Spec. No.	PS-ST-FLFFCF1XX-G3X
Rev.	L

PRODUCT SPECIFICATION

Model No：CSST-FLFFCF1XX-G3X

Descriptions:		
・ LED Type	：	SMD LED(Std luminance)
	：	PLCC4 1.5x1.6x1.0mm
・ Emitting Color	：	Full Color
・ Encapsulation	：	level matt

CUSTOMER APPROVED SIGNATURES	APPROVED BY	CHECKED BY	PREPARED BY
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Model No.：CSST-FLFFCF1XX-G3X

■ Features –

1. PLCC-4 Package
2. High Luminous Output
3. Inside 3 chips
4. Wide viewing angle at 110°
5. RoHS Compliant
6. Compatible Lead-Free Reflow Soldering process

■ Applications –

1. Full-Color Video Screen
2. Decorative lighting
3. Amusement

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■ Absolute Maximum Ratings（Ta=25℃）–

Parameter	Symbol	Rating		Unit
Power Dissipation	Pd	R	46	mW
		G	60	
		B	62	
Forward Current (DC)	I_F	R	20	mA
		G	20	
		B	20	
Peak Forward Current *	I_{FP}	R	100	mA
		G	100	
		B	100	
Reverse Voltage *	V_R	5		V
Operating Temp.	Topr	-40 ~ +85		℃
Storage Temp.	Tstg	-40 ~ +100		℃
Junction Temp. *	T_J	R	125	℃
		G	125	
		B	125	
Soldering Temperature	Tsol	Reflow Soldering: 260℃ for 10 sec. Hand Soldering: 350℃ for 3 sec.		

Notes:

1. **Pulse width ≦ 0.1 msec, duty ≦ 1/10**
2. **Proper current rating must be observed to maintain junction temperature below the maximum at all the time.**
3. **The device can not operated under continuous reverse voltage**

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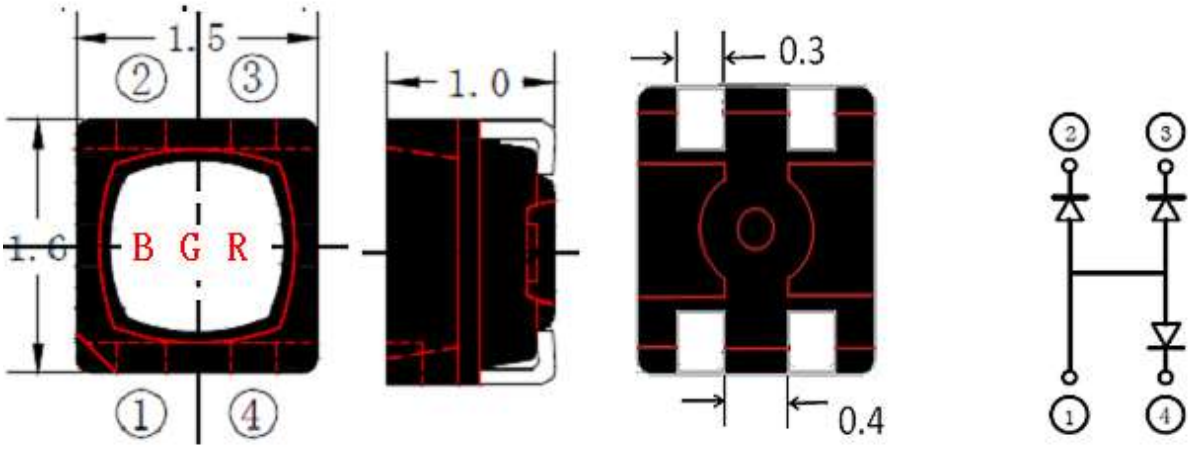
■ Package Outline Dimensions and Polarity–

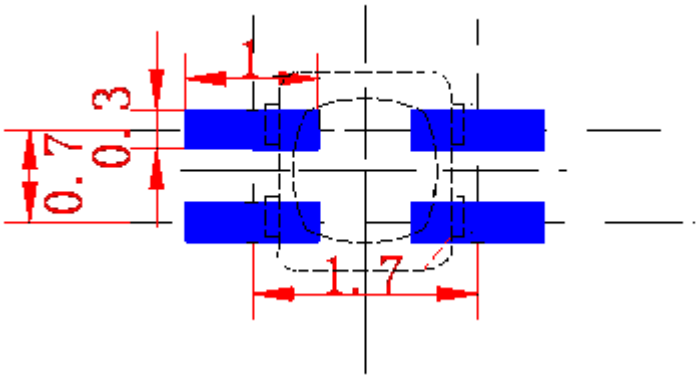
Unit: mm



①	Common Anode
②	Cathode（Blue）
③	Cathode（Green）
④	Cathode（Red）

Note: Tolerance of measurement of Dimension: ±0.2mm

■ Recommended Soldering Pad Pattern



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■ Electrical / Optical Characteristics （Ta=25℃）–

