



RoHS

MESSRS: \_\_\_\_\_

APPROVAL NO

730 - 021

DATE

2016.01.15

ALUMINUM ELECTROLYTIC

**CAPACITOR****APPROVAL SHEET**

CATALOG TYPE	MVK SERIES
USER PART NO.	
适用机种	
特记事项	Halogen-Free

QINGDAO SAMYOUNG ELECTRONICS CO.,LTD

MANAGER OF DEVELOPMENT DEPARTMENT

**GONG JANG SUG**

USER APPROVAL: \_\_\_\_\_

APPROVAL NO.: \_\_\_\_\_

SamYoung(Korea) : 47,SAGIMAKGOL-RO,JUNGWON-GU,SEONGNAM-SI,GYEONGGI-DO,KOREA

SamYoung(China) : No.5 CHANGJIANG ROAD,PINGDU-CITY,SHANDONG-PROVINCE,CHINA

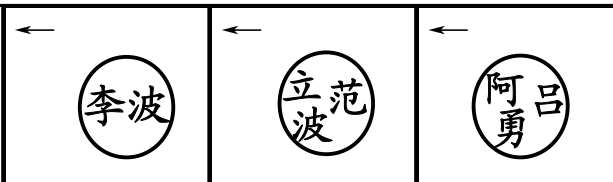
样式: H-1001-011

A4 (210×297)

**SamYoung Electronics Co., Ltd.**

**SPECIFICATIONS**

Item	Characteristics								
Rated Voltage Range	6.3 ~ 450 V <sub>DC</sub>								
Operating Temperature Range	- 40 ~ + 105 °C								
Capacitance Tolerance	±20%(M) (at 20 °C, 120Hz)								
Leakage Current	Rated Voltage(V <sub>DC</sub> )	6.3 ~ 100						160 ~ 450	
	Max. Leakage current(μA)	0.01CV (μA) or 3μA, whichever is greater ( at 20°C, 2minutes )						0.04CV + 100 (μA) ( at 20°C, 1minute )	
	Where, C : Nominal capacitance (μF) , V : Rated Voltage (V <sub>DC</sub> )								
Dissipation Factor Tanδ (Max.)	Rated voltage(V <sub>DC</sub> )	6.3	10	16	25	35	50~100	160~250	400~450
	Φ4 ~ Φ6.3	0.30	0.24	0.20	0.16	0.14	0.12	-	-
	Φ8 ~ Φ18	0.40	0.30	0.26	0.16	0.14	0.12	0.15	0.20
(at 120Hz, 20°C)									
Temperature characteristics ( Max. Impedance ratio ) ( at 120Hz )	Rated Voltage (V <sub>DC</sub> )	6.3	10	16	25	35	50~100	160~250	400~450
	Z(-25°C)/Z(20°C)	4	3	2	2	2	3	3	6
	Z(-40°C)/Z(20°C)	10	8	6	4	3	4	6	10
Load Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after the rated voltage is applied with the following conditions. Φ4~Φ6.3: 105°C, 1000 hours, Φ8~Φ18: 105°C, 2000 hours								
	Capacitance change								
	Φ4~Φ6.3 : ≤± 30% of the initial Value								
	Φ8~Φ18 : ≤± 20% of the initial Value								
	TANδ								
Φ4~Φ6.3 : ≤300% of the initial specified value									
Φ8~Φ18 : ≤200% of the initial specified value									
Leakage current : ≤The initial specified value									
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them for the specified time at 105°C without voltage applied. The rated voltage shall be applied to the capacitors for a minimum of 30 minutes, at least 24 hours and not more than 48 hours before the measurements. Φ4~Φ6.3: 105°C, 500 hours, Φ8~Φ18: 105°C, 1000 hours								
	Capacitance change								
	Φ4~Φ6.3 : ≤± 25% of the initial Value								
	Φ8~Φ18 : ≤± 20% of the initial Value								
	TANδ : ≤200% of the initial specified value								
Leakage current : ≤The initial specified value									
Others	Satisfies characteristic <u>KS C IEC 60384-4</u>								



# ALUMINUM ELECTROLYTIC CAPACITOR

APPROVAL NO.  
730 - 021

## DIMENSIONS OF MVK Series

**Dimensions**

**Marking**

**Recommended solder land on PC board**

**[D55 to J10]**      **[K14 to M22]**

Note1: L±0.5 for 8×6.3(H63) ~ 18×21.5(M22)  
 Note2: 4×5.2(D55), 5×5.2(E55) is excluded symbol mark.  
 Note3: 6.3WV is marked by 6V.

