



佛山市国星光电股份有限公司

FOSHAN NATIONSTAR OPTOELECTRONICS CO., LTD

SPECIFICATION

Customer		Product	TOP LED
Customer No.		Type	FM-5050XXX

APPROVED SIGNATURES

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Research & Development Center		
APPROVE	CHECK	DRAW
Release Date : 2009-12-21		

FM-5050X X X Top Light Emitting Diode

Technical Data Sheet

This product is generally used as indicator and luminary for electronic equipment such as dashboard and signal Led board. And it also be widely used for indoor and outdoor decorative lighting.

Features:

Color	Material
Red	Red-AlGaInP
Orange	Orange -AlGaInP
Yellow	Yellow -AlGaInP
Yellow Green	Yellow Green –AlGaInP
Green	Green-InGaN
Blue	Blue-InGaN
White	Blue-InGaN

- Wide Viewing Angle
- Reflow Solderable
- High Luminous Intensity and Low Power Dissipation
- Good Reliability and Long Life
- Complied With RoHS Directive

Electrical Characteristics

✧ **Absolute Maximum Ratings (Temperature=25°C):**

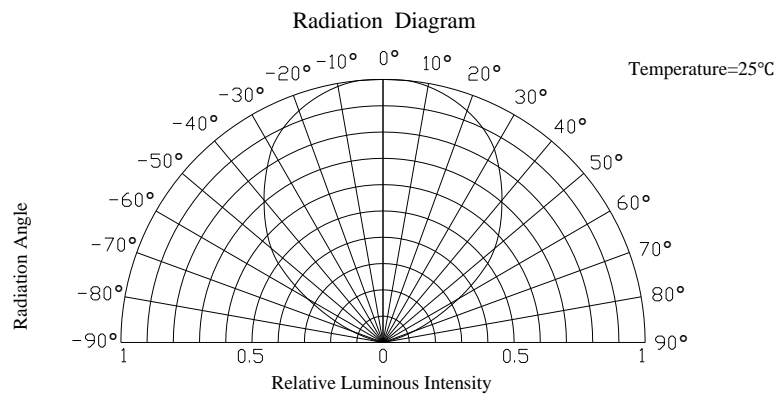
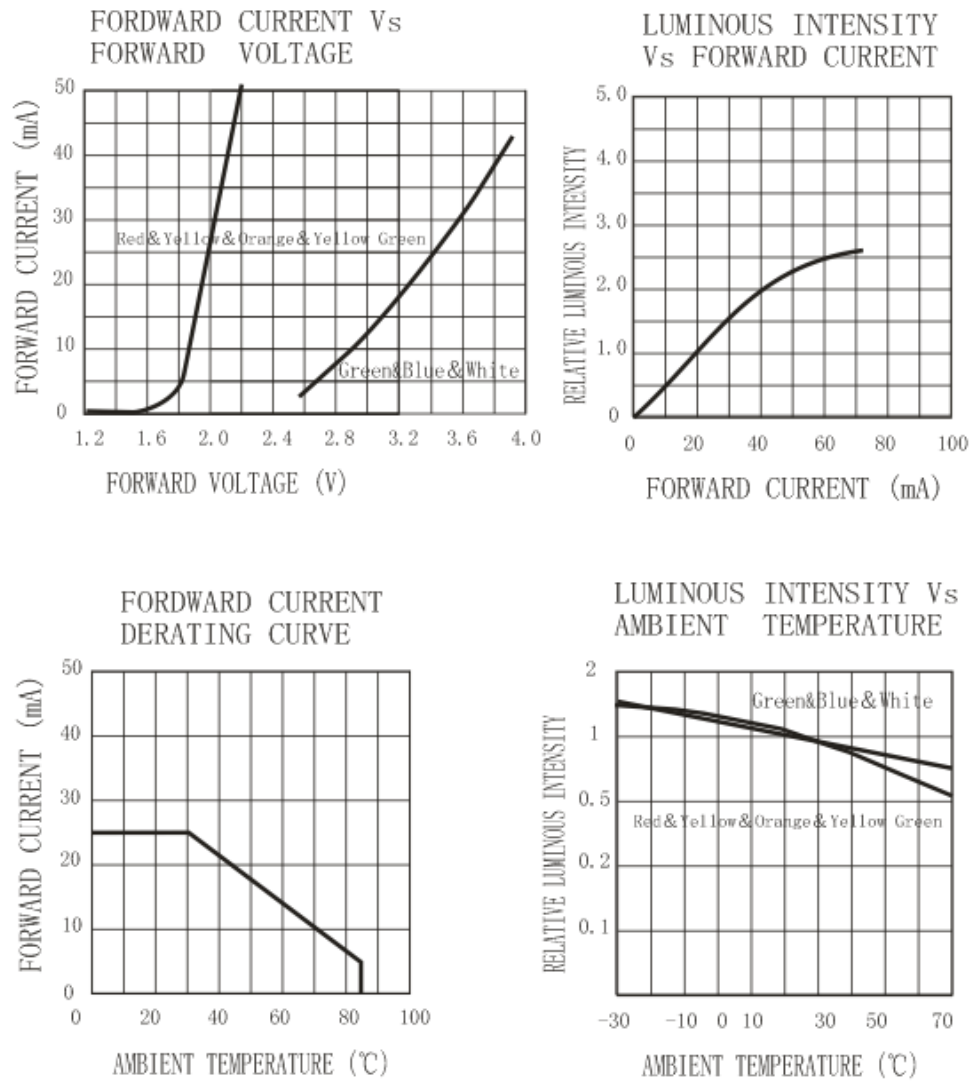
Parameter	Symbol	Rating		Unit
Forward Current	I _F	75 Max.		mA
Pulse Forward Current [*]	I _{FP}	200 Max.		mA
Reverse Voltage	V _R	5 Max.		V
Operating Temperature	T _{OPR}	-30 ~ +85		°C
Storage Temperature	T _{stg}	-40 ~ +100		°C
Power Dissipation	P _D	R	150 MAX	mW
		O		
		Y		
		YG		
		G	200 MAX	
		B		
		W		

