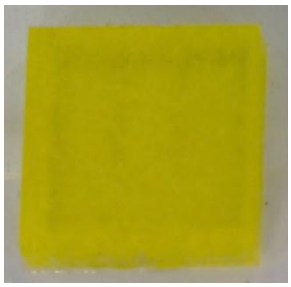
Direct TV Application

WICOP

SWHUO110E



Product Brief

Description

- This SMT LED comes in standard PKG dimension.
- This has a phosphor layer on surface of Blue Chip without Lead Frame & Gold-wire.
- Because of the good thermal character, The SWHUO110E allow to perform with high reliability.

Features and Benefits

- White colored SMT package
- Low Thermal Resistance
- Own patent reserved
- RoHS Complaint
- Pb-free Reflow Soldering application
- Suitable for all SMT assembly and soldering methods (Must not be hand soldering)

Key Applications

- Flat Backlighting (LCD, Display)
- MNT, TV etc.

Table of Contents

Performance Characteristics

Table 1. Absolute Maximum Ratings *3 (T_a = 25ºC)

Parameter	Symbol	Value	Unit
Power Dissipation	P_d *1	3118	mW
DC Forward Current	I_F	1000	mA
Peak Forward Current	I_{FM} *2	1150	mA
Operating Temperature	T_{opr}	-40 ~ +85	ºC
Storage Temperature	T_{stg}	-40 ~ +100	ºC
Junction Temperature	T_j max	135	ºC

Notes :

(1) Care is to be taken that power dissipation does not exceed the absolute maximum rating of the product.
(2) 1/10 Duty Cycle @ 100Hz .
(3) Absolute Maximum Rating is lighting conditions during the 500 hrs.

Table 2. Electro Optical Characteristics (T_a = 25ºC)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Forward Voltage*1	V_F	I_F =350mA	2.9	3.15	3.3	V
Luminous Flux*2	Φ_V	I_F =350mA	84.0	106.5	-	lm
Viewing Angle*3	H axis-2$\theta_{½}$	I_F =350mA		145		deg.
	V axis-2$\theta_{½}$	I_F =350mA		145		deg.
CIE x	C_x	I_F =350mA	-	0.2759	-	-
CIE y	C_y	I_F =350mA	-	0.2516	-	-
Thermal Resistance*4	$R_{th(j-b)}$	I_F =500mA	-	-	15.8	K/W
ESD Sensitivity		HBM	2	-	-	kV
Life Time*5		Tj < 125°C I_F ≤ 800mA	30,000	-	-	Hrs

Notes :

(1) Forward voltage measurement allowance is ±0.1V
(2) The luminous Flux value is based on SSC Calibration. Luminous Flux measurement allowance is ±7%.
(3) $2\theta_{1/2}$ is the off-axis where the luminous intensity is 1/2 of the peak intensity.
(4) TEST Condition : T_a= 70℃
PCB : CEM3 2oz, 15mm*100mm*1T, 1LED/1PCB
T_b Point = 3000um from LED
(5) Failure means that luminous intensity degrades to 50% of initial value .(L50) The lifetime is estimated by the measured datum at 3khr. (MTTF)

Characteristic Diagram

Fig 1. Color Spectrum, T_a = 25℃, I_F = 500mA, RH30%

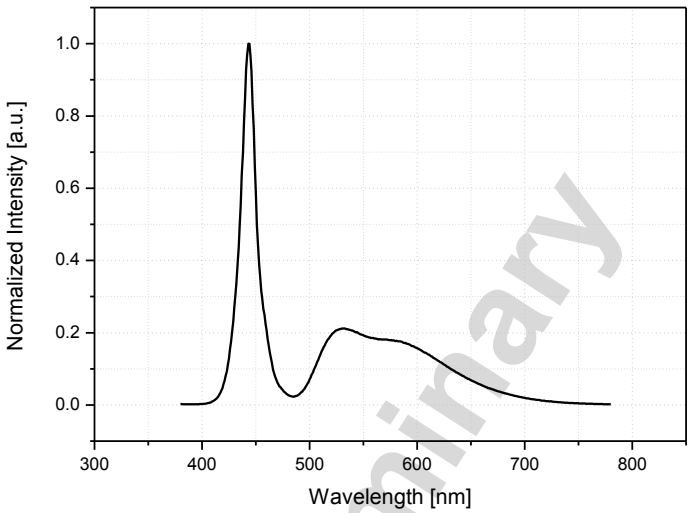
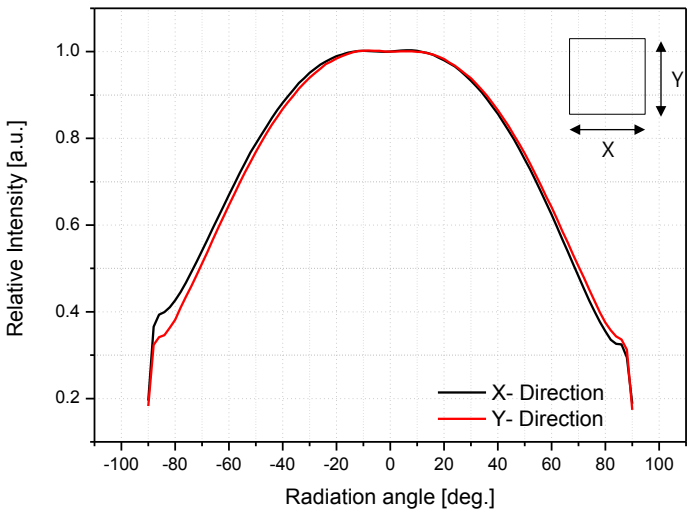