Case code	ΦD	L	A	B	C	W	P	a	b	c
D55	4	5.2	4.3	4.3	5.1	0.5-0.8	1.0	1.0	2.6	1.6
E55	5	5.2	5.3	5.3	5.9	0.5-0.8	1.4	1.4	3.0	1.6
F55	6.3	5.2	6.6	6.6	7.2	0.5-0.8	1.9	1.9	3.5	1.6
F60	6.3	5.7	6.6	6.6	7.2	0.5-0.8	1.9	1.9	3.5	1.6
F80	6.3	7.7	6.6	6.6	7.2	0.5-0.8	1.9	1.9	3.5	1.6
H63	8	6.3	8.3	8.3	9.0	0.5-0.8	2.3	2.3	4.5	1.6
H10	8	10	8.3	8.3	9.0	0.7-1.1	3.1	3.1	4.2	2.2
J10	10	10	10.3	10.3	11.0	0.7-1.1	4.5	4.5	4.4	2.2
K14	12.5	13.5	13.0	13.0	13.7	1.0-1.3	4.2	4.0	5.7	2.5
L17	16	16.5	17.0	17.0	18.0	1.0-1.3	6.5	6.0	6.9	2.5
L22	16	21.5	17.0	17.0	18.0	1.0-1.3	6.5	6.0	6.9	2.5
M17	18	16.5	19.0	19.0	20.0	1.0-1.3	6.5	6.0	7.9	2.5
M22	18	21.5	19.0	19.0	20.0	1.0-1.3	6.5	6.0	7.9	2.5

## RATINGS OF MVK Series

μF	6.3		10		16		25		35		50		63		100	
	V <sub>DC</sub>		V <sub>DC</sub>		V <sub>DC</sub>		V <sub>DC</sub>		V <sub>DC</sub>		V <sub>DC</sub>		V <sub>DC</sub>		V <sub>DC</sub>	
0.1											D55	1.3	D55	1.3		
0.22											D55	2.6	D55	3.0		
0.33											D55	3.2	D55	4.0		
0.47											D55	3.8	D55	5.0		
1											D55	7.0	D55	8.0		
2.2											D55	10	D55	12		
3.3											D55	14	E55	17		
4.7											D55	15	E55	20		
10											E55	19	E55	20		
22	D55	21	E55	30	D55	16	E55	25	E55	25	F55	29	F60	32	H63	48
33	E55	34	E55	34	F55	30	F55	40	F55	40	H63	70	H10	80	H10	90
47	E55	36	F55	48	F55	16	E55	35	F55	45	F55	45	F60	48	F80	60
100	F55	56	F60	90	F55	45	F55	49	H63	80	H63	80	H10	140	H10	145
150	E55	38			F55	45	F55	49	F60	80	F60	140	H10	170	H10	180
220	H63	150	F80	150	F55	75	F60	135	H10	135	H10	135	J10	310	K14	380
330	F80	127	F55	75	F80	150	F80	135	H10	135	H10	135	J10	310	K14	380
470	J10	290	J10	450	F80	275	F80	275	H10	275	H10	275	J10	450	K14	480
1000	J10	460	J10	460	J10	450	J10	450	K14	480	K14	500	L17	700	L17	700
1500	J10	520	J10	540	J10	460	J10	460	K14	520	K14	500	L17	700	M17	900
2200	J10	430	J10	540	J10	540	J10	540	K14	520	K14	500	L17	700	M17	900
3300	J10	550	J10	620	J10	550	J10	550	K14	550	K14	500	L17	700	M17	900
4700	J10	680	J10	850	J10	680	J10	680	K14	750	K14	500	L17	700	M17	900
6800	J10	1000	J10	1100	J10	1000	J10	1000	K14	1200	K14	500	L17	700	M17	900
	J10	1200	J10	1350	J10	1200	J10	1200	K14	1450	K14	500	L17	700	M17	900
	J10	1350	J10	1350	J10	1350	J10	1350	K14	1450	K14	500	L17	700	M17	900

