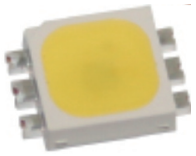
EDISON
Lighting Design Manufacturing Service

PLCC Series

PLCC 5050 1W HR Datasheet



Features :

- High luminous Intensity and high efficiency
- Based on 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 displays
- Backlighting (illuminated advertising, general lighting)
- Interior automotive lighting
- Emergency lighting

EDISON
Lighting Design Manufacturing Service

Table of Contents

General Information 3
Absolute Maximum Ratings 4
Characteristics 4
Luminous Flux Characteristic 5
Voltage Bin Structure 5
Mechanical Dimensions 6
Color BIN code 7
Characteristic Curves 12
Reflow Profile 14
Reliability 15
Product Packaging Information 16
Revision History 17
About Edison Opto 17

EDISON
Lighting Design Manufacturing Service

General Information

Introduction

High power PLCC is a surface mount, compact, high brightness LED that is built for various illumination needs. A single Cool White high power PLCC can deliver typical luminous flux of 115 lm while driving at 60mA suitable for any kind of lighting sources, including general illumination, flashlights, spotlights, tube light source, freezer lighting, industrial and commercial lightings.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.

Ordering Code Format

2	T	04	01	xW	xx	000	xxx
X1	X2	X3-X4	X5-X6	X7-X8	X9-X10	X11-X13	X14-X16

X1		X2		X3-X4		X5-X6		X7-X8	
Type		Component		Series		Wattage		Color	
2	Emitter	T	PLCC	04	5050	01	1W	CW	Cool White
								NW	Neutral White
								WW	Warm White

X9-X10		X11-X13		X14-X16	
Internal code		PCB Board		Serial Number	
-	-	000	-	-	-

EDISON
Lighting Design Manufacturing Service

Absolute Maximum Ratings

Absolute maximum ratings (T_a=25°C)

Parameter	Symbol	Value	Units
DC Forward Current	I_F	60	mA
Pulse Forward Current (tp≤100μs, Duty cycle=0.25)	I_{pulse}	100	mA
Reverse Voltage	V_R	5	V
LED Junction Temperature	T_J	125	°C
Operating Temperature	-	-40 ~ +85	°C
Storage Temperature	-	-40 ~ +120	°C
ESD Sensitivity (HBM)	V_B	2,000	V
Soldering Temperature	T_S	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.

Characteristics

Parameter		Symbol	Value	Units
Viewing Angle	(Typ.)	$2\Theta_{1/2}$	120	Degree
Forward voltage		V_F	20	V
Thermal resistance		-	10	°C/W
CRI		-	85	-
CCT	(Cool White) (Neutral White) (Warm White)	-	5000-10000 3800-5000 2670-3800	K
JEDEC Moisture Sensitivity		-	Level 2a **Floor Life** Conditions: ≤30°C / 60% RH **Soak Requirements(Standard)** Time (hours): 120+1/-0 Conditions: 60°C / 60% RH	-

Notes:
1. $2\theta_{1/2}$ is the off-axis angle where the luminous intensity is half of the axial luminous intensity.
2. Edison maintains a tolerance of +/-2 on CRI measurements.
3. CIE_x/y tolerance: ±0.005

Luminous Flux Characteristic

Luminous Flux Characteristics, I_F=60mA and T_J=25˚C

Color	Group	Min. Luminous Flux(lm)@60mA	Max. Luminous Flux(lm)@60mA	Order Code
Cool White	U3	100	110	2T0401CW11000001
	V1	110	120	
Neutral White	U3	100	110	2T0401NW11000001
	V1	110	120	
Warm White	U3	100	110	2T0401WW05000004
	V1	110	120	
	V2	120	130	

Note:
The luminous flux performance is guaranteed within published operating conditions. Edison Opto maintains a tolerance of ±10% on flux measurements.

