

# Specification

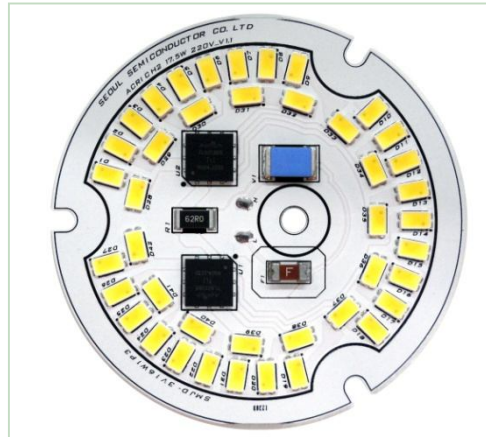
## Acrich2 – Downlight

**220V 17.5W**

**SMJD-3V16W1P3**

SSC		Customer
Drawn	Approval	Approval

## Acrich2 – 220V 17.5W Downlight



### 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.

## 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

- Down light
- Factory Ceiling light
- Industrial Light

## Contents

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## 1. Characteristics of 220V 17.5W Downlight

### 1-1-1. Electro-Optical characteristics of SMJD-3V16W1P3-B rank

Parameter	Symbol	Value			Unit
		Min	Typ	Max	
Luminous Flux <sup>[2]</sup>	$\Phi_V$ <sup>[3]</sup>	1380	1450		lm
Correlated Color Temperature <sup>[4]</sup>	CCT	5300	5600	6000	K
CRI	$R_a$	80	82	-	-
Operating Voltage <sup>[5]</sup>	$V_{opt}$	220			Vrms <sup>[1]</sup>
Power Dissipation	$P_D$	-	17.5	-	W
Operating Frequency	Freq	50 / 60			Hz
Power Factor	PF	Over 0.95			-
View Angle	$2\theta$ 1/2	120			deg.

### 1-1-2. Electro-Optical characteristics of SMJD-3V16W1P3-C rank

Parameter	Symbol	Value			Unit
		Min	Typ	Max	
Luminous Flux <sup>[2]</sup>	$\Phi_V$ <sup>[3]</sup>	1380	1450	-	lm
Correlated Color Temperature	CCT	4700	5000	5300	K
CRI	$R_a$	80	82	-	-
Operating Voltage <sup>[5]</sup>	$V_{opt}$	220			Vrms <sup>[1]</sup>
Power Dissipation	$P_D$	-	17.5	-	W
Operating Frequency	Freq	50 / 60			Hz
Power Factor	PF	Over 0.95			-
View Angle	$2\theta$ 1/2	120			deg.

1-1-3. Electro-Optical characteristics of SMJD-3V16W1P3-E rank

Parameter	Symbol	Value			Unit
		Min	Typ	Max	
Luminous Flux <sup>[2]</sup>	$\Phi_V$ <sup>[3]</sup>	1300	1340	-	lm
Correlated Color Temperature <sup>[4]</sup>	CCT	3700	4000	4200	K
CRI	$R_a$	80	82	-	-
Operating Voltage <sup>[5]</sup>	$V_{opt}$	220			Vrms <sup>[1]</sup>
Power Dissipation	$P_D$	-	17.5	-	W
Operating Frequency	Freq	50 / 60			Hz
Power Factor	PF	Over 0.95			-
View Angle	$2\theta$ 1/2	120			deg.

1-1-4. Electro-Optical characteristics of SMJD-3V16W1P3-G rank

Parameter	Symbol	Value			Unit
		Min	Typ	Max	
Luminous Flux <sup>[2]</sup>	$\Phi_V$ <sup>[3]</sup>	1260	1300	-	lm
Correlated Color Temperature <sup>[4]</sup>	CCT	2900	3000	3200	K
CRI	$R_a$	80	82	-	-
Operating Voltage <sup>[5]</sup>	$V_{opt}$	220			Vrms <sup>[1]</sup>
Power Dissipation	$P_D$	-	17.5	-	W
Operating Frequency	Freq	50 / 60			Hz
Power Factor	PF	Over 0.95			-
View Angle	$2\theta$ 1/2	120			deg.

1-1-5. Electro-Optical characteristics of SMJD-3V16W1P3-H rank

Parameter	Symbol	Value			Unit
		Min	Typ	Max	
Luminous Flux <sup>[2]</sup>	$\Phi_V$ <sup>[3]</sup>	1200	1250	-	lm
Correlated Color Temperature <sup>[4]</sup>	CCT	2600	2700	2900	K
CRI	$R_a$	80	82	-	-
Operating Voltage <sup>[5]</sup>	$V_{opt}$	220			Vrms <sup>[1]</sup>
Power Dissipation	$P_D$	-	17.5	-	W
Operating Frequency	Freq	50 / 60			Hz
Power Factor	PF	Over 0.95			-
View Angle	$2\theta$ 1/2	120			deg.

