

# Specification

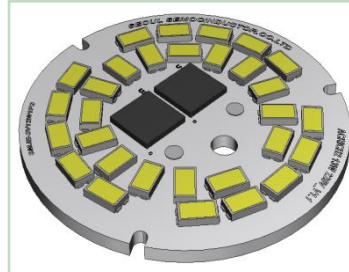
**Acrich2 – Bulb**

**220V 13W**

**SMJE-3V12W1P3**

SSC		Customer
Drawn	Approval	Approval

## Acrich2 - 220V 13W Bulb



### Description

Acrich 2 series designed for AC drive(or operation) doesn't need the converter which is essential for conventional general lighting. Also, its high power factor can show best energy saving effect in many lighting applications.

As there is no need of converter, Acrich 2 series can realize as close life-time as original LED and make a better use of a space in many applications.

\* The appearance and specifications of the product can be changed for improvement without notice.

## Acrich2

### Features

- Connect using a AIC directly to AC power
- High Power Efficiency
- High Power Factor
- Low THD
- Long Life Time
- Simplest BOM
- Miniaturization
- Lead Free product
- RoHS compliant

### Applications

- Bulb light
- Down light
- Factory Ceiling light
- Industrial Light

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## 1. Characteristics of 220V 13W Bulb

### 1-1-1. Electro-Optical characteristics of SMJE-3V12W1P3-B rank

Parameter	Symbol	Value			Unit
		Min	Typ	Max	
<b>Luminous Flux</b> <sup>[1]</sup>	$\Phi_V$ <sup>[2]</sup>	980	1030	-	lm
<b>Correlated Color Temperature</b> <sup>[3]</sup>	CCT	5300	5600	6000	K
<b>CRI</b>	$R_a$	80	-	-	-
<b>Operating Voltage</b> <sup>[4]</sup>	$V_{opt}$	220			V[RMS]
<b>Power Dissipation</b>	$P_D$	12.6	13.0	13.4	W
<b>Operating Frequency</b>	Freq	50 / 60			Hz
<b>Power Factor</b>	PF	Over 0.95			-
<b>View Angle</b>	$2\theta$ 1/2	120			deg.

### 1-1-2. Electro-Optical characteristics of SMJE-3V12W1P3-C rank

Parameter	Symbol	Value			Unit
		Min	Typ	Max	
<b>Luminous Flux</b> <sup>[1]</sup>	$\Phi_V$ <sup>[2]</sup>	980	1030	-	lm
<b>Correlated Color Temperature</b> <sup>[3]</sup>	CCT	4700	5000	5300	K
<b>CRI</b>	$R_a$	80	-	-	-
<b>Operating Voltage</b> <sup>[4]</sup>	$V_{opt}$	220			V[RMS]
<b>Power Dissipation</b>	$P_D$	12.6	13.0	13.4	W
<b>Operating Frequency</b>	Freq	50 / 60			Hz
<b>Power Factor</b>	PF	Over 0.95			-
<b>View Angle</b>	$2\theta$ 1/2	120			deg.

**1-1-3. Electro-Optical characteristics of SMJE-3V12W1P3-E rank**

Parameter	Symbol	Value			Unit
		Min	Typ	Max	
<b>Luminous Flux</b> <sup>[1]</sup>	$\Phi_V$ <sup>[2]</sup>	920	960	-	lm
<b>Correlated Color Temperature</b> <sup>[3]</sup>	CCT	3700	4000	4200	K
<b>CRI</b>	$R_a$	80	-	-	-
<b>Operating Voltage</b> <sup>[4]</sup>	$V_{opt}$	220			V[RMS]
<b>Power Dissipation</b>	$P_D$	12.6	13.0	13.4	W
<b>Operating Frequency</b>	Freq	50 / 60			Hz
<b>Power Factor</b>	PF	Over 0.95			-
<b>View Angle</b>	$2\theta$ 1/2	120			deg.

**1-1-4. Electro-Optical characteristics of SMJE-3V12W1P3-G rank**

Parameter	Symbol	Value			Unit
		Min	Typ	Max	
<b>Luminous Flux</b> <sup>[1]</sup>	$\Phi_V$ <sup>[2]</sup>	910	940	-	lm
<b>Correlated Color Temperature</b> <sup>[3]</sup>	CCT	2900	3000	3200	K
<b>CRI</b>	$R_a$	80	-	-	-
<b>Operating Voltage</b> <sup>[4]</sup>	$V_{opt}$	220			V[RMS]
<b>Power Dissipation</b>	$P_D$	12.6	13.0	13.4	W
<b>Operating Frequency</b>	Freq	50 / 60			Hz
<b>Power Factor</b>	PF	Over 0.95			-
<b>View Angle</b>	$2\theta$ 1/2	120			deg.

