

SMJQ-XCA5W4PX - Acrich3 105W

Integrated AC LED Solution

Acrich3 – 105W

SMJQ-XCA5W4PX





SMJQ-2CA5W4PA

SMJQ-3CA5W4P7



# 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 Efficiency & Factor
- Low THD
- Long Life Time
- Simple BOM
- Miniaturization
- Lead Free Product
- RoHS Compliant

#### **Key Applications**

- Factory Ceiling Light
- Industrial Light
- High-bay
- Low-bay

Part No	Vin [Vac]			Flux	CRI	
Fait NO.	viii [vac]			Min.	Тур.	Min.
SMJQ-2CA5W4PA	120	405			44.500	
SMJQ-3CA5W4P7	220	105	3700 - 6000	10,500	11,300	70

#### Table 1. Product Selection





SEOUL

SMJQ-XCA5W4PX - Acrich3 105W

# **Table of Contents**

Index		
•	Product Brief	1
•	Table of Contents	2
•	Performance Characteristics	3
•	Characteristic Graph	4
•	Color Bin Structure	8
•	Part List	10
•	Mechanical Dimensions	12
•	Circuit Drawing	13
•	Marking Information	14
•	Packing & Label Information	15
•	Handling of Silicone Resin for LEDs	17
•	Precaution for Use	18
•	Company Information	20

### **Performance Characteristics**

SEOUL

#### Table 2. Electro Optical Characteristics, $T_a = 25^{\circ}C$

Deremeter	Cumhal	Value			11:0:1	Mark
Parameter	Symbol	Min.	Тур.	Max.	Unit	Widik
Luminous Flux [1]	$\Phi_{V}$		11500		lm	B,C,D,E
		5300	5600	6000	- - К	В
Correlated Color	COT	4700	5000	5300		С
Temperature <sup>[2]</sup>	CCT	4200	4500	4700		D
		3700	4000	4200		E
CRI	Ra	70	-	-	-	
Innut Valtage [3]			120			2C
	v <sub>in</sub>	220			vac	3C
Power Consumption	Р		105		W	A5W
Operating Frequency	f		50 / 60		Hz	
Power Factor	PF		Over 0.97		-	
Viewing Angle	2Θ <sub>1/2</sub>		120		deg.	
Tolerance of Surge [4]	Vs	500	-	-	V	

#### Notes :

- (1)  $\Phi_V$  is the total luminous flux output measured with an integrated sphere.
- (2) Correlated Color Temperature is derived from the CIE 1931 Chromaticity diagram.
- (3) 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 °C.
- (4) Surge withstand in accordance with IEC61000-4-5.(Line to Line)

## **Performance Characteristics**

SEOUL

### Table 3. Absolute Maximum Ratings, $T_a = 25^{\circ}C$

Parameter	Symbol	Unit	Value
Movimum Input Voltogo	V	VAC	144 (@120VAC)
Maximum input voitage	v <sub>in</sub>	VAC	264 (@220VAC)
Power Consumption	Р	W	126
Operating Temperature	T <sub>opr</sub>	٥C	-30 ~ 85
Storage Temperature	T <sub>stg</sub>	٥C	-40 ~ 100
ESD Sensitivity	-	-	±4,000V HBM

# **Characteristic Graph**

SEOUL



Fig 1. Relative Spectral Distribution vs. Wavelength Characteristic – B,C

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



SMJQ-XCA5W4PX - Acrich3 105W

## **Characteristic Graph**

SEOUL





Fig 4. Relative Power Distribution vs. Voltage, T<sub>a</sub>=25°C, 220V (P.Com Mode)



