



SPECIFICATIONS

PRODUCT NAME: SMD 4014 (0.4W) White LED

CUSTOMER: General Customer

MODEL NAME:

CUSTOMER P/N:

DATE: 2014-12-10

APT Electronics Ltd.			CUSTOMER
Prepared by	Checked by	Approved by	Approved by
Kuang Jian 邝健 2015.2.12	邝健 2015.2.12	正伟峰	

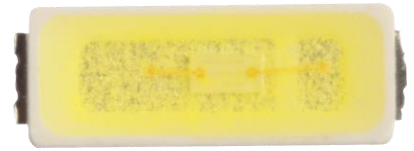


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1. Features

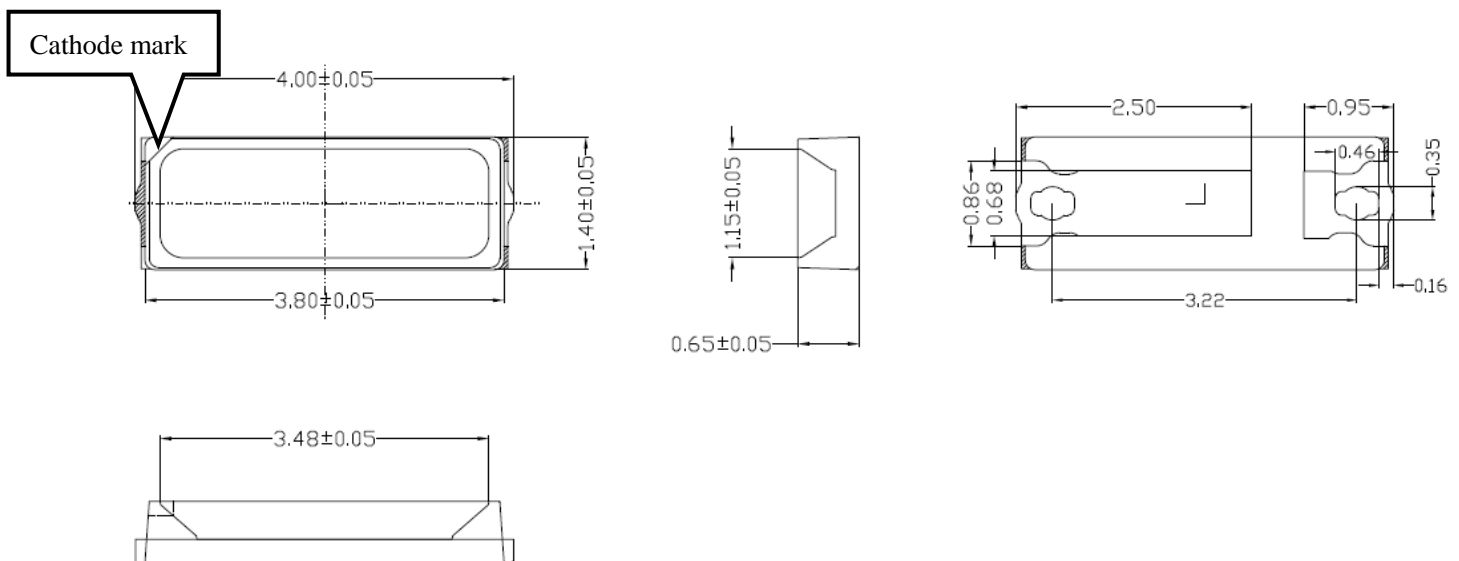
- Top view white LED with PLCC package.
- **Package dimensions: $4.0 \times 1.4 \times 0.65 \text{ mm}^3$**
- Lambertian Emitter, with viewing angle 120°
- High luminous flux output: **Typ. flux Up to 38lm@120mA**
- ESD protection design ($\text{ESD}_{\text{HBM}} > 8000 \text{ V}$).
- Pb-free.
- ROHS compliant.



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2. Packaging Outline Dimensions



Notes: All dimensions are in millimeters and tolerance is ± 0.10 mm.

3. Specifications

1) Absolute Maximum Ratings (Ta=25°C)

Items	Symbol	Maximum
Power	P_d	0.5W
Forward current	I_F	150 mA
Pulse forward current (Duty 2/10@120Hz)	I_{FP}	240 mA
Operating temperature	T_{opr}	-40 °C ~ +85 °C
Storage temperature	T_{stg}	-40 °C ~ +100 °C
Junction temperature	T_j	125°C
Solder-Point temperature	T_s	75°C
Soldering temperature	T_{sol}	Reflow Soldering : 260°C for 10 sec. Hand Soldering : 350 °C for 3 sec.

Notes: LEDs are **NOT** designed to be driven in reverse bias.