Parameter	Symbol		Min.	Typ.	Max.	Unit	Condition
Forward Voltage	V_F	R		2.0		V	I_F=10mA
		G		2.9			
		B		3.0			
Luminous Intensity	Iv	R		150		mcd	
		G		410			
		B		70			
Peak Wavelength	λp	R		632		nm	
		G		517			
		B		463			
Dominant Wavelength	λd	R		622		nm	
		G		523			
		B		467			
Spectrum Radiation Bandwidth	△λ	R		15		nm	
		G		32			
		B		22			
Viewing Angle	2θ 1/2	R		110		deg	
		G		110			
		B		110			
Reverse Current	I_R	R			10	μA	V_R=5V
		G			10		
		B			10		

Note: For each die

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■ Luminous Intensity Rank Limits –（IF =10mA）

Bin Code	Red		Unit
	Min	Max	
19	92	120	mcd
20	120	156	
21	156	200	
22	200	260	

Bin Code	Green		Unit
	Min	Max	
22	215	280	mcd
23	280	365	
24	365	470	
25	470	610	

Bin Code	Blue		Unit
	Min	Max	
17	50	65	mcd
18	65	85	
19	85	110	
20	110	143	

Note: Tolerance of measurement of Luminous Flux：±12%

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■ **Color Rank Limits–（IF =10mA）**

Bin Code	Red		Unit
	Min	Max	
A5	612	617	nm
R1	617	622	
R2	622	627	

Bin Code	Green		Unit
	Min	Max	
TG1	516	521	nm
TG2	521	526	
TG3	526	531	

Bin Code	Blue		Unit
	Min	Max	
B5	460	465	nm
B6	465	470	
B7	470	475	

Note：Tolerance of measurement of Dominant Wavelength ：±1nm

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■ **Forward Voltage Rank Limits –（IF =10mA）**

Bin Code	Red		Unit
	Min	Max	
V1B	1.55	1.85	V
V1C	1.85	2.15	
V2A	2.15	2.45	

Bin Code	Green		Unit
	Min	Max	
V2B	2.4	2.7	V
V2C	2.7	3.0	
V3A	3.0	3.3	

Bin Code	Blue		Unit
	Min	Max	
V2C	2.7	3.0	V
V3A	3.0	3.3	

Notice: Tolerance of measurement of Forward Voltage: ±0.1V

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■ Typical Electrical / Optical Characteristics Curves –
(Ta = 25℃ Unless Otherwise Noted)