μF	160		200		250		400		450	
	V <sub>DC</sub>		V <sub>DC</sub>		V <sub>DC</sub>		V <sub>DC</sub>		V <sub>DC</sub>	
3.3										
4.7										
10	J10	45	K14	80	L17	100	L17	85	L17	85
22	K14	85	K14	85	L17	180	M22	130	M22	130
33	K14	95	L17	220	M17	230				
47	L17	260	M17	270	M22	280				
68	M17	320	M22	330						
100	L22	380								

Rated ripple Current(mArms/105°C, 120Hz)  
Case code



# ALUMINUM ELECTROLYTIC CAPACITOR

APPROVAL NO.

730 - 021

## TAPING DIMENSIONS

FIG.1

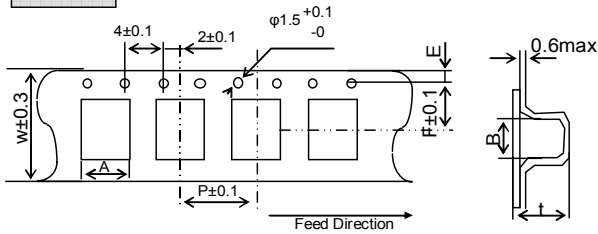


FIG.2

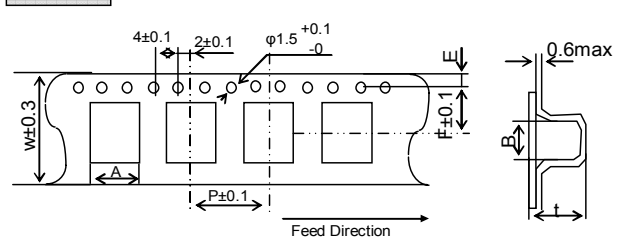


FIG.3

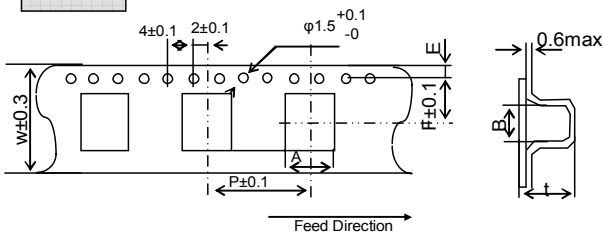
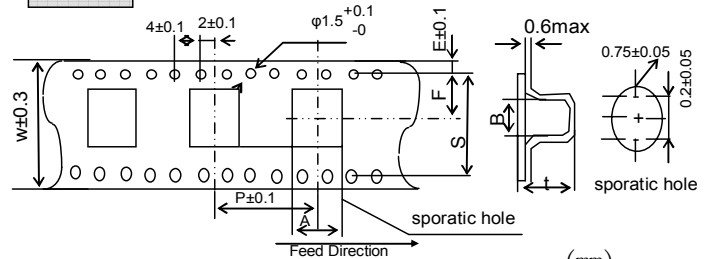
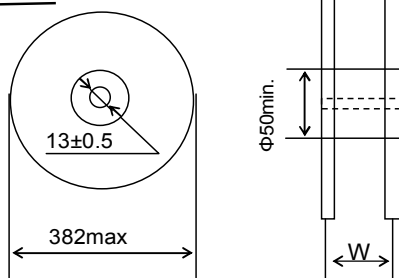


