

# Specification

## SAWX5X0X (AX52X0-01)

SSC		고객명
Drawn	Approval	Approval

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## SAWX5X0X

### Description

The Acriche series of devices are designed for ease of implementation and readily connect to AC sources emitting very high flux while avoiding power losses associated with AC to regulated DC conversion.



Acriche is a long-lasting, environmentally friendly semiconductor light source that can be attached either directly to AC voltages.

Acriche's thermal management exceeds other power LED solutions incorporating state-of-the-art SMD technology, thermal path design, and materials.

Whether designing a spot light or tiled array the Acriche A5 is an ideal light source for general purpose illumination applications.

This application note provides binning and labeling information of A5 series. It includes the A5 bins for luminous flux, color coordinates and correlated color temperature for white.

### Features

- Connect directly in AC power
- Power Saving
- Long Life Time
- Simple BOM
- Miniaturization
- Low thermal resistance
- SMT solderability
- Lead Free product
- RoHS compliant

### Applications

- Architectural lighting
- Residential lighting
- Task lighting
- Decorative / Pathway lighting







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


**Part number**

**1. Part Number form : SA X<sub>1</sub> X<sub>2</sub> X<sub>3</sub> X<sub>4</sub> X<sub>5</sub> X<sub>6</sub> – X<sub>7</sub> X<sub>8</sub> X<sub>9</sub> X<sub>10</sub> X<sub>11</sub>**

<b>X<sub>1</sub> X<sub>2</sub></b>	<b>Color</b>	<b>W0</b>	Cool White
		<b>W8</b>	Warm White
<b>X<sub>3</sub></b>	<b>Acriche series</b>	<b>5</b>	A5 series
<b>X<sub>4</sub></b>	<b>Voltage</b>	<b>B</b>	100V / 110V / 120V, RMS
		<b>D</b>	220V / 230V, RMS
<b>X<sub>5</sub></b>	<b>PCB type</b>	<b>0</b>	Emitter
<b>X<sub>6</sub></b>	<b>Revision</b>	<b>X</b>	Internal code (Rev.0 : A / Rev.1 : B / Rev.2 : C)
<b>X<sub>7</sub> X<sub>8</sub></b>	<b>Brightness bin</b>	-	-
<b>X<sub>9</sub> X<sub>10</sub></b>	<b>Color bin</b>	-	-
<b>X<sub>11</sub></b>	<b>VF bin</b>	-	-

**2. Sticker Diagram on Reel & Aluminum Vinyl Bag**

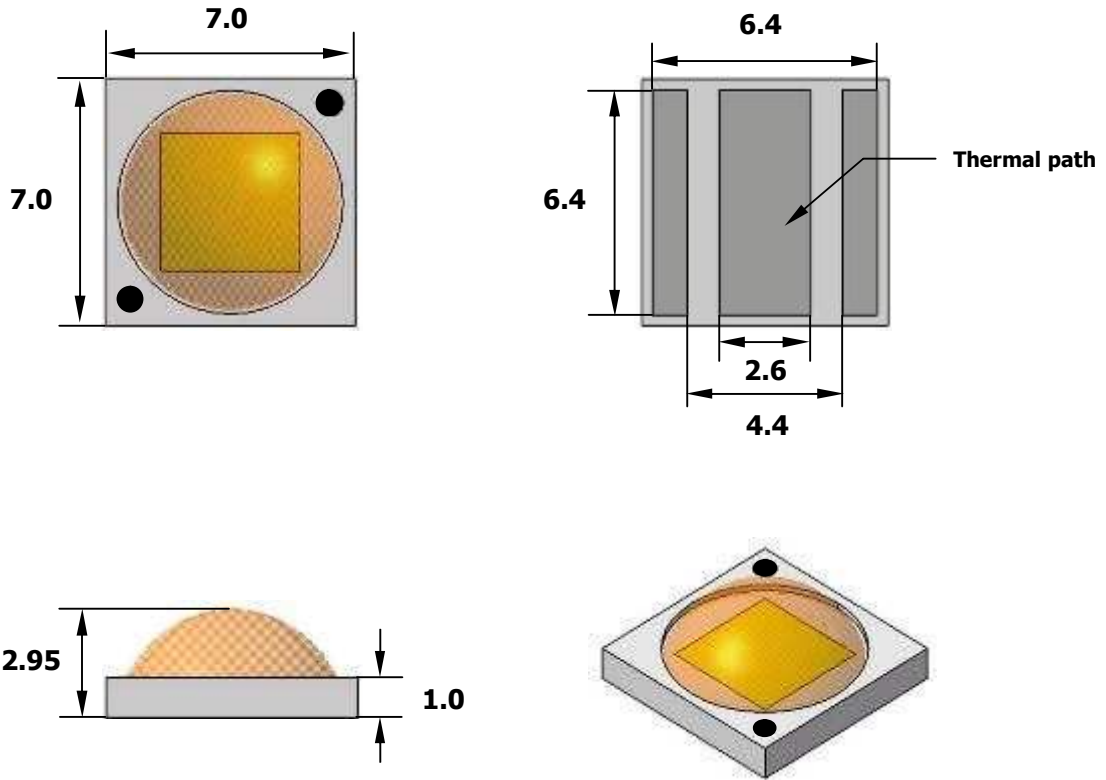
PART NO. : SA X<sub>1</sub> X<sub>2</sub> X<sub>3</sub> X<sub>4</sub> X<sub>5</sub> X<sub>6</sub>  
  
 QUANTITY : ###  
  
 LOT NUMBER : #####  
  
 BIN CODE : X<sub>7</sub> X<sub>8</sub> X<sub>9</sub> X<sub>10</sub> X<sub>11</sub>  