**1-1-5. Electro-Optical characteristics of SMJE-3V12W1P3-H rank**

Parameter	Symbol	Value			Unit
		Min	Typ	Max	
<b>Luminous Flux</b> [1]	$\Phi_V$ [2]	900	930	-	lm
<b>Correlated Color Temperature</b> [3]	CCT	2600	2700	2900	K
<b>CRI</b>	$R_a$	80	-	-	-
<b>Operating Voltage</b> [4]	$V_{opt}$	220			V[RMS]
<b>Power Dissipation</b>	$P_D$	12.6	13.0	13.4	W
<b>Operating Frequency</b>	Freq	50 / 60			Hz
<b>Power Factor</b>	PF	Over 0.95			-
<b>View Angle</b>	$2\theta$ 1/2	120			deg.

**1-2 Absolute Maximum Ratings of 220v 13W Bulb**

Parameter	Symbol	Value	Unit
<b>Max. Voltage</b>	$V_{opt}$	264	V[RMS]
<b>Power Dissipation</b>	$P_d$	17.5	W
<b>Operating Temperature</b>	$T_{opr}$	-30 ~ 85	°C
<b>Storage Temperature</b>	$T_{stg}$	-40 ~ 100	°C
<b>ESD Sensitivity</b>	-	±4,000V HBM	-

\* Notes :

[1] At 220V RMS,  $T_a=25^\circ\text{C}$

[2] Acrich 2 series maintain the tolerance of  $\pm 10\%$  on flux and power measurements.

[3]  $\Phi_V$  is the total luminous flux output measured with an integrated sphere.

[4] Correlated Color Temperature is derived from the CIE 1931 Chromaticity diagram.

[5] '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  $70^\circ\text{C}$ .

## 2. Thermal Resistance of 13W

Part	Package power dissipation [W]	Maximum Junction Temp[ °C]	R $\theta_{j-s}$ [°C/W]
Acrich2 LED	5630 Max. 0.5	125	27
Acrich2 IC	Max. 1.5	125	5.5

Acrich2 LED, which has 27°C/W thermal resistance from junction to LED lead.

The maximum junction temperature of Acrich2 LED package is 125°C. So permissible max lead temperature T<sub>s\_max</sub> is

$$T_{s\_max} = T_{j\_max} - (R\theta_{j-s} * P_D)$$

$$= 125^\circ\text{C} - (27^\circ\text{C/W} * 0.5\text{W}) = 111.5^\circ\text{C}$$

But, Recommendation of LED lead temperature is under 70°C

Acrich2 IC, which has 5.5°C/W thermal resistance from junction to top surface.

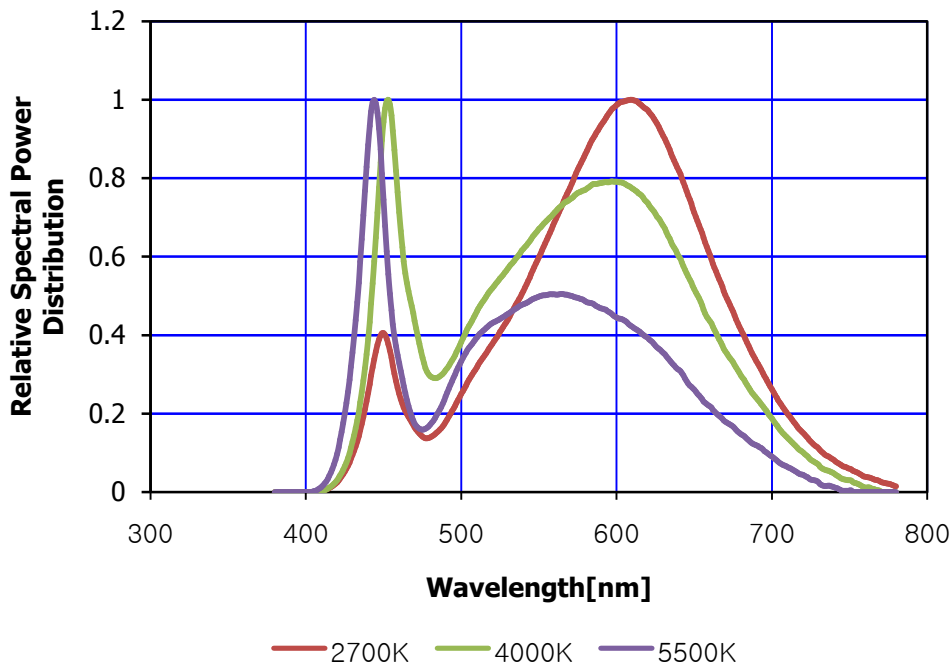
The maximum junction temperature of its IC is 125°C. So allowable Acrich2 IC top surface temperature (T<sub>t\_max</sub>) is

$$T_{t\_max} = T_{j\_max} - (\psi_{j-t} * P_D)$$

$$= 125^\circ\text{C} - (5.5^\circ\text{C/W} * 1.5\text{W}) = 116.8^\circ\text{C}$$

