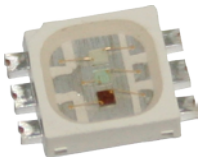
Lighting Design Manufacturing Service

www.edison-opto.com.tw

PLCC Series

1W PLCC RTB 3in1 Datasheet

High power PLCC is a surface mount, compact, high brightness LED that is built for various illumination needs. A RTB 3in1 high power PLCC can deliver typical luminous flux of 8, 15, 5lm respectively while driving each die at 100mA suitable for any kind of lighting sources, including architectural lighting, signage & Indirect lighting, commercial lighting, advertising light box. 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.



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

 version : 4

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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 RTB - 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

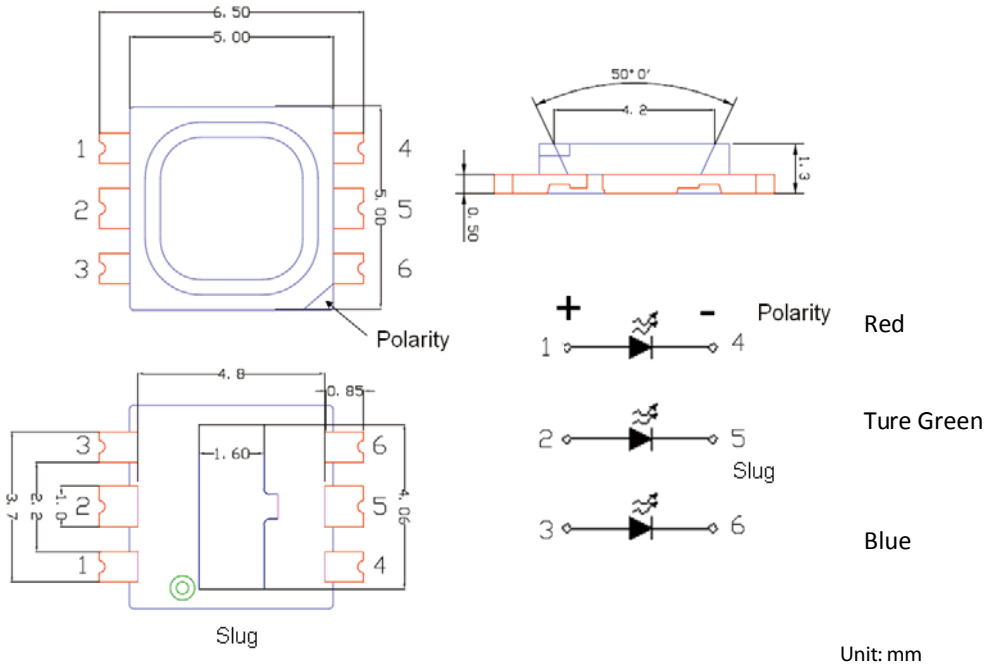


Figure 2. 5050RTB PLCC Dimension, circuit diagram and recommended soldering pad

Notes:
1. 1W PLCC slug has polarity as true green 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.

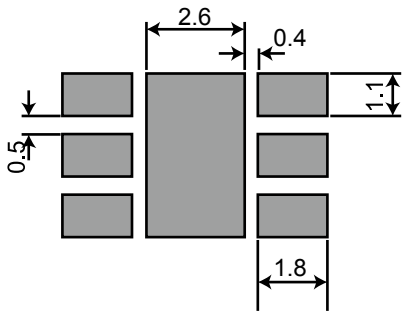


Figure 3. 5050RTB PLCC recommended soldering pad

Absolute Maximum Ratings

The following table describe absolute maximum ratings of PLCC

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

Parameter	Symbol	Value	Unit
Forward Current	I_F	R : 100 T : 100 B : 100	mA
Pulse Forward Current	I_{FP}	R : 200 T : 200 B : 200	mA
Reverse Voltage	V_R	5	V
LED Junction Temperature	T_J	125	°C
Operating Temperature	T_{op}	-30 ~ +85	°C
Storage Temperature	T_{stg}	-40 ~ +120	°C
ESD Sensitivity	V_B	2,000	V
Soldering Temperature	Tsld	Reflow Soldering : 255~260°C/10~30sec Manual Soldering : 350°C/3sec	

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

Electro-Optical Characteristic

The following table describes luminous intensity of PLCC 5050 series.

