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lead-free

SPECIFICATIONS

US0605F LED Chip 0605 Red Green Blue

Version December 2017

Unilite Opto Technology

U-S0605F-A15

■ Description

The SMD type U-S0605 RGB Full Color, 3 chips LED, with its light weight and smaller than lead frame type components, enables smaller board size, higher packing density, reduced storage space and miniature applications.

- Dice Material： InGaN: Green, Blue, and AlInGaP: Red,
- Light Color： Red, Green, Blue
- Lens Color： Water Clear

■ Features

- 3 chips package
- Compatible with automatic placement equipment
- Compatible with reflow soldering process
- Long operating life
- Low forward voltage operated
- Instant light
- Pb -free/ RoHS compliant

■ Applications

- Information boards
- Automotive Interior Lighting
- Indoor and outdoor display
- Indicator
- Backlighting
- Gerneral applications

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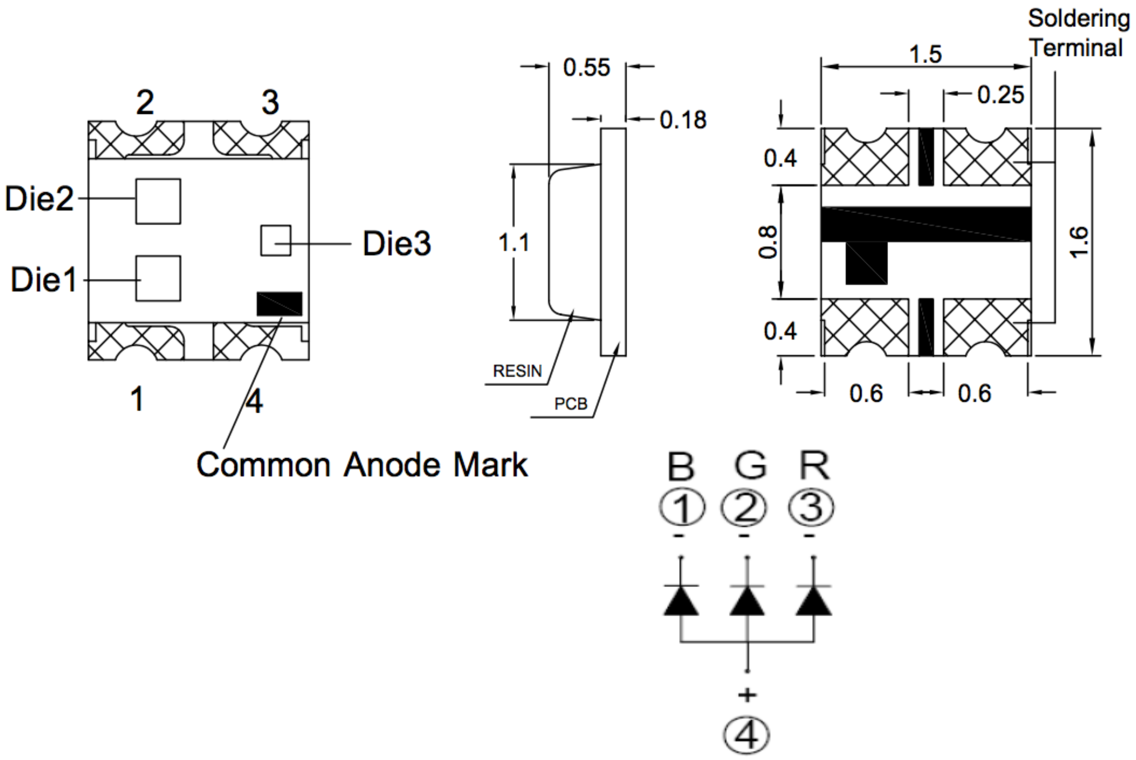
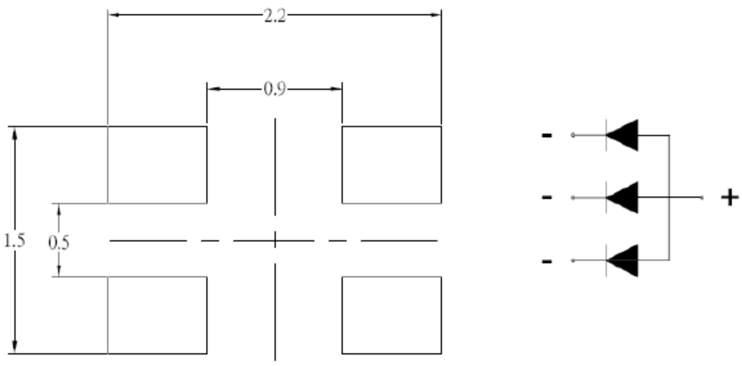
■ Outline Dimensions (mm)



