



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-H5050RGBW-WQ

APPROVED SIGNATURES

APPROVED SIGNATURES			



Add: NO.18 South Huabao Rd,Foshan,Guangdong,China

Tel: 0086-0757-83985607,82100231,82109348

Fax: 0086-0757-82100221,82960551

Zip: 528000

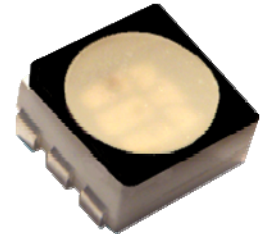
<http://www.nationstar.com>

Research & Development Center		
APPROVE	CHECK	DRAW
Version NO: B1		
Release Date: 2012-03-20		

FM-H5050RGBW-WQ Top Light Emitting Diode

Technical Data Sheet

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



Features:

- Material:

Red	Green	Blue
AlGaInP	InGaN	InGaN
- Top Tri-Color LED Lamp
- Encapsulation: Resin
- Reflow Solderable
- High Luminous Intensity and Low Power Dissipation
- Good Reliability and Long Life
- Complied With RoHS Directive

Catalogue

Electro-Optical Characteristics	2
Typical Characteristic Curves	3
Reliability Test Items And Conditions	4
Outline Dimensions	5
Packaging	6
Guideline for Soldering	8
Precautions	9

The Specifications of the product may be modified for improvement without notice.

Electro-Optical Characteristics

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

Parameter	Symbol	Rating	Unit
Forward Current	I_F	25	mA
Pulse Forward Current*	I_{FP}	100	mA
Reverse Voltage	V_R	5	V
Operating Temperature	T_{OPR}	-30 ~ +85	°C
Storage Temperature	T_{stg}	-40 ~ +100	°C
Power Dissipation	Red	65	mW
	Green	90	
	Blue	90	

* Note: Pulse width $\leq 0.1ms$, Duty $\leq 1/10$ *

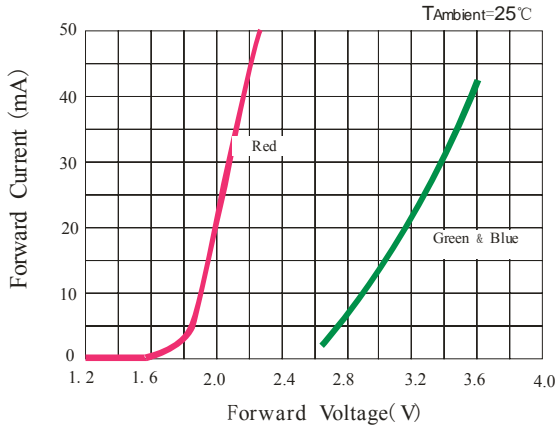
✧ Electro-Optical Characteristics (Temperature=25°C):

Parameter	Symbol	Condition	Color	Min.	Typ.	Max.	Unit
Reverse Current	I_R	$V_R=5V$	Red			10	μA
			Green			10	
			Blue			10	
Forward Voltage	V_F	$I_F=20mA$	Red	1.6	2.0	2.6	V
			Green	2.8	3.2	3.6	
			Blue	2.8	3.2	3.6	
Dominant Wavelength	λ_D	$I_F=20mA$	Red	615	620	630	nm
			Green	515	520	530	
			Blue	465	470	480	
Spectrum Radiation Bandwidth	$\Delta\lambda$	$I_F=20mA$	Red		20		nm
			Green		35		
			Blue		30		
Luminous Intensity*	I_V	$I_F=20mA$	Red	700	850	1000	mcd
			Green	1400	1950	2600	
			Blue	350	480	700	
View Angle	$2\theta_{1/2}$				110		deg.

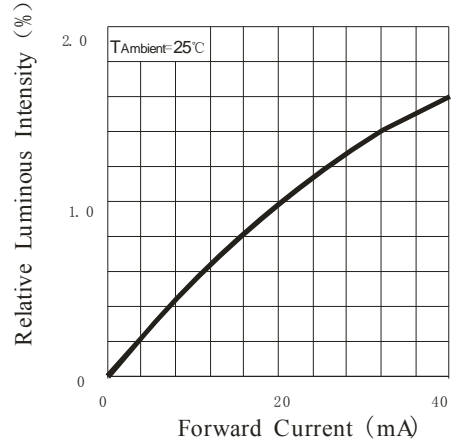
* Note: Luminous intensity is measured with a light sensor and filter combination that approximates the CIE eye-response curve. *