1-2 Absolute Maximum Ratings of 220V 17.5W Downlight

Parameter	Symbol	Value	Unit
Max. Voltage	$V_{opt}$	264	Vrms
Power Dissipation	$P_d$	23	W
Operating Temperature	$T_{opr}$	-30 ~ 85	°C
Storage Temperature	$T_{stg}$	-40 ~ 100	°C
ESD Sensitivity	-	±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 17.5W

Part	Package Power Dissipation [W]	Maximum Junction Temp[°C]	R <sub>θj-s</sub> [°C/W]
Acrich2 LED	SAW8KG0B 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

$$T_{s\_max} = T_{j\_max} - (R_{qj-s} * P_D)$$

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

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.

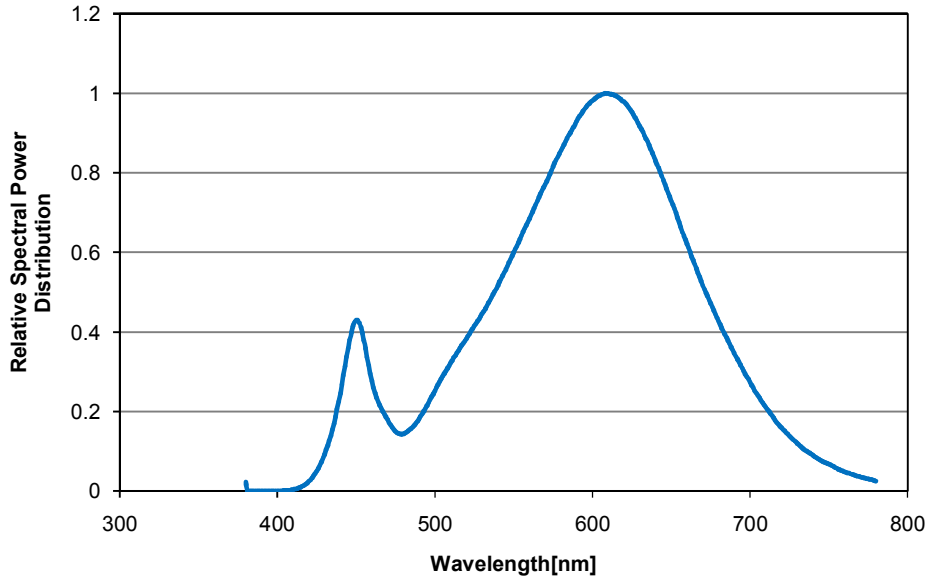
The maximum junction temperature of its IC is 125 °C. So allowable Acrich2 IC top surface temperature (T<sub>t\_max</sub>) is

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

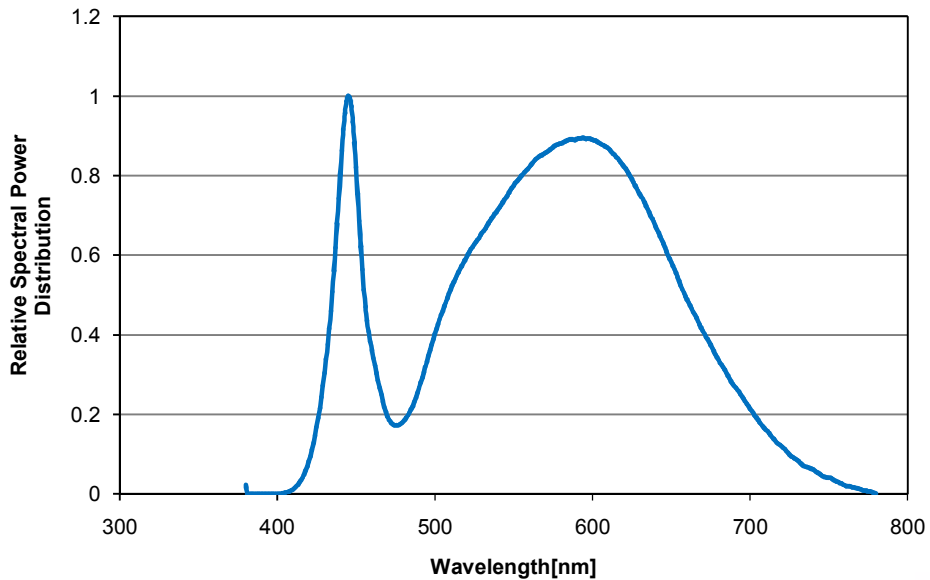
$$= 125\text{°C} - (5.5\text{°C/W} * 1.5\text{W}) = 116.8\text{°C}$$