2) Typical Electro-Optical Characteristics (Ta=25°C)

Items	Symbol	Forward Current If=120mA	Unit
Forward Voltage	V _F	3.1	V
Luminous Flux	Φ	38	lm
Luminous Efficiency	-	102	lm/W
Color Coordinates	-	(0.260, 0.230)	-
Viewing Angle	2θ _{1/2}	120	°
Thermal resistance	R _{th(j-s)}	30	°C/W
ESD _{HBM}	-	>8000	V

4. Product Code & Ranks

LL - MB XXE - FF X GG - T

LL: APTE/Linux Technology

MB: SMD4014(0.4W) for Backlight application
XXE: Reserved code

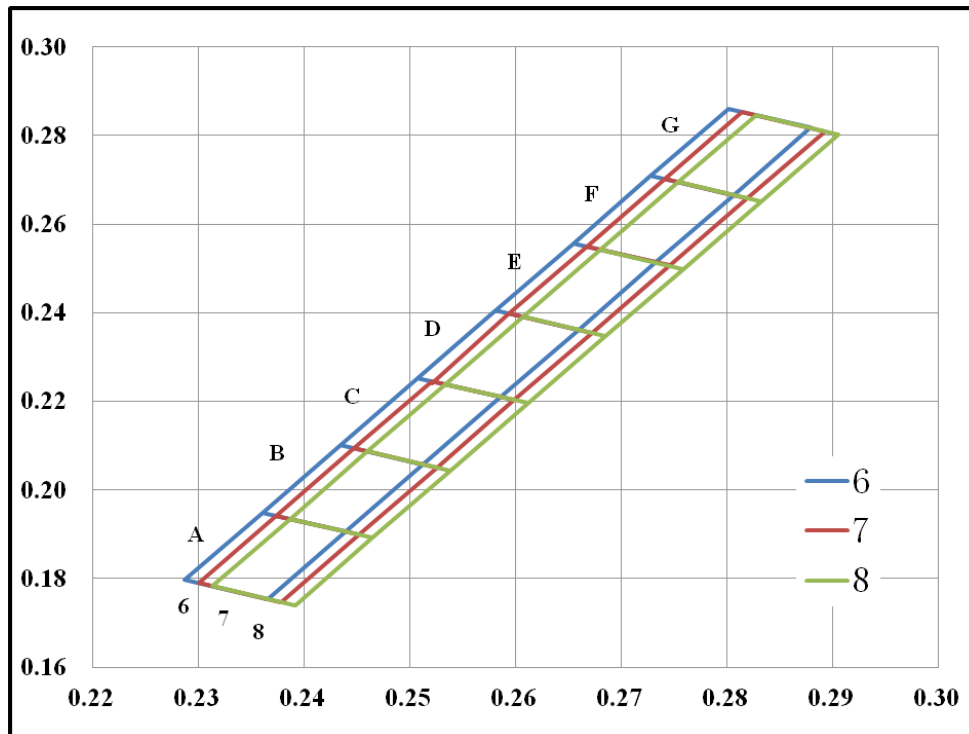
FF: Chromaticity Coordinates Ranks

X: Forward Voltage Ranks

T: Package
T: tape and reel

GG: Luminous Flux Ranks

1) Chromaticity Coordinates Ranks ($I_F=120mA$, $T_a=25^\circ C$)



A6		B6		C6		D6		E6		F6		G6	
0.2361	0.1949	0.2434	0.2101	0.2507	0.2253	0.2581	0.2405	0.2654	0.2557	0.2728	0.2709	0.2801	0.2861
0.2287	0.1797	0.2361	0.1949	0.2434	0.2101	0.2507	0.2253	0.2581	0.2405	0.2654	0.2557	0.2728	0.2709
0.2339	0.1769	0.2413	0.1920	0.2486	0.2072	0.2560	0.2224	0.2633	0.2376	0.2707	0.2528	0.2780	0.2680
0.2413	0.1920	0.2486	0.2072	0.2560	0.2224	0.2633	0.2376	0.2707	0.2528	0.2780	0.2680	0.2853	0.2832
A7		B7		C7		D7		E7		F7		G7	
0.2387	0.1935	0.2460	0.2087	0.2534	0.2239	0.2607	0.2391	0.2680	0.2543	0.2754	0.2694	0.2827	0.2846
0.2313	0.1783	0.2387	0.1935	0.2460	0.2087	0.2534	0.2239	0.2607	0.2391	0.2680	0.2543	0.2754	0.2694
0.2365	0.1754	0.2439	0.1906	0.2512	0.2058	0.2586	0.2210	0.2659	0.2362	0.2733	0.2514	0.2806	0.2666
0.2439	0.1906	0.2512	0.2058	0.2586	0.2210	0.2659	0.2362	0.2733	0.2514	0.2806	0.2666	0.2880	0.2818
A8		B8		C8		D8		E8		F8		G8	
0.2413	0.1920	0.2486	0.2072	0.2560	0.2224	0.2633	0.2376	0.2707	0.2528	0.2780	0.2680	0.2853	0.2832
0.2339	0.1769	0.2413	0.1920	0.2486	0.2072	0.2560	0.2224	0.2633	0.2376	0.2707	0.2528	0.2780	0.2680
0.2392	0.1740	0.2465	0.1892	0.2538	0.2044	0.2612	0.2195	0.2685	0.2347	0.2759	0.2499	0.2832	0.2651
0.2465	0.1892	0.2538	0.2044	0.2612	0.2195	0.2685	0.2347	0.2759	0.2499	0.2832	0.2651	0.2906	0.2803