Voltage Bin Structure

Group	Min. Voltage (V)	Max. Voltage (V)
V16	16	17
V17	17	18
V18	18	19
V19	19	20

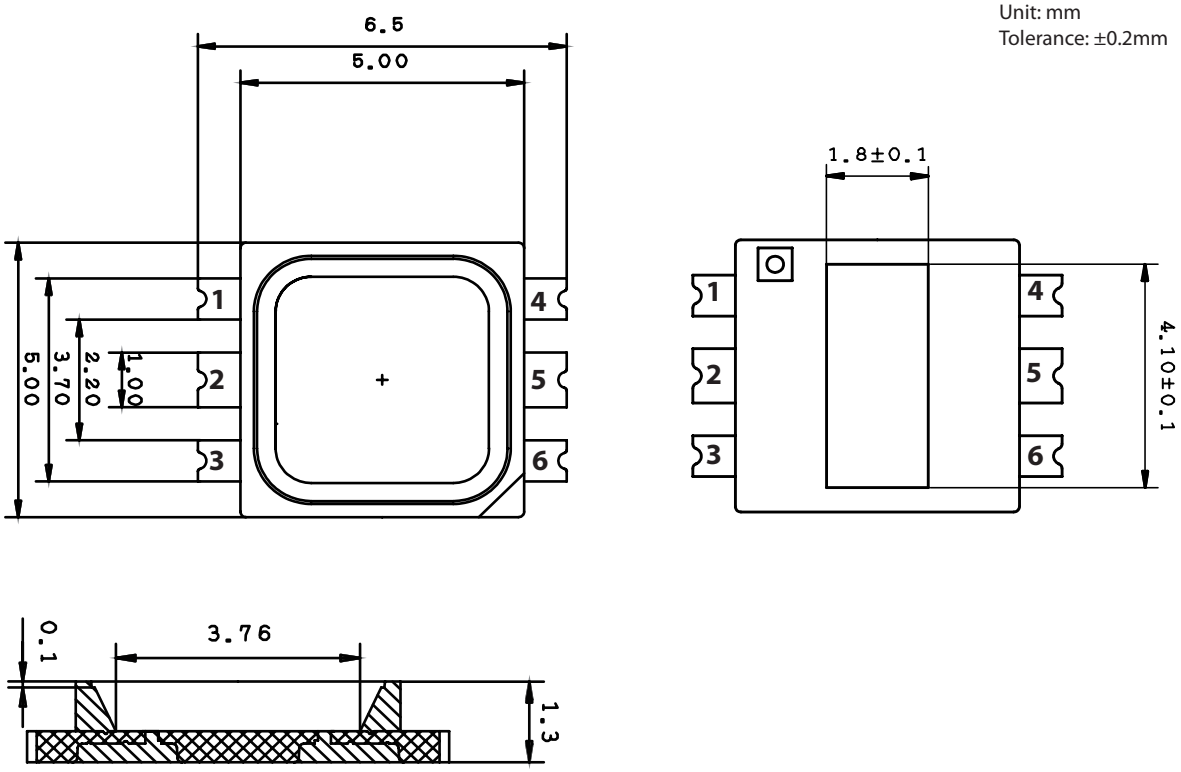
Note:
Forward voltage measurement allowance is ± 0.1V.

Lighting Design Manufacturing Service

Mechanical Dimensions

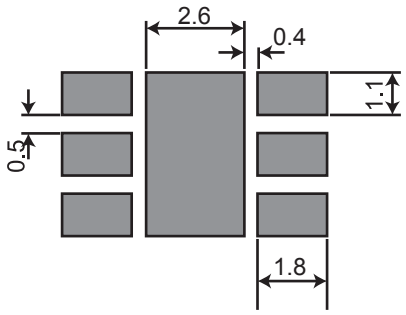
Emitter Type Dimension

Unit: mm
Tolerance: ±0.2mm



Circuit

Solder Pad

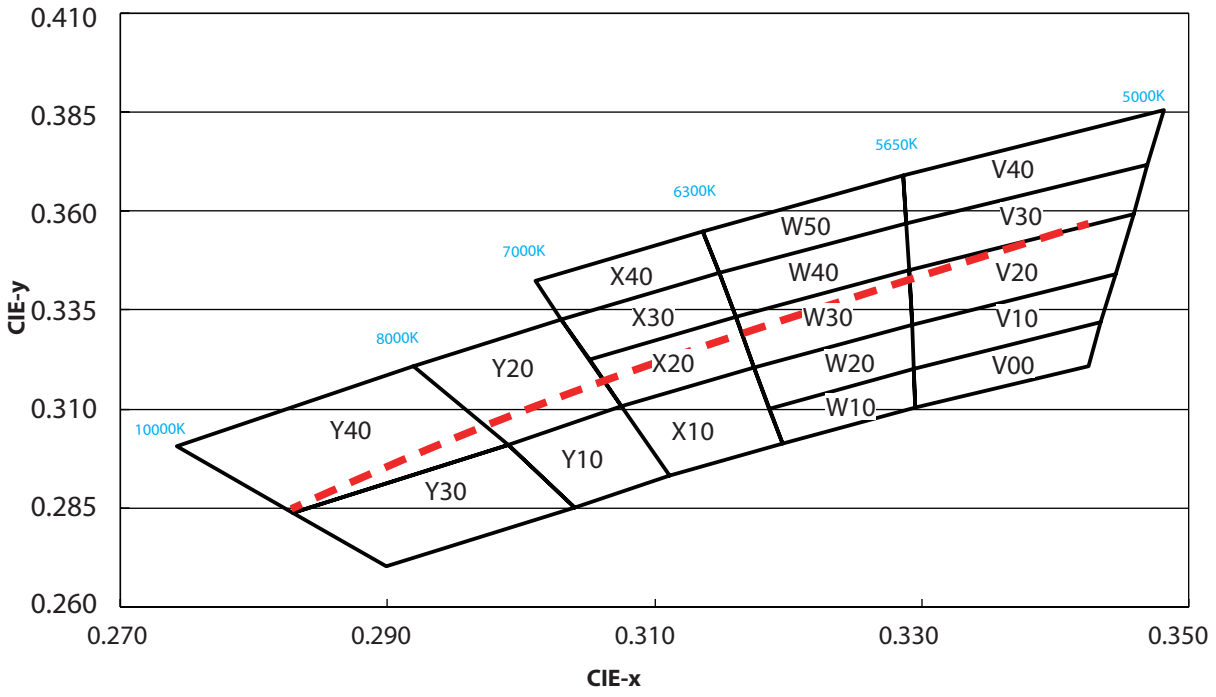


Notes:
1. All dimensions are measured in mm.
2. Tolerance : ± 0.2 mm
3. PLCC Slug without polarity.

