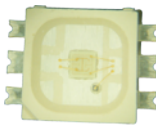
PLCC Series

1W PLCC Single Color Blue & Green Datasheet

High power PLCC is a surface mount, compact, high brightness LED that is built for various illumination needs. A blue and green single color high power PLCC can deliver typical luminous flux of 15 lm and 52lm respectively while driving at 350mA suitable for any kind of lighting sources, including display, stage, ambient, signal and street lighting. The small physical dimension can free customers from any constrains or limitations in these fields of applications. Furthermore, the reflow-solderable nature of high power PLCC provides an easy path towards the optimum thermal management to achieve a promising reliability. In conclusion, high power PLCC offers you an extraordinary LED experience.



Features :

- High luminous Intensity and high efficiency
- Base on InGaN / GaN technology
- Wide viewing angle : 120°
- Excellent performance and visibility
- Suitable for all SMT assembly methods
- IR reflow process compatible
- Environmental friendly; RoHS compliance

Typical Applications

- Signal and symbol luminaire
- Indoor and outdoor displays
- Backlighting (illuminated advertising, general lighting)
- Interior automotive lighting
- Emergency lighting

Lighting Design Manufacturing Service

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Product Nomenclature

The following table describes the available color, power, and lens type. For more flux and forward voltage information, please consult the Bin Group document.

E	T	-	5050	B	-	B	1	1	W
X1			X2	X3		X4	X5	X6	X7

X1 LED Item		X2 Package Type		X3 Emitting Color		X4 Chip Quantity		X5~X6 Serial No.	X7 Feature	
Code	Type	Code	Type	Code	Type	Code	Type		Code	Type
ET	Edison Top LED	5050	5.0x5.0mm	W	Cool White	A	0.5W		W	White surface
				H	Neutral White	B	1W			
				X	Warm White					
				R	Red					
				A	Amber(590nm)					
				T	True Green					
				B	Blue					
				RTB	RGB 3chips					

