SPECIFICATION

Product : SZ5–M4–WS–00–E0AN000

Seoul Semiconductor			Customer
Drawn by	Checked by	Approved by	Approved by
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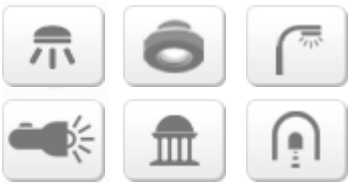
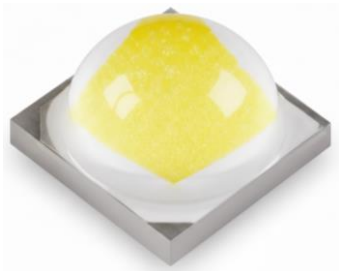
29.01.2026	29.01.2026		

Superior Efficacy & Lumen output with Small Form Factor

Z Power LED – Z5-M4 SunLike Series

SZ5–M4–WS–00–E0AN000 (Cool, Warm)





LM-80 RoHS

Product Brief

Description

- The Z-Power series is designed for high flux output applications with high current operation capability.
- It incorporates state of the art SMD design and low thermal resistant material.
- The Z Power LED is ideal light sources for directional lighting applications such as Spot Lights, various outdoor applications, automotive lightings and high performance torches .

Features and Benefits

- High Color Quality with CRI Min.95
- High Lumen Output and Efficacy
- Designed for high current operation
- Low Thermal Resistance
- ANSI compliant Binning
- Ceramic package

Key Applications

- Architectural
- Industrial
- Outdoor area
- Exterior Lighting
- Commercial

Table 1. Product Selection Tab

Reference P/N	Order code	Flux bin	CCT	Step	VF bin
SZ5–M4–WS–00–E0AN000	170653S000	170	65:6500K	3S: 3step	000
	170573S000	170	57:5700K		000
	170503S000	170	50:5000K		000
	170403S000	170	40:4000K		000
	155353S000	155	35:3500K		000
	155303S000	155	30:3000K		000
	155273S000	155	27:2700K		000

Reference P/N	Order code	Flux bin	CCT	Step	VF bin
SZ5–M4–WS–00–E0AN000	170654M000	170	65:6500K	4M: 3step+4step Mixing	000
	170574M000	170	57:5700K		000
	170504M000	170	50:5000K		000
	170404M000	170	40:4000K		000
	155354M000	155	35:3500K		000
	155304M000	155	30:3000K		000
	155274M000	155	27:2700K		000

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Performance Characteristics

Table 2. Product Selection Guide I_F = 700mA, T_j= 85ºC

Part Number	CCT (K) [1]	RANK	Luminous Flux [2] Φ_V (lm)		CRI R_a
	Typ.		Min	Max	Min.
SZ5–M4–WS–00–E0AN000	6500	170	170	185	95
		185	185	200	
		200	200	215	
	5700	170	170	185	
		185	185	200	
		200	200	215	
	5000	170	170	185	
		185	185	200	
		200	200	215	
	4000	170	170	185	
		185	185	200	
		200	200	215	
	3500	155	155	155	
		170	170	170	
	3000	155	155	155	
		170	170	170	
	2700	155	155	155	
		170	170	170	

Notes :

(1) Correlated Color Temperature is derived from the CIE 1931 Chromaticity diagram.

(2) Seoul Semiconductor maintains a tolerance of ±5% on flux and power measurements.

The luminous flux was measured at the peak of the spatial pattern which may not be aligned with the mechanical axis of the LED package.

Performance Characteristics

Table 3. Characteristics, I_F = 700mA,

Parameter	Symbol	Value			Unit
		Min.	Typ.	Max.	
Forward Current	I_F	-	700	2000 [4]	mA
Peak Pulsed Forward Current				2600	mA
Forward Voltage [1]	V_F	2.92	-	3.12	V
Luminous Intensity (5000K) [1]	I_v	-	181	-	lm
CRI [1]	R_a	95	-	-	
Viewing Angle [2]	$2\Theta_{1/2}$	-	120	-	Deg.
Thermal resistance (J to S) [3]	$R\theta_{J\text{-}S}$	-	4.5	-	K/W
ESD Sensitivity(HBM)	-	Class 3B JEDEC JS-001-2017			

Table 4. Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Forward Current	I_F	2000 [4]	mA
Power Dissipation	P_D	6.12	W
Junction Temperature	T_j	150	ºC
Operating Temperature	T_{opr}	-40 ~ +105	ºC
Storage Temperature	T_{stg}	-40 ~ +125	ºC

Notes :

(1) Tolerance : VF :±0.06V, Flux :±7%, Ra :±2, x,y :±0.005

(2) $2\Theta_{1/2}$ is the off-axis where the luminous intensity is 1/2 of the peak intensity.

(3) Thermal resistance : $Rth_{J\text{-}S}$ (Junction / solder)

(4) It is recommended to use it in the condition that the reliability is secured within the Max value.

- LED's properties might be different from suggested values like above and below tables if operation condition will be exceeded our parameter range. Care is to be taken that power *dissipation does not* exceed the absolute maximum rating of the product.
- Thermal resistance can be increased substantially depending on the heat sink design/operating condition, and the maximum possible driving current will decrease accordingly.
- All measurements were made under the standardized environment of Seoul Semiconductor.