● Note: Pulse width $\leq 0.1\text{ms}$, Duty $\leq 1/10^*$


✧ Electro-Optical Characteristics (Temperature=25°C):

Part Number	EMITTED COLOR	Lens Color	Dominant Wavelength (nm)	IV (mcd)		Test Current IF (mA)	VF (v) Typ.	View Angle 2θ1/2
				Min	Typ			
FM-T5050HRK-624O	Super Red	Water Clear	624	1400	1800	60mA	2.2	110
FM-P5050HRK-624F			624	1200	1500		2.0	
FM-T5050HOK-605O	Orange		606	1400	1800		2.2	110
FM-T5050HYK-589O	Super Yellow		585	1400	1800		2.2	110
FM-T5050UGK-520D	Super Green		520	1500	2200		3.2	110
FM-T5050BK-470D	Super Blue		470	600	1200		3.2	110
FM-T5050WD-460R	Cool White	Yellow diffused	8000K	5000	6000	60mA	3.2	110
FM-T5050WLD-460R	Warm White		3300K	4000	5000		3.0	110
FM-P5050WD-460G60	Cool White		8000K	4000	5500			
FM-P5050WDD-460G60	Nature White		4100K	400	5000			
FM-P5050WLD-460G60	Warm White		3100K	3500	4500			
FM-5050SQGIBIK	Tri Color	Water Clear	R:620	250	300	20mA	2.0	110
			G:520	1000	1300		3.2	
			B:470	300	400		3.2	
FM-5050SHGTBTK	Tri Color		R:625	600	750		2.0	110
			G:520	1500	1800		3.2	
			B:470	400	500		3.2	
FM-H5050SEGWBWK	Tri Color		R:624	180	800		2.0	110
			G:520	1500	1800		3.2	
			B:470	400	500		3.2	

Typical Characteristics Curves



Reliability Test Items And Conditions

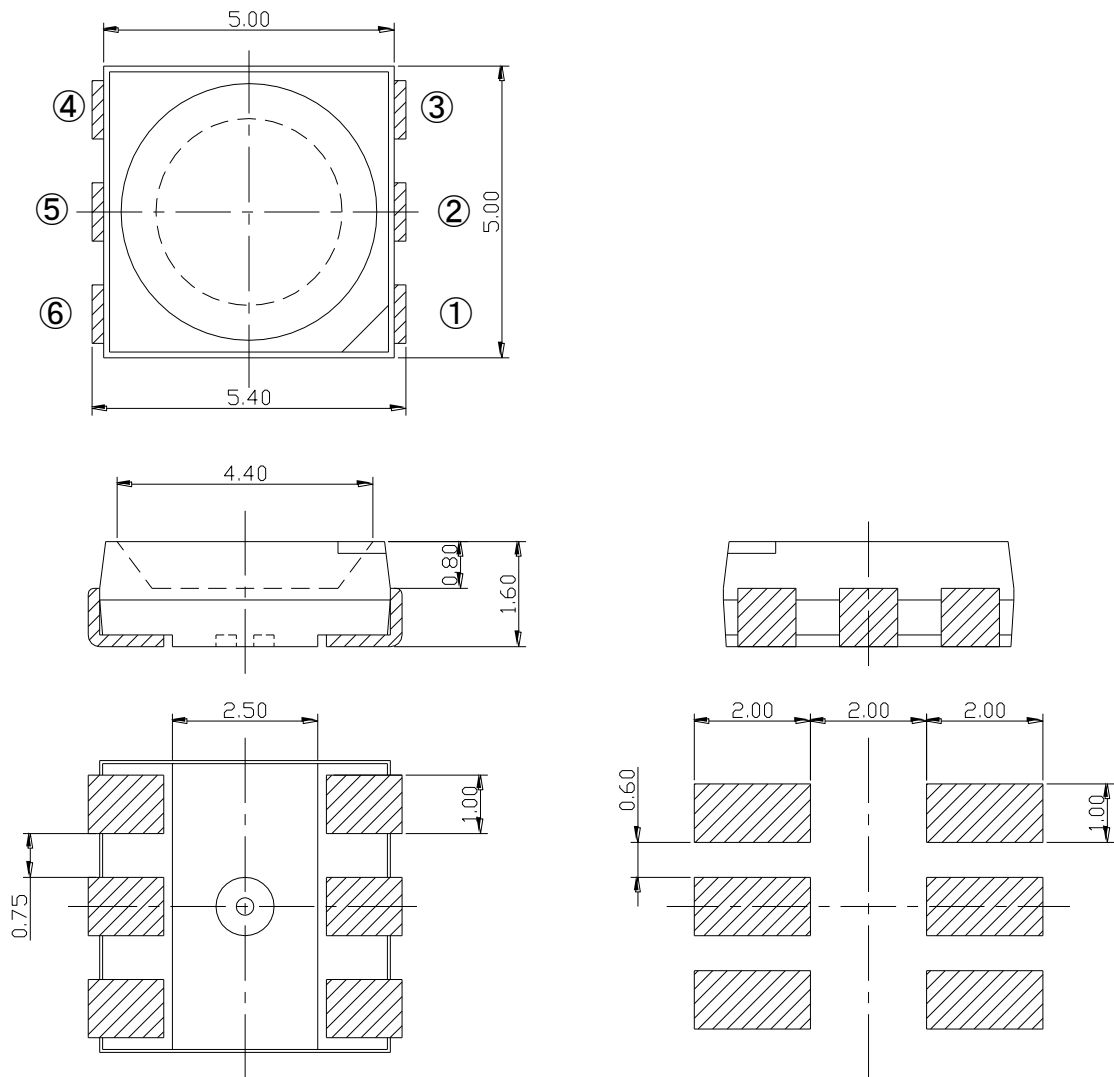
Test Items	Test Conditions	Quantity	Judging Criteria
Solderability	Solder Temperature: 300℃ Solder Duration: (3.5±0.5) sec.	15	Solderable Area Over 95%
Thermal Shock Followed by High Temperature And High Humidity Cyclic	-40℃ → 10 min. 5 Cycles  Shift (2~3) min. 100℃ → 10 min. ↓ 25℃~55℃ (90%~95%) RH 2 Cycles for 48 hrs., Recover for 2 hrs.	11	C=0 & I**
Resistance For Soldering Heat	Reflow Soldering	15	C=0 & I**
DC Operating Life	1000 hrs. Forward Current: 25mA	22	C=0 & I*
High Temperature Storage	100℃ → 1000 hrs.	15	C=0 & I*
High Temperature And High Humidity Cyclic	25℃~55℃ (90%~95%) RH 6 Cycles for 144 hrs., Recover for 2 hrs.	11	C=0 & I*