Figure1. Relative Luminous Flux vs Forward Current

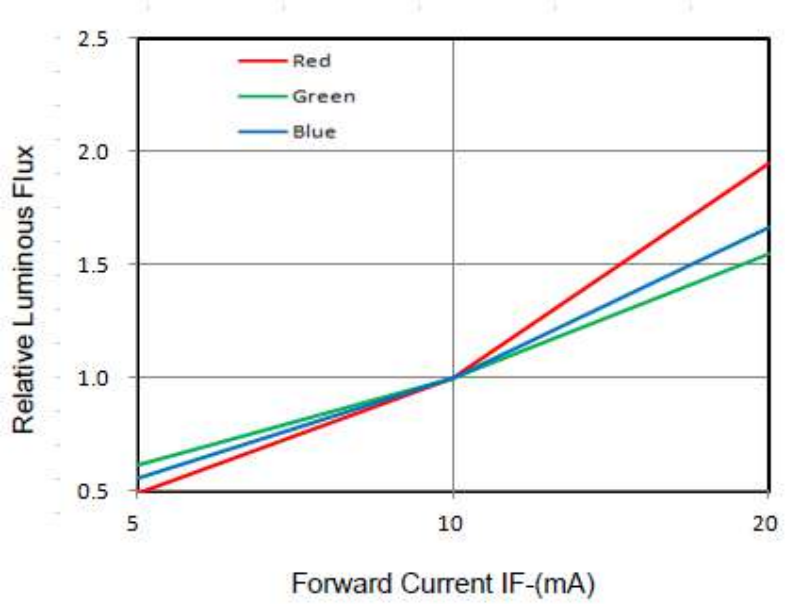

Figure2. Forward Current VS. Forward Voltage

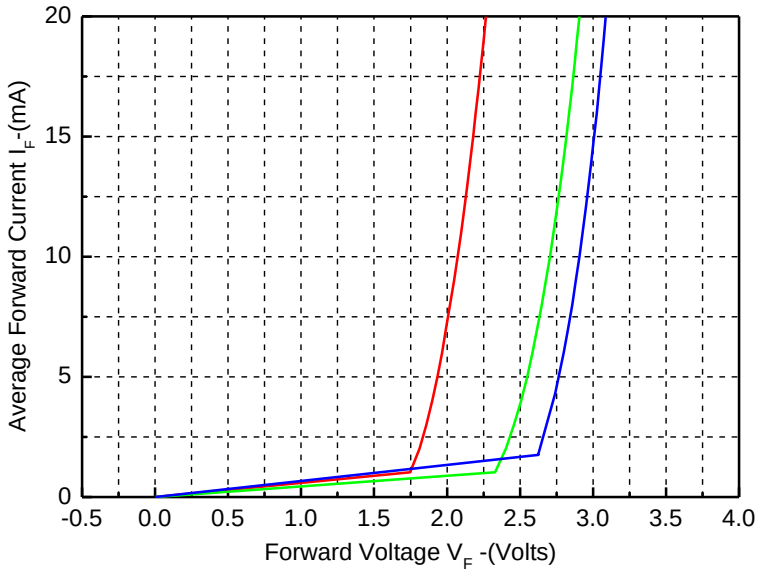

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Figure3. Relative Spectral Power Distribution vs. Wavelength