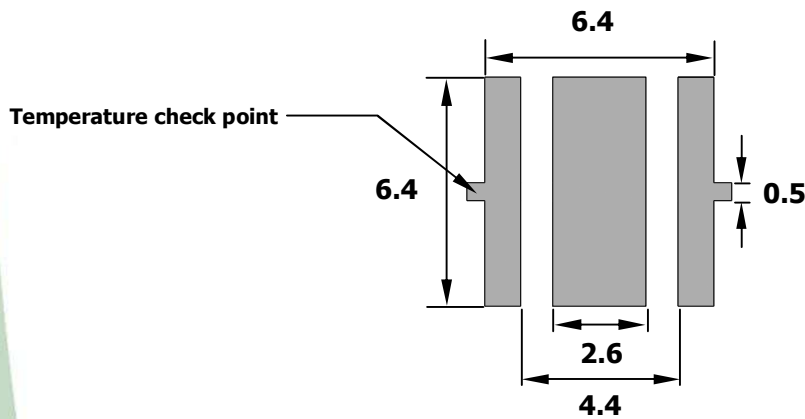
\* For more information about binning and labeling, refer to the SAWX5X0X Bin & Labeling

**Mechanical dimensions**

**1. Outline dimensions**



**2. Recommended PCB solder pad**



\* 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
- [4] Electrically neutral thermal path
- [5] Do not design solder-pad larger than recommended size.
- [6] Excess solder paste may form solder ball and create electrical short between internal pads.

Rev. 01

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서식번호 : SSC-QP-7-07-18 (Rev.00)

## Optical and thermal characteristics

### 1. SAW05B0X(AW5200-01)

1-1 Electro-Optical characteristics at 100V/110V/120V[RMS] Ta=25°C

Parameter	Symbol	Value			Unit
		Min	Typ	Max	
Luminous Flux <sup>[1]</sup>	$\Phi_V$ <sup>[2]</sup>	-	120	-	lm
Correlated Color Temperature <sup>[3]</sup>	CCT	-	6300	-	K
CRI	R <sub>a</sub>	-	70	-	-
Operating Current	I <sub>opt</sub>	-	20	-	mA [RMS]
Power Dissipation	P <sub>D</sub>	1.65			W
Operating Frequency	Freq	50 / 60			Hz
View Angle	2 $\theta$ 1/2	145			deg.

1-2 Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Operating Voltage	V <sub>opt</sub> <sup>[4]</sup>	115/127/138	V [RMS]
Power Dissipation	P <sub>D</sub>	-	W
Junction Temperature	T <sub>j</sub>	125	°C
Operating Temperature	T <sub>opr</sub>	-30 ~ +85	°C
Storage Temperature	T <sub>stg</sub>	-40 ~ +120	°C
ESD Sensitivity	-	±2,000V HBM	-

\* Notes :

[1] Acriche series maintains a tolerance of ±10% on flux and power measurements.

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

[3] Correlated Color Temperature is derived from the CIE 1931 Chromaticity diagram.  
CCT ±5% tester tolerance

[4] 'Operating Voltage' doesn't indicate the maximum voltage which customers use, but it means tolerable voltage according to the voltage variation rate by one's country.

It is recommended that the temperature of solder pad should be below 70°C.

## Optical and thermal characteristics

### 2. SAW05D0X(AW5220-01)

2-1 Electro-Optical characteristics at 220V/230V[RMS] Ta=25°C

Parameter	Symbol	Value			Unit
		Min	Typ	Max	
Luminous Flux <sup>[1]</sup>	$\Phi_V$ <sup>[2]</sup>	-	120	-	lm
Correlated Color Temperature <sup>[3]</sup>	CCT	-	6300	-	K
CRI	R <sub>a</sub>	-	70	-	-
Operating Current	I <sub>opt</sub>	-	10	-	mA [RMS]
Power Dissipation	P <sub>D</sub>	1.65			W
Operating Frequency	Freq	50 / 60			Hz
View Angle	2 $\theta$ 1/2	145			deg.

2-2 Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Operating Voltage	V <sub>opt</sub> <sup>[4]</sup>	253/265	V [RMS]
Power Dissipation	P <sub>D</sub>	-	W
Junction Temperature	T <sub>j</sub>	125	°C
Operating Temperature	T <sub>opr</sub>	-30 ~ +85	°C
Storage Temperature	T <sub>stg</sub>	-40 ~ +120	°C
ESD Sensitivity	-	±2,000V HBM	-

\* Notes :

[1] Acriche series maintains a tolerance of ±10% on flux and power measurements.

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

[3] Correlated Color Temperature is derived from the CIE 1931 Chromaticity diagram.  
CCT ±5% tester tolerance

[4] 'Operating Voltage' doesn't indicate the maximum voltage which customers use, but it means tolerable voltage according to the voltage variation rate by one's country.

It is recommended that the temperature of solder pad should be below 70°C.

## Optical and thermal characteristics

### 3. SAW85B0X(AN5200-01)

3-1 Electro-Optical characteristics at 100V/110V/120V [RMS] Ta=25°C

Parameter	Symbol	Value			Unit
		Min	Typ	Max	
Luminous Flux [1]	$\Phi_V$ [2]	-	80	-	lm
Correlated Color Temperature [3]	CCT	-	3000	-	K
CRI	$R_a$	-	80	-	-
Operating Current	$I_{opt}$	-	20	-	mA [RMS]
Power Dissipation	$P_D$	1.65			W
Operating Frequency	Freq	50 / 60			Hz
View Angle	$2\theta$ 1/2	135			deg.

3-2 Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Operating Voltage	$V_{opt}$ [4]	115/127/138	V [RMS]
Power Dissipation	$P_D$	-	W
Junction Temperature	$T_j$	125	°C
Operating Temperature	$T_{opr}$	-30 ~ +85	°C
Storage Temperature	$T_{stg}$	-40 ~ +120	°C
ESD Sensitivity	-	±2,000V HBM	-

\* Notes :

[1] Acriche series maintains a tolerance of ±10% on flux and power measurements.

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

[3] Correlated Color Temperature is derived from the CIE 1931 Chromaticity diagram.  
CCT ±5% tester tolerance

[4] 'Operating Voltage' doesn't indicate the maximum voltage which customers use, but it means tolerable voltage according to the voltage variation rate by one's country.  
It is recommended that the temperature of solder pad should be below 70°C.