Fig 2. Radiant pattern, T_a = 25℃



Characteristic Diagram

Fig 3. Forward Voltage vs. Forward Current , T_a = 25℃

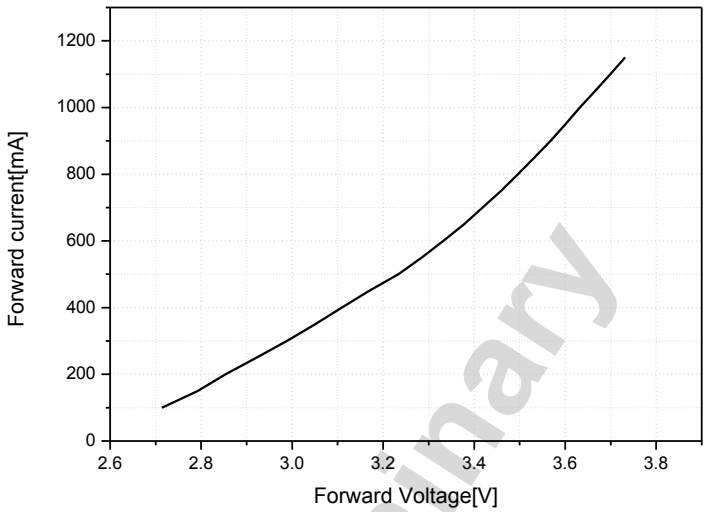
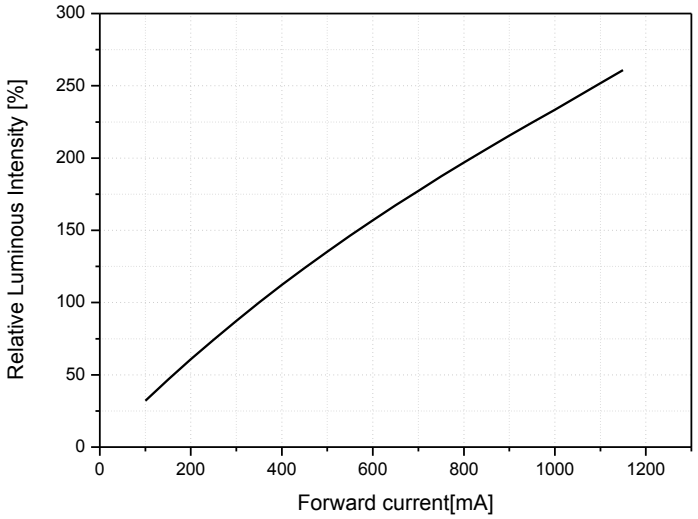


Fig 4. Forward Current vs. Relative Luminous Intensity, T_a = 25℃



Characteristic Diagram

Fig 5. Forward Current vs. CIE X, Y Shift, T_a = 25℃

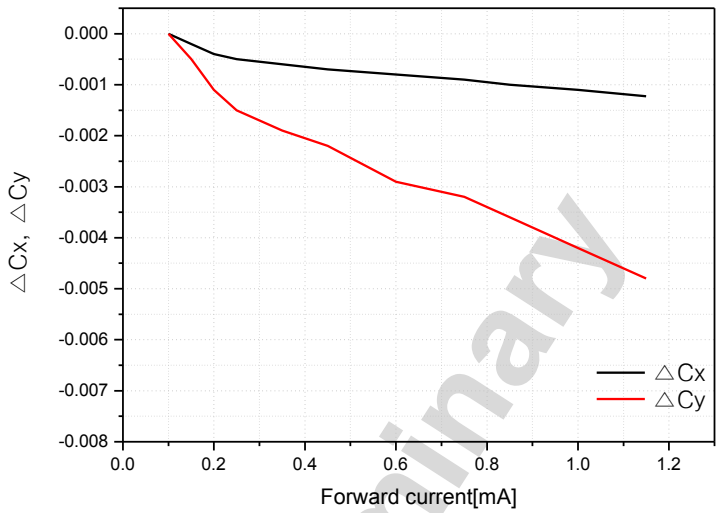
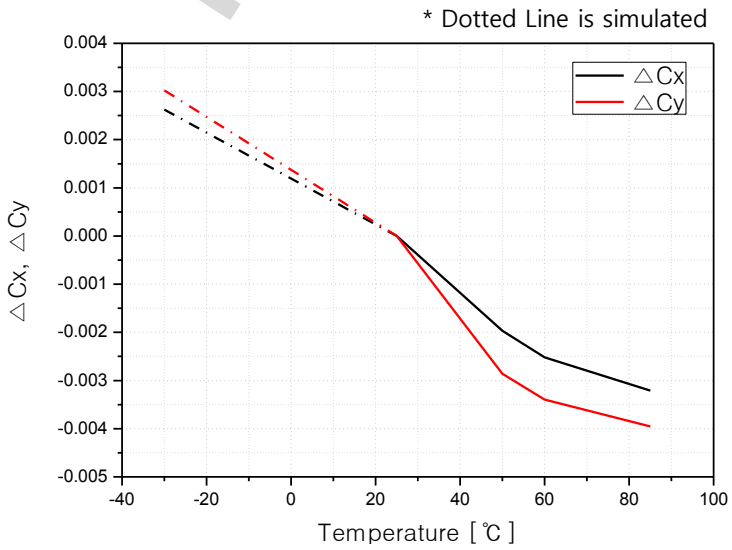