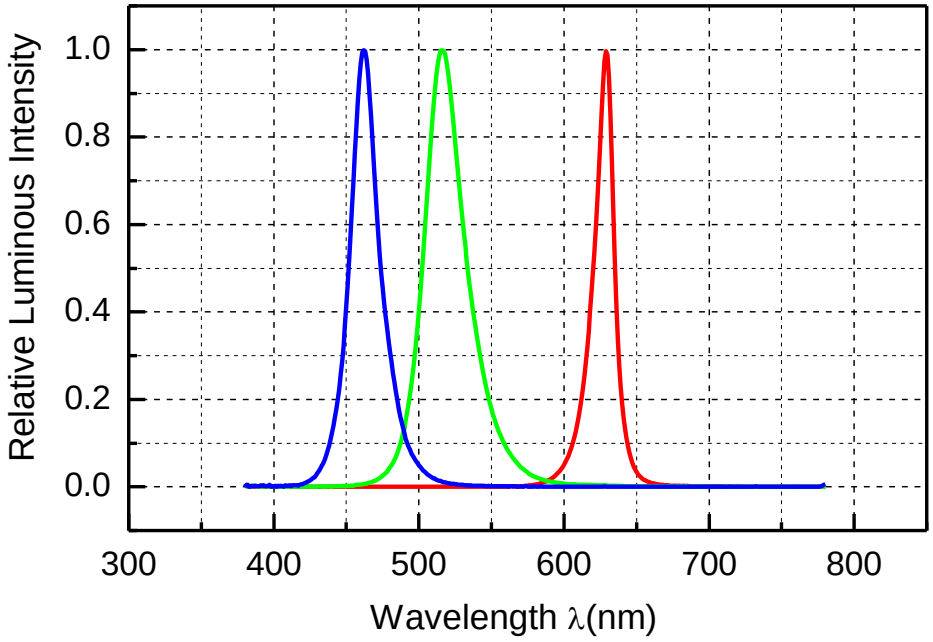

Figure4. Forward Current vs. Ambient Temperature

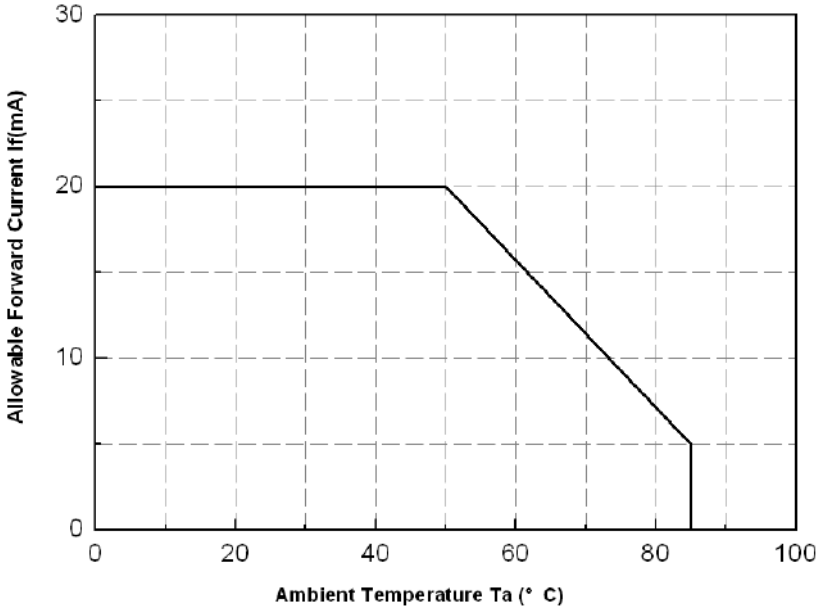

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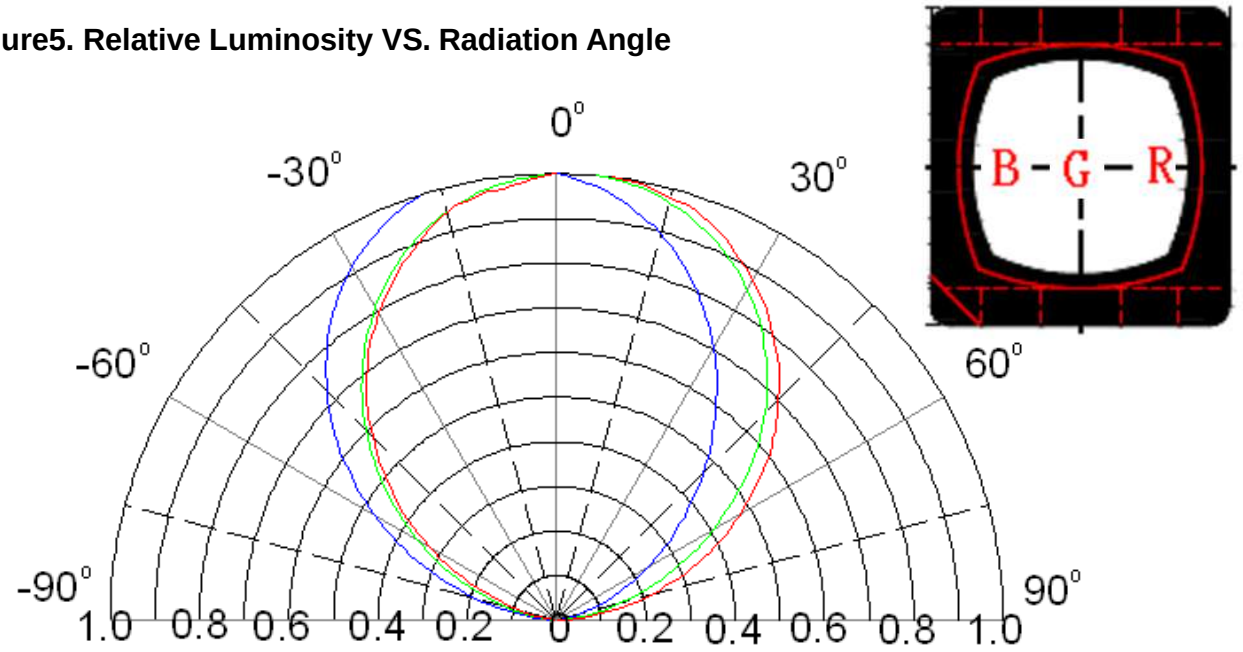
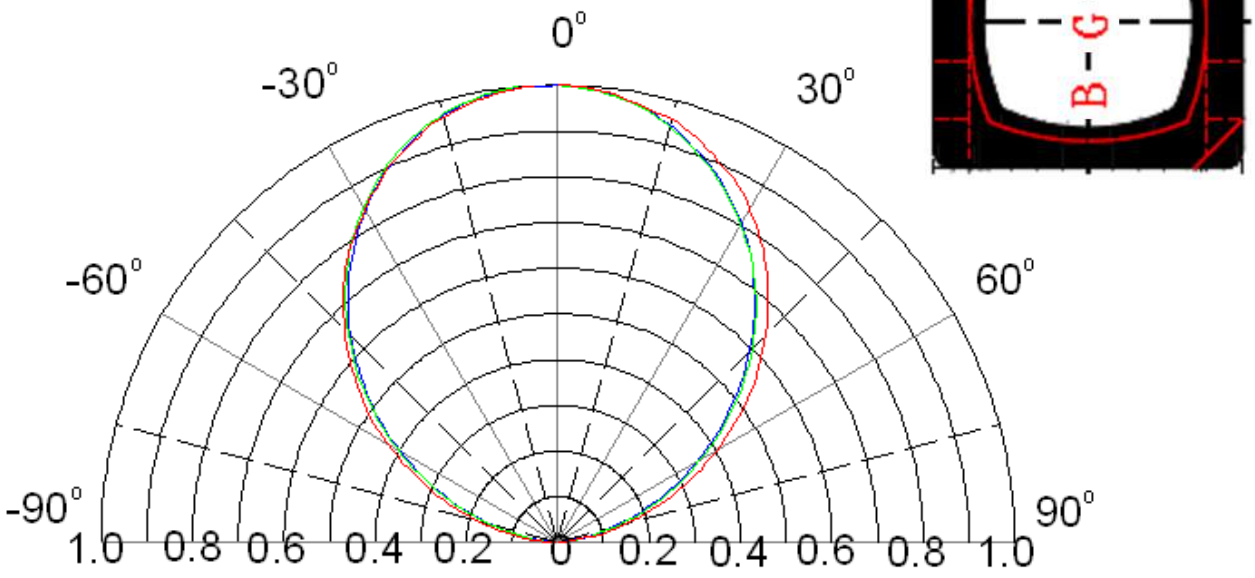
Figure5. Relative Luminosity VS. Radiation Angle