Figure 1. PLCC Nomenclature

LED Package Dimension and Polarity

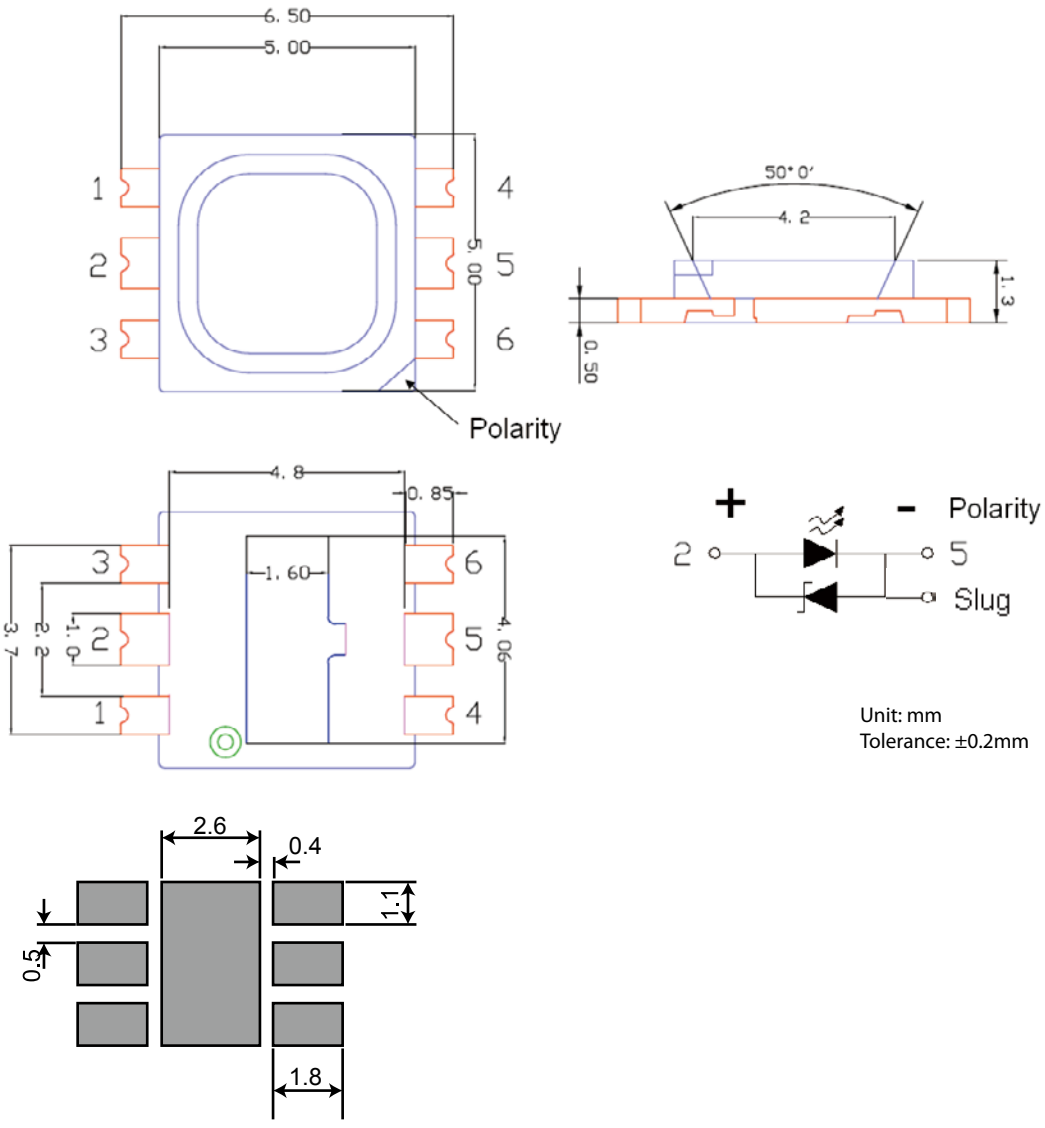


Figure 2. 5050W PLCC Dimension, circuit diagram and recommended soldering pad

Notes:
1. 1W PLCC slug has polarity as cathode.
2. It is important that the slug can not contact aluminum surface, it is strongly recommended that there should coat a uniform electrically isolated heat dissipation film on the aluminum surface.

Absolute Maximum Ratings

The following table describe absolute maximum ratings of 1W PLCC Single Color - Blue & Green series.

Table 1. PLCC Absolute maximum ratings (T_a=25°C)

Parameter	Symbol	Value	Unit
Forward Current	I_F	350	mA
Pulse Forward Current	I_{pulse}	1,000	mA
Reverse Voltage	V_R	5	V
LED Junction Temperature	T_J	125	°C
Operating Temperature		-30 ~ +85	°C
Storage Temperature		-40 ~ +120	°C
ESD Sensitivity	V_B	2,000	V
Soldering Temperature		Reflow Soldering : 255~260°C/10~30sec Manual Soldering : 350°C/3sec	

Notes:
1. The values are based on 1-die performance.
2. I_{pulse} condition: pulse width ≤0.1msec and duty ≤1/10.

Electro-Optical Characteristic

The following table describes luminous intensity of 1W PLCC Single Color - Blue & Green series.

Table 2 . PLCC Electro-optical characteristics (T_a=25°C)

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Forward Voltage	V_F	I_F=350mA/die	2.8	-	3.8	V
Reverse Current	I_R	V_R=5V	-	-	10	μA
Viewing Angle	$2\theta_{1/2}$*	I_F=350mA/die	-	120	-	deg.

Note:
$2\theta_{1/2}$ is the off-axis angle where the luminous intensity is half of the axial luminous intensity.

Luminous Flux Characteristic

The following table describes luminous intensity of 1W PLCC Single Color - Blue & Green series, I_F=350mA

Table 3. PLCC Luminous Flux characteristic

Power Consumption	Part Name	Color	Flux			Unit
			Min.	Typ.	Max.	
1W	ET-5050B-B11W	Blue	--	15	--	lm
	ET-5050T-B11W	Green	--	52	--	lm

Dominant/Peak Wavelength Characteristic

The following table describes forward voltage of 1W PLCC Single Color - Blue & Green series

Table 4. PLCC dominant/peak wavelength characteristic, T_a=25°C at 350mA

Power Consumption	Part Name	Color	CCT/Wavelength			Unit
			Min.	Typ.	Max.	
1W	ET-5050B-B11W	Blue	455	--	475	lm
	ET-5050T-B11W	Green	520	--	535	lm

V_F Rank

Table 5. PLCC forward voltage rank

Blue & True Green

V_F(V)			
V01	2.8 — 3.1	V04	3.7 — 4.0
V02	3.1 — 3.4	V05	4.0 — 4.3
V03	3.4 — 3.7	V06	4.3 — 4.6

Note:
Forward voltage measurement allowance is ± 0.1V.

