

PLCC Series

3528 0.06W 3 Series

Datasheet



Wall Light



Floor Lamp



Bulb

Decorative
Light

Tube Light

Introduction :

Ultra high luminous efficacy, combined with the flexibility in design due to its slim and miniature size. PLCC LED Series are optimized to be used as lighting for building.

Description :

- Best luminous and color uniformity.
- Enables halogen and CDM replacement.
- The article itself presents the actual color.

Feature and Benefits :

- High luminous Intensity and high efficiency
- Based 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

Table of Contents

General Information	3
Absolute Maximum Ratings	4
Characteristics	4
Luminous Flux Characteristic.....	5
Voltage Bin Structure	6
Mechanical Dimensions.....	7
Color BIN code.....	8
Characteristic Curve	14
Reflow Profile	19
Reliability.....	20
Product Packaging Information.....	21
Revision History	22
About Edison Opto	22

General Information

Ordering Code Format

2 T 03 Y6 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	03	3528	Y6	0.06W	CW	Cool White
								NW	Neutral White
								WW	Warm White

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

Absolute Maximum Ratings

Absolute maximum ratings ($T_a=25^{\circ}\text{C}$)

Parameter	Symbol	Value	Units
DC Forward Current	I_F	30	mA
Pulse Forward Current ($t_p \leq 100\mu\text{s}$, Duty cycle=0.25)	I_{pulse}	100	mA
Reverse Voltage	V_R	5	V
LED Junction Temperature	T_J	125	$^{\circ}\text{C}$
Operating Temperature	-	-40 ~ +85	$^{\circ}\text{C}$
Storage Temperature	-	-40 ~ +125	$^{\circ}\text{C}$
ESD Sensitivity (HBM)	V_B	2,000	V
Soldering Temperature	T_s	Reflow Soldering : 255~260 $^{\circ}\text{C}$ /10~30sec Manual Soldering : 350 $^{\circ}\text{C}$ /3sec	

Notes:

- The values are based on 1-die performance.
- * I_{FP} condition: pulse width $\leq 0.1\text{msec}$ and duty $\leq 1/10$.

Characteristics

Parameter	Symbol	Value	Units	
Viewing Angle	(Typ.) $2\theta_{1/2}$	120	Degree	
Thermal resistance	-	180	$^{\circ}\text{C}/\text{W}$	
CRI	(Typ.) -	CW-70/80/90 NW-75/80/90 WW-80/90	-	
CCT	(Cool White) (Neutral White) (Warm White)	-	5000-10000 3800-5000 2670-3800	K
JEDEC Moisture Sensitivity	-	Level 2a Floor Life Conditions: $\leq 30^{\circ}\text{C}$ / 60% RH Soak Requirements(Standard) Time (hours): 120+1/-0 Conditions: 60 $^{\circ}\text{C}$ / 60% RH	-	

Notes:

- $2\theta_{1/2}$ is the off-axis angle where the luminous intensity is half of the axial luminous intensity.
- Color Rendering Index CRI Tolerance: ± 2
- CIE_x/y tolerance: ± 0.005

Luminous Flux Characteristic

Luminous Flux Characteristics, $I_f=20\text{mA}$ and $T_j=25^\circ\text{C}$

Color	Group	Min. Luminous Flux(lm)	Max. Luminous Flux(lm)	Typ. Luminous Intensity (mcd)	Forward Current(mA)	Order Code
Cool White	23	6.4	6.7	2,600	20	2T03Y6CW06000002 (CRI70) 2T03Y6CW11000001 (CRI80) 2T03Y6CW36000001 (CRI90)
	24	6.7	7.0			
	25	7.0	7.3			
	26	7.3	7.5			
	27	7.5	7.8			
	28	7.8	8.1			
	29	8.1	8.7			
	30	8.7	9.8			
Neutral White	24	6.7	7.0	2,500		
	25	7.0	7.3			
	26	7.3	7.5			
	27	7.5	7.8			
	28	7.8	8.1			
	29	8.1	8.7			
Warm White	20	5.6	5.8	2,100		
	21	5.8	6.1			
	22	6.1	6.4			
	23	6.4	6.7			
	24	6.7	7.0			
	25	7.0	7.3			
	26	7.3	7.5			
	27	7.5	7.8			
	28	7.8	8.1			
	29	8.1	8.7			
	30	8.7	9.8			

Note:

The luminous flux performance is guaranteed within published operating conditions. Edison Opto maintains a tolerance of $\pm 10\%$ on flux measurements.