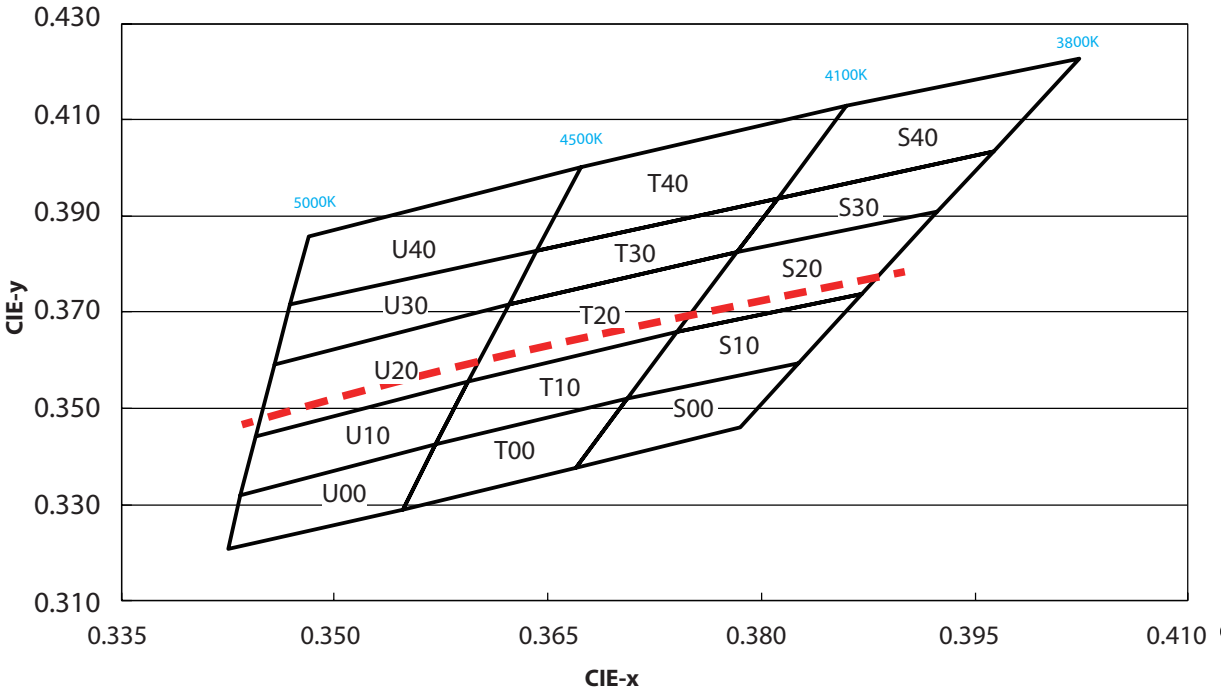
Lighting Design Manufacturing Service

Color BIN code

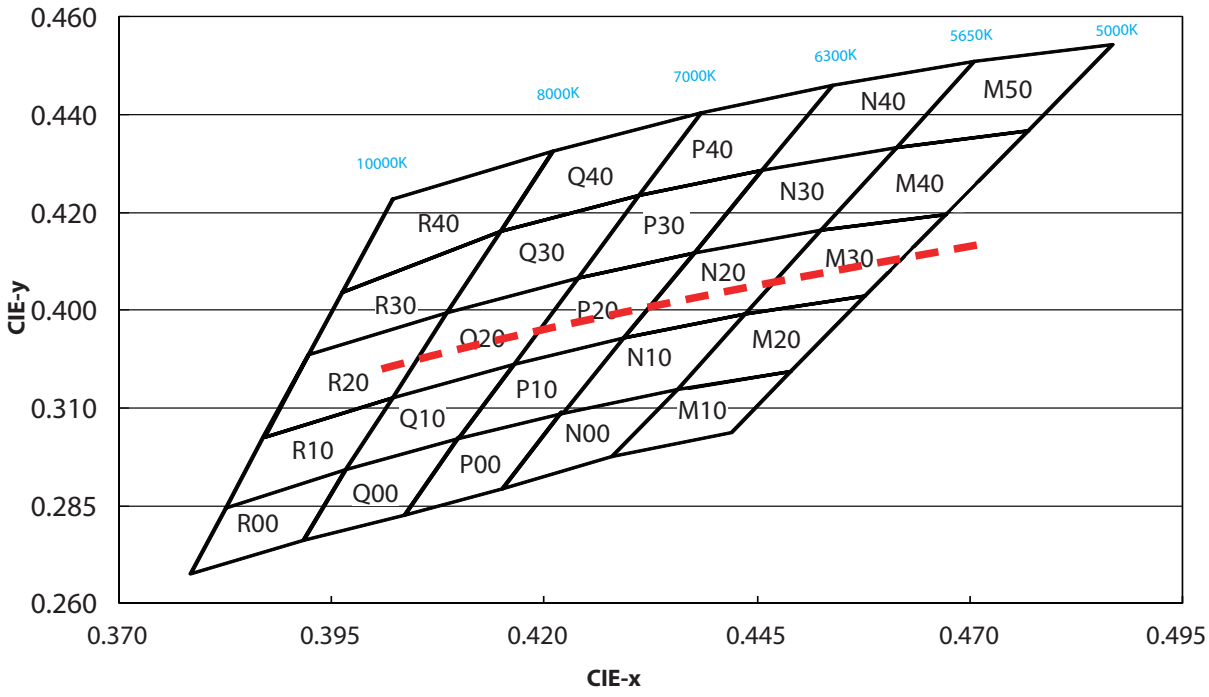
Cool White



Neutral White



Warm White



Cool White

Y10		Y20		Y30		Y40	
X	Y	X	Y	X	Y	X	Y
0.3040	0.2850	0.2990	0.3010	0.3040	0.2850	0.2920	0.3210
0.2990	0.3010	0.2920	0.3210	0.2899	0.2703	0.2742	0.3007
0.3076	0.3108	0.3031	0.3327	0.2830	0.2838	0.2830	0.2838
0.3112	0.2932	0.3076	0.3108	0.2990	0.3010	0.2990	0.3010

X10		X20		X30		X40	
X	Y	X	Y	X	Y	X	Y
0.3076	0.3108	0.3076	0.3108	0.3052	0.3224	0.3031	0.3327
0.3174	0.3204	0.3052	0.3224	0.3031	0.3327	0.3011	0.3422
0.3196	0.3013	0.3160	0.3332	0.3148	0.3444	0.3136	0.3550
0.3112	0.2932	0.3175	0.3204	0.3160	0.3332	0.3148	0.3444

W10		W20		W30		W40		W50	
X	Y	X	Y	X	Y	X	Y	X	Y
0.3294	0.3202	0.3292	0.3313	0.3290	0.3451	0.3290	0.3451	0.3148	0.3444
0.3295	0.3105	0.3294	0.3202	0.3292	0.3313	0.3160	0.3332	0.3136	0.3550
0.3196	0.3013	0.3186	0.3102	0.3175	0.3204	0.3148	0.3444	0.3286	0.3690
0.3186	0.3102	0.3175	0.3204	0.3160	0.3332	0.3288	0.3569	0.3288	0.3569

V00		V10		V20		V30		V40	
X	Y	X	Y	X	Y	X	Y	X	Y
0.3434	0.3320	0.3292	0.3313	0.3292	0.3313	0.3290	0.3451	0.3288	0.3569