Luminous Intensity Rank

Table 6. Luminous intensity rank, T_a=25℃

Group	Min.	Max.
G	3.7	4.8
H	4.8	6.3
J	6.3	8.2
K	8.2	10.6
L	10.6	13.8
M	13.8	17.9
N	17.9	23.3
P	23.3	30.3
Q	30.3	39.4
R	39.4	51.2
S1	51.2	58.8
S2	58.8	66.5
T1	66.5	70
T2	70	80
T3	80	86.5
U1	86.5	90

Note:
Luminous Intensity Measurement Allowance is ± 10%.

Dominant/Peak Wavelength Rank

Table 7. PLCC dominant/peak wavelength rank

Power Consumption	Color	Bin	Min	Max	Unit
1W	Blue	V	455	460	nm
		W	460	465	nm
		X	465	470	nm
		Y	470	475	nm
	Green	W	520	525	nm
		X	525	530	nm
		Y	530	535	nm

Note:
Dominant wavelength Measurement Allowance is ± 0.08nm

Characteristic Curves

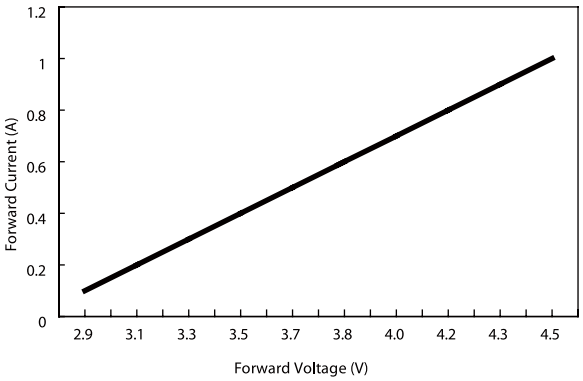


Figure 3. Forward current & forward voltage for 1W PLCC Blue & Green

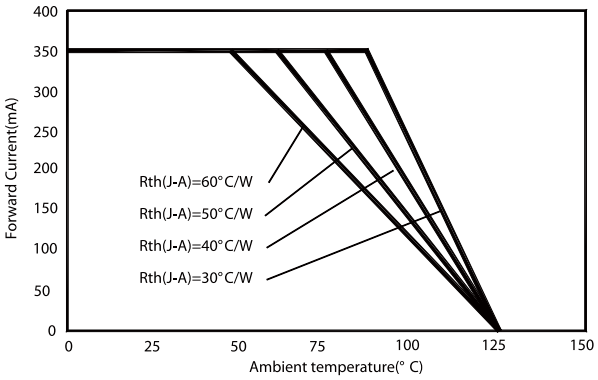


Figure 4. Operating current & ambient temperature for 1W PLCC Blue & Green

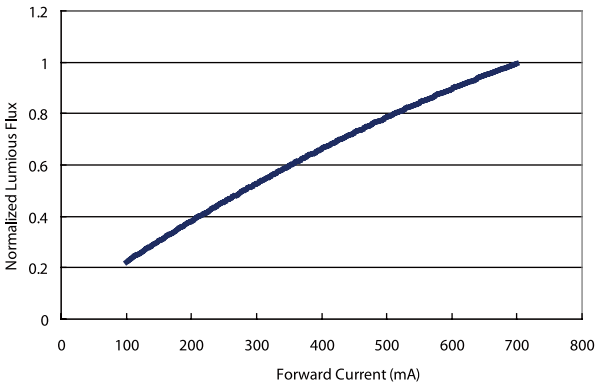


Figure 5. Forward current & relative luminous at Ta=25°C for 1W PLCC Blue & Green

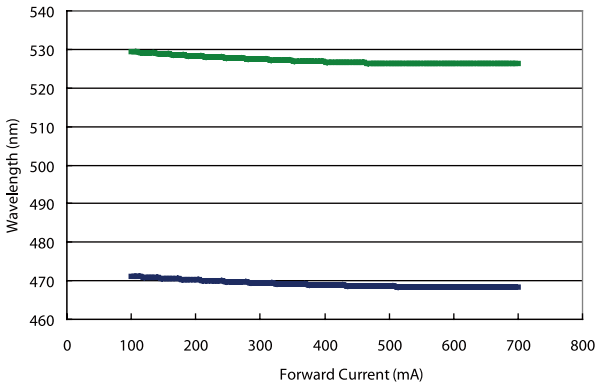


Figure 6. Wavelength length vs. forward current for True Green, Blue

Thermal Resistance

Table 8. Thermal Resistance

Thermal Resistance from Junction to Thermal Pad	Unit
10	°C/W

Reliability Test Items

The following table describes operating life, mechanical, and environmental tests performed on 1W PLCC Single Color series.