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

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Forward Voltage	V_F	R=100mA/die	1.8	-	3.8	V
		T=100mA/die	2.8	-	3.8	V
		B=100mA/die	2.8	-	3.8	V
Reverse Current	I_R	V_R=5V	-	-	10	μA
Viewing Angle	$2\theta_{1/2}$*	I_F=100mA/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 RTB 3in1 series, I_F=100mA/ Die

Table 3. PLCC Luminous Flux characteristic

Power Consumption	Part Name	Color	Flux			Unit
			Min.	Typ.	Max.	
1W	ET-5050RTB-B11W	Red	--	8	--	lm
		True Green	--	15	--	lm
		Blue	--	5	--	lm

Color Temperature or Dominant/Peak Wavelength Characteristic

The following table describes forward voltage of 1W PLCC RTB 3in1 series

Table 4. PLCC color temperature or dominant/peak wavelength characteristic, T_a=25°C at 100mA/ Die

Power Consumption	Part Name	Color	CCT/Wavelength			Unit
			Min.	Typ.	Max.	
1W	ET-5050RTB-B11W	Red	620	--	630	nm
		True Green	520	--	535	nm
		Blue	455	--	475	nm

Luminous Intensity Rank

Table 5. Luminous intensity rank, T_a=25°C

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

Note:
Luminous Intensity Measurement Allowance is ± 10%.

Dominant Wavelength Bin Structure

Table 6. Dominant wavelength bin rank

Group	λd (nm)
Blue	**455-475**
V	455-460
W	460-465
X	465-470
Y	470-475
True Green	**520-535**
W	520-525
X	525-530
Y	530-535
Red	**620-630**
F (Full)	620-630