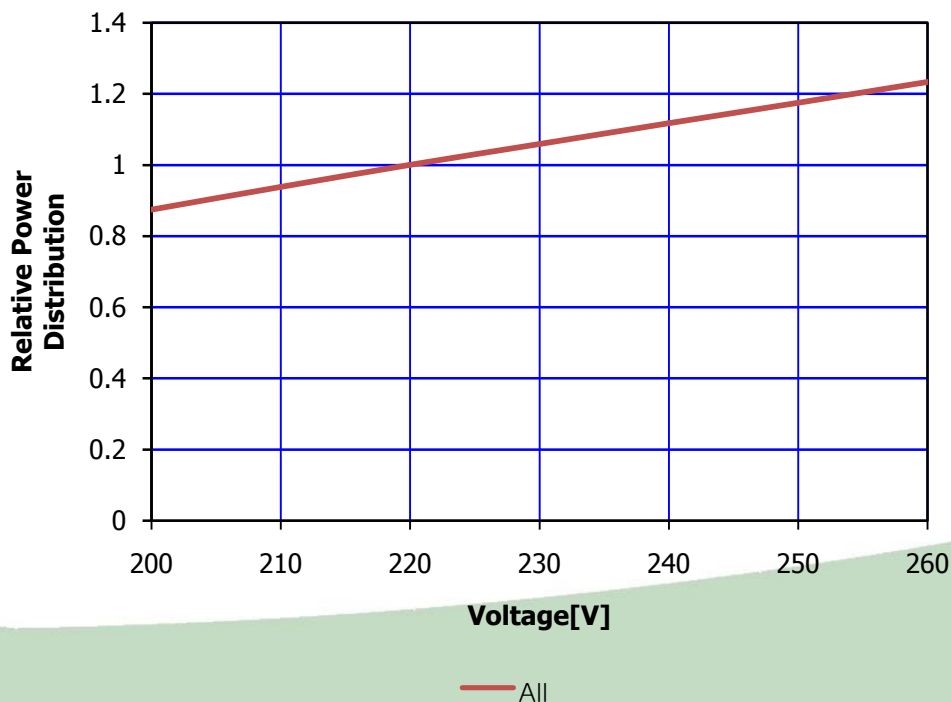
### 3. Color spectrum

Relative Spectral Power Distribution at Ta=25°C



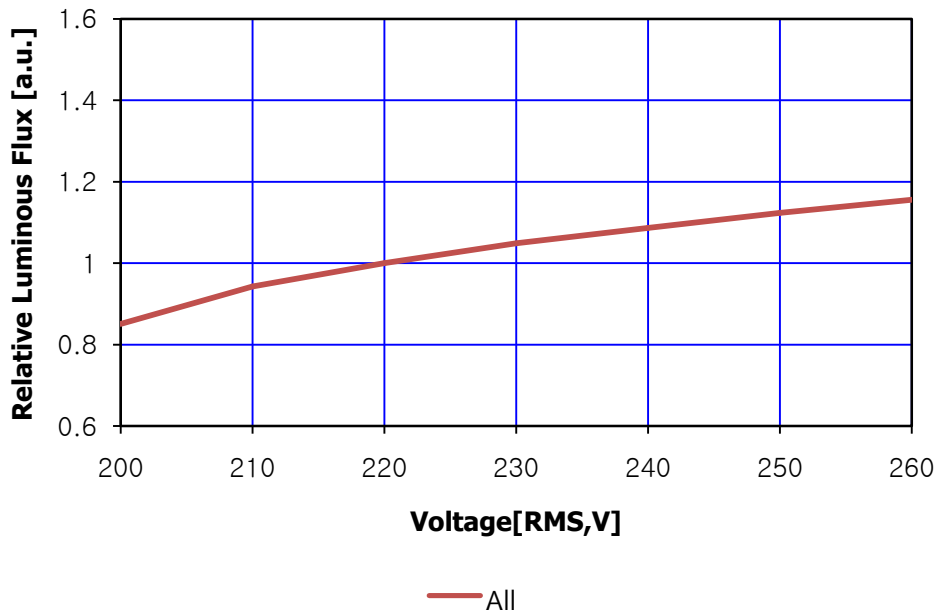
### 4. Power characteristic

Relative