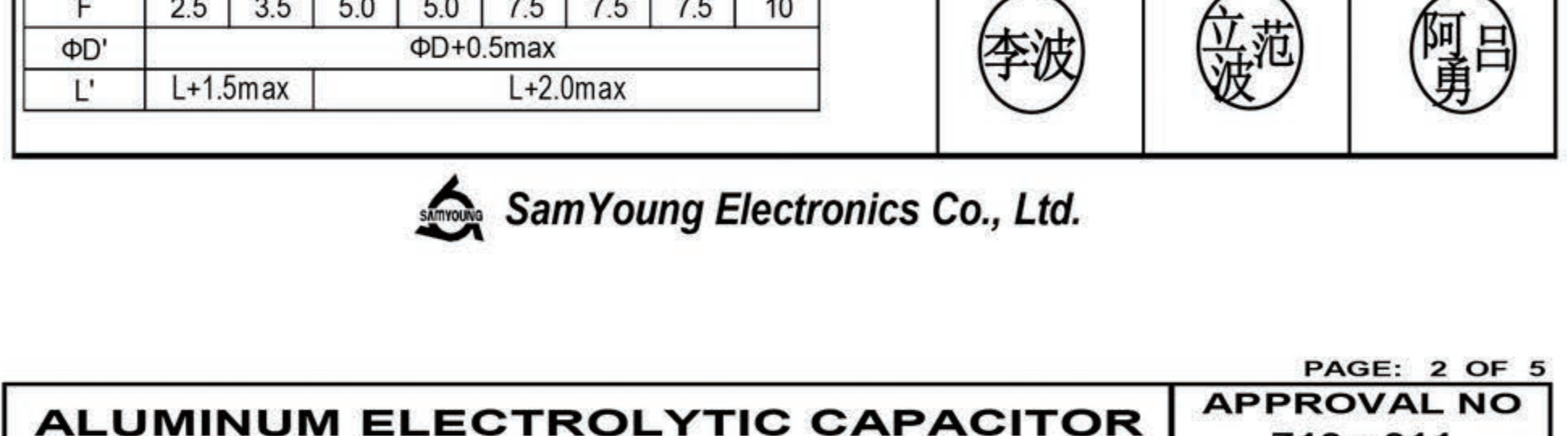


MESSRS:	APPROVAL NO 710 - 011	DATE 2020.06.23
ALUMINUM ELECTROLYTIC CAPACITOR		
APPROVAL SHEET		
CATALOG TYPE	NFA SERIES	
USER PART NO.		
适用机种		
特记事项	Halogen-Free	
QINGDAO SAMYOUNG ELECTRONICS CO.,LTD.		
MANAGER OF DEVELOPMENT DEPARTMENT		
GONG JANG SUG		
USER APPROVAL:	APPROVAL NO.:	
SamYoung(Korea) : 47,SAGIMAKGOL-R0,JUNGWON-GU,SEONGNAM-SI,GYEONGGI-DO,KOREA SamYoung(China) : No.5 CHANGJIANG ROAD,PINGDU-CITY,SHANDONG-PROVINCE,CHINA 样式: H-1001-011 A4 (210x297)		