*1 Criteria For Judging Damage

Items	Symbol	Test Conditions	Criteria For Judging Damage I*	Criteria For Judging Damage I**
Forward Voltage	V _F	I _F =20mA	≥USL×1.2	≥USL
Reverse Current	I _R	V _R =5V	≥USL×2.0	≥USL
Luminous Intensity	I _V	I _F =20mA	≤LSL×0.5	≤LSL

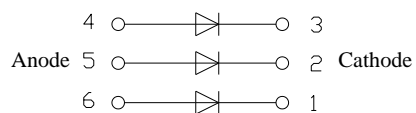
* USL: Upper Standard Level, LSL: Lower Standard Level *

Outline Dimensions



T5050 Single Color

Recommended Soldering Pad

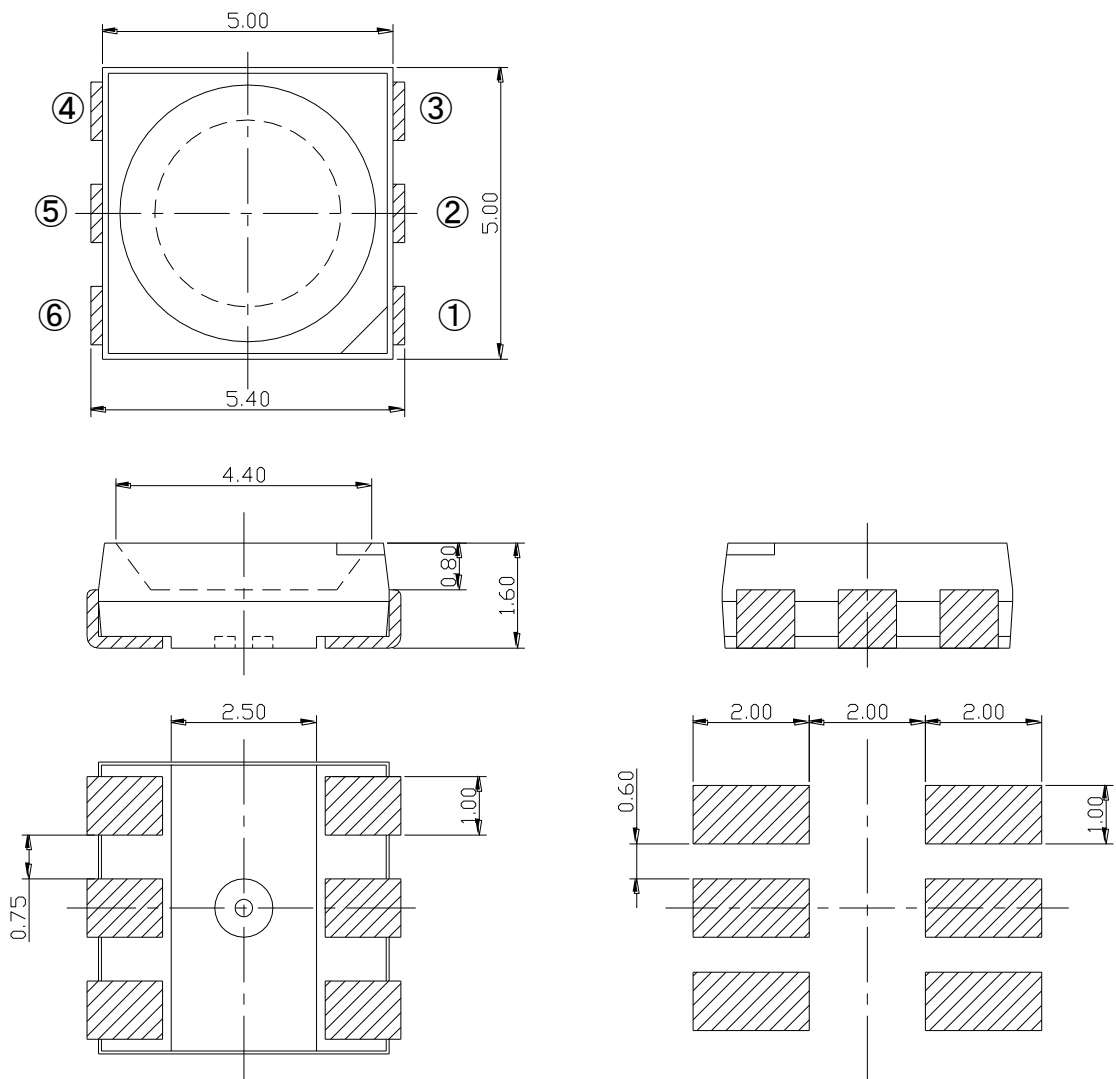


Polarity

Note:

All dimensions in mm.

Tolerances unless mentioned is ± 0.1 mm.




