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RoHS

MESSRS:

APPROVAL NO	726-023
DATE	2015.05.12

ALUMINUM ELECTROLYTIC

CAPACITOR

APPROVAL SHEET

CATALOG TYPE	MVG SERIES
USER PART NO.	
适 用 机 种	
特 记 事 项	Halogen-Free

GONG JANG SUG 长孔硕

USER APPROVAL:

APPROVAL NO.:

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APPROVAL NO. 726-023	ALUMINUM ELECTROLYTIC CAPACITOR	PAGE: 1 OF 6 DATE：2015.04.24

SPECIFICATIONS

Item	Characteristics
Rated Voltage Range	4 ~450V_{DC}
Operating Temperature Range	-40 ~ + 85 ℃
Capacitance Tolerance	±20%(M) （ at 20 ℃,120Hz）

Leakage Current

Rated Voltage(V_{DC})	4 ~ 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 (Max. TANδ，at 20℃ 120HZ)

Rated Voltage(V_{DC})	4	6.3	10	16	25-50	63-100	160-250	400-450
Tan δ	0.42	0.40	0.30	0.20	0.15	0.12	0.20	0.25

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

Rated Voltage (V_{DC})	4	6.3	10	16	25	35~50	63~100	160~250	400~450
Z(-25℃)/Z(20℃)	7	4	3	2	2	2	3	3	6
Z(-40℃)/Z(20℃)	15	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 for 2,000 hours at 85℃. (where,1000 hours for 3φ)

Rated Voltage(V_{DC})	4~6.3	10~100	160~450
Capacitance change	≤±30% of the initial value	≤±25% of the initial value	≤±20% of the initial value
TAN δ	≤300% of the initialspecified value		≤200% of the initialspecified value
Leakage current	≤The initialspecified value		

Shelf Life

The following specifications shall be satisfied when the capacitors are restored to 20℃ after exposing them at 85℃ for 1000 hours without voltage applied.The rated voltage shall be appled to the capacitors for a minimum of 30 minutes,at least 24 hours and not more than 48 hours before the measurements.(where,500 hours for 3φ)

Rated Voltage(V_{DC})	4~6.3	10~100	160~450
Capacitance change	≤±30% of the initial value	≤±25% of the initial value	≤±20% of the initial value
TAN δ	≤300% of the initialspecified value		≤200% of the initialspecified value
Leakage current	≤The initialspecified value		

Others

Satisfies characteristic **KS C IEC 60384-4**

← 李波 ← 范立波 ← 呂阿勇

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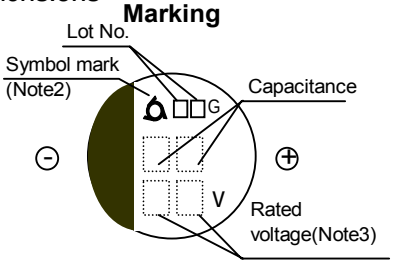
ALUMINUM ELECTROLYTIC CAPACITOR

APPROVAL NO.
726-023

DIMENSIONS OF MVG Series

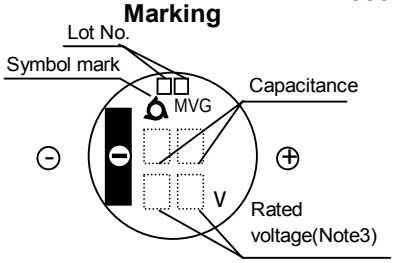
Dimensions

Marking



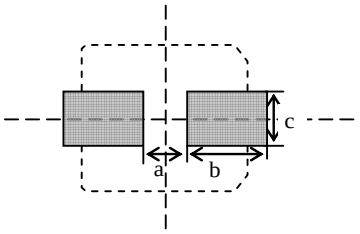
[B55 ~ J10]

Marking

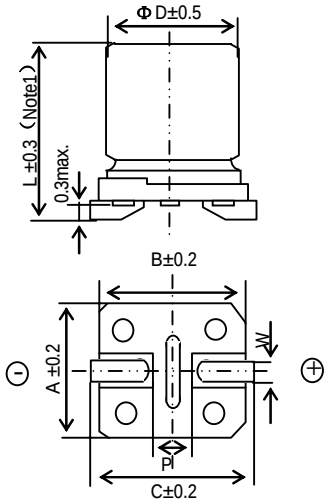


[K14~M22]

Recommended solder land on PC board



Solder land on PC board



Note1: L±0.5 for 8× 6.3(H63)~18x21.5(M22)

Note2: 3×5.2(B55),4×5.3(D56),5×5.3(E56)is excluded symbol mark.

Note3: 6.3WV is marked by 6V.

Case code	ΦD	L	A	B	C	W	P	a	b	c
B55	3	5.2	3.3	3.3	3.7	0.45-0.75	0.8	0.8	2.2	1.6
D56	4	5.3	4.3	4.3	5.1	0.5-0.8	1.0	1.0	2.6	1.6
E56	5	5.3	5.3	5.3	5.9	0.5-0.8	1.4	1.4	3.0	1.6
F56	6.3	5.3	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 MVG Series