Power Distribution vs. Voltage at Ta=25°C

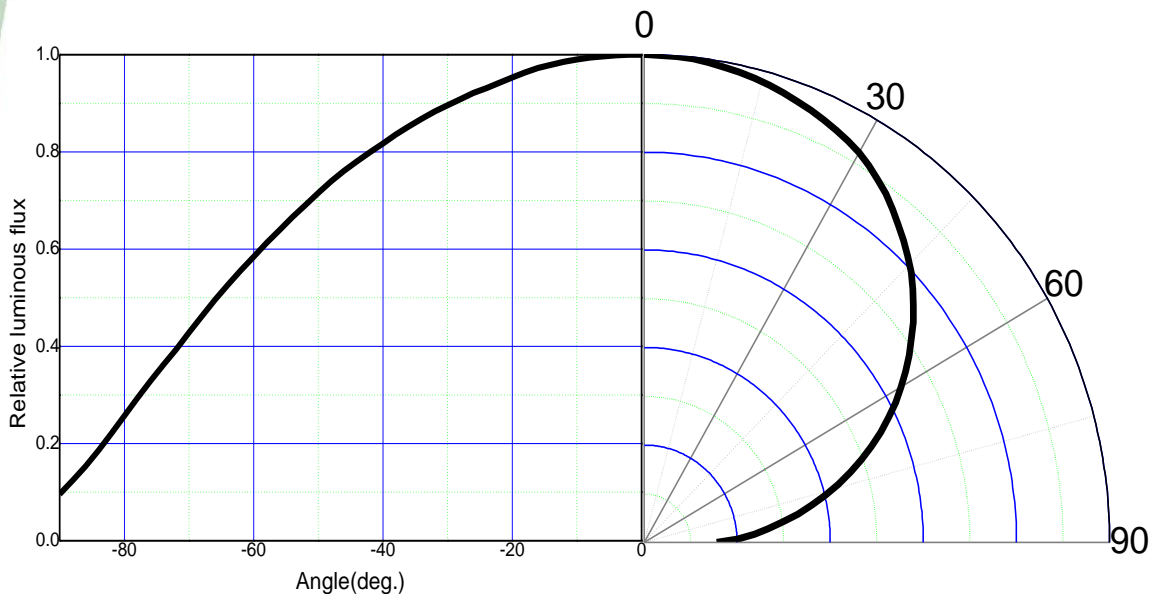




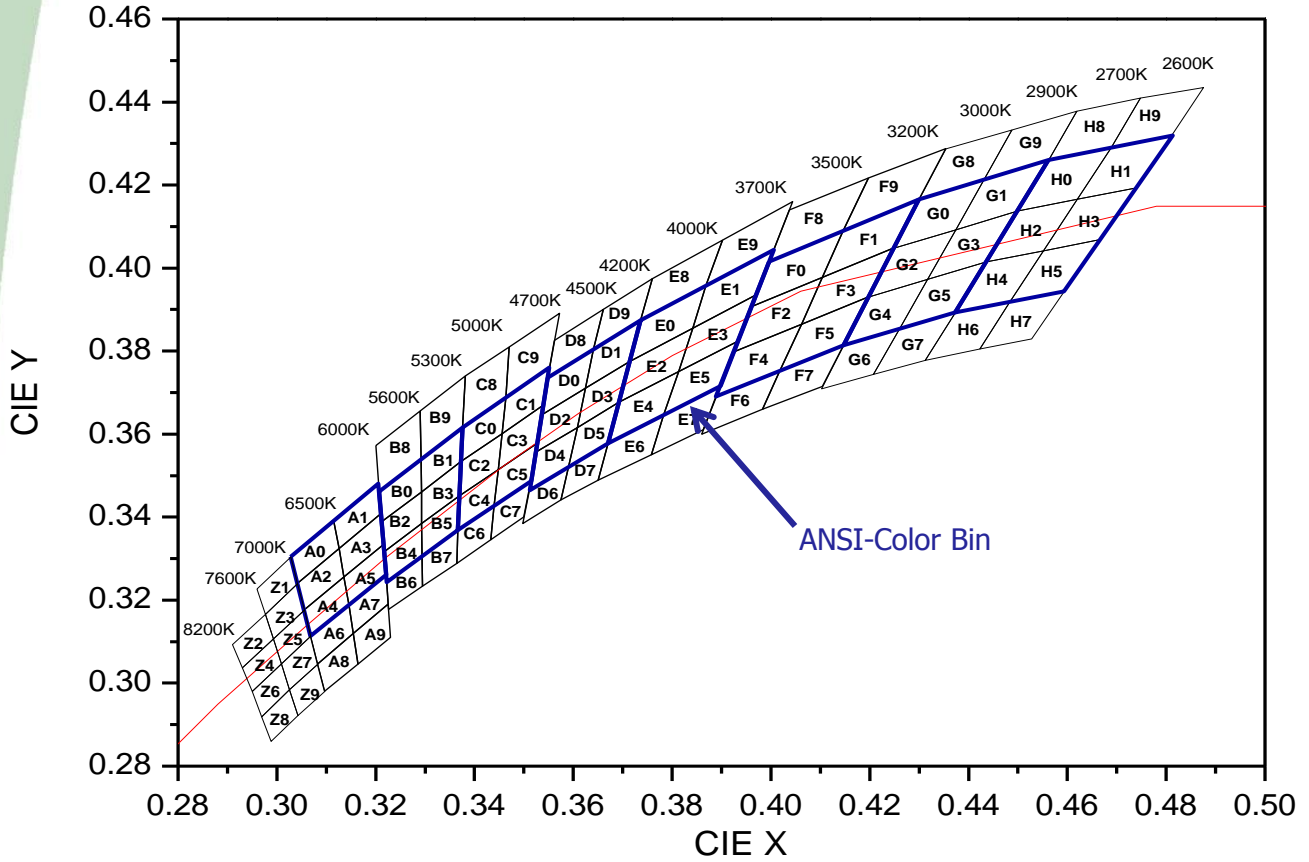
**Relative Luminous flux vs. Forward Voltage, Ta=25°C**