Characteristics Graph

Fig 1. Color Spectrum, I_F = 700mA,

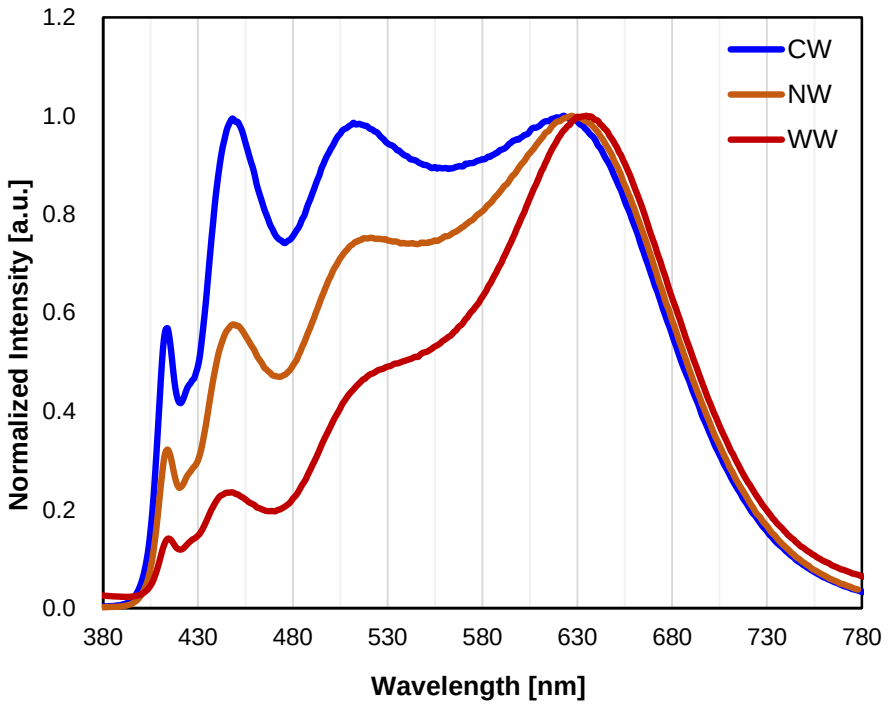
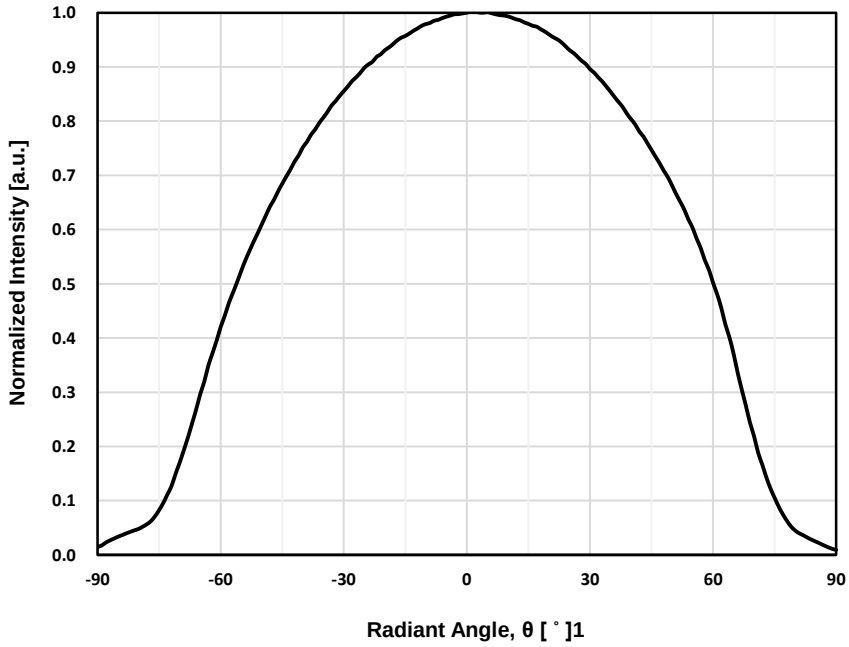


Fig 2. Radiant Pattern



Characteristics Graph

Fig 3. Forward Voltage vs. Forward Current, T_j = 85ºC

TBD

Fig 4. Forward Current vs. Relative Luminous Intensity, T_j = 85ºC

TBD

Characteristics Graph

Fig 5. Forward Current vs. CIE X, Y Shift, T_j = 85ºC

TBD

Characteristics Graph

Fig 6. Junction Temperature vs. Relative Luminous Intensity, I_F = 700mA, T_j = 85ºC

TBD

Fig 7. Junction Temperature vs. Relative Forward Voltage, I_F = 700mA, T_j = 85ºC

TBD

Characteristics Graph

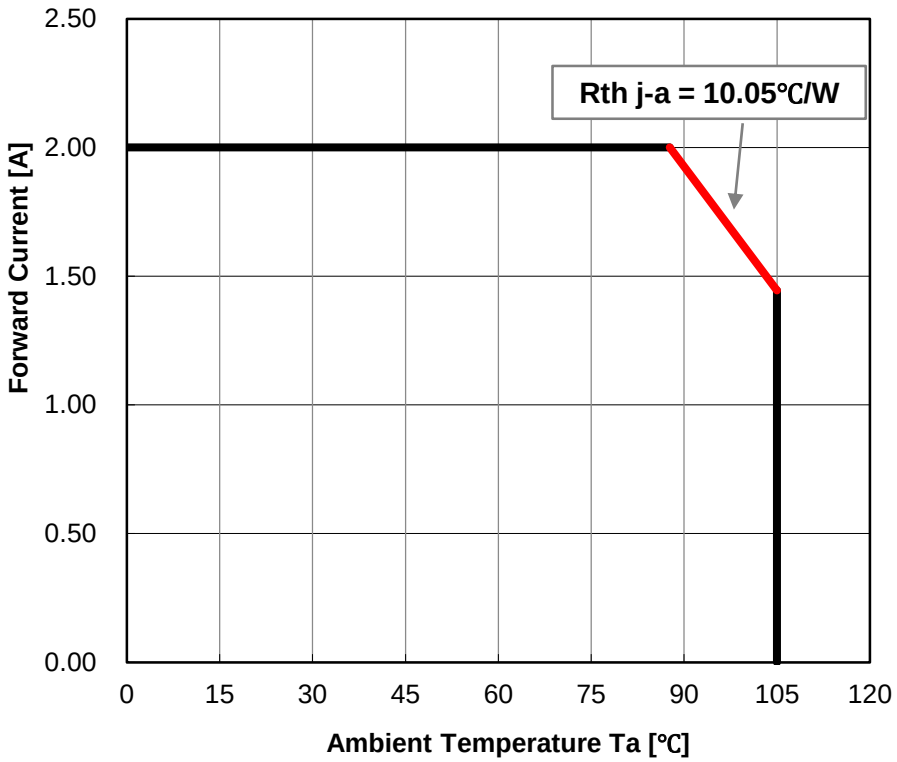
Fig 8. Chromaticity Coordinate vs. Junction Temperature, I_F = 700mA, T_j = 85ºC

TBD

(2600K~4200K)

Characteristics Graph

Fig 9. Ambient Temperature vs. Maximum Forward Current, T_{j_max} = 150℃



Color Bin Structure

Table 5. Bin Code description, T_j = 85℃, I_F = 700mA

Part Number	Luminous Flux (lm)			Color Chromaticity Coordinate	Typical Forward Voltage (V)		
	Bin Code	Min.	Max.		Bin Code	Min.	Max.
SZ5–M4–WS–00–E0AN000	155	155	170	Refer page 13	E0A	2.92	3.02
	170	170	185		E0B	3.02	3.12
	185	185	200				
	200	200	215				