Typical Characteristics Curves

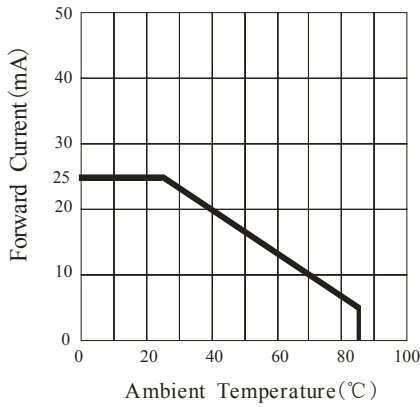
Volt-Ampere Characteristics



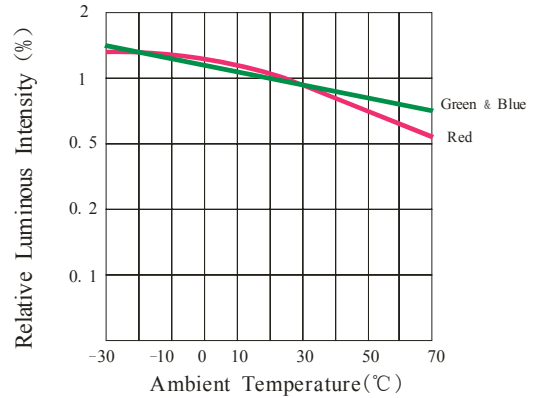
Relative Luminous Intensity VS Forward Current



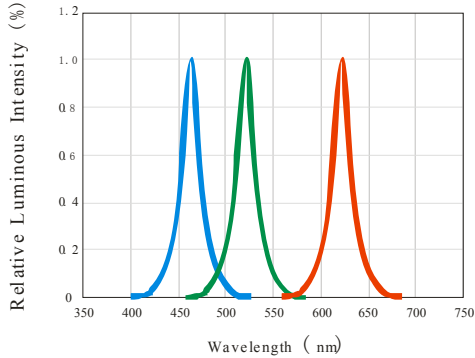
Forward Current Derating Curve



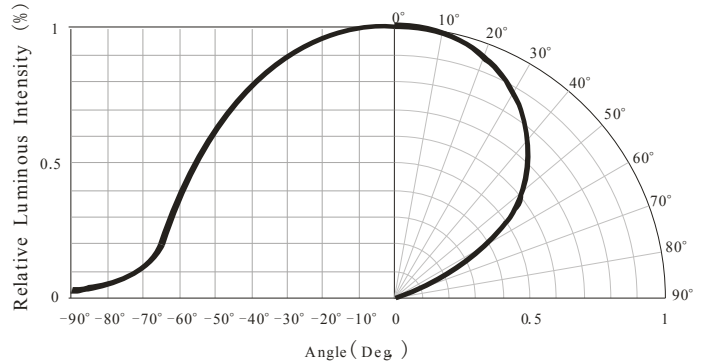
Luminous Intensity VS Ambient Temperature



Relative Spectral Distribution



Typical Spatial Distribution



Reliability Test Items And Conditions

ESD-damaged LEDs will exhibit abnormal characteristics such as high reverse leakage current, low forward voltage, or “no lightup” at low current.

To verify for ESD damage, check for “lightup” and V_F of the suspect LEDs at low currents.

The V_F of “good” LEDs should be $> 2.0V@0.1mA$ for InGaN product and $> 1.4V@0.1mA$ for AlInGaP product.