## 5. Radiation Pattern



## 6. Color & Binning



### ▷ COLOR RANK

Rank	Bin	CIE X	CIE Y	Bin	CIE X	CIE Y	Bin	CIE X	CIE Y						
B	B0	X1	0.3207	Y1	0.3462	B1	X1	0.3292	Y1	0.3539	B2	X1	0.3212	Y1	0.3389
		X2	0.3212	Y2	0.3389		X2	0.3293	Y2	0.3461		X2	0.3217	Y2	0.3316
		X3	0.3293	Y3	0.3461		X3	0.3373	Y3	0.3534		X3	0.3293	Y3	0.3384
		X4	0.3292	Y4	0.3539		X4	0.3376	Y4	0.3616		X4	0.3293	Y4	0.3461
	B3	X1	0.3293	Y1	0.3461	B4	X1	0.3217	Y1	0.3316	B5	X1	0.3293	Y1	0.3384
		X2	0.3293	Y2	0.3384		X2	0.3222	Y2	0.3243		X2	0.3294	Y2	0.3306
		X3	0.3369	Y3	0.3451		X3	0.3294	Y3	0.3306		X3	0.3366	Y3	0.3369
		X4	0.3373	Y4	0.3534		X4	0.3293	Y4	0.3384		X4	0.3369	Y4	0.3451

\*Notes : For more detailed information on Acrich binning see the "Acrich Binning and Labeling" document at [www.Acrich.com](http://www.Acrich.com)

\* Measurement Uncertainty of the Color Coordinates : ± 0.01

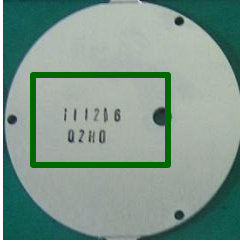
Rank	Bin	CIE X		CIE Y		Bin	CIE X		CIE Y		Bin	CIE X		CIE Y	
C	C0	X1	0.3376	Y1	0.3616	C1	X1	0.3463	Y1	0.3687	C2	X1	0.3373	Y1	0.3534
		X2	0.3373	Y2	0.3534		X2	0.3456	Y2	0.3601		X2	0.3369	Y2	0.3451
		X3	0.3456	Y3	0.3601		X3	0.3539	Y3	0.3669		X3	0.3448	Y3	0.3514
		X4	0.3463	Y4	0.3687		X4	0.3552	Y4	0.3760		X4	0.3456	Y4	0.3601
	C3	CIE X		CIE Y		C4	CIE X		CIE Y		C5	CIE X		CIE Y	
		X1	0.3456	Y1	0.3601		X1	0.3369	Y1	0.3451		X1	0.3448	Y1	0.3514
		X2	0.3448	Y2	0.3514		X2	0.3366	Y2	0.3369		X2	0.3440	Y2	0.3428
		X3	0.3526	Y3	0.3578		X3	0.3440	Y3	0.3428		X3	0.3514	Y3	0.3487
	X4	0.3539	Y4	0.3669	X4	0.3448	Y4	0.3514	X4	0.3526	Y4	0.3578			

Rank	Bin	CIE X		CIE Y		Bin	CIE X		CIE Y		Bin	CIE X		CIE Y	
E	E0	X1	0.3736	Y1	0.3874	E1	X1	0.3869	Y1	0.3958	E2	X1	0.3714	Y1	0.3775
		X2	0.3714	Y2	0.3775		X2	0.3842	Y2	0.3855		X2	0.3692	Y2	0.3677
		X3	0.3841	Y3	0.3855		X3	0.3970	Y3	0.3935		X3	0.3813	Y3	0.3751
		X4	0.3869	Y4	0.3958		X4	0.4006	Y4	0.4044		X4	0.3842	Y4	0.3855
	E3	CIE X		CIE Y		E4	CIE X		CIE Y		E5	CIE X		CIE Y	
		X1	0.3842	Y1	0.3855		X1	0.3692	Y1	0.3677		X1	0.3813	Y1	0.3751
		X2	0.3813	Y2	0.3751		X2	0.3670	Y2	0.3578		X2	0.3783	Y2	0.3646
		X3	0.3934	Y3	0.3825		X3	0.3783	Y3	0.3646		X3	0.3898	Y3	0.3716
	X4	0.3970	Y4	0.3935	X4	0.3813	Y4	0.3751	X4	0.3934	Y4	0.3825			

Rank	Bin	CIE X		CIE Y		Bin	CIE X		CIE Y		Bin	CIE X		CIE Y	
G	G0	X1	0.4299	Y1	0.4165	G1	X1	0.4430	Y1	0.4212	G2	X1	0.4248	Y1	0.4048
		X2	0.4248	Y2	0.4048		X2	0.4374	Y2	0.4093		X2	0.4198	Y2	0.3931
		X3	0.4374	Y3	0.4093		X3	0.4499	Y3	0.4138		X3	0.4317	Y3	0.3973
		X4	0.4430	Y4	0.4212		X4	0.4562	Y4	0.4260		X4	0.4374	Y4	0.4093
	G3	CIE X		CIE Y		G4	CIE X		CIE Y		G5	CIE X		CIE Y	
		X1	0.4374	Y1	0.4093		X1	0.4198	Y1	0.3931		X1	0.4317	Y1	0.3973
		X2	0.4317	Y2	0.3973		X2	0.4147	Y2	0.3814		X2	0.4259	Y2	0.3853
		X3	0.4436	Y3	0.4015		X3	0.4259	Y3	0.3853		X3	0.4373	Y3	0.3893
	X4	0.4499	Y4	0.4138	X4	0.4317	Y4	0.3973	X4	0.4436	Y4	0.4015			