Notes: Measurement Uncertainty of the Color Coordinates: ± 0.01

2) Forward Voltage Ranks (Ta=25°C)

V _F Rank	Condition	Min.	Typ.	Max.	Unit
3	I _F =120mA	3.0	-	3.1	V
4		3.1	-	3.2	
5		3.2	-	3.3	
6		3.3	-	3.4	

Notes: Measurement Uncertainty of the Forward Voltage: ± 0.05V

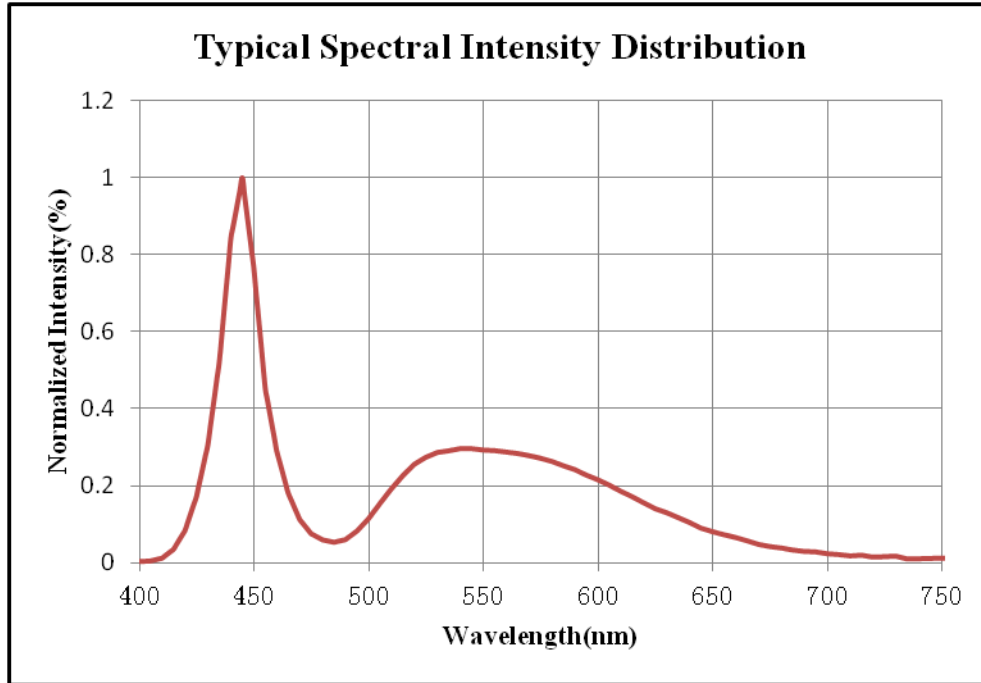
3) Luminous Flux Ranks (Ta=25°C)

Luminous Flux Rank	Condition	Min	Typ.	Max.	Unit
F2	I _F =120mA	30	-	32	lm
F3		32	-	34	
F4		34	-	36	
F5		36	-	38	
F6		38	-	40	
F7		40	-	42	

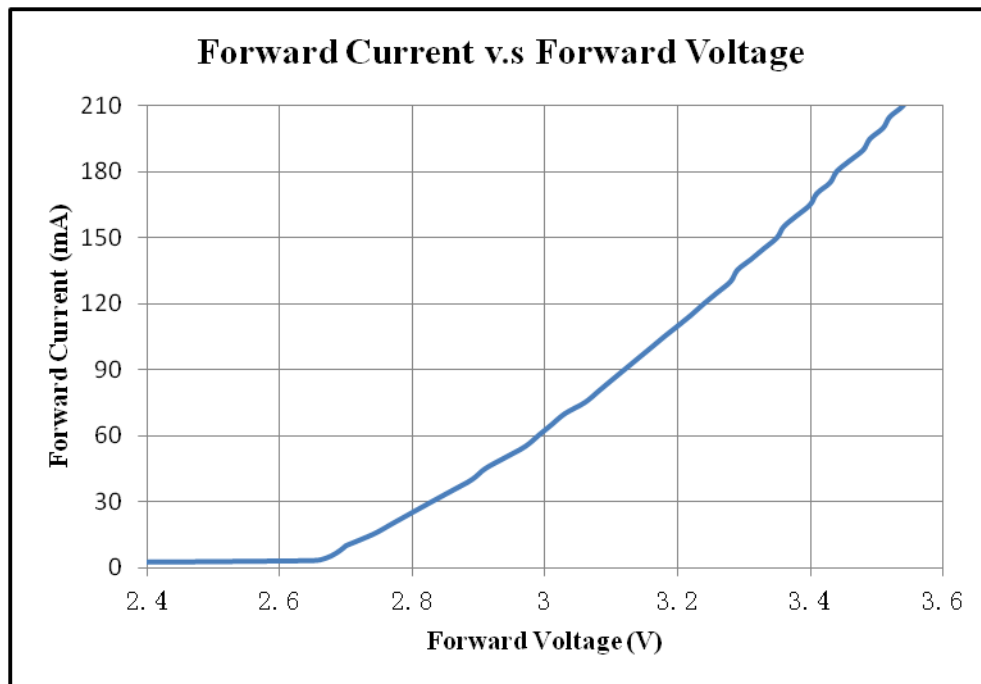
Notes: Measurement Uncertainty of the Luminous Flux: ± 5%