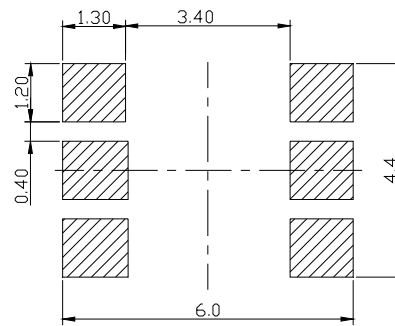
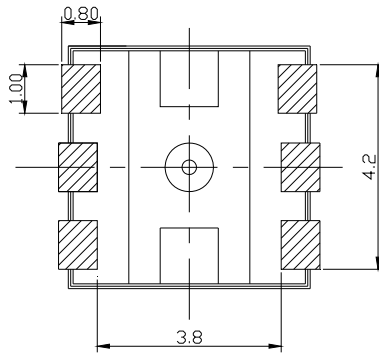
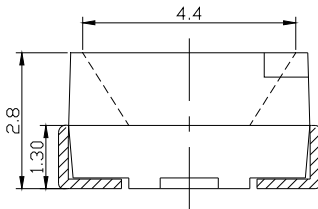
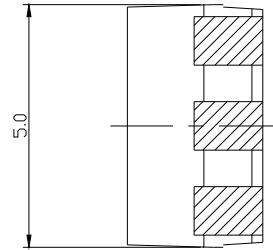
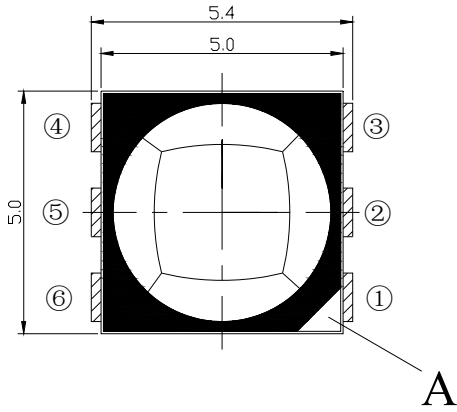
Test Items	Reference	Test Conditions	Time	Quantity	Criterion
Thermal Shock	MIL-STD-202G	-40°C(30min)←→100°C(30min)	200 cycles	22	0/22
Temperature And Humidity Cyclic	JEITA ED-4701 200 203	25°C~65°C , 90%RH 24hrs./1cycle	10 cycles	22	0/22
High Temperature Storage	JEITA ED-4701 200 201	Ta=100°C	1000h	22	0/22
Low Temperature Storage	JEITA ED-4701 200 202	Ta=-40°C	1000h	22	0/22
High Temperature High Humidity Storage	JEITA ED-4701 100 103	Ta=60°C , RH=90%	1000h	22	0/22
Life Test	JESD22-A108D	Ta=25°C IF _R =20mA,IF _G =20mA,IF _B =20mA	1000h	22	0/22
High Temperature Life Test	JESD22-A108D	Ta=80°C IF _R =20mA,IF _G =20mA,IF _B =20mA	1000h	22	0/22
Low Temperature Life Test	JESD22-A108D	Ta=-40°C IF _R =20mA,IF _G =20mA,IF _B =20mA	1000h	22	0/22
High Temperature High Humidity Life Test	JEITA ED-4701 100 102	Ta=60°C , RH=90% IF _R =20mA,IF _G =20mA,IF _B =20mA	1000h	22	0/22
Resistance to Soldering Heat	GB/T 4937, II ,2.2&2.3	Tsol*=(240±5)°C 10secs.	2 times	22	0/22

Criteria For Judging Damage

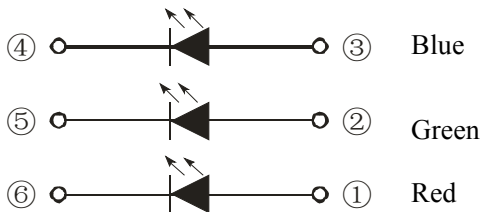
Test Items	Symbol	Test Conditions	Criteria For Judging Damage
Forward Voltage	V_F	$I_F = I_{FT}$	Initial Data \pm 10%
Reverse Current	I_R	$V_R = 5V$	$I_R \leq 10\mu A$
Luminous Intensity	I_V	$I_F = I_{FT}$	Average I_V degradation \leq 30%; Single LED I_V degradation \leq 50%
Resistance to Soldering Heat			Material without internal cracks, no material between stripped, no dead light.

* Note: T_{sol}-Temperature of tin liquid; I_{FT}: Typical current.

Outline Dimensions



Recommended Soldering Pad



Polarity

Note:

A : Nick Mark

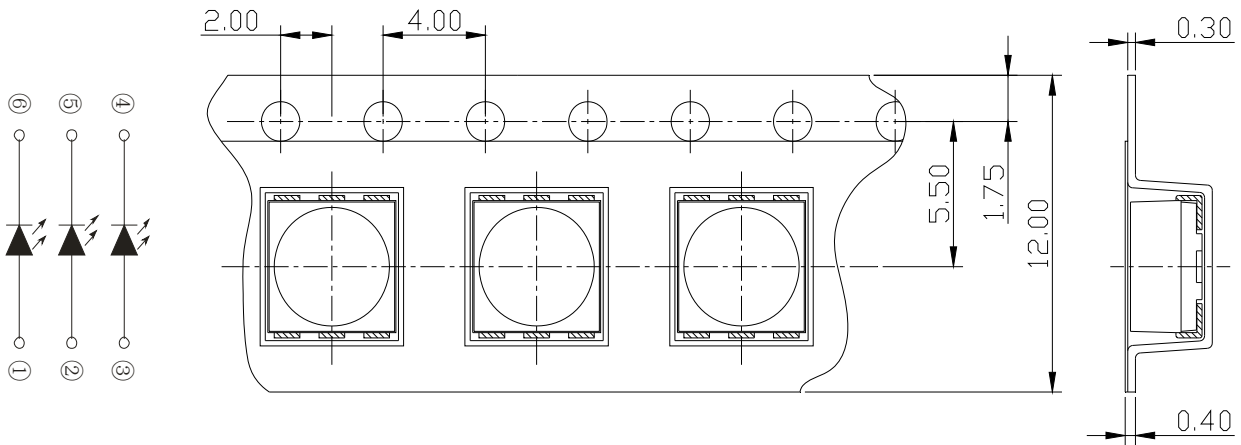
All dimensions in mm.

Tolerances: X.X ±0.1 mm

X.XX ±0.05mm

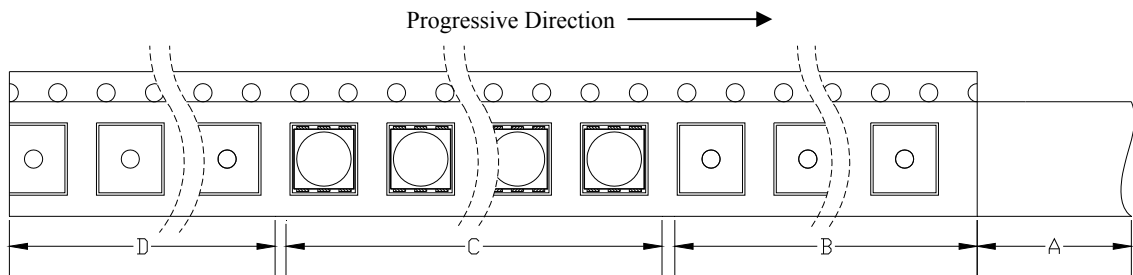
Packaging (1)

Carrier Tape



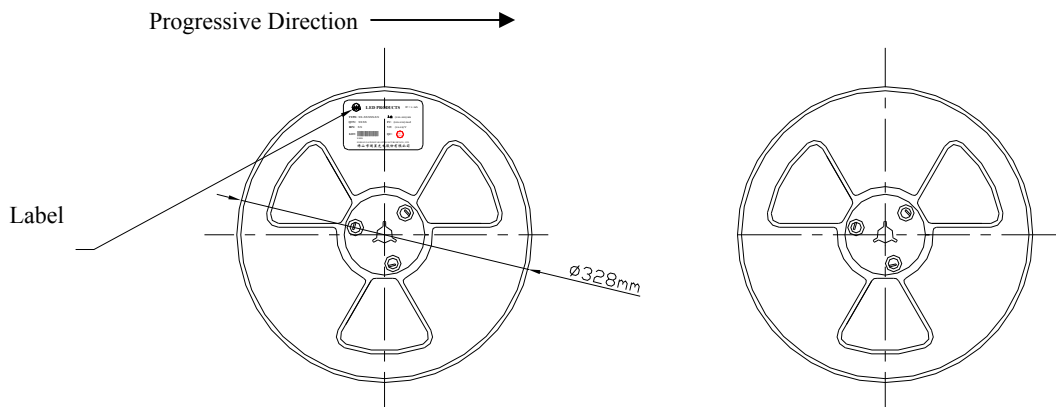
All dimensions in mm, tolerances unless mentioned is ± 0.1 mm.

