

# MULTI-COLOR SPECIFICATION FOR SMD 2727WSI

## MC-S2727WSI

- FEATURES:**
- Size (mm): 2.7×2.8×2.45
  - High Luminous Intensity
  - High reliability
  - Good UV resistance performance
  - Multiple Waterproofness
  - Pb-free Reflow soldering Application
  - RoHS Compliant

## 1. SPECIFICATIONS

### 1.1 Absolute Maximum Ratings (Ta=25°C)

Item	Symbol	Absolute Maximum Rating			Unit
		Red	Green	Blue	
Forward Current	I <sub>F</sub>	30	30	30	mA
Pulse Forward Current	I <sub>FP</sub>	100	100	100	mA
Reverse Voltage	V <sub>R</sub>	5	5	5	V
Power dissipation	P <sub>D</sub>	62	100	100	mW
Operating Temperature	T <sub>opr</sub>	-30 to +85	-30 to +85	-30 to +85	°C
Storage Temperature	T <sub>stg</sub>	-40 to +100	-40 to +100	-40 to +100	°C

\* I<sub>FP</sub> conditions with pulse width ≤10ms and duty cycle ≤10%.

### 1.2 Optical and Electrical Characteristics (Ta=25°C)

Item	Symbol	Condition	Red		Green		Blue		Unit
			Min	Max	Min	Max	Min	Max	
Forward Voltage	V <sub>F</sub>	I <sub>F</sub> =20mA	1.7	2.45	2.5	3.65	2.5	3.65	V
Reverse Current	I <sub>R</sub>	V <sub>R</sub> =5V	--	1	--	1	--	1	μA
Wavelength	λ <sub>D</sub>	I <sub>F</sub> =20mA	615	630	520	540	460	480	nm
			3nm per Bin		3nm per Bin		3nm per Bin		
Luminous Intensity	I <sub>V</sub>	I <sub>F</sub> =20mA	Typ. 900		Typ. 1850		Typ. 350		mcd

\* Each Bin: I<sub>V</sub>(Max):I<sub>V</sub>(Min) ≤1.2.

\* Tolerance of measurements of the Forward Voltage is ±0.05V.

\* Tolerance of measurements of the Luminous Intensity is ±5%.

\* Tolerance of measurements of the Wavelength is ±0.5nm.

## 2. RELIABILITY

Test Item	Standard Test Method	Test Conditions	Test Duration	Units Failed/Tested
Resistance to Soldering Heat (Reflow Soldering)	JEITA ED-4701 300 301	Tsld=260°C,10sec.	5times	0/100
Temperature Cycle		-65°C~150°C 15min. 15min. (30min./cycle)	200cycles	0/100
Temperature Cycle	JEITA ED-4701 100 105	-40°C~25°C~100°C~25°C 30min. 5min. 30min. 5min	100cycles	0/100
Moisture Resistance (Cyclic)	JEITA ED-4701 200 203	25°C~65°C~-10°C 90%RH, 24hr per cycle	10cycles	0/100
High Temperature Storage	JEITA ED-4701 200 201	Ta=100°C	500hrs	0/100
Temperature Humidity Storage		Ta=85°C,RH=85%	500hrs	0/100
Low Temperature Storage	JEITA ED-4701 200 202	Ta=-40°C	500hrs	0/100
Room Temperature Operating Life		Ta=25°C, I <sub>F</sub> =15mA	1000hrs	0/10
Temperature Humidity Operating Life		Ta=85°C,RH=85% I <sub>F</sub> =15mA	500hrs	0/10
Low Temperature Operating Life		Ta=-30°C, I <sub>F</sub> =15mA	1000hrs	0/10

NOTES:

\*Measurements are performed after allowing the LEDs to return to room temperature.