P5050 Single Color

Recommended Soldering Pad

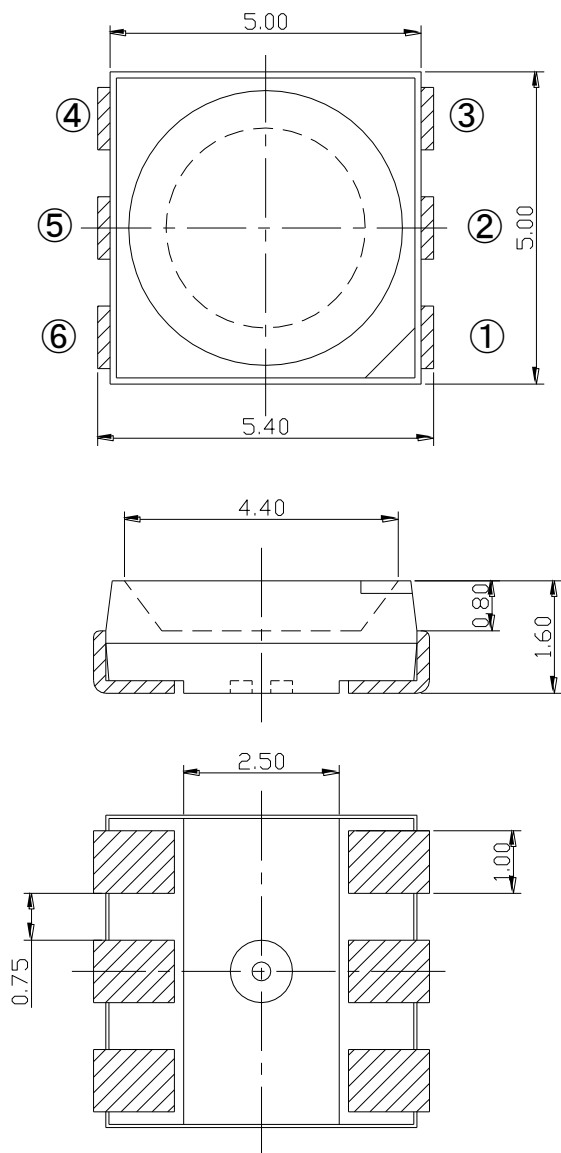
Note:

All dimensions in mm.

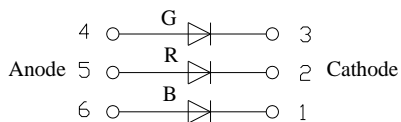
Tolerances unless mentioned is ± 0.1 mm.

Anode 5  2 Cathode

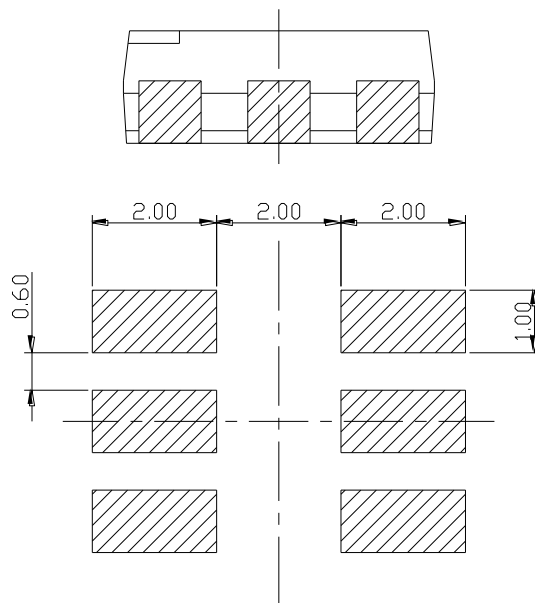
Polarity



5050SQQIBIK



Polarity

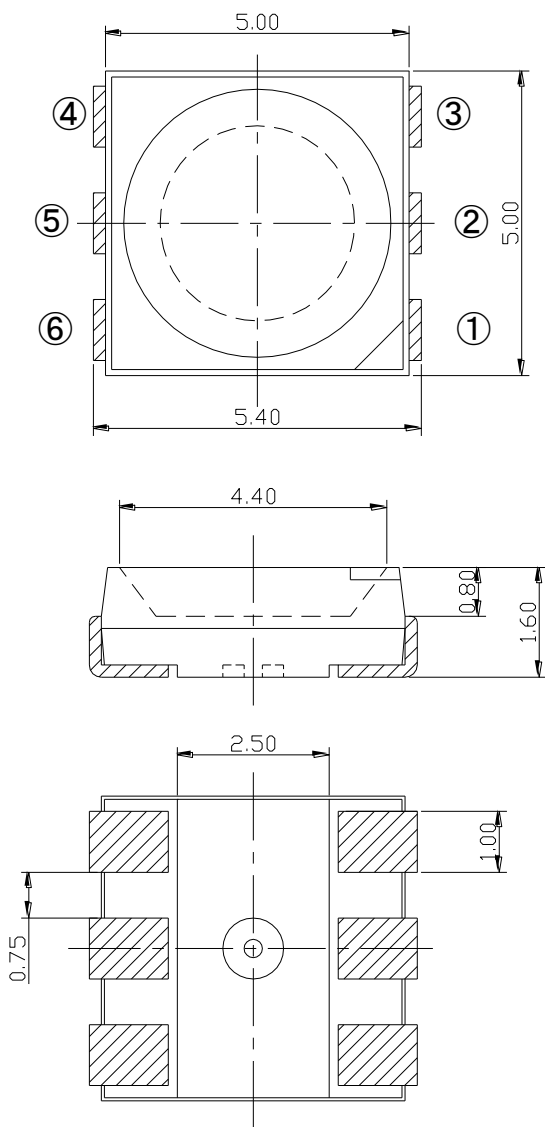


Recommended Soldering Pad

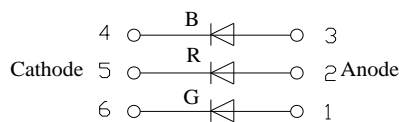
Note:

All dimensions in mm.