#### Notes :

Power Compensation Range :  $\pm 5\%$  of Rated Power within Rated Voltage +20%

# Characteristic Graph

SEOUL

### Fig 5. Radiant Pattern, T<sub>a</sub> =25 ℃





## **Color Bin Structure**

#### **CIE Chromaticity Diagram**



E	30	B	1	B	2
CIE X	CIE Y	CIE X	CIE Y	CIE X	CIE Y
0.3207	0.3462	0.3292	0.3539	0.3212	0.3389
0.3212	0.3389	0.3293	0.3461	0.3217	0.3316
0.3293	0.3461	0.3373	0.3534	0.3293	0.3384
0.3292	0.3539	0.3376	0.3616	0.3293	0.3461
E	33	B	4	B	5
CIE X	CIE Y	CIE X	CIE Y	CIE X	CIE Y
0.3293	0.3461	0.3217	0.3316	0.3293	0.3384
0.3293	0.3384	0.3222	0.3243	0.3294	0.3306
0.3369	0.3451	0.3294	0.3306	0.3366	0.3369
0.3373	0.3534	0.3293	0.3384	0.3369	0.3451
(	00	C	1	C	2
CIE X	CIE Y	CIE X	CIE Y	CIE X	CIE Y
0.3376	0.3616	0.3463	0.3687	0.3373	0.3534
0.3373	0.3534	0.3456	0.3601	0.3369	0.3451
0.3456	0.3601	0.3539	0.3669	0.3448	0.3514
0.3463	0.3687	0.3552	0.376	0.3456	0.3601
(	3	с	4	c	5
CIE X	CIE Y	CIE X	CIE Y	CIE X	CIE Y
0.3456	0.3601	0.3369	0.3451	0.3448	0.3514
0.3448	0.3514	0.3366	0.3369	0.344	0.3428
0.3526	0.3578	0.344	0.3428	0.3514	0.3487
0.3539	0.3669	0.3448	0.3514	0.3526	0.3578



# **Color Bin Structure**

SEOUL

#### **CIE Chromaticity Diagram**



D	0	0	)1	D	2
CIEX	CIE Y	CIE X	CIE Y	CIE X	CIE Y
0.3548	0.3736	0.3641	0.3804	0.3536	0.3646
0.3536	0.3646	0.3625	0.3711	0.3523	0.3555
0.3625	0.3711	0.3714	0.3775	0.3608	0.3616
0.3641	0.3804	0.3736	0.3874	0.3625	0.3711
D	3	C	4	D	5
CIEX	CIE Y	CIEX	CIE Y	CIE X	CIE Y
0.3625	0.3711	0.3523	0.3555	0.3608	0.3616
0.3608	0.3616	0.3511	0.3465	0.3590	0.3521
0.3692	0.3677	0.3590	0.3521	0.3670	0.3578
0.3714	0.3775	0.3608	0.3616	0.3692	0.3677
E	0	E	1	E	2
CIEX	CIE Y	CIE X	CIE Y	CIE X	CIE Y
0.3736	0.3874	0.3869	0.3958	0.3714	0.3775
0.3714	0.3775	0.3842	0.3855	0.3692	0.3677
0.3842	0.3855	0.3970	0.3935	0.3813	0.3751
0.3869	0.3958	0.4006	0.4044	0.3842	0.3855
E	3	E	4	E	5
CIEX	CIE Y	CIE X	CIE Y	CIE X	CIE Y
0.3842	0.3855	0.3692	0.3677	0.3813	0.3751
0.3813	0.3751	0.3670	0.3578	0.3783	0.3646
0.2024		0.2702	0.2646	0.3808	0.3716
0.3834	0.3825	0.3/63	0.3040	0.0080	0.5710



### **Part List**

SEOUL

Table 4-1. Part List

No	Part	Reference Specification		Quantity
1	PCB	-	Al, ø145, T=1.6, 1 layer / Cu 2oz / White PSR	1
			SAW0LA0A @120Vac	98
2	LED	- '	SAW0LH0A @220Vac	84
	10		DT3007C @120Vac	7
3	IC	01~07	DT3007B @220Vac	7
4	Fuse	F1	250V, 2A	1
5	Varistor	V1~V4	391Vac	4
6	Bridge Diode	BD1	600V, 1A	1
7	TVS	Z1~Z7	440V, 600W, 5%, Unidirectional	7
8	DIODE	D2	RS1010FL(1000V 1A)	1
9	ZENER DIODE	Z8	MMSZ5258B	1
10		R1~R14	R6432, 22Ω, 5%(J)	14
11	-	R15,R17,R19,R21,R23,	R2012, 12KΩ, 1%(F) @120Vac	7
12	-	R25,R27	R2012, 16KΩ, 1%(F) @220Vac	7
13	-	R16,R18,R20,R22,R24,	R2012, 21KΩ, 1%(F) @120Vac	7
14	-	R26,R28	R2012, 16KΩ, 1%(F) @220Vac	7
15	-	R29~R35	R2012, 2MΩ, 5%(J)	7
16	- Resistor		R2012, 68KΩ, 5%(J) @120Vac	7
17		R36~R42	R2012, 39KΩ, 5%(J) @220Vac	7
18	-	R43	-	-
19	-	R44,R45	R3216, 160KΩ, 5%(J)	2
20	-	R46	R3216, 300Ω, 5%(J)	1
21	-	J1~J6	6432, 0Ω, 5%(J)	6

### **Part List**

SEOUL

Table 4-2. Part List

No	Part	Reference	Specification	Quantity
22		C1~C7	C2012, 100nF, 25V X7R	7
23	— Capacitor	C8~C21	C2012, 10uF, 25V X7R	14
24		C22	-	-
25	-	C23	C3225 10uF X7R	1
26	Connector	Con1, Con2	Wago 2060-401 Molex 1041880110	2

#### Notes :

The above specification is subject to change without further notice for the improvement of products.