## Optical and thermal characteristics

### 4. SAW85D0X(AN5220-01)

4-1 Electro-Optical characteristics at 220V/230V[RMS] Ta=25°C

Parameter	Symbol	Value			Unit
		Min	Typ	Max	
Luminous Flux <sup>[1]</sup>	$\Phi_V$ <sup>[2]</sup>	-	80	-	lm
Correlated Color Temperature <sup>[3]</sup>	CCT	-	3000	-	K
CRI	R <sub>a</sub>	-	80	-	-
Operating Current	I <sub>opt</sub>	-	10	-	mA [RMS]
Power Dissipation	P <sub>D</sub>	1.65			W
Operating Frequency	Freq	50 / 60			Hz
View Angle	2 $\theta$ 1/2	135			deg.

4-2 Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Operating Voltage	V <sub>opt</sub> <sup>[4]</sup>	253/265	V [RMS]
Power Dissipation	P <sub>D</sub>	-	W
Junction Temperature	T <sub>j</sub>	125	°C
Operating Temperature	T <sub>opr</sub>	-30 ~ +85	°C
Storage Temperature	T <sub>stg</sub>	-40 ~ +120	°C
ESD Sensitivity	-	±2,000V HBM	-

\* Notes :

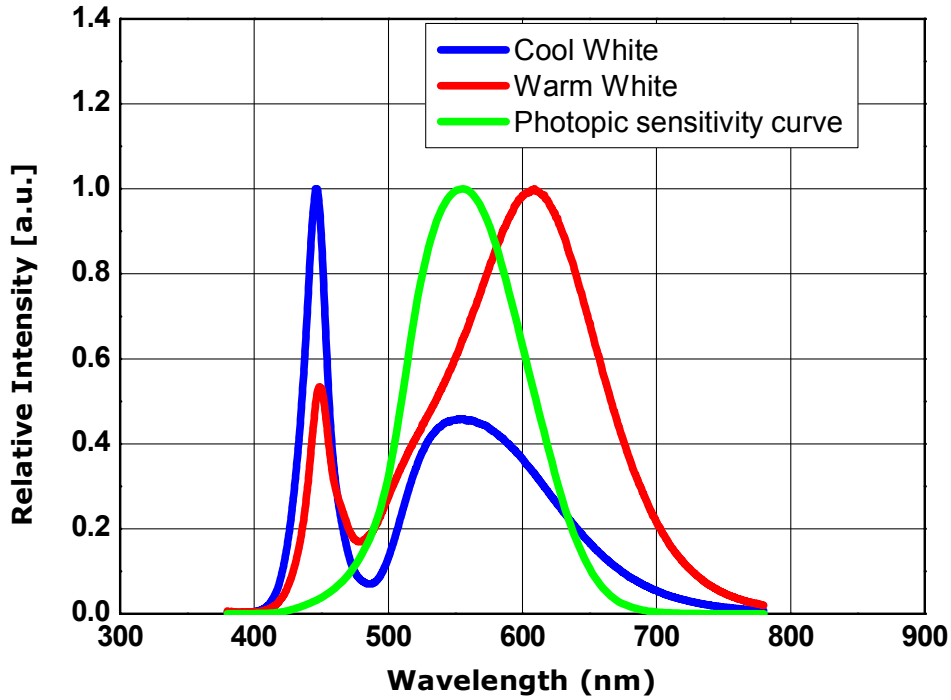
[1] Acriche series maintains a tolerance of ±10% on flux and power measurements.

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

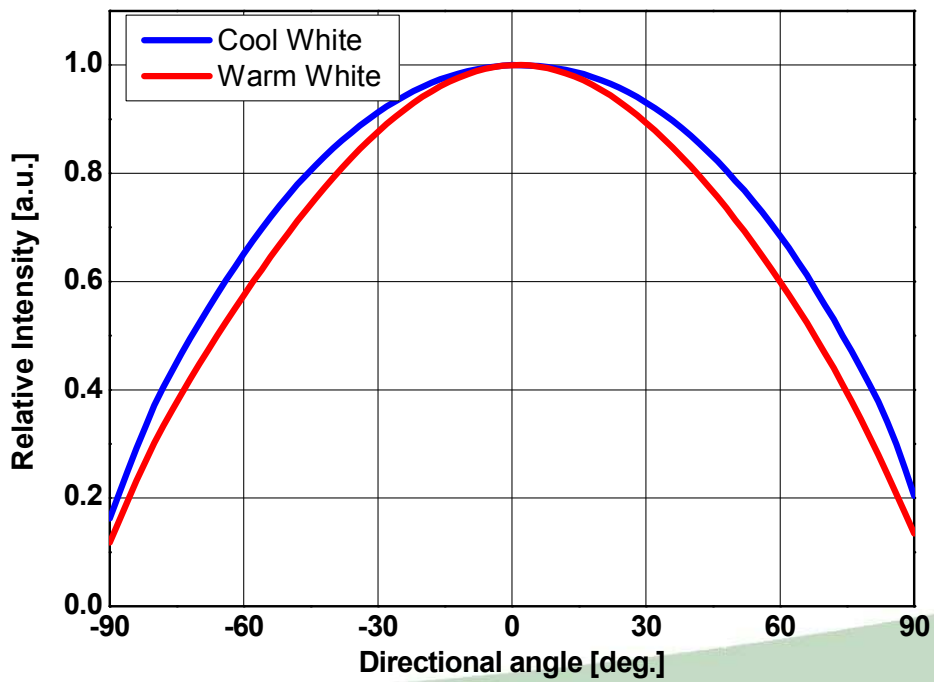
[3] Correlated Color Temperature is derived from the CIE 1931 Chromaticity diagram.  
CCT ±5% tester tolerance

[4] 'Operating Voltage' doesn't indicate the maximum voltage which customers use, but it means tolerable voltage according to the voltage variation rate by one's country.  
It is recommended that the temperature of solder pad should be below 70°C.