■ Recommended Soldering Pad Design



Note: The tolerance unless mentioned is +/- 0.1mm, Angel +/- 0.5. Unit=mm

■ Part Numbering System

U - S 0 6 0 5 F - A15

- A15: Internal Code
- F: Color; R: Red, G: Green B: Blue
- 0605: Package Type code
- S: Product Code

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■ **Absolute Maximum Ratings at Ta = 25 ℃**

PARAMETER	symbol	MAX.		UNIT
Power Dissipation *	PD	Red	65	mW
		Green	72	
		Blue	72	
Continuous Forward Current *	IF	Red	25	mA
		Green	20	
		Blue	20	
Peak Forward Current (1/10 Duty Cycle , 0.1ms Pulse Width) *	IFP	Red	60	mA
		Green	100	
		Blue	100	
Reverse Voltage	IR	Red	10	μA
		Green	50	
		Blue	50	
Electrostatic Discharge	ESD	Red	2000	V
		Green	500	
		Blue	500	
Operating Temperature Range	Topr	－20 to ＋ 85		℃
Storage Temperature Range	Tstg	－30 to ＋ 100		℃
Reflow Soldering Condition	Tsld	265 ℃ for 5 sec.		

■ **Electro-Optical Characteristics** Red ,T_a = 25°C, IF=15mA

PARAMETER	SYMBOL	VALUES			UNIT
		MIN.	TYP.	MAX.	
Luminous Intensity	IV	125	200		mcd
Forward Voltage	Vf	1.5		2.4	V
View angle	2θ 1/2		140		Deg
Dominant Wavelength	λd	621		630	nm
Spectral Line Half-Width	△d		20		nm
Reverse Current, VR= 5V	I_R			10	μA

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■ **Electro-Optical Characteristics** Green ,T_a = 25°C, IF=15mA

PARAMETER	SYMBOL	VALUES			UNIT
		MIN.	TYP.	MAX.	
Luminous Intensity	IV	320	400		mcd
Forward Voltage	Vf	2.8		4	V
View angle	2θ 1/2		140		Deg
Dominant Wavelength	λd	519		530	nm
Spectral Line Half-Width	△d		30		nm
Reverse Current, VR= 5V	I_R			50	μA

■ **Electro-Optical Characteristics** Blue ,T_a = 25°C, IF=15mA

PARAMETER	SYMBOL	VALUES			UNIT
		MIN.	TYP.	MAX.	
Luminous Intensity	IV	50	100		mcd
Forward Voltage	Vf	2.8		3.5	V
View angle	2θ 1/2		140		Deg
Dominant Wavelength	λd	465		474	nm
Spectral Line Half-Width	△d		30		nm
Reverse Current, VR= 5V	I_R			50	μA