5. Typical Electro-optical Characteristics Curves

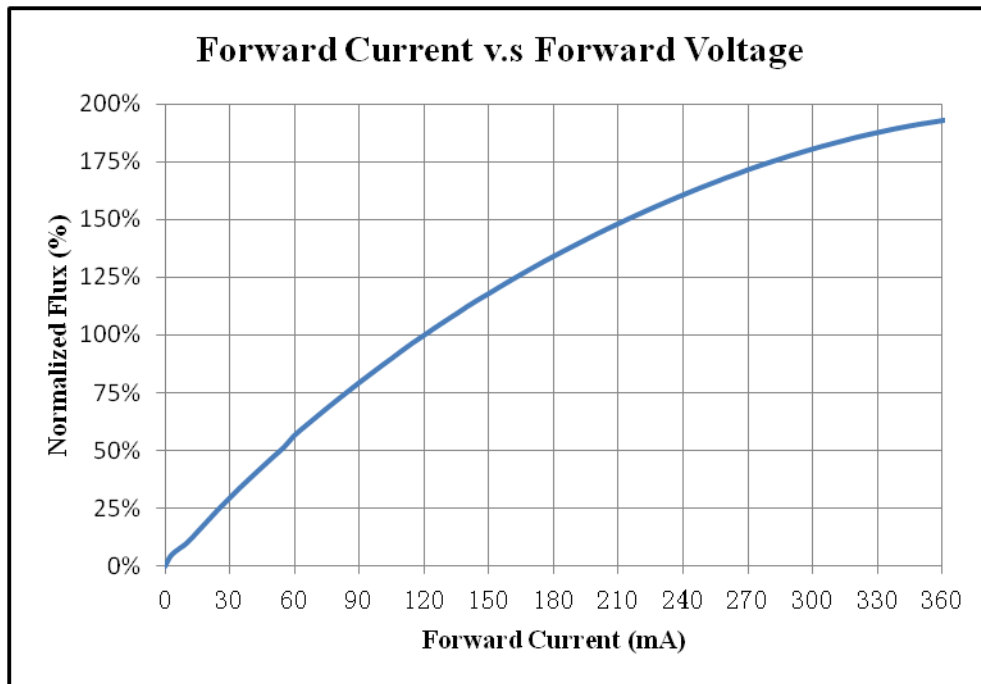
1) Spectrum



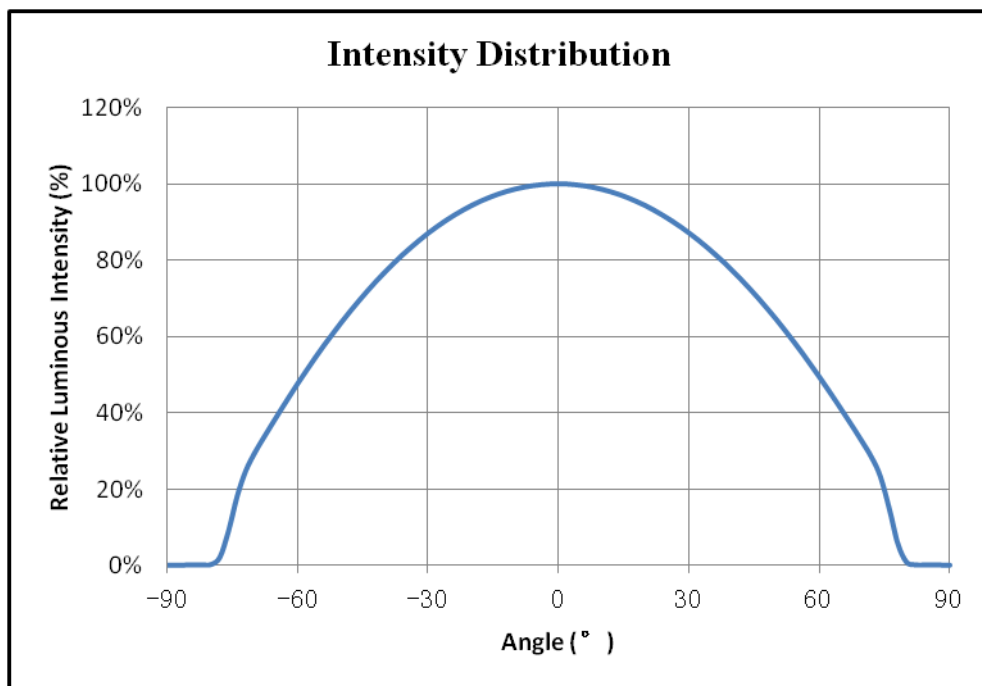
2) I-V Curve (Ta=25°C)