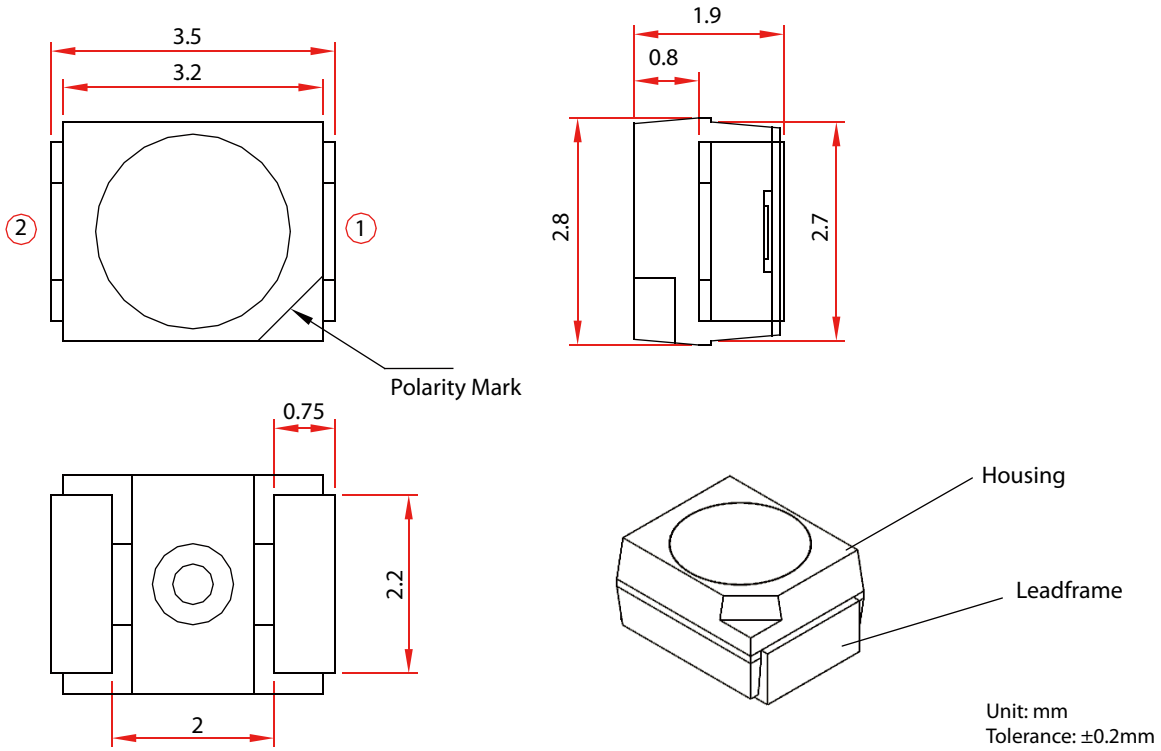
Voltage Bin Structure

Group	Min Voltage (V)	Max Voltage (V)
VA1	2.8	2.9
VB1	2.9	3.0
VC1	3.0	3.1
VA2	3.1	3.2
VB2	3.2	3.3
VC2	3.3	3.4
VA3	3.4	3.5
VB3	3.5	3.6

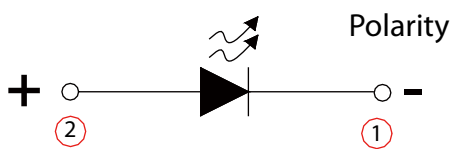
Note:
Forward voltage measurement allowance is $\pm 0.06V$.

Mechanical Dimensions

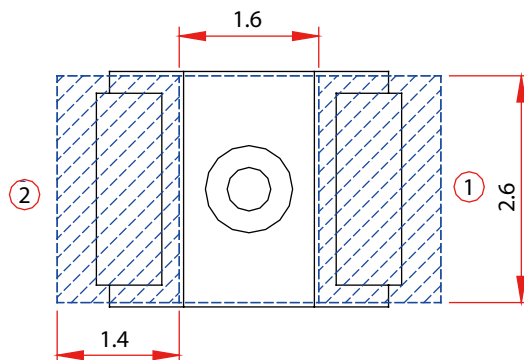
Emitter Type Dimension



Circuit



Solder Pad

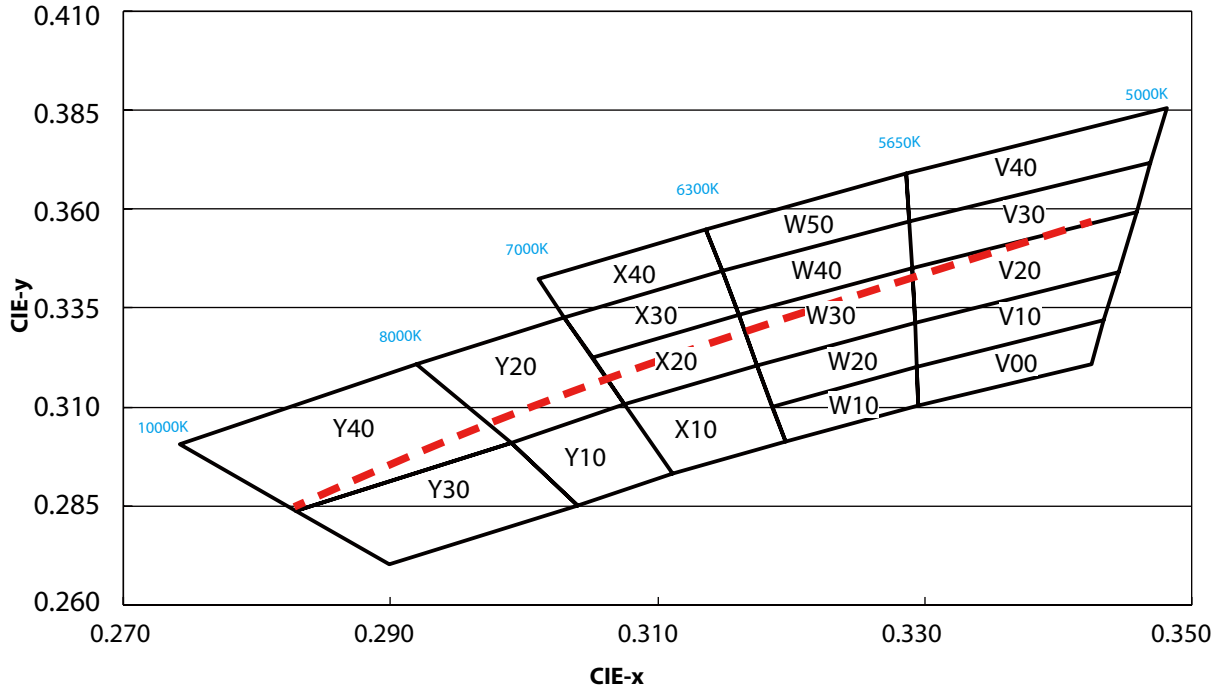


Notes:

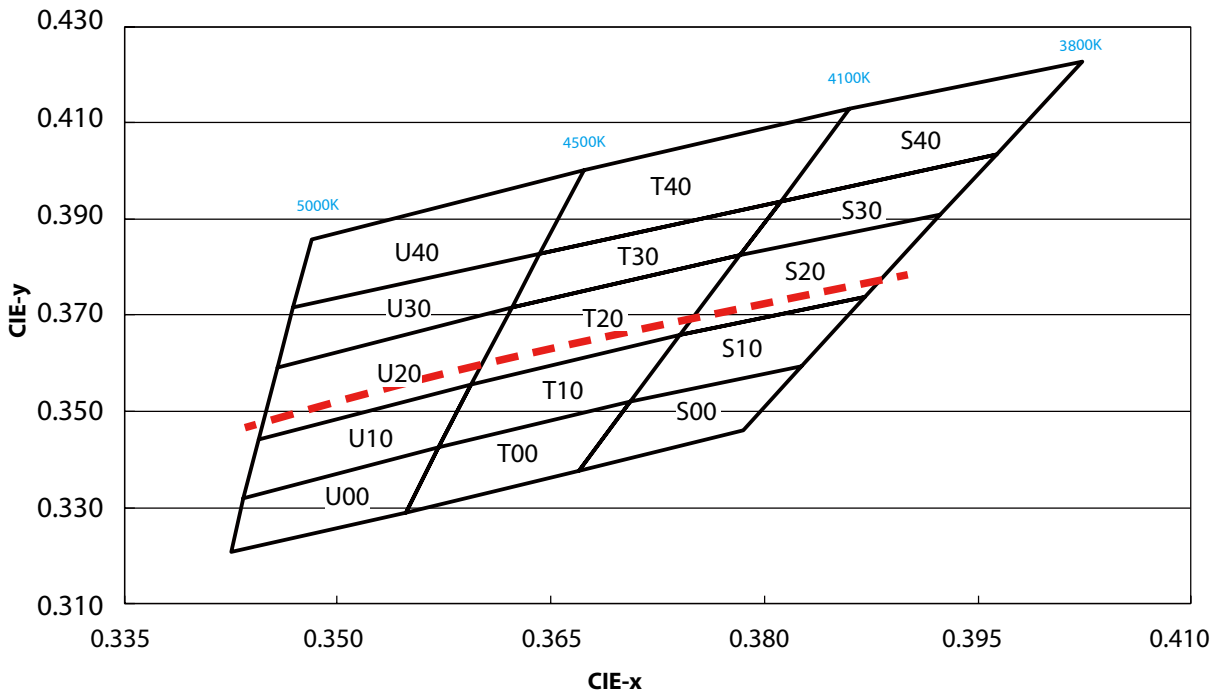
1. All dimensions are measured in mm.
2. Tolerance : $\pm 0.2\text{ mm}$

Color BIN code

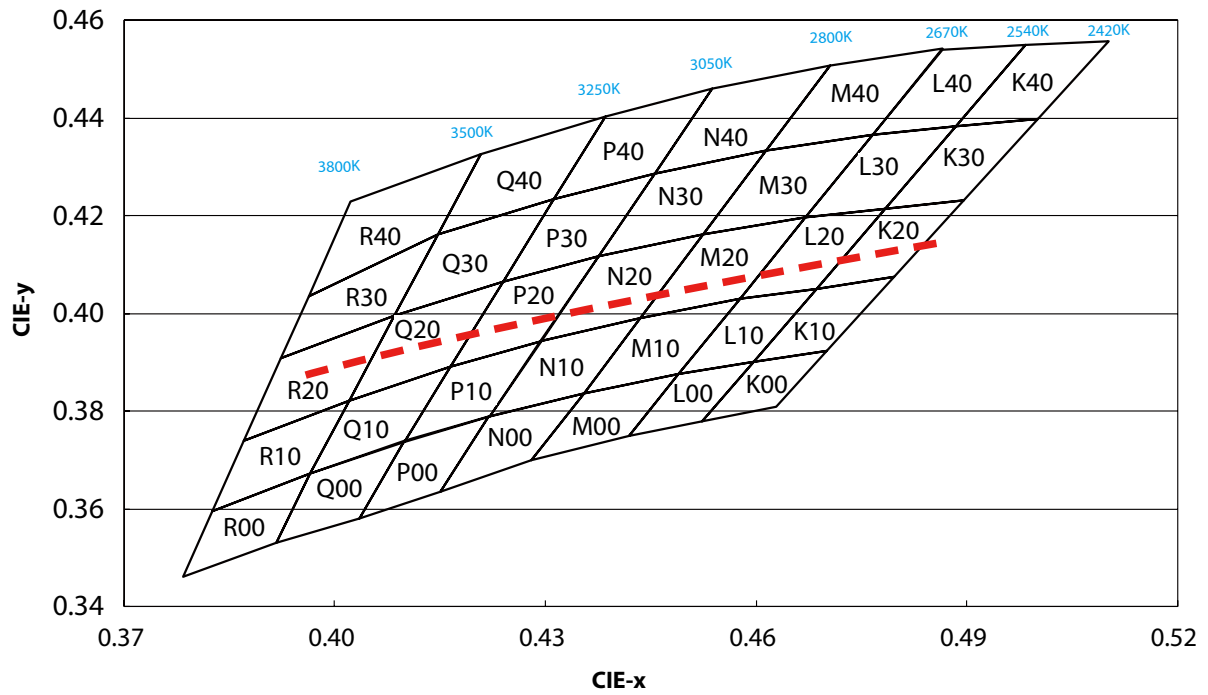
Cool White



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
0.4356	0.3837	0.4294	0.3943	0.4376	0.4116	0.4614	0.4333	0.4538	0.4460
0.4280	0.3700	0.4436	0.3991	0.4294	0.3943	0.4525	0.4162	0.4705	0.4508
0.4150	0.3635	0.4356	0.3837	0.4436	0.3991	0.4376	0.4116	0.4614	0.4333
0.4220	0.3790	0.4221	0.3790	0.4525	0.4162	0.4456	0.4287	0.4456	0.4287

