Intematix Technology Center Corporation
Accelerating Phosphor Enabled LED Application
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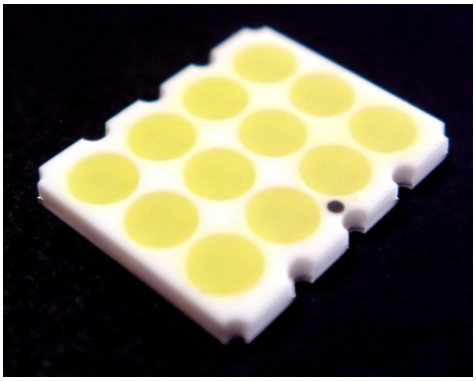
英特明光能股份有限公司
桃園縣楊梅鎮青年路五之二號九樓
9F, No.5-2, ChingNian Road,
YangMei, TaoYuan, Taiwan

C1109-12050-XX-12900

White LED

SPECIFICATION

CHIP-ON-CERAMIC TYPE SMD LED



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Contents:

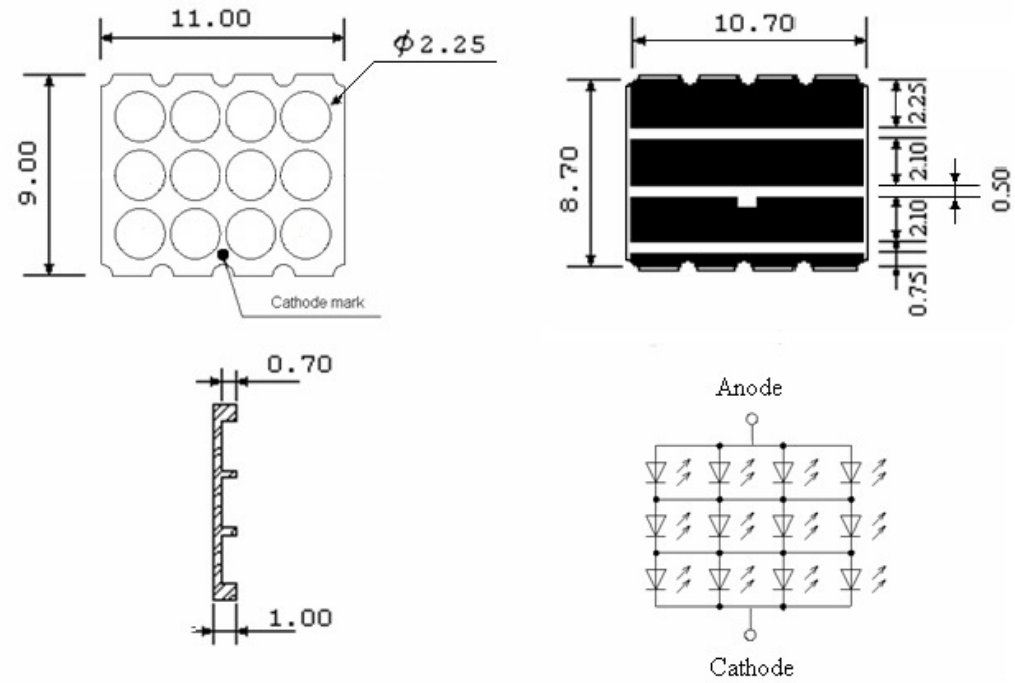
1. Features

Dimensions: 11.0 x 9.0 x 1.0 mm (LxWxH)
Package: Ceramic 4 chips Parallel and 3 Series Array with low thermal resistance
High power: 5.0W(480mA)
High efficacy
Viewing angle: 110°
Emitting Color Temperature: Warm White/Neutral White/Cool White
Compliant with RoHS directive

2. Applications

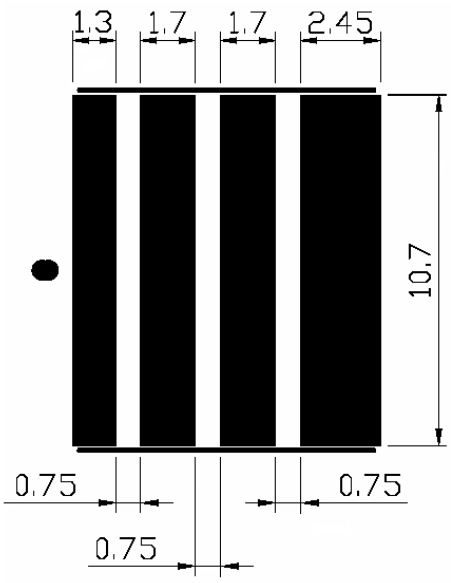
Indoor/Outdoor General Lighting
Signage
Automotive
Portable Lighting
Electronic Equipment

3. Mechanical Dimensions and Polarity



Notes :
1. All dimensions are in millimeters.
2. Tolerance is ±0.2mm unless otherwise noted.

4. Recommended Soldering pad layout



5. Absolute Maximum Ratings (Ta=25°C)

ITEM	SYMBOL	ABSOLUTE MAXIMUM RATING	UNIT
Power Dissipation	Pd	5	W
Reverse Voltage	Vr	5	V
D.C. Forward Current	If	480	mA
Pulse Forward Current (*1)	IfP	800	mA
Operatiing Temperature	To	-40 ~ +85	℃
Storage Temperature	Ts	-40 ~ +100	℃
Junction Temperature	Tj_{max}	125	℃
Soldering Temperature	Tsld	260	℃
Soldering Temperature(Hand)	Tsld	350	℃

*1: Ifp conditions: 1/10 Duty Cycle & 0.1ms for pulse width.

6. Electrical & Optical Characteristics (Ta=25°C, pulsed measurement)

ITEM	SYMBOL	CONDITION	UNIT	MIN.	TYP.	MAX.
Forward Voltage	Vf	If=480mA	V	8.7	9.9	11.1
Reverse Current	Ir	Vr=5V	μA			50
Viewing Angle	2θ½	If=480mA	deg		110	
Thermal Resistance	$R_{\theta j\text{-}c}$	If=480mA	℃/W		5	
Luminous Flux	Φ	If=480mA	lm	295		415