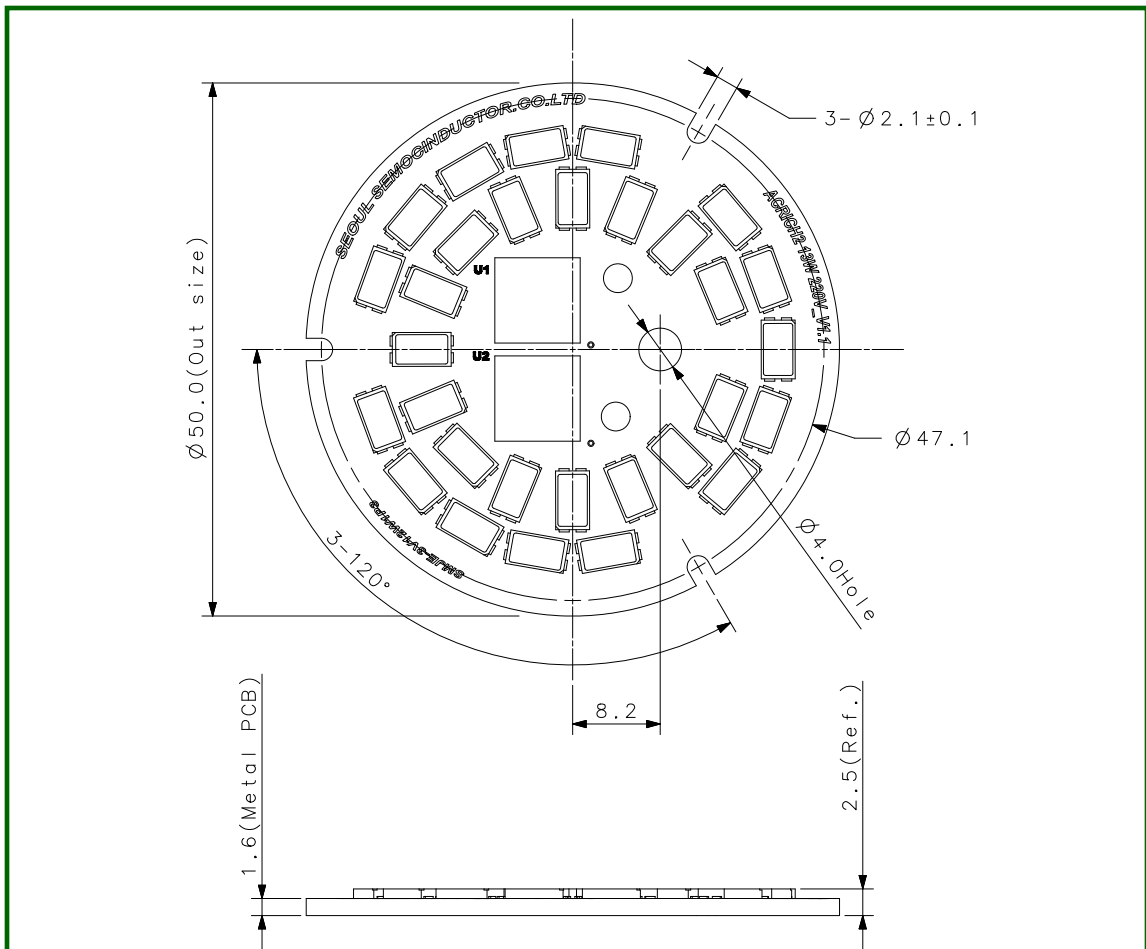
Rank	Bin	CIE X		CIE Y		Bin	CIE X		CIE Y		Bin	CIE X		CIE Y	
H	H0	X1	0.4562	Y1	0.4260	H1	X1	0.4687	Y1	0.4289	H2	X1	0.4499	Y1	0.4138
		X2	0.4499	Y2	0.4138		X2	0.4620	Y2	0.4166		X2	0.4436	Y2	0.4015
		X3	0.4620	Y3	0.4166		X3	0.4740	Y3	0.4194		X3	0.4551	Y3	0.4042
		X4	0.4687	Y4	0.4289		X4	0.4810	Y4	0.4319		X4	0.4620	Y4	0.4166
	H3	CIE X		CIE Y		H4	CIE X		CIE Y		H5	CIE X		CIE Y	
		X1	0.4620	Y1	0.4166		X1	0.4436	Y1	0.4015		X1	0.4551	Y1	0.4042
		X2	0.4551	Y2	0.4042		X2	0.4373	Y2	0.3893		X2	0.4483	Y2	0.3919
		X3	0.4666	Y3	0.4069		X3	0.4483	Y3	0.3919		X3	0.4593	Y3	0.3944
	X4	0.4740	Y4	0.4194	X4	0.4551	Y4	0.4042	X4	0.4666	Y4	0.4069			