Note:
Dominant wavelength Measurement Allowance is ± 0.8nm

Characteristic Curves

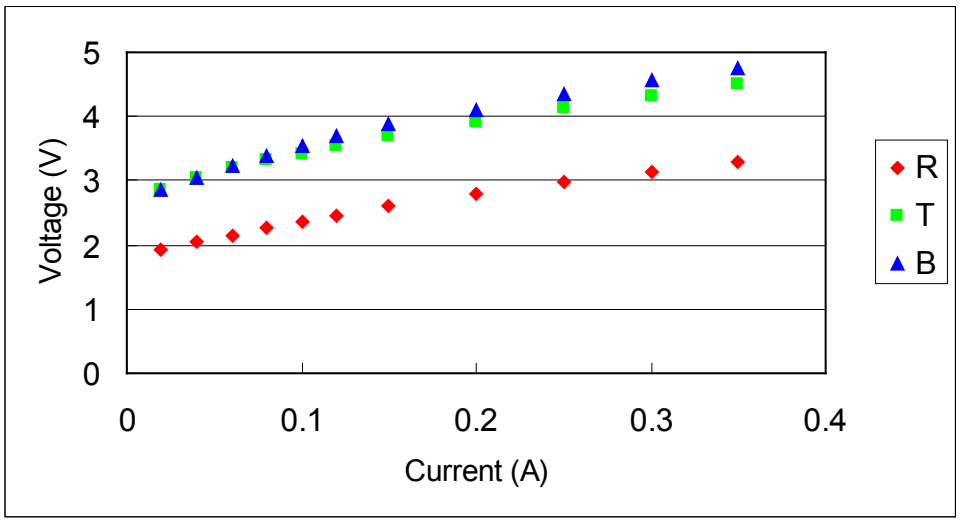


Figure 4. Forward current vs. Forward voltage for High power PLCC RTB 3in1

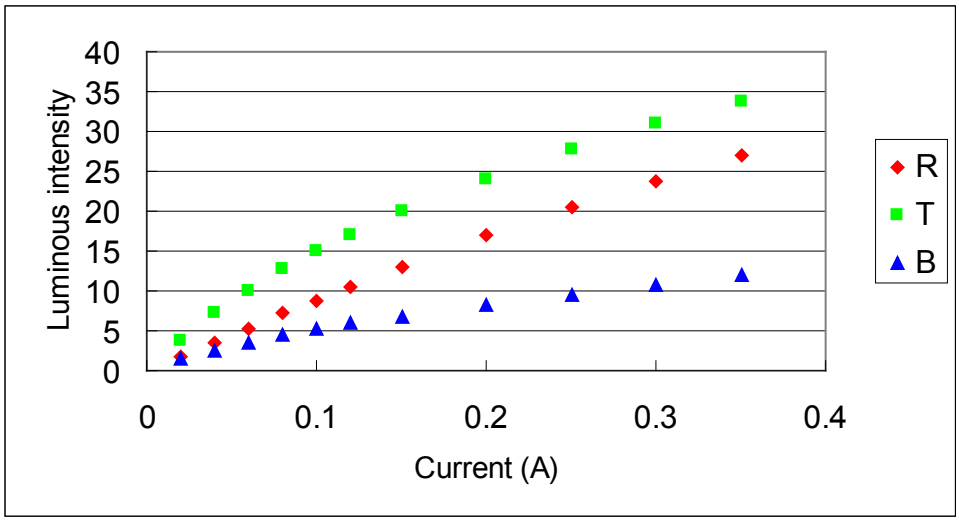


Figure 5. Operating current vs. Luminous intensity for High power PLCC RTB 3in1

PLCC Color Spectrum