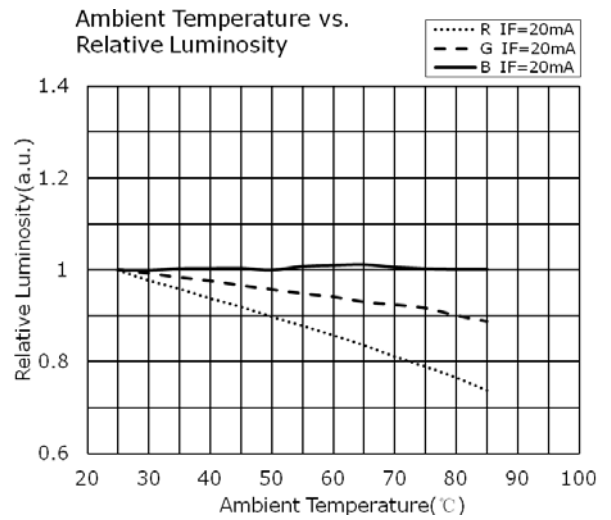
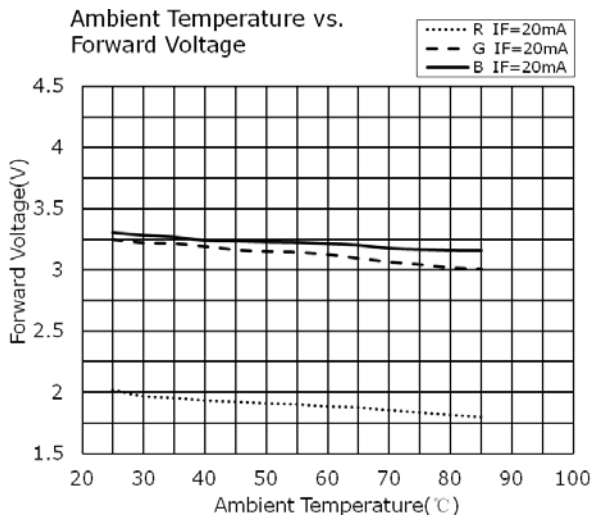
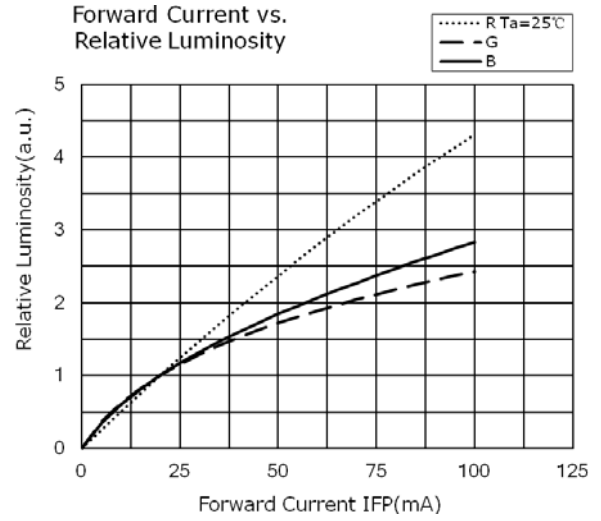
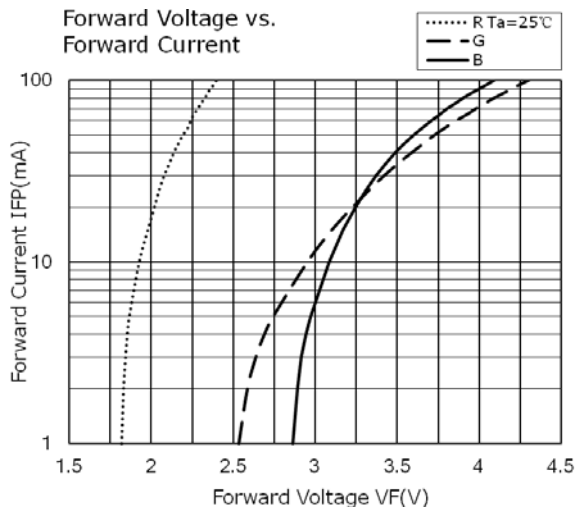
\*Criteria for Judging Damage