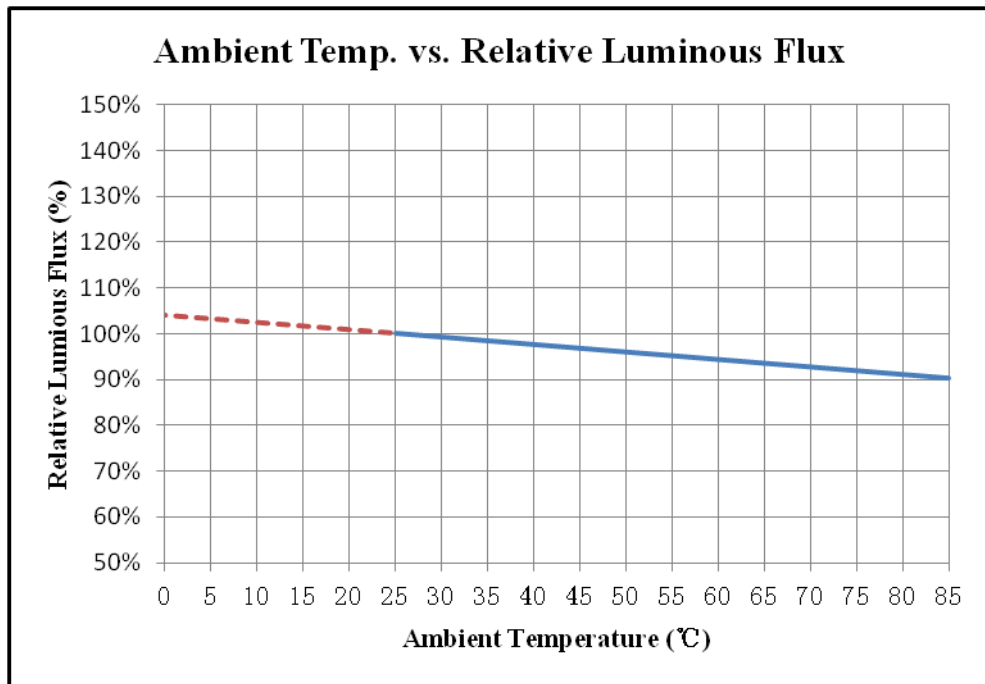
3) Iv-I Curve (Ta=25°C)