X-X



Y-Y

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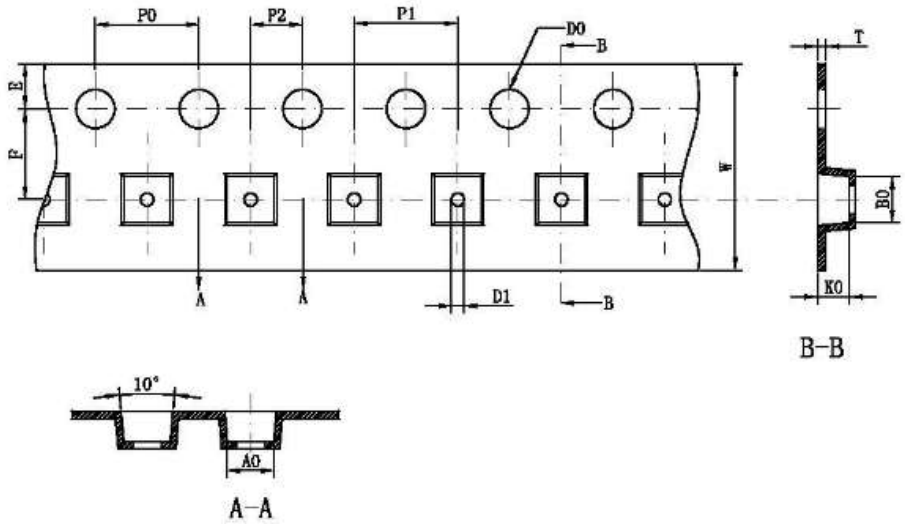
■ Package –

1. Tape Dimension



Unit: mm

Symbol	A0	B0	K0	P0	P1	P2	T
Spec	1.8±0.1	1.85±0.1	1.2±0.1	4.0±0.1	4.0±0.1	2.00±0.1	0.25±0.05
Symbol	E	F	D0	D1	W	P0	
Spec	1.75±0.10	3.50±0.05	1.5±0.1	1.0±0.1	8.0±0.1	40.0±0.2	

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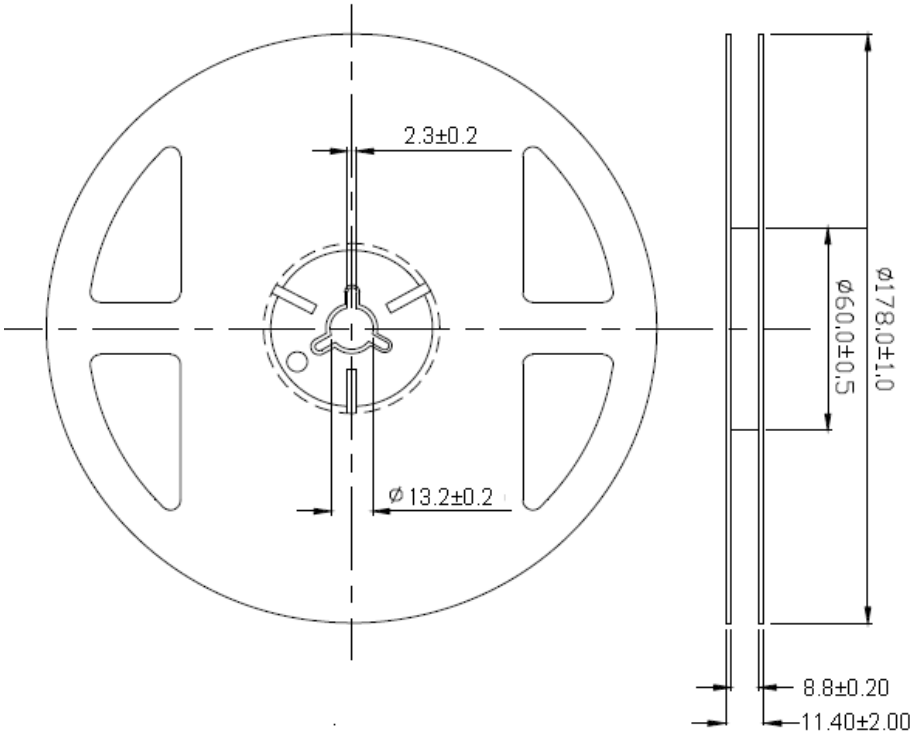
2. Reel Dimension