SEOUL SEOUL SEMICONDUC

SMJQ-XCA5W4PX - Acrich3 105W

### **Mechanical Dimensions**



- (1) All dimensions are in millimeters. (Tolerance :  $\pm 0.2$ )
- (2) Scale : None

SMJQ-XCA5W4PX - Acrich3 105W



SEOUL

SMJQ-2CA5W4PA



SMJQ-3CA5W4P7





SMJQ-XCA5W4PX - Acrich3 105W

## **Marking Information**



### A : Marking

ex) 150101 W2C2A

- Description

### W2 C2 A

150101①SMT Date (YYMMDD, 6 Digits)①②LED PKG. Luminous Intensity BinW2C2A(2 Digits)③④④UED PKG. Color Bin (2 Digits)④④Voltage Bin (2 Digits)

### SEOUL SEMICONDUCTOR



# Packing

1. Tray information



- 6 PCS LED modules packed per tray
- 2. Tray stack and taping



- 12 LED module trays and additional 2 dummy trays up and down of box
- Add silica gel (1EA) on top of the tray
- 3. Sealing packing



4. Box information & packing



- 60 PCS modules per BOX 1EA
- \*\* 1 Box: 6 PCS per tray x 12 trays = 60 PCS



### **Label Information**

SEOUL

Model No.	SMJQ-XCA5W4PX <sup>(1)</sup>
Rank	W2G06A <sup>(2)</sup>
Туре	STD <sup>(3)</sup>
Quantity	<b>60</b>
Lot No.	
SEOUL	SEOUL SEMICONDUCTOR CO., LTD.

#### Notes

- The model number designation is explained as follow SMJQ : Seoul Semiconductor internal code X : (2=120V, 3=220V)
   C : Power Compensation Mode(Optional)
   A5W : About Power Consumption
   4 : Acrich3 IC(DT3007B, DT3007C)
   PD: MJT PKG (SAW0LA0A, SAW0LH0A)
   It represents the LED module rank.
- W2 : Flux Bin
  G06 : 6 LED Bins of CCT (C = CCT)
  A : Non-Mixing
- (3) It represents ANSI 7 Step bin(STD).

	TOTAL Quantity
SEOUL	SEOUL SEMICONDUCTOR CO.,LTD.

SEOUL



### Handling of Silicone Resin for LEDs





- (1) Acrich3 series is encapsulated with silicone resin for high optical efficiency.
- (2) Please do not touch the silicone resin area with sharp objects such as pincette(tweezers).
- (3) Finger prints on silicone resin area may affect the performance.
- (4) Please store LEDs in covered containers to prevent dust accumulation as this may affect performance.
- (5) Excessive force more than 3000gf to the silicone lens can result in fatal or permanent damage with LEDs.
- (6) Please do not cover the silicone resin area with any other resins such as epoxy, urethane, etc.



# **Precaution for Use**

SEOUL

- (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) Make sure proper discharge prior to starting work.
- (4) DO NOT touch any of the circuit board, components or terminals with body or metal while circuit is active.
- (5) Please do not add or change wires while Acrich3 circuit is active.
- (6) Long time exposure to sunlight or UV can cause the lens to discolor.
- (7) Please do not use adhesives to attach the LED that outgas organic vapor.
- (8) Please do not use together with the materials containing Sulfur.
- (9) Please do not assemble in conditions of high moisture and/or oxidizing gas such as Cl, H<sub>2</sub>S, NH<sub>3</sub>, SO<sub>2</sub>, NO<sub>x</sub>, etc.
- (10) Please do not make any modification on module.
- (11) Please be cautious when soldering to board so as not to create a short between different trace patterns.
- (12) 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.
- (13) 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.
- (14) LEDs and IC are sensitive to Electro-Static Discharge (ESD) and Electrical Over Stress (EOS). The Acrich3 product should also not be installed in end equipment without ESD protection. 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:



# SEOUL

### **Precaution for Use**

- 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



## **Company Information**

#### Published by

Seoul Semiconductor © 2013 All Rights Reserved.

#### **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

Information in this document is provided in connection with Seoul Semiconductor products. With respect to any examples or hints given herein, any typical values stated herein and/or any information regarding the application of the device, Seoul Semiconductor hereby disclaims any and all warranties and liabilities of any kind, including without limitation, warranties of non-infringement of intellectual property rights of any third party. The appearance and specifications of the product can be changed to improve the quality and/or performance without notice.