Table 6. Intensity rank distribution

Available ranks

CCT	CIE	Flux Rank			
6000 ~ 7000K	A	155	170	185	200
5300 ~ 6000K	B	155	170	185	200
4700 ~ 5300K	C	155	170	185	200
3700 ~ 4200K	E	155	170	185	200
3200 ~ 3700K	F	155	170	185	200
2900 ~ 3200K	G	155	170	185	200
2600 ~ 2900K	H	155	170	185	200

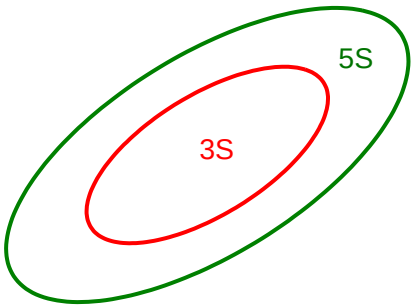
*Notes :

All measurements were made under the standardized environment of Seoul Semiconductor.

In order to ensure availability, single color rank will not be orderable.

Color Bin Structure

CIE Chromaticity Diagram (Cool White), T_j = 85℃, I_F = 700mA



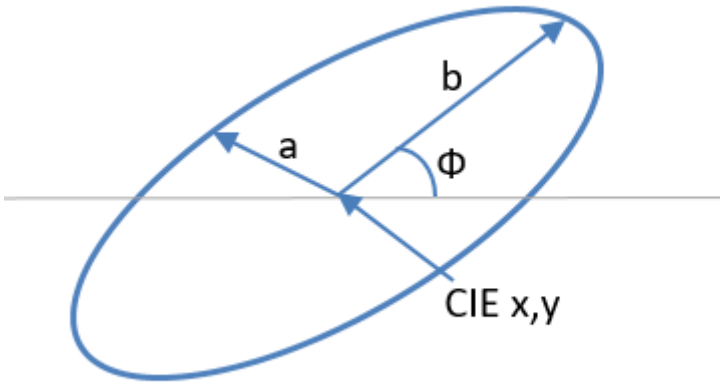
Order	Box Packing Method
xx3S	3S(3step) Single
xx4M	3S(3step) & 5S (5step) Mixing

***Notes :**
1. xx3S Order will ship 3S only
2. xx4M Order will ship 3S & 5S Mixing(=also include 3S))
3. Doughnut Bin will not ship alone(=Will ship with mixing bin)

* 'xx' can be 65=6500K, 56=5600K, 50=5000K, 40=4000K, 30=3000K, 27= 2700K

Color Bin Structure

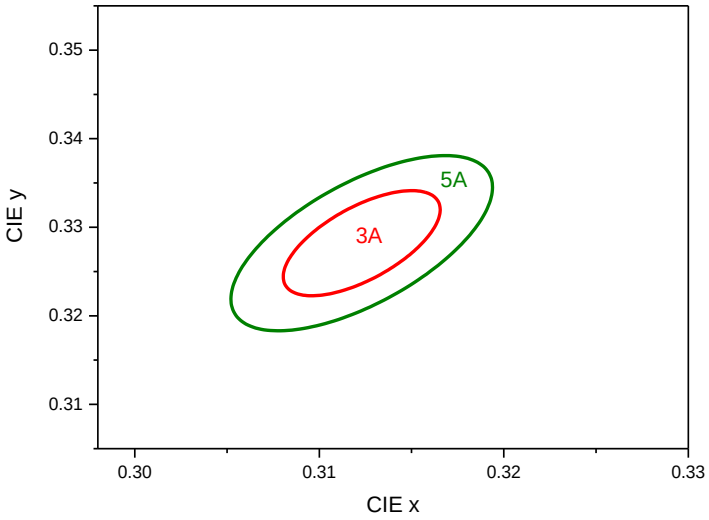
CIE Chromaticity Diagram T_j = 85℃, I_F = 700mA



Macadam	CCT	Center Point		Major Axis	Minor Axis	Rotation Angle
	(K)	CIE x	CIE y	a	b	Φ
3 step	2700	0.4578	0.4101	0.0081	0.0042	54
	3000	0.4338	0.403	0.0083	0.0040	53
	3500	0.4073	0.3917	0.0093	0.0042	54
	4000	0.3818	0.3797	0.0094	0.0040	54
	5000	0.3447	0.3553	0.0082	0.0035	60
	5700	0.3287	0.3417	0.0076	0.0033	59
	6500	0.3123	0.3282	0.0067	0.0029	59
5 step	2700	0.4578	0.4101	0.0135	0.0070	54
	3000	0.4338	0.403	0.0140	0.0068	53
	3500	0.4073	0.3917	0.0155	0.0069	54
	4000	0.3818	0.3797	0.0156	0.0068	54
	5000	0.3447	0.3553	0.0137	0.0058	60
	5700	0.3287	0.3417	0.0125	0.0053	59
	6500	0.3123	0.3282	0.0112	0.0048	59

Color Bin Structure

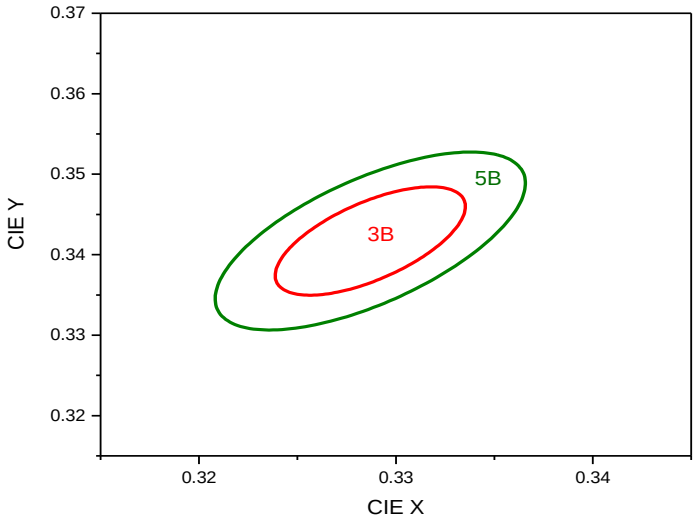
CIE Chromaticity Diagram (Cool White), T_j= 85℃, I_F = 700mA, CCT = 6500K



3A (3.0step)		5A (5.0Step)	
Center point	0.3123 : 0.3282	Center point	0.3123 : 0.3282
Major Axis a	0.0067	Major Axis a	0.0112
Minor Axis b	0.0029	Minor Axis b	0.0048
Ellipse Rotation Angle	59	Ellipse Rotation Angle	59