### 3. Color spectrum

Warm White Relative Spectral Distribution vs. Wavelength Characteristic

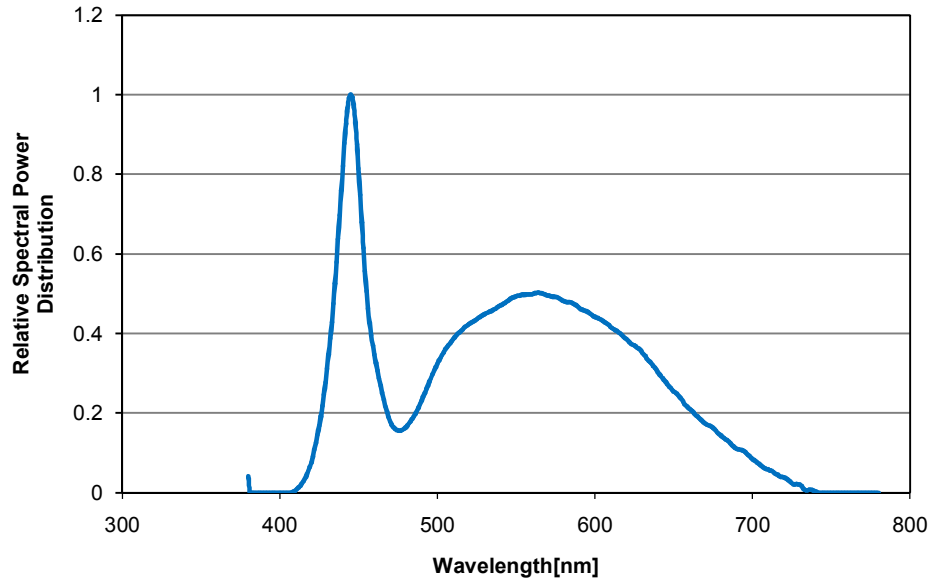


Neutral White Relative Spectral Distribution vs. Wavelength Characteristic



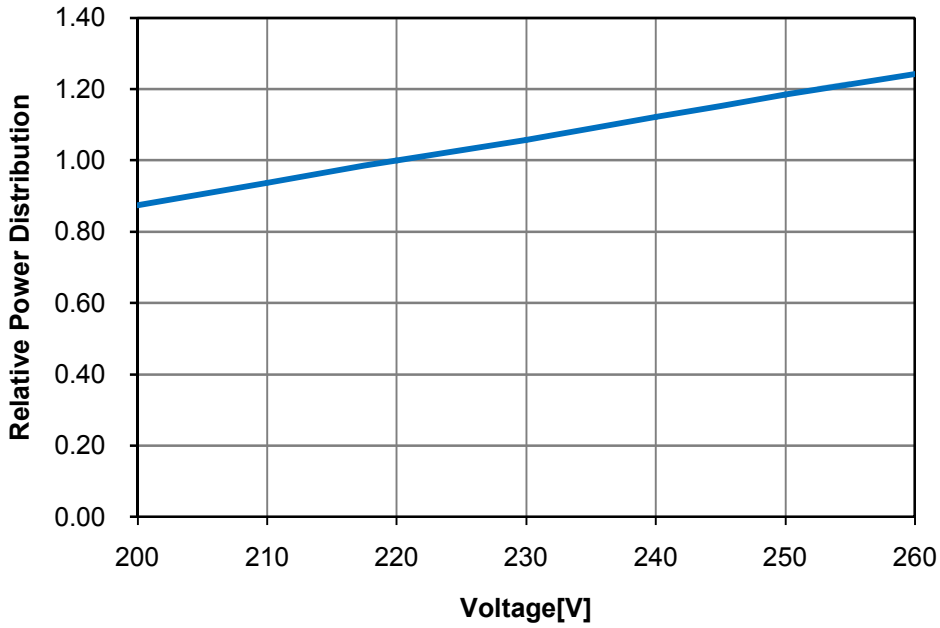


Cool White Relative Spectral Distribution vs. Wavelength Characteristic

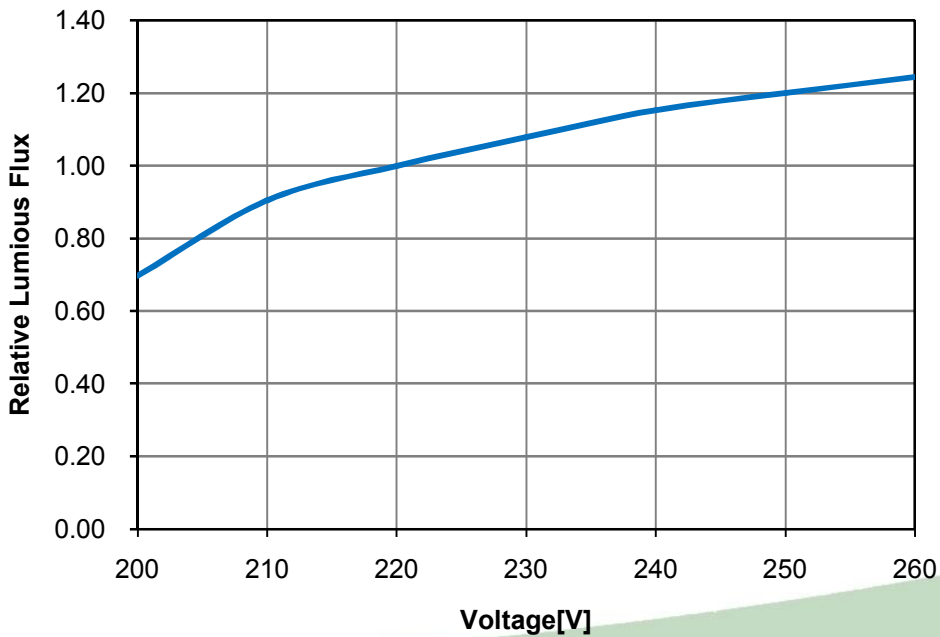


## 4. Power characteristic

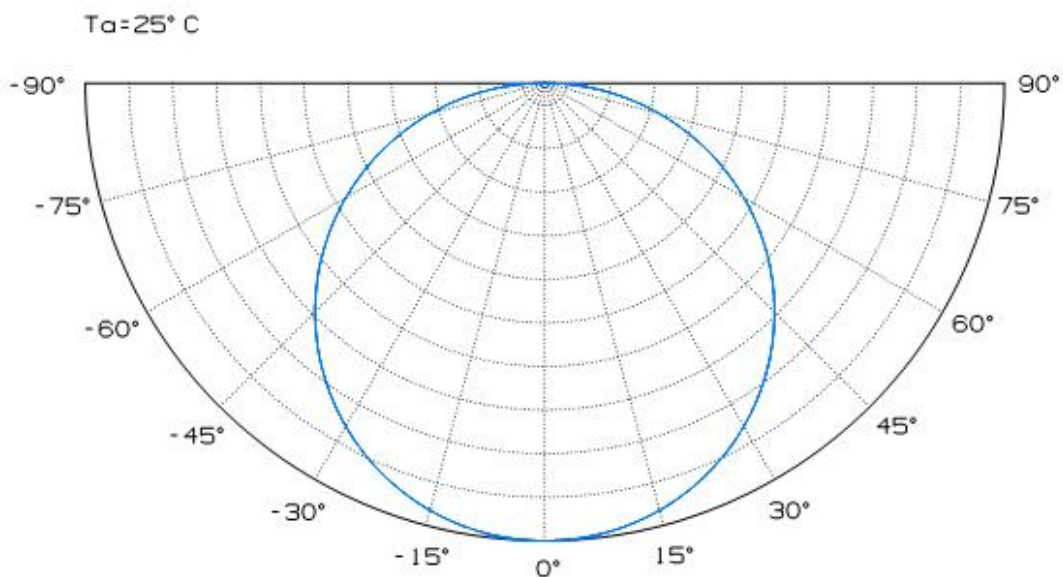
Relative Power Distribution vs. Voltage at Ta=25oC