Item	Symbol	Test Conditions	Criteria for Judgement	
			Min.	Max.
Forward Voltage	V <sub>F</sub>	I <sub>F</sub> =20mA	-	U.S.L. ×1.1
Reverse Current	I <sub>R</sub>	V <sub>R</sub> =5V	-	U.S.L. ×2.0
Luminous Intensity	I <sub>v</sub>	I <sub>F</sub> =20mA	L.S.L. ×0.8	-

U.S.L.: Upper Standard Level L.S.L.: Lower Standard Level

### 3. TYPICAL ELECTRICAL CHARACTERISTICS CURVES

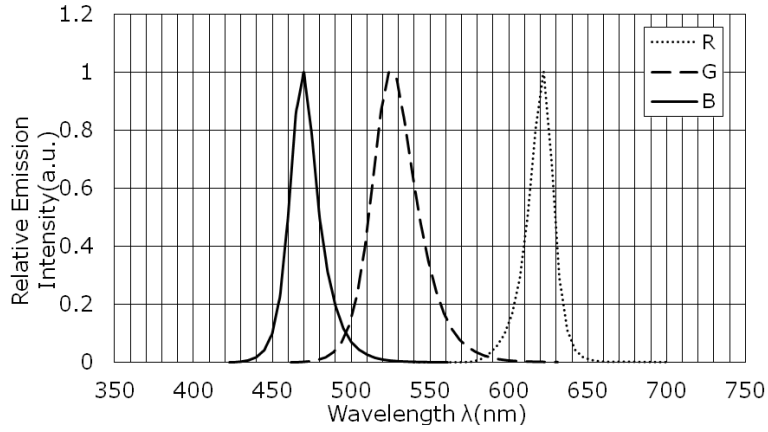
All characteristics shown are for reference only and are not guaranteed.



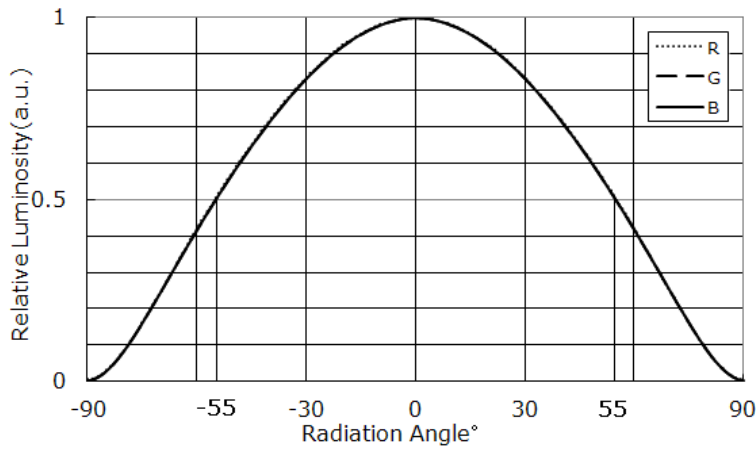
## 4. TYPICAL OPTICAL CHARACTERISTICS CURVES

All characteristics shown are for reference only and are not guaranteed.