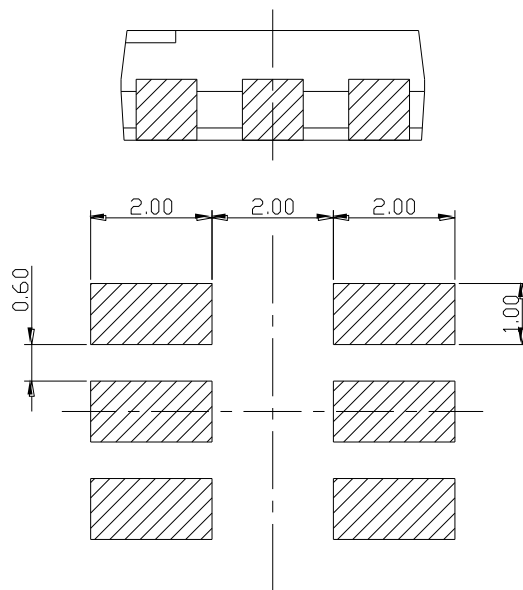
Tolerances unless mentioned is ± 0.1 mm.



5050SHGTBTK



Polarity

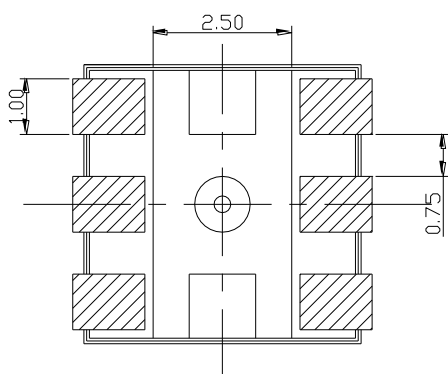
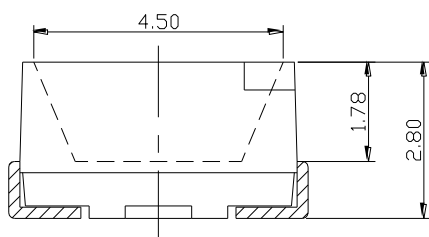
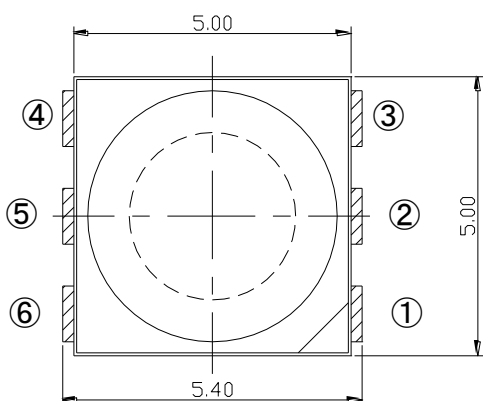


Recommended Soldering Pad

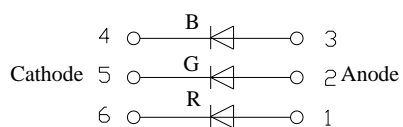
Note:

All dimensions in mm.

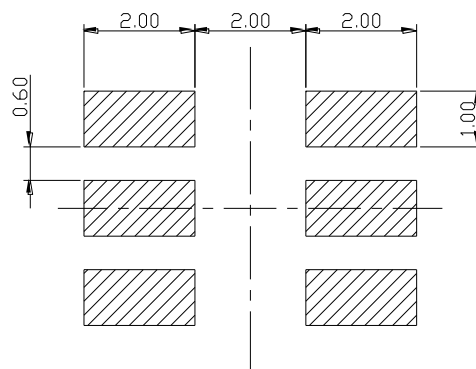
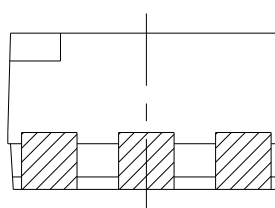
Tolerances unless mentioned is ± 0.1 mm.



H5050SEGWBWK



Polarity



Recommended Soldering Pad

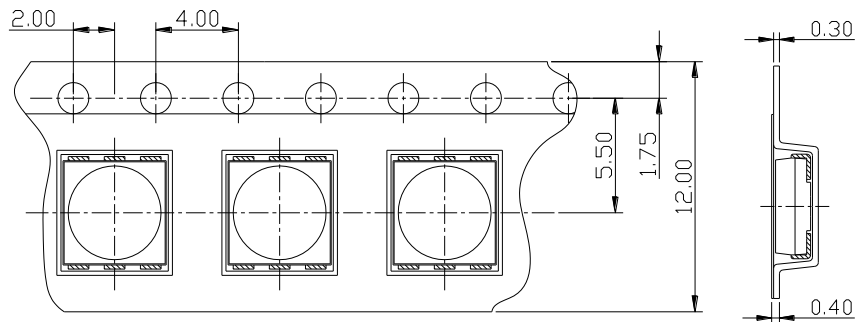
Note:

All dimensions in mm.

Tolerances unless mentioned is ± 0.1 mm.

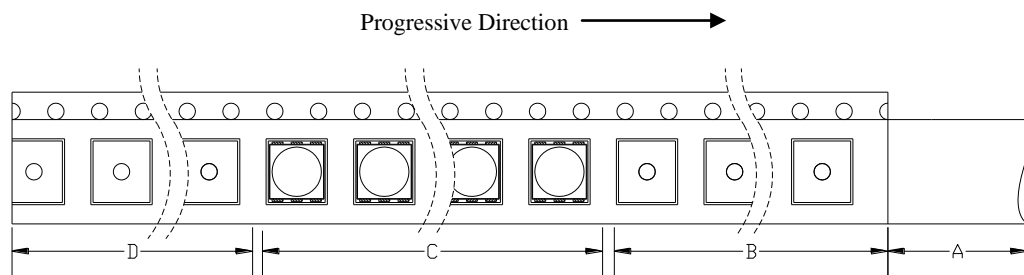
Packaging (1)