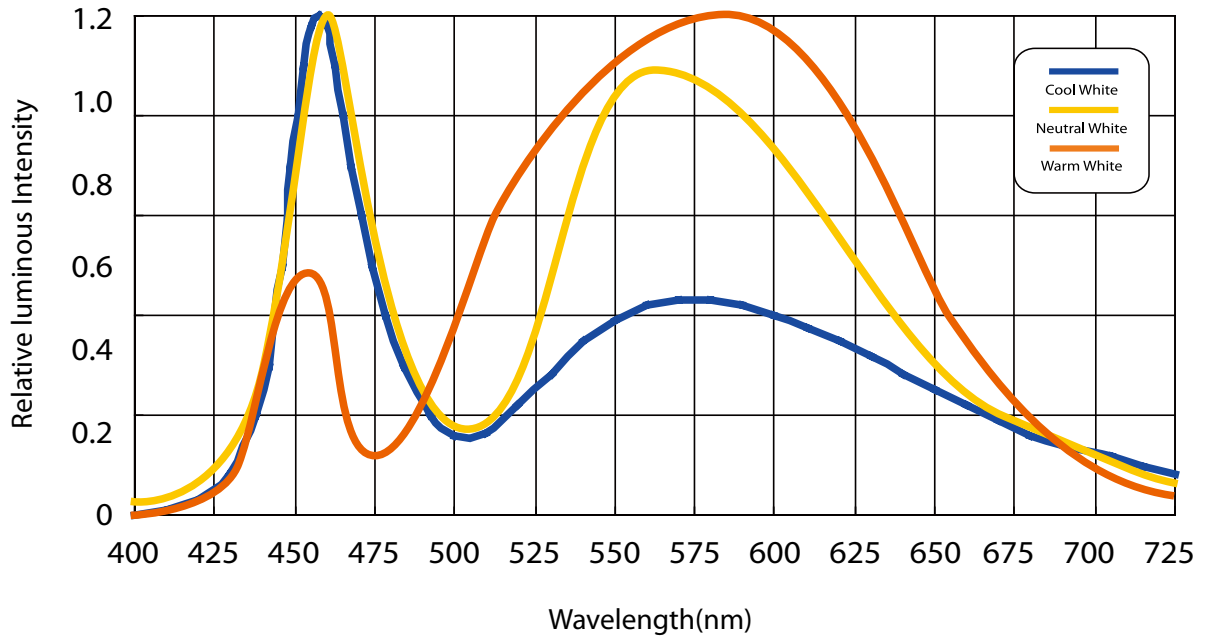
M00		M10		M20		M30		M40	
X	Y	X	Y	X	Y	X	Y	X	Y
0.4280	0.3700	0.4436	0.3991	0.4525	0.4162	0.4614	0.4333	0.4705	0.4508
0.4356	0.3837	0.4577	0.4029	0.4671	0.4196	0.4767	0.4366	0.4866	0.4542
0.4490	0.3875	0.4490	0.3875	0.4577	0.4029	0.4671	0.4196	0.4767	0.4366
0.4420	0.3750	0.4356	0.3837	0.4436	0.3991	0.4525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

L00		L10		L20		L30		L40	
X	Y	X	Y	X	Y	X	Y	X	Y
0.4420	0.3750	0.4490	0.3875	0.4577	0.4029	0.4671	0.4196	0.4767	0.4366
0.4490	0.3875	0.4577	0.4029	0.4671	0.4196	0.4767	0.4366	0.4865	0.4540
0.4596	0.3900	0.4686	0.4051	0.4784	0.4214	0.4884	0.4382	0.4984	0.4550
0.4524	0.3780	0.4596	0.3900	0.4686	0.4051	0.4784	0.4214	0.4884	0.4382

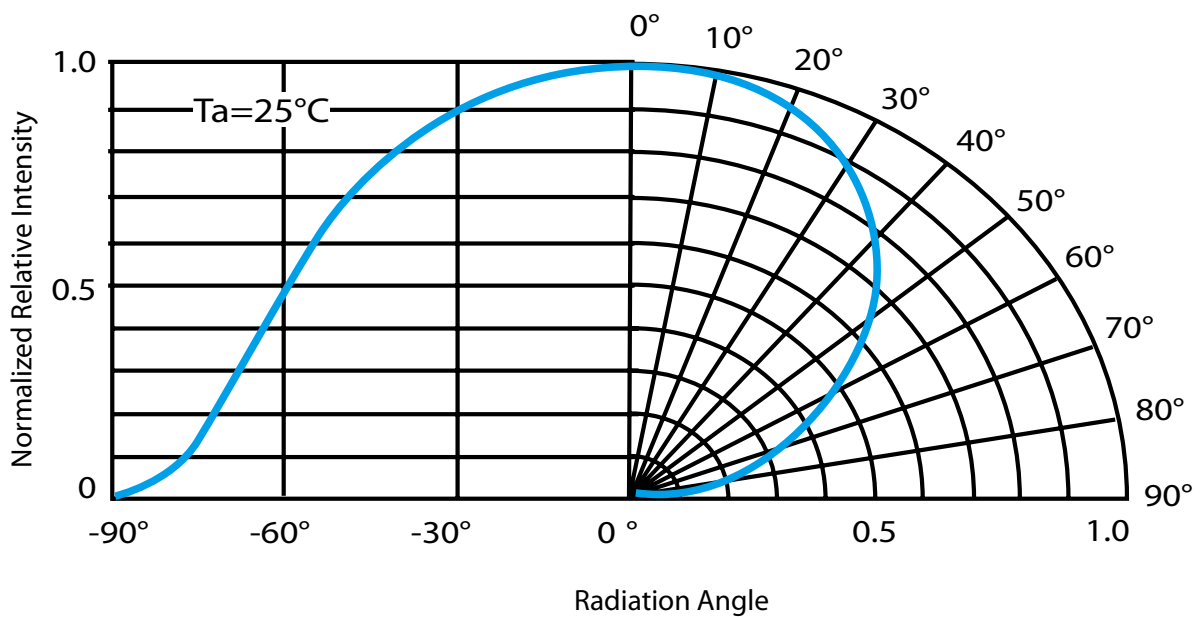
K00		K10		K20		K30		K40	
X	Y	X	Y	X	Y	X	Y	X	Y
0.4596	0.3900	0.4686	0.4051	0.4784	0.4214	0.4884	0.4382	0.4984	0.4550
0.4701	0.3924	0.4796	0.4074	0.4896	0.4232	0.5001	0.4398	0.5102	0.4558
0.4628	0.3809	0.4701	0.3924	0.4796	0.4074	0.4896	0.4232	0.5001	0.4398
0.4524	0.3780	0.4596	0.3900	0.4686	0.4051	0.4784	0.4214	0.4884	0.4382