■ **Bin code**

Unit: mcd@15mA

Bin code		IV	
		Min	Max
Red	R4	125	200
	R5	200	320
	R6	320	500

Unit: mcd@15mA

Bin code		IV	
		Min	Max
Green	G2	320	500
	G3	500	800
	G4	800	1250

Unit: mcd@15mA

Bin code		IV	
		Min	Max
Blue	B1	50	80
	B2	80	125
	B3	125	200
	B4	200	320

■ Typical Electro-Optical Characeristics Curve--RED

Fig.1 Forward current vs. Forward Voltage

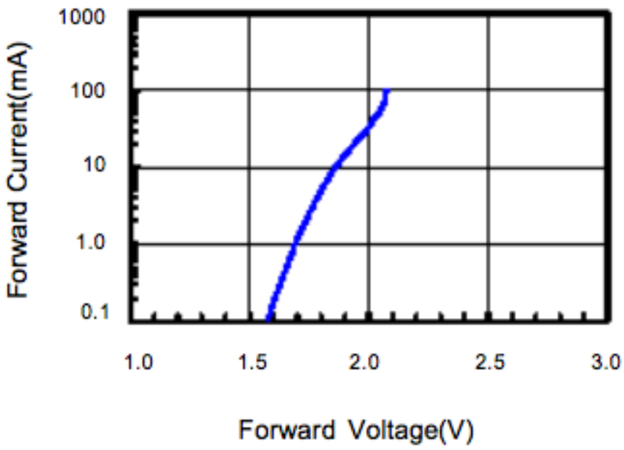


Fig.2 Relative Intensity vs. Forward Current

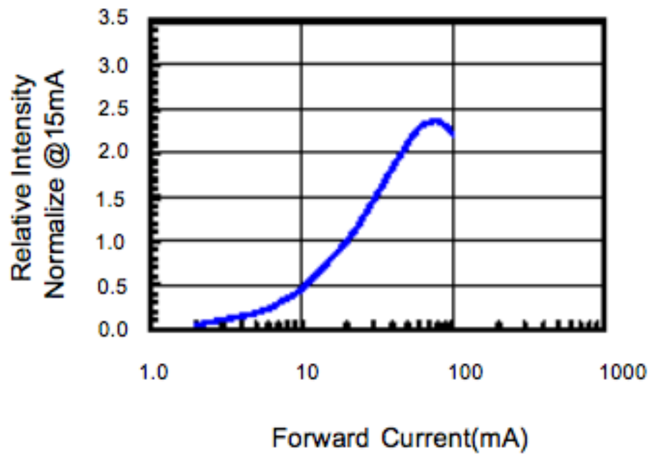


Fig.3 Forward Current vs. Temperature

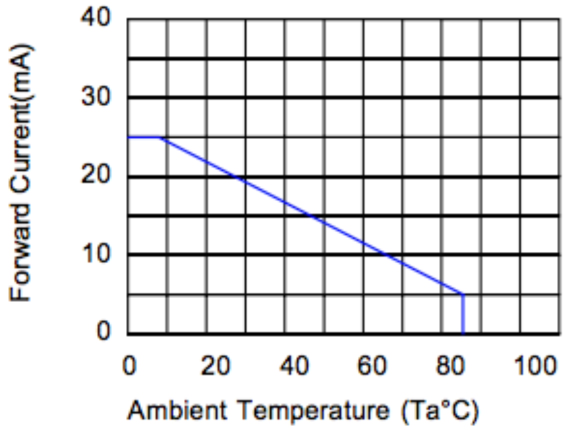


Fig.4 Relative Intensity vs. Temperature

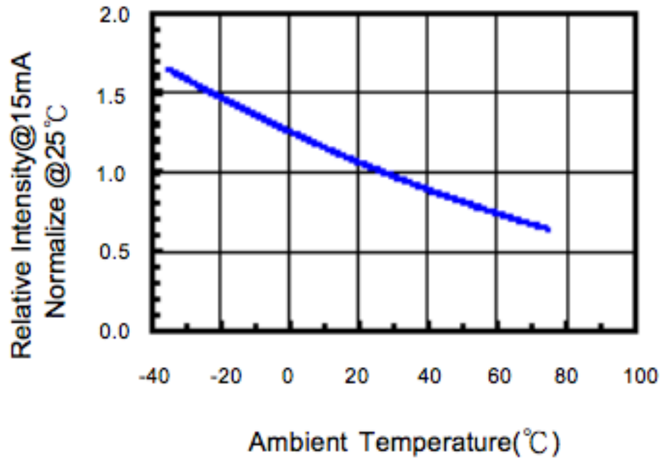


Fig.5 Relative Intensity vs. Wavelength

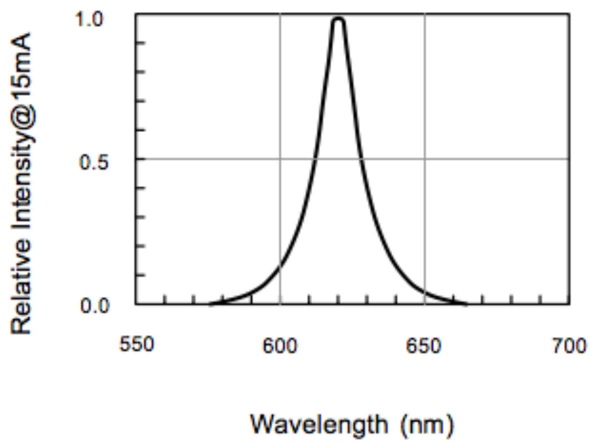
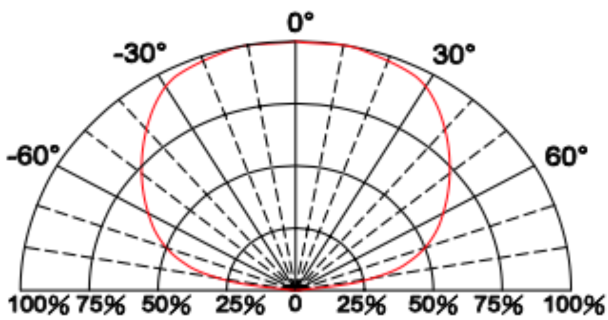