Color Bin Structure

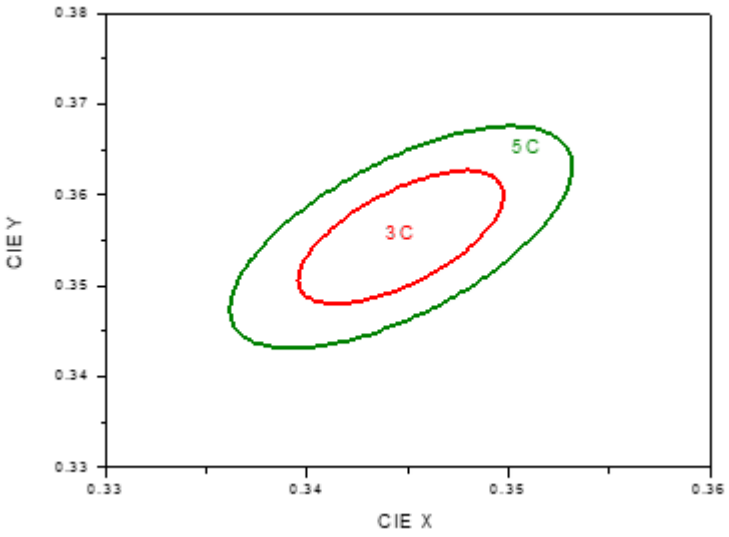
CIE Chromaticity Diagram (Cool White), T_j = 85℃, I_F = 700mA, CCT = 5700K



3B (3.0step)		5B (5.0Step)	
Center point	0.3287 : 0.3417	Center point	0.3287 : 0.3417
Major Axis a	0.0076	Major Axis a	0.0125
Minor Axis b	0.0033	Minor Axis b	0.0053
Ellipse Rotation Angle	59	Ellipse Rotation Angle	59

Color Bin Structure

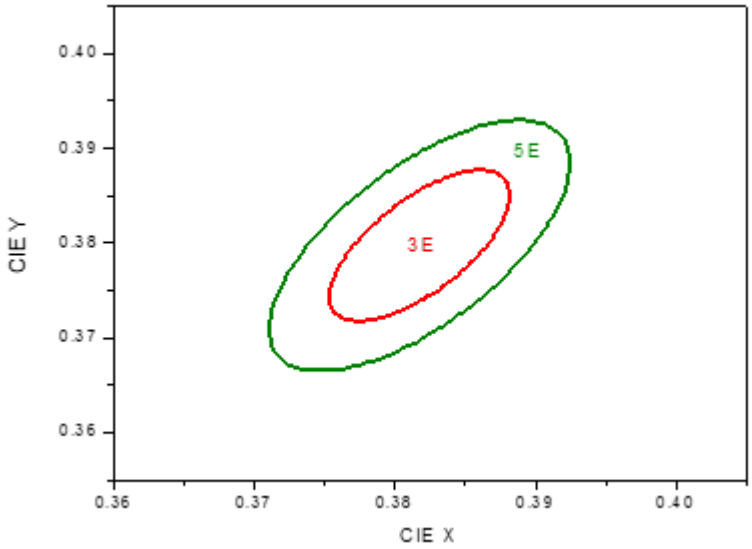
CIE Chromaticity Diagram (Cool White), T_j = 85℃, I_F = 700mA, CCT = 5000K



3C(3.0step)		5C (5.0Step)	
Center point	0.3447 : 0.3553	Center point	0.3447 : 0.3553
Major Axis a	0.0082	Major Axis a	0.0137
Minor Axis b	0.0035	Minor Axis b	0.0058
Ellipse Rotation Angle	60	Ellipse Rotation Angle	60

Color Bin Structure

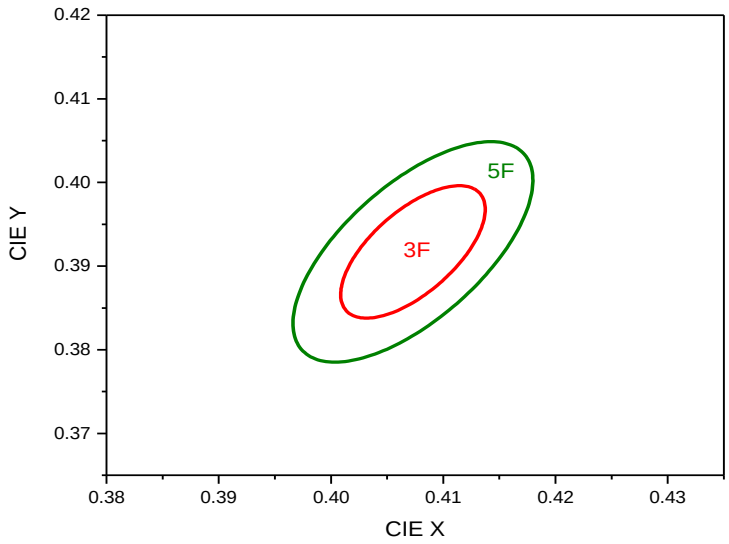
CIE Chromaticity Diagram (Neutral White), T_j = 85℃, I_F = 700mA, CCT = 4000K



3E(3.0step)		5E (5.0Step)	
Center point	0.3818 : 0.3797	Center point	0.3818 : 0.3797
Major Axis a	0.0094	Major Axis a	0.0156
Minor Axis b	0.0040	Minor Axis b	0.0068
Ellipse Rotation Angle	54	Ellipse Rotation Angle	54

Color Bin Structure

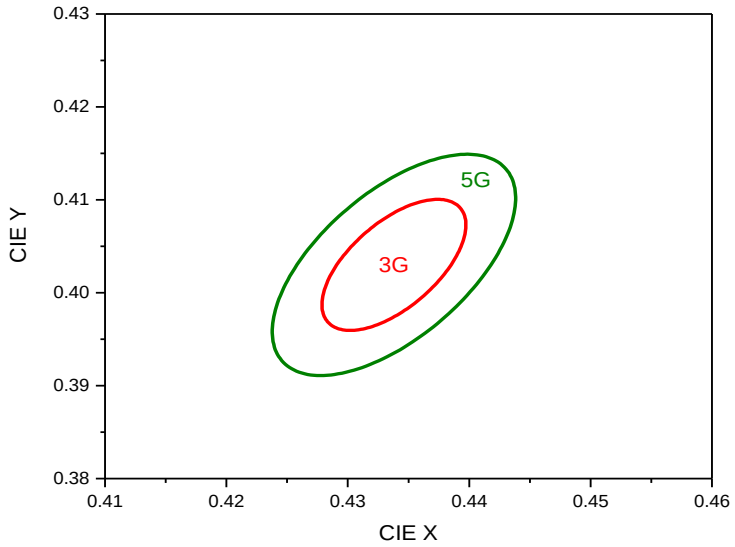
CIE Chromaticity Diagram (Warm White), T_j = 85℃, I_F = 700mA, CCT = 3500K