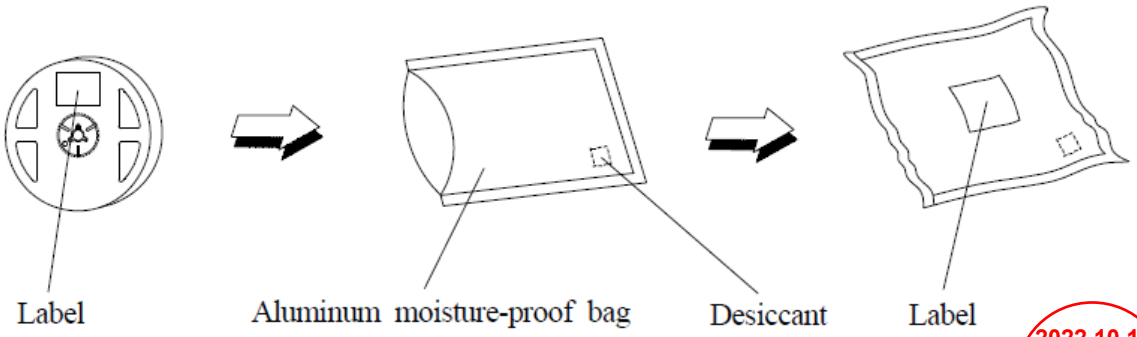


Unit: mm

Notice: (1) Quantity:3500PCS/Reel

(2)Tolerance unless mentioned is ±0.2mm

3. Packing Model



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Packing Amount

Package Name	Package Dimension		Distribution of the layer or box		Total Mount		Note
	Size	Unit	Amount	Unit	Amount	Unit	
Reel	8	mm	1	Reel	3500	Pcs	
Inner Box	265X235X78	mm	5	Reel	17500	Pcs	
Outer Box	540x260x170	mm	4	Inner Box	70000	Pcs	

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■ **Soldering Characteristics**

IR-reflow Condition (Pb free)

Area	Title	Symbol	Min	Max	Unit
(1)Preheat	Ramp-up rate	Vp	1	5	℃/sec
	temperature	Tp	150	–	℃
	time	tp	–	–	sec
(2)Equilibrium	Ramp-up rate	Ve	–	–	℃/sec
	temperature	Te	150	200	℃
	Time	te	60	120	sec
(3)Reflow	Ramp-up rate	Vr	1	5	℃/sec
	temperature	Tr	220	–	℃
	Time	tr	–	60	sec
	Peak temperature	Trp	–	260	℃
	Peak time	trp	–	10	sec
(4)Cooling	Ramp-down rate	Vc	3	6	℃/sec

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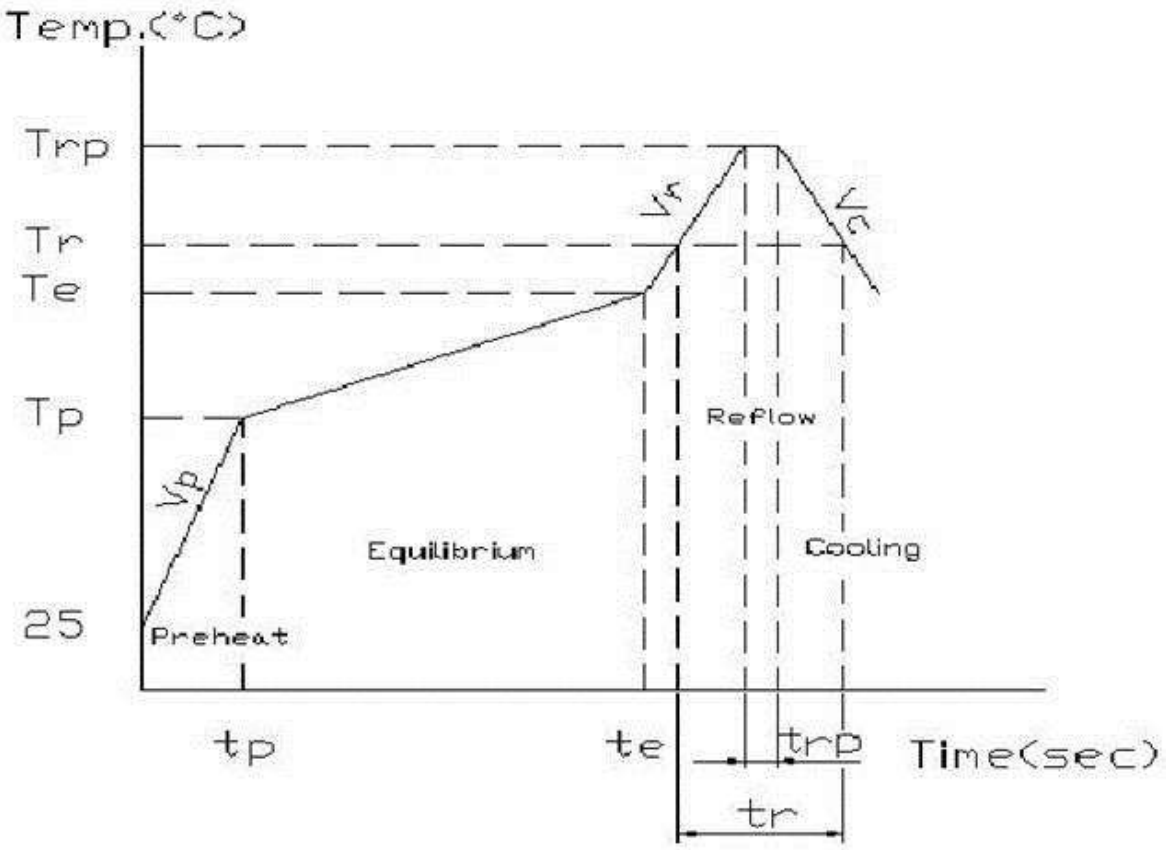