FIG.4



Case code	Fig	W	A	B	F	E	P	t	S
φ3 (B55)	1	12	3.5±0.2	3.5±0.2	5.5	1.75±0.1	8	5.9±0.2	—
φ4 (D55, D56, D60)	1	12	4.7±0.2	4.7±0.2	5.5	1.75±0.1	8	5.7±0.2 (D55, D56)	—
φ5 (E55, E56, E60)	2	12	5.7±0.2	5.7±0.2	5.5	1.75±0.1	12	5.7±0.2 (E55, E56)	—
φ6.3 (F55, F56, F60)	2	16	7.0±0.2	7.0±0.2	7.5	1.75±0.1	12	5.7±0.3 (F55, F56)	—
φ6.3x8L (F80)	2	16	7.0±0.2	7.0±0.2	7.5	1.75±0.1	12	8.2±0.2	—
φ8x6L (H63)	2	16	8.7±0.2	8.7±0.2	7.5	1.75±0.1	12	6.8±0.2	—
φ8x6.7L (H70)	2	24	8.7±0.2	8.7±0.2	11.5	1.75±0.1	12	7.3±0.2	—
φ8x10L (H10)	3	24	8.7±0.2	8.7±0.2	11.5	1.75±0.1	16	11.0±0.2	—
φ8x11.5L (H12)	3	24	8.7±0.2	8.7±0.2	11.5	1.75±0.1	16	12.3±0.2	—
φ10x10L (J10)	3	24	10.7±0.2	10.7±0.2	11.5	1.75±0.1	16	11.0±0.2	—
φ10x12.2L (J12)	3	24	10.7±0.2	10.7±0.2	11.5	1.75±0.1	16	13.0±0.2	—
φ12.5x13.5L (K14)	4	32	13.4±0.2	13.4±0.2	14.5	1.75±0.1	24	14.0±0.2	28.4±0.1

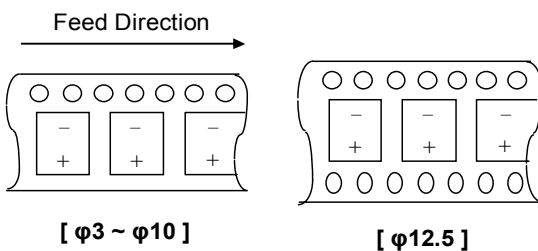
## REEL



## QUANTITY PER REEL

Case code	W (mm)	Qty (pcs/reel)	Qty (pcs/box)
φ3 (B55)	14	2,000	20,000
φ4 (D55, D56, D60)	14	2,000	20,000
φ5 (E55, E56, E60)	14	1,000	10,000
φ6.3 (F55, F56, F60)	18	1,000	10,000
φ6.3x8L (F80)	18	900	9,000
φ8x6L (H63)	18	1,000	10,000
φ8x6.7L (H70)	26	1,000	6,000
φ8x10L (H10)	26	500	3,000
φ8x11.5L (H12)	26	400	2,400
φ10x10L (J10)	26	500	3,000
φ10x12.2L (J12)	26	400	2,400
φ12.5x13.5L (K14)	34	200	1,000

## ORIENTATION OF POLARITY



**ALUMINUM ELECTROLYTIC CAPACITOR****APPROVAL NO:**  
**730 - 021****CE32 TYPE****MINIATURE SIZED TYPE CAPACITORS COMPONENT**