Fig 6. Color Coordinate vs. Ambient Temperature, I_F =500mA



Characteristic Diagram

Fig 7. Forward Voltage vs. Ambient Temperature, I_F =500mA

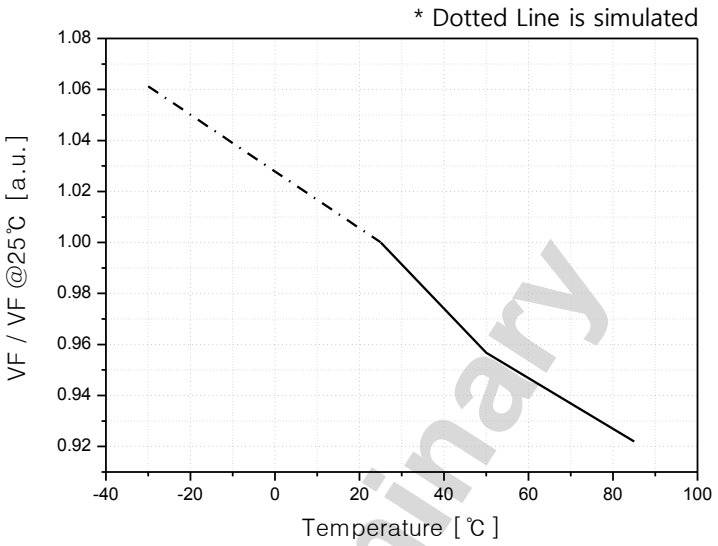
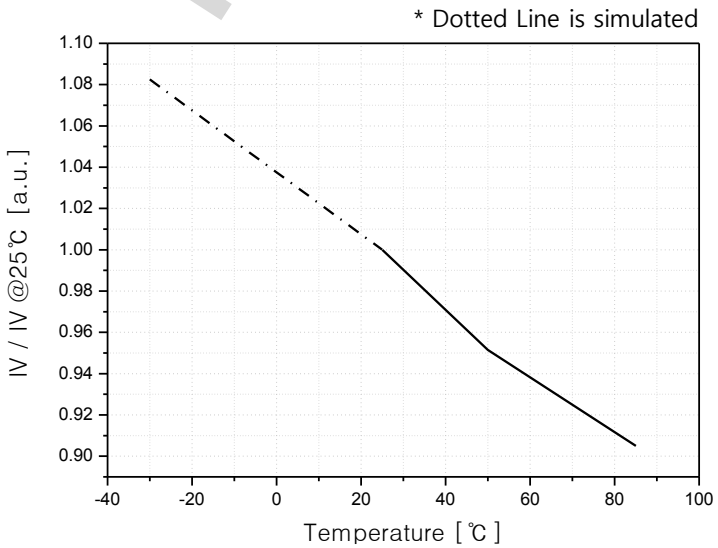
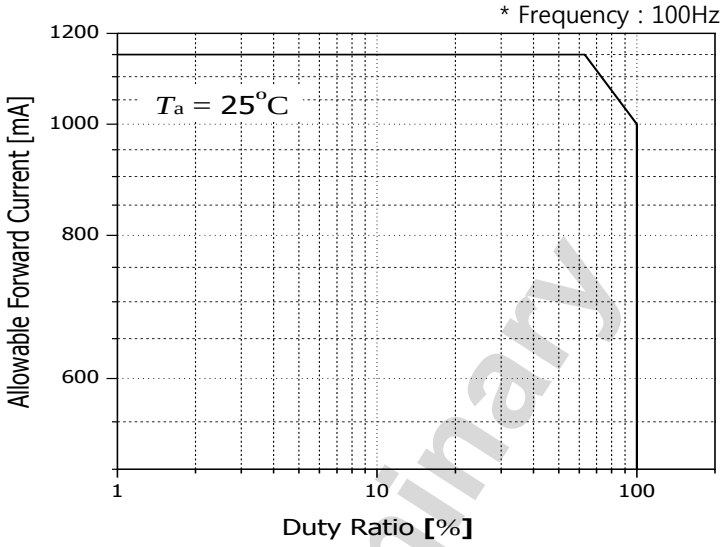


Fig 8. Relative Luminosity vs. Ambient Temperature, I_F =500mA



Characteristic Diagram

Fig 9. Allowable Forward Current vs. Duty Ratio, Ta = 25℃



Reliability Test

Table 3. TEST ITEMS AND RESULTS

Item	Reference	Test Condition	Duration / Cycle	Number of Damage
Thermal Shock	Internal Reference	T_a =-40°C (30MIN) ~ 100°C (30MIN)	100 cycle	-
Temperature Cycle	EIAJED-4701	T_a =-40°C (30MIN) ~ 25°C (5MIN) ~ 125°C (30MIN) ~ 25°C (5MIN)	100 cycle	-
Operating Endurance Test	Internal Reference	T_a =25°C, I_F =800mA	1,000 Hours	-
High Temperature /Humidity Life	Internal Reference	T_a =60°C, RH=90%, I_F =800mA	1,000 Hours	-
High Temperature Life Test-1	Internal Reference	T_a =60°C, I_F =800mA	1,000 Hours	-

Table 4. Criteria for Judging the Damage

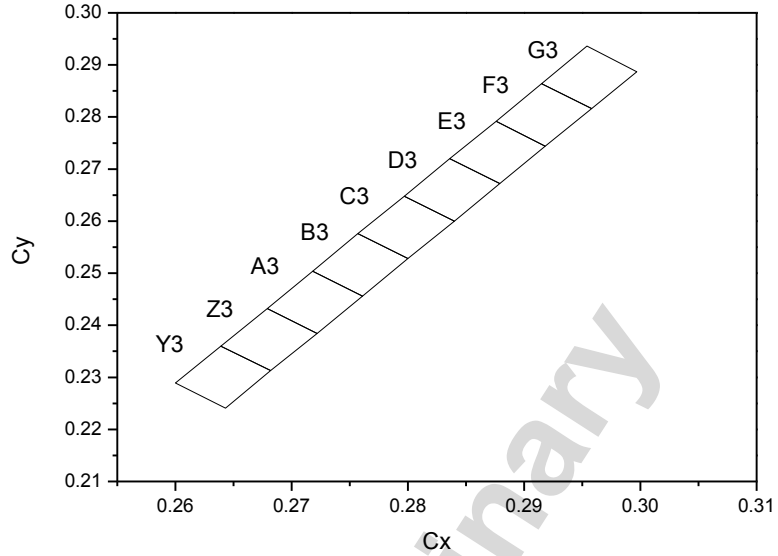
Item	Symbol	Condition	Criteria for Judgment	
			MIN	MAX
Forward Voltage	V_F	I_F =800mA		I.V. *1 × 1.2
Luminous Flux	Φ_V	I_F =800mA	Flux × 0.7	

