RoHS

MESSRS:	APPROVAL NO	214 - 016
	DATE	2008.12.25

ALUMINUM ELECTROLYTIC

CAPACITOR

APPROVAL SHEET

CATALOG TYPE	SMS SERIES
USER PART NO.	
适 用 机 种	
特 记 事 项	Pb-FREE

QINGDAO SAMYOUNG ELECTRONICS CO.,LTD

MANAGER OF DEVELOPMENT DEPARTMENT

GONG JANG SUG

长孔硕

USER APPROVAL:

APPROVAL NO.:

SamYoung(Korea) : 146-1,SANGDAEWON-DONG,JOONGWON-GU,SUNGNAM-CITY,KYUNGKI-DO,KOREA

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

APPROVAL NO. 214 - 016	ALUMINUM ELECTROLYTIC CAPACITOR	PAGE: 1 OF 5 DATE: 2008.12.25

Specifications of SMS Series

Item	Characteristics	
Rated Voltage Range	100 V_{DC} or less	160 ~ 450V_{DC}
Operating Temperature Range	- 40 ~ + 85 ℃	- 25 ~ + 85 ℃
Nominal Capacitance Range	0.1 ~ 15,000 uF	
Capacitance Tolerance	±20% (AT 120Hz,20℃)	
Leakage Current (at 20 ℃)	After 2 minute:0.01C_RV_R (μA) or 3 μA, whichever is greater Where,C_R =Nominal capacitance (μF) V_R =Rated Voltage (V_{DC})	

After 1 minute		After 5 minutes	
$C_RV_R \leq 1,000$	$C_RV_R > 1,000$	$C_RV_R \leq 1,000$	$C_RV_R > 1,000$
$0.1C_RV_R+40$	$0.04C_RV_R+100$	$0.03C_RV_R+15$	$0.02C_RV_R+25$

Dissipation Factor (TAN δ)
(20℃, 120Hz)

Rated voltage(V_{DC})	6.3	10	16	25	35	50	63	100	160~250	350~450
TAN δ	0.24	0.20	0.16	0.14	0.12	0.10	0.09	0.08	0.20	0.24

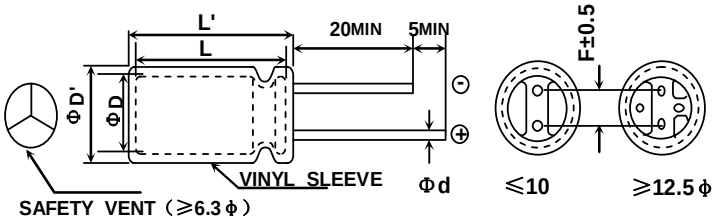
When the capacitance exceeds 1000 μF,0.02 shall be added every 1000 μF increase.

Temperature Characteristic
(Impedance ratio at 120Hz)

Rated voltage(V_{DC})	6.3	10	16	25	35~100	160	200~250	350	400	450
Z-25℃/z+20℃	4	3	2	2	2	4	8	12	16	16
Z-40℃/z+20℃	10	8	6	4	3	-	-	-	-	-

Load Life	The following specifications shall be satisfied when the capacitors are restored to 20℃ after the rated voltage applied for 2,000 hours at 85℃. Capacitance change:≤± 20% of initial Value TAN δ ≤150% of initial specified value Leakage current : ≤Initial specified value	The following specifications shall be satisfied when the capacitors are restored to 20℃ after the rated voltage applied for 2,000 hours at 85℃. Capacitance change:≤± 20% of initial Value TAN δ ≤200% of initial specified value (where,150% for≥ WV 450V_{DC}) Leakage current:≤Initial specified value
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20℃ after exposing them at 85℃ for a half assurance load life time without voltage applied. Capacitance change:≤± 20% of initial Value TAN δ ≤150% of initial specified value Leakage current : ≤Initial specified value	The following specifications shall be satisfied when the capacitors are restored to 20℃ after exposing them at 85℃ for a half assurance load life time without voltage applied. Capacitance change:≤± 20% of initial Value TAN δ ≤200% of initial specified value Leakage current : ≤200% of initial specified value
Others	Satisfies characteristic W of KS C 6421	

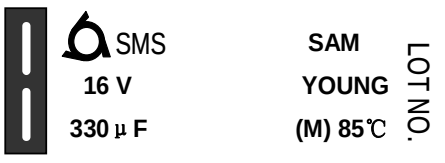
A.DIAGRAM OF DIMENSION



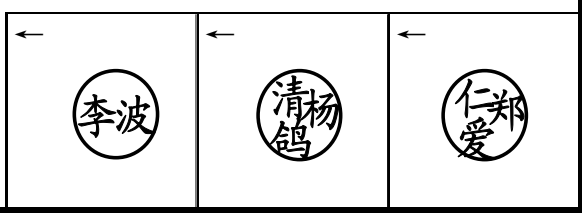
When ΦD≤8,ΦD'≤ΦD+0.5,and L'≤L+1.5
When ΦD>8,ΦD'≤ΦD+0.5,and L'≤L+2.0

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	2.0	2.5	3.5	5.0	5.0	7.5	7.5

B.MARKING:WITH BLACK SLEEVE, WHITE INK



FRONT VIEW OF CAPACITOR BACK VIEW OF CAPACITOR



SamYoung Electronics Co., Ltd.