<b>PART NAME</b>	<b>MATERIALS</b>	<b>VENDER</b>
<b>LEAD WIRE</b>	<b>TINNED COPPER - PLY WIRE(PB-FREE)</b>	<b>KISTRON (KOREA/CHINA)</b> <b>KOHOKU (JAPAN/CHINA)</b> <b>NANTONG HONGYANG (CHINA)</b>
<b>AL LEAD</b>	<b>ALUMINUM 99.92%</b>	<b>KISTRON (KOREA/CHINA)</b> <b>KOHOKU (JAPAN/CHINA)</b> <b>NANTONG HUIFENG (CHINA)</b>
<b>PACKING PAD</b>	<b>SYNTHETIC RUBBER</b>	<b>SUNG NAM (KOREA/CHINA)</b> <b>CCW (CHINA)</b>
<b>CHIP BASE</b>	<b>PPA ( POLY PHTHAL AMIDE )</b>	<b>BASE (KOREA)</b> <b>ZICVISION (JAPAN)</b> <b>SANKYO TOHOKU (CHINA)</b> <b>VIVID (CHINA)</b>
<b>AL CASE</b>	<b>COATED ALUMINUM</b>	<b>D.N TECH/HA NAM (KOREA)</b> <b>LINAN AOXING (CHINA)</b>
<b>AL FOIL (+)</b>	<b>FORMED ALUMINUM 99.9% OVER</b>	<b>SAM YOUNG (KOREA)</b> <b>K.D.K/JCC/MATSUSHITA (JAPAN)</b> <b>BECROMAL (ITALY)</b> <b>HEC/HISTAR (CHINA)</b>
<b>AL FOIL (-)</b>	<b>ETCHED ALUMINUM 98% OVER</b>	<b>K.D.K (JAPAN)</b> <b>K-JCC (KOREA)</b> <b>ELECON/WU JIANG FEILO (CHINA)</b>
<b>SEPARATOR</b>	<b>INSULATION PAPER</b>	<b>N.K.K (JAPAN)</b> <b>KAN (CHINA)</b>
<b>ADHESIVE TAPE</b>	<b>POLYPHENYLENE SULFIDE OR POLY IMIDE FILM</b>	<b>DAEIL/SWECO (KOREA)</b> <b>NITTO/NICHIBAN (JAPAN)</b>

**PRECAUTIONS TO USERS****Soldering method**

The capacitors of Al chip have no capability to withstand such dip or wave soldering as totally immerses components into a solder bath.

**Reflow soldering**

Use the capacitors within the Recommended Reflow Soldering Conditions, and also make sure to check the temperature stress to the capacitors because the following makes a difference in the stress to the capacitors.If any other reflow soldering conditions are applied,please consult us.

- (1)Location of components.(The edge sides of a PC board increases its temperature more than the center does.)
- (2)Population of components. The less the component population is the more the temperature is increased.
- (3)Material of printed circuit board. As a ceramic board needs heating up more than a glass epoxy board to reach the same board temperature,the capacitors may be damaged.
- (4)Thickness of PC board. A thick PC board needs heating up more than a thin board. It may damage the capacitors.
- (5)Size of PC board. A large PC board needs heating up more than a small board and it may damage the capacitors.
- (6)Location of infrared ray lamps. On IR reflow as well as hot plate reflow, heating only the reverse side of the PC board will reduce stress to the capacitors.

**Rework of soldering**

Avoid soldering more than once by reflow. Use a soldering iron

for rework of solder, and do not exceed an iron tip temperature of 300°C and a max. exposure time of 5 seconds.

**Mechanical stress**

Do not lift up or push the capacitor after soldering.Avoid curvature of the PC board. These may damage the capacitor.

**Cleaning of Assembly board**

Standard aluminum electrolytic capacitors should be free from solvent during PC board cleaning after soldering.Use solvent—proof capacitors and follow the cleaning condition when halogenated solvents are used.

After solvent cleaning, immediately evaporate the solvents residue for at least 10 minutes with a hot forced air. If the assembly board is inadequately dried after a washing process,the capacitors will keep suffering from the residual solvent for long periods of time,and will be corroded while in service.

**Coating on assembly board**

- (1)Before coating ,evaporate cleaning solvents from the assembly board.
- (2)Before the conformal coating ,using a buffer precoat which does not contain chloride is recommended to reduce stress to the capacitors.

**Molding by resin**

Inner pressure of a capacitor slowly increases over the service life of the capacitor with gas being produced by internal chemical reaction.If the end seal of the capacitor is completely be in danger. Also if the resin contains a large amount of chlorine ion,it will penetrate into the end seal,get into the inside element of the capacitor,and damage the capacitor while in service.

