Integrated AC LED Solution

Acrich3 – 28W

SMJQ-12XNJNSC



Product Brief

Description

- The Acrich3 series of products are designed to be driven directly off of AC line voltage, therefore they do not need the standard converter essential for conventional general lighting products.
- The converter or driver found in most general lighting products can limit the overall life of the product, but with the Acrich3 series of products the life of the product can more closely be estimated from the LED itself. This will also allow for a much smaller form factor from an overall fixture design allowing for higher creativity in the fixture.
- The modules have a high power factor which can contribute to a higher energy savings in the end application.

Features and Benefits

- Connects directly to AC line voltage
- High Power Factor
- Low THD
- Long Life Time
- Simple BOM
- Lead Free Product
- RoHS Compliant
- High Efficacy

Key Applications

- Street Light / Road-way
- High-bay / Low-bay
- Tunnel Light

Table 1. Product Selection

Part No.	Vin [Vac]	P [W]	CCT [K]	Flux [lm]		CRI
				Min.	Typ.	Min.
SMJQ-122NJNSC	120	28	3700~4200 4700~5300	2400	2600	70
SMJQ-123NJNSC	220	28	3700~4200 4700~5300	2800	3000	

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Performance Characteristics

Table 2. Electro Optical Characteristics, Stabilized at T_a = 25ºC

Parameter	Symbol	Value			Unit	Mark
		Min.	Typ.	Max.		
Luminous Flux	Φ_V [2]	-	2700	-	lm	120V
		-	3000	-		220V
Correlated Color Temperature [3]	CCT	3700	4000	4200	K	E
		4700	5000	5300		C
CRI	Ra	70	-	-	-	
Input Voltage [4]	V_{in}		120		Vac	2C
			220			3C
Power Consumption	P	25	28	31	W	
Operating Frequency	f		50 / 60		Hz	
Power Factor	PF		Over 0.97		-	
Viewing Angle	$2\Theta_{1/2}$		120		deg.	
Transient Surge[5]	Vs	1000			V	
Ring Wave Surge[6]	Vs	2500			V	

Notes :

(1) Test voltage is 120Vac and 220Vac at T_a = 25ºC.

(2) Φ_V is the total luminous flux output measured with an integrated sphere.

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

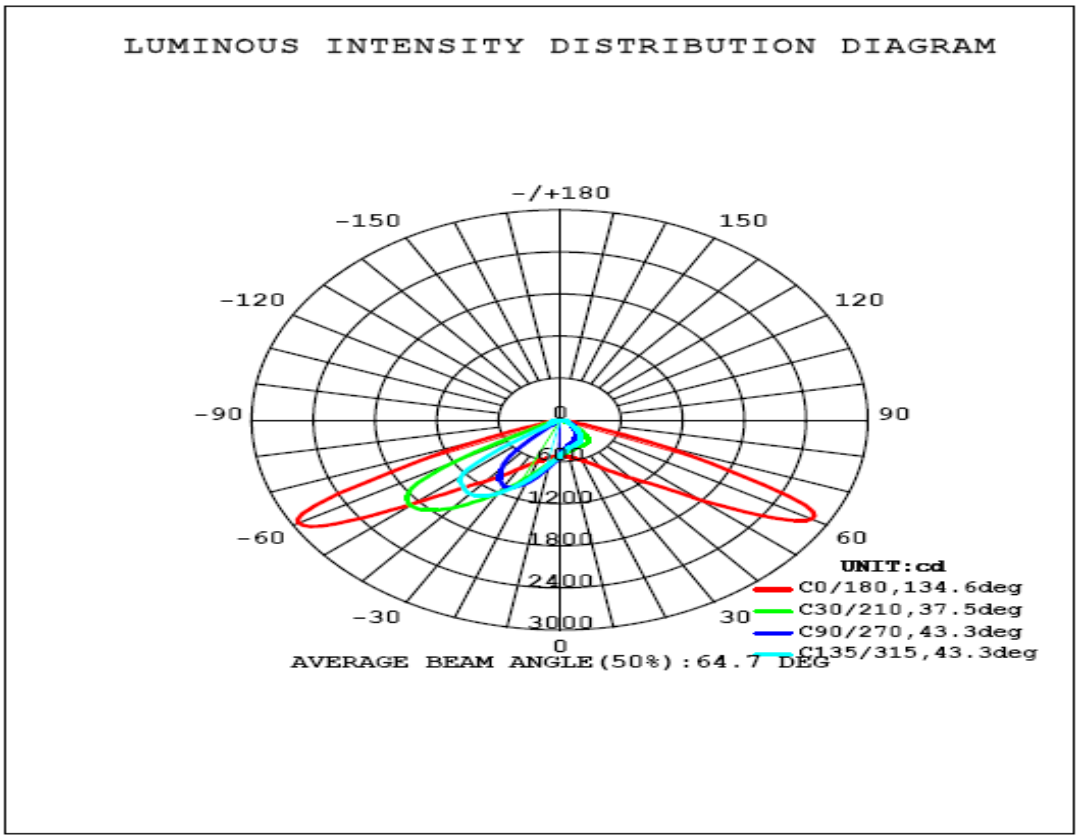
(4) Operating Voltage doesn't indicate the maximum voltage which customers use but means tolerable voltage according to each country's voltage variation rate. It is recommended that the solder pad temperature should be below 70℃.

