



RoHS

MESSRS: _____

APPROVAL NO

710-038

DATE

2014.05.06

ALUMINUM ELECTROLYTIC

CAPACITOR

APPROVAL SHEET

CATALOG TYPE	SHL 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 (210x297)



SamYoung Electronics Co., Ltd.

Specifications of SHL Series

Item	Characteristics											
Rated Voltage Range	100 VDC or less						160 ~ 500VDC					
Operating Temperature Range	- 40 ~ + 85 °C						- 25 ~ + 85 °C					
Capacitance Tolerance	± 20% <M> (AT 120Hz,20°C)											
Leakage Current(Max) (at 20 °C)	The following specifications shall be satisfied when the rated voltage is applied for the required time											
	≤100VDC						>100VDC					
	After 1 minute:0.03CV(μA)or4μA, whichever is greater						After 1 minute		After 5 minutes			
	After 2 minutes:0.01CV(μA)or3μA, whichever is greater						CrVr≤1000	CrVr>1000	CrVr≤1000	CrVr>1000	CrVr≤1000	CrVr>1000
Where, C =Nominal capacitance (μF)												
V =Rated Voltage (VDC)												
Dissipation Factor (TANδ) (at 20°C 120Hz)	Rated voltage(Vdc)	6.3	10	16	25	35	50	63	100	160~250	350 ~ 500	
	TANδ (Max.)	0.34	0.24	0.20	0.16	0.14	0.12	0.10	0.09	0.20	0.24	
When the capacitance exceeds 1000μF,0.02 shall be added every 1000μF increase.												
Temperature Characteristic (Max. Impedance ratio) (at 120Hz)	Rated voltage(Vdc)	6.3	10	16	25	35	50	63~100	160	200~250	350 ~ 500	
	Z-25°C/Z+20°C	5	4	3	2	2	2	3	4	8	16	
	Z-40°C/Z+20°C	12	10	8	5	4	3	4	-	-	-	
Load Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after the rated voltage applied for 2,000 hours at 85°C. Capacitance change : ≤± 20% of initial value TANδ : ≤200% of 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 1000 hours at 85°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. Capacitance change : ≤± 20% of initial value TANδ : ≤200% of initial specified value Leakage current : ≤The initial specified value (where, 200% for ≥WV 160VDC)											
Others	Satisfies characteristic KS C IEC 60384-4											

A. DIAGRAM OF DIMENSION

When $\Phi D \leq 8$, $\Phi D' \leq \Phi D + 0.5$, and $L' \leq L + 1.5$
 When $\Phi D > 8$, $\Phi D' \leq \Phi D + 0.5$, and $L' \leq L + 2.0$

ΦD	5	6.3	8	10	12.5	16	18
Φd	0.5	0.5	0.6	0.6	0.6	0.8	0.8
F	2	2.5	3.5	5	5	7.5	7.5

B. MARKING: WITH BLACK SLEEVE, WHITE INK

FRONT VIEW OF CAPACITOR

BACK VIEW OF CAPACITOR

ALUMINUM ELECTROLYTIC CAPACITORS

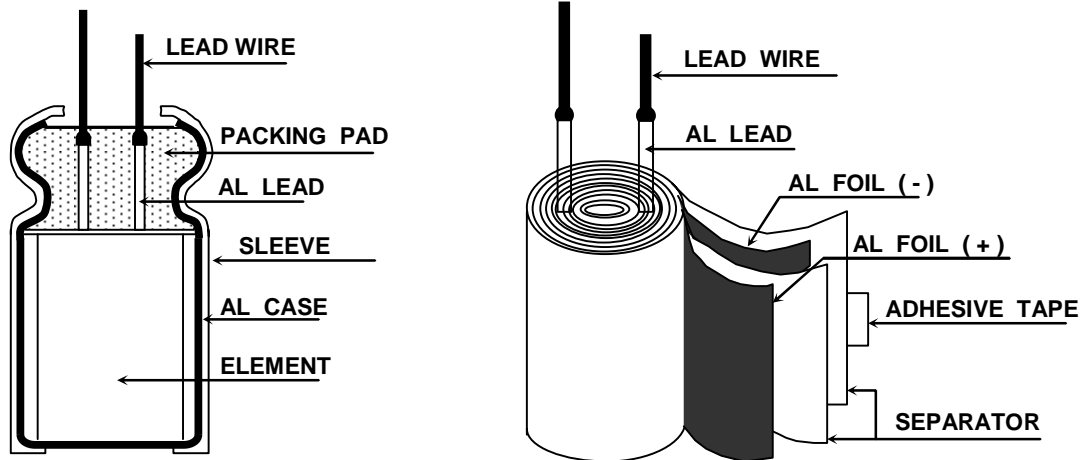
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RATINGS OF SHL Series