**Others**

Pls refer to Page 5 of 6 and 6 of 6.



## When using aluminum electrolytic capacitors, pay strict attention to the following:

### 1. Electrolytic capacitors for DC application require polarization.

Confirm the polarity. If used in reversed polarity, the circuit life may be shortened or the capacitor may be damaged. For use on circuits whose polarity is occasionally reversed, or whose polarity is unknown, use bi-polarized capacitors (BP-series). Also, note that the electrolytic capacitor cannot be used for AC application.

### 2. Do not apply a voltage exceeding the capacitor's voltage rating.

If a voltage exceeding the capacitor's voltage rating is applied, the capacitor may be damaged as leakage current increases. When using the capacitor with AC voltage superimposed on DC voltage, care must be exercised that the peak value of AC voltage does not exceed the rated voltage.

### 3. Do not allow excessive ripple current to pass.

Use the electrolytic capacitor at current values within the permissible ripple range. If the ripple current exceeds the specified value, request capacitors for high ripple current applications.

### 4. Ascertain the operating temperature range.

Use the electrolytic capacitors according to the specified operating temperature range. Usage at room temperature will ensure longer life.

### 5. The electrolytic capacitor is not suitable for circuits in which charge and discharge are frequently repeated.

If used in circuits in which charge and discharge are frequently repeated, the capacitance value may drop, or the capacitor may be damaged. Please consult our engineering department for assistance in these applications.

### 6. Apply voltage treatment to the electrolytic capacitor which has been allowed to stand for a long time.

If the electrolytic capacitor is allowed to stand for a long time, its withstand voltage is liable to drop, resulting in increased leakage current. If the rated voltage is applied to such a product, a large leakage current occurs and this generates internal heat, which damaged the capacitor. If the electrolytic capacitor is allowed to stand for a long time, therefore, use it after giving voltage treatment (Note 1). (However, no voltage treatment is required if the electrolytic capacitor is allowed to stand for less than 2 or 3 years at normal temperature.)

### 7. Be careful of temperature and time when soldering.

When soldering a printed circuit board with various components, care must be taken that the soldering temperature is not too high and that the dipping time is not too long. Otherwise, there will be adverse effects on the electrical characteristics and insulation sleeve of electrolytic capacitors in the case of small-sized electrolytic capacitors, nothing abnormal will occur if dipping is performed at less than 260°C for less than 10 seconds.

### 8. Do not place a soldering iron on the body of the capacitor.

The electrolytic capacitor is covered with a vinyl sleeve. If the soldering iron comes in contact with the electrolytic capacitor body during wiring, damage to the vinyl sleeve and/or case may result in defective insulation, or improper protection of the capacitor element.

### 9. Cleaning circuit boards after soldering.

Some solvents have adverse effects on capacitors.

Please refer to the next page.

### 10. Do not apply excessive force to the lead wires or terminals.

If excessive force is applied to the lead wires and terminals, they may be broken or their connections with the internal elements may be affected. (For strength of terminals, refer to KS C IEC 60384-4 (JIS C5101-1, JIS C5101-4))

### 11. Care should be used in selecting a storage area.

If electrolytic capacitors are exposed to high temperatures caused by such things as direct sunlight, the life of the capacitor may be adversely affected. Storage in a high humidity atmosphere may affect the solderability of lead wires and terminals.