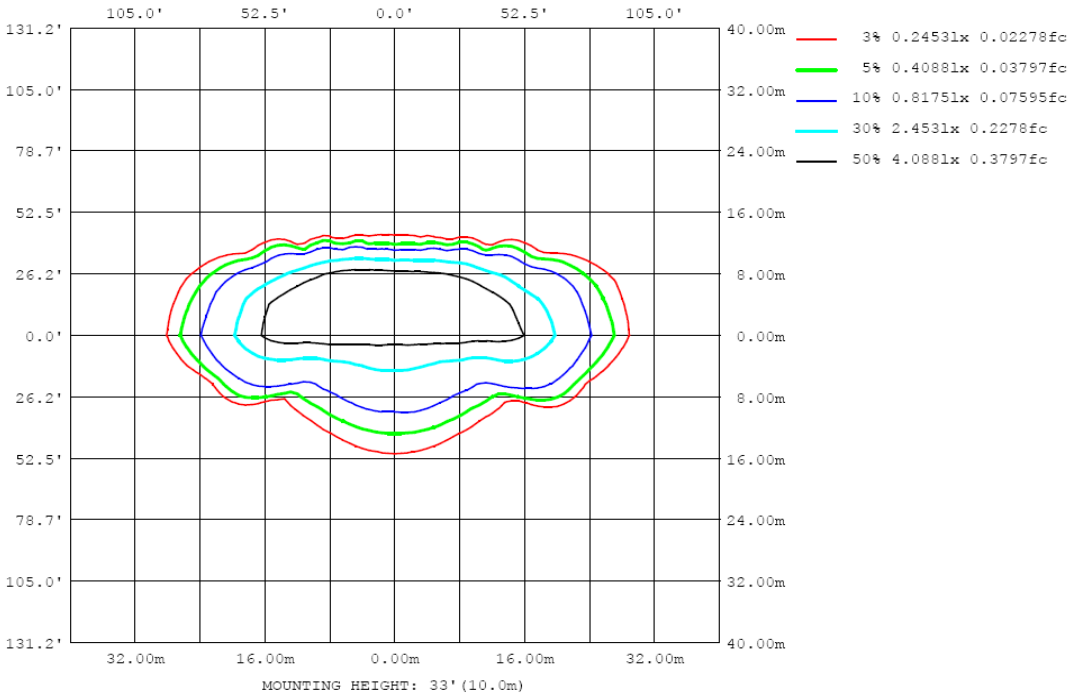
(5) Surge withstand in accordance with IEC61000-4-5(Line to Line)