0.3425	0.3208	0.3444	0.3442	0.3290	0.3451	0.3288	0.3569	0.3286	0.3690
0.3295	0.3105	0.3434	0.3320	0.3458	0.3592	0.3469	0.3717	0.3481	0.3856
0.3294	0.3200	0.3294	0.3200	0.3444	0.3442	0.3458	0.3592	0.3469	0.3717

Neutral White

U00		U10		U20		U30		U40	
X	Y	X	Y	X	Y	X	Y	X	Y
0.3571	0.3426	0.3444	0.3442	0.3622	0.3716	0.3642	0.3829	0.3642	0.3829
0.3548	0.329	0.3434	0.332	0.3594	0.3557	0.3622	0.3716	0.3673	0.4003
0.3425	0.3208	0.3571	0.3426	0.3444	0.3442	0.3458	0.3592	0.3481	0.3856
0.3434	0.332	0.3594	0.3557	0.3458	0.3592	0.3469	0.3717	0.3469	0.3717

T00		T10		T20		T30		T40	
X	Y	X	Y	X	Y	X	Y	X	Y
0.3706	0.3520	0.3594	0.3557	0.3622	0.3716	0.3642	0.3829	0.3673	0.4003
0.3670	0.3377	0.3571	0.3426	0.3783	0.3825	0.3811	0.3937	0.3860	0.4130
0.3548	0.3290	0.3706	0.3520	0.3741	0.3658	0.3783	0.3825	0.3811	0.3937
0.3571	0.3426	0.3741	0.3658	0.3594	0.3557	0.3622	0.3716	0.3642	0.3829

S00		S10		S20		S30		S40	
X	Y	X	Y	X	Y	X	Y	X	Y
0.3826	0.3595	0.3741	0.3658	0.3783	0.3825	0.3783	0.3825	0.3860	0.4130
0.3785	0.3460	0.3871	0.3739	0.3924	0.3909	0.3811	0.3937	0.4023	0.4228
0.3670	0.3377	0.3826	0.3595	0.3871	0.3739	0.3963	0.4035	0.3963	0.4035
0.3706	0.3520	0.3706	0.3520	0.3741	0.3658	0.3924	0.3909	0.3811	0.3937