### 12. Surge voltage.

The surge voltage rating is the maximum DC over-voltage to which the capacitor may be subjected for short periods not exceeding approximately 30 seconds at infrequent intervals of not more than six minutes. According to KS C IEC 60384-4, the test shall be conducted 1000 cycles at room temperature for the capacitors of characteristic KS C IEC 60384-4 or at the maximum operating temperature for the capacitors of characteristics B and C of KS C IEC 60384-4 with voltage applied through a series resistance of 1000 ohms without discharge. The electrical characteristics of the capacitor after the test are specified in KS C IEC 60384-4. Unless otherwise specified, the rated surge voltage are as follows:

Rated Voltage(V)	2	4	6.3	10	16	25	35	50	63	80	100	160	200	250	315	350	400	450	500
Rated Surge Voltage(V)	2.5	5	8	13	20	32	44	63	79	100	125	200	250	300	365	400	450	500	550

**Note 1 Voltage treatment** ... Voltage treatment shall be performed by increasing voltage up to the capacitor's voltage rating gradually while lowering the leakage current. In this case, the impressed voltage shall be in the range where the leakage current of the electrolytic capacitor is less than specified value. Meanwhile, the voltage treatment time may be effectively shortened if the ambient temperature is increased (within the operating temperature range).

**Note 2 For methods of testing**, refer to KS C IEC 60384-4, (JIS C 5101-1, JIS C 5101-4)



## CLEANING CONDITIONS

Aluminum electrolytic capacitors that have been exposed to halogenated hydrocarbon cleaning and defluxing solvents are susceptible to attack by these solvents. This exposure can result in solvent penetration into the capacitors, leading to internal corrosion and potential failure.

Common type of halogenated cleaning agents are listed below.

Chemical Name	Structural Formula	Representative Brand Name
Trichlorotrifluoroethane	C <sub>2</sub> Cl <sub>3</sub> F <sub>3</sub>	Freon TF, Daiflon S-3
Fluorotrichloromethane	CCl <sub>3</sub> F	Freon-11, Daiflon S-1
1,1,1-Trichloroethane	F <sub>2</sub> H <sub>3</sub> Cl <sub>3</sub>	Chloroethane
Trichloroethylene	C <sub>2</sub> HCl <sub>3</sub>	Trichiene
Methyl Chloride	CH <sub>3</sub> Cl	MC

We would like to recommend you the below cleaning materials for your stable cleaning condition taking the place of previous materials.

◎ Isopropyl Alcohol (IPA) or Water

Cleaning method: One of immersion, ultrasonic or vapor cleaning.

Maximum cleaning time: 5 minutes (Chip type: 2 minutes)

※ Do not use AK225AES

Aluminum electrolytic capacitors are easily affected by halogen ions, particularly by chloride ions. Excessive amounts of halogen ions, if happened to enter the inside of the capacitors, will give corrosion accidents-rapid capacitance drop and vent open. The extent of corrosion accidents varies with kinds of electrolytes and seal-materials. Therefore, the prevention of halogen ion contamination is the most important check point for quality control in our production lines. At present, halogenated hydrocarbon-contained organic solvents such as Trichloroethylene, 1,1,1-Trichloroethane, and Freon are used to remove flux from circuit boards.

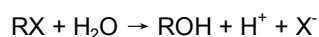
If electrolytic capacitors are cleaned with such solvents, they may gradually penetrate the seal portion and cause the erosion. When using latex-based adhesive on the capacitors rubber end seal for adhesion to a PCB, corrosion may occur depending on the kind of solvent in the adhesive. Select an adhesive as an organic solvent with dissolved polymer that is not halogenated hydrocarbon. Hot air drying is required for eliminating the solvent between the product and the PCB at 50°C~80°C after coating.

Followings are the penetration path of the halogenated solvent.

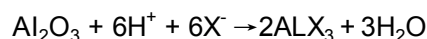
- ① Penetration between the rubber and the aluminum case
- ② Penetration between the rubber and the lead wire
- ③ Penetration through the rubber

The inside of the capacitors, the mechanism of corrosion of aluminum electrolytic capacitors by halogen ions can be explained as follows:

Halides (RX) are absorbed and diffused into the seal portion. The halides then enter the inside of the capacitors and contact with the electrolyte of the capacitors. Where by halogen ions are made free by a hydrolysis with water in the electrolyte:



The halogen ions (X<sup>-</sup>) react with the dielectric substance (Al<sub>2</sub>O<sub>3</sub>) of aluminum electrolytic capacitors:



ALX<sub>3</sub> is dissociated with water:



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