(6) At 120Vac, seven strikes, 100kHz 2.5kV in accordance with ANSI/IEEE C62.41.2-2002 Category A operation

Performance Characteristics

Fig 1. Light Distribution Profile, T_a = 25ºC





Performance Characteristics

Table 3. Absolute Maximum Ratings, T_a = 25ºC, 220Vac

Parameter	Symbol	Unit	Value
Maximum Input Voltage[1)]	V_{in}	Vac	264 at 220Vac
			144 at 120Vac
Power Consumption	P	W	28
Operating Temperature	T_{opr}	ºC	- 20 ~ 45
Storage Temperature[2)]	T_{stg}	ºC	- 40 ~ 100
ESD Sensitivity	-	-	±4,000V HBM

Notes :

(1) Maximum Voltage doesn't indicate the operating voltage which customers use but means tolerable voltage according to each country's voltage variation rate.

(2) Ambient temperature without operation.

Characteristics Graph

Fig 2. Relative Spectral Distribution vs. Wavelength Characteristic – E

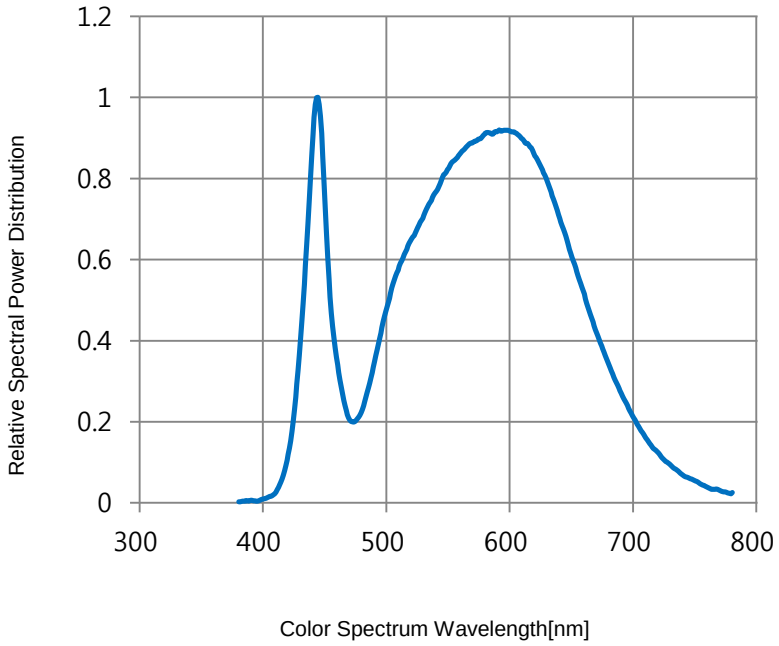
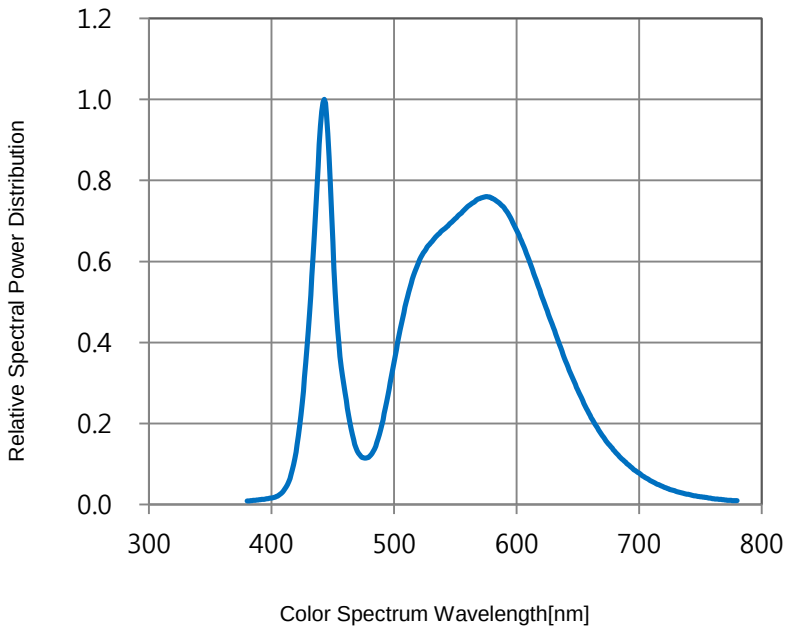
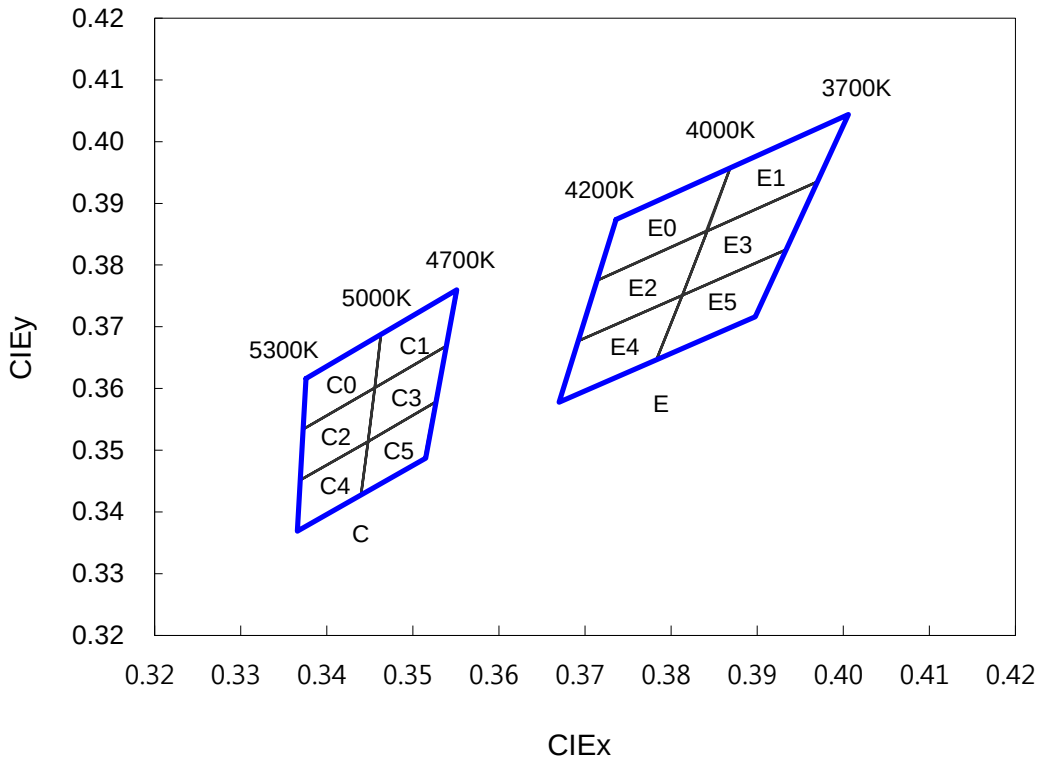