WV CAP	6.3	10	16	25	35	50	63	100	160	200	250	350	400	450	500	
0.1						5X11 5.5	5X11 6.2	5X11 6.5								
0.22						5X11 8	5X11 9	5X11 11								
0.33						5X11 10	5X11 11	5X11 13								
0.47						5X11 15	5X11 16	5X11 17	6.3X11 18	6.3X11 18	6.3X11 19	6.3X11 20	6.3X11 20			
0.68						5X11 18	5X11 19	5X11 19	6.3X11 21	6.3X11 21	6.3X11 22	6.3X11 23	6.3X11 23			
1						5X11 22	5X11 24	5X11 24	6.3X11 25	6.3X11 26	6.3X11 27	6.3X11 28	6.3X11 29	8x11.5 26	6.3x11 20	
2.2						5X11 34	5X11 35	5X11 37	6.3X11 38	6.3X11 39	6.3X11 41	8X11.5 46	8X11.5 47	8x11.5 40	8x11.5 34	
3.3						5X11 41	5X11 43	5X11 44	6.3X11 46	6.3X11 47	8X11.5 54	8X11.5 56	10X12.5 64	10X16 58	10x12.5 50	
													8X11.5 59			
4.7					5X11 35	5X11 48	5X11 53	5X11 55	6.3X11 56	8X11.5 64	8X11.5 66	10X12.5 77	10X16 77	10X20 76	10x16 68	
6.8					5X11 46	5X11 59	5X11 63	5X11 64	8X11.5 78	8X11.5 80	8X11.5 82	10X12.5 92	10X16 100	10X20 90	10x20 85	
10			5X11 39	5X11 49	5X11 53	5X11 71	5X11 76	6.3X11 87	10X12.5 110	10X12.5 112	10X16 114	10X20 123	10X20 134	12.5X20 120	12.5x20 110	
22		5X11 52	5X11 68	5X11 73	5X11 80	5X11 106	5X11 113	6.3X11 130	10X20 181	10X20 183	10X20 198	12.5X20 233	12.5X25 254	16X25 228	16x20 140	
33	5X11 41	5X11 70	5X11 76	5X11 83	5X11 100	5X11 129	6.3X11 159	8X11.5 187	10X20 243	10X20 245	12.5X20 286	16X25 312	16X25 345	16X31.5 309	16x31.5 220	
47	5X11 59	5X11 88	5X11 98	5X11 126	5X11 138	6.3X11 177	6.3X11 190	10X12.5 259	12.5X20 341	12.5X20 343	12.5X25 371	16X25 413	16X31.5 451	16X35.5 403	18x31.5 247	
68	5X11 90	5X11 110	5X11 130	5X11 151	6.3X11 191	6.3X11 213	8X11.5 269	10X16 342	12.5X20 410	12.5X20 447	16X25 495	16X31.5 542	16X35.5 569	18X40 573	18x35.5 278	
100	5X11 135	5X11 150	5X11 170	6.3X11 211	6.3X11 231	8X11.5 306	8X11.5 321	10X20 453	12.5X25 541	16X25 601	16X31.5 658	18X31.5 691	18X40 778			
220	5X11 211	5X11 229	6.3X11 290	8X11.5 370	8X11.5 405	10X12.5 506	10X16 615	12.5X25 860	16X31.5 976	18X35.5 1099	18X40 1152					
330	6.3X11 297	6.3X11 322	8X11.5 419	8X11.5 453	10X12.5 576	10X16 706	10X20 823	16X25 1169	18X35.5 1346							
470	6.3X11 355	6.3X11 384	8X11.5 499	10X12.5 628	10X16 753	10X20 918	12.5X20 1153	18X25 1394								
680	8X11.5 503	8X11.5 546	10X12.5 690	10X16 826	10X20 988	12.5X20 1296	12.5X25 1512	16X35.5 1620								
1000	8X11.5 610	10X12.5 791	10X16 928	10X20 1094	12.5X25 1407	12.5X25 1715	16X25 2037	18X40 2130								
2200	10X20 1147	10X20 1226	12.5X20 1555	12.5X25 1800	16X25 2134	16X35.5 2645	←	Case Size ØD X L (mm)								
				16X20 1850			←	Permissible Ripple Current (mA rms/85°C, 120Hz)								
3300	10X20 1350	12.5X20 1685	12.5X25 1970	16X25 2304	16X35.5 2806	18X35.5 3218										
4700	12.5X20 1822	12.5X25 2103	16X25 2487	16X31.5 2854	18X35.5 3386											
6800	12.5X25 2235	16X25 2606	16X31.5 3010	18X35.5 3528												
10000	16X25 2760	16X35.5 3302	18X35.5 3705													
15000	16X35.5 3453	18X35.5 3826														
22000	18X40 4143															