μF \ V_{DC}	4	6.3	10	16	25	35	50	63	100
0.1							B55 D56 1.1 1.3	D56 1.3	
0.22							B55 D56 2.0 2.9	D56 3.0	
0.33							B55 D56 3.0 3.5	D56 4.0	
0.47							B55 D56 3.8 4.2	D56 5.0	
1							B55 D56 5.6 6.2	D56 8.0	
2.2						B55 D56 7.7	B55 D56 8.3 10	D56 12	
3.3						B55 D56 9.4	D56 14	E56 17	
4.7					B55 D56 10.5	D56 15	D56 19	E56 20	
10			B55 D56 12.8	B55 D56 14 17	D56 20	D56 25	E56 29	F60 32	
22	B55 D56 14	B55 D56 23	D56 27	D56 27	E56 28	F56 33	F60 F56 40 35	F80 60	H10 90
33	D56 23	D56 30	D56 30	E56 40	E56 40	F56 40	F80 55	H10 110	J10 120
47	D56 27	D56 33	E56 45	E56 F56 45 50	F56 60	F60 55	H63 F80 140 55	H10 130	J10 144
68	E56 38	E56 49	F56 54	F56 78	F60 90	H63 157	H10 170	J10 170	K14 380
100	E56 46	E56 55	F56 65	F60 F56 85 80	F80 H63 145	H10 F80 175 100	H10 190	K14 380	K14 440
220	F56 74	F60 75	H63 F80 130	F80 130	H10 260	H10 260	J10 320	K14 580	M17 800
330		F80 H63 135	H10 270	H10 270	H10 300	J10 360	K14 600	L17 820	M22 1000
470		H10 280	H10 280	H10 280	J10 400	K14 600	L17 850	M17 1000	
1000		J10 430	J10 430	K14 710	K14 820	L17 1100	L22 1300		
1500		J10 480	K14 850						
2200		K14 890	K14 960	L17 1150	M17 1400	M22 1700			
3300		L17 1200	L17 1300	M17 1450	M22 1800				
4700		L17 1400	M17 1600	M22 1750					
6800		M17 1700	M22 1850						
10000		M22 2000							

μF \ V_{DC}	160	200	250	400	450
4.7				K14 120	K14 120
10	J10 55	K14 150	K14 150	L17 140	L17 140
22	K14 240	K14 240	L17 300	M17 280	L22 280
33	k14 260	L17 350	L17 340	M22 350	M22 350
47	L17 400	L17 420	M17 420		
68	L17 500	M17 510	M22 490		
100	M17 590	M22 590			

Rated ripple Current(mArms/85℃，120Hz)

Case code

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ALUMINUM ELECTROLYTIC CAPACITOR

APPROVAL NO.

726-023

TAPING DIMENSIONS

FIG.1

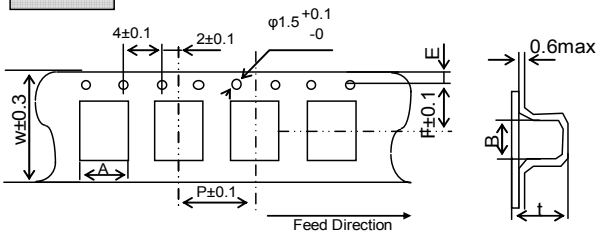


FIG.2

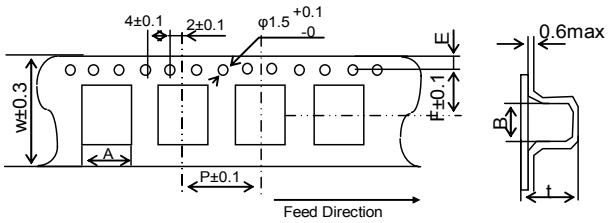


FIG.3

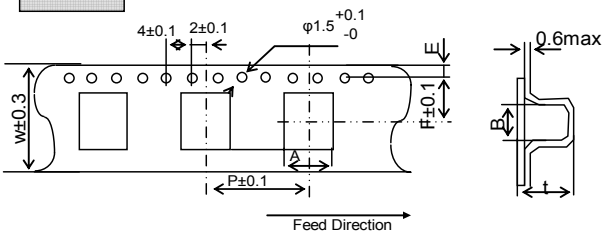
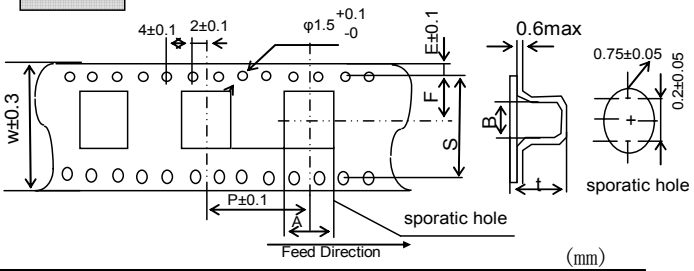


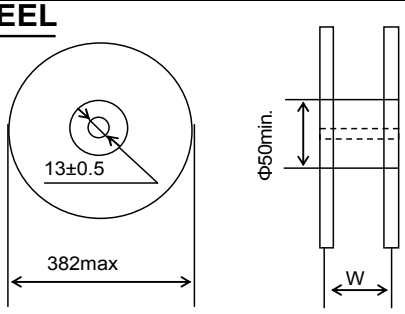
FIG.4



(㎜)

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）	—
Φ6.3×8L（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

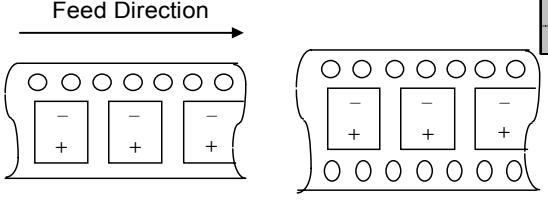
REEL



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



[φ3 ~ φ10]

[φ12.5]

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ALUMINUM ELECTROLYTIC CAPACITOR

APPROVAL NO: 726-023

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 ZICVISION	(KOREA)
		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.

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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℃ 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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