✧ Carrier Tape



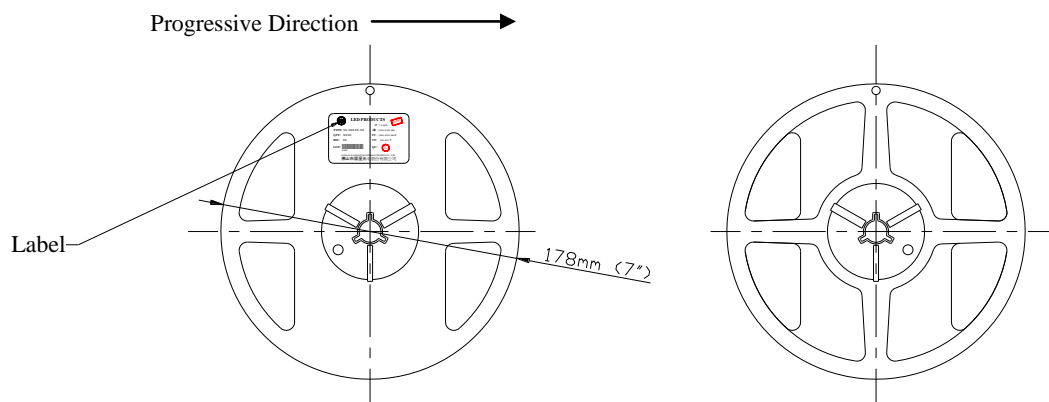
All dimensions in mm, tolerances unless mentioned is ± 0.1 mm.

✧ Details Of Carrier Tape



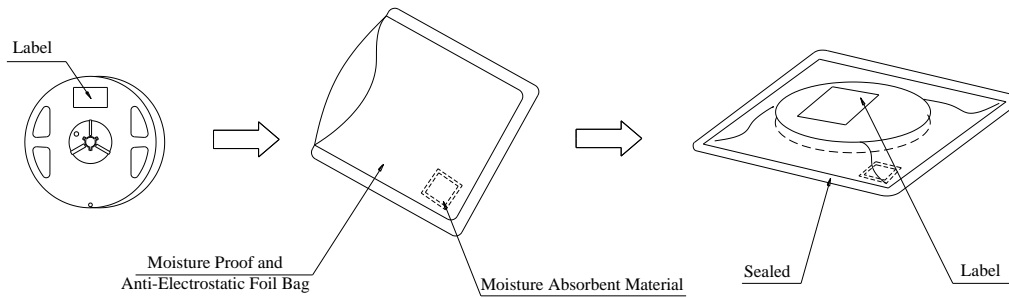
A: Top Cover Tape, 300mm; B: Leader, Empty, 200mm; C: 3500(H:1.6);2500(H:2.8) Lamps Loaded; D: Trailer, Empty, 200mm.

✧ Reel Dimension

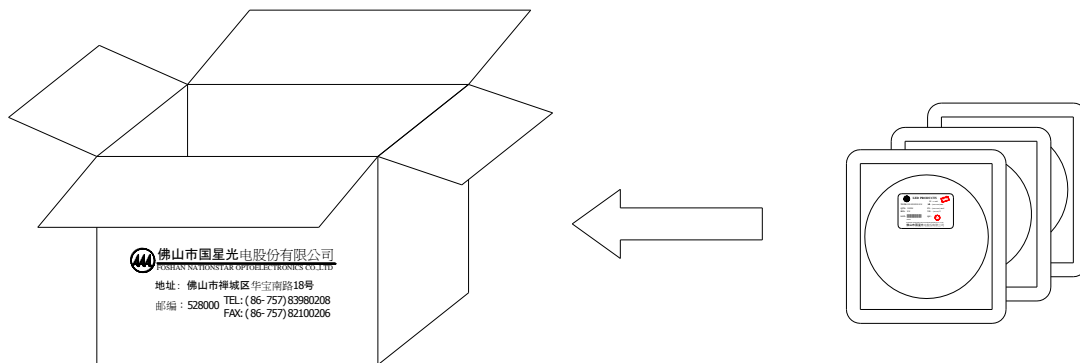


Packaging (2)

✧ Moisture Proof and Anti-Electrostatic Foil Bag



✧ Cardboard Box



✧ Label Explanation

QTY: Quantity

BIN: Rank

LOT: Lot Number

λ_d : Wavelength Range or (Xx-x)

IV: Luminous Intensity Range

VF: Forward Voltage Range

IF: Testing Current

444	TOP LEDS	RoHS
	IF = x mA	
TYPE: XX-XXXXXX-XX	λ_d : (xxx-xxx) nm	
QTY: XXXX	IV: (xxx-xxx) mcd	
BIN: XX	VF: (xx-xx) V	
LOT: 	QC: 	
XXXX		
FOSHAN NATIONSTAR OPTOELECTRONICS CO., LTD 佛山市国星光电股份有限公司		

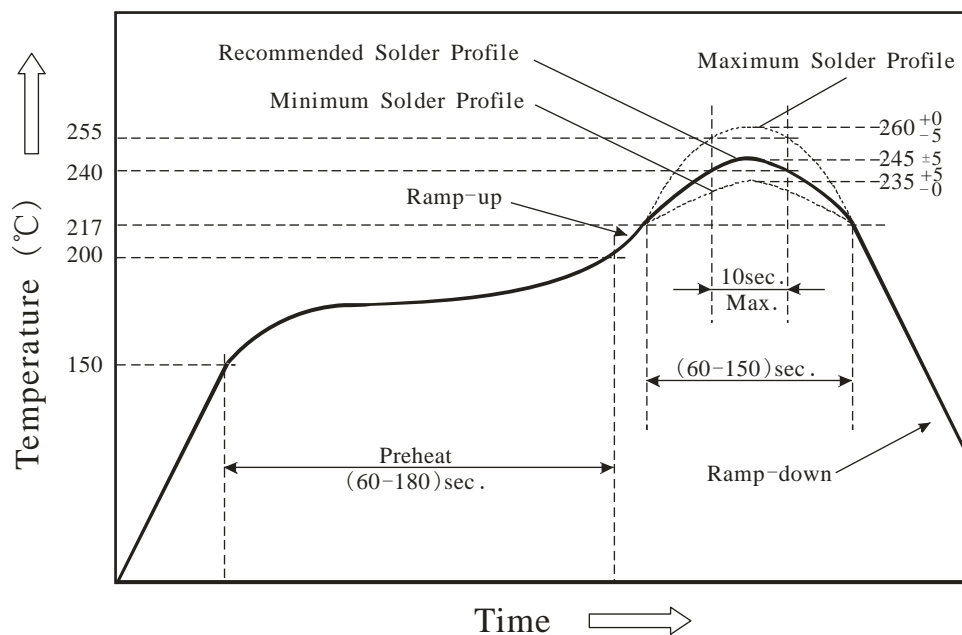
Guideline for Soldering

1. Hand Soldering

A soldering iron of less than 20W is recommended to be used in Hand Soldering. Please keep the temperature of the soldering iron under 300°C while soldering. Each terminal of the LED is to go for less than 3 second and for one time only.