Table 9. Test Items

Stress Tes	Stress Conditions	Stress Duration	Failure Criteria
IR reflow	Peak temp.=255~260°C 10sec (Pre treatment 60°C/60%RH,168hrs)	3 times	No catastrophic
Room Temperature Operating Life	25 °C, I_F =DC max	1000 hours	Note 2
High Temperature High Humidity Operating Life	85 °C / 85%RH, I_F = 150mA	1000 hours	Note 2
High Temperature Operating Life	85 °C, I_F = 150mA	1000 hours	Note 2
Low Temperature Operating Life	-40 °C, I_F = DC max [1]	1000 hours	Note 2
High Temperature Storage Life	150°C	1000 hours	Note 2
Low Temperature Storage Life	-40°C	1000 hours	Note 2
Non-Operating Thermal Shock	-40°C / 125°C, 20 min dwell <10 sec transfer	300 cycles	No catastrophic

Notes:
1. DC max is defined to be 350mA for 1W PLCC Single Color.
2. Failure Criteria:
   - Electrical failures: V_F shifts ≥10%
   - Light Output Degradation: Percentage level shift ≥50% at 1,000hrs or 500cycle
   - Visual failures: Broken or damaged package on lens or substrate
3. The IR reflow test can pass through JEDEC level 2a criterion.

Reflow Profile

The following reflow profile is from IPC/JEDEC J-STD-020D which provided here for reference.

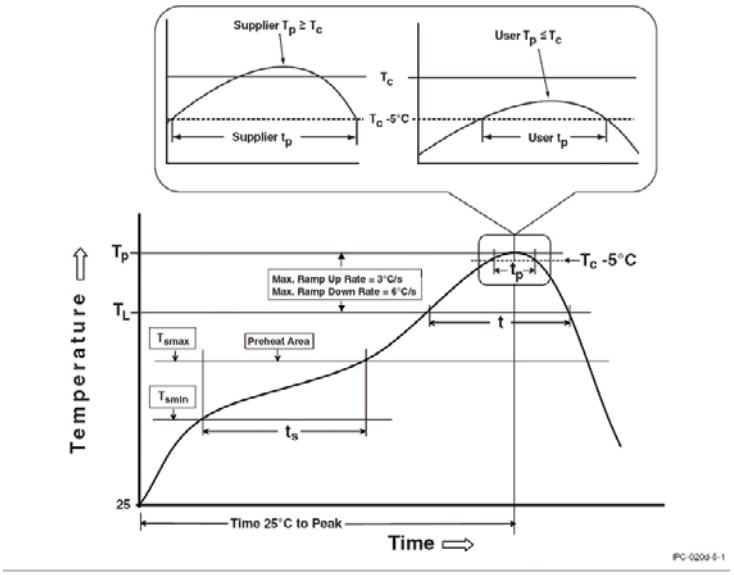


Figure 7. Reflow Profiles

Table 10. Classification Reflow Profiles

Profile Feature	Sn-Pb Eutectic Assembly	Pb-Free Assembly
Preheat & Soak Temperature min (Tsmin) Temperature max (Tsmax) Time (Tsmin to Tsmax) (ts)	100°C 150°C 60-120 seconds	150 °C 200 °C 60-120 seconds
Average ramp-up rate (Tsmax to Tp)	3°C/second max.	3 °C/second max.
Liquidous temperature (TL) Time at liquidous (tL)	183 °C 60-150 seconds	217 °C 60-150 seconds
Peak package body temperature (Tp)*	230 °C ~235°C *	255 °C ~260 °C *
Classification temperature (Tc)	235°C	260 °C
Time (tp)** within 5 °C of the specified classification temperature (Tc)	20** seconds	30** seconds
Average ramp-down rate (Tp to Tsmax)	6°C/second max.	6°C/second max.
Time 25°C to peak temperature	6 minutes max.	8 minutes max.

Notes:
1. * Tolerance for peak profile temperature (Tp) is defined as a supplier minimum and a user maximum.
2. ** Tolerance for time at peak profile temperature (tp) is defined as a supplier minimum and a user maximum.