Relative Luminous Flux vs. Voltage at Ta=25oC

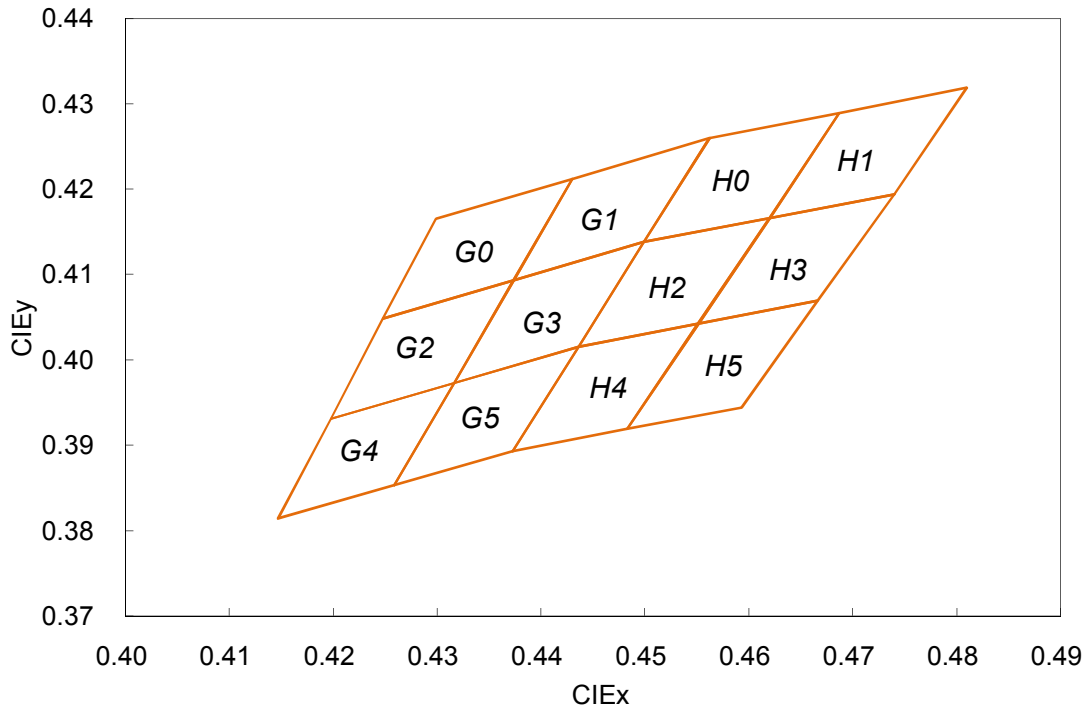


## 5. Radiation Pattern



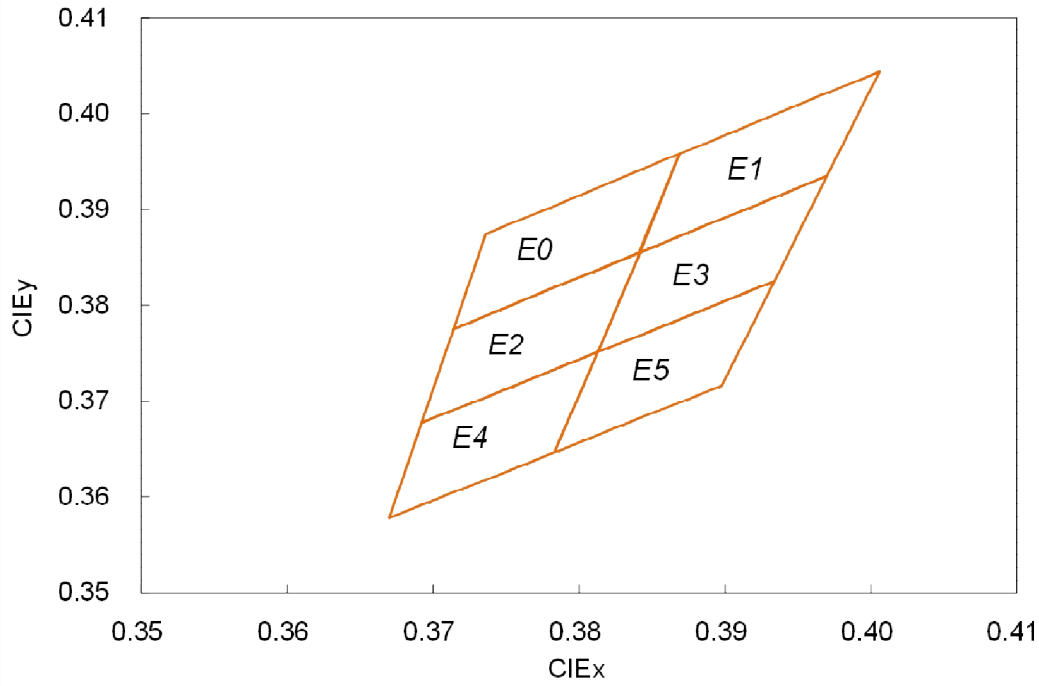
## 6. Color & Binning

### 6-1. Warm White Ansi binning structure range 2,600K(H) to 3,200K(G)



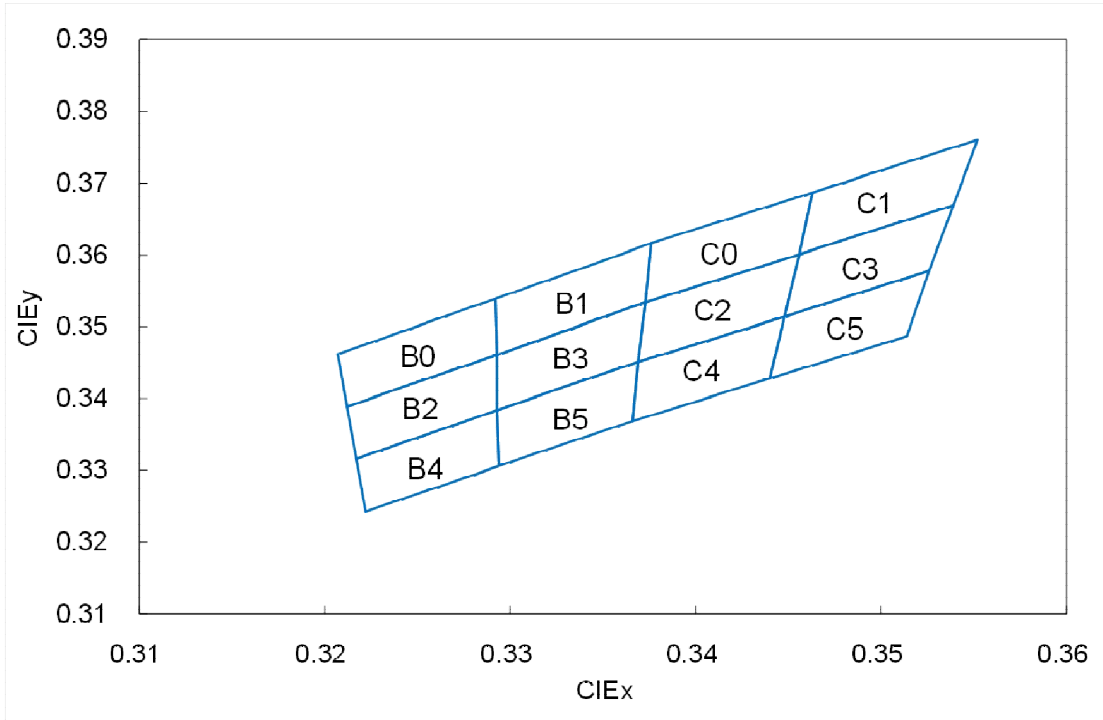
Bin code	X	Y	Bin code	X	Y	Bin code	X	Y
G0	0.4299	0.4165	G1	0.4430	0.4212	G2	0.4248	0.4048
	0.4248	0.4048		0.4374	0.4093		0.4198	0.3931
	0.4374	0.4093		0.4499	0.4138		0.4317	0.3973
	0.4430	0.4212		0.4562	0.4260		0.4374	0.4093
G3	0.4374	0.4093	G4	0.4198	0.3931	G5	0.4317	0.3973
	0.4317	0.3973		0.4147	0.3814		0.4259	0.3853
	0.4436	0.4015		0.4259	0.3853		0.4373	0.3893
	0.4499	0.4138		0.4317	0.3973		0.4436	0.4015
H0	0.4562	0.4260	H1	0.4687	0.4289	H2	0.4499	0.4138
	0.4499	0.4138		0.4620	0.4166		0.4436	0.4015
	0.4620	0.4166		0.4740	0.4194		0.4551	0.4042
	0.4687	0.4289		0.4810	0.4319		0.4620	0.4166
H3	0.4620	0.4166	H4	0.4436	0.4015	H5	0.4551	0.4042
	0.4551	0.4042		0.4373	0.3893		0.4483	0.3919
	0.4666	0.4069		0.4483	0.3919		0.4593	0.3944
	0.4740	0.4194		0.4551	0.4042		0.4666	0.4069