Characteristic Curve

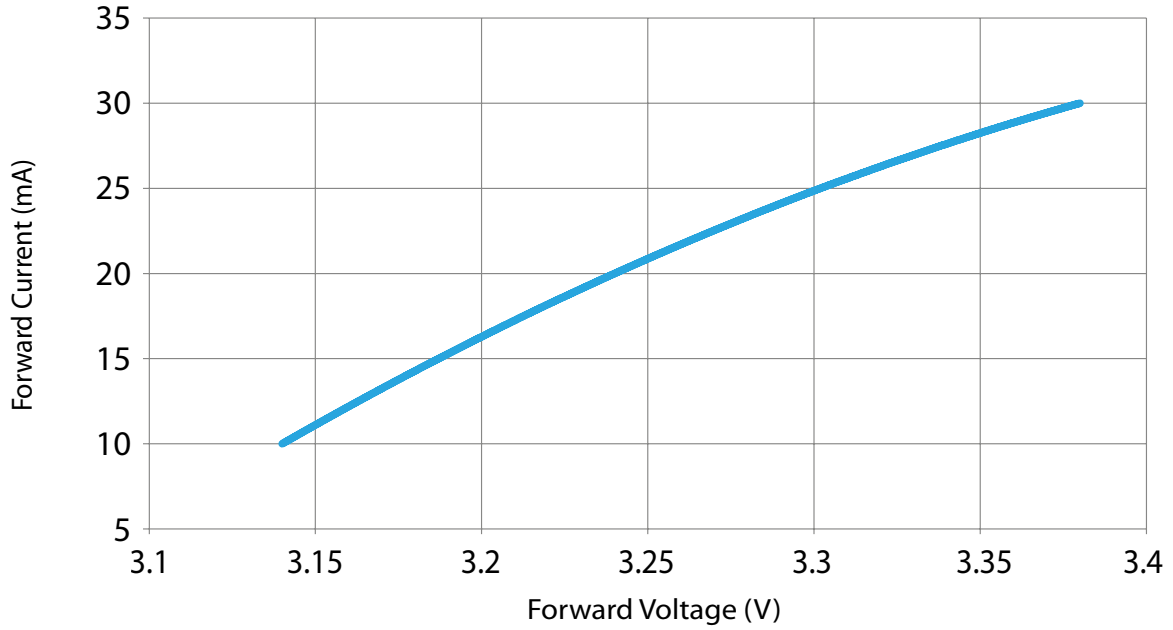
Color Spectrum



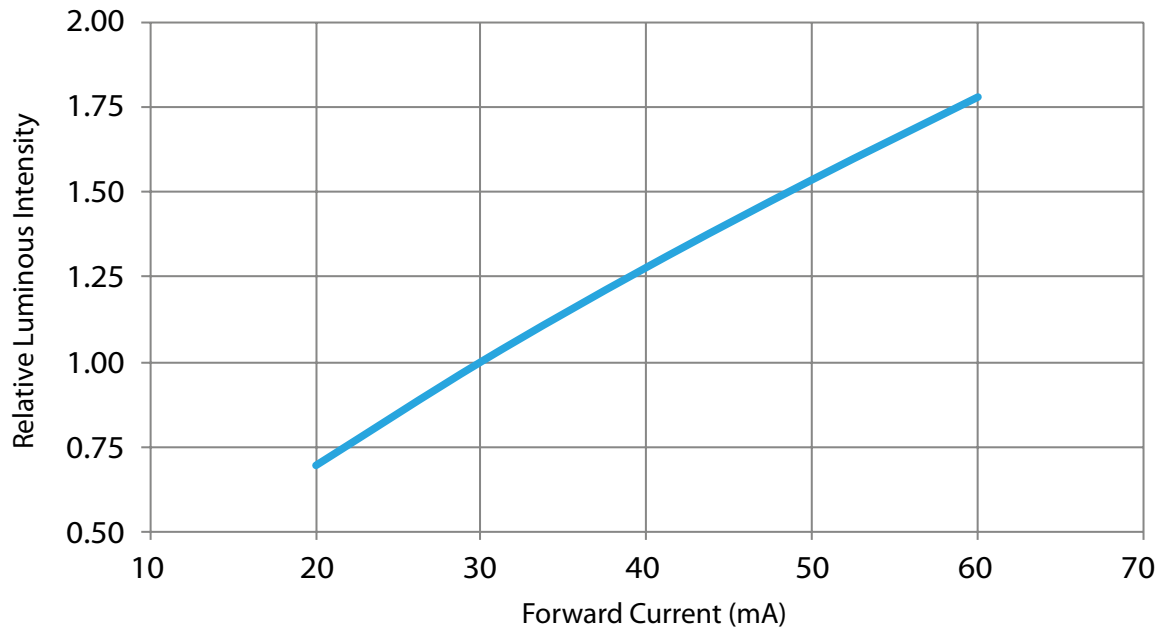
Beam Pattern



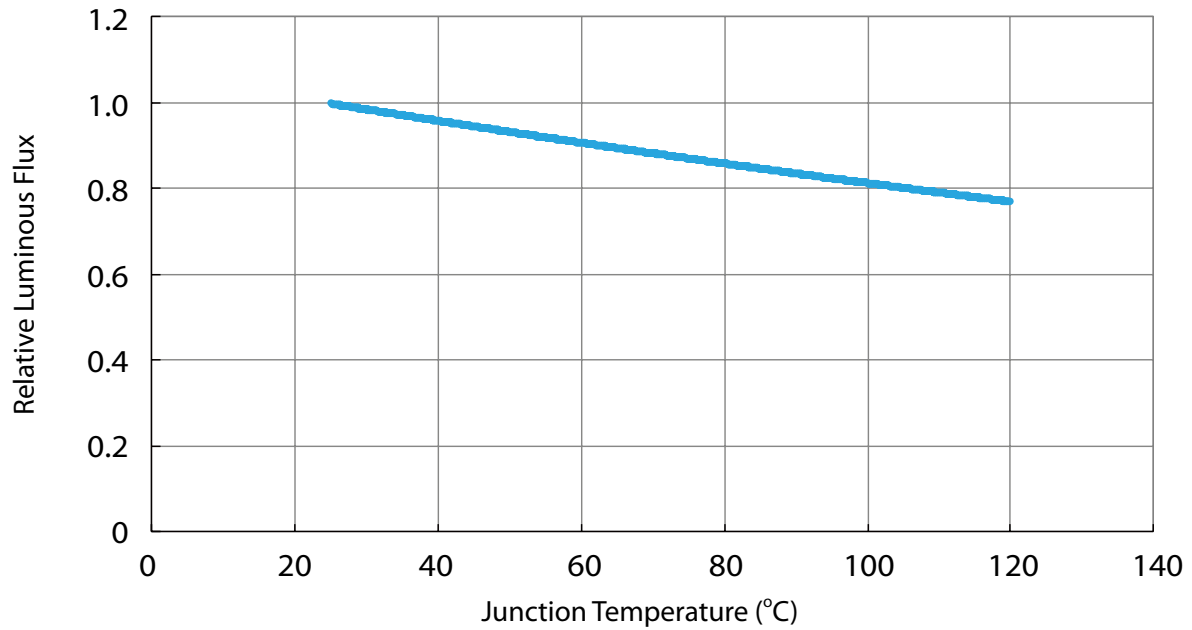
Forward Current vs. Forward Voltage