*Measurement Uncertainty of the Luminous Intensity: ± 10%

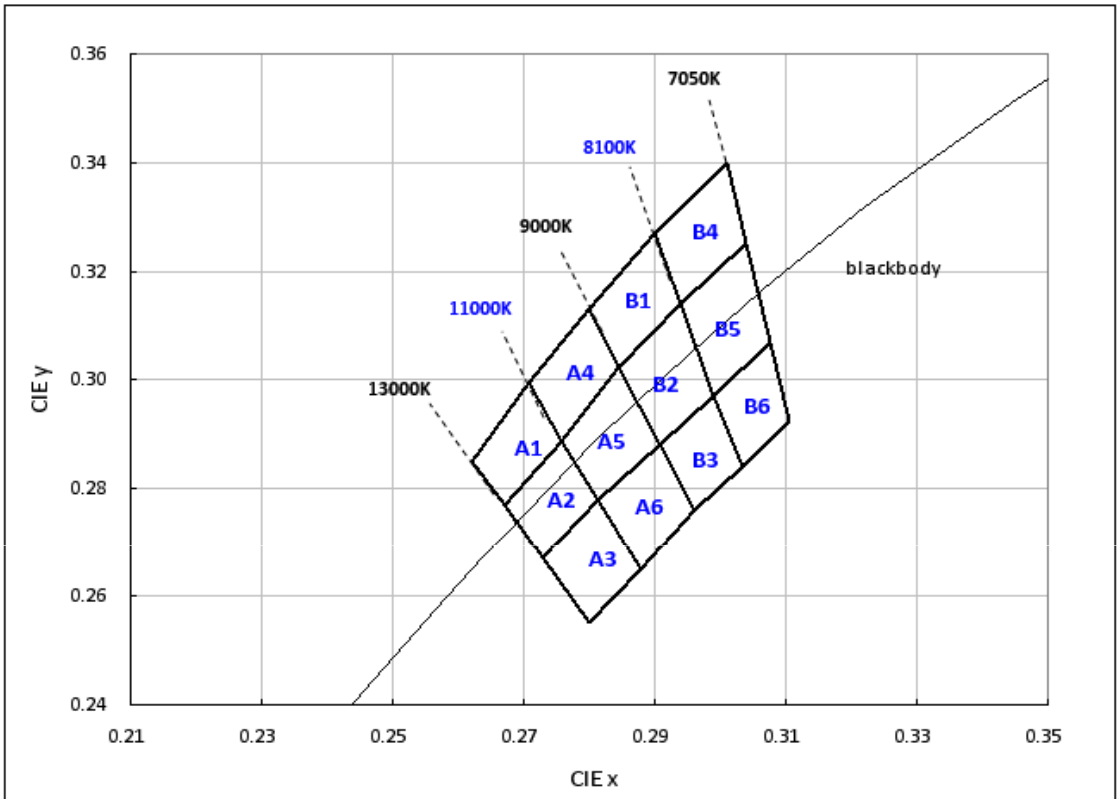
7. Flux Binning (IF=480mA, Ta=25°C, pulsed measurement)

Emitting Color	Center CCT(K)	Flux Code	MIN.	MAX.	Model Name
Warm white	2700-3500	F45	295	330	C1109-12050-TZ-12900 C1109-12050-RZ-12900 C1109-12050-SZ-12900
		F46	330	370	
		F47	370	415	
Neutral white	4000-4500	F45	295	330	C1109-12050-PZ-12900 C1109-12050-NZ-12900
		F46	330	370	
		F47	370	415	
Cool white	5000-6500	F45	295	330	C1109-12050-EZ-12900 C1109-12050-DZ-12900 C1109-12050-CZ-12900
		F46	330	370	
		F47	370	415	
Bluish white (Cool White)	8100-11000	F45	295	330	C1109-12050-BZ-12900 C1109-12050-AZ-12900
		F46	330	370	
		F47	370	415	

8. Chromaticity Coordinates & Bin Grade Diagram

(IF=480mA, Ta=25°C, pulsed measurement)

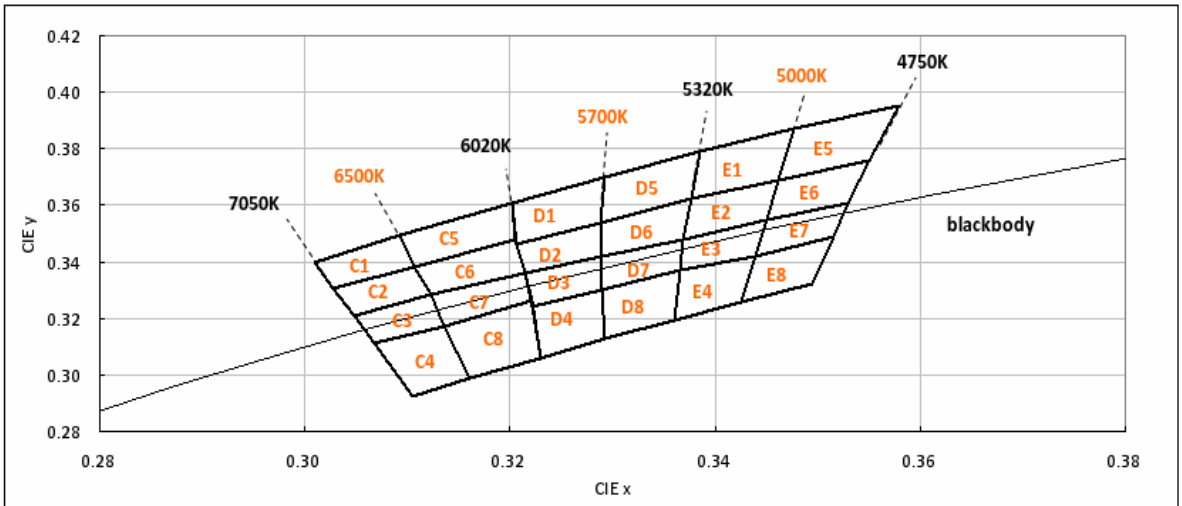
8-1. C.I.E Color Rank: Bluish White (Cool White) - AZ & BZ



Zone	Rank	x1	y1	x2	y2	x3	y3	x4	y4	Center CCT(K)
BZ	B1	0.2800	0.3130	0.2845	0.3023	0.2940	0.3140	0.2900	0.3270	8100
	B2	0.2845	0.3023	0.2907	0.2880	0.2990	0.2970	0.2940	0.3140	
	B3	0.2907	0.2880	0.2960	0.2760	0.3033	0.2840	0.2990	0.2970	
	B4	0.2900	0.3270	0.2940	0.3140	0.3040	0.3250	0.3010	0.3400	
	B5	0.2940	0.3140	0.2990	0.2970	0.3076	0.3070	0.3040	0.3250	
	B6	0.2990	0.2970	0.3033	0.2840	0.3105	0.2925	0.3076	0.3070	
AZ	A1	0.2620	0.2850	0.2670	0.2770	0.2758	0.2887	0.2707	0.2995	11000
	A2	0.2670	0.2770	0.2730	0.2670	0.2813	0.2780	0.2758	0.2887	
	A3	0.2730	0.2670	0.2800	0.2550	0.2880	0.2650	0.2813	0.2780	
	A4	0.2707	0.2995	0.2758	0.2887	0.2845	0.3023	0.2800	0.3130	
	A5	0.2758	0.2887	0.2813	0.2780	0.2907	0.2880	0.2845	0.3023	
	A6	0.2813	0.2780	0.2880	0.2650	0.2960	0.2760	0.2907	0.2880	