Hand Soldering (Iron Condition)

Soldering Iron:30W Max

Temperature 350°C Max （iron tip 260℃ Max）

Soldering Time:3 Seconds Max(Once)

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■ **Reliability Test Program/ Reliability Test Item**

NO.	Test Item	Standard Test Method	Test Conditions	Test Duration	Failure Criteri	Units Failed/Tested
1	Resistance to Soldering Heat	JEITA ED-4701 300 301	Tsld=260°C, 10sec,reflows Pretreatment30°C,70%,168hrs		#1	0/20
2	Solderability (Reflow Soldering)	JEITA ED-4701 300 303A	Tsld=245±5°C,5sec. Lead-free Solder(Sn-3.0Ag-0.5Cu)		#3	0/20
3	Thermal Shock	JEITA ED-4701 300 307	-40°C~110°C 10min dwell, 10sec transfer,	100cycles	#1	0/20
4	Temperature Cycle	JEITA ED-4701 100 105	-40℃（30min）～25℃（5min）～110℃（30min）～25℃（5min）	100cycles	#1	0/20
5	High Temperature Storage	JEITA ED-4701 200 201	Ta=110°C	1000hrs.	#1	0/20
6	Temperature Humidity	JEITA ED-4701 100 103	Ta=60°C, RH=90%	1000hrs.	#1	0/20
7	Low Temperature Storage	JEITA ED-4701 200 202	Ta=-40°C	1000hrs.	#1	0/20
8	Room Temperature Operating life		Ta=25°C, IF=10mA	1000 hrs.	#2	0/20
9	Low Temperature Operating life		Ta=-40°C, IF=10mA	1000hrs.	#2	0/20

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Failure Criteria

Criteria #	Items	Conditions	Failure Criteria
#1	Forward Voltage(VF)	IF=10mA	>U.S.L.X1.1
	Luminous Intensity(IV)	IF=10mA	<L.S.L.X0.7
#2	Forward Voltage(VF)	IF=10mA	>U.S.L.X1.1
	Luminous Intensity(IV)	IF=10mA	<L.S.L.X0.5
#3	Solderability		Less than 95% solder coverage

U.S.L.: Upper Specification limit L.S.L.: Lower Specification Limit

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■ Handling of Silicone Resin LEDs-

- **Handling Indications**

ii. When handling the product, do not touch it directly with bare hands as it may contaminate the surface and affect on optical characteristics. In the worst cases, excessive force to the product might result in catastrophic failure due to package damage and/or wire breakage.

iii. When handling the product with tweezers, LEDs should only be handled from the side and make sure that excessive force is not applied to the resin portion of the product. Failure to comply can cause the resin portion of the product to be cut, chipped, delaminated and/or deformed, and wire to be broken, and thus resulting in catastrophic failure.

■ Storage –

- Storage Conditions

A. Before opening the package:

The LEDs should be kept at ≦40°C and ≦90%RH. The LEDs should be used within a year. When storing the LEDs, moisture proof packaging with absorbent material (silica gel) is recommended.

B. After opening the package:

The LEDs should be kept at ≦30°C and ≦60%RH. The LEDs should be soldered within 672 hours (4 weeks) after opening the package. If unused LEDs remain, they should be stored in moisture proof packages, such as sealed containers with packages of moisture absorbent material (silica gel). It is also recommended to return the LEDs to the original moisture proof bag and to reseal the moisture proof

bag again.