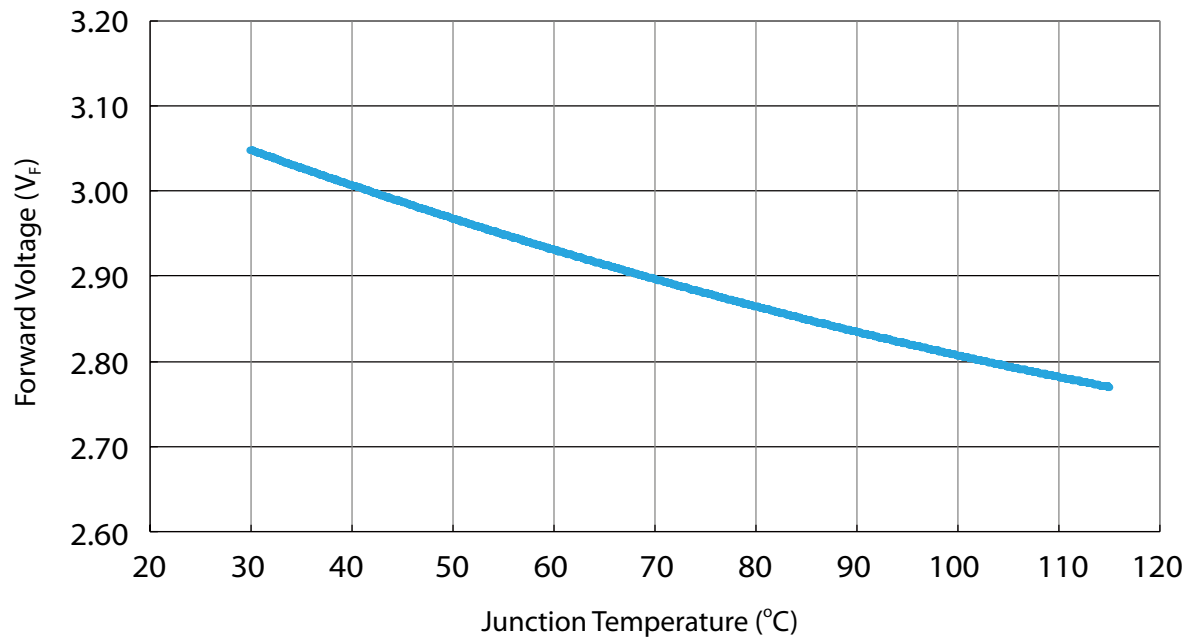
Relative Luminous Intensity vs. Forward Current



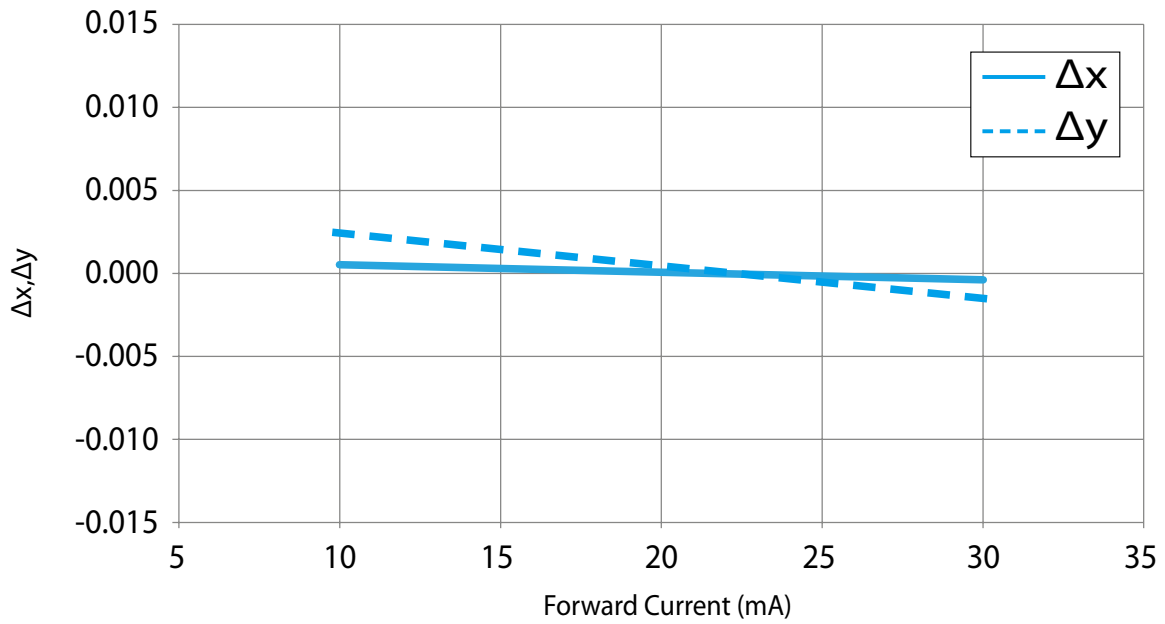
Relative Luminous Flux vs. Junction Temperature