ALUMINUM ELECTROLYTIC CAPACITORS**APPROVAL NO.****710-038****STRUCTURE AND MATERIALS**

CE04 TYPE

*MINIATURE SIZED TYPE CAPACITORS COMPONENT

PART NAME	MATERIALS	VENDER
LEAD WIRE	TINNED COPPER - PLY WIRE(Pb-FREE)	KISTRON (KOREA) JIANG SU HONG YANG (CHINA)
AL LEAD	ALUMINUM 99.92 % OVER	KANG WON AUTO FITTING (CHINA) NAN TONG HUI FENG (CHINA) JIANG SU HONG YANG (CHINA) KISTRON (KOREA)
PACKING PAD	SYNTHETIC RUBBER OR BAKE PAD	SUNG NAM (KOREA/CHINA) ZHE JIANG TIAN TAI (CHINA) ZHE JIANG TIAN HUA
SLEEVE	P.E.T(Poly Ethylene Terephthalate Resin)	MOO DEUNG (KOREA/CHINA) YUN LIN PLASTIC (CHINA)
AL CASE	ALUMINUM 99.0 % OVER	ZHANG JIA GANG LIAN YI (CHINA) LIN AN AO XING (CHINA) D.N TECH (KOREA/CHINA)
AL FOIL ⊕	FORMED ALUMINUM 99.9 % OVER	K.D.K (JAPAN) SAM YOUNG (KOREA) HUAFENG / HISTAR / HAIYI (CHINA)
AL FOIL ⊖	ETCHED ALUMINUM 98.0 % OVER	K-JCC (KOREA) WU JIANG FEILO (CHINA) K.D.K (JAPAN) ELECON (CHINA)
SEPARATOR	INSULATION PAPER	KAN (CHINA) N.K.K (JAPAN)
ADHESIVE TAPE	POLY PROPYLENE OR POLY IMIDE FILM	DAI IL (KOREA)



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 ₂ Cl ₃ F ₃	Freon TF, Daiflon S-3
Fluorotrichloromethane	CCl ₃ F	Freon-11, Daiflon S-1
1,1,1-Trichloroethane	F ₂ H ₃ Cl ₃	Chloroethane
Trichloroethylene	C ₂ HCl ₃	Trichiene
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 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.

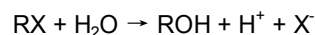
If electrolytic capacitors are cleaned with such solvents, they may gradually penetrate the seal portion and cause the corrosion. When using latex-based adhesive on the capacitors rubber end seal for adhesion to a PCB, corrosion may occur depending on the kind of solvent in the adhesive. Select an adhesive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

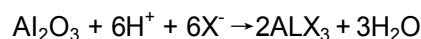
- ① Penetration between the rubber and the aluminum case
- ② Penetration between the rubber and the lead wire
- ③ Penetration through the rubber

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⁻) react with the dielectric substance (Al₂O₃) of aluminum electrolytic capacitors:



ALX₃ is dissociated with water:



※ **MANUFACTURING SIET**

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