3F (3.0step)		5F (5.0Step)	
Center point	0.4073 : 0.3917	Center point	0.4073 : 0.3917
Major Axis a	0.0093	Major Axis a	0.0155
Minor Axis b	0.0042	Minor Axis b	0.0069
Ellipse Rotation Angle	54	Ellipse Rotation Angle	54

Color Bin Structure

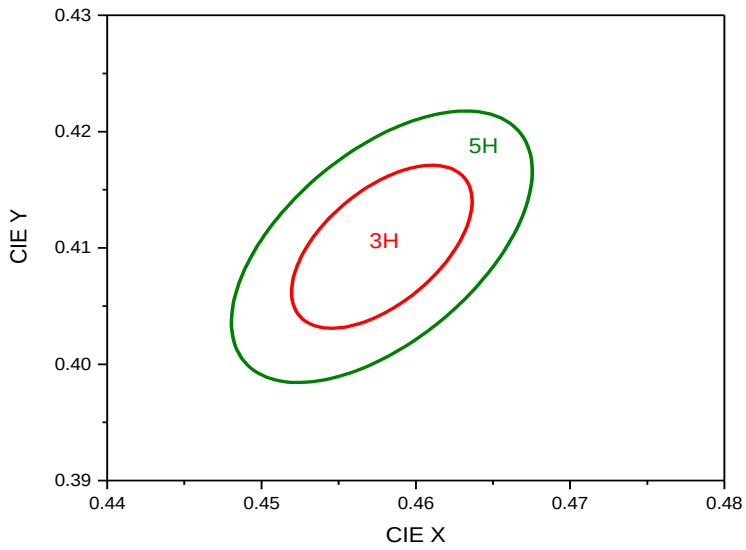
CIE Chromaticity Diagram (Warm White), T_j = 85℃, I_F = 700mA, CCT = 3000K



3G (3.0step)		5G (5.0Step)	
Center point	0.4338 : 0.4030	Center point	0.4338 : 0.4030
Major Axis a	0.0083	Major Axis a	0.0140
Minor Axis b	0.0040	Minor Axis b	0.0068
Ellipse Rotation Angle	53	Ellipse Rotation Angle	53

Color Bin Structure

CIE Chromaticity Diagram (Warm White), T_j = 85℃, I_F = 700mA, CCT = 2700K



3H (3.0step)		5H (5.0Step)	
Center point	0.4578 : 0.4101	Center point	0.4578 : 0.4101
Major Axis a	0.0081	Major Axis a	0.0135
Minor Axis b	0.0042	Minor Axis b	0.0070
Ellipse Rotation Angle	54	Ellipse Rotation Angle	54

Mixing order kiting combination

1. Kiting Combination with xx4M

Combination	Reel	FLUX	VF	CIE	Qty
Kiting_a	Reel 1	ALL	E0A	3S	900pcs
	Reel 2	ALL	E0A	3S	900pcs
Kiting_b	Reel 1	ALL	E0A	3S	900pcs
	Reel 2	ALL	E0A	5S	900pcs
Kiting_c	Reel 1	ALL	E0A	3S	900pcs
	Reel 2	ALL	E0B	3S	900pcs
Kiting_d	Reel 1	ALL	E0A	3S	900pcs
	Reel 2	ALL	E0B	5S	900pcs

Product Nomenclature

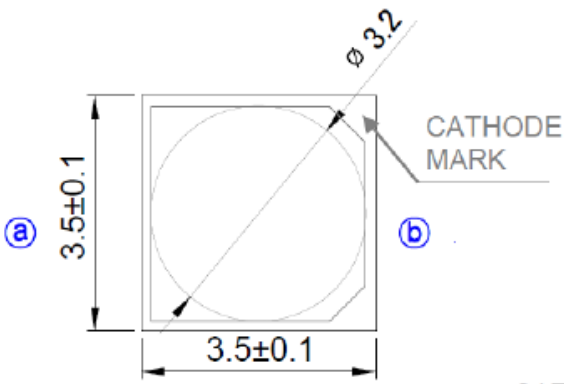
Table 8. Nomenclature example

S	Z	5	-	M	4	-	W	S	-	0	0	-	E	0	A	N	0	0	0	a	b	b	c	c	d	d	e	e	e
X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8	X_9	X_{10}	X_{11}	X_{12}	X_{13}	X_{14}	X_{15}	X_{16}	X_{17}	X_{18}	X_{19}	X_{20}	X_{21}	X_{22}	X_{23}	X_{24}	X_{25}	X_{26}	X_{27}	X_{28}	X_{29}	X_{30}

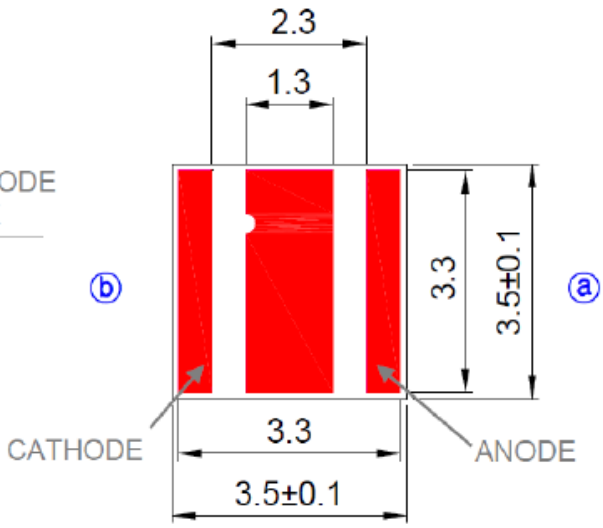
Part Number Code	Value	References	Description
X_1	S	Seoul Semiconductor	Company
X_2X_3	Z5	Series	Z5 series
X_4	–	–	–
X_5X_6	M4	Chip Size	
X_7	–	–	–
X_8X_9	WS	Color	SunLike
X_{10}	–	–	–
$X_{11}X_{12}$	00	Characteristic code	CRI Min 95.
X_{13}	–	–	–
$X_{14}X_{15}$	E0	internal code	SunLike
$X_{16}X_{17}$	AN	PCB	A3:AL2O3 AN:ALN
X_{18}~X_{20}	000	internal code	
$X_{21}X_{22}X_{23}$	abb	Flux Bin	abb : 155, 170, 185, 200
$X_{24}X_{25}$	cc	Color Temp.	65=6500K, 56=5600K, 50=5000K, 40=4000K, 30=3000K, 27= 2700K
$X_{26}X_{27}$	dd	Step	3S: 3step single / 4M: 4step Mixing
$X_{28}X_{29}X_{30}$	eee	VF Bin	000: All bin