*Measurement Uncertainty of the Color Coordinates : ± 0.01

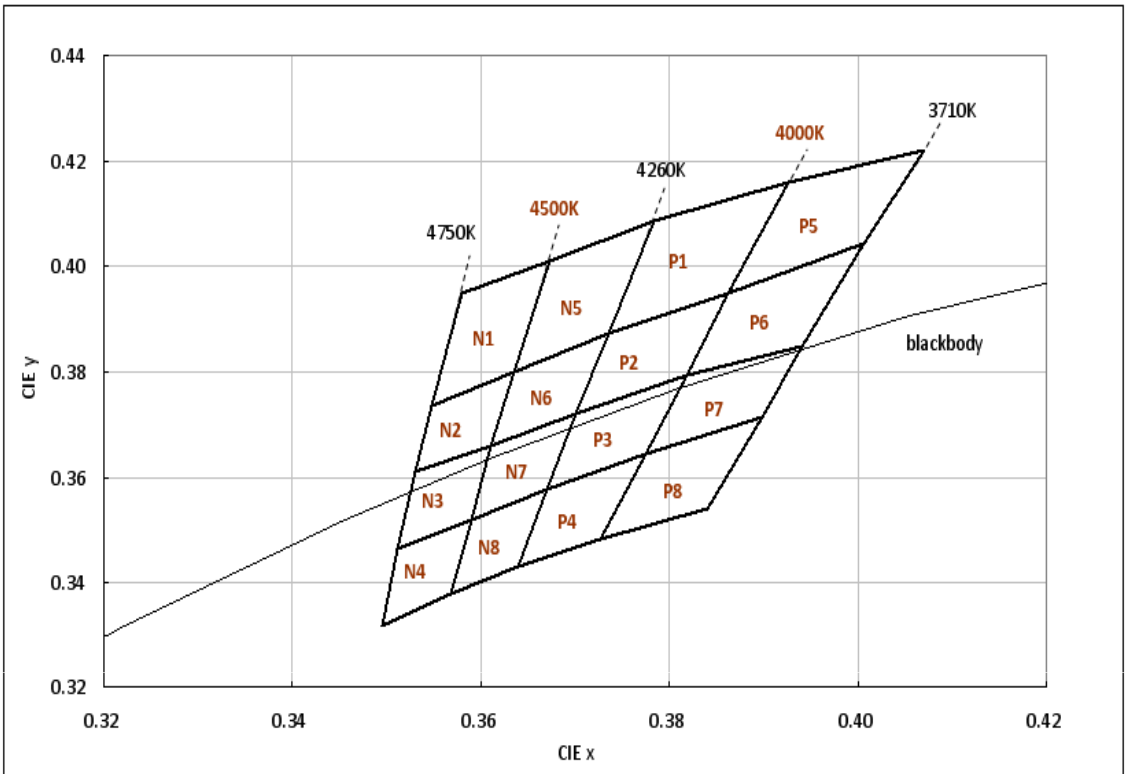
8-2. C.I.E Color Rank: Cool White – CZ(CY)&DZ(DY)&EZ(EY)



ITC Std Zone	Energy star ANSI	Rank	x1	y1	x2	y2	x3	y3	x4	y4	Center CCT(K)
CZ	CY	**C2**	**0.3028**	**0.3304**	**0.3048**	**0.3209**	**0.3123**	**0.3282**	**0.3107**	**0.3380**	6500
		C3	**0.3048**	**0.3209**	**0.3068**	**0.3113**	**0.3135**	**0.3170**	**0.3123**	**0.3282**	
		C6	**0.3107**	**0.3380**	**0.3123**	**0.3282**	**0.3215**	**0.3360**	**0.3205**	**0.3481**	
		C7	**0.3123**	**0.3282**	**0.3135**	**0.3170**	**0.3221**	**0.3261**	**0.3215**	**0.3360**	
		C1	0.3010	0.3400	0.3028	0.3304	0.3107	0.3380	0.3092	0.3495	
		C4	0.3068	0.3113	0.3105	0.2925	0.3160	0.2990	0.3135	0.3170	
		C5	0.3092	0.3495	0.3107	0.3380	0.3205	0.3481	0.3202	0.3610	
		C8	0.3135	0.3170	0.3160	0.2990	0.3230	0.3060	0.3221	0.3261	
DZ	DY	**D2**	**0.3207**	**0.3462**	**0.3215**	**0.3360**	**0.3290**	**0.3417**	**0.3288**	**0.3540**	5700
		D3	**0.3215**	**0.3360**	**0.3222**	**0.3243**	**0.3290**	**0.3300**	**0.3290**	**0.3417**	
		D6	**0.3288**	**0.3540**	**0.3290**	**0.3417**	**0.3368**	**0.3480**	**0.3377**	**0.3625**	
		D7	**0.3290**	**0.3417**	**0.3290**	**0.3300**	**0.3366**	**0.3369**	**0.3368**	**0.3480**	
		D1	0.3202	0.3610	0.3207	0.3462	0.3288	0.3540	0.3292	0.3700	
		D4	0.3222	0.3243	0.3230	0.3060	0.3292	0.3130	0.3290	0.3300	
		D5	0.3292	0.3700	0.3288	0.3540	0.3377	0.3625	0.3385	0.3790	
		D8	0.3290	0.3300	0.3292	0.3130	0.3360	0.3195	0.3366	0.3369	
EZ	EY	**E2**	**0.3377**	**0.3625**	**0.3368**	**0.3480**	**0.3450**	**0.3550**	**0.3461**	**0.3690**	5000
		E3	**0.3368**	**0.3480**	**0.3366**	**0.3369**	**0.3440**	**0.3420**	**0.3450**	**0.3550**	
		E6	**0.3461**	**0.3690**	**0.3450**	**0.3550**	**0.3530**	**0.3610**	**0.3551**	**0.3760**	
		E7	**0.3450**	**0.3550**	**0.3440**	**0.3420**	**0.3515**	**0.3487**	**0.3530**	**0.3610**	
		E1	0.3385	0.3790	0.3377	0.3625	0.3461	0.3690	0.3477	0.3870	
		E4	0.3366	0.3369	0.3360	0.3195	0.3425	0.3260	0.3440	0.3420	
		E5	0.3477	0.3870	0.3461	0.3690	0.3551	0.3760	0.3580	0.3950	
		E8	0.3440	0.3420	0.3425	0.3260	0.3495	0.3320	0.3515	0.3487	

*Measurement Uncertainty of the Color Coordinates : ± 0.01

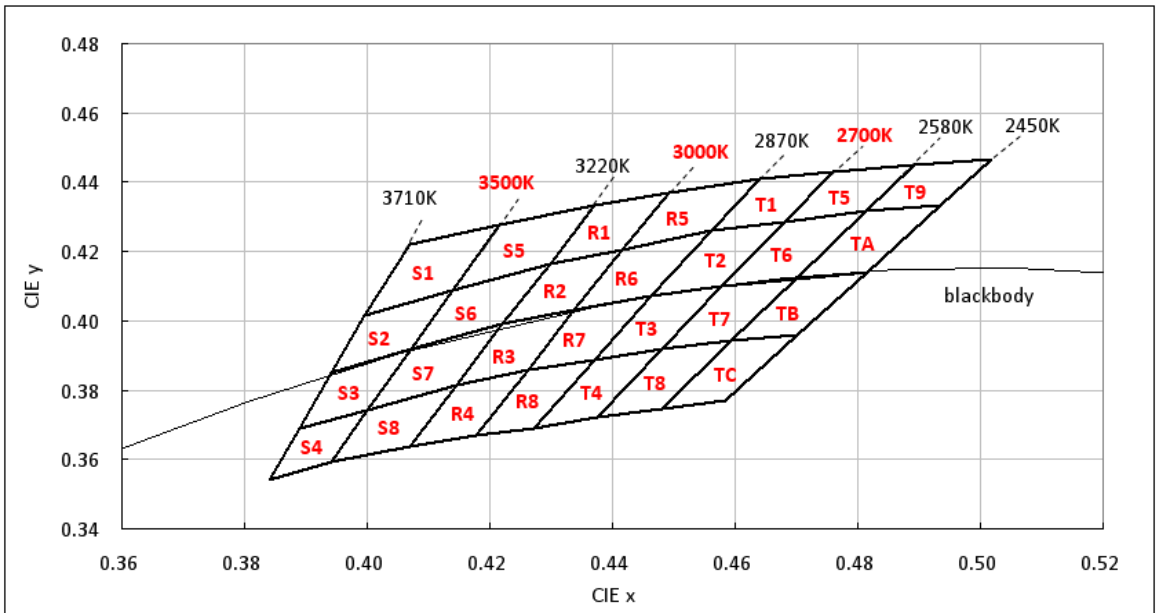
8-3. C.I.E Color Rank: Neutral White –NZ(NY) & PZ(PY)