Fig.6 Directive Radiation



■ Typical Electro-Optical Characeristics Curve--Green

Fig.1 Forward current vs. Forward Voltage

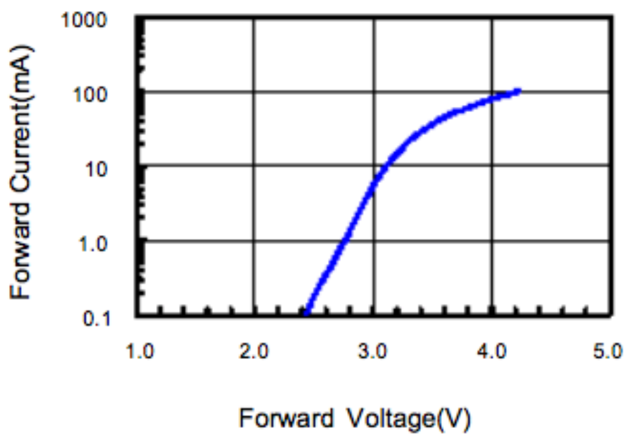


Fig.2 Relative Intensity vs. Forward Current

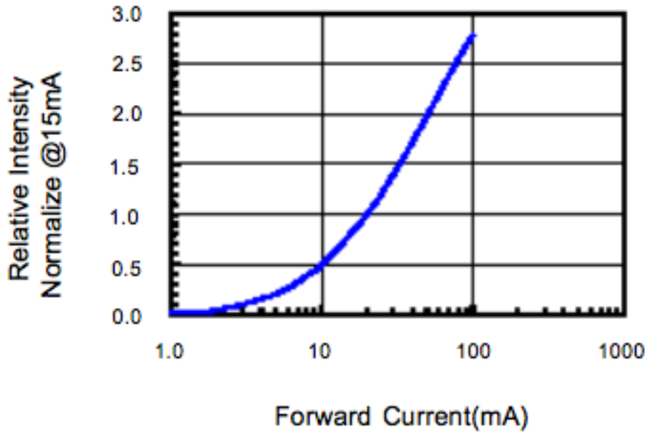


Fig.3 Forward Current vs. Temperature

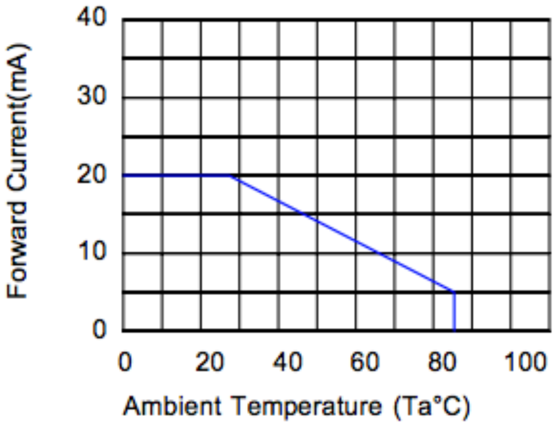


Fig.4 Relative Intensity vs. Temperature

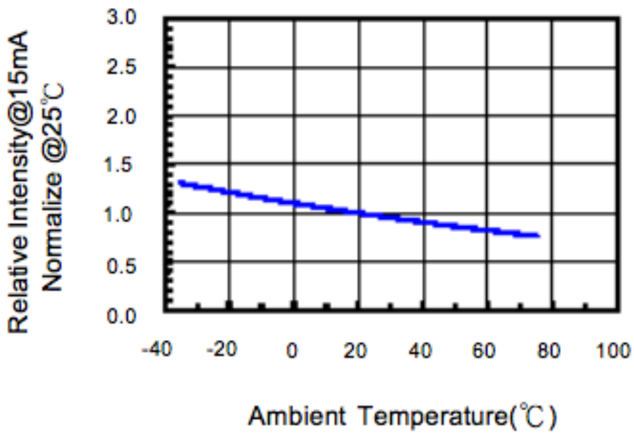


Fig.5 Relative Intensity vs. Wavelength

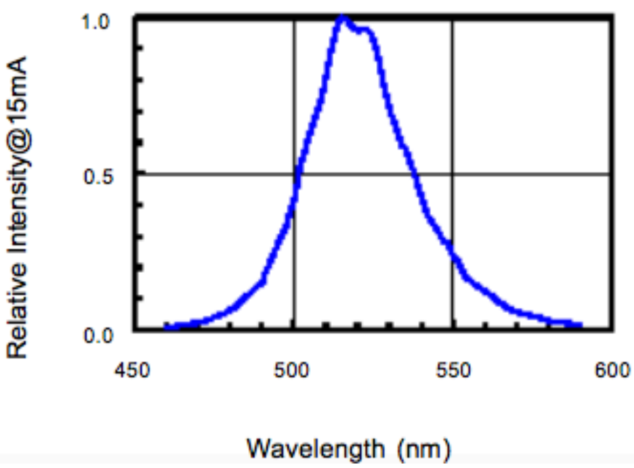
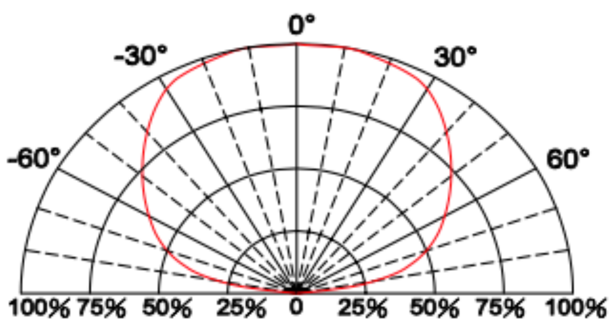