Mechanical Dimensions

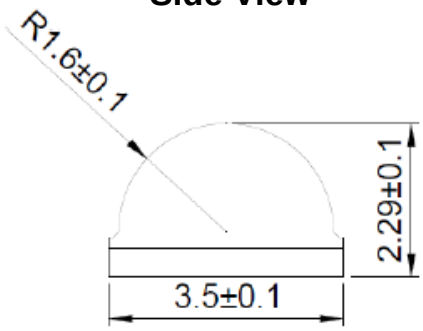
Top View



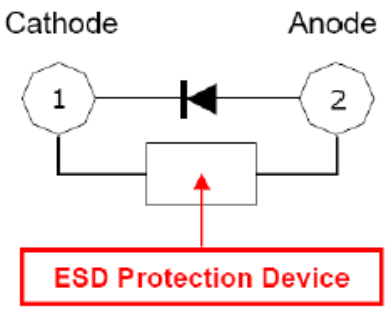
Bottom View



Side View

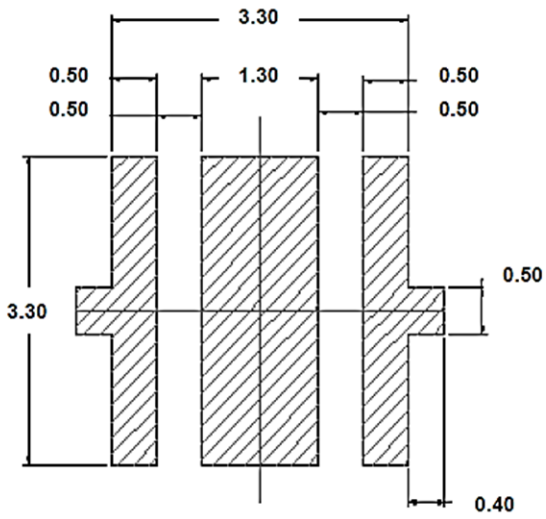


Circuit

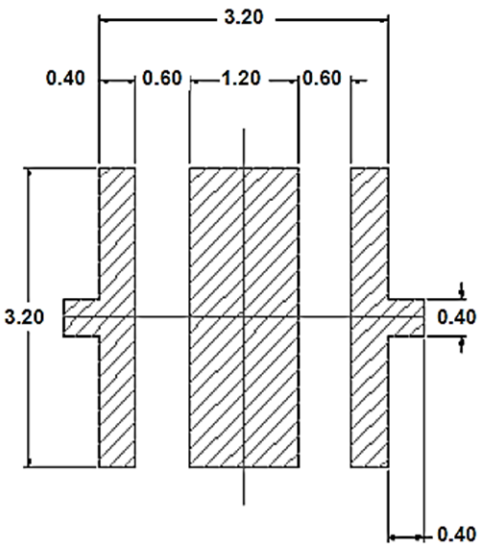


(1) All dimensions are in millimeters.
(2) Scale : none
(3) Undefined tolerance is ±0.2mm

Recommended Solder Pad



Recommended PCB Solder Pad

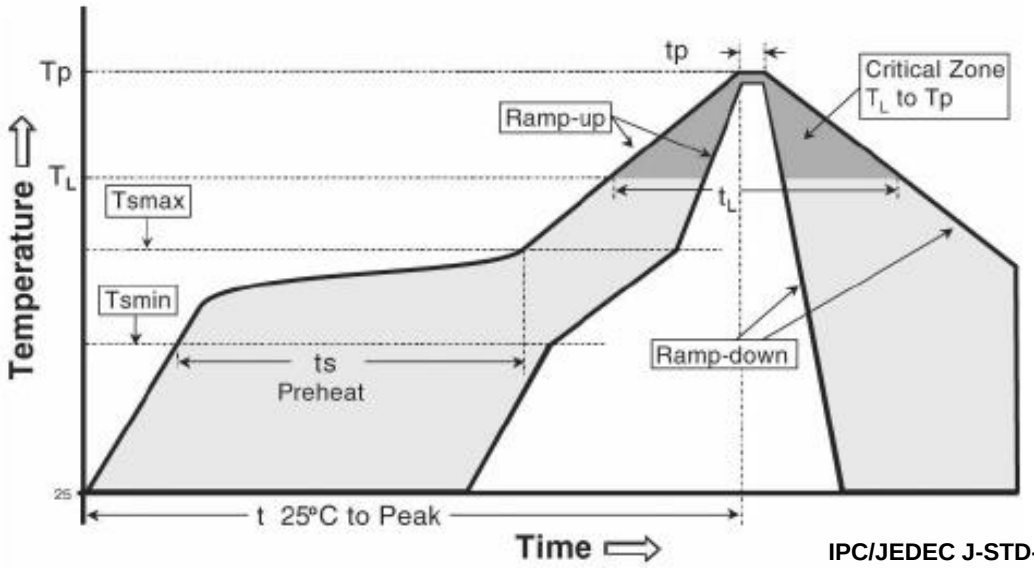


Recommended Stencil Pattern

Notes :

(1) All dimensions are in millimeters.
(2) Scale : none
(3) This drawing without tolerances are for reference only
(4) Undefined tolerance is ±0.1mm