ITC Std Zone	Energy star ANSI	Rank	x1	y1	x2	y2	x3	y3	x4	y4	Center CCT(K)
NZ	NY	**N2**	**0.3548**	**0.3736**	**0.3530**	**0.3610**	**0.3611**	**0.3660**	**0.3635**	**0.3800**	4500
		N3	**0.3530**	**0.3610**	**0.3512**	**0.3465**	**0.3590**	**0.3520**	**0.3611**	**0.3660**	
		N6	**0.3635**	**0.3800**	**0.3611**	**0.3660**	**0.3700**	**0.3720**	**0.3736**	**0.3874**	
		N7	**0.3611**	**0.3660**	**0.3590**	**0.3520**	**0.3670**	**0.3578**	**0.3700**	**0.3720**	
		N1	0.3580	0.3950	0.3548	0.3736	0.3635	0.3800	0.3673	0.4010	
		N4	0.3512	0.3465	0.3495	0.3320	0.3568	0.3380	0.3590	0.3520	
		N5	0.3673	0.4010	0.3635	0.3800	0.3736	0.3874	0.3783	0.4085	
		N8	0.3590	0.3520	0.3568	0.3380	0.3640	0.3430	0.3670	0.3578	
PZ	PY	**P2**	**0.3736**	**0.3874**	**0.3700**	**0.3720**	**0.3818**	**0.3795**	**0.3863**	**0.3950**	4000
		P3	**0.3700**	**0.3720**	**0.3670**	**0.3578**	**0.3775**	**0.3646**	**0.3818**	**0.3795**	
		P6	**0.3863**	**0.3950**	**0.3818**	**0.3795**	**0.3941**	**0.3850**	**0.4006**	**0.4044**	
		P7	**0.3818**	**0.3795**	**0.3775**	**0.3646**	**0.3898**	**0.3716**	**0.3941**	**0.3850**	
		P1	0.3783	0.4085	0.3736	0.3874	0.3863	0.3950	0.3926	0.4160	
		P4	0.3670	0.3578	0.3640	0.3430	0.3727	0.3482	0.3775	0.3646	
		P5	0.3926	0.4160	0.3863	0.3950	0.4006	0.4044	0.4070	0.4220	
		P8	0.3775	0.3646	0.3727	0.3482	0.3840	0.3540	0.3898	0.3716	

*Measurement Uncertainty of the Color Coordinates : ± 0.01

8-4. C.I.E Color Rank: Warm White-SZ(SY)&RZ(RY)&TZ(TY)



ITC Std Zone	Energy star ANSI	Rank	x1	y1	x2	y2	x3	y3	x4	y4	Center CCT(K)
SZ	SY	**S2**	**0.3996**	**0.4015**	**0.3941**	**0.3850**	**0.4073**	**0.3917**	**0.4140**	**0.4086**	3500
		S3	**0.3941**	**0.3850**	**0.3889**	**0.3690**	**0.4000**	**0.3740**	**0.4073**	**0.3917**	
		S6	**0.4140**	**0.4086**	**0.4073**	**0.3917**	**0.4220**	**0.3990**	**0.4299**	**0.4165**	
		S7	**0.4073**	**0.3917**	**0.4000**	**0.3740**	**0.4147**	**0.3814**	**0.4220**	**0.3990**	
		S1	0.4070	0.4220	0.3996	0.4015	0.4140	0.4086	0.4215	0.4276	
		S4	0.3889	0.3690	0.3840	0.3540	0.3942	0.3595	0.4000	0.3740	
		S5	0.4215	0.4276	0.4140	0.4086	0.4299	0.4165	0.4370	0.4332	
		S8	0.4000	0.3740	0.3942	0.3595	0.4070	0.3636	0.4147	0.3814	
RZ	RY	**R2**	**0.4299**	**0.4165**	**0.4220**	**0.3990**	**0.4338**	**0.4030**	**0.4416**	**0.4205**	3000
		R3	**0.4220**	**0.3990**	**0.4147**	**0.3814**	**0.4262**	**0.3860**	**0.4338**	**0.4030**	
		R6	**0.4416**	**0.4205**	**0.4338**	**0.4030**	**0.4463**	**0.4070**	**0.4562**	**0.4260**	
		R7	**0.4338**	**0.4030**	**0.4262**	**0.3860**	**0.4371**	**0.3885**	**0.4463**	**0.4070**	
		R1	0.4370	0.4332	0.4299	0.4165	0.4416	0.4205	0.4493	0.4370	
		R4	0.4147	0.3814	0.4070	0.3636	0.4178	0.3670	0.4262	0.3860	
		R5	0.4493	0.4370	0.4416	0.4205	0.4562	0.4260	0.4640	0.4410	
		R8	0.4262	0.3860	0.4178	0.3670	0.4273	0.3690	0.4371	0.3885	
TZ	TY	**T2**	**0.4562**	**0.4260**	**0.4463**	**0.4070**	**0.4578**	**0.4101**	**0.4680**	**0.4285**	2700
		T3	**0.4463**	**0.4070**	**0.4371**	**0.3885**	**0.4482**	**0.3920**	**0.4578**	**0.4101**	
		T6	**0.4680**	**0.4285**	**0.4578**	**0.4101**	**0.4700**	**0.4120**	**0.4813**	**0.4319**	
		T7	**0.4578**	**0.4101**	**0.4482**	**0.3920**	**0.4593**	**0.3944**	**0.4700**	**0.4120**	
		T1	0.4640	0.4410	0.4562	0.4260	0.4680	0.4285	0.4760	0.4430	
		T4	0.4371	0.3885	0.4273	0.3690	0.4376	0.3720	0.4482	0.3920	
		T5	0.4760	0.4430	0.4680	0.4285	0.4813	0.4319	0.4892	0.4450	
		T8	0.4482	0.3920	0.4376	0.3720	0.4480	0.3745	0.4593	0.3944	
		T9	0.4892	0.4450	0.4813	0.4319	0.4935	0.4335	0.5017	0.4465	
		TA	0.4813	0.4319	0.4700	0.4120	0.4815	0.4140	0.4935	0.4335	
		TB	0.4700	0.4120	0.4593	0.3944	0.4702	0.3960	0.4815	0.4140	
		TC	0.4593	0.3944	0.4480	0.3745	0.4585	0.3770	0.4702	0.3960	