**6-2. Neutral White Ansi binning structure range 3,700K to 4,200K**



Bin code	X	Y	Bin code	X	Y	Bin code	X	Y
E0	0.3736	0.3874	E1	0.3869	0.3958	E2	0.3714	0.3775
	0.3714	0.3775		0.3842	0.3855		0.3692	0.3677
	0.3841	0.3855		0.3970	0.3935		0.3813	0.3751
	0.3869	0.3958		0.4006	0.4044		0.3842	0.3855
E3	0.3842	0.3855	E4	0.3692	0.3677	E5	0.3813	0.3751
	0.3813	0.3751		0.3670	0.3578		0.3783	0.3646
	0.3934	0.3825		0.3783	0.3646		0.3898	0.3716
	0.3970	0.3935		0.3813	0.3751		0.3934	0.3825

**6-3. Cool White Ansi binning structure range 4,700K to 6,000K**



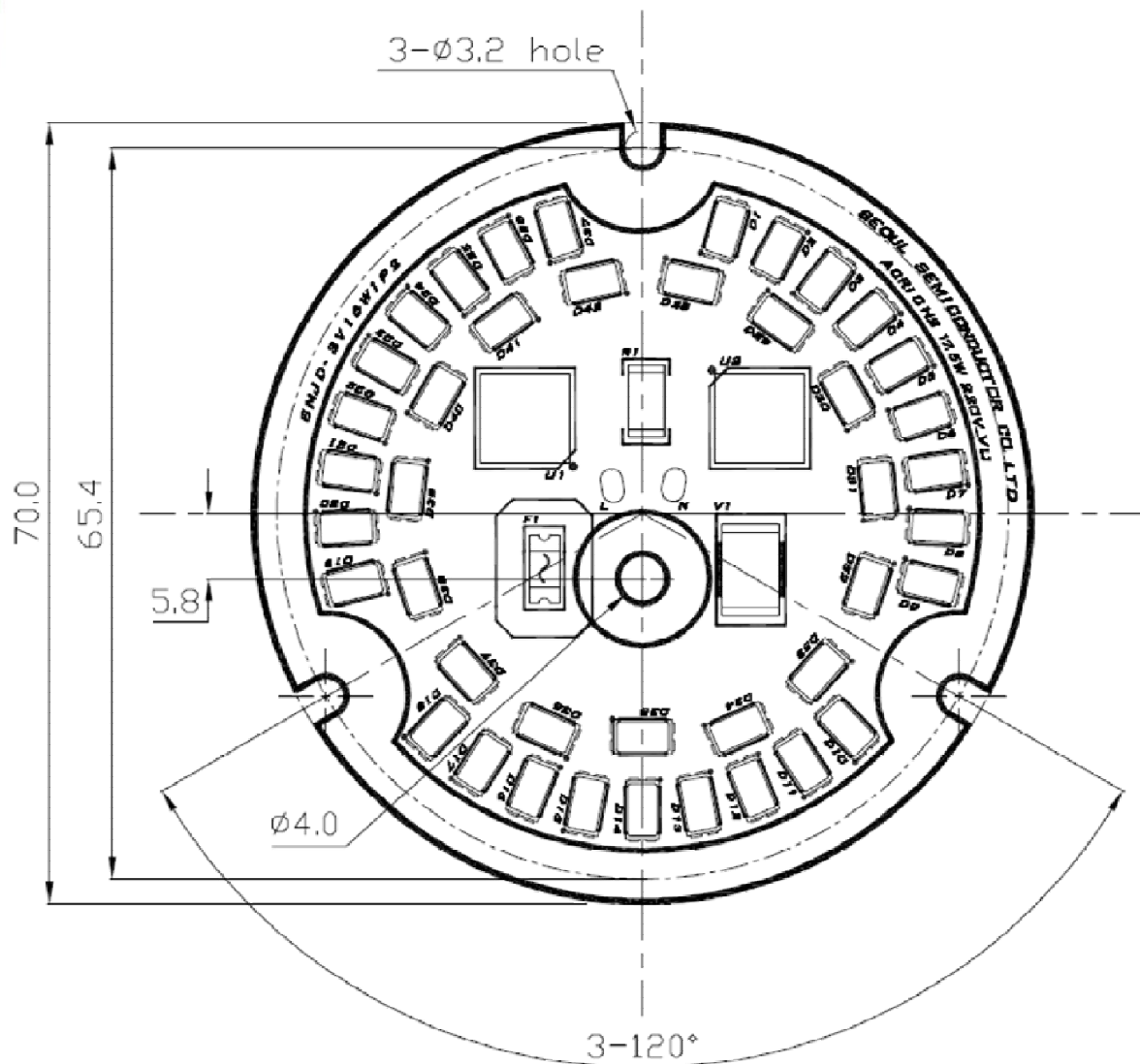
Bin code	X	Y	Bin code	X	Y	Bin code	X	Y
B0	0.3207	0.3462	B1	0.3292	0.3539	B2	0.3212	0.3389
	0.3212	0.3389		0.3293	0.3461		0.3217	0.3316
	0.3293	0.3461		0.3373	0.3534		0.3293	0.3384
	0.3292	0.3539		0.3376	0.3616		0.3293	0.3461
B3	0.3293	0.3461	B4	0.3217	0.3316	B5	0.3293	0.3384
	0.3293	0.3384		0.3222	0.3243		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
C0	0.3376	0.3616	C1	0.3463	0.3687	C2	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	0.3760		0.3456	0.3601
C3	0.3456	0.3601	C4	0.3369	0.3451	C5	0.3448	0.3514
	0.3448	0.3514		0.3366	0.3369		0.3440	0.3428
	0.3526	0.3578		0.3440	0.3428		0.3514	0.3487
	0.3539	0.3669		0.3448	0.3514		0.3526	0.3578