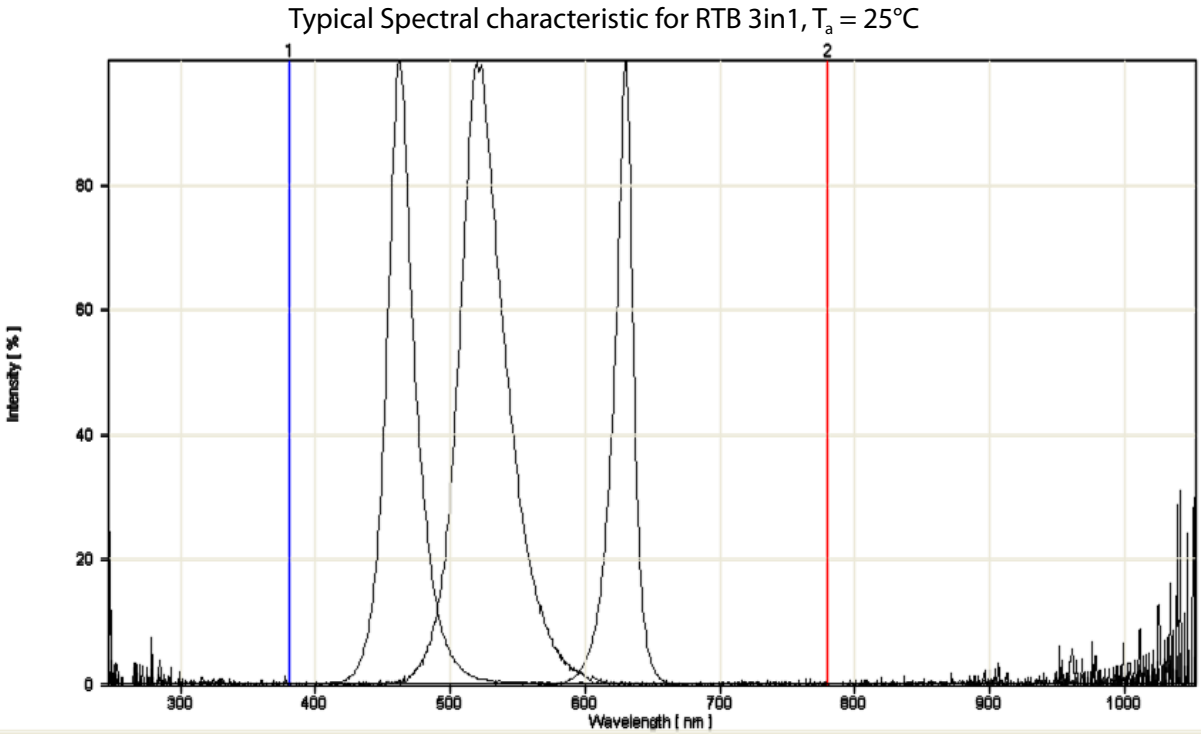


Figure 6. Intensity vs. Wavelength length

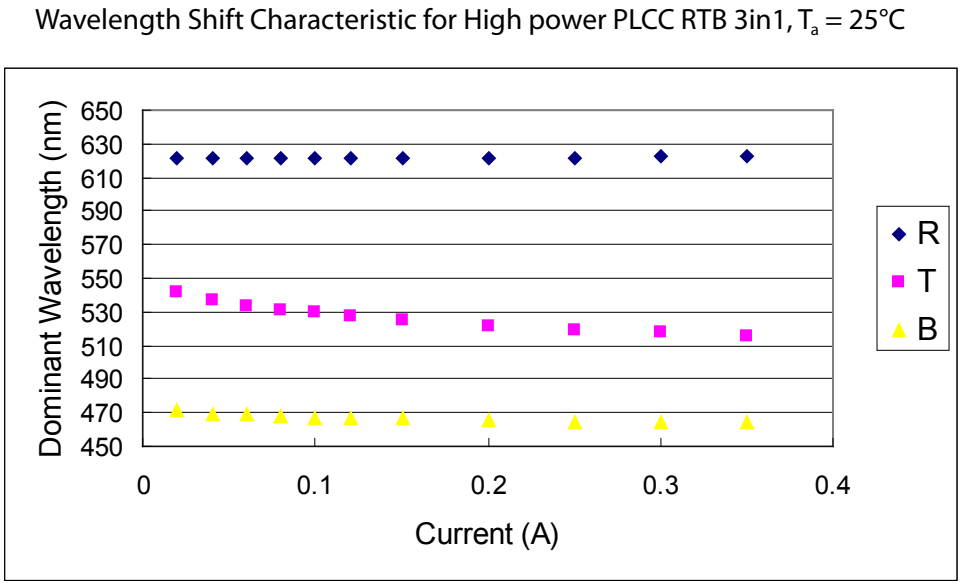


Figure 7. Dominant wavelength length vs. Forward current for RTB 3in1

CIE Chromaticity Diagram of R.G.B.

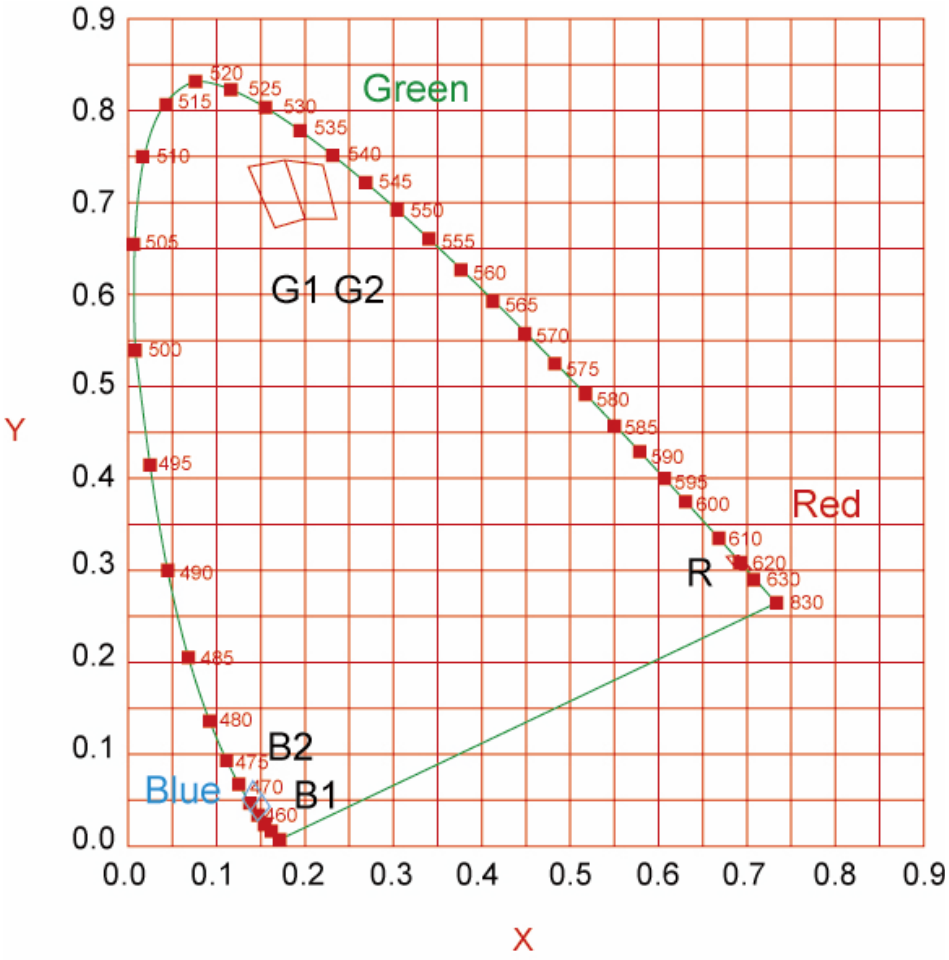


Figure 8. High power PLCC RTB 3in1 CIE Chromaticity Diagram of R.G.B.