Notes :

*(1) I.V. : Initial Value

Color Bin Structure

CIE Chromaticity Diagram

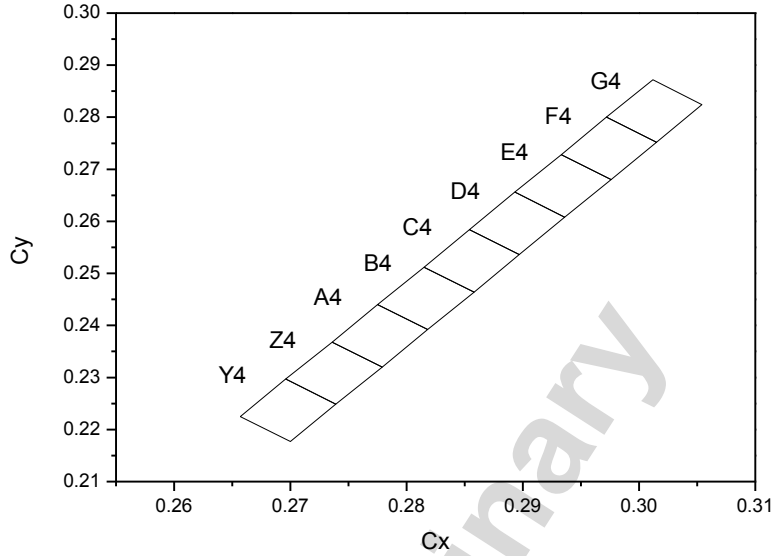


RANK	x1	y1	x2	y2
	x3	y3	x4	y4
Y3	0.2600	0.2289	0.2639	0.2360
	0.2682	0.2313	0.2643	0.2241
Z3	0.2639	0.2360	0.2679	0.2432
	0.2722	0.2384	0.2682	0.2313
A3	0.2679	0.2432	0.2718	0.2504
	0.2761	0.2456	0.2722	0.2384
B3	0.2718	0.2504	0.2757	0.2576
	0.2800	0.2528	0.2761	0.2456
C3	0.2757	0.2576	0.2797	0.2648
	0.2840	0.2600	0.2800	0.2528
D3	0.2797	0.2648	0.2836	0.2720
	0.2879	0.2672	0.2840	0.2600
E3	0.2836	0.2720	0.2876	0.2792
	0.2918	0.2744	0.2879	0.2672
F3	0.2876	0.2792	0.2915	0.2864
	0.2958	0.2816	0.2918	0.2744
G3	0.2915	0.2864	0.2954	0.2936
	0.2997	0.2887	0.2958	0.2816

* Measurement Uncertainty of the Color Coordinates is ±0.007

Color Bin Structure

CIE Chromaticity Diagram



RANK	x1	y1	x2	y2
	x3	y3	x4	y4
Y4	0.2657	0.2225	0.2696	0.2297
	0.2739	0.2249	0.2700	0.2177
Z4	0.2696	0.2297	0.2736	0.2368
	0.2779	0.2320	0.2739	0.2249
A4	0.2736	0.2368	0.2775	0.2440
	0.2818	0.2392	0.2779	0.2320
B4	0.2775	0.2440	0.2815	0.2512
	0.2858	0.2464	0.2818	0.2392
C4	0.2815	0.2512	0.2854	0.2584
	0.2897	0.2536	0.2858	0.2464
D4	0.2854	0.2584	0.2893	0.2656
	0.2936	0.2608	0.2897	0.2536
E4	0.2893	0.2656	0.2933	0.2728
	0.2976	0.2680	0.2936	0.2608
F4	0.2933	0.2728	0.2972	0.2800
	0.3015	0.2752	0.2976	0.2680
G4	0.2972	0.2800	0.3012	0.2872
	0.3054	0.2824	0.3015	0.2752

* Measurement Uncertainty of the Color Coordinates is ±0.007

Color Bin Structure

Table 5. Bin Code description

Part Number : SWHUO110E

Bin Code			
Luminous Flux	CIE	Wp	Forward Voltage
A105	B3	B	B29

Luminous Flux (lm) @ I_F = 350mA

Bin Code	Min.	Max.
A084	84.0	87.0
A087	87.0	90.0
A090	90.0	93.0
A093	93.0	96.0
A096	96.0	99.0
A099	99.0	102.0
A102	102.0	105.0
A105	105.0	108.0
A108	108.0	111.0
A111	111.0	114.0
A114	114.0	117.0
A117	117.0	120.0