Details Of Carrier Tape



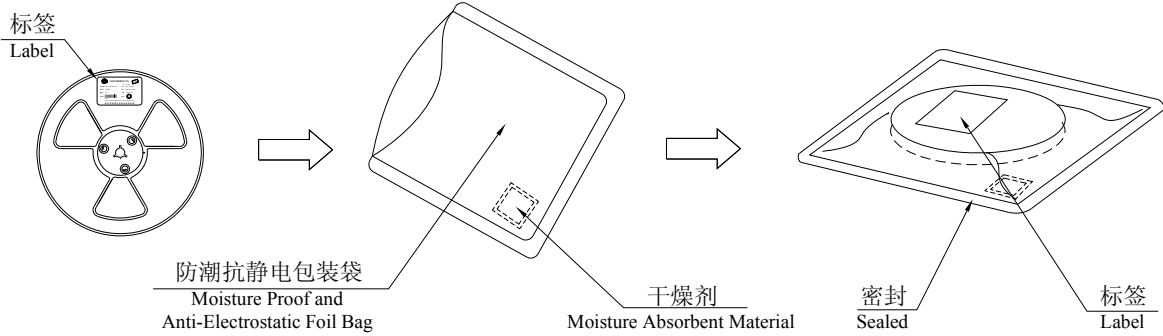
A: Top Cover Tape, 300mm; B: Leader, Empty, 200mm; C: 3500 Lamps Loaded; D: Trailer, Empty, 200mm.

Reel Dimension

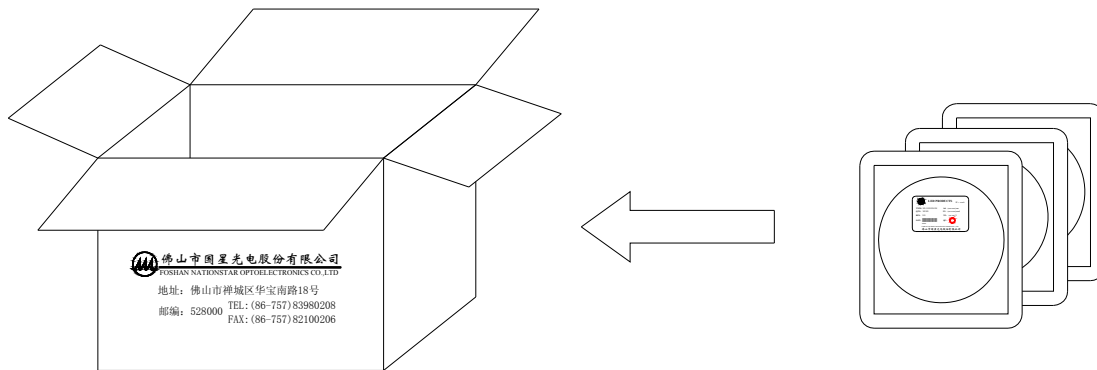


Packaging (2)

Moisture Proof and Anti-Electrostatic Foil Bag



Cardboard Box



Label Explanation

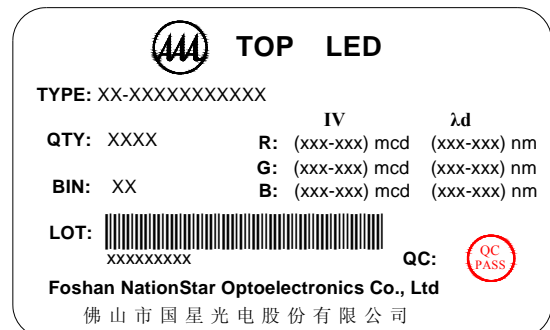
QTY: Quantity

BIN: Rank

LOT: Lot Number

λd : Wavelength Range


IV: Luminous Intensity Range




TOP LED

TYPE: XX-XXXXXXXXXX

	IV	λd
QTY: XXXX	R: (xxx-xxx) mcd	(xxx-xxx) nm
	G: (xxx-xxx) mcd	(xxx-xxx) nm
BIN: XX	B: (xxx-xxx) mcd	(xxx-xxx) nm

LOT: 
XXXXXXXXXX

QC: 