Note:
The figure is only for reference

Thermal Resistance

Table 7.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 RTB 3in1 series.

Table 8. 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, R T B I_F =DC max	1000 hours	Note 2
High Temperature High Humidity Operating Life	85 °C / 85%RH, R T B I_F = 50mA	1000 hours	Note 2
High Temperature Operating Life	85 °C, R T B I_F = 50mA	1000 hours	Note 2
Low Temperature Operating Life	-40 °C, R T B 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 100mA for RTB PLCC.
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.

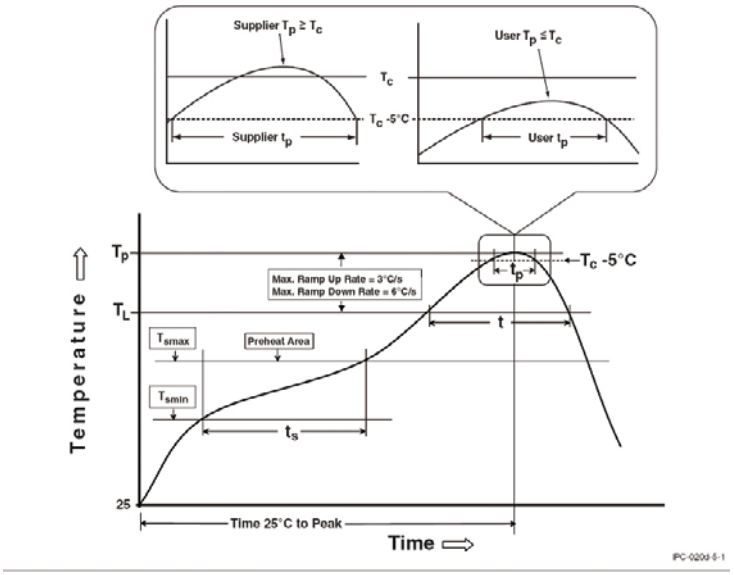


Figure 9.Reflow Profiles

Table 9. 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

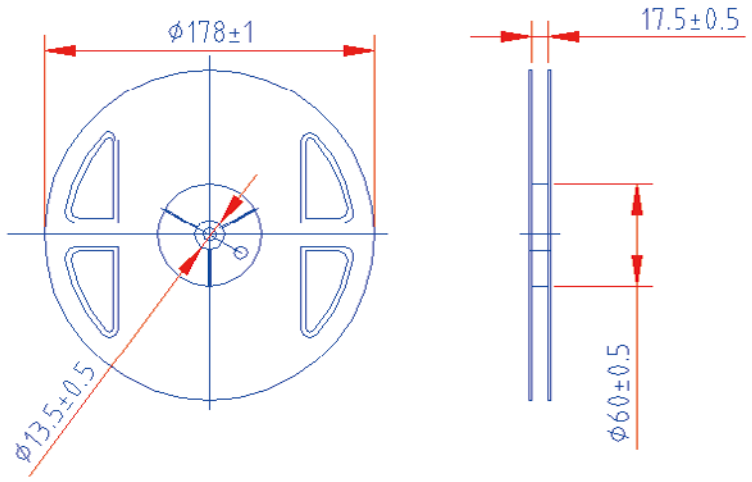
- Reflow soldering should not be done more than twice.
- When soldering, do not put stress on the LEDs during heating.
- After soldering, do not warp the circuit board.
- Repair should not be done after the LEDs have been soldered. When repair is unavoidable, a double-head soldering iron should be used. 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)