Warm White

R00		R10		R20		R30		R40	
X	Y	X	Y	X	Y	X	Y	X	Y
0.3966	0.3673	0.3871	0.3739	0.3924	0.3909	0.4086	0.3995	0.4023	0.4228
0.3917	0.3530	0.4021	0.3822	0.3871	0.3739	0.3924	0.3909	0.4209	0.4326
0.3785	0.3460	0.3966	0.3673	0.4021	0.3822	0.3963	0.4035	0.4148	0.4161
0.3826	0.3595	0.3826	0.3595	0.4086	0.3995	0.4148	0.4161	0.3963	0.4035

Q00		Q10		Q20		Q30		Q40	
X	Y	X	Y	X	Y	X	Y	X	Y
0.4100	0.3740	0.4165	0.3890	0.4086	0.3995	0.4086	0.3995	0.4385	0.4404
0.4035	0.3580	0.4100	0.3738	0.4240	0.4065	0.4148	0.4161	0.4312	0.4234
0.3917	0.3530	0.4021	0.3822	0.4165	0.3890	0.4312	0.4234	0.4148	0.4161
0.3966	0.3673	0.3966	0.3673	0.4021	0.3822	0.4240	0.4065	0.4209	0.4326

P00		P10		P20		P30		P40	
X	Y	X	Y	X	Y	X	Y	X	Y
0.4220	0.3790	0.4294	0.3943	0.4240	0.4065	0.4312	0.4234	0.4385	0.4404
0.4150	0.3635	0.4221	0.3790	0.4376	0.4116	0.4456	0.4287	0.4538	0.4460
0.4035	0.3580	0.4100	0.3738	0.4294	0.3943	0.4376	0.4116	0.4456	0.4287
0.4100	0.3740	0.4165	0.3890	0.4165	0.3890	0.4240	0.4065	0.4312	0.4234

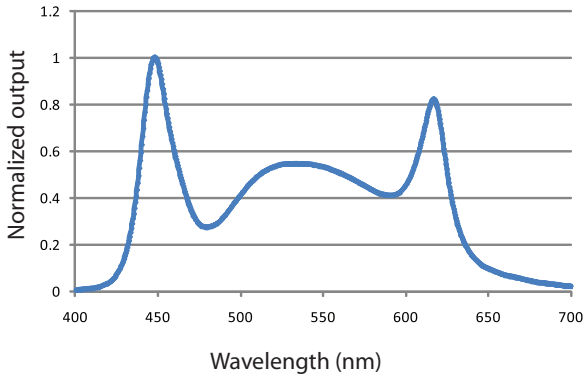
N00		N10		N20		N30		N40	
X	Y	X	Y	X	Y	X	Y	X	Y
0.4100	0.3740	0.4165	0.3890	0.4086	0.3995	0.4086	0.3995	0.4385	0.4404
0.4035	0.3580	0.4100	0.3738	0.4240	0.4065	0.4148	0.4161	0.4312	0.4234
0.3917	0.3530	0.4021	0.3822	0.4165	0.3890	0.4312	0.4234	0.4148	0.4161
0.3966	0.3673	0.3966	0.3673	0.4021	0.3822	0.4240	0.4065	0.4209	0.4326

M00		M10		M20		M30		M40	
X	Y	X	Y	X	Y	X	Y	X	Y
0.4490	0.3875	0.4436	0.3991	0.4525	0.4162	0.4614	0.4333	0.4705	0.4508
0.4420	0.3750	0.4577	0.4029	0.4671	0.4196	0.4767	0.4366	0.4866	0.4542
0.4280	0.3700	0.4490	0.3875	0.4577	0.4029	0.4671	0.4196	0.4767	0.4366
0.4370	0.3840	0.4356	0.3837	0.4436	0.3991	0.4525	0.4162	0.4614	0.4333