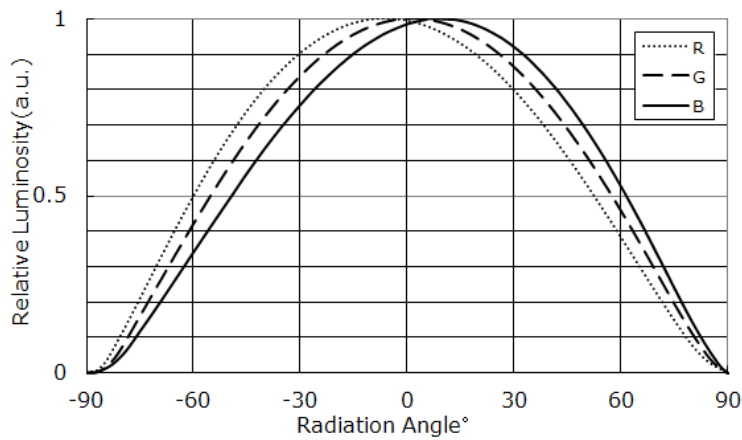
Spectrum



Directivity X-X



Directivity Y-Y



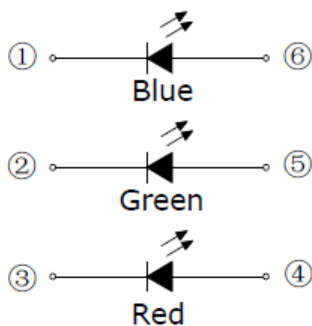
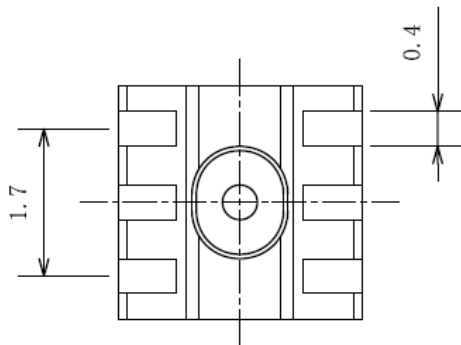
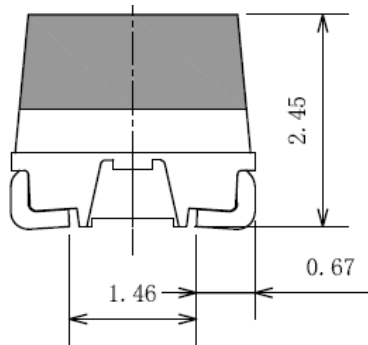
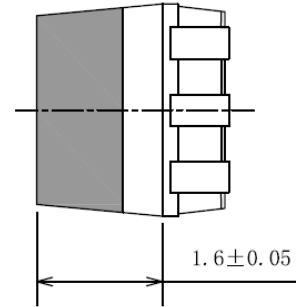
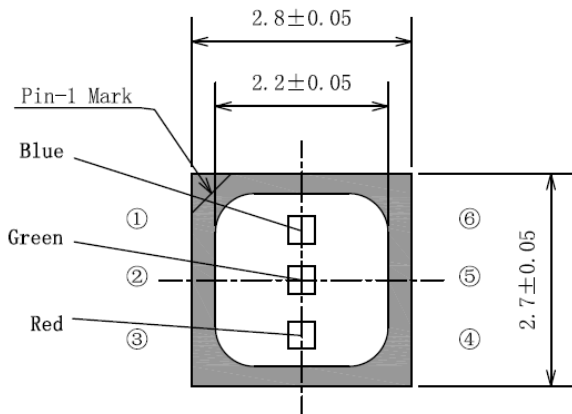
\* Monochromatic Relative Intensity Profile was controlled  $\leq \pm 10\%$

\* RGB Relative Intensity Profile was controlled  $\leq \pm 5\%$

## 5. OUTLINE DIMENSIONS AND MATERIALS

This product complies with RoHS Directive.

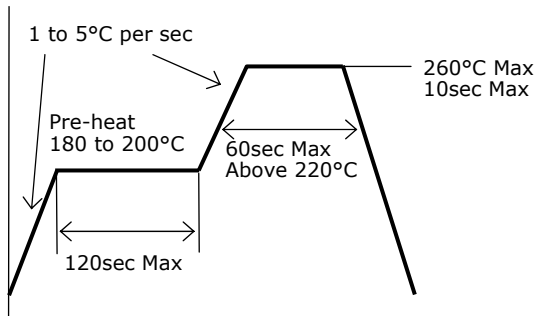
(Unit: mm, Tolerance:  $\pm 0.2$ )



Item	Description
Package Materials	White Heat-Resistant Polymer
Package Upper Surface Color	Black
Encapsulating Resin Materials	Epoxy Resin(With diffuser)
Electrodes Materials	Ag-plated Copper Alloy