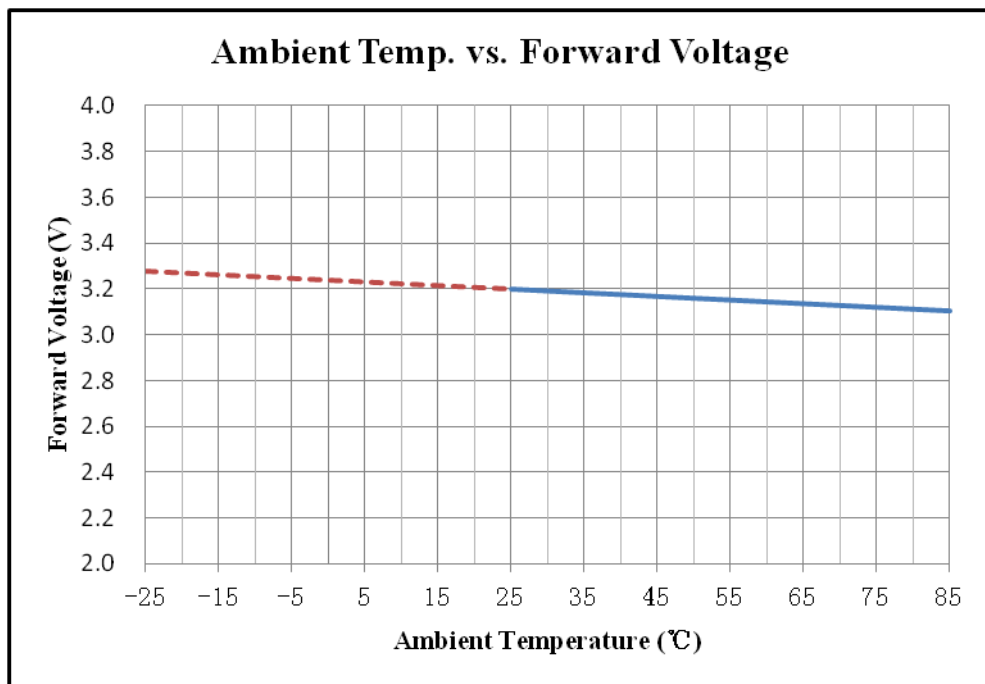
4) Intensity distribution



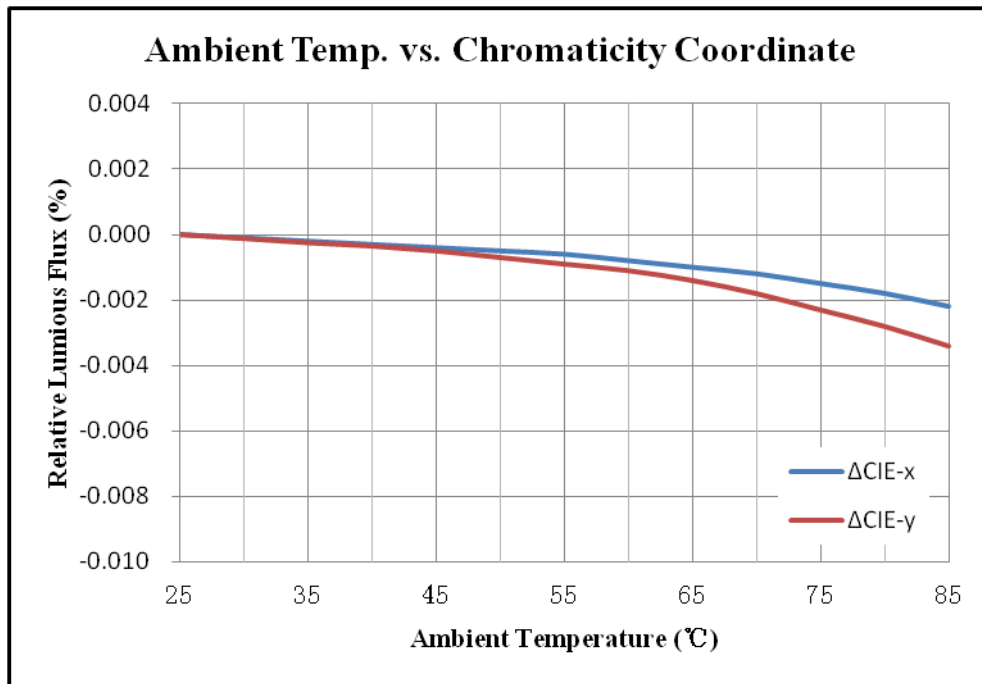
5) Ambient Temp. Vs. Relative Luminous Flux