## 7. Marking



XXXXXX – Year / Month/date / Production date  
XXXX – LED PKG Flux Rank / Color Bin Rank

## 8. Outline dimensions – 220V 13W Bulb



\* Notes :

[1] All dimensions are in millimeters. (Tolerance :  $\pm 0.2$ )

[2] Scale : none

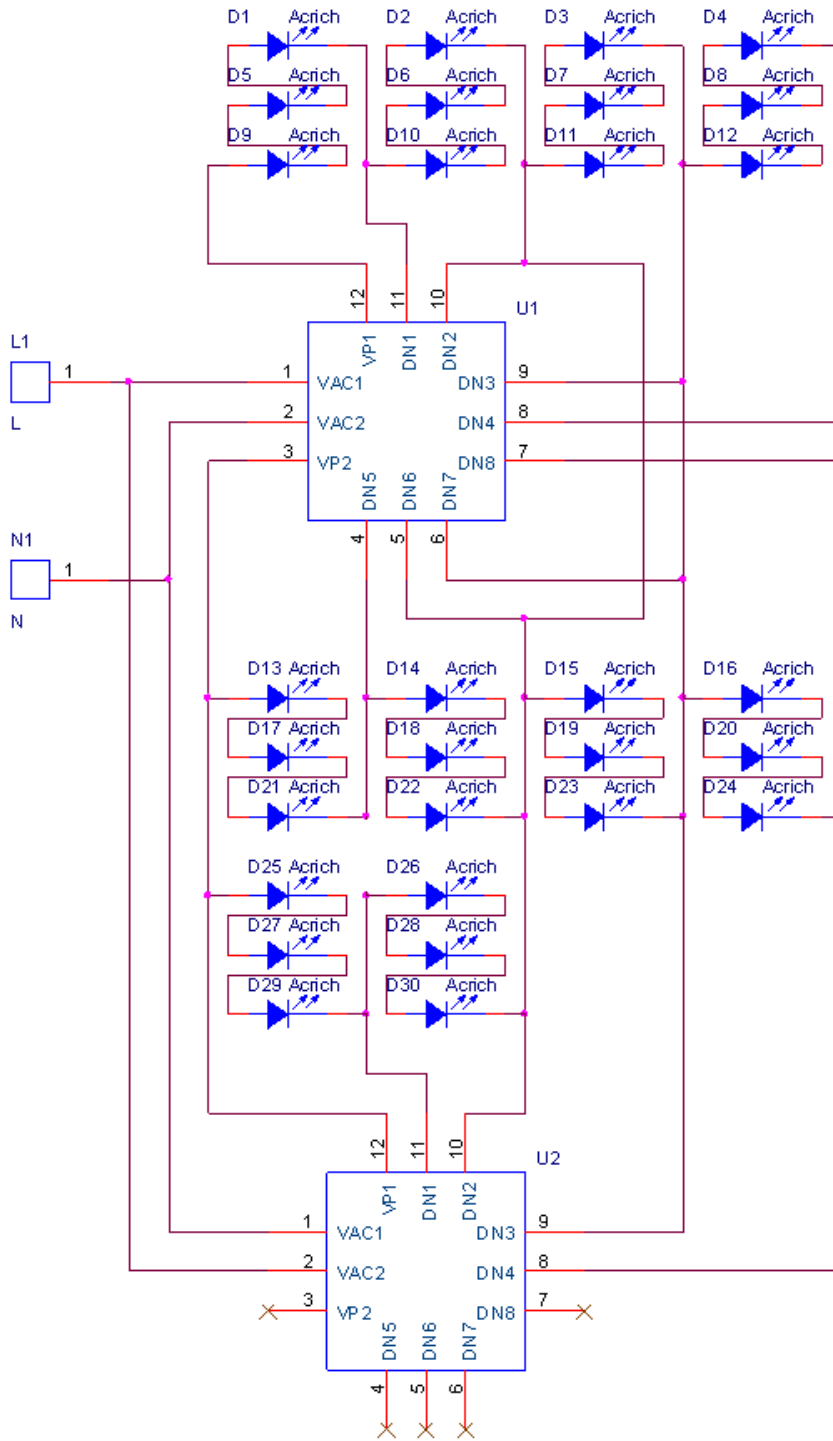
[3] The appearance and specifications of the product may be changed for improvement without notice