Fig.6 Directive Radiation



■ **Typical Electro-Optical Characeristics Curve--Blue**

Fig.1 Forward current vs. Forward Voltage

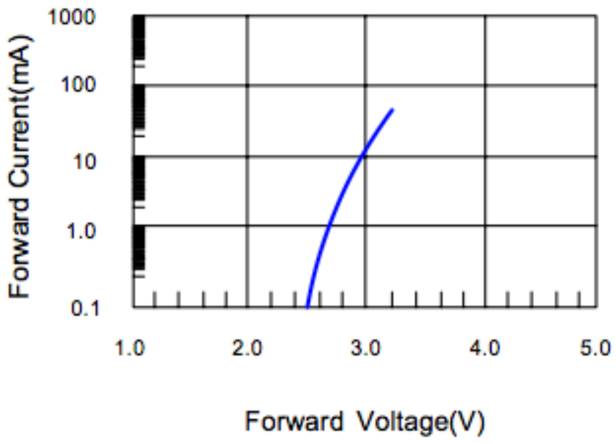


Fig.2 Relative Intensity vs. Forward Current

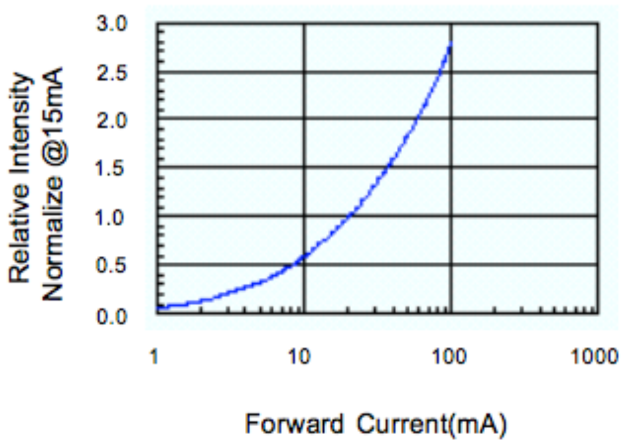


Fig.3 Forward Current vs. Temperature