## 7. Marking



YYMMDD - Year / Month / date  
AABB - LED PKG Flux Rank / Color Bin Rank

## 8. Outline dimensions – 220V 17.5W Downlight



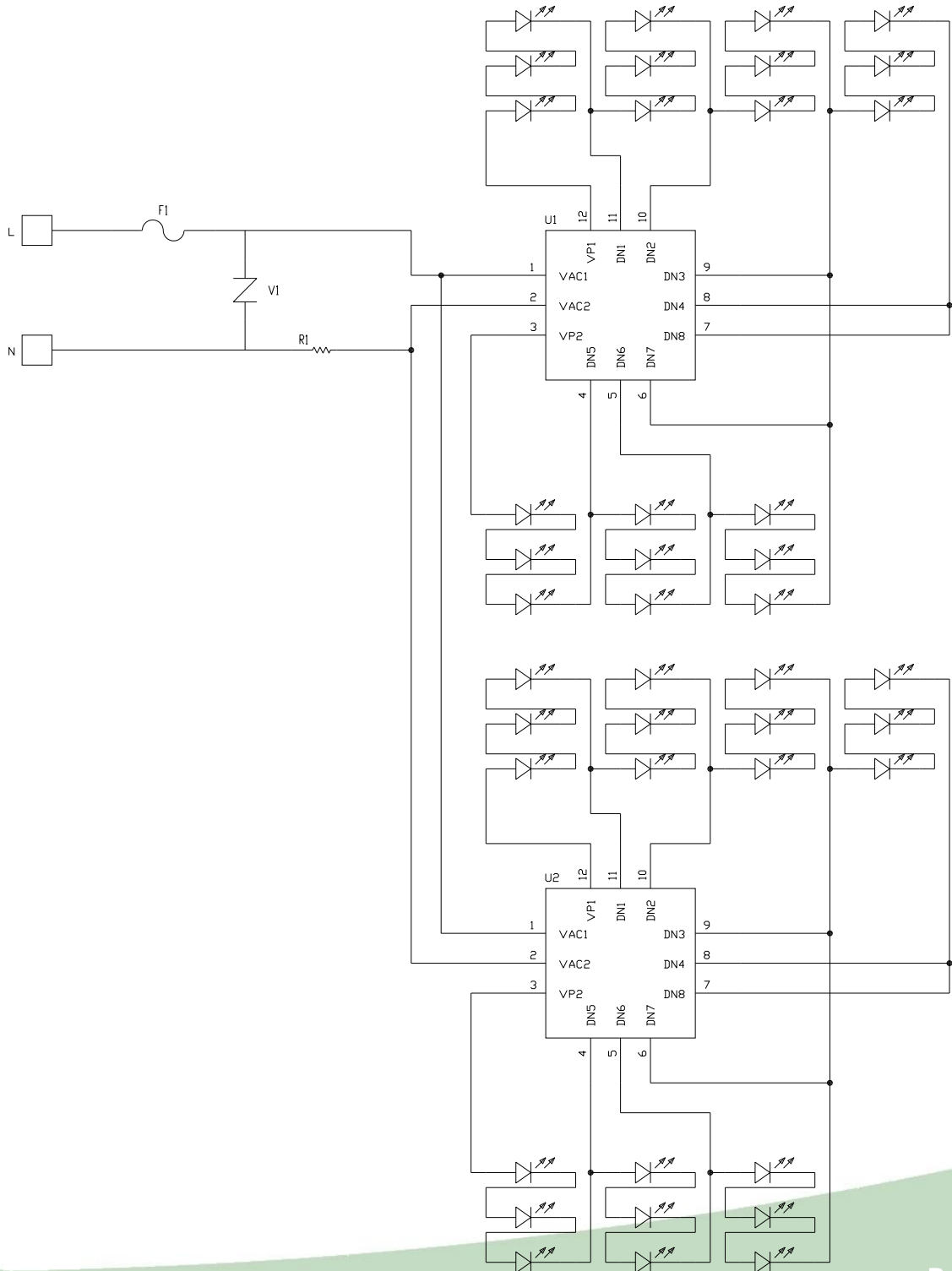
\* Notes :