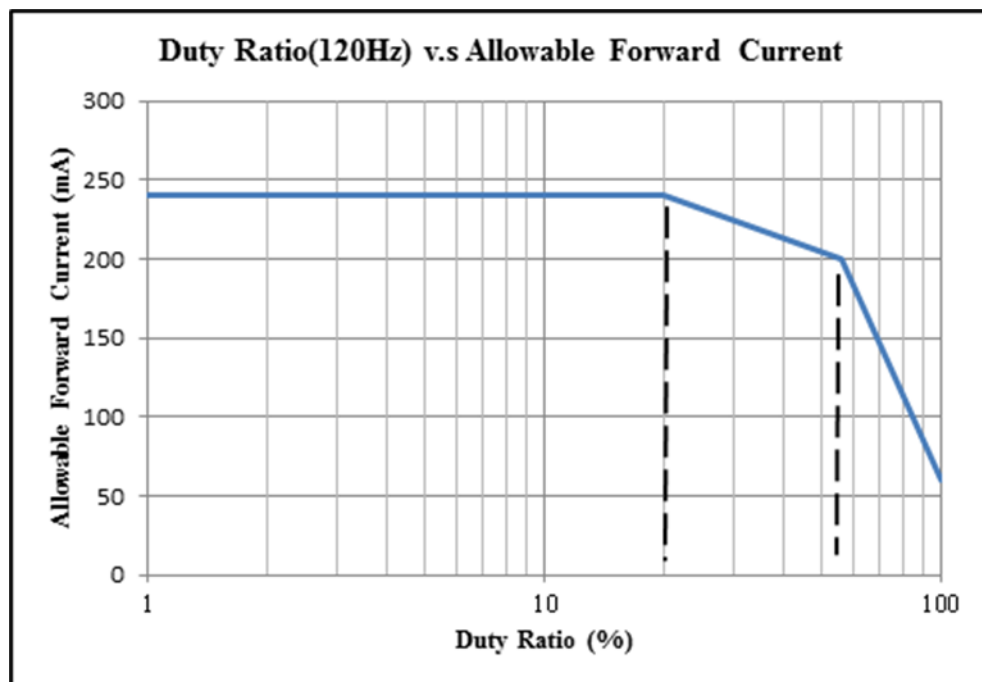
6) Ambient Temp. Vs. Forward Voltage



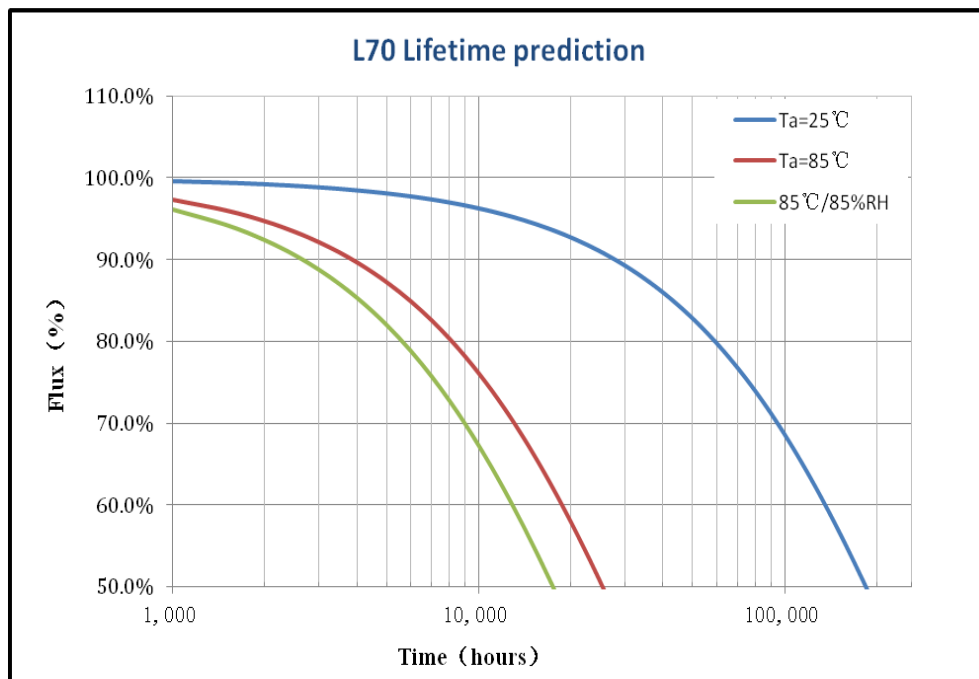
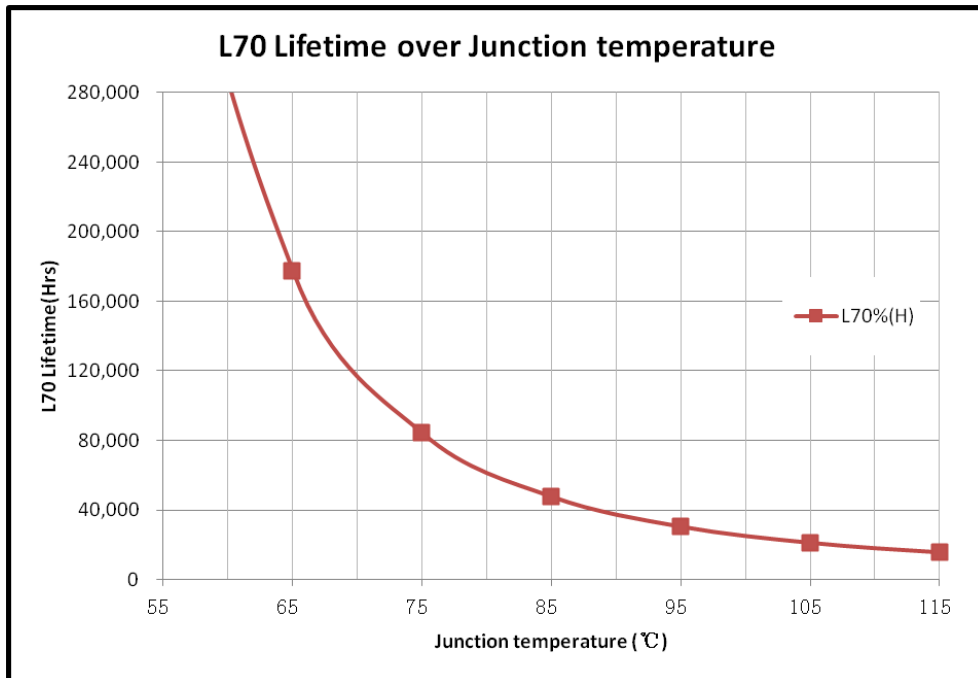
7) Ambient Temp. Vs. Chromaticity Coordinate



8) Duty Ratio Vs. Allowable Forward Current (@120Hz)



9) L70 Lifetime Prediction



6. Reliability

Items	Condition	Cycle	Ref. Standard
Operating life at room temperature	$T_a=25^{\circ}\text{C}$, $I_F=150\text{mA}$	1000 hours	JESD22-A108C
Operating life at high temperature	$T_a=85^{\circ}\text{C}$, $I_F=150\text{mA}$	1000 hours	JESD22-A108C
Operating life at high temperature and high humidity	$T_a=85^{\circ}\text{C}$, RH=85%, $I_F=150\text{mA}$	1000 hours	JESD22-A101B
Storage life at high temperature	$T_a=100^{\circ}\text{C}$	1000 hours	JESD22-A103B
Storage life at low temperature	$T_a=-20^{\circ}\text{C}$	1000 hours	JESD22-A1119
Thermal shock	$-40^{\circ}\text{C} / 125^{\circ}\text{C}$, 30mins dwell, 10sec transfer	200 cycles	JESD22-A106B
Thermal cycle	$-40^{\circ}\text{C} / 125^{\circ}\text{C}$, 15mins dwell, 15 mins transfer	200 cycles	JESD22-A104B
ESD-HBM	—	—	JESD22-A114D

Notes:

Failure Criteria: (1) Forward voltage shift $\Delta V_F \geq 0.1\text{V}$;