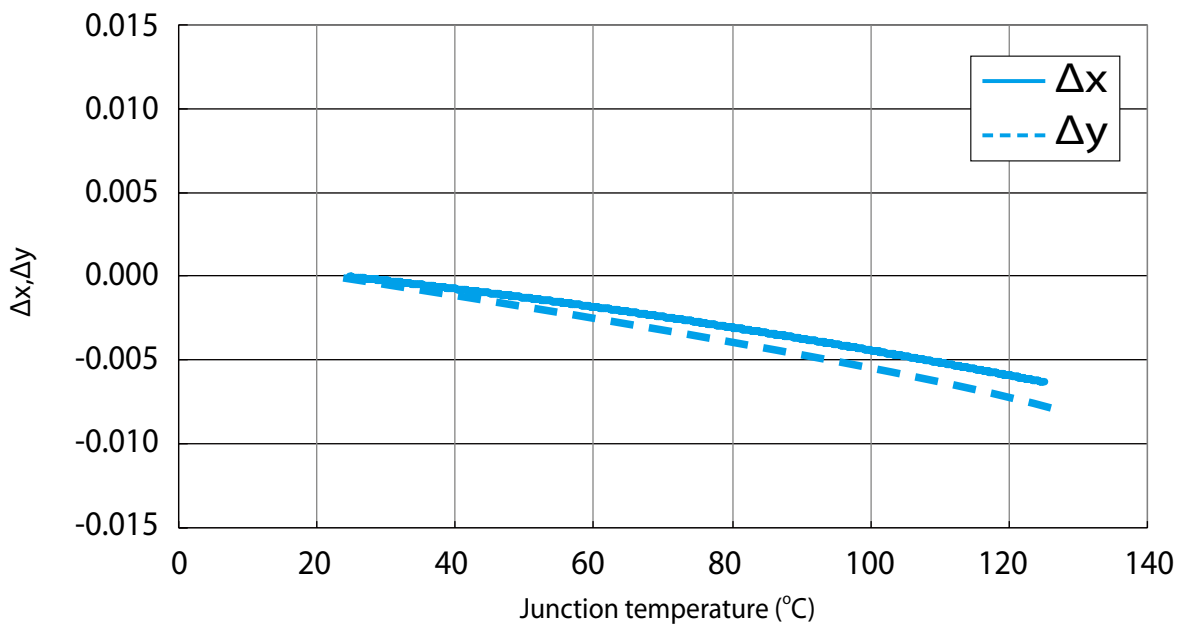
Forward Voltage vs. Junction Temperature



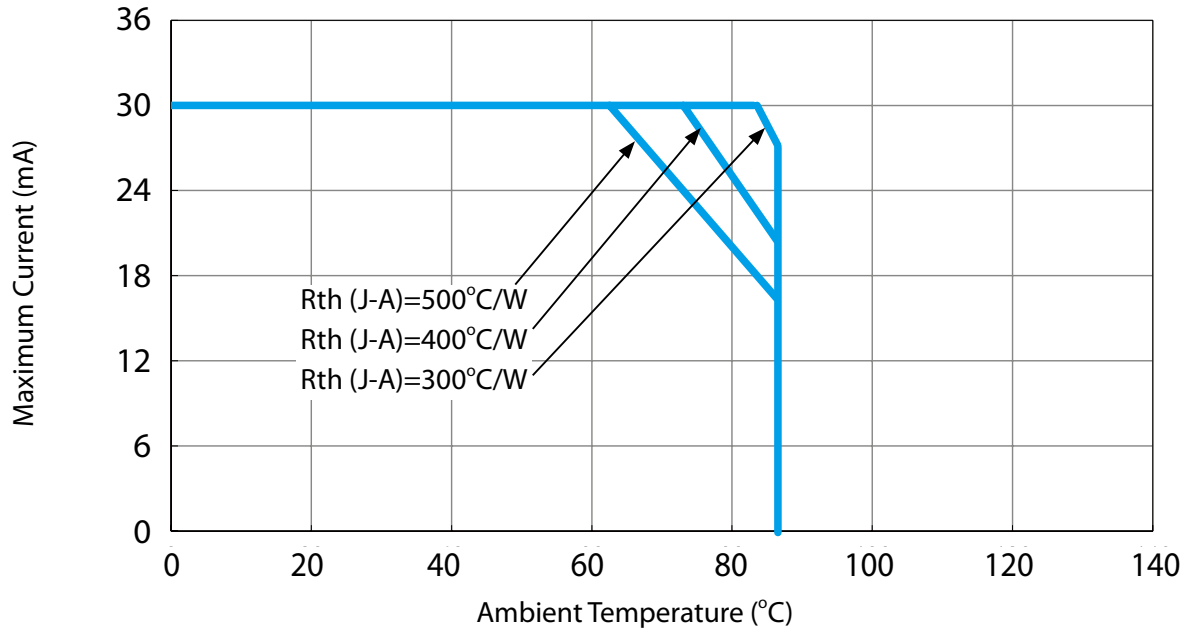
$\Delta x, \Delta y$ vs. Forward Current