Reflow Soldering Characteristics



IPC/JEDEC J-STD-020

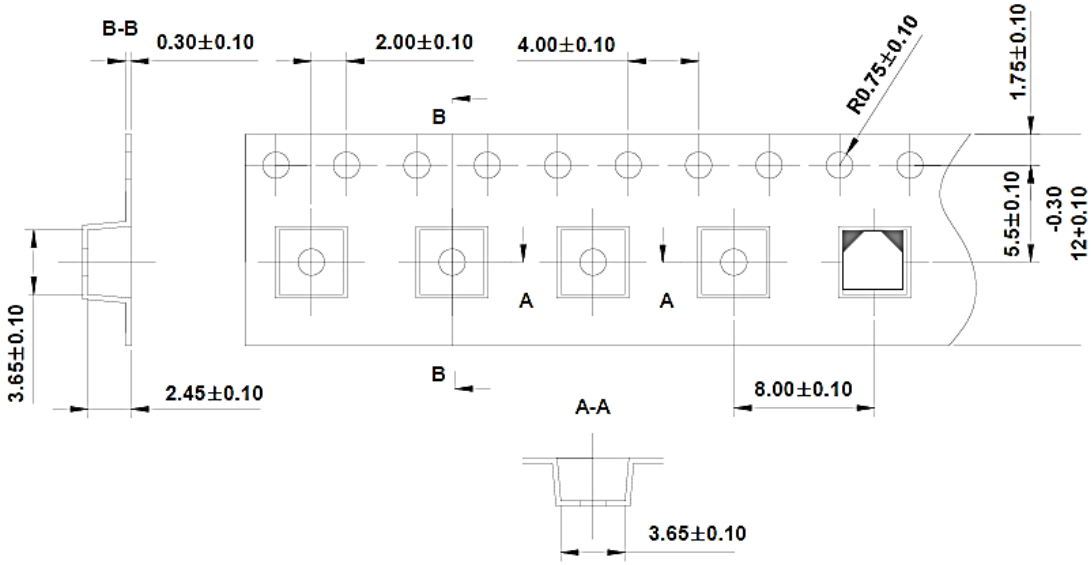
Table 7.

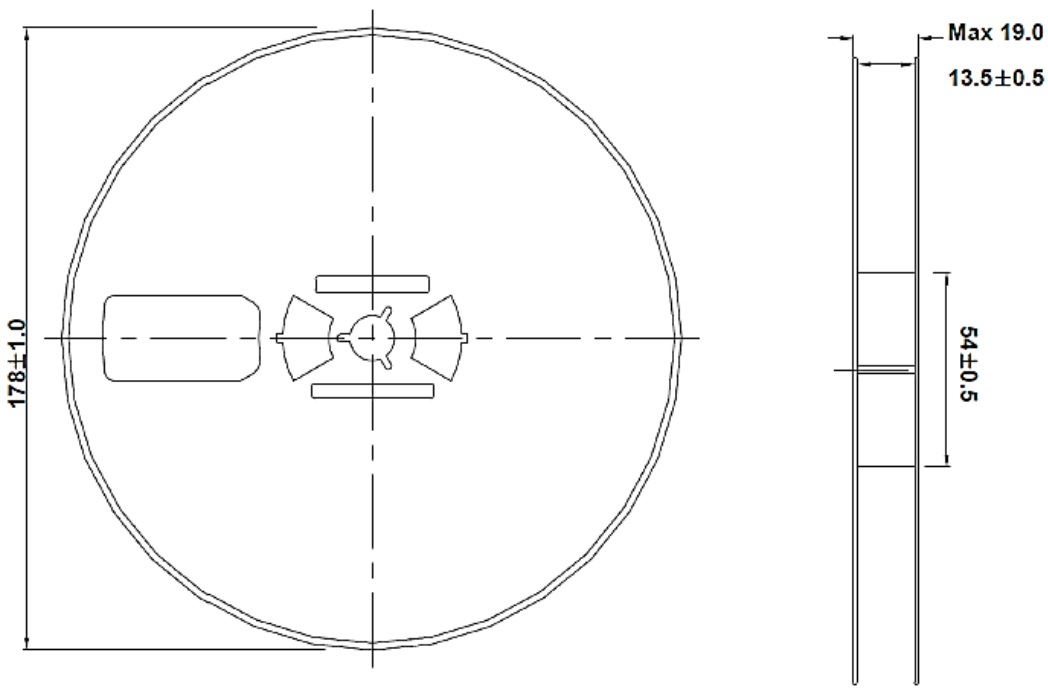
Profile Feature	Sn-Pb Eutectic Assembly	Pb-Free Assembly
Average ramp-up rate (Tsmax to Tp)	3° C/second max.	3° C/second max.
Preheat - Temperature Min (Tsmin) - Temperature Max (Tsmax) - Time (Tsmin to Tsmax) (ts)	 100 °C 150 °C 60-120 seconds	 150 °C 200 °C 60-180 seconds
Time maintained above: - Temperature (TL) - Time (tL)	 183 °C 60-150 seconds	 217 °C 60-150 seconds
Peak Temperature (Tp)	215℃	260℃
Time within 5°C of actual Peak Temperature (tp)2	10-30 seconds	20-40 seconds
Ramp-down Rate	6 °C/second max.	6 °C/second max.
Time 25°C to Peak Temperature	6 minutes max.	8 minutes max.

Caution

(1) Reflow soldering is recommended not to be done more than two times. In the case of more than 24 hours passed soldering after first, LEDs will be damaged.
(2) Repairs should not be done after the LEDs have been soldered. When repair is unavoidable, suitable tools must be used.
(3) Die slug is to be soldered.
(4) When soldering, do not put stress on the LEDs during heating.
(5) After soldering, do not warp the circuit board.

Emitter Tape & Reel Packing



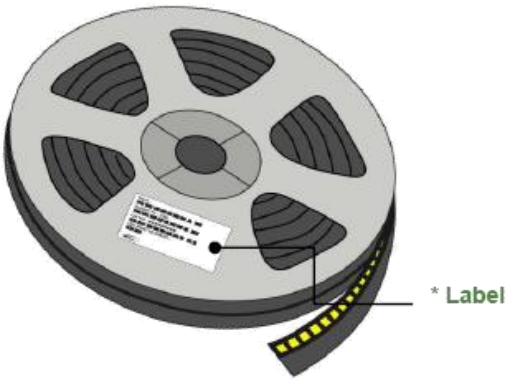


(Tolerance: ±0.2, Unit: mm)