Foshan NationStar Optoelectronics Co., Ltd
佛山市国星光电股份有限公司

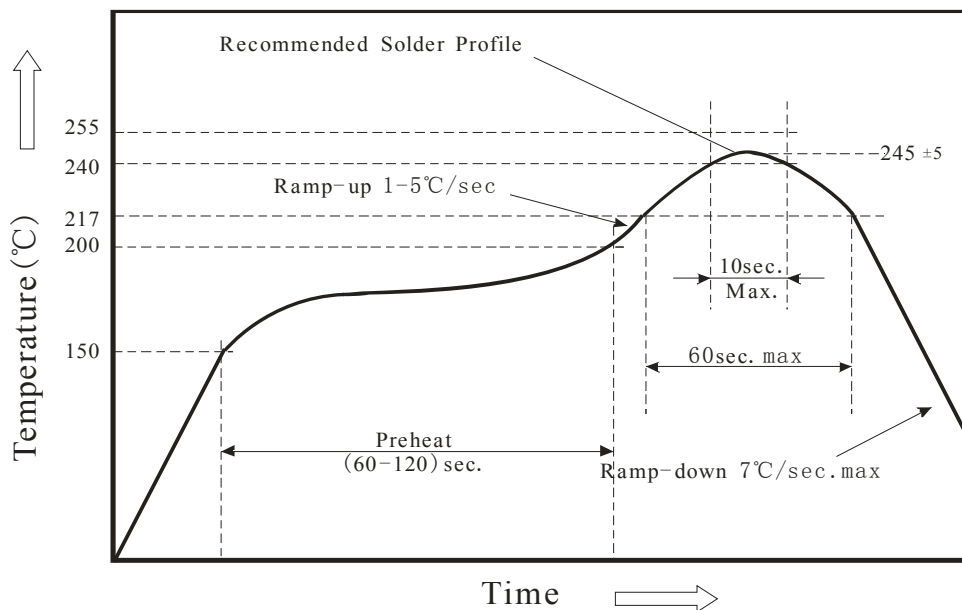
Guideline for Soldering

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 360°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 soldered within 24 hours. If not, please store at 30°C or less and humidity less than 10%RH. 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 faded away or the LEDs have exceeded the storage time, baking treatment should be performed based on the following condition: $(60 \pm 5)^{\circ}\text{C}$ for 24 hours.

2. Static Electricity

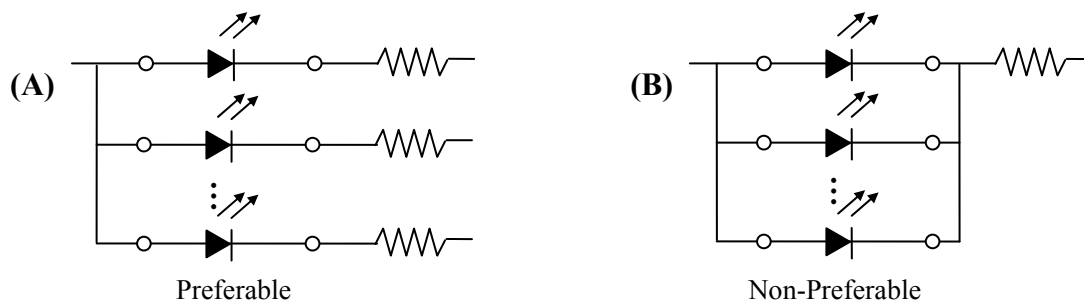
Static electricity or surge voltage damages the LEDs. Damaged LEDs will show some unusual characteristics such as the forward voltage becomes lower, or the LEDs do not light at the low current. even not light.

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. Reverse voltage protection

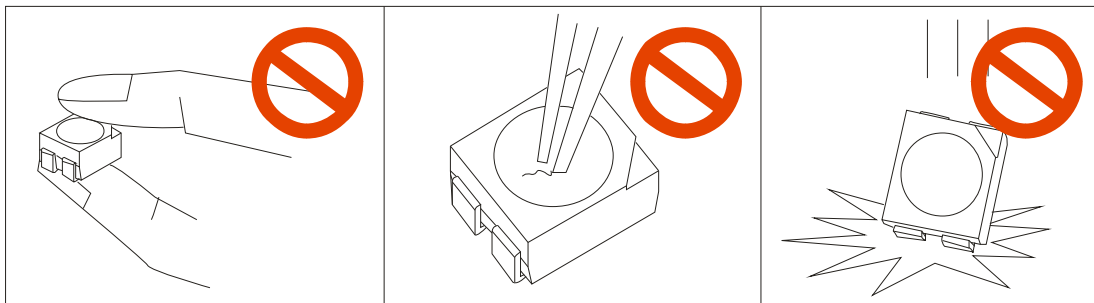
In generally the reverse current of LED is very small, it can't effect using the component normally, but when it often suffered the reverse voltage which exceed the limits of the component than it will be damaged, the reverse current increases rapidly causing the LED degenerating rapidly so when designing , please pay attention to control the reverse voltage we suggest the reverse voltage less than 10V.

5. The safe temperature for LEDs working

The high temperature will make the LEDs' Luminous Intensity decreased radically, if LEDs worked in hot environment for a long time, they will be disabled easily. When LEDs are working in a closed array, we suggest that the LEDs' surface temperature should be lower than 55°C and the legs' temperature should be lower than 75°C.

6. 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.