Be careful because the damage of the product is often started at the time of the hand soldering.

2. Reflow Soldering: Use the conditions shown in the under Profile of Pb-Free Reflow Soldering.



- Reflow soldering should not be done more than two times.
- Stress on the LEDs should be avoided during heating in soldering process.
- After soldering, do not deal with the product before its temperature drop down to room temperature.

3. Cleaning

It is recommended that alcohol be used as a solvent for cleaning after soldering. Cleaning is to go under 30°C for 3 minutes or 50°C for 30 seconds. When using other solvents, it should be confirmed beforehand whether the solvents will dissolve the package and the resin or not.

Ultrasonic cleaning is also an effective way for cleaning. But the influence of Ultrasonic cleaning on LED depends on factors such as ultrasonic power. Generally, the ultrasonic power should not be higher than 300W. Before cleaning, a pre-test should be done to confirm whether any damage to LEDs will occur.

Note: This general guideline may not apply to all PCB designs and configurations of all soldering equipment. The technique in practice is influenced by many factors, it should be specialized base on the PCB designs and configurations of the soldering equipment.

Precautions (1)

1. Storage

- Moisture proof and anti-electrostatic package with moisture absorbent material is used, to keep moisture to a minimum.
- Before opening the package, the product should be kept at 30°C or less and humidity less than 60% RH, and be used within a year.
- After opening the package, the product should be stored at 30°C or less and humidity less than 10%RH, and be soldered within 24 hours (1 days). It is recommended that the product be operated at the workshop condition of 30°C or less and humidity less than 60%RH.
- If the moisture absorbent material has fade away or the LEDs have exceeded the storage time, baking treatment should be performed based on the following condition: $(80 \pm 5)^{\circ}\text{C}$ for 24 hours.

2. Static Electricity

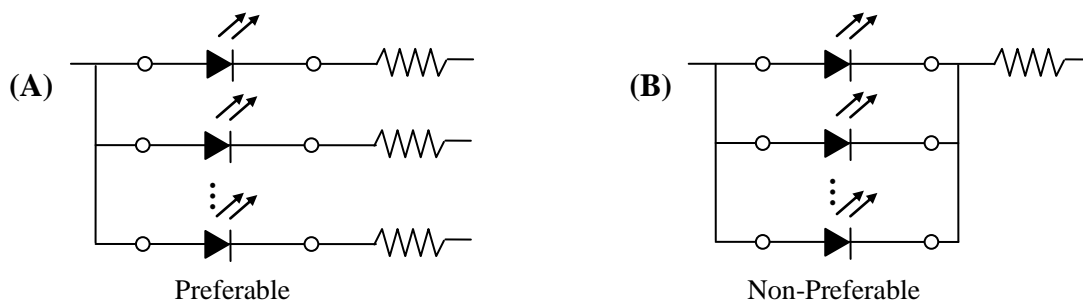
Static electricity or surge voltage damages the LEDs. Damaged LEDs will show some unusual characteristics such as the forward voltage becomes lower, or the LEDs do not light at the low current., even not light.

All devices, equipment and machinery must be properly grounded. At the same time, it is recommended that wrist bands or anti-electrostatic gloves, anti-electrostatic containers be used when dealing with the LEDs.

3. Design Consideration

In designing a circuit, the current through each LED must not exceed the absolute maximum rating specified for each LED. In the meanwhile, resistors for protection should be applied, otherwise slight voltage shift will cause big current change, burn out may happen.

It is recommended to use Circuit A which regulates the current flowing through each LED rather than Circuit B. When driving LEDs with a constant voltage in Circuit B, the current through the LEDs may vary due to the variation in Forward Voltage (V_F) of the LEDs. In the worst case, some LED may be subjected to stresses in excess of the Absolute Maximum Rating.

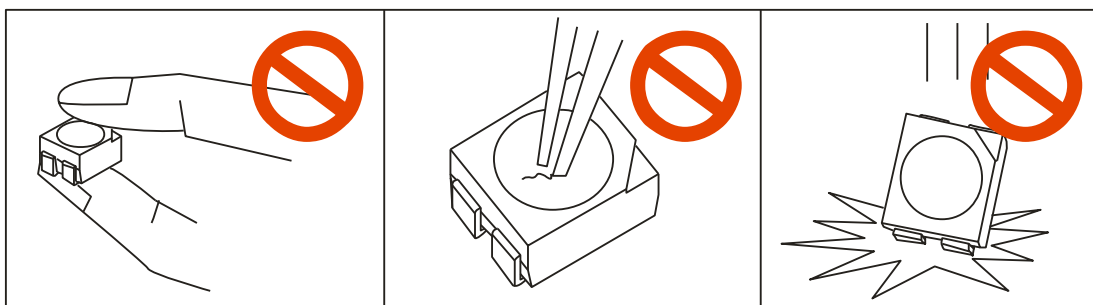


Thermal Design is paramount importance because heat generation may result in the Characteristics decline, such as brightness decreased, Color changed and so on. Please consider the heat generation of the LEDs when making the system design.

Precautions (2)

4. Others

When handling the product, touching the encapsulant with bare hands will not only contaminate its surface, but also affect on its optical characteristics. Excessive force to the encapsulant might result in catastrophic failure of the LEDs due to die breakage or wire deformation. For this reason, please do not put excessive stress on LEDs, especially when the LEDs are heated such as during Reflow Soldering.



The epoxy resin of encapsulant is fragile, so please avoid scratch or friction over the epoxy resin surface. While handling the product with tweezers, do not hold by the epoxy resin, be careful.