1. Soldering conditions

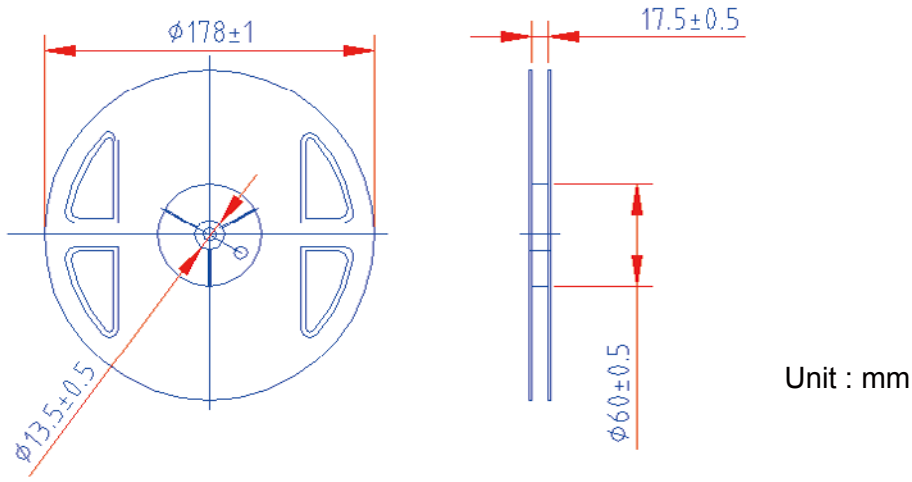
- Reflow soldering should not be done more than twice.
- When soldering, do not put stress on the LEDs during heating.
- After soldering, do not warp the circuit board.
- Repair should not be done after the LEDs have been soldered. When repair is unavoidable, a double-head soldering iron should be used. It should be confirmed beforehand whether the characteristics of the LEDs will be damaged by repairing or not.
- The encapsulated material of the LEDs is silicone. Therefore precautions should be taken to avoid the strong pressure on the encapsulated part.

2. Cleaning

- It is recommended to use isopropyl alcohol as a solvent to clean the LEDs. When using other solvents, it should be confirmed beforehand whether the solvents will dissolve the package and the resin or not.

Product Packaging Information

Taping Reel



Unit : mm

1. Common dimensions.

Item	Specification	Tol. (+/-)
W	16.00	± 0.30
E	1.75	± 0.10
F	7.50	± 0.10
D0	1.50	± 0.10
D1	1.50	± 0.10
P0	4.00	± 0.10
P1	8.00	± 0.10
P2	2.00	± 0.10
P0 x10	40.00	± 0.20

2. Pocket & other dimensions.

Item	Specification	Tol. (+/-)
t	0.30	± 0.05
A0	5.30	± 0.10
B0	7.50	± 0.10
K0	1.60	± 0.10