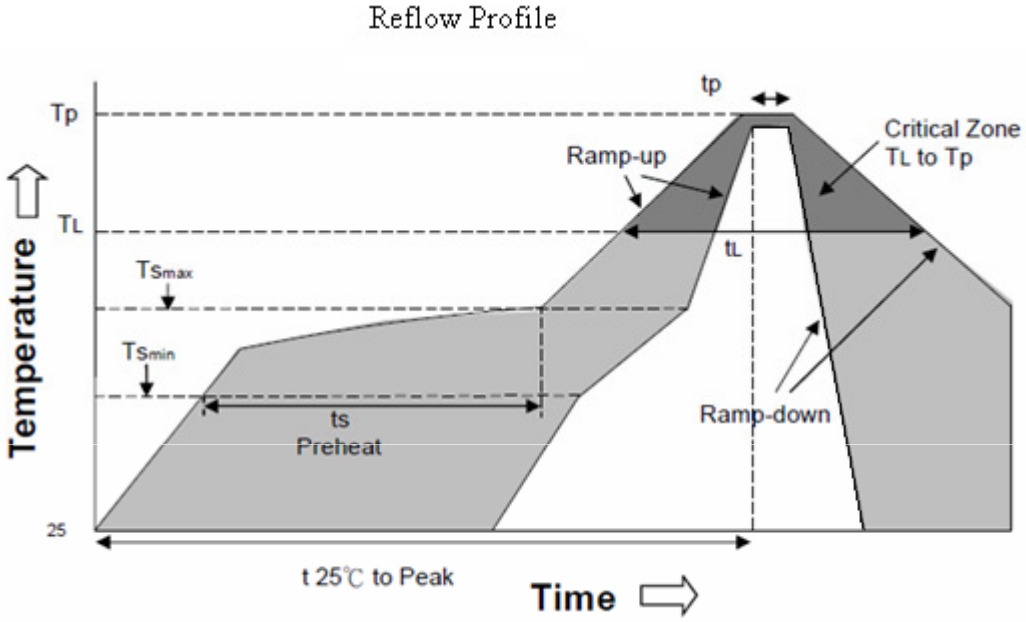
*Measurement Uncertainty of the Color Coordinates : ± 0.01

9. Soldering Characteristics

9-1. Reflow soldering: Follow JEDEC-J-STD-020C

As a general guideline, ITC recommends that users follow the recommended soldering profile provided by the manufacturer of solder paste used.

Note that this general guideline may not apply to all PCB designs and configurations of reflow Soldering equipment.



Profile Feature	Lead-Base Solder	Lead-Free Solder
Average Ramp-up rate (Tsmax to Tp)	3˚C/second max.	3˚C/second max.
Preheat - Temperature min (Tsmin) - Temperature min (Tsmax) - Time (Tsmin to Tsmax) (ts)	 100˚C 150˚C 60-120 seconds	 150˚C 200˚C 60-180 seconds
Time maintained above: - Temperature (T_L) - Time (t_L)	 183˚C 60-150 seconds	 217˚C 60-150 seconds
Peak Temperature (Tp)	225˚C	260˚C
Time within 5˚C of actual Peak Temperature (tp)	10 seconds Max.	10 seconds Max.
Ramp-down Rate	6˚C/second max.	6˚C/second max.
Time 25˚C to Peak Temperature	6 minutes max.	8 minutes max.

Note : All temperatures refer to topside of the package, measured on the package body surface.

9-2. Manual Iron Soldering (NOT RECOMMANDED)

Use SN60 solder of solder with silver content.

Use 25W soldering iron at 350°C Max for 3 seconds or less.

The soldering time and temperature will be different according with different LED thermal dissipation base.Must not touch top resin portion of SMD LED by heated soldering iron. Repairing should not be done after the LEDs have been soldered. When repairing is unavoidable, a double-head soldering iron should be used. It should be confirmed beforehand whether the characteristics of the LEDs will or will not be damaged by repairing.

10.Cautions

10-1. 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 affect the optical characteristics of the LEDs. For this reason, a moisture proof package is used to keep moisture to a minimum in the package.

10-2. Storage

Recommended storage environment:

Temperature: 5°C ~ 30°C (41°F ~ 86°F)

Humidity: 60% RH Max.

Use within 7 days after opening of sealed vapor/ESD barrier bags.

If LEDs remain unused, they should be stored in moisture proof packages, such as sealed containers with packages of moisture absorbent material.

10-3. Heat Generation

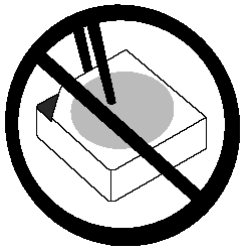
Thermal design of the end product is of paramount importance. Heat generated by the LED must be considered in system design. The coefficient of temperature increase per input electric power is affected by the thermal resistance of the circuit board and density of LED placement on the board, as well as 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 derated if ambient temperature is to exceed recommended value in this datasheet.

10-4. Handling Instructions of Silicone Resin LEDs

Mechanical stress on the surface should be minimized as much as possible during handling.

Sharp objects of all types should not be used to avoid piercing the sealing compound.



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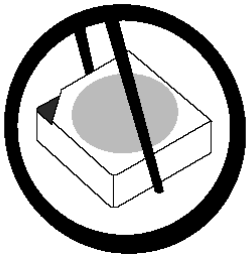

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10-5. Cleaning

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 damage the LED.

Avoid using organic solvents. Surface condition of this device may change when organic solvents such as trichloroethylene or acetone is applied.

Do not clean the LEDs by the ultrasonic method. When it is absolutely necessary, the effect of ultrasonic cleaning on the LEDs depends on factors such as ultrasonic power, baking time and assembled condition. Before cleaning, a pre-test should be done to confirm whether any damage to the LEDs will occur.

10-6. Other

Not responsible for any damage caused due to using the LEDs at conditions exceeding our specifications.

These LEDs are designed and manufactured for use in typical consumer applications. It is recommended to consult us in advance if user's application requires any particular quality or reliability which concerns human life. Examples would be medical equipment, aerospace applications, traffic signals, safety system equipment and so on.

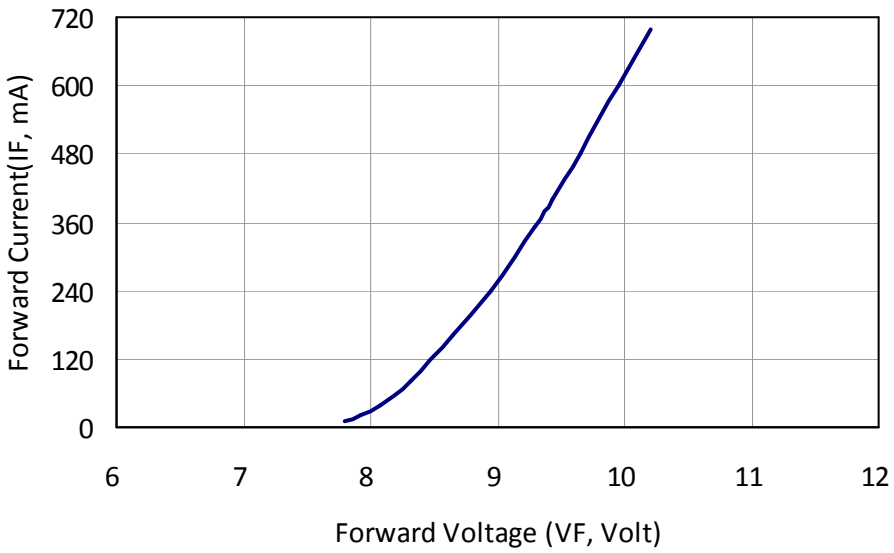
Care must be taken to ensure that the reverse voltage will not exceed the absolute maximum rating when using the LEDs with matrix drive.