Fig 3. Relative Spectral Distribution vs. Wavelength Characteristic – C

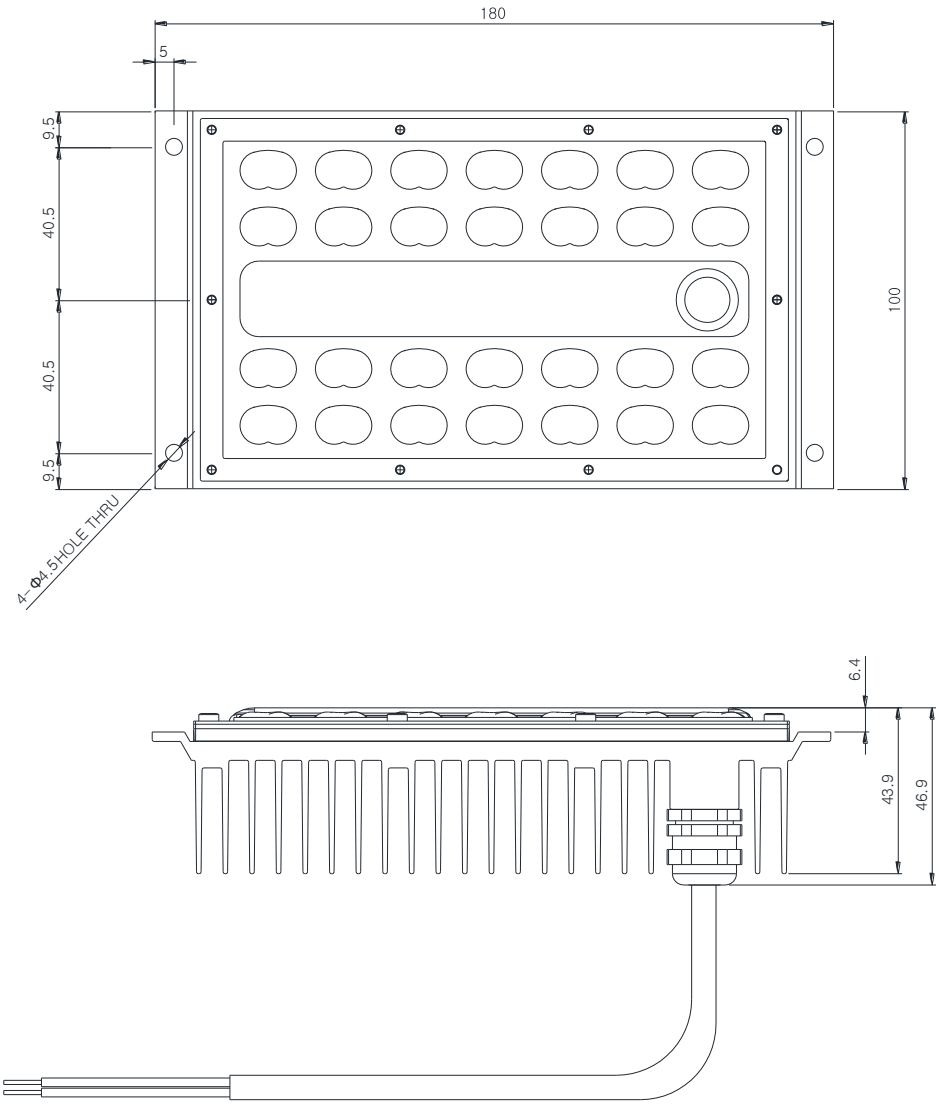


Color Bin Structure



C0		C1		E0		E1	
CIE X	CIE Y	CIE X	CIE Y	CIE X	CIE Y	CIE X	CIE Y
0.3376	0.3616	0.3463	0.3687	0.3736	0.3874	0.3869	0.3958
0.3373	0.3534	0.3456	0.3601	0.3714	0.3775	0.3842	0.3855
0.3456	0.3601	0.3539	0.3669	0.3841	0.3855	0.3970	0.3935
0.3463	0.3687	0.3552	0.3760	0.3869	0.3958	0.4006	0.4044
C2		C3		E2		E3	
CIE X	CIE Y	CIE X	CIE Y	CIE X	CIE Y	CIE X	CIE Y
0.3373	0.3534	0.3456	0.3601	0.3714	0.3775	0.3842	0.3855
0.3369	0.3451	0.3448	0.3514	0.3692	0.3677	0.3813	0.3751
0.3448	0.3514	0.3526	0.3578	0.3813	0.3751	0.3934	0.3825
0.3456	0.3601	0.3539	0.3669	0.3842	0.3855	0.3970	0.3935
C4		C5		E4		E5	
CIE X	CIE Y	CIE X	CIE Y	CIE X	CIE Y	CIE X	CIE Y
0.3369	0.3451	0.3448	0.3514	0.3692	0.3677	0.3813	0.3751
0.3366	0.3369	0.3440	0.3428	0.3670	0.3578	0.3783	0.3646
0.3440	0.3428	0.3514	0.3487	0.3783	0.3646	0.3898	0.3716
0.3448	0.3514	0.3526	0.3578	0.3813	0.3751	0.3934	0.3825