Color Rank @ I_F = 350mA

X3~G3 X4~G4

Wp[nm] @ I_F = 350mA

Bin Code	Min.	Max.
A	435	441
B	441	447
C	447	453

Forward Voltage[V] @ I_F = 350mA

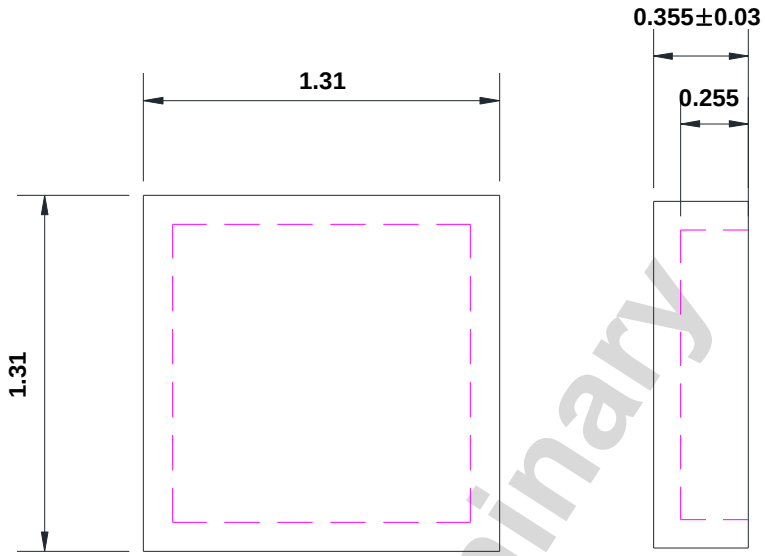
Bin Code	Min.	Max.
B29	2.9	3.3

Available Ranks

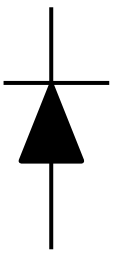
Mechanical Dimensions

PKG Outline dimension

Tolerance (Except for marked tolerance) : ±0.1mm



< Inner circuit >



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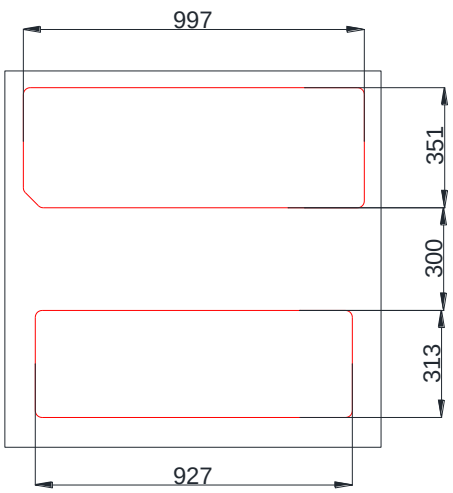
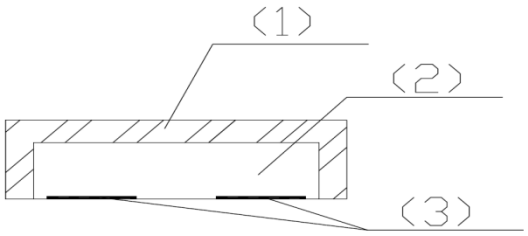
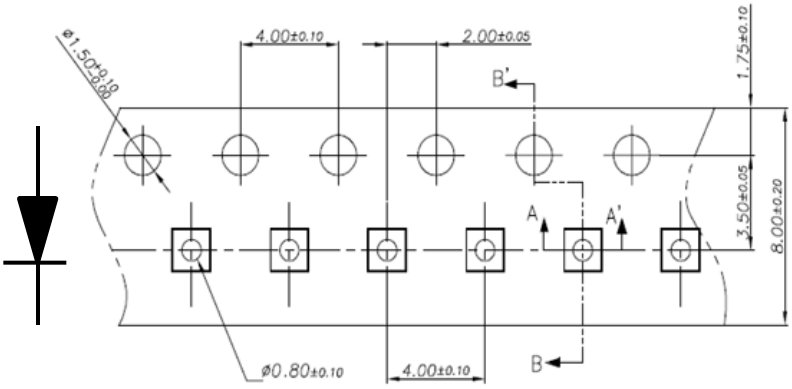


Material Structure

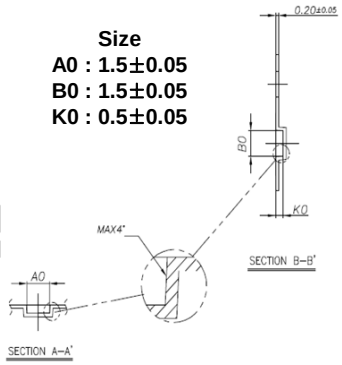


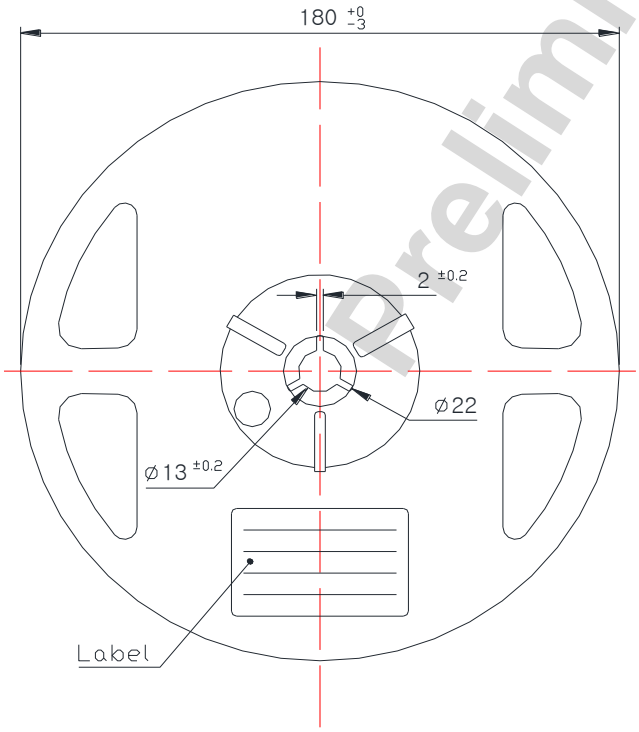
No.	LIST	MATERIAL
①	Encapsulation	Silicone, Phosphor(Y+a / Nitride, Nitride)
②	Chip Source	GaN ON SAPPHIRE
③	Solder-PAD	Metal (Au)