## 6. SOLDERING

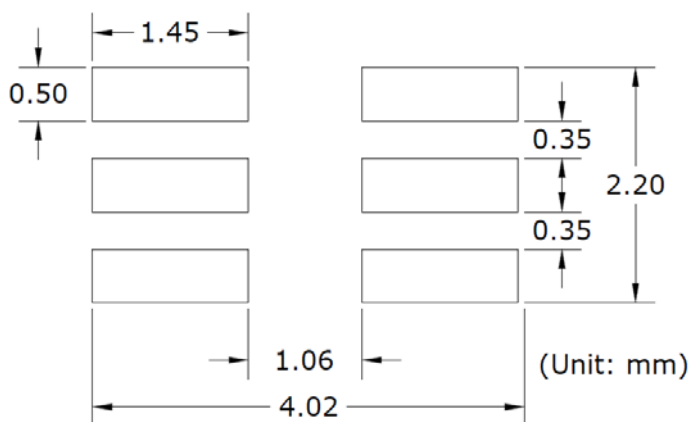
- Recommended Reflow Soldering Condition(Lead-free Solder)



- Recommended Hand Soldering Condition

Temperature	350°C Max
Soldering Time	3sec Max

- Recommended Soldering Pad Pattern

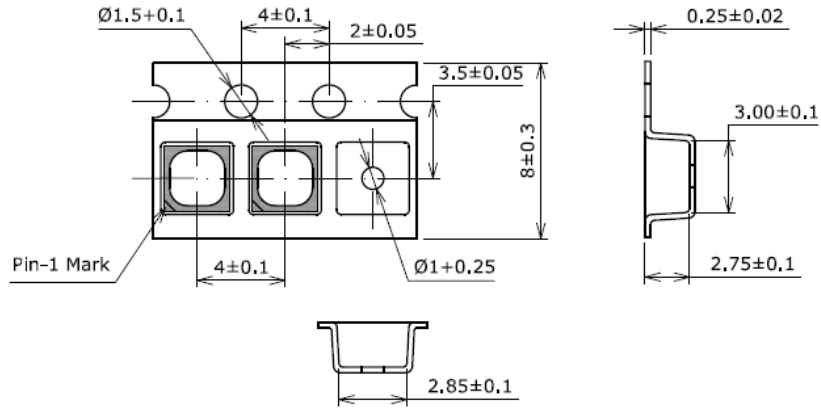


- \* This LED is designed to be reflow soldered on to a PCB. If dip soldered, Multi Color cannot guarantee its reliability.
- \* Reflow soldering must not be performed more than twice. Hand soldering must not be performed more than once.
- \* Avoid rapid cooling. Ramp down the temperature gradually from the peak temperature.
- \* Nitrogen reflow soldering is recommended. Air flow soldering conditions can cause optical degradation, caused by heat and/or atmosphere.
- \* Repairing should not be done after the LEDs have been soldered. When repairing is unavoidable, a double-heat soldering iron should be used.  
It should be confirmed beforehand whether the characteristics of the LEDs will or will not be damaged by repairing.
- \* When soldering, do not apply stress to the LED while the LED is hot.
- \* This product can differ in optical characteristics depending on the number of reflow cycles.  
In a single display, only LEDs with same number of reflow cycles should be used regardless of the application type, such as rental and/or permanent installations.