**Color spectrum, Ta=25°C**

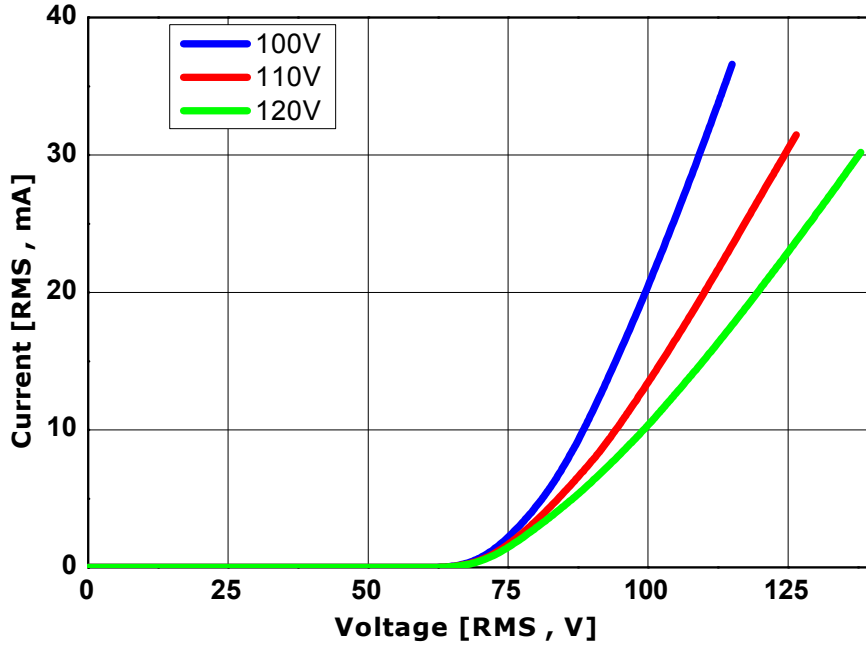


**Radiation pattern, Ta=25°C**

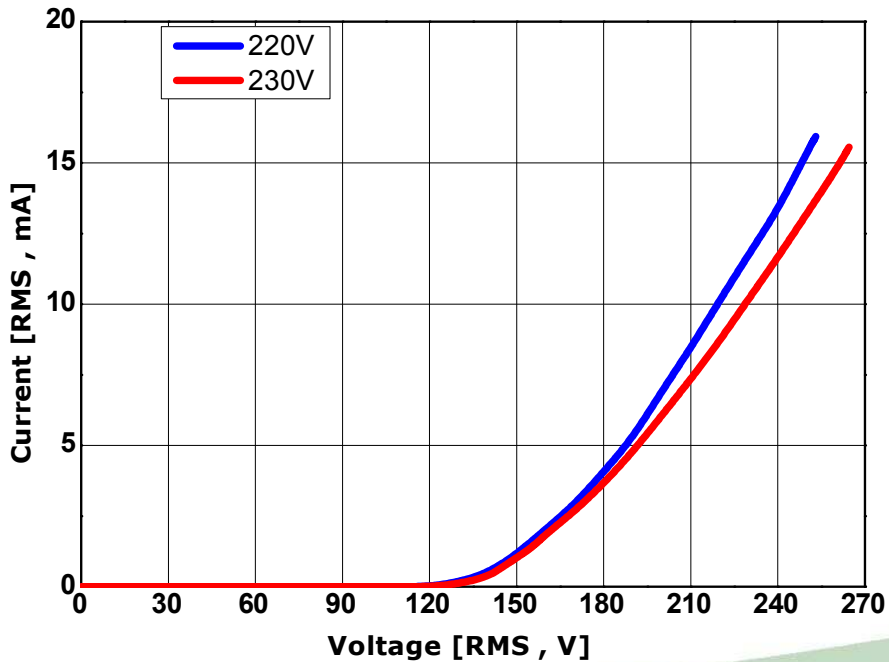


**I-V characteristics, Ta=25°C**

**1. SAWX5B0X with external resistor @ 100V and 110V, 120V**

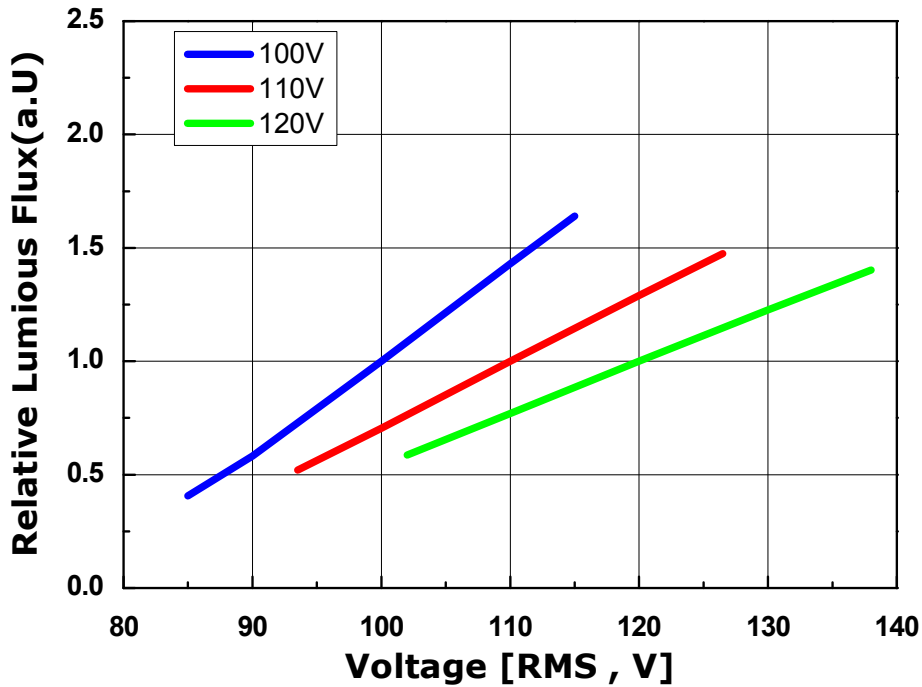


**2. SAWX5D0X with external resistor @ 220V and 230V**

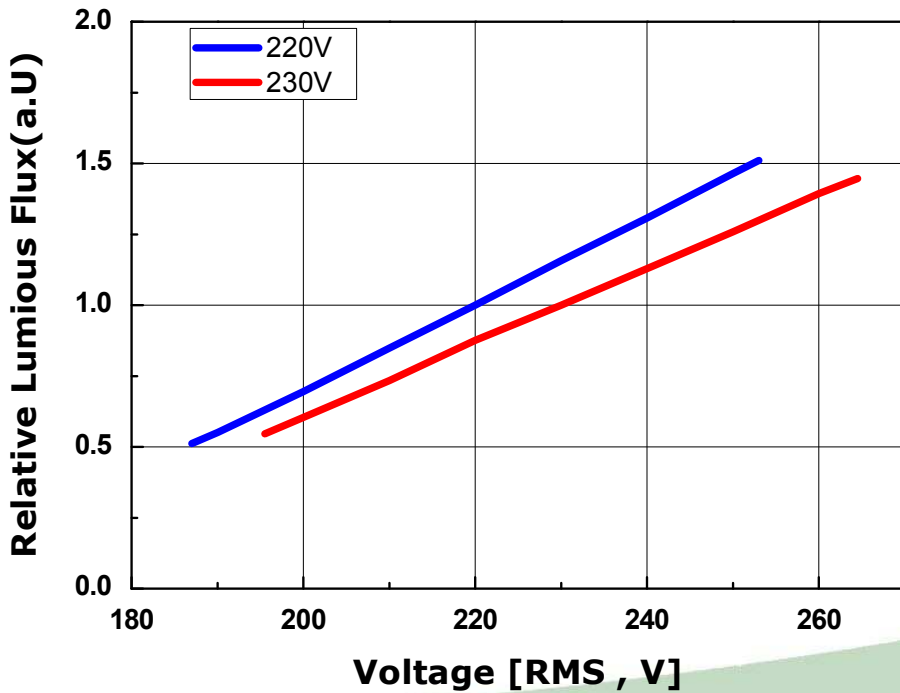


**Relative Flux vs. Forward voltage**

**1. SAWX5B0X with external resistor @ 100V and 110V, 120V**

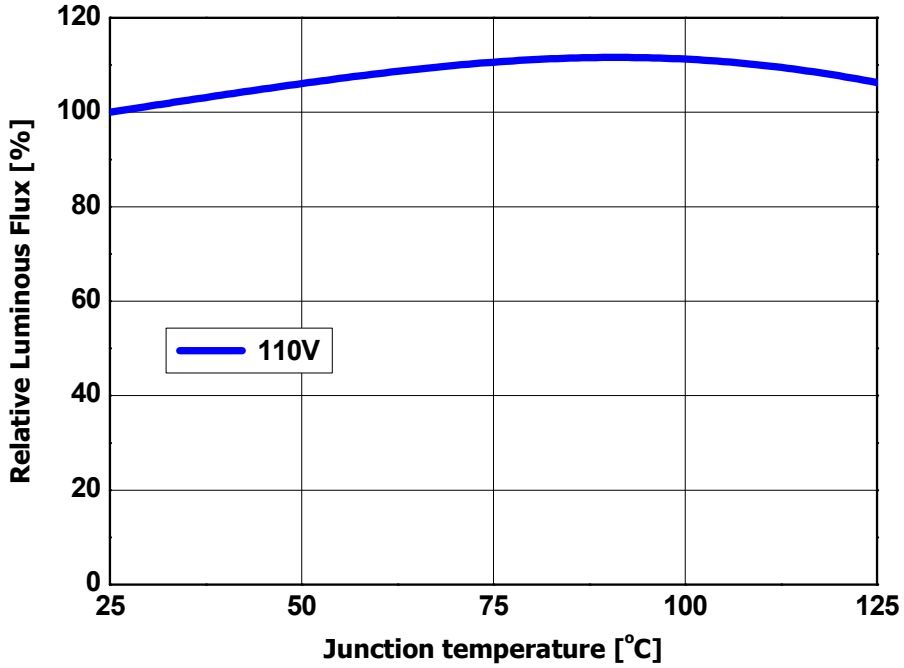