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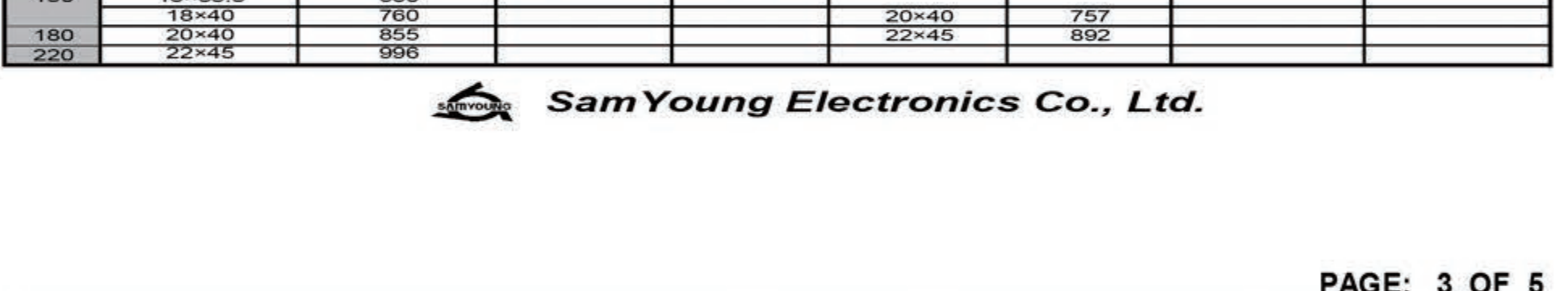
Specifications of NFA Series															
Item	Characteristics														
Rated Voltage Range	160 ~ 400Vdc	420 ~ 500VDC													
Operating Temperature Range	- 40 ~ + 105 °C	- 25 ~ + 105 °C													
Capacitance Tolerance	±20% <M> (at 20 °C, 120Hz)														
Leakage Current (at 20 °C)	Where, I: Max. Leakage current (µA) C: Nominal capacitance(µF) V: Rated Voltage (Vdc)		<table border="1" style="width:100%; border-collapse: collapse;"> <tr> <th colspan="2">After 1 minute</th> <th colspan="2">After 5 minutes</th> </tr> <tr> <td>CrVr≤1000</td> <td>CrVr>1000</td> <td>CrVr≤1000</td> <td>CrVr>1000</td> </tr> <tr> <td>0.1CrVr+40</td> <td>0.04CrVr+100</td> <td>0.03CrVr+15</td> <td>0.02CrVr+25</td> </tr> </table>	After 1 minute		After 5 minutes		CrVr≤1000	CrVr>1000	CrVr≤1000	CrVr>1000	0.1CrVr+40	0.04CrVr+100	0.03CrVr+15	0.02CrVr+25
	After 1 minute		After 5 minutes												
CrVr≤1000	CrVr>1000	CrVr≤1000	CrVr>1000												
0.1CrVr+40	0.04CrVr+100	0.03CrVr+15	0.02CrVr+25												
Dissipation Factor (TAN δ) (at 20 °C, 120Hz)	Rated voltage(Vdc)	160 ~ 250	350 ~ 500												
Temperature Characteristic (Max.Impedance ratio)	TANδ(Max.)	0.20	0.24												
	Rated voltage(Vdc)	160-250	350-400	420-500											
	Z-25 °C/Z+20 °C	3	5	6											
Load Life	Z-40 °C/Z+20 °C	6	6	-											
	(at 120Hz)														
	The following specifications shall be satisfied when the capacitors are restored to 20 °C after the rated voltage with the rated ripple current is applied(the peak voltage shall not exceed the rated voltage) at 105 °C for 10,000 hours.(Where,2,000 hours for φ6.3; 7,000 hours for φ8; 8,000 hours for φ10.) Capacitance change ≤± 20% of the initial Value TANδ ≤200% of the initial specified value LC ≤ The initial specified value														
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20 °C after exposing them for 1,000 hours at 105 °C without voltage applied.The rated voltage shall be applied to the capacitor for a minimum of 30 minutes,at least 24 hours and not more than 48 hours before the measurements. Capacitance change ≤± 20% of the initial Value TANδ ≤200% of the initial specified value LC ≤500% of the initial specified value														
	Others														
	Satisfies characteristic KS C IEC 60384-4														