Mechanical Dimensions



Notes :

(1) All dimensions are in millimeters. (Tolerance unless noted : ±0.3)

(2) Scale : None

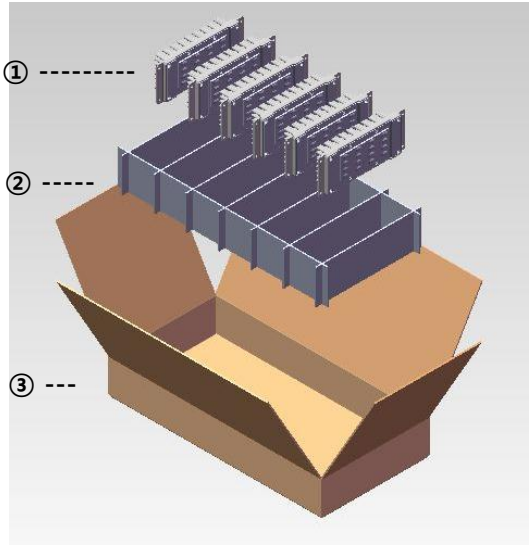
Packing

1. Inner Box packing

Step1.



- All Engines are packed bubble bag
- Air cap Size : 180 * 250

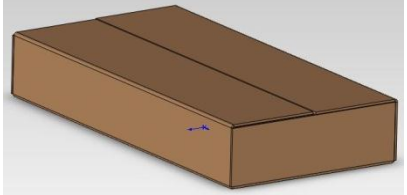


① 28W street engines
② Paper assembly guide
③ Inner box

Step2.

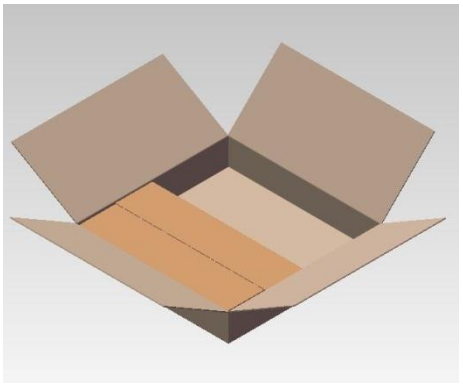


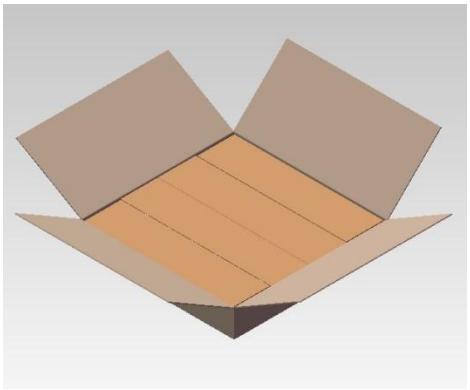
- 6 PCS Engines packed per inner box



2. Outer Box packing

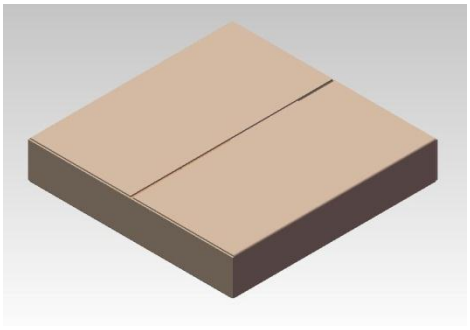
Step3.