**2. SAWX5D0X with external resistor @ 220V and 230V**

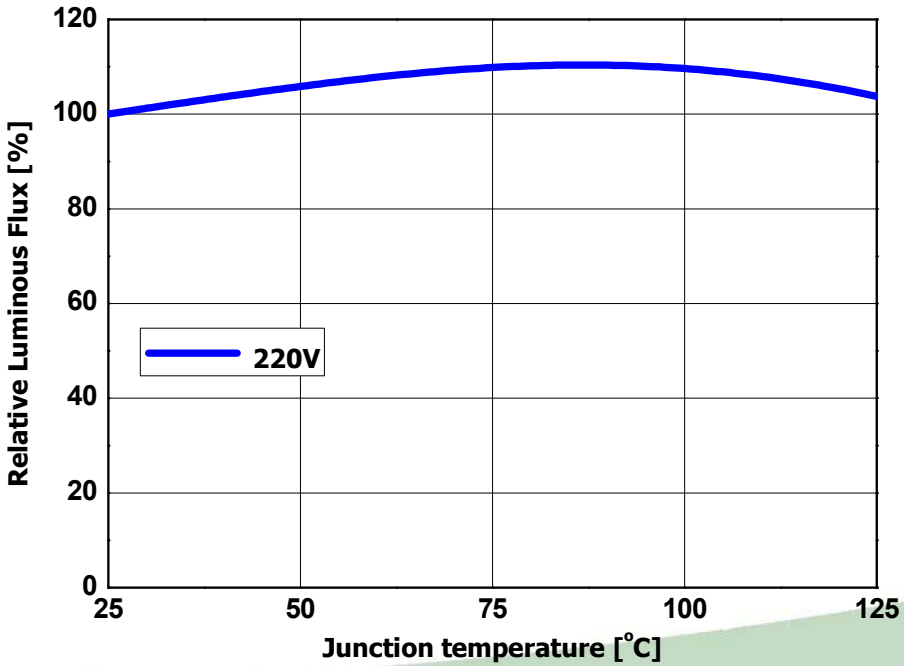


**Relative Flux vs. Junction temperature**

**1. SAWX5B0X with external resistor @110V**  
(20mA,RMS @ 110V,RMS / Tj=25°C, Initial point)

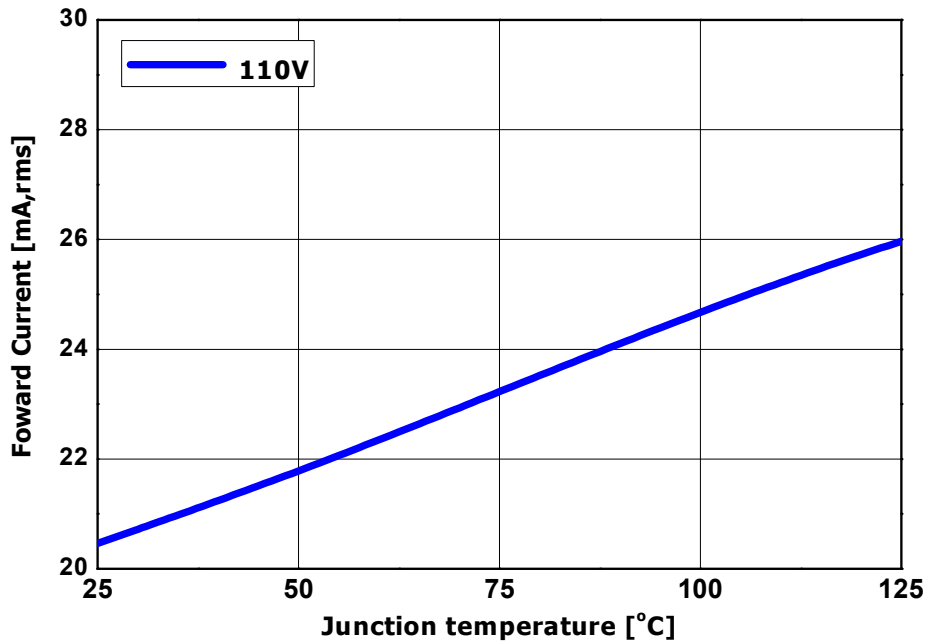


**2. SAWX5D0X with external resistor @220V**  
(10mA,RMS @ 220V,RMS / Tj=25°C, Initial point)

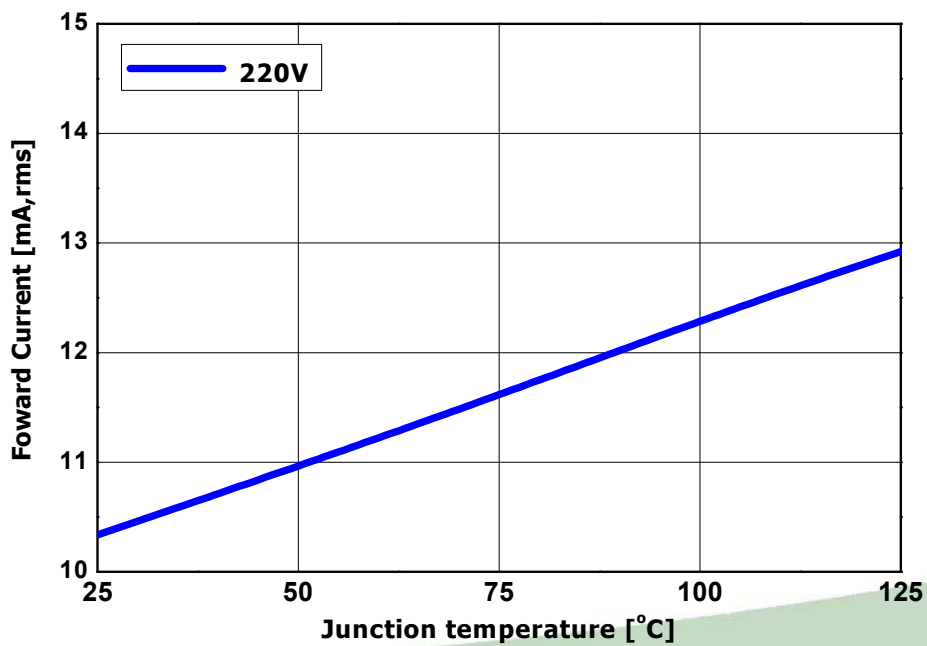


**Forward Current vs. Junction temperature**

**1. SAWX5B0X with external resistor @ 110V**  
(20mA,RMS @ 110V,RMS / Tj=25°C, Initial point)