The LED light output is strong enough to injure human eyes. Precautions must be taken to prevent looking directly at the LEDs with unprotected eyes for more than a few seconds.

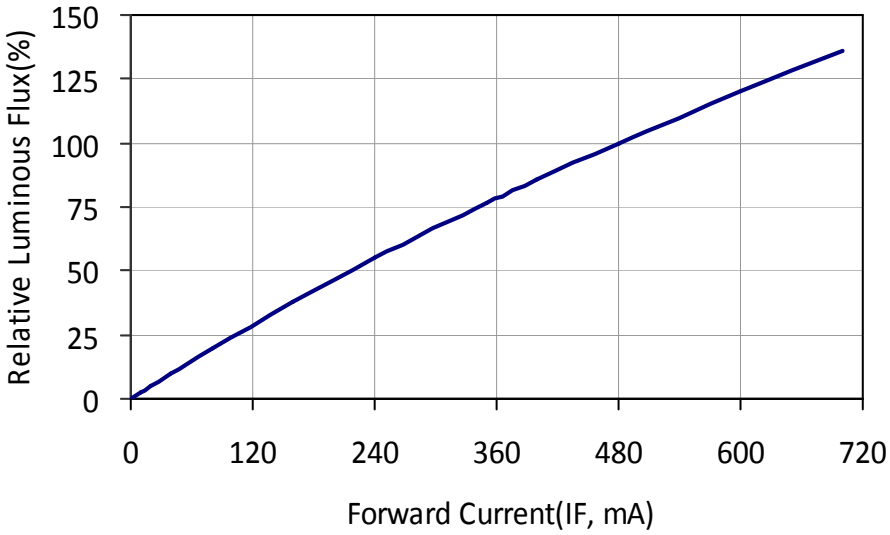
The appearance and specifications of the product may be modified for improvement without notice.

11. Typical Electrical & Optical Characteristic Curves

11-1. Electrical Characteristics (Ta=25°C, pulsed measurement)

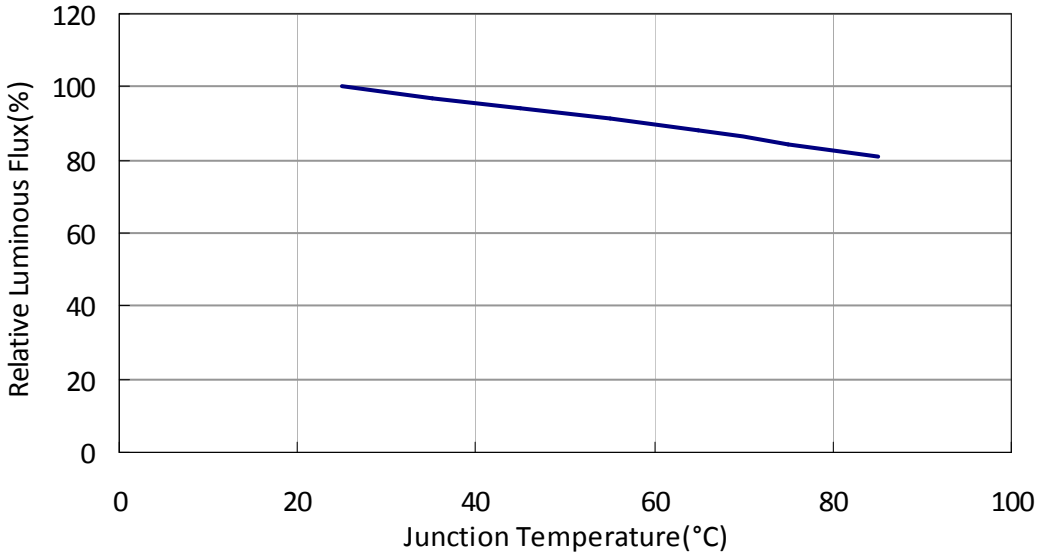


11-2. Relative Flux vs Forward Current (Ta=25°C, pulsed measurement)

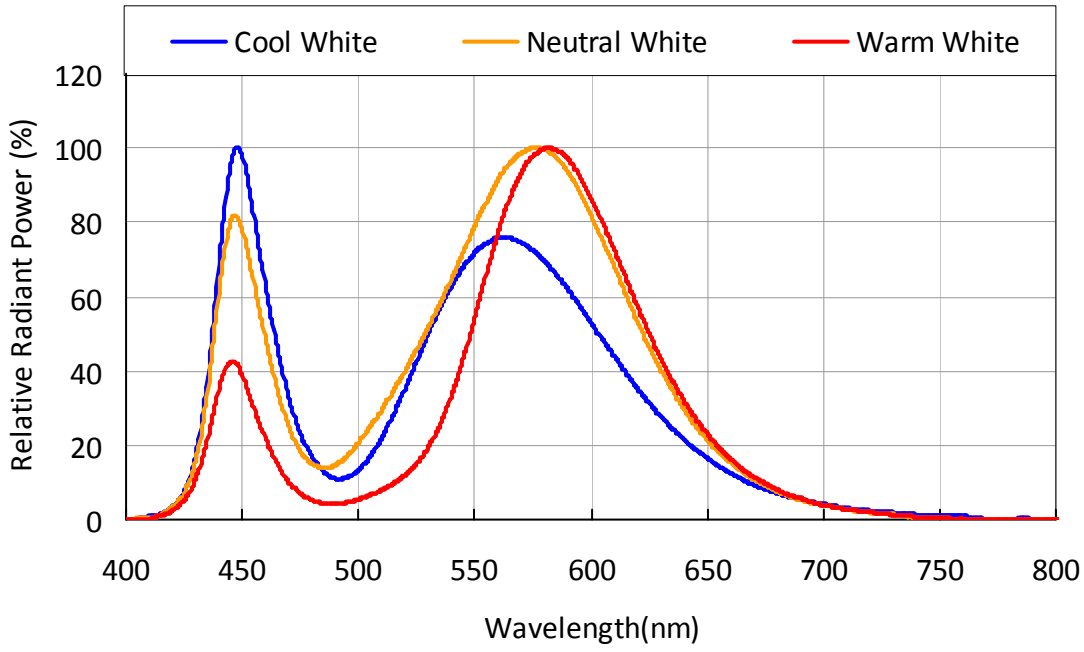


11. Typical Electrical & Optical Characteristic Curves:

11-3. Relative Flux vs Junction Temperature (IF=480mA)