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RATINGS OF NFA Series									
Capacitance (µF)	160WV		200WV		250WV		350WV		Rated ripple current (mA Arms/105 °C (120Hz))
	Case size	Rated ripple current (mA Arms/105 °C (120Hz))	Case size	Rated ripple current (mA Arms/105 °C (120Hz))	Case size	Rated ripple current (mA Arms/105 °C (120Hz))	Case size	Rated ripple current (mA Arms/105 °C (120Hz))	
1	6.3x11	16	8x11.5	42	6.3x11	20	8x11.5	38	
1.5	8x11.5	22	8x11.5	51	6.3x11	38	8x11.5	48	
1.8	8x11.5	24	6.3x11	45	8x11.5	48	8x11.5	64	
2.2	8x11.5	27			8x11.5	64			
3.3	8x11.5	33			10x12.5	100			
4.7	10x12.5	40	8x11.5	75	10x16	120			
6.8	10x12.5	45	10x12.5	85	10x20	130	10x20	128	
10	10x12.5	55	10x12.5	109	10x20	110			
15	8x15	139	10x16	150	10x16	178			
22	10x16	150							
33	10x16	182	10x20	192	12.5x20	214	12.5x20	207	
47	10x20	236	10x20	236	10x20	230			
68	10x20	236	10x20	262	12.5x25	285	16x25	284	
100	10x20	236	12.5x20	312	12.5x20	280			
150	12.5x20	312	12.5x20	312	12.5x20	340	16x25	364	
220	12.5x20	312	10x33	409	10x33	350	18x20	284	
330	10x20	380	12.5x20	312	16x20	420	16x31.5	472	
470	12.5x25	409	12.5x25	409	16x25	452	18x20	420	
680	12.5x20	390	16x20	386	16x25	480	18x25	550	
1000	12.5x25	450	16x25	548	16x31.5	591	18x31.5	691	
1500	16x25	548			18x20	452	18x31.5	550	
2200			12.5x30	600	18x20	570	18x31.5	648	
3300	16x20	550	12.5x30	548	12.5x50	720	18x31.5	724	
4700			16x25	800	16x25	800			
6800	16x20	724	16x31.5	701	16x35.5	670	18x40	760	
10000	16x25	813			12.5x50	590			
15000	16x31.5	876	18x31.5	906	18x31.5	850	22x45	970	
22000	16x31.5	876	18x31.5	906	20x40	1196			
33000	16x25	1110							
47000	18x25	900							
68000	18x31.5	1030	18x40	950					

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PART NAME	MATERIALS	VENDER
LEAD WIRE	TINNED COPPER - PLY WIRE(Pb-FREE)	KISTROM (KOREA/CHINA) KOHOKU (JAPAN/CHINA) NANTONG HONG YANG (CHINA)
AL LEAD	ALUMINUM 99.92 % OVER	KANG WON AUTO FITTING (CHINA) NAN TONG HUI FENG (CHINA) NANTONG HONG YANG (JAPAN/CHINA) KOHOKU (KOREA/CHINA) KISTRON (KOREA/CHINA)
PACKING PAD	SYNTHETIC RUBBER	SUNG NAM (KOREA/CHINA) CCW/ZHE JIANG TIAN TAI (CHINA) ZHE JIANG TIAN HUA (CHINA)
SLEEVE	P.E.T(Poly Ethylene Terephthalate Resin)	MOO DEUNG (KOREA/CHINA) SUZHOU QILIAN (CHINA) SHUN PENG PLASTIC (CHINA) YUN LIN PLASTIC (CHINA)
AL CASE	ALUMINUM 99.0 % OVER	ZHANG JIA GANG LIAN YI (CHINA) LIN AN AO XING (CHINA) NANTONG CHUANGJIA DONG NAM (KOREA/CHINA) D.N TECH/HA NAM (KOREA/CHINA)
AL FOIL ⊕	FORMED ALUMINUM 99.9 % OVER	K.D.K/JCC/MATSUSHITA (JAPAN) SAM YANG (KOREA) BECROMAL (ITALY) SATMA (FRANCE) HEC (CHINA) XINJIANG JOINWORLD (CHINA) HUIJANG / NANTONG /RAOIO (TAIWAN) LUXON/LITON (TAIWAN)
AL FOIL ⊖	ETCHED ALUMINUM 98.0 % OVER	K.JCC (KOREA) K.D.K (JAPAN) AFT/INCU/SHENGHONG (CHINA) ELECON/WU JIANG FEILO (CHINA)
SEPARATOR	INSULATION PAPER	KAN/LUNAN (CHINA) SPO (GERMANY) N.K.K (JAPAN)
ADHESIVE TAPE	POLY PROPYLENE OR POLY IMIDE FILM	NITTO/NICHIBAN (JAPAN) DAEIL/SWECO (KOREA)

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- 1. Electrolytic capacitors used in 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. Cleanse 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 frequent 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 up to 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)

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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 ₂ Cl ₃ F ₃	Freon TF, Daiflon S-3
Fluorotrichloroethane	C ₂ Cl ₃ F	Freon-11, Daiflon S-1
1,1,1-Trichloroethane	F ₂ HCl	Chloroethane
Trichloroethylene	C ₂ HCl ₃	Trichlene
Methyl Chloride	CH ₃ 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 electrolytic 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.