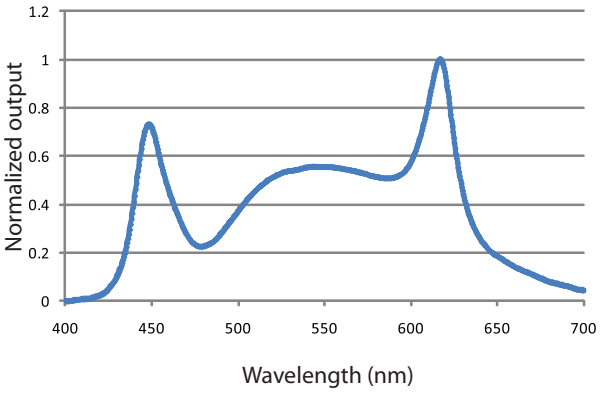
Lighting Design Manufacturing Service

Characteristic Curves

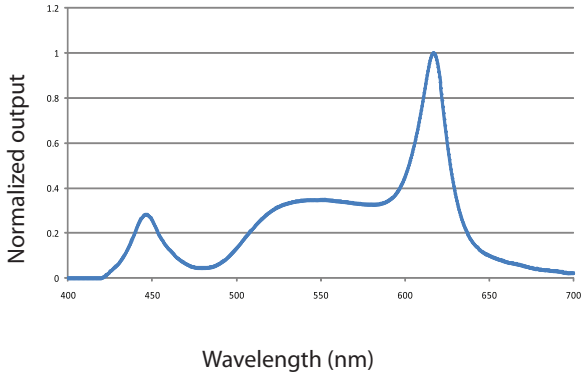
Spectrum



Spectrum for PLCC Cool White

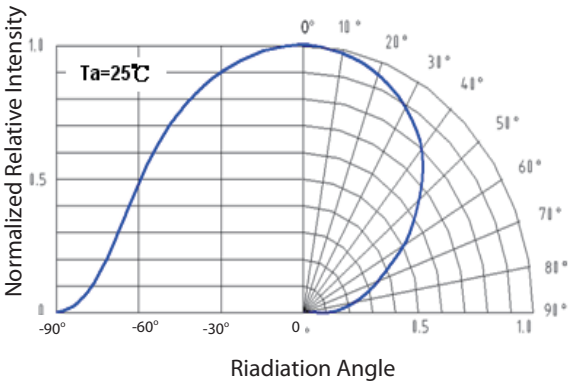


Spectrum for PLCC Neutral White



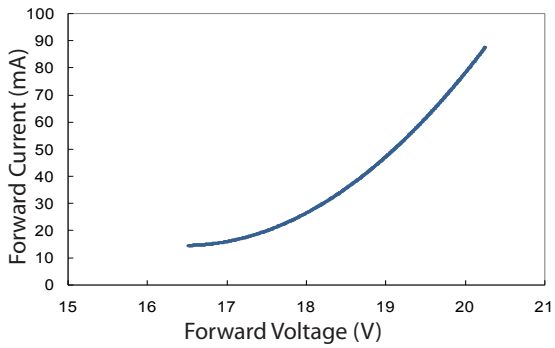
Spectrum for PLCC Warm White

Radiation Diagram



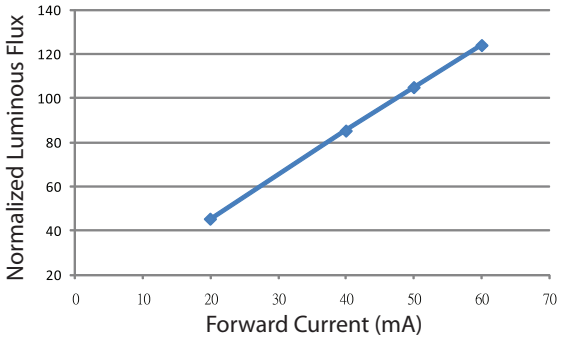
Emission Angle

Forward Voltage vs. Forward Current



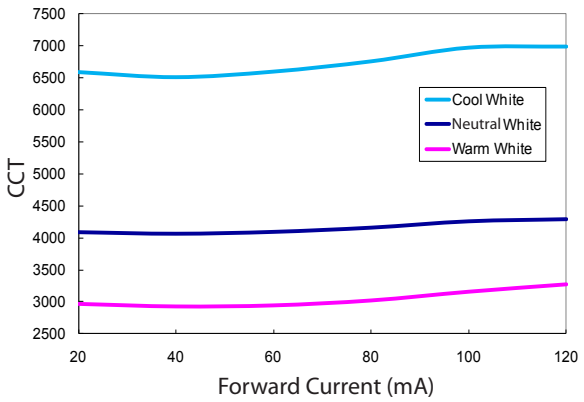
Forward current vs. forward voltage for 1W PLCC 5050

Luminous Flux vs. Forward Current



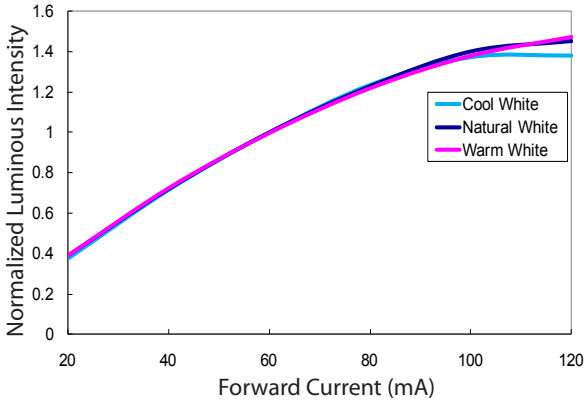
Forward current vs. luminous flux at T_a=25°C for 1W PLCC 5050

CCT vs. Forward Current



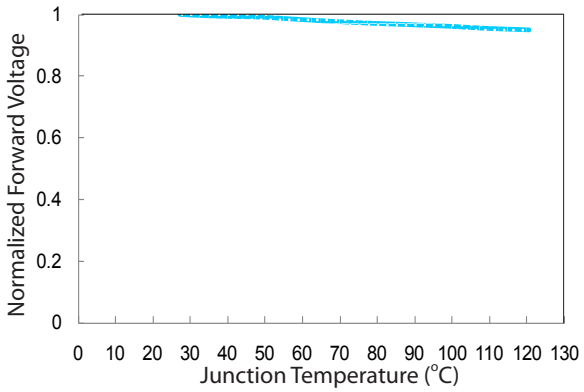
Forward current vs. CCT at Ta =25°C for 1W PLCC 5050

