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 长孔硕

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

SPECIFICATIONS

Item	Characteristics
Rated Voltage Range	6.3 ~ 450 V_{DC}
Operating Temperature Range	- 40 ~ + 105 ℃
Capacitance Tolerance	±20%(M) (at 20 ℃,120Hz)

Leakage Current

Rated Voltage(V_{DC})	6.3 ~ 100	160 ~ 450
Max. Leakage current(μA)	0.01CV (μA) or 3μA, whichever is greater (at 20℃, 2minutes)	0.04CV + 100 (μA) (at 20℃, 1minute)

Where, C : Nominal capacitance（μF ）, V : Rated Voltage（V_{DC}）

Dissipation Factor Tanδ（Max.）

Rated voltage(V_{DC})	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℃)

Temperature characteristics (Max. Impedance ratio) （at 120Hz）

Rated Voltage (V_{DC})	6.3	10	16	25	35	50~100	160~250	400~450
Z(-25℃)/Z(20℃)	4	3	2	2	2	3	3	6
Z(-40℃)/Z(20℃)	10	8	6	4	3	4	6	10

Load Life

The following specifications shall be satisfied when the capacitors are restored to 20℃ after the rated voltage is applied with the following conditions.

Φ4~Φ6.3: 105℃,1000 hours, Φ8~Φ18: 105℃,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℃ after exposing them for the specified time at 105℃ 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℃,500 hours, Φ8~Φ18: 105℃,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 KS C IEC 60384-4

	← 李波	← 立范波	← 阿吕勇

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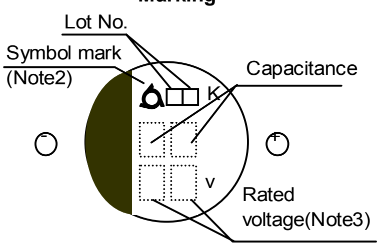
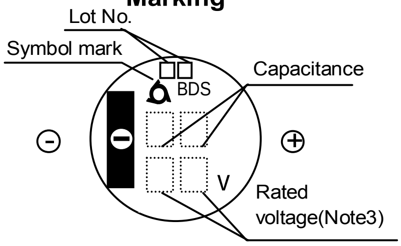
DIMENSIONS OF MVK Series

Dimensions

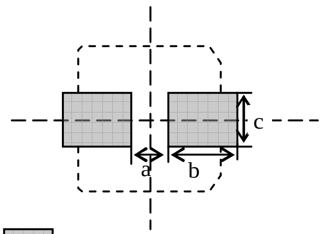


[D55 to J10]

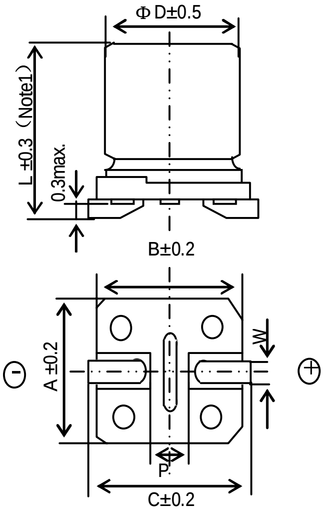


[K14 to M22]

Recommended solder land on PC board



Solder land on PC board



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

VDC / μF	6.3		10		16		25		35		50		63		100	
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	D55	15	E55 / D55	19 / 16	E55	20		
10					D55	16	E55 / D55	25 / 15	E55	25	F55	29	F60	32	H63	48
22	D55	21	E55	30	E55	30	F55	40	F55	40	H63	70	H10	80	H10	90
					D55	16	E55	35			F60	48	F80	60		
33	E55	34	E55	34	F55	45	F55	45	H63 / F60	80 / 68	H10	140	H10	145	J10	150
47	D55	25					F55	49								
	E55	36	F55	48	F55 / E55	48 / 40	F60 / H63	52 / 80	H63 / F60	140 / 52	H10 / F80	170 / 80	H10	180	K14	250
100	F55 / F60	56	F60 / H63	90	F60 / H10	110 / 180	F80 / H63	135	H10 / F80	250 / 135	J10 / H10	310 / 210	K14	380	K14	380
	E55	38			F55	106										
150							H10	230								
220	H63 / F55	150 / 70	F80 / H63	150	F80 / H10	150 / 275	H10	275	J10 / H10	375 / 275	K14	420	K14	470	M17	750
			F55	75												
330	F80 / H10	127 / 290	J10	450	J10 / H10	450 / 275	J10 / H10	450 / 282	K14	480	K14	500	L17	700	M22	980
470	J10 / H10	460 / 300	J10 / H10	460 / 160	J10 / H10	460 / 300	J10	460	K14	520	L17	700	M17	900		
1000	J10 / H10	520 / 430	J10	540	K14	550	K14	550	L17	750	M22	1200				
1500	J10	550	K14	620												
2200	K14	680	L17	850	M17	1000	M22	1300	M22	1450						
3300	M17	1000	M17	1100	M17	1200										
4700	L22	1200	M22	1350												
6800	M22	1350														

VDC / μF	160		200		250		400		450	
3.3							K14	30	K14	40
4.7					K14	65	L17	60	L17	60
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℃, 120Hz)
Case code