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

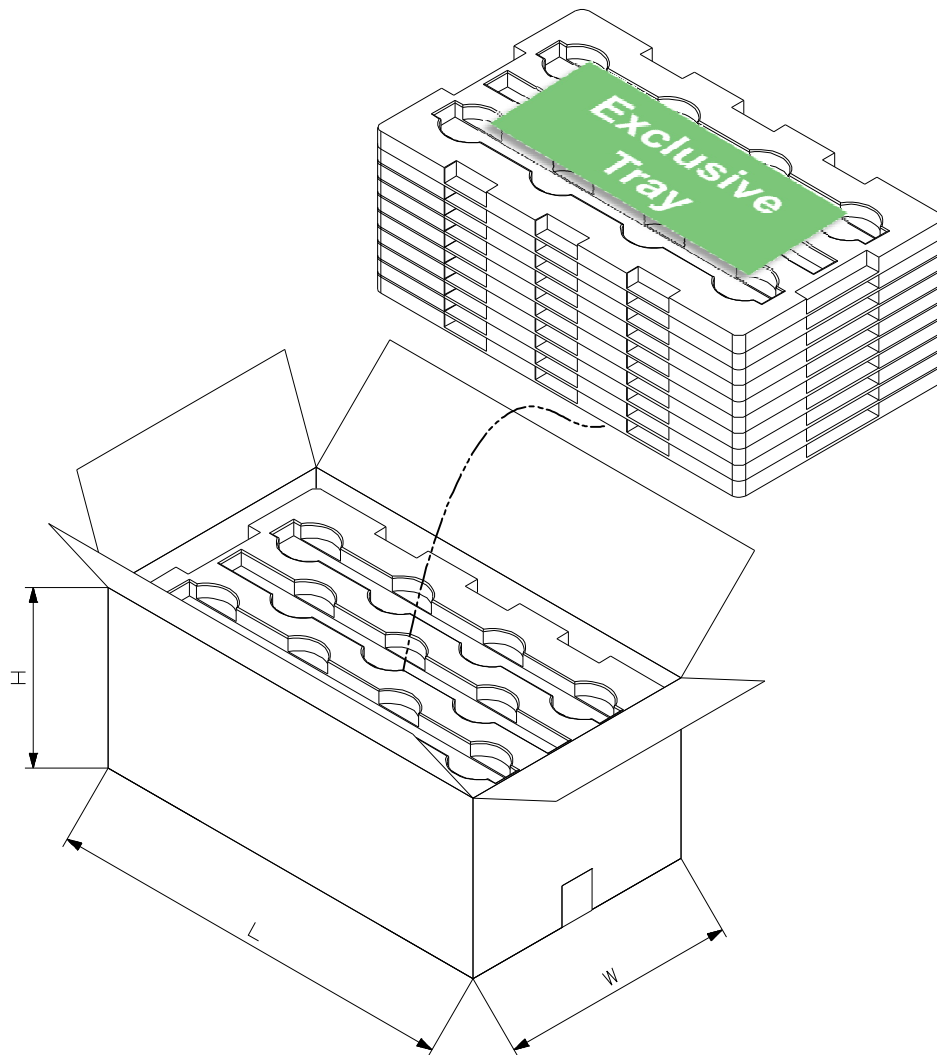
[2] Scale : none



## 9. Circuit Drawing



## 10. Packing



▪ 1Box : 20 PCS per tray x Max 10 layer = Max 200 PCS

about 6.5kg

▪ 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
- 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.

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