Luminous Intensity vs. Forward Current



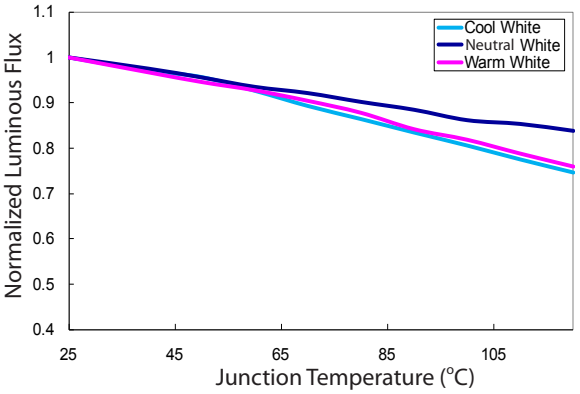
Luminous Intensity vs. Forward Current for 1W PLCC 5050

Forward voltage vs. Junction temperature



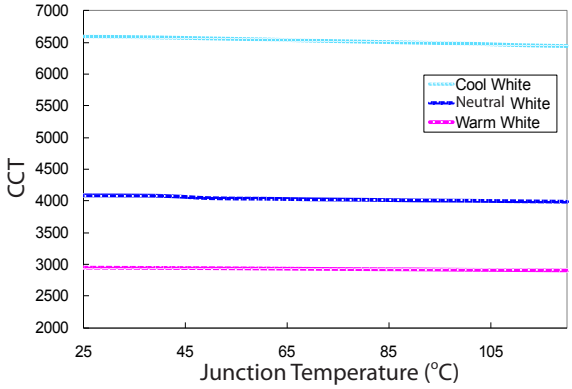
Forward voltage vs. Junction temperature for 1W PLCC 5050

Luminous Flux vs. Junction temperature



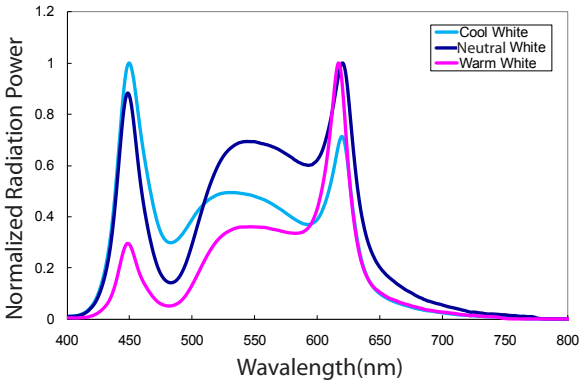
Luminous Flux vs. Junction temperature for 1W PLCC 5050