3. Drawing. (Conform to EIA-481 standard)

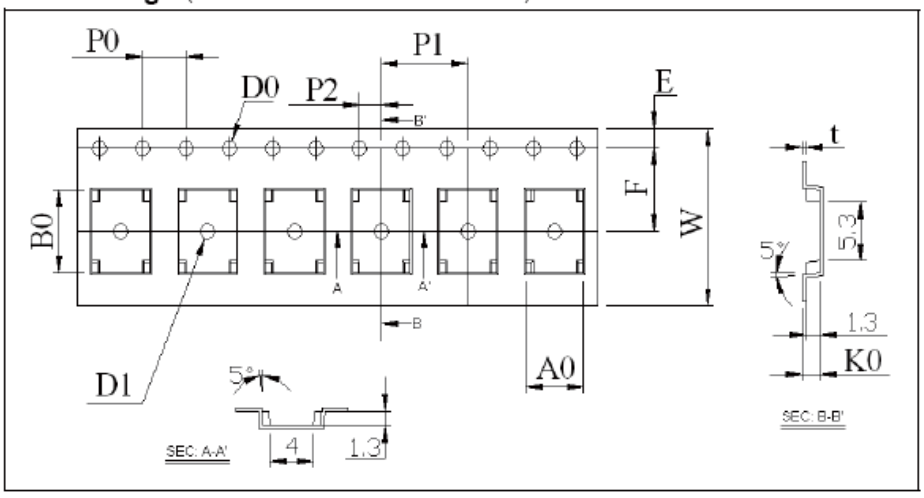


Figure 8. Taping reel dimensions

Packaging

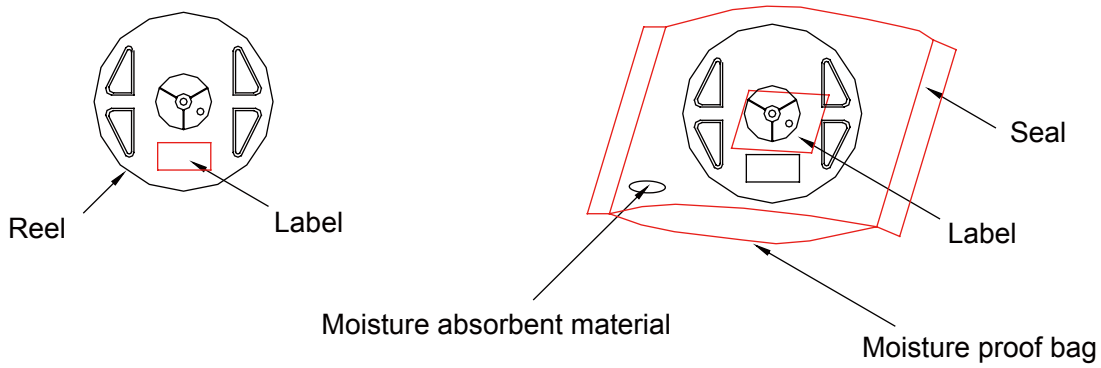


Figure 9. Packaging diagram

Package Label

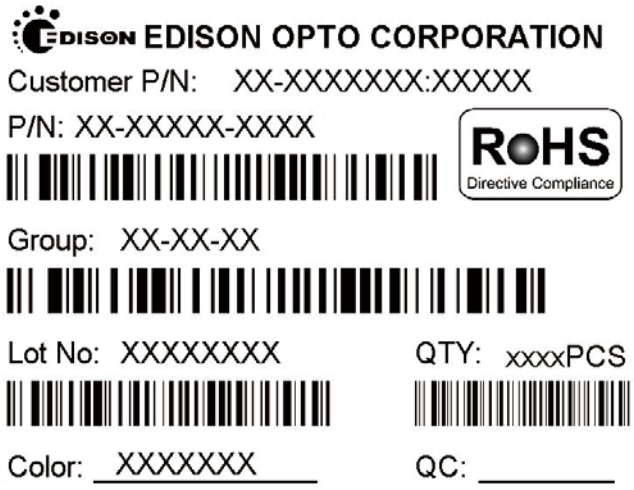


Figure 10. Package label

Table 11. Package dimensions and quantity

Item	Quantity	Total	Dimensions(mm)
Reel	1,000pcs	1,000pcs	Diameter=178
Box	3 reels	3,000pcs	240*235*67
Carton	10 boxes	30,000pcs	500*260*355

Precaution for Use

Storage

1.1 Before opening the package

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

1.2 After opening the package

The LEDs should be kept at ≤30°C & ≤60%RH. The LEDs should be soldered within 4 weeks after opening the moisture proof package.

If unused LEDs remain, they should be stored in moisture proof packages, such as sealed containers with moisture proof package within absorbent material (silica gel).It is also recommended to return the unused LEDs to the original moisture proof package and to seal the moisture proof package again.

If the moisture absorbent material (silica gel) vapors or expires the expiration date, baking treatment should be performed by using the following conditions : 60°C for 20 hours.

The LEDs electrode and leadframe comprise a silver plated copper alloy. The silver surface may be affected by environments. Please avoid conditions which may cause the LEDs being corroded or discolored. The corrosion or discoloration might lower solderability or affect optical characteristics.

Please avoid rapid transition in ambient temperature, especially in high humidity environments where condensation can occur.

Static electricity

The products are sensitive to static electricity and highly taken care when handling them.

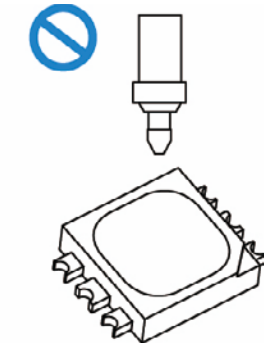
Static electricity or surge voltage will damage the LEDs. It is recommended to wear an anti-electrostatic wristband or an anti-electrostatic glove when handling the LEDs.

All devices, equipments and machinery must be properly grounded. It is recommended that measures be taken against surge voltage to the equipment that mounts the LEDs.

Pick and Place

Recommended conditions: Outer nozzle>ψ 4.2 mm

*Avoid direct contact to the encapsulant with picking up nozzle. Failure to comply might result in pick and place processes or damage to encapsulant. In the worst cases, catastrophic failure of the LEDs due to wire deformation and/or breakage.



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