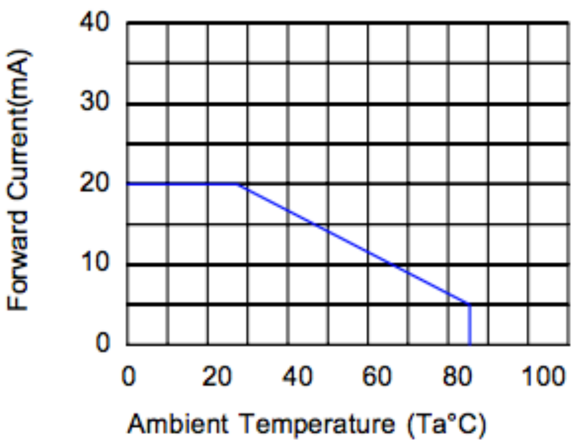


Fig.4 Relative Intensity vs. Temperature

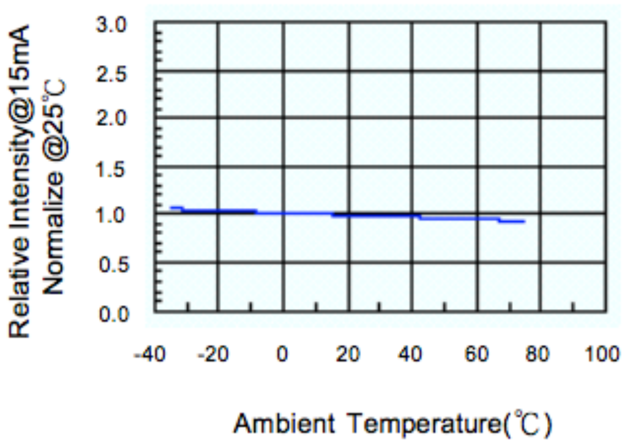


Fig.5 Relative Intensity vs. Wavelength

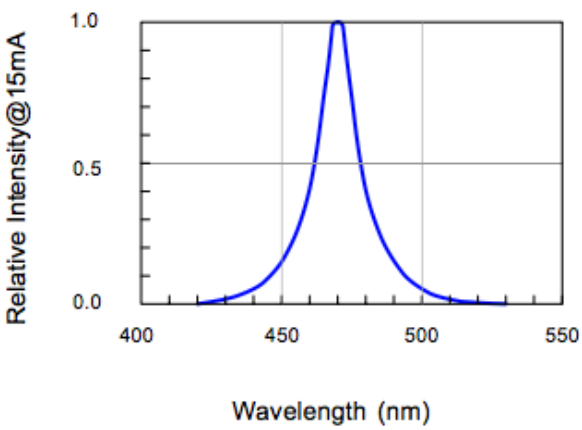
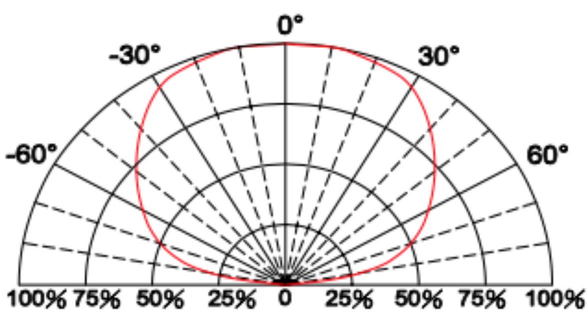
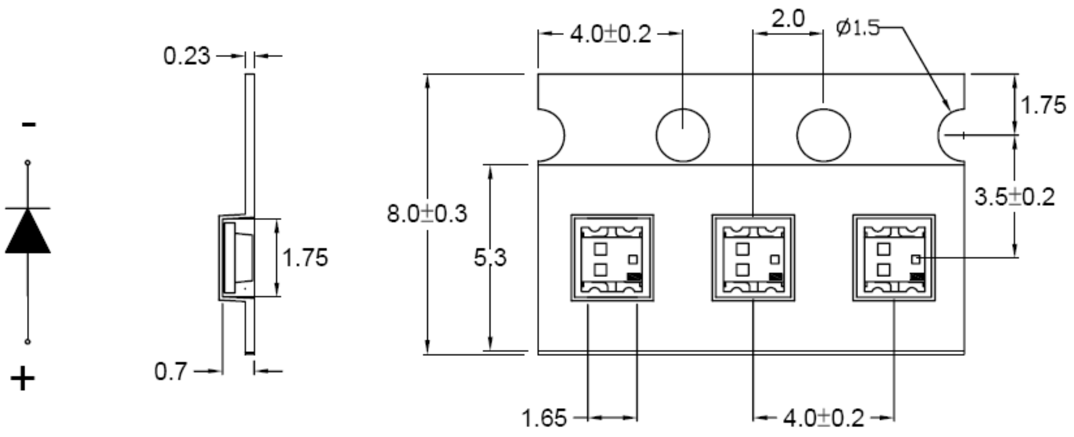