$\Delta x, \Delta y$ vs. Junction Temperature

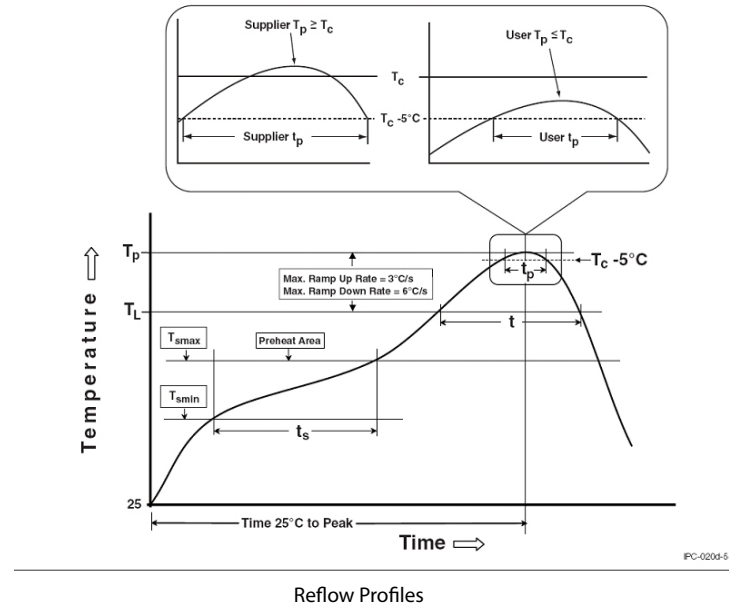


Maximum Current vs. Ambient Temperature



Reflow Profile

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



Classification Reflow Profiles

Profile Feature	Pb-Free Assembly
Preheat & Soak	
Temperature min (T _{sm})	150 °C
Temperature max (T _{smax})	200 °C
Time (T _{sm} to T _{smax}) (t _s)	60-120 seconds
Average ramp-up rate (T _{smax} to T _p)	3 °C/second max.
Liquidous temperature (T _L)	217 °C
Time at liquidous (t _L)	60-150 seconds
Peak package body temperature (T _p)*	255 °C ~260 °C *
Classification temperature (T _c)	260 °C
Time (t _p)** within 5 °C of the specified classification temperature (T _c)	30** seconds
Average ramp-down rate (T _p to T _{smax})	6°C/second max.
Time 25°C to peak temperature	8 minutes max.

Notes:

- * Tolerance for peak profile temperature (T_p) is defined as a supplier minimum and a user maximum.
- ** Tolerance for time at peak profile temperature (t_p) is defined as a supplier minimum and a user maximum.

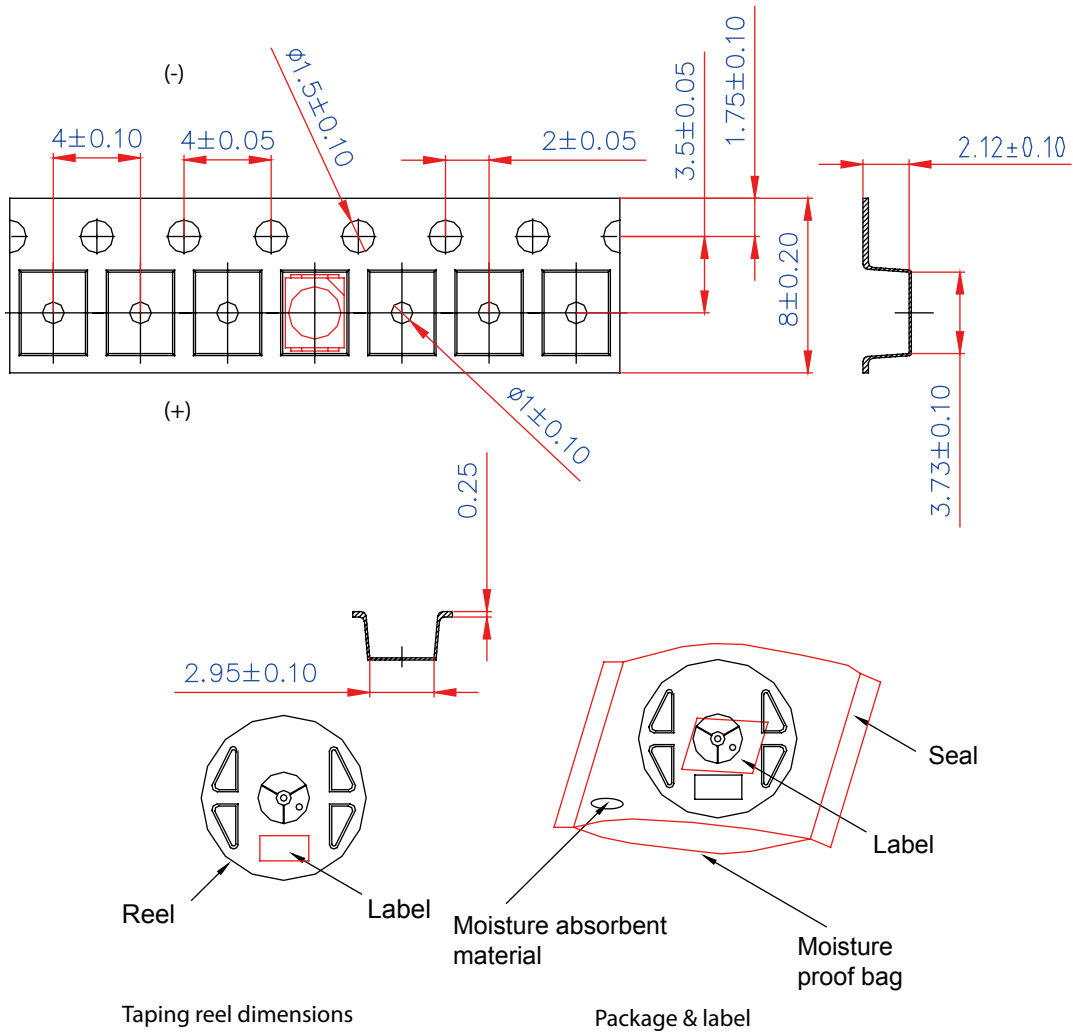
Reliability

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 \leq 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%	-
$\Delta u'v'$	-	0.006
Forward Voltage	-	Initial Data x 1.1
Reverse Current	-	10 μ A
Resistance to Soldering Heat	No dead lamps or visual damage	

Product Packaging Information



Item	Quantity	Total	Dimensions(mm)
Reel	2,000pcs	2,000pcs	R=178
Box	5 Reels	10,000pcs	240*235*67
Carton	5 boxes	50,000pcs	353*254*256

Starting with 50pcs empty, and 50pcs empty at the last

Revision History

Versions	Description	Release Date
1	Establish order code information	2012/12/28
2	Add the Characteristic Curve	2013/03/12
3	1. Add JEDEC Moisture Sensitivity 2. Add Reliability & Order code 3. Revise the name of Datasheet	2014/09/01
4	Update Luminous flux characteristic	2015/01/09
5	Revise Luminous flux characteristic	2015/04/01
6	Update Luminous flux characteristic	2015/05/08
7	1. Update Characteristic curve 2. Add WW Color BIN Code 3. Revise Absolute Maximum Ratings	2016/03/25
8	Add CRI90 Information	2016/07/04
9	Revise Absolute Maximum Ratings	2016/08/19

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

Copyright©2016 Edison Opto. All rights reserved. No part of publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photo copy, recording or any other information storage and retrieval system, without prior permission in writing from the publisher. The information in this publication are subject to change without notice.

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