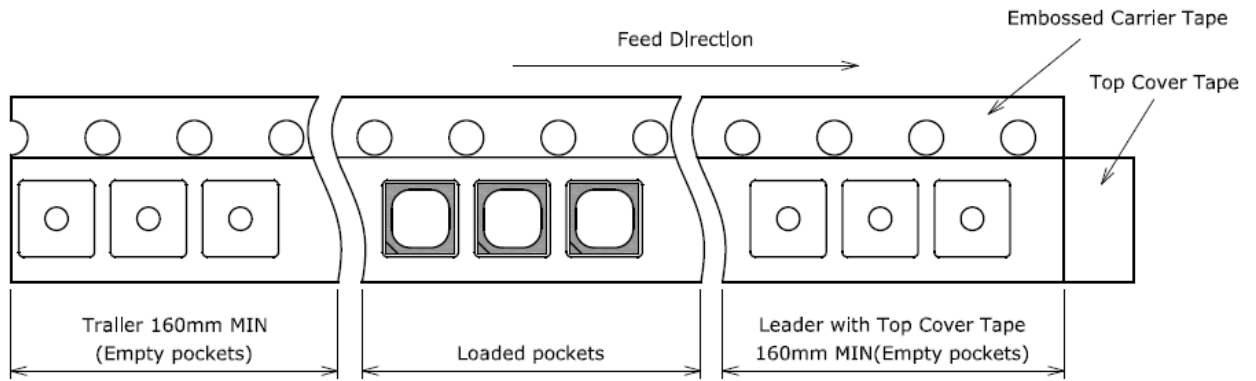
## 7. TAPE AND REEL DIMENSIONS

Tape:

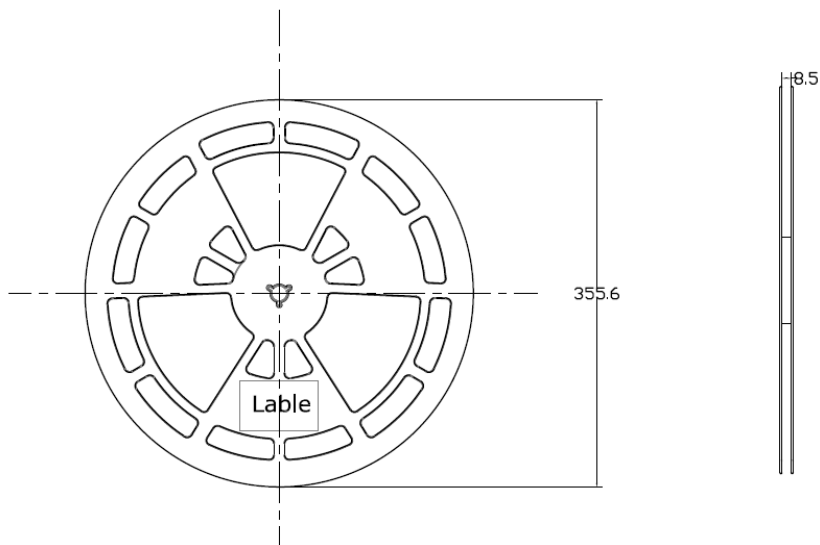
(Unit: mm)



Trailer and Leader:



Reel:



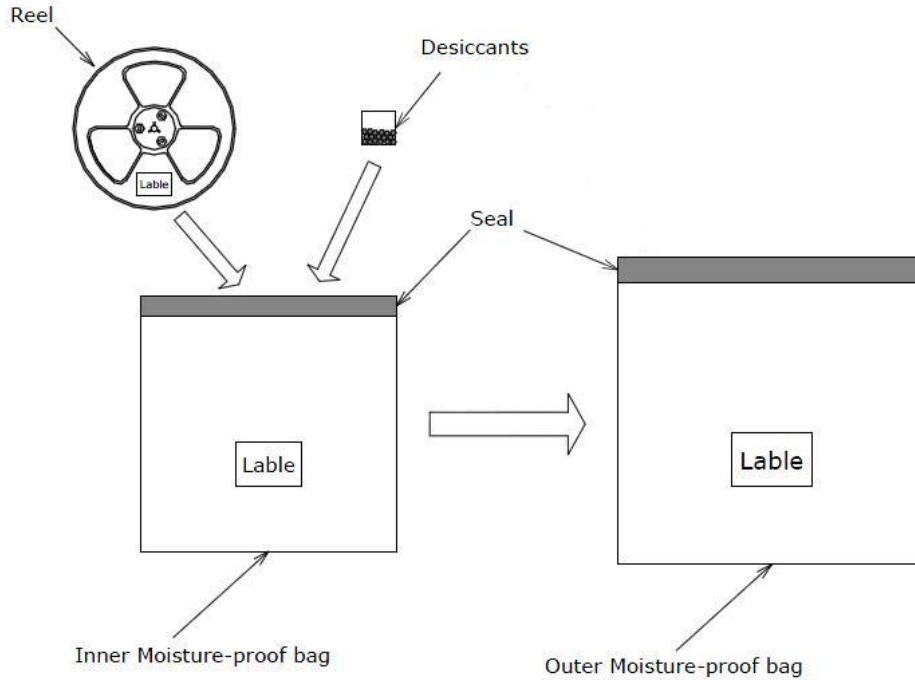
Quantity per reel=7000pcs



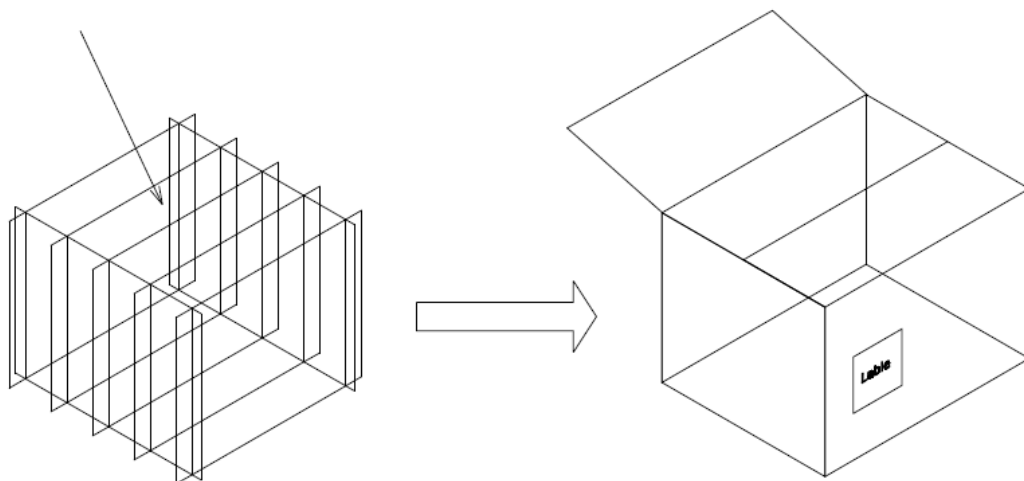
## 8. PACKAGING – TAPE & REEL

Reels are shipped with desiccants in heat-sealed inner moisture-proof bags.

Inner moisture-proof bags are shipped in heat-sealed outer moisture-proof bags.



Outer moisture-proof bags are packed in cardboard boxes with corrugated partitions.



\* The Label shows: P/O NO., TYPE, QTY, IV, VF, WLD.

\* Products shipped on tape and reel are packed in moisture-proof bag.

They are shipped in cardboard boxes to protect them from external forces during transportation.

\* Do not drop or shock the box. It may damage the products.

\* Do not expose to water, the box is not water-resistant.

\* Using an original packaging material or equivalent in transit is recommended.

## 9. STORAGE CONDITIONS

- Before opening the package, must check if the package bag is well packaged or damaged.  
If the package is damaged, please return back to Multi-Color.
- After opening the package:  
After this bag is opened, devices that will be subjected to infrared reflow, vapor-phase reflow, or equivalent processing  
Must be:
  - a) Mounted within 24 hours at factory condition of  $\leq 30^{\circ}\text{C} / 60\% \text{RH}$ .
  - b) If unused LEDs remain, please return these LEDs back to Multi-Color.
- The LEDs must be used within 6 months.