- 2pcs inner box are packed in outer box

Step4.



- 12pcs 30W engines are packed each outer box

※ Outer box size
- 511(W) x 550(L) x 145(H)mm

※ Inner box size
- 246(W) x 492(L) x 125(H)mm

※ Packing box(12pcs inside) weight is about 9kg.

Label Information

Model No.	**SMJQ-12XNJNSC (1)**
Rank	**W2C2A (2)**
Type	**STD**
Quantity	**XX**
Date	**YYYY.MM.DD**
SEOUL	**SEOUL SEMICONDUCTOR CO.,LTD.**

Notes

(1) The model number designation is explained as follow
(2) It represents the LED module rank that consists of three characters.
(3) It is attached to the top left corner of the box.

TOTAL Quantity

XX

SEOUL **SEOUL SEMICONDUCTOR CO.,LTD.**

Notes

(1) It is attached to the bottom right corner of the box.

Precaution for Use

(1) Please review the Acrich3 Application Note for proper protective circuitry usage.
(2) Please note, Acrich3 products run off of high voltage, therefore caution should be taken when working near Acrich3 products.
(3) DO NOT touch any of the circuit board, components or terminals with body or metal while circuit is active.
(4) Please do not add or change wires while Acrich3 circuit is active.
(5) Long time exposure to sunlight or UV can cause the lens to discolor.
(6) Please do not use adhesives to attach the LED that outgas organic vapor.
(7) Please do not use together with the materials containing Sulfur.
(8) Please do not assemble in conditions of high moisture and/or oxidizing gas such as Cl, H_2S, NH_3, SO_2, NO_x, etc.
(9) Please do not make any modification on module.
(10) Please be cautious when soldering to board so as not to create a short between different trace patterns.

Precaution for Use

(11) 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)

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

Handling with regards to static electricity

(1) The Acrich3 products use an integrated circuit (IC) which can be damaged when exposed to static electricity. Please handle using equipment that prevents static electricity. Do not touch unless ESD protection is used.
(2) The Acrich3 product should also not be installed in end equipment without ESD protection.

Storage before use

(1) Do not impact or place pressure on this product because even a small amount of pressure can damage the product. The product should also not be placed in high temperatures, high humidity or direct sunlight since the device is sensitive to these conditions.
(2) When storing devices for a long period of time before usage, please following these guidelines:
* The devices should be stored in the anti-static bag that it was shipped in from Seoul-Semiconductor with opening.
* If the anti-static bag has been opened, re-seal preventing air and moisture from being present in the bag.

Guidelines for properly working with Acrich3

(1) Discharge the lighting system a minimum of 2-3 times prior to working with the module.
(2) Use only properly rated test equipment and tools for the rated voltage and current of the product being tested.
(3) It is strongly suggested to wear rubber insulated gloves and rubber bottom shoes.
(4) Do not wear any conductive items (such as jewelry) which could accidentally contact electric circuits.
(5) Perform several tests with power off and the lighting system unplugged.
(6) Faults, lightning, or switching transients can cause voltage surges in excess of the normal ratings.
(7) Internal component failure can cause excessive voltages.
(8) Stored or residual electricity in long wire could be hazardous.
(9) Make sure proper discharge prior to starting work.

Company Information

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Company Information

Seoul Semiconductor (SeoulSemicon.com) manufacturers and packages a wide selection of light emitting diodes (LEDs) for the automotive, general illumination/lighting, 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", deep UV LEDs, "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, high-brightness LEDs, mid-power LEDs, side-view LEDs, through-hole type LED lamps, custom displays, and sensors. The company is vertically integrated from epitaxial growth and chip manufacture in it's fully owned subsidiary, Seoul Viosys, through packaged LEDs and LED modules in three Seoul Semiconductor manufacturing facilities. Seoul Viosys also manufactures a wide range of unique deep-UV wavelength devices.

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