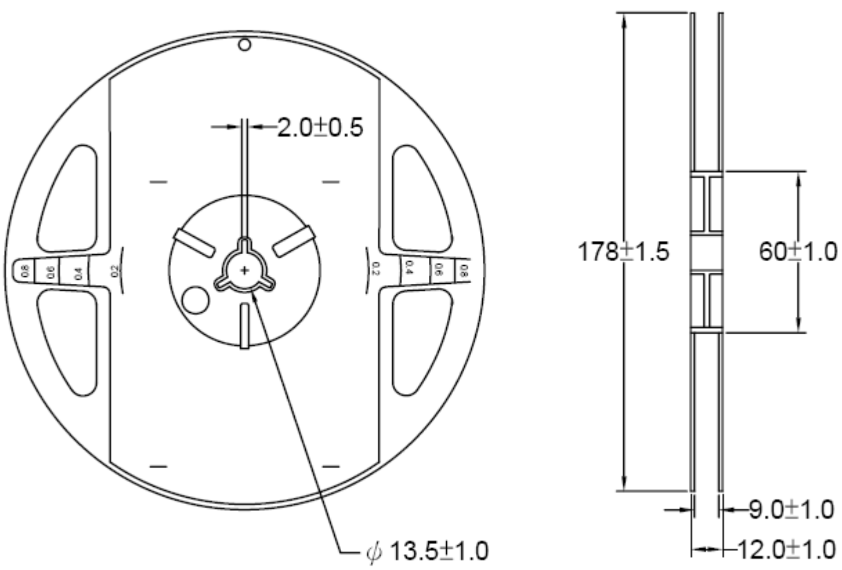
Fig.6 Directive Radiation



■ Carrier Type Dimensions



■ Reel Dimensions



Unilite Opto Technology

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■ Reliability Test Items and Conditions

(1)TEST ITEMS AND RESULTS

Test Item	Standard Test Method	Test Conditions	Note	Number of Damaged
Thermal Shock	MIL-ST-202F:107D MIL-ST-750D:1051 MIL-ST-883D:1011	-40℃ ~ 105℃ 10min. 10min.	100 cycles	0/60
Temperature Cycle	MIL-ST-202F:107D MIL-ST-750D:1051 MIL-ST-883D:1010 JIS C 7021:A-4	105℃ ~ 25℃ ~ -55℃ ~ 25℃ 30min. 5min. 30min. 5min.	10 cycles	0/60
High Temperature Storage	MIL-STD-883D:1008 JIS C 7021:B-10	Ta=105℃+/- 5℃	1000 hrs.	0/60
Low Temperature Storage	JIS C 7021:B-12	Ta=-40℃+/-5℃	1000 hrs.	0/60
Steady State Operating Life	MIL-STD-750D:1026 MIL-STD-883D:1005 JIS C 7021:B-1	Ta=25℃, I_F=20mA, DC	1000 hrs.	0/60
High Temperature &High Humidity Storage Test	MIL-ST-202F:103B JIS C 7021:B-11	Ta=65℃+/- 5℃, RH=90-95%,	1000 hrs.	0/60
Solerability Test	MIL-ST-202F:208D MIL-STD-750D:2026 MIL-STD-883D:2003 IEC 68 Part 2-20 JIS C 7021:A-2	T. Sol:235℃+/- 5℃ Immersion Time 2+/- 0.5sec Coverage≧95% of the dipped surface	10 cycles	0/60
IR Reflow	MIL-STD-750D:2031.2 J-STD-020	T=260C Max, 10 sec Max, Time= 6min		

■ Cautions

(1) Moisture Proof Package

A) The moisture proof package, a plastic bag with a zipper, is used to keep moisture to a minimum in the package.

B) A package of a moisture absorbent material (silica gel) is also inserted into the plastic moisture proof bag and the silica gel changes its color from blue to pink as it absorbs moisture.

C) The absorbed moisture in the SMT package may vaporize and expand during soldering. This may cause exfoliation of the contacts and damage to the optical characteristics of the LEDs.

(2) Storage Conditions

A) Before opening the package：
The LEDs should be kept at 30℃ or less and 45~60% RH or less and should be used within a year. When storing the LEDs, moisture proof package with absorbent material (silica gel) is recommended.

B) After opening the package：
The LEDs should be kept at 30℃ or less and 55% RH or less and should be soldered within 168 hours (7days) after opening the package. The unused LEDs should be stored in moisture proof packages.

C) It’s also recommended to return the LEDs to the original moisture proof bag and to reseal the moisture proof bag again.

D) If the moisture absorbent material (silica gel) has faded away or the SMD LEDs have exceeded the storage time, baking treatment（more than 24 hours at 65+/-5℃）should be performed before soldering.