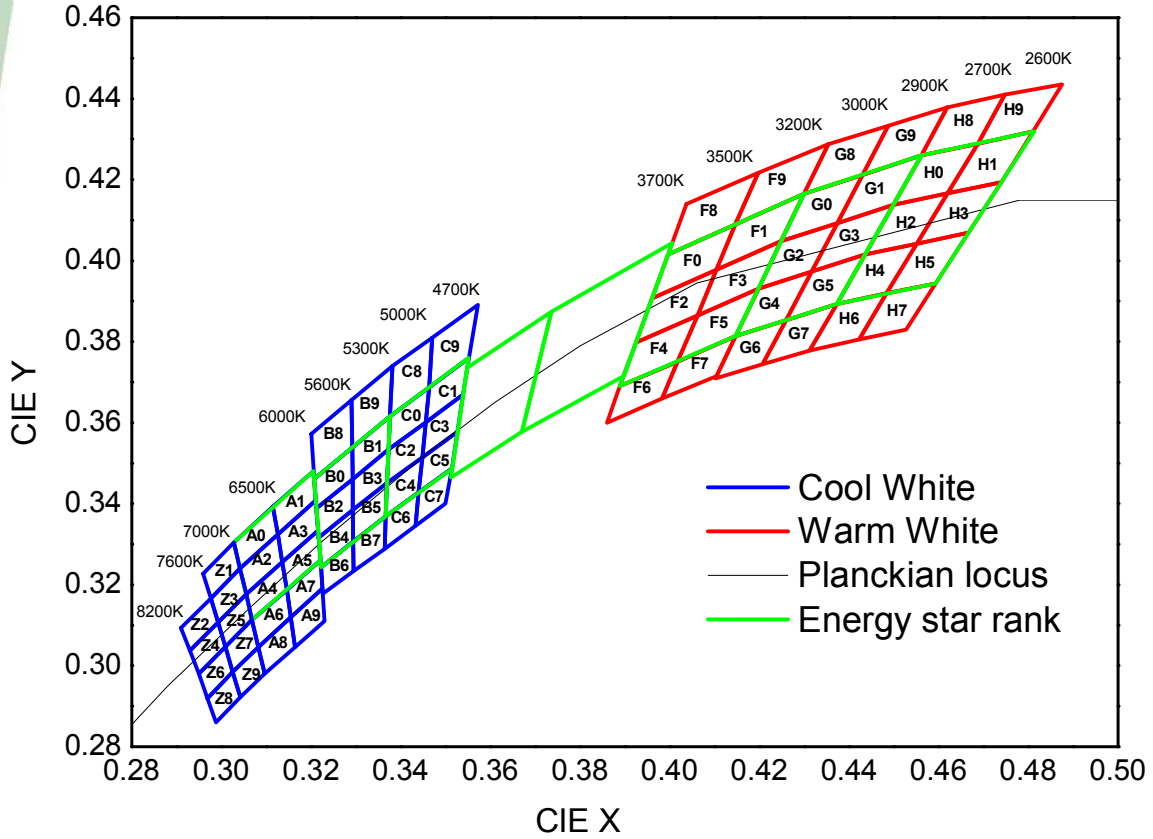


**2. SAWX5D0X with external resistor @ 220V**  
(10mA,RMS @ 220V,RMS / Tj=25°C, Initial point)



**Acriche Binning structure graphical representation**

**1. SAWX5X0X**

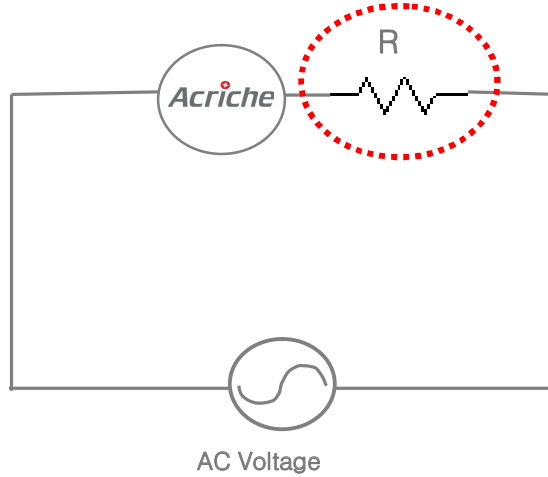


\*Notes : For more detailed information on Acriche binning see the "Binning and Labeling(A5 series)" document at [www.Acriche.com](http://www.Acriche.com)

## Operating and biasing instructions of SAWX5X0X(AX52X0-01)

### 1. Operating circuit

Attention: see notes 1 through 4 below