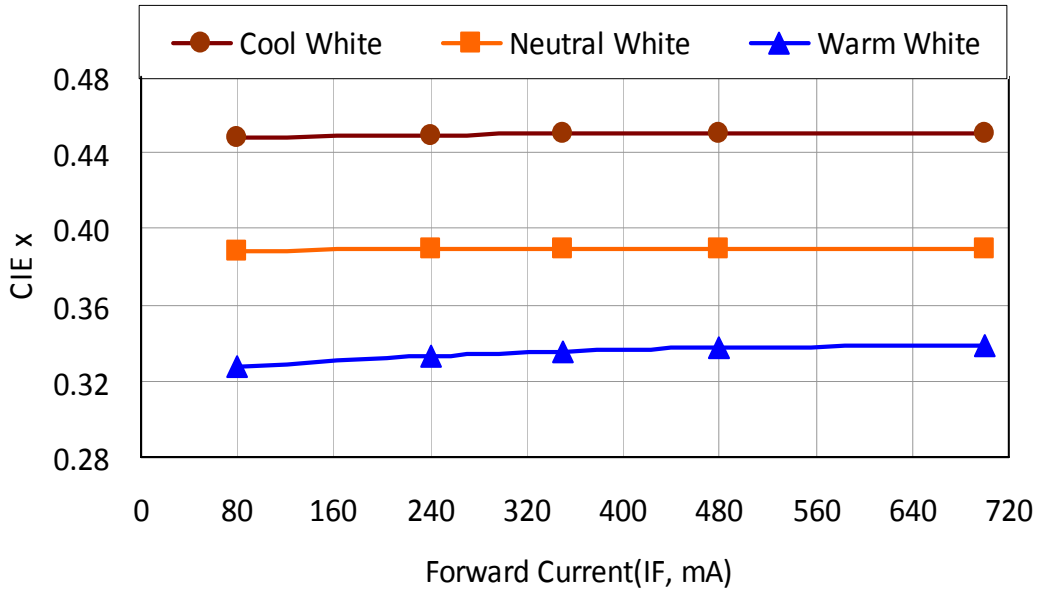


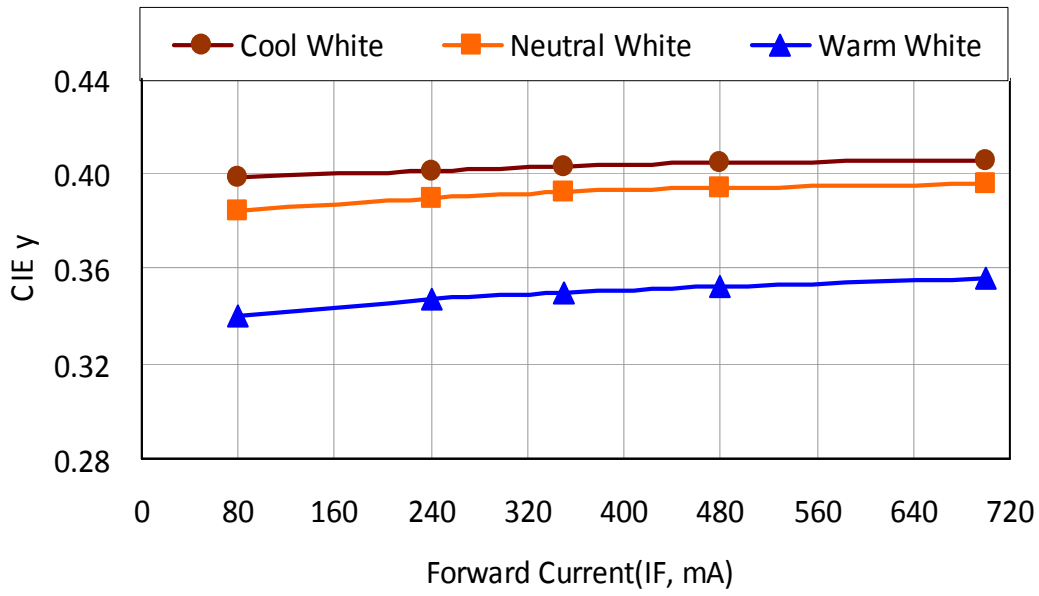
11-4. Spectrum (IF=480mA, Ta=25°C)



11. Typical Electrical & Optical Characteristic Curves:

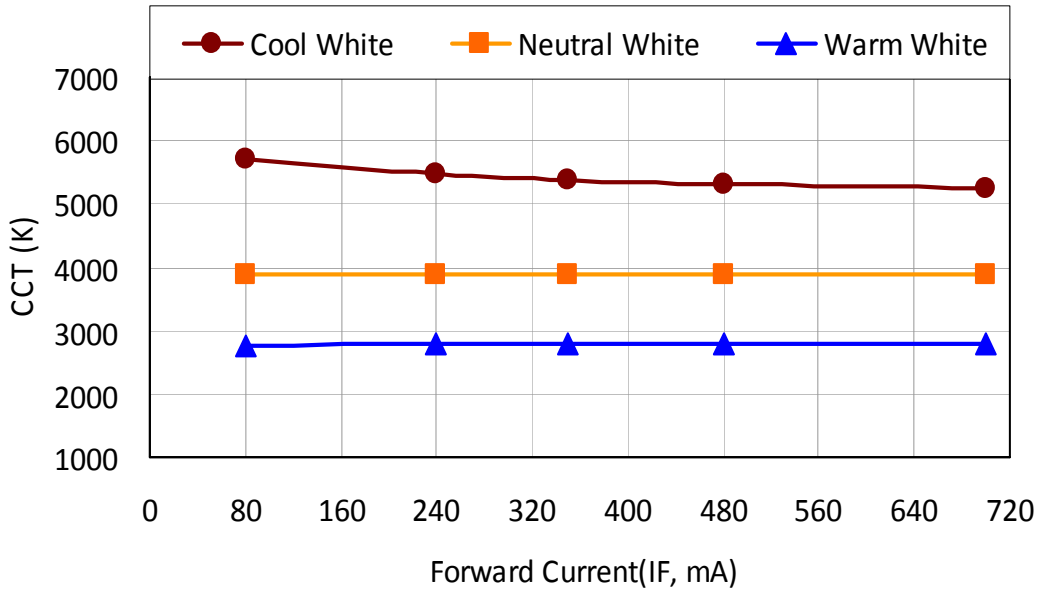
11-5. Forward current vs CIE (x,y) (Ta=25°C, pulsed measurement)



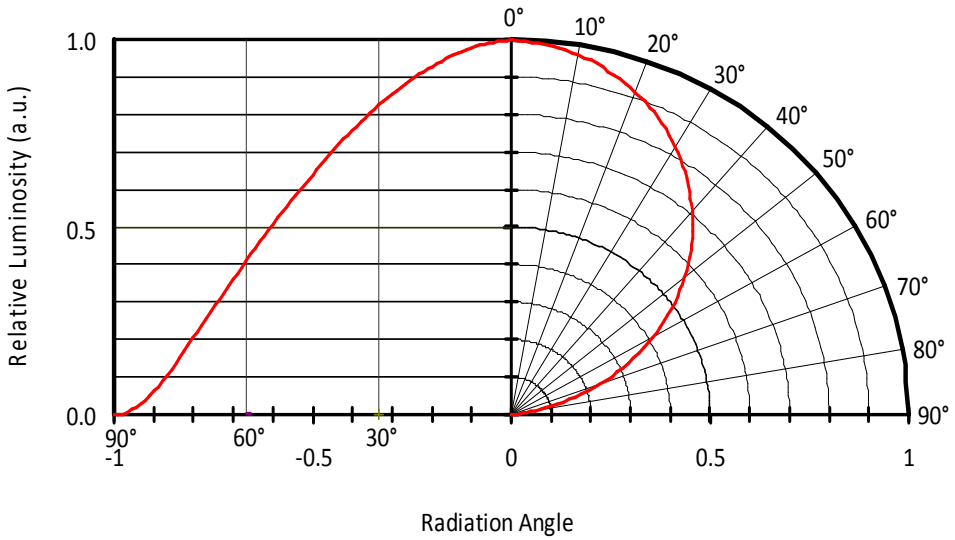


11. Typical Electrical & Optical Characteristic Curves:

11-6. Forward current vs CCT (K) (Ta=25°C, pulsed measurement)