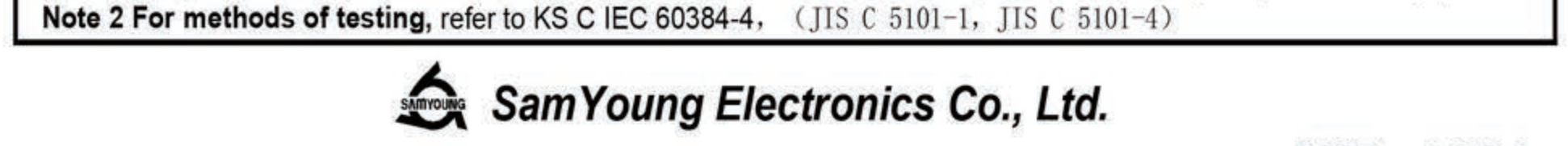
If electrolytic capacitors are cleaned with such solvents, they may gradually penetrate the seal portion and cause the erosion. When using latex-based adhesive on the capacitors rubber and seal for adhesion to a PCB, corrosion may occur depending on the kind of solvent in the adhesive. Select an adhesive 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.

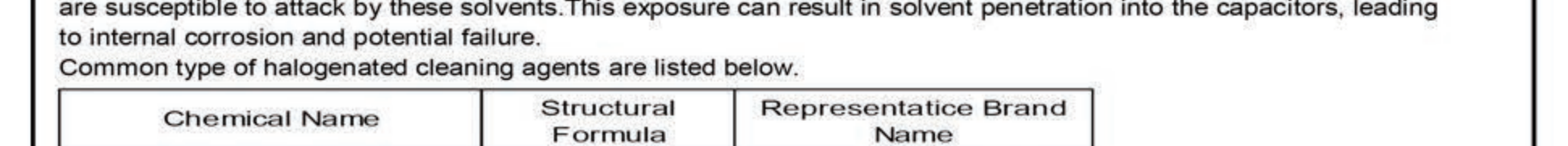
- ① Penetration between the rubber and the aluminum case
- ② Penetration between the rubber and the lead wire
- ③ Penetration through the rubber

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

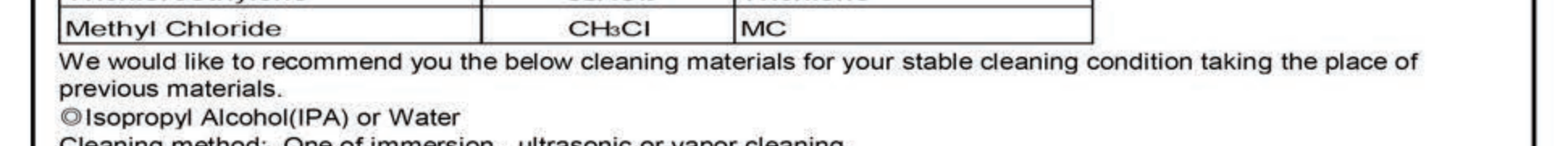
Halides(RX) are absorbed and diffused into the seal portion. The halides then enter the inside of the capacitors and contact with the electrolyte of the capacitors. Where by halogen ions are made free by a hydrolysis with water in the electrolyte.



The halogen ions (X⁻) react with the dielectric substance(Al₂O₃) of aluminum electrolytic capacitors:



AlX₃ is dissociated with water:



※ MANUFACTURING SITE
- SamYoung Electronics Co., Ltd.(Korea/China)

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■ Standard Temperature Multiplying Factor

Assurance Load Life Time	65 °C	75 °C	85 °C	105 °C	Remarks
105 °C 7000-10000Hrs	1.5	1.5	1.5	1	

■ Rated Ripple Current Multipliers
Frequency Multipliers

Freq. (Hz)	120	1K	10K	50K	100K
Factor	1.00	1.25	1.50	1.60	1.75

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