## 10. Directions for Use

- During designing a circuit, the current goes through each LED chip must not exceed the Absolute Max Rating current specified for each chip.
- It is recommended that each LED chip is driven by a constant current.
- When having the two or more dices within this product at the same time, the total power dissipation for the LED package must be within the max value specified in this specification.
- This product should be operated with forward current. Make sure the product is not subjected to either forward or reverse voltage while it isn't in use. Specially, DO NOT subject it to continuous reverse voltage because it may cause damage to the LED chip. If the display will not be used for a long time, the main power should be switched off.
- It is recommended to operate the LEDs at a current greater than 10% of the sorting current to stabilize the LED's characteristics.
- Make sure that the reverse voltage will not exceed the Absolute Max Rating when using the LEDs with matrix drive.
- Ensure that excessive voltages such as lightning surges are not applied to the LEDs.
- Aging is recommended in order to detect manufacturing and assembly defects. Particularly, make sure that excessive current and/or voltage is not applied to the LEDs. This aging should be conducted in environments where water condensation does not occur.
- This product can be used in both indoor and outdoor applications; however, when the LEDs are used in the following environments, incorporate sufficient measures into the display to prevent debris, water/moisture and gases that will adversely affect the product.
  - where water vapor is abundant
  - where water condensation is likely to occur
  - where water is likely to splash onto the LEDs
  - where frost is likely to form on the surface of the LEDs (e.g. freezer, ice skating rink, etc.)
  - where dust, dirt, debris, loose metallic materials and/or gases that will adversely affect the product are present
- When this product is used for displays that will be installed outside, the lead frames of the LEDs should be covered by silicone resin to avoid exposure to outdoor environments. When silicone resin is filled up to the height of the 1-pin mark of the LED, the LED lens will absorb less moisture. Choose a silicone resin that is sufficient to prevent water/moisture penetration and salt damage.
- Reducing direct sunlight can extend the life (Example: using a louver).
- The loss of luminous output due to sunlight can be minimized if the LEDs are used with louvers and mounted in an orientation where the LED dices are vertically arranged in BGR order (Blue on top).

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- In areas where hydrogen sulfide, which is a sulfide-based gas, is present (e.g. hot springs and volcanic areas), and where salt is abundant (e.g. coastal areas), the life may be shortened.
  - When power is applied for the first time after display's installation, it should not be powered at 100% wattage for the LEDs may have absorbed moisture. Before normal use of this display, operate the display at approximately 20% wattage for an initial time period.
  - If the display units will be rented, those units should be selected carefully to ensure that the display as a whole will appear the same color and brightness.
  - If the display modules are loaded onto and/or transported by ship, the moisture environment on the vessel can cause condensation; the display units should be packaged to prevent moisture absorption.
  - If a display that has been, or is being, used is relocated, it is possible that degradation of the LED has occurred. When transporting this display, provide sufficient protection for the LEDs in addition to the moisture-proof packaging for the display. When this display is reinstalled, ensure to follow the installation instructions for environments and use.

## 11. STATIC ELECTRICITY

- Static electricity or surge voltage damages the LEDs.  
It is recommended that a wrist band or an anti-electrostatic glove be used when handling the LEDs.
- All devices equipment and machinery must be properly grounded. It is recommended that precautions be taken against surge voltage to the equipment that mounts the LEDs.

## 12. Thermal Management

- Thermal design of the end product is paramount importance.  
Please consider the heat generation of the LED when making the system design. The coefficient of temperature increase per input electric power is affected by the thermal resistance of the circuit board and density of LED placement on the board, as well as other components. It is necessary to avoid intense heat generation and operate within the maximum ratings given in this specification.
- The drive current should be decided after considering the ambient maximum temperature ( $T_a$ ) of LEDs.

## 13. Safety Guideline for Human Eyes

- The international Commission (IEC) published in 2006 IEC 62471:2006 Photobiological safety of lamps and lamp systems which includes LEDs within its scope.
- Following IEC 62471:2006, most of Multi-Color LEDs can be classified as belonging to either Exempt Group or Risk Group  
1. Optical characteristics of a LED such as output power, spectrum and light distribution are factors that affect the risk group determination of the LED. Especially a high-power LED, that emits light containing blue wavelengths, may be in Risk Group  
2. Great care should be taken when viewing directly the LED driven at high current or the LED with optical instruments which may greatly increase the hazard to your eyes.