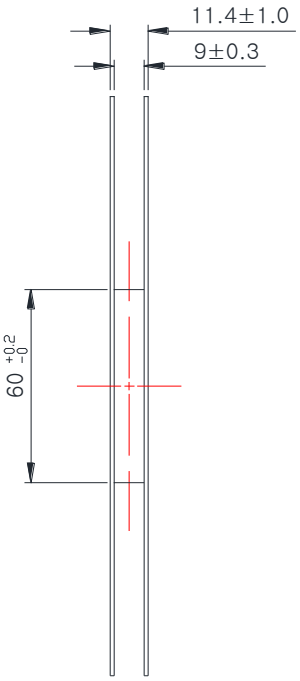
Emitter Tape & Reel Packaging



Size
A0 : 1.5±0.05
B0 : 1.5±0.05
K0 : 0.5±0.05



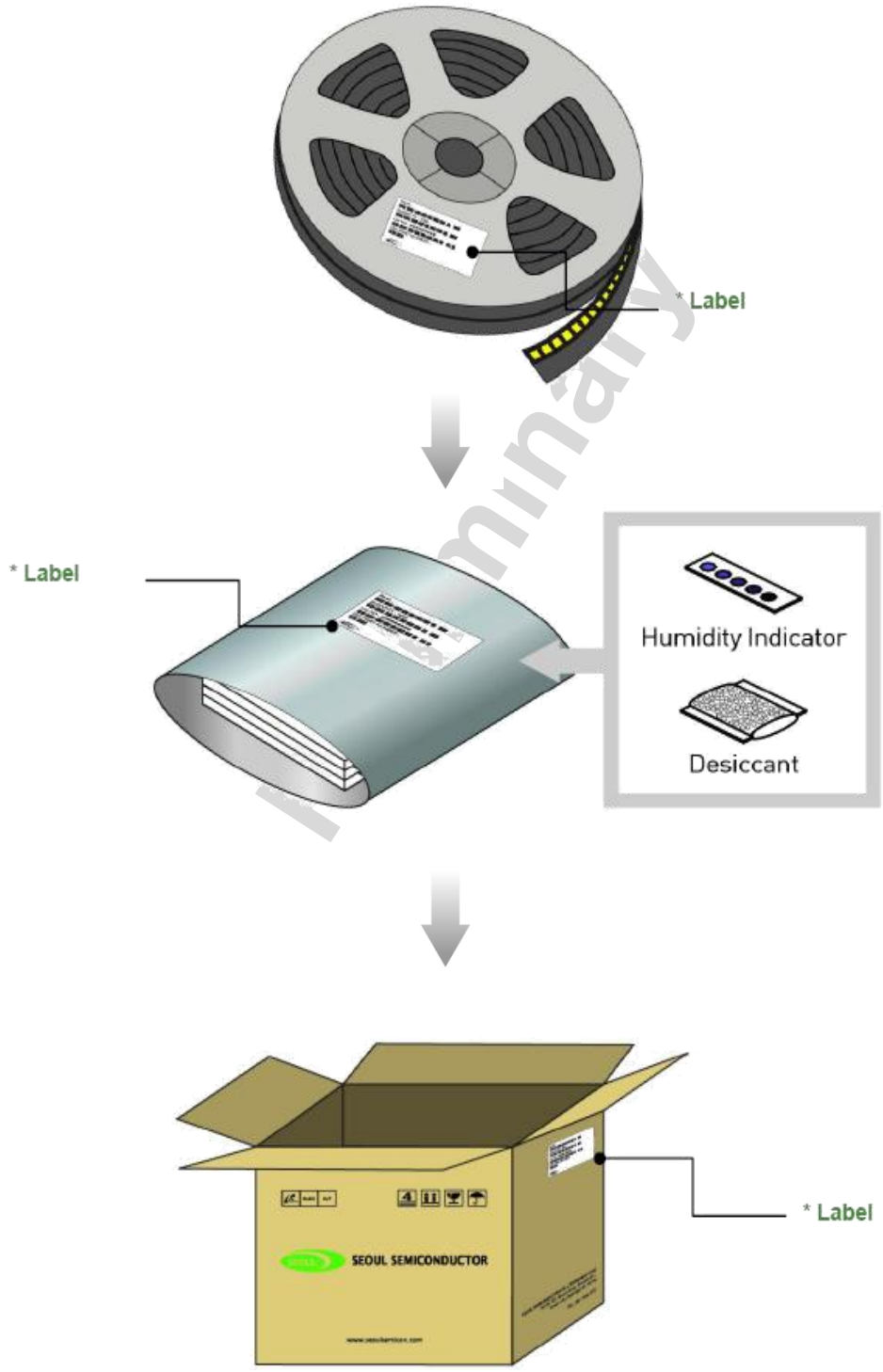




(Tolerance: ±0.2, Unit: mm)

(1) Quantity : max 2500pcs/Reel (Can be blank , less than 20)
(2) Cumulative Tolerance : Cumulative Tolerance/10 pitches to be ±0.2mm
(3) Adhesion Strength of Cover Tape : Adhesion strength to be 0.1-0.7N when the cover tape is turned off from the carrier tape at the angle of 10º to the carrier tape
(4) Package : P/N, Manufacturing data Code No. and quantity to be indicated on a damp proof Package

Emitter Tape & Reel Packaging



Product Nomenclature

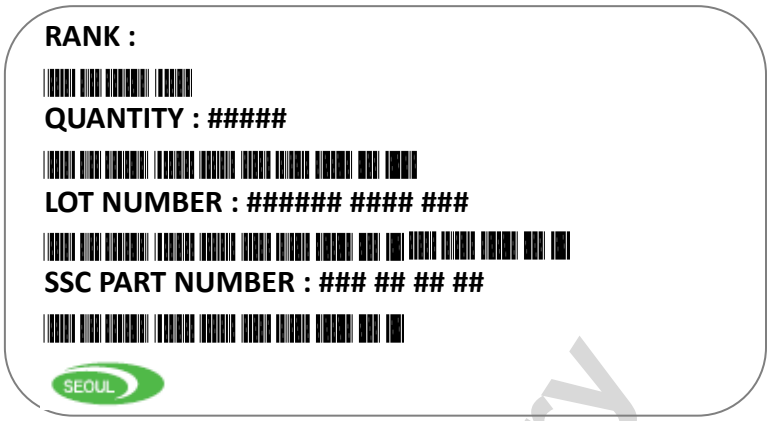


Table 6. Part Numbering System : $X_1X_2X_3\ X_4X_5\ X_6X_7X_8X_9$

Part Number Code	Description	Part Number	Value
X_1	Company	S	
X_2	LED series number	W	WICOP
X_3X_4	Color Specification	HU	
$X_5X_6\ X_7$	PKG series	O11	WICOP1100
X_8	Revision number	0	
X_9	Chip Company	E	SVC