- If the moisture absorbent material (silica gel) has faded away or the LEDs have exceeded the storage time, baking treatment should be performed using the following conditions.
  Baking treatment: more than 24 hours at 60 ± 5°C
- This product has silver plated metal parts that are inside and/or outside the package body. The silver plating becomes tarnished when being exposed to an environment which contains corrosive gases. Any LED with tarnished leads may lead to poor solderability and deterioration of optical characteristics. Please do not expose the LEDs to corrosive atmosphere during storage.
- After assembly and during use, silver plating can be affected by the corrosive gases emitted by components and materials in close proximity of the LEDs within an end product, and the gases entering into the product from the external atmosphere. The above should be taken into consideration when designing.

■ Moisture Proof Package –

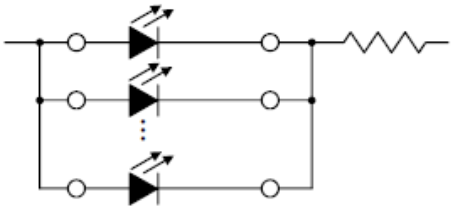
- When moisture is absorbed into the SMT package it may vaporize and expand during soldering. There is a possibility that this can cause exfoliation of the contacts and damage to the optical characteristics of the LEDs. For this reason, the moisture proof package is used to keep moisture to a minimum in the package.
- The moisture proof package is made of an aluminum moisture proof bag. A package of a moisture absorbent material (silica gel) is inserted into the aluminum moisture proof bag. The silica gel changes its color from blue to red as it absorbs moisture.
- Please avoid rapid transitions in ambient temperature, especially in high humidity environments where condensation can occur.

■ Recommended circuit –

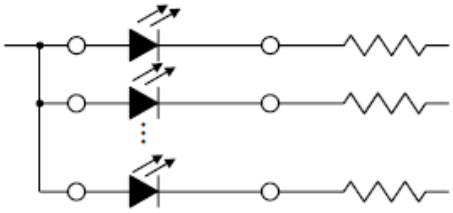
- In designing a circuit, the current through each LED must not exceed the absolute maximum rating specified for each LED. It is recommended to use Circuit B which regulates the current flowing through each LED. In the meanwhile, when driving LEDs with a constant voltage in Circuit A, the current through the LEDs may vary due to the variation in forward voltage (VF) of the LEDs. In the worst case, some LED

may be subjected to stresses in excess of the absolute maximum rating.

(A)



(B)



- This product should be operated in forward bias. A driving circuit must be designed so that the product is not subjected to either forward or reverse voltage while it is off. In particular, if a reverse voltage is continuously applied to the product; such operation can cause migration resulting in LED damage.

■ Heat Generation –

- Thermal design of the end product is of 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 operating current should be decided after considering the ambient maximum temperature of LEDs.

■ 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.
- When inspecting the final products in which LEDs were assembled, it is recommended to check whether the assembled LEDs are damaged by static electricity or not. It is easy to find static-damaged LEDs by a light-on test or a VF test at a lower current (below 1mA is recommended).
- Damaged LEDs will show some unusual characteristics such as the leak current remarkably increases, the forward voltage becomes lower, or the LEDs do not light

at the low current.

- Criteria: (VF > 2.0V at IF=0.5mA)

■ Cleaning –

- It is recommended that isopropyl alcohol be used as a solvent for cleaning the LEDs. When using other solvents, it should be confirmed beforehand whether the solvents will dissolve the package and the resin or not. Freon solvents should not be used to clean the LEDs because of worldwide regulations.
- Do not clean the LEDs by the ultrasonic. When it is absolutely necessary, the influence of ultrasonic cleaning on the LEDs depends on factors such as ultrasonic power and the assembled condition. Before cleaning, a pre-test should be done to confirm whether any damage to the LEDs will occur.

Notice: The specifications are subject to change without notice. Please contact us for updated information

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■ Change story

REV.	Date	Change Description
C	2015.08.11	1、Original Version
D	2015.10.27	1、Change Luminous Intensity in Electrical / Optical Characteristics 2、Change Luminous Intensity Rank Limits
E	2015.12.17	1、Change Luminous Intensity in Electrical / Optical Characteristics 2、Change Luminous Intensity Rank Limits 3、Change Dominant Wavelength Rank Limits 4、Change Forward Voltage Rank Limits
F	2016.10.28	1、Change Package Outline Dimensions and Polarity 2、Change Forward Voltage in Electrical / Optical Characteristics 3、Change Forward Voltage Rank Limits 4、Change Outer Box's Size in Packing Amount
G	2017.02.21	1、Change Total Mount in Packing Amount

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■ Change story

REV.	Date	Change Description
H	2018.07.20	1、Add Forward Current vs. Ambient Temperature 2、Add Relative Luminous Flux vs Forward Current 3、Change Features
J	2018.09.03	1、Change Electrical / Optical Characteristics 2、Change Luminous Intensity Rank Limits 3、Change Features
K	2019.02.22	Change Figure5. Relative Luminosity VS. Radiation Angle
L	2020.01.18	Change Absolute Maximum Rating Polarity Notes