(3) Heat Generation

A) The thermal design of the end product is very important. It is necessary to avoid intense heat generation and operate within the maximum ratings given in this specification.

B) The operating current should be decided after considering the ambient maximum temperature of LEDs.

(4) Cleaning

A) Isopropyl alcohol is recommended to be used as a solvent for cleaning the LEDs.

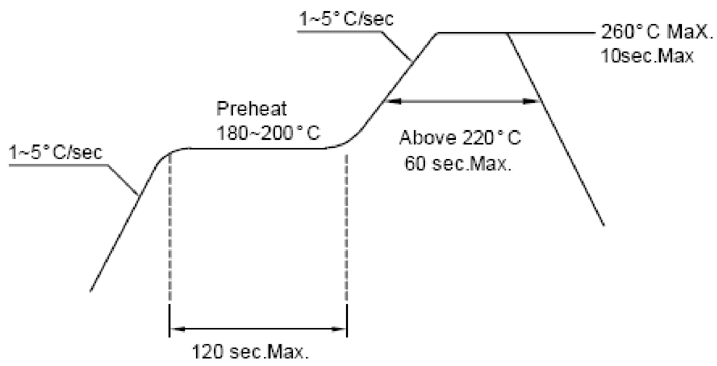
B) Before cleaning, a pre-test should be done to confirm whether any damage to the LEDs will occur.

(5) Soldering

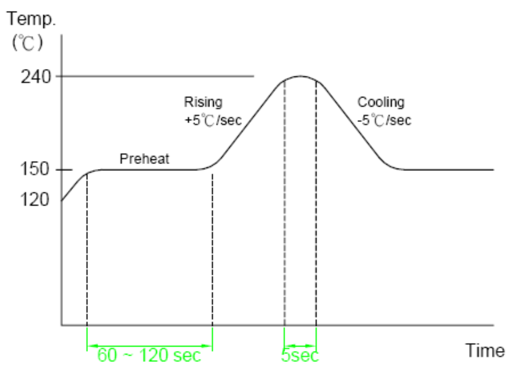
Reflow Soldering (recommended) :

A) To prevent from cracking, please bake (65℃, 24hrs)before soldering.
B) When soldering, do not load stress on the LEDs during heating.
C) Never take next process until the component is cooled down to room temperature after reflow.
D) After soldering, do not warp the circuit board.
E) The recommended reflow soldering profile (measuring on the surface of the LED resin) is the following:

(a) Lead-Free Solder



(b) Lead Solder



Manual Soldering (not recommended) :

A) To prevent from cracking, please bake (65℃, 24hrs) before soldering.
B) Temperature at tip of iron: 250℃ Max. (25W).
C) It's banned to load any stress on the resin during soldering.
D) Soldering time: 3 sec. Max.(one time only).

(6) ESD (eletrostatic discharge) protection (base on machine mode)

A) The product is Gallium Nitride (GaN) based light emitting diode (LED) and is extremely sensitive to ESD. Users are strongly recommended to take necessary meter to test the static electricty and avoid ESD when handling this product.
B) Proper grounding of machines (via 1MΩ), using static disspative mats, containers, working uniforms and shoes are considered to be effective against ESD.
C) An ionizer is recommended in the facility or environment where ESD may be generated easily, and soldering iron with a grounded tip is also recommended.
D) When inspecting the final products in which LEDs are assembled, it is recommended to check whether the assembled LEDs are damaged by ESD or not. It is simple to find damaged LEDs by light-on or VF test at lower current (below 1mA is recommended).
E) ESD damaged LEDs will show some unusual characteristics such as the remarkable increasing of leak current, the decreasing of forward voltage, or the LEDs do not light on at the low current.

(7) Other

A) Care must be taken to ensure that the reverse voltage will not exceed the absolute maximum rating when using the LEDs with matrix drive.
B) The LED light output is strong enough to injure human eyes. Precaution must be taken to prevent looking directly at the LEDs with unaided eyes for more than a few seconds.
C) The LEDs described here are intended to be used for ordinary electronic equipment, please consult Unilite Opto in advance for information on applications.
D) Installing a protection device in the LED driving circuit to avoid surge current exceeding the max rating during on/off switching.
E) The appearance and specifications of the product may be modified for improvement without notice.
F) Please use the product within 168 hours after opening the seal and keep under 30 ℃ and 70% humidity.
G) Unilite Opto Technology will not be responsible for any claim for damage if the user use the product without following the caution or instruction of the specification.