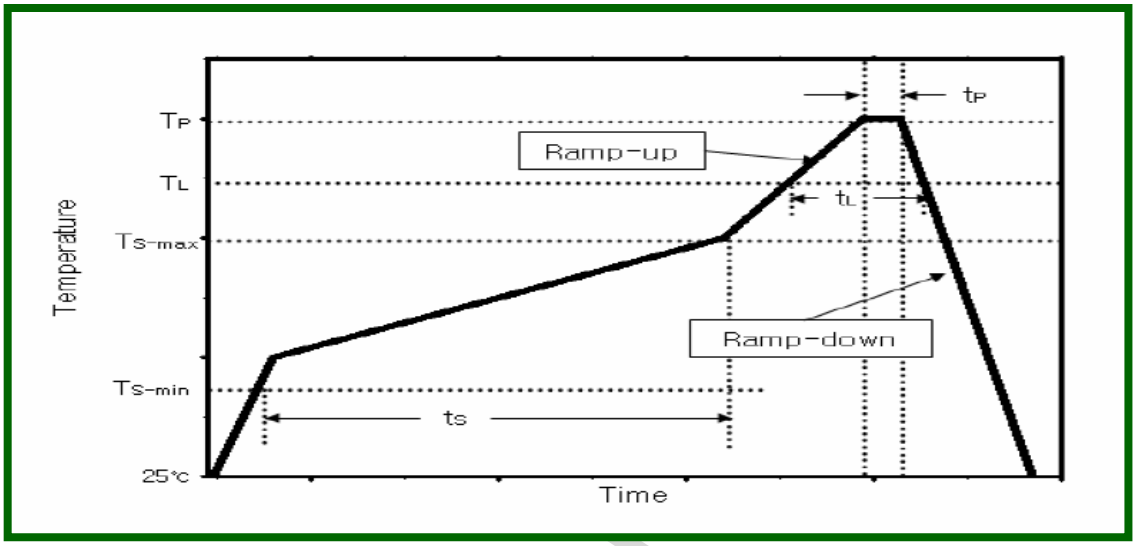
Table 7. Part Numbering System :

Y1Y2Y3Y4Y5 – Y6Y7Y8Y9Y10 – Y11Y12Y13 – Y14Y15Y16- Y17Y18Y19Y20Y21Y22

Lot Number Code	Description	Lot Number	Value
Y_1Y_2	Year	16	
Y_3	Month	9	
Y_4Y_5	Day	09	
Y_6	Company	S	
$Y_7Y_8Y_9\ Y_{10}$	SSC's Number	0017	0001~9999 allowance
$Y_{11}Y_{12}Y_{13}$ -$Y_{14}\ Y_{15}Y_{16}$	Order of Tapping	014-001	
$Y_{17}Y_{18}Y_{19}Y_{20}Y_{21}Y_{22}Y_{23}$	SSC's Number	7300024	Automatic

Reflow Soldering Characteristics

(1) Reflow solder conditions / profile (Lead-Free Solder)

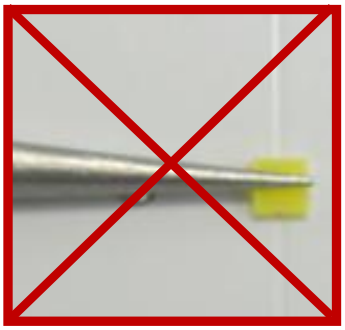


Reflow condition	Pb-Free assembly
Average ramp-up rate (T_{s-max} to Peak)	2~3℃ / second
Preheat Temperature Min (T_{s-min})	150℃
Preheat Temperature Max (T_{s-max})	200℃
Time maintained above: : Liquidus Temperature (T_L)	217~220℃
Time maintained above: Time (t_L)	60~150 seconds
Peak Temperature (T_P)	250℃
Time within 5℃ of actual Peak Temperature (t_P)	20~40 seconds
ramp-down rate	4~6℃ / second
Time 25℃ to Peak Temperature	6 minutes max

Note : In case that the soldered products are reused in soldering process, we don't guarantee the products.

Handling of Silicone Resin for LEDs

(1) During processing, mechanical stress on the surface should be minimized as much as possible.
(2) Sharp objects of all types should not be used to pierce the sealing compound.
(3) At no times should metal tweezers be used to handle the LEDs (Figure 3a).
Also plastic tweezers can be use to handle the LEDs. (Figure 3b)
When handling finished boards containing LED (WICOP series), do not touch the surface of the LED with fingers or any other material. Do not apply pressure on the top or sides of the LED. (Figure 3c)



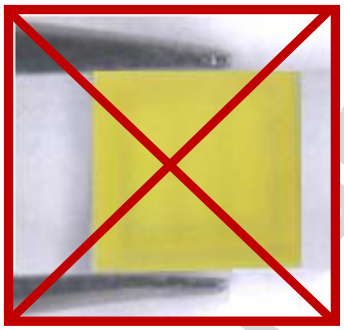


Figure 3a. Incorrect handling of WICOP LEDs

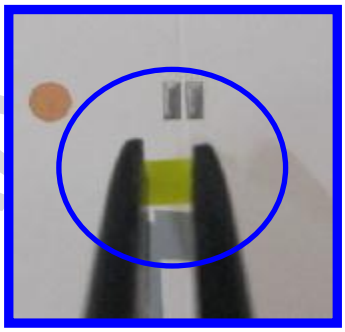


Figure 3b. correct handling of WICOP LEDs with plastic tweezers

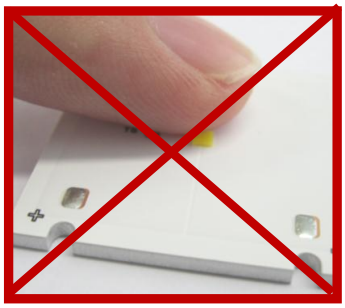


Figure 3c. Incorrect handling of WICOP LEDs

(4) When it is mounted WICOP on the PCB, material of the pick and place nozzle must be used soft form in SMT.
(5) It must be choosing a pick and place nozzle which is smaller than the WICOP's size.