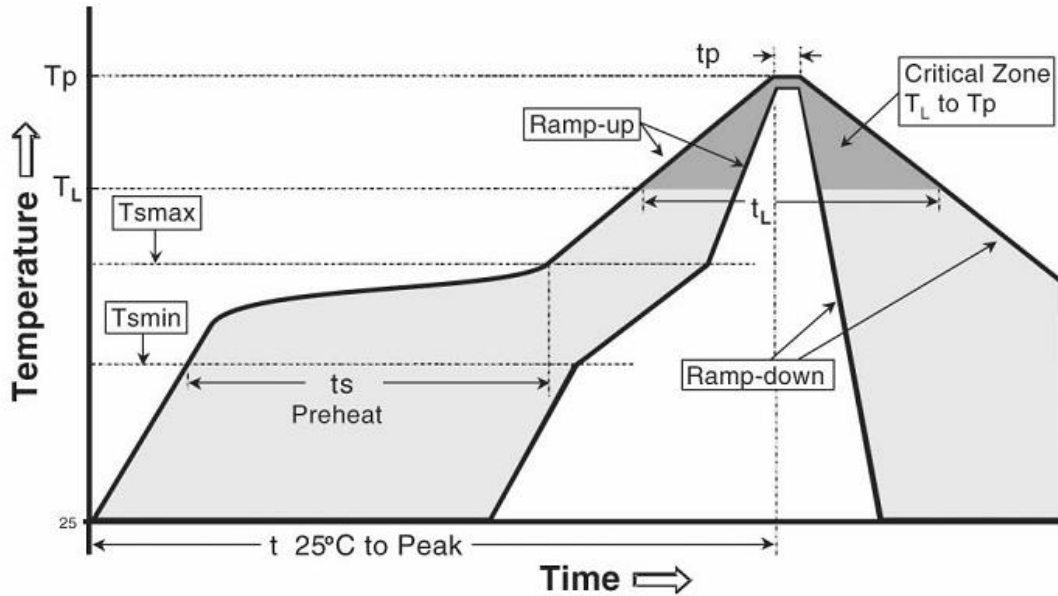
(2) Flux output degradation $\Delta I_v \geq 10\%$;

(3) 1 REJ and 0 ACC of 22 samples of each test item.

7. Precautions for Use

1) Soldering Characteristics

i. Reflow Soldering Characteristics



IPC/JEDEC J-STD-020C

Classification Reflow Profiles

Profile Feature	Sn-Pb Eutectic Assembly	Pb-Free Assembly
Average ramp-up rate ($T_{S_{max}}$ to T_p)	3°C /second max.	3°C/second max.
Preheat		
-Temperature Min($T_{S_{min}}$)	100°C	150°C
-Temperature Max($T_{S_{max}}$)	150°C	200°C
-Time($T_{S_{min}}$ to $T_{S_{max}}$)(t_s)	60-120seconds	60-180seconds
Time maintained above:		
-Temperature(T_L)	183°C	217°C
-Time(t_L)	60-150seconds	60-150seconds
Peak Temperature(T_p)	215°C	260°C
Time within 5°C of actual Peak Temperature t_p	10-30seconds	20-40seconds
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 the application Printed Circuit Board (PCB), measured on the surface adjacent to the package body.

ii. Hand Soldering (Lead Part)

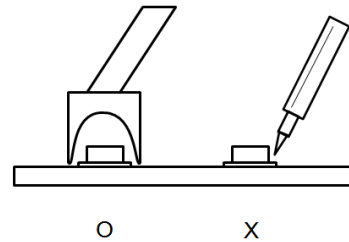
Temperature	Max. 340°C
Soldering Time	Max. 3 sec(only one time)

iii. Soldering Iron

Basic spec is ≤ 5 sec when 260°C. If temperature is higher, time shorter (+10°C → -1sec). Power dissipation of Iron should be smaller than 15W, and temperature should be controllable. Surface temperature of the device should be under 230°C

iv. Rework

1. Customer must finish rework within 5 sec under 260°C.
2. The head of iron can not touch the resin and copper foil.
3. Twin-head type is preferred.


2) Storage
Before opening the package

The LEDs should be kept at 30°C or less and 90% RH or less. The LEDs should be used within a year. When storing the LEDs, moisture proof packaging with absorbent material(silica gel) is recommended.

After opening the package

The LEDs should be kept at 30°C or less and 70% RH or less. The LEDs should be soldered within 168 hours(7days) after opening the package. If unused LEDs remain, they should be stored in moisture proof packages, such as sealed containers with package of moisture absorbent material(silica gel). It is also recommended to return the LEDs to the original moisture proof bag and to reseal the moisture proof bag again.

If the moisture absorbent material(silicagel) has faded away or the LEDs have exceeded the storage time, baking treatment should be performed using the following conditions. Baking treatment : more than 4hours at 70°C

LED operating environment and sulfur element composition cannot be over 100PPM in the LED mating usage material.

8. Package

3) Label pattern



4) Package: Tape and Reel (3 k-pcs)