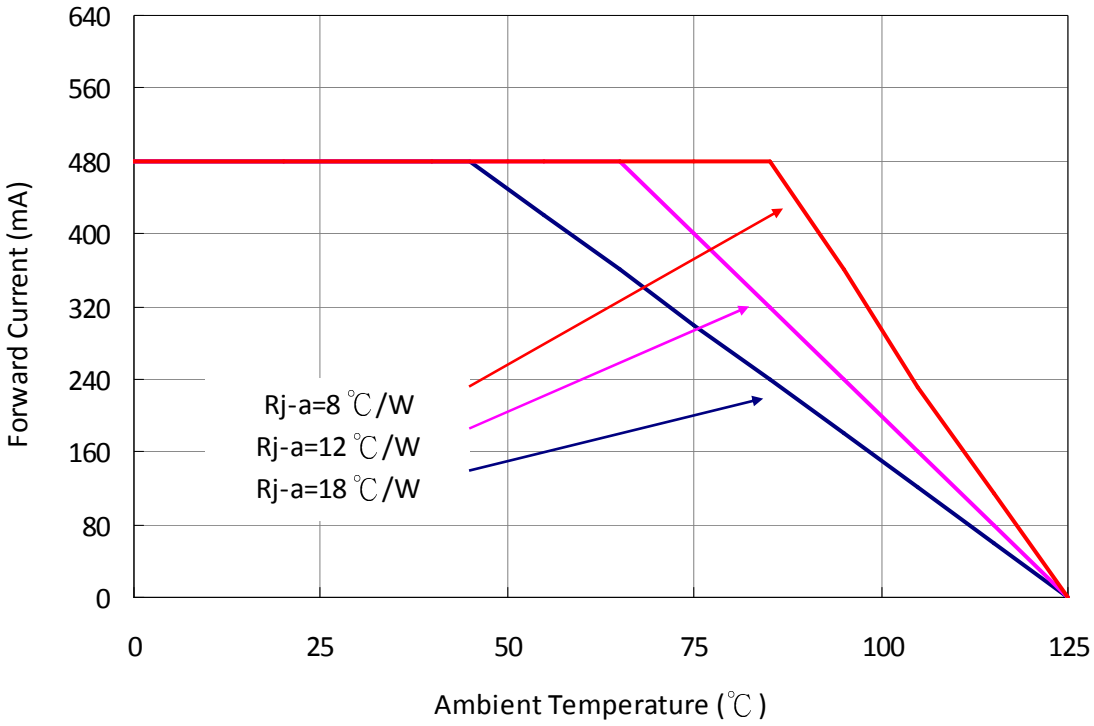


11-7. Radiant Angle & Pattern (IF=480 mA, Ta=25°C)



12. Thermal design

Ambient Temperature vs. Allowable Forward Current



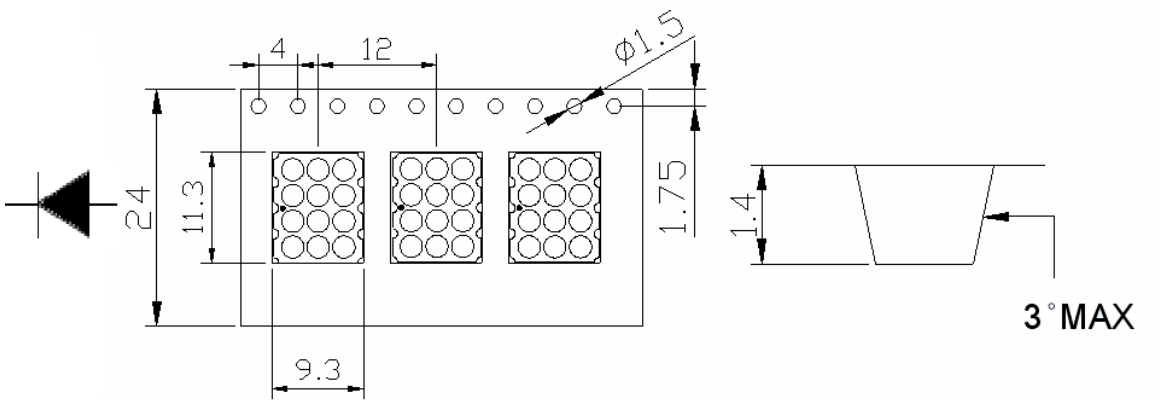
13. Reliability Test Item and Criteria

NO	Test Item	Test Condition	
		Condition	Note
1	Soldering Heat	Tsld=260℃±5℃, 10sec	2 times
2	Temperature Cycle	-40℃~110℃ 30min dwell.,5min transfer	500 cycles
3	Steady State Operating of High Temperature	Ta=85℃, IF= 480mA	1008 hrs
4	Steady State Operating of High Humidity Heat	Ta=60℃, RH=90%IF=480mA	1008 hrs

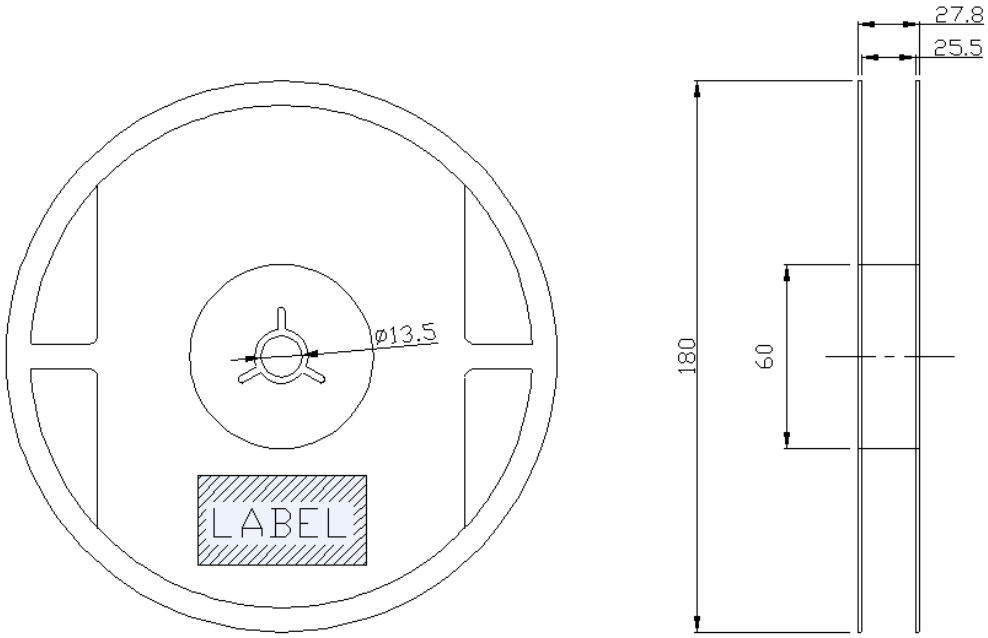
Criteria for Failure：
* Luminous Flux(lm) = 0.7 * initial flux @ rated current
* Vf = Initial Vf * 1.10 @ rated current

14. Packaging

14-1. Carrier &Tap



14-2. Reel



14. Packaging

14-3. Drying Package & Labeling