(6) (2),(3) contents is necessary in SMT to prevent surface of WICOP

(7) In case WICOP is not recommended isopropyl alcohol and ultrasonic , solvent for cleaning . Isopropyl alcohol and ultrasonic, solvent cleaning may cause damage to the WICOP

(8) If you want to be cleaning particle on surface of WICOP, Seoul semiconductors suggests using cotton bud for cleaning after soldering of components

(9) Avoid leaving fingerprints on silicone resin parts.

Precaution for Use

(1) Storage conditions

Keep the product in a dry box or a desiccator with a desiccant in order to prevent moisture absorption.

a. Keep it at a temperature in the range from 5˚C to 30˚C and at a humidity of less than 50% RH. The product should be kept within a year.

(2) After opening the package .

When soldering, this could result in a decrease of the photoelectric effect or light intensity.

a. Soldering should be done right after mounting the product.
b. Keep the temperature in the range from 5˚C to 30˚C and the humidity at less than 60%.

Soldering should be done within 7 days after opening the desiccant package.
If the product has been exposed for more than 7 days after opening the package or the indicating color of the desiccator changes, the product must be baked at a temperature between 65 ± 5˚C for less than 24 hours.
An unused and unsealed product should be repacked in a desiccant package and kept sealed in a dry atmosphere.
Stored at a humidity of less than 10% RH.

(3) Precautions for use

Any external mechanical force or excessive vibration should not be applied to the product during cooling after soldering, and it is preferable to avoid rapid cooling.
The product should not be mounted on a distorted part of PCB.
Gloves or wrist bands for ESD(Electric Static Discharge) should be wore in order to prevent ESD and surge damage, and all devices and equipments must be grounded to the earth.
Turn on test is conducted only at room temperature. Also, Should not be turned on at high temperatures.

(4) Miscellaneous

Radiation resistance is not considered.
When cleaning the product, any kind of fluid such as water, oil and organic solvent must not be used and IPA(Isopropyl Alcohol) must be used.
When using the product, operating current should be settled in consideration of the maximum ambient temperature.
Its appearance or specification for improvement is subject to change without notice.

Precaution for Use

(5) LEDs are sensitive to Electro-Static Discharge (ESD) and Electrical Over Stress (EOS).
Below is a list of suggestions that Seoul Semiconductor purposes to minimize these effects.

a. ESD (Electro Static Discharge)

Electrostatic discharge (ESD) is the defined as the release of static electricity when two objects come into contact. While most ESD events are considered harmless, it can be an expensive problem in many industrial environments during production and storage. The damage from ESD to an LEDs may cause the product to demonstrate unusual characteristics such as:

- Increase in reverse leakage current lowered turn-on voltage
- Abnormal emissions from the LED at low current

The following recommendations are suggested to help minimize the potential for an ESD event.
One or more recommended work area suggestions:

- Ionizing fan setup
- ESD table/shelf mat made of conductive materials
- ESD safe storage containers

One or more personnel suggestion options:
- Antistatic wrist-strap
- Antistatic material shoes
- Antistatic clothes

Environmental controls:
- Humidity control (ESD gets worse in a dry environment)

Precaution for Use

b. EOS (Electrical Over Stress)

Electrical Over-Stress (EOS) is defined as damage that may occur when an electronic device is subjected to a current or voltage that is beyond the maximum specification limits of the device. The effects from an EOS event can be noticed through product performance like:

- Changes to the performance of the LED package
  (If the damage is around the bond pad area and since the package is completely encapsulated the package may turn on but flicker show severe performance degradation.)
- Changes to the light output of the luminaire from component failure
- Components on the board not operating at determined drive power

Failure of performance from entire fixture due to changes in circuit voltage and current across total circuit causing trickle down failures. It is impossible to predict the failure mode of every LED exposed to electrical overstress as the failure modes have been investigated to vary, but there are some common signs that will indicate an EOS event has occurred:

- Damaged may be noticed to the bond wires (appearing similar to a blown fuse)
- Damage to the bond pads located on the emission surface of the LED package
  (shadowing can be noticed around the bond pads while viewing through a microscope)
- Anomalies noticed in the encapsulation and phosphor around the bond wires.
- This damage usually appears due to the thermal stress produced during the EOS event.

c. To help minimize the damage from an EOS event Seoul Semiconductor recommends utilizing:

- A surge protection circuit
- An appropriately rated over voltage protection device
- A current limiting device

Company Information

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Seoul Semiconductor (www.SeoulSemicon.com) manufacturers and packages a wide selection of light emitting diodes (LEDs) for the automotive, general illumination/lighting, Home appliance, signage and back lighting markets. The company is the world's fifth largest LED supplier, holding more than 10,000 patents globally, while offering a wide range of LED technology and production capacity in areas such as "nPola", "Acrich", the world's first commercially produced AC LED, and "Acrich MJT - Multi-Junction Technology" a proprietary family of high-voltage LEDs.

The company's broad product portfolio includes a wide array of package and device choices such as Acrich and Acirch2, high-brightness LEDs, mid-power LEDs, side-view LEDs, and through-hole type LEDs as well as custom modules, displays, and sensors.

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