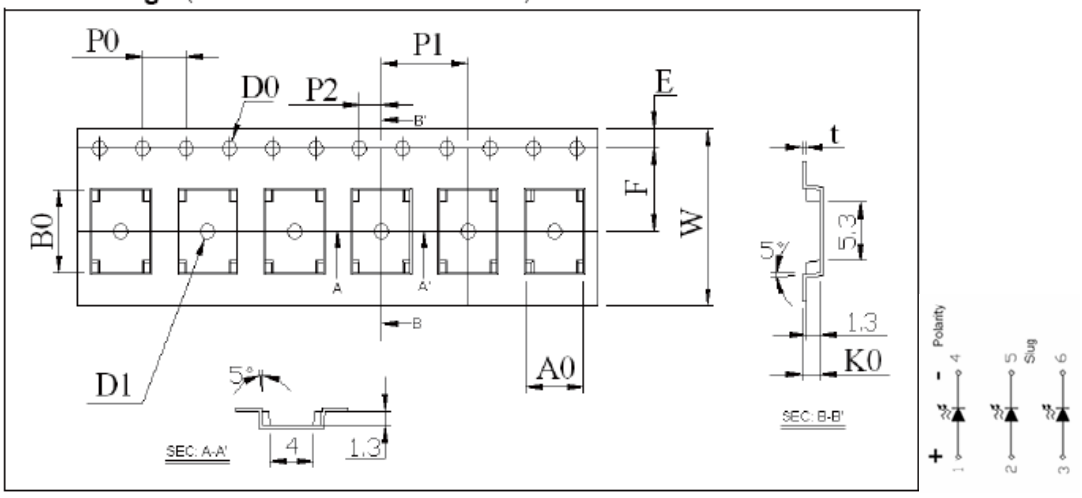


Figure 10. Taping reel dimensions

Packaging

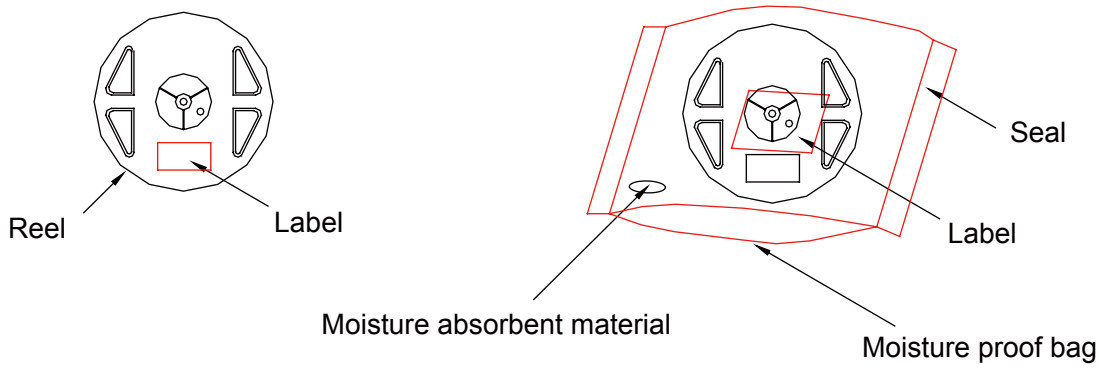


Figure 11. Packaging diagram

Package Label

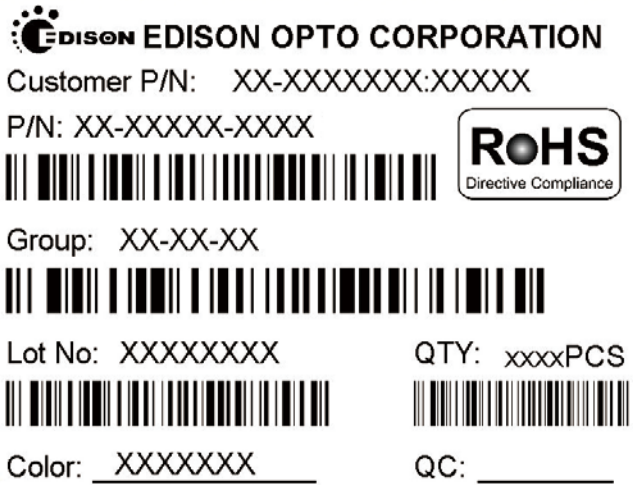


Figure 12. Package label

Table 10. 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.

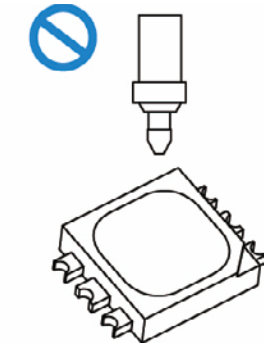
Static electricity or surge voltage will damage the LEDs. It is recommended to wear an anti-electrostatic wristband or an anti-electrostatic glove when handling the LEDs.

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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