Rev. 01

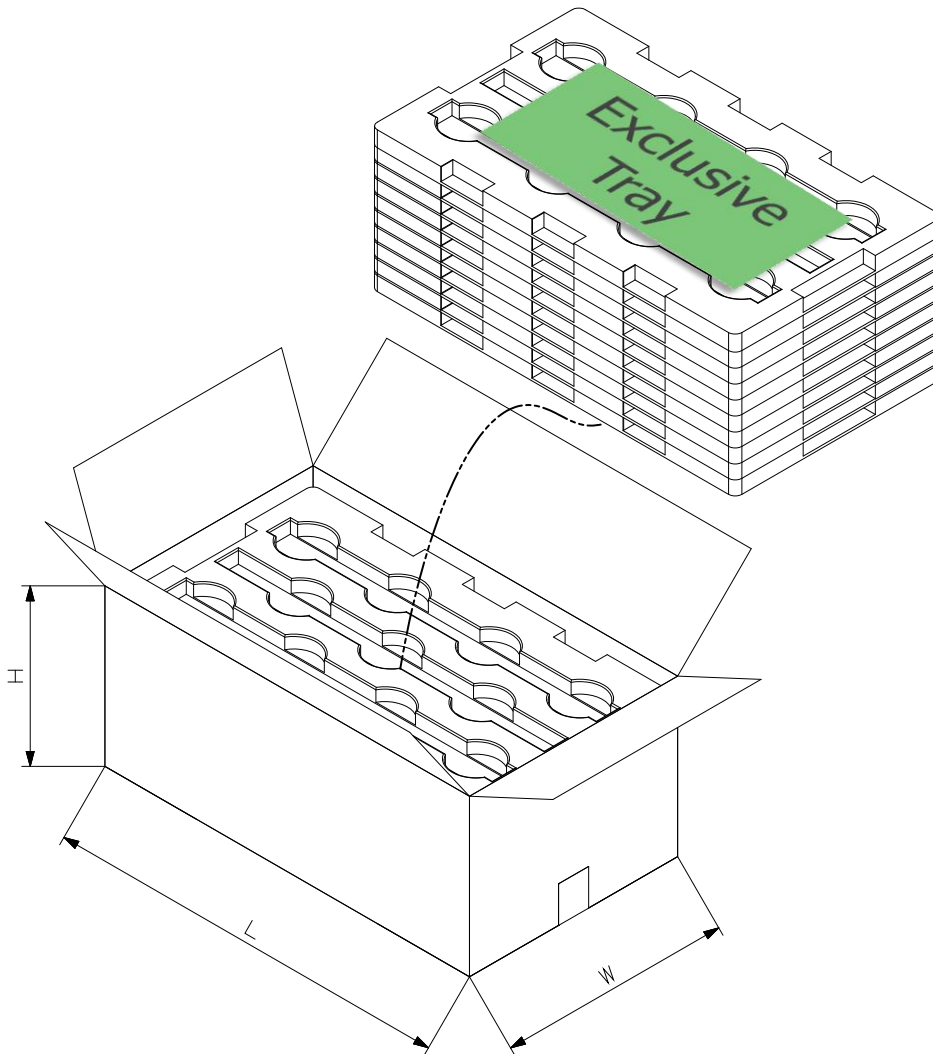
June 2012

www.Acrich.com

## 9. Circuit Drawing



## 10. Packing



◦ **1Box : 100 PCS per tray x Max.10 layer = Max.1000 PCS**

**about 6kg**

◦ **Box size( L x W x H ) = 590 x 330 x 260**

## 11. Cautions for use

- Please attach a varistor for protecting surge according to the application note
- Please attach a resistance according to the application note
- Please note Acrich runs on high voltage so use caution when near the leads or if a dome is inadvertently removed while circuit is active
- Please do not touch any of the circuit board, components or terminals with bare hands or metal while circuit is electrically active.
- Please do not add or change wires while Acrich circuit is active
- Please do not touch wire on solder pad at driving AC source
- The appearance and specifications of the product may be modified for improvement without notice.
- Long time exposure of sunlight or occasional UV exposure will cause lens discoloration.
- Attaching LEDs, do not use adhesives that outgas organic vapor.
- Please do not use together with the materials containing Sulfur
- Please do not assemble under the condition of moisture and oxidizing gas in the air(Cl, H<sub>2</sub>S, NH<sub>3</sub>, SO<sub>2</sub>, NO<sub>x</sub>, etc)

## 12. Handling of silicone resin for LEDs

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



## 13. Content regarding static electricity

- Acrich2 control IC is installed in this product. This kind of package could get damaged when it is exposed to static electricity. So, please, wear equipment to prevent it from static electricity.  
Moreover, be cautious not to touch each exposed package and AC PAD on top of product with bare hands.  
When installing the product on user's Main heat sink, should wear some equipment to prevent static electricity.

## 14. Content regarding storage and treatment

- Do not impact or pressure on this product since this product get damaged easily by small amount of impact. Moreover, it should avoid high temperature, high humidity, and direct sunlight in order to function properly since LED PKG is sensitive to temperature and humidity, when storing or operating it.

Criteria are here as below.

(1) Please, confirm to next lists, when storing it in a long term.

\*It should be stored in the anti-static bag that Seoul-Semiconductor packed without opening it.

\* If you opened it in order to prevent humidity, you should seal it and not let the air and humidity into the bag.