### 2. Resistor sheet

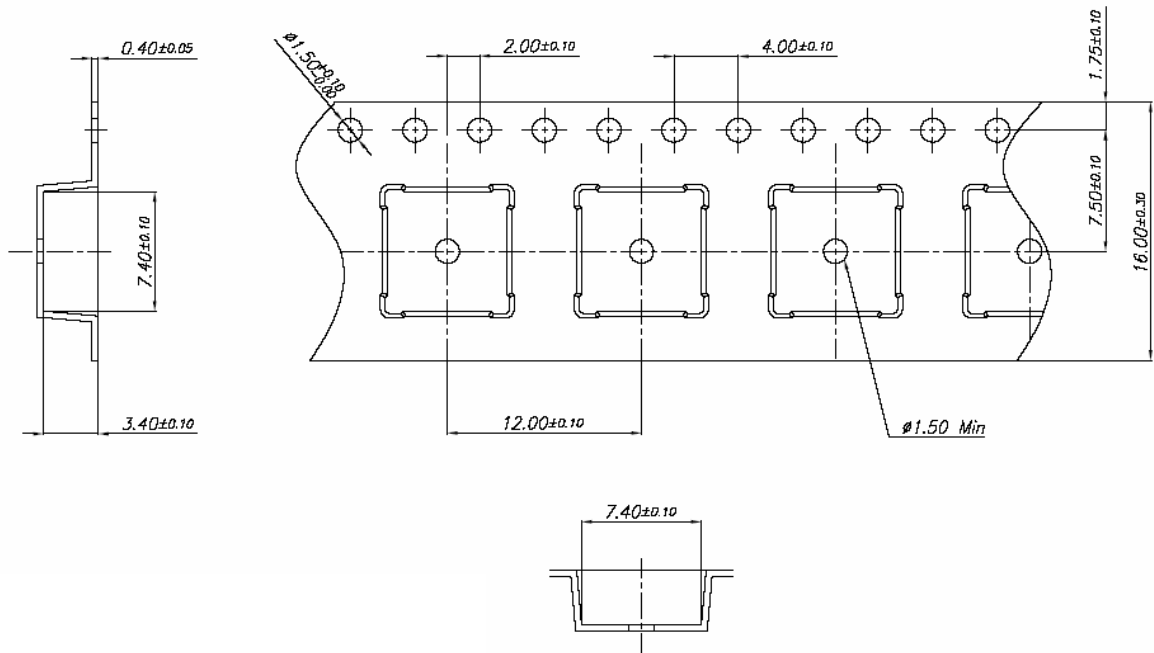
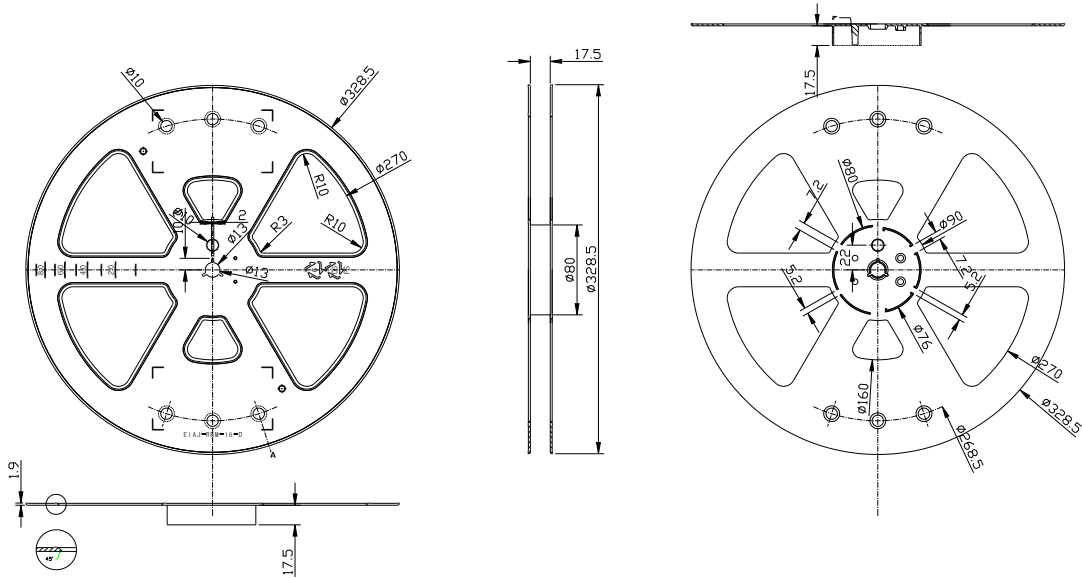
VF BIN code	SAWX5B0X (AX5200-01) [1]			SAWX5D0X (AX5220-01) [1]	
	Drive current : 20mA [RMS] [2]			Drive current : 10mA [RMS] [2]	
	Resistor value [3] [4]			Resistor value [3] [4]	
	100V	110V	120V	220V	230V
<b>A</b>	640 Ω	1120 Ω	1550 Ω	4500 Ω	5430 Ω
<b>B</b>	580 Ω	1020 Ω	1470 Ω	4230 Ω	4850 Ω
<b>C</b>	540 Ω	980 Ω	1430 Ω	3890 Ω	4830 Ω
<b>D</b>	420 Ω	850 Ω	1330 Ω	3490 Ω	4250 Ω

