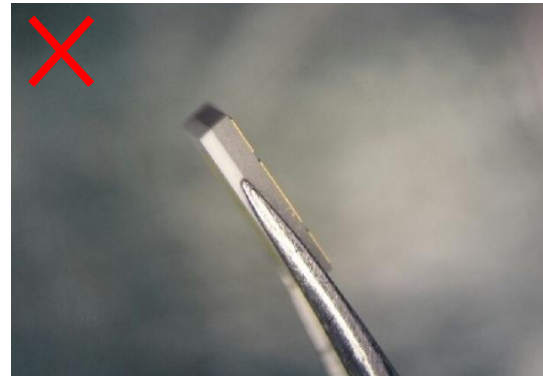
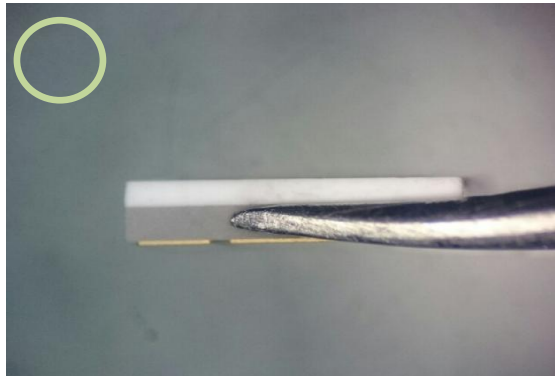
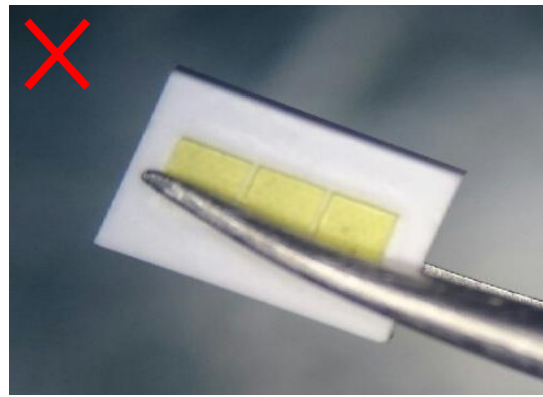
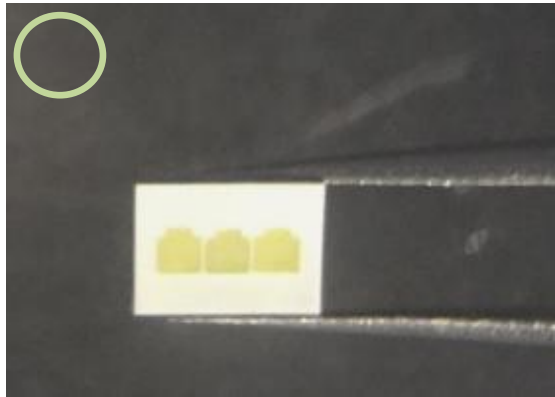


**Notes:**

1. Dimensions are in millimeters.
2. Tolerances unless mentioned are  $\pm 0.2$ mm.

## 11. Handling of Silicon Resin for LEDs

- Do not put mechanical stress on the LED.
- When handling the product, do not apply direct pressure on the optical surface. The LED surface could be damaged, which could affect the optical performance of the LED.
- In low-humidity work environment, please keep handling the LEDs with appropriate ESD grounding.
- It is recommended to handle the LED with powder-less latex gloves.
- Do not touch the resin with tweezers to avoid scratching or other damage.



## 12. Precaution for Use

- Before the package is opened, the LEDs should be stored at 30°C or less and 60%RH or less after being shipped from Everlight and the storage life limits are 12 months.
- After opening the package, all unused LEDs are recommended to be stored in moisture proof packages.
- If the moisture absorbent material (silica gel) has exceeded effectiveness 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.