5. Safety Advice For Human Eyes

Viewing direct to the light emitting center of the LEDs, especially those of great Luminous Intensity will cause great hazard to human eyes. Please be careful.

Appendix

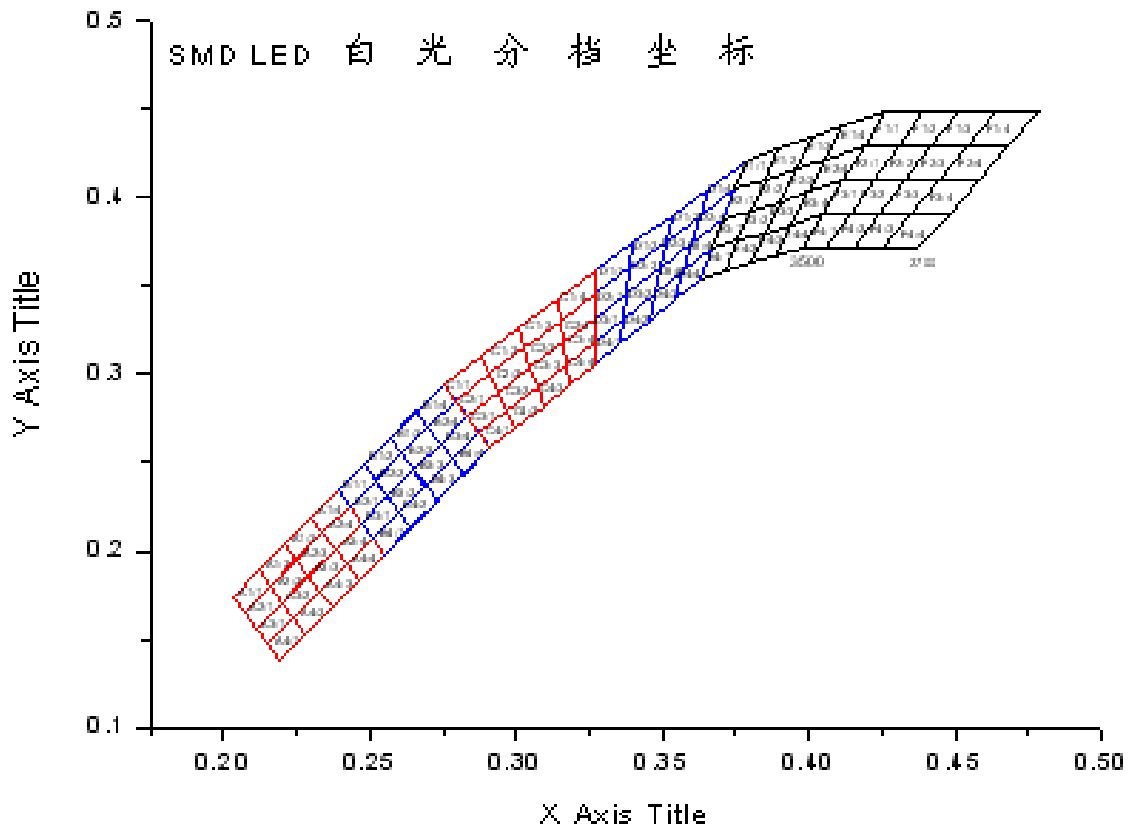
IV(mcd) BINS:		Detailed Bracket			
IV(mcd)	IV(mcd)	IV(mcd)	IV(mcd)	IV(mcd)	IV(mcd)
80-100	180-220	400-500	900-1200	2200-2700	5000-6000
100-120	220-270	500-600	1200-1500	2700-3300	6000-7500
120-150	270-330	600-750	1500-1800	3300-4000	7500-9000
150-180	330-400	750-900	1800-2200	4000-5000	9000-12000

V_F(V) BINS:		Detailed Bracket		
V_F(V)	V_F(V)	V_F(V)	V_F(V)	V_F(V)
1.6-1.7	2.1-2.2	2.6-2.7	3.1-3.2	3.6-3.7
1.7-1.8	2.2-2.3	2.7-2.8	3.2-3.3	3.7-3.8
1.8-1.9	2.3-2.4	2.8-2.9	3.3-3.4	3.8-3.9
1.9-2.0	2.4-2.5	2.9-3.0	3.4-3.5	3.9-4.0
2.0-2.1	2.5-2.6	3.0-3.1	3.5-3.6	

λ_D (nm) BINS

	λ_D (nm)		λ_D (nm)		
Blue	463-466	Green	515-517.5	527.5-530	554-556
	466-469		517.5-520	530-532.5	556-558
	469-472		520-522.5	532.5-535	558-560
	472-475		522.5-525		560-562
Yellow Green	568-570	Yellow	525-527.5		562-564
	570-572		580-582.5	590-592.5	
	572-574		582.5-585	592.5-595	
	574-576		585-587.5		
Orange	598~601	Red	587.5-590		
	601~604		620~625		
	604~607		625-635		
	607~610		635-650		

White (X,Y) BINS:



		Bottom	Left	Top	Right			Bottom	Left	Top	Right
A ☒ X:0.229 Y:0.186	X	0.219	0.203	0.239	0.255	B ☒ X:0.265 Y:0.246	X	0.255	0.239	0.275	0.291
	Y	0.138	0.174	0.234	0.198		Y	0.198	0.234	0.294	0.258
C ☒ X:0.305 Y:0.304	X	0.291	0.275	0.327	0.327	D ☒ X:0.349 Y:0.36	X	0.327	0.327	0.379	0.363
	Y	0.258	0.294	0.358	0.306		Y	0.306	0.358	0.422	0.354
E ☒ X:0.39 Y:0.398	X	0.363	0.379	0.426	0.398	F ☒ X:0.433 Y:0.41	X	0.398	0.426	0.479	0.437
	Y	0.354	0.422	0.448	0.372		Y	0.372	0.448	0.448	0.372
When the Label is printed Please give clear indication of color coordinate area （as: A1-2）											