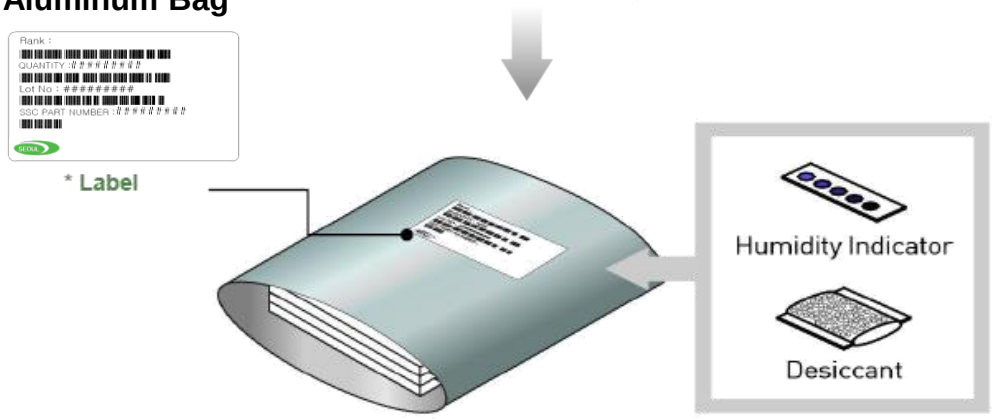
(1) Quantity : 900pcs/Reel
(2) Cumulative Tolerance : Cumulative Tolerance/10 pitches to be ±0.2mm
(3) Adhesion Strength of Cover Tape
Adhesion strength to be 0.1-0.7N when the cover tape is turned off from the carrier tape at the angle of 10˚ to the carrier tape.
(4) Package : P/N, Manufacturing data Code No. and Quantity to be indicated on a damp proof Package.

Emitter Tape & Reel Packing

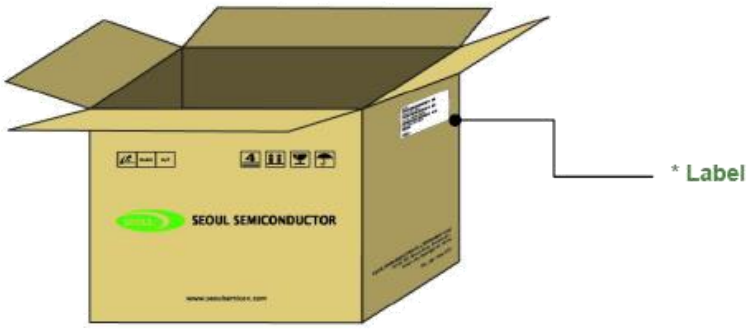
Reel



Aluminum Bag

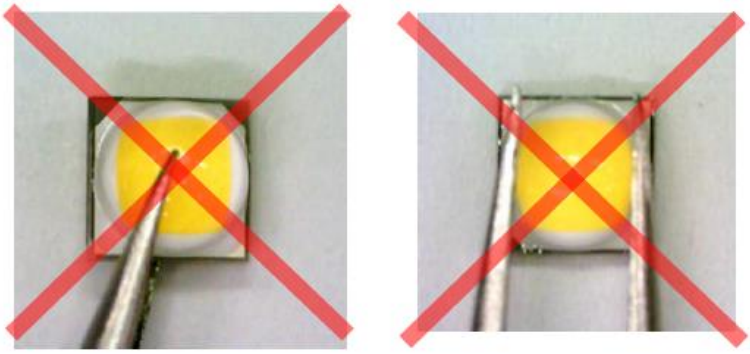


Outer Box



Handling of Silicone Resin for LEDs

(1) During processing, mechanical stress on the surface should be minimized as much as possible. Sharp objects of all types should not be used to pierce the sealing compound.



(2) In general, LEDs should only be handled from the side. By the way, this also applies to LEDs without a silicone sealant, since the surface can also become scratched.

(3) When populating boards in SMT production, there are basically no restrictions regarding the form of the pick and place nozzle, except that mechanical pressure on the surface of the resin must be prevented. This is assured by choosing a pick and place nozzle which is larger than the LED's reflector area.

(4) Silicone differs from materials conventionally used for the manufacturing of LEDs. These conditions must be considered during the handling of such devices. Compared to standard encapsulants, silicone is generally softer, and the surface is more likely to attract dust.

As mentioned previously, the increased sensitivity to dust requires special care during processing. In cases where a minimal level of dirt and dust particles cannot be guaranteed, a suitable cleaning solution must be applied to the surface after the soldering of components.

(5) SSC suggests using isopropyl alcohol for cleaning. In case other solvents are used, it must be assured that these solvents do not dissolve the package or resin.
Ultrasonic cleaning is not recommended. Ultrasonic cleaning may cause damage to the LED.

(6) Please do not mold this product into another resin (epoxy, urethane, etc) and do not handle this. product with acid or sulfur material in sealed space.

Precaution for Use

(1) Storage

To avoid the moisture penetration, we recommend store in a dry box with a desiccant.

The recommended storage temperature range is 5℃ to 30℃ and a maximum humidity of RH50%.

(2) Use Precaution after Opening the Packaging

Use SMT techniques properly when you solder the LED as separation of the lens may affect the light output efficiency.

Pay attention to the following:

a. Recommend conditions after opening the package

-Sealing / Temperature : 5 ~ 40℃Humidity : less than RH30%

b. If the package has been opened more than 4 week(MSL_2a) or the color of the desiccant changes, components should be dried for 10-12hr at 60±5℃

(3) Do not apply mechanical force or excess vibration during the cooling process to normal temperature after soldering.

(4) Do not rapidly cool device after soldering.

(5) Components should not be mounted on warped (non coplanar) portion of PCB.

(6) Radioactive exposure is not considered for the products listed here in.

(7) Gallium arsenide is used in some of the products listed in this publication.

These products are dangerous if they are burned or shredded in the process of disposal.

It is also dangerous to drink the liquid or inhale the gas generated by such products when chemically disposed of.

(8) This device should not be used in any type of fluid such as water, oil, organic solvent and etc.

When washing is required, IPA (Isopropyl Alcohol) should be used.

(9) When the LEDs are in operation the maximum current should be decided after measuring the package temperature.

Precaution for Use

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

(11) Long time exposure of sunlight or occasional UV exposure will cause lens discoloration.

(12) VOCs (Volatile organic compounds) emitted from materials used in the construction of fixtures can penetrate silicone encapsulants of LEDs and discolor when exposed to heat and photonic energy. The result can be a significant loss of light output from the fixture. Knowledge of the properties of the materials selected to be used in the construction of fixtures can help prevent these issues.

(13) Attaching LEDs, do not use adhesives that outgas organic vapor.

(14) The driving circuit must be designed to allow forward voltage only when it is ON or OFF.
If the reverse voltage is applied to LED, migration can be generated resulting in LED damage.

(15) Similar to most Solid state devices;
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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Company Information

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.

Legal Disclaimer

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