CCT vs. Junction temperature



CCT vs. Junction temperature for 1W PLCC 5050

Radiation Power vs. Wavelength

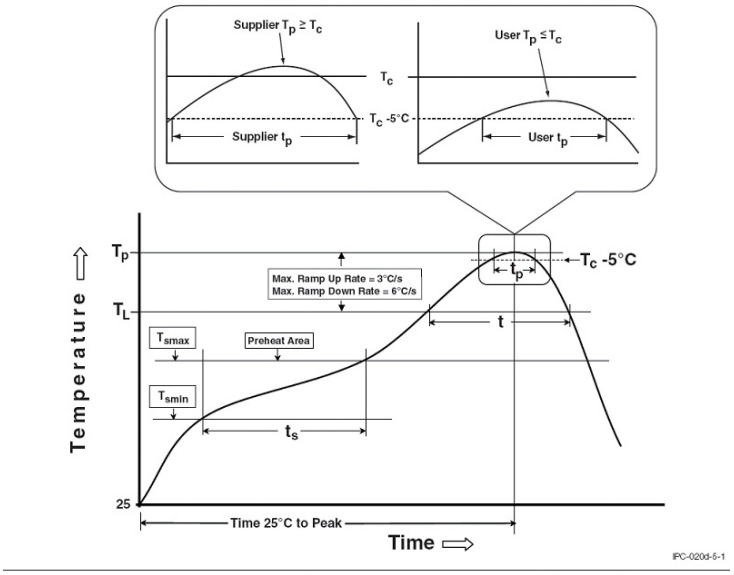


Radiation power vs. Wavelength for 1W PLCC 5050

Lighting Design Manufacturing Service

Reflow Profile

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



Reflow Profiles

Classification Reflow Profiles

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

Reliability

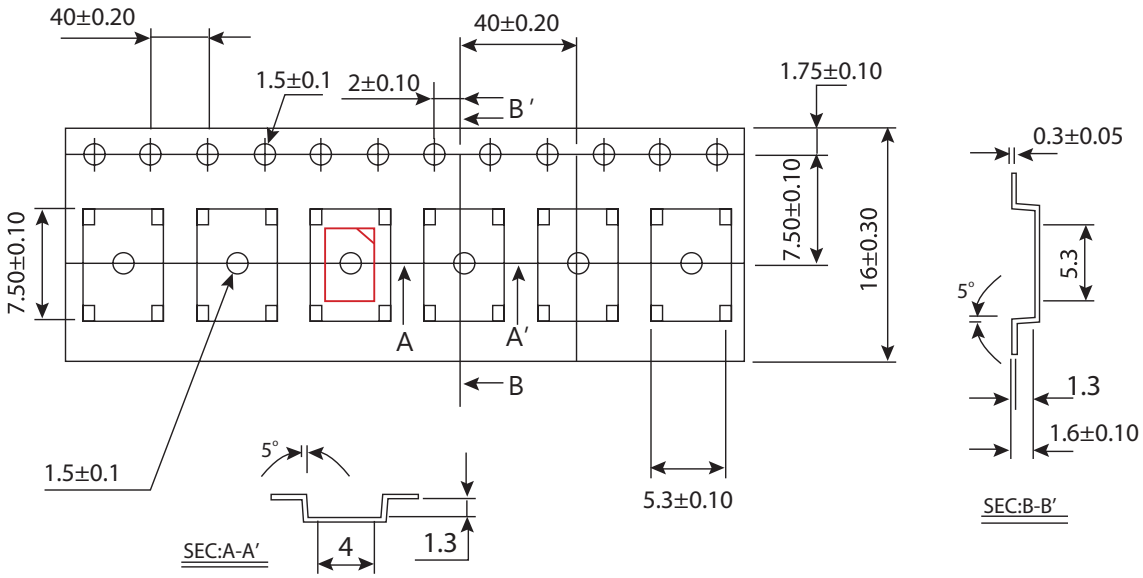
NO .	Test Item	Test Condition	Remark
1	Temperature Cycle	-40°C~100°C 30, 30, mins	100 Cycle
2	Thermal Shock	-40°C~100°C 15, 15 mins ≦10 sec	100 Cycle
3	Resistance to Soldering Heat	T_{SOL}=260°C, 30 sec	3 times
4	Moisture Resistance	25°C~65°C 90% RH 24 hrs / 1 cycle	10 Cycle
5	High-Temperature Storage	T_A=100°C	1,000 hrs
6	Humidity Heat Storage	T_A=85°C RH=85%	1,000 hrs
7	Low-Temperature Storage	T_A=-40°C	1,000 hrs
8	Operation Life test	25°C	1,000 hrs
9	High Temperature Operation Life test	85°C	1,000 hrs
10	High Humidity Heat Life Test	85°C, 85%RH	1,000 hrs
11	ON/OFF Test	30 sec ON, 30 sec OFF	1.5W times

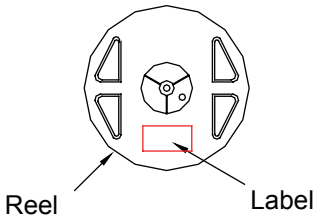
Failure Criteria

Item	Criteria for Judgment	
	Min.	Max.
Lumen Maintenance	85%	-
Δu'v'	-	0.006
Forward Voltage	-	Initial Data x 1.1
Reverse Current	-	10 μA
Resistance to Soldering Heat	No dead lamps or visual damage	

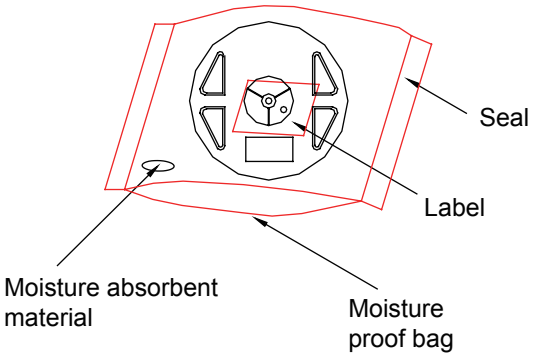
Lighting Design Manufacturing Service

Product Packaging Information





Taping reel dimensions



Package & label

Item	Quantity	Total	Dimensions(mm)
Reel	1,000pcs	1,000pcs	R=178
Box	3 Reels	3,000pcs	240*235*67
Carton	10 boxes	30,000pcs	500*260*355
Starting with 50pcs empty,and 50pcs empty at the last			

EDISON
Lighting Design Manufacturing Service

Revision History

Versions	Description	Release Date
1	Establish order code information	2012/11/26
2	Add the Characteristic Curve	2013/04/11
3	1. Add tolerance on CRI measurements 2. Update mechanical dimensions	2013/10/24
4	1. Revise the name of datasheet 2. Revise the circuit	2014/05/23
5	1. Add JEDEC Moisture Sensitivity 2. Add Reliability	2014/08/22
6	Add Color BIN Code	2015/01/09

About Edison Opto

Edison Opto is a leading manufacturer of high power LED and a solution provider experienced in LDMS. LDMS is an integrated program derived from the four essential technologies in LED lighting applications- Thermal Management, Electrical Scheme, Mechanical Refinement, Optical Optimization, to provide customer with various LED components and modules. More Information about the company and our products can be found at www.edison-opto.com

www.edison-opto.com

For general assistance please contact:
service@edison-opto.com.tw

For technical assistance please contact:
LED.Detective@edison-opto.com.tw