Notes :

- [1] External resistor is required for proper Acriche biasing.
- [2] Drive current and voltage levels must not cause Acriche to operate outside Absolute Maximum Rating for power dissipation in table 1-2.
- [3] Drive current tolerance is ±10% on each resistor value.
- [4] Resistor power value must be taken into consideration when choosing the type of resistor.  
[rated power = operating current<sup>2</sup> X resistance]



**Emitter Reel Packaging**

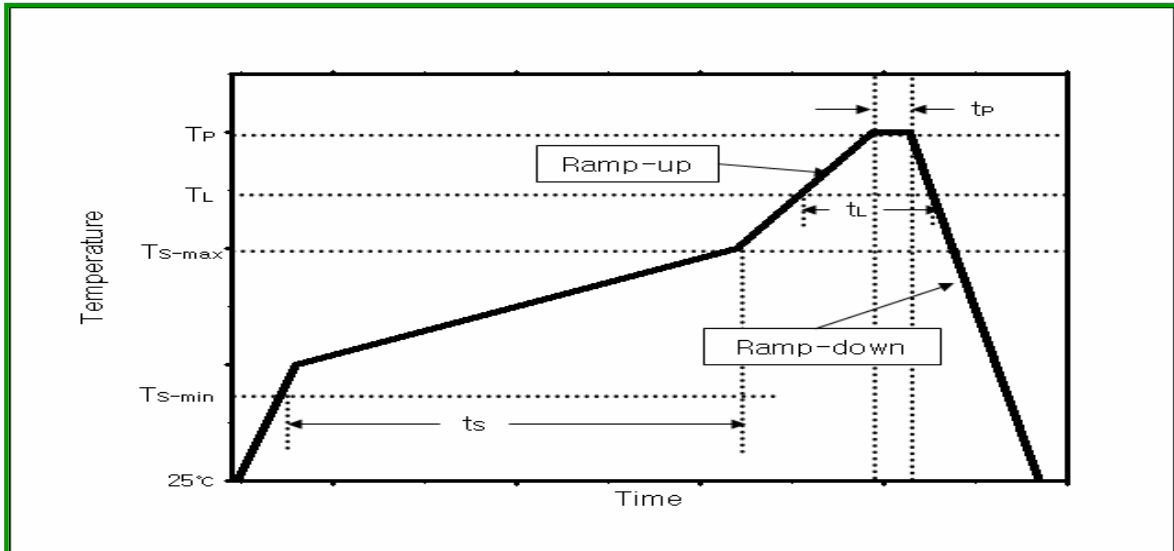


\* Notes :

- [1] The number of loaded products in the reel is 500 or 1000ea
- [2] All dimensions are in millimeters (tolerance :  $\pm 0.2$ )
- [3] Scale none

**Solder profile**

**1. Reflow solder conditions / profile**



Reflow condition	Pb-Free assembly
Average ramp-up rate (TS-max to Peak)	2~3°C / second
Preheat Temperature Min (TS-min)	150°C
Preheat Temperature Max (TS-max)	200°C
Time maintained above: : Liquidus Temperature (TL)	217~220°C
Time maintained above: Time (tL)	60~150 seconds
Peak Temperature (TP)	250°C
Time within 5°C of actual Peak Temperature (tp)	20~40 seconds
ramp-down rate	4~6°C / second
Time 25°C to Peak Temperature	6 minutes max

**2. Hand Solder conditions**

- 2-1 Lead : Not more than 3 seconds @MAX280°C
- 2-2 Slug : Use a thermal-adhesives

**\* Caution**

- [1] Reflow soldering should not be done more than one time.
- [2] Repairing should not be done after the LEDs have been soldered. When repairing is unavoidable, suitable tools have to 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.
- [6] Recommend to use a convection type reflow machine with 7 ~ 8 zones.

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### Precautions for use

- [1] 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
- [2] Please do not touch any of the circuit board, components or terminals with bare hands or metal while circuit is electrically active.
- [3] Please do not add or change wires while Acrich circuit is active

### Handling of silicone resin for LEDs

- [1] Acrich series is encapsulated by silicone resin for the highest flux efficiency.
- [2] Avoid touching silicone resin portion of LED especially with sharp tools such as Pincette (tweezers).
- [3] Avoid leaving fingerprints on silicone resin parts.
- [4] Silicone resin is dust sensitive and needs a covered container for storage
- [5] When populating boards in SMT production there are no unusual restrictions regarding the form of the pick and place nozzle except that mechanical stress on the surface of the resin must be avoided.
- [6] Please do not apply diagonal force to the silicone lens in excess of 3000gf or permanent and fatal damage will occur.
- [7] Please do not cover the silicone resin with any other resin (epoxy, urethane, etc)