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TAPING DIMENSIONS

FIG.1

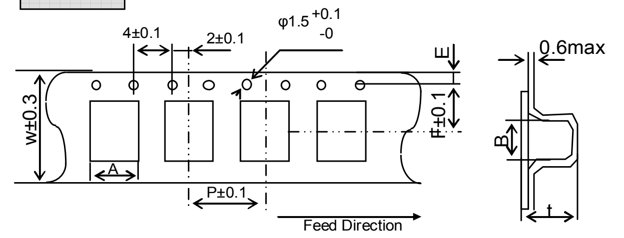


FIG.2

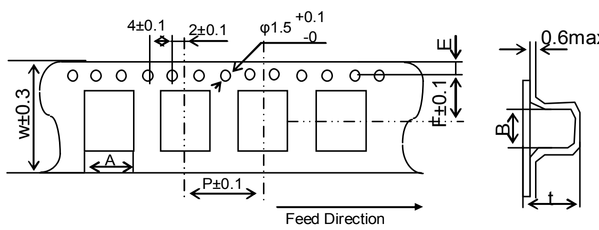


FIG.3

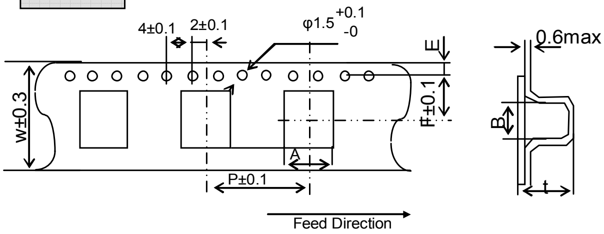
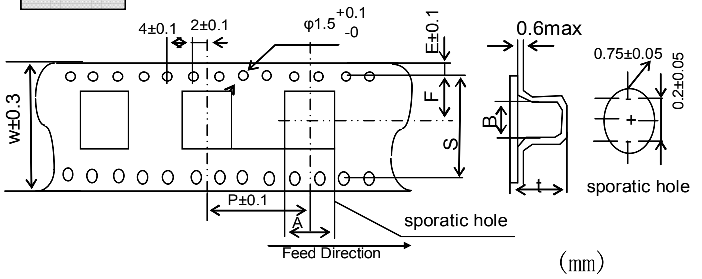


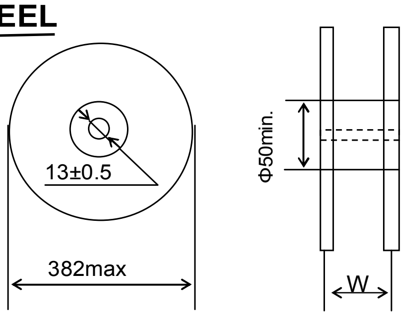
FIG.4



(mm)

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）	—
Φ6.3×8L（F80）	2	16	7.0±0.2	7.0±0.2	7.5	1.75±0.1	12	8.2±0.2	—
Φ8×6L（H63）	2	16	8.7±0.2	8.7±0.2	7.5	1.75±0.1	12	6.8±0.2	—
Φ8×6.7L（H70）	2	24	8.7±0.2	8.7±0.2	11.5	1.75±0.1	12	7.3±0.2	—
Φ8×10L（H10）	3	24	8.7±0.2	8.7±0.2	11.5	1.75±0.1	16	11.0±0.2	—
Φ8×11.5L（H12）	3	24	8.7±0.2	8.7±0.2	11.5	1.75±0.1	16	12.3±0.2	—
Φ10×10L（J10）	3	24	10.7±0.2	10.7±0.2	11.5	1.75±0.1	16	11.0±0.2	—
Φ10×12.2L（J12）	3	24	10.7±0.2	10.7±0.2	11.5	1.75±0.1	16	13.0±0.2	—
Φ12.5×13.5L（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

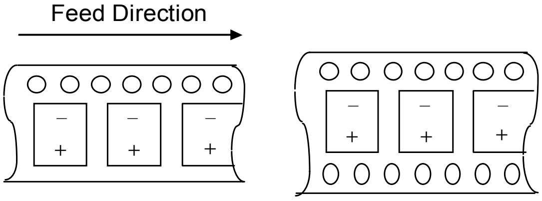


QUANTITY PER REEL

Case code	W（mm）	Q'ty（pcs/reel）	Q'ty（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
Φ6.3×8L（F80）	18	900	9,000
Φ8×6L（H63）	18	1,000	10,000
Φ8×6.7L（H70）	26	1,000	6,000
Φ8×10L（H10）	26	500	3,000
Φ8×11.5L（H12）	26	400	2,400
Φ10×10L（J10）	26	500	3,000
Φ10×12.2L（J12）	26	400	2,400
Φ12.5×13.5L（K14）	34	200	1,000

ORIENTATION OF POLARITY

Feed Direction



[φ3 ~ φ10] **[φ12.5]**

ALUMINUM ELECTROLYTIC CAPACITOR

APPROVAL NO：
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CE32 TYPE

MINIATURE SIZED TYPE CAPACITORS COMPONENT

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

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 popluation is the more the temperature is increased.

(3)Mater ial 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 capaciors.

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℃ 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 aluminnum 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 capcitor 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 execeeding 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℃ 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 affectde.(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	Representatice Brand Name
Trichlorotrifluoroethane	$C_2Cl_3F_3$	Freon TF,Daiflon S-3
Fluorotrichloromethane	CCl_3F	Freon-11,Daiflon S-1
1,1,1-Trichloroethane	$F_2H_3Cl_3$	Chloroethane
Trichloroethylene	C_2HCl_3	Trichiene
Methyl Chloride	CH_3Cl	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 affeceted 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 improtant check point for quality control in our procuction 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 electroytic capacitors are cleaned with such solvents,they may gradually penetrate the seal portion and cause the eosion.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℃~80℃ 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 explainedas 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:

$$RX + H_2O \rightarrow ROH + H^+ + X^-$$

The halogen ions (X^-) react with the dielectric substance(Al_2O_3) of aluminum electrolytic capacitors:

$$Al_2O_3 + 6H^+ + 6X^- \rightarrow 2ALX_3 + 3H_2O$$

AlX_3 is dissociated with water:

$$ALX_3 + 3H_2O \rightarrow AL(OH)_3 + 3H^+ + 3X^-$$

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