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RATINGS OF SMS SERIES

ØDXL(mm)

WV / CAP	6.3	10	16	25	35	50	63	100	160	200	250	350	400	450
0.1						5X11 7.5	5X11 8.2	5X11 8.5						
0.22						5X11 10	5X11 11	5X11 13						
0.33						5X11 12	5X11 13	5X11 15						
0.47						5X11 17	5X11 18	5X11 18	6.3X11 19	6.3X11 19	6.3X11 20	8X11.5 21	8X11.5 21	
0.68						5X11 20	5X11 21	5X11 21	6.3X11 23	6.3X11 23	6.3X11 24	8X11.5 25	8X11.5 25	
1						5X11 24	5X11 25	5X11 25	6.3X11 26	6.3X11 27	6.3X11 28	8X11.5 29	8X11.5 30	10X12.5 27
2.2						5X11 36	5X11 37	6.3X11 39	6.3X11 39	6.3X11 40	8X11.5 45	10X12.5 52	10X12.5 53	10X16 42
3.3						5X11 44	5X11 46	5X11 47	8X11.5 54	8X11.5 56	10X12.5 62	10X16 63	10X16 64	10X20 63
4.7					5X11 40	5X11 53	5X11 57	5X11 58	8X11.5 66	10X12.5 74	10X12.5 77	10X16 78	10X20 84	12.5X20 82
6.8					5X11 50	5X11 63	5X11 68	5X11 69	10X12.5 90	10X12.5 92	10X12.5 94	10X16 101	12.5X20 110	12.5X20 99
10			5X11 44	5X11 54	5X11 58	5X11 76	5X11 82	6.3X11 95	10X16 112	10X16 123	10X20 125	12.5X20 134	12.5X20 156	12.5X20 141
22		5X11 59	5X11 75	5X11 80	5X11 87	5X11 113	6.3X11 140	8X11.5 165	10X20 195	10X20 198	12.5X25 233	12.5X25 254	16X25 254	16X31.5 252
33	5X11 55	5X11 84	5X11 90	5X11 97	5X11 129	6.3X11 158	6.3X11 171	10X12.5 235	12.5X20 280	12.5X25 286	12.5X25 312	16X25 312	16X31.5 345	16X35.5 348
47	5X11 79	5X11 100	5X11 110	5X11 138	6.3X11 177	6.3X11 190	8X11.5 242	10X16 308	12.5X25 341	12.5X25 372	16X25 412	16X31.5 418	16X35.5 473	16X35.5 423
68	5X11 110	5X11 130	5X11 151	6.3X11 191	6.3X11 213	8X11.5 269	10X12.5 347	10X20 360	16X25 447	16X25 490	16X25 495	16X35.5 569	18X35.5 611	18X40 573
100	5X11 150	5X11 165	6.3X11 211	6.3X11 231	8X11.5 306	8X11.5 327	10X12.5 409	10X20 450	16X25 602	16X31.5 608	18X35.5 658	18X40 778		
220	6.3X11 256	6.3X11 280	8X11.5 370	8X11.5 405	10X12.5 526	10X16 615	10X20 726	16X25 929	18X35.5 1099	18X40 1153				
330	6.3X11 313	8X11.5 405	8X11.5 453	10X12.5 576	10X16 706	10X20 823	12.5X20 1044	16X25 1262						
470	8X11.5 441	8X11.5 483	10X12.5 626	10X16 752	10X20 909	12.5X20 1153	12.5X25 1358	16X31.5 1647						
680	10X12.5 616	10X12.5 675	10X20 902	10X20 988	12.5X20 1296	12.5X25 1519	16X25 1811	18X35.5 2230						
1000	10X12.5 747	10X16 896	10X20 1094	12.5X20 1407	12.5X25 1714	16X25 2034	16X31.5 2403							
2200	12.5X20 1457	12.5X20 1514	12.5X25 1798	16X25 2134	16X31.5 2521	18X35.5 3049								
3300	12.5X20 1649	12.5X25 1922	16X25 2303	16X31.5 2673	18X31.5 3218	← Case Size ØD X L (mm) ← Ripple Current (mArms)AT 85℃,120Hz								
4700	16X25 2287	16X25 2433	16X31.5 2854	18X35.5 3386										
6800	16X25 2562	16X31.5 2954	18X31.5 3192											
10000	16X31.5 3102	18X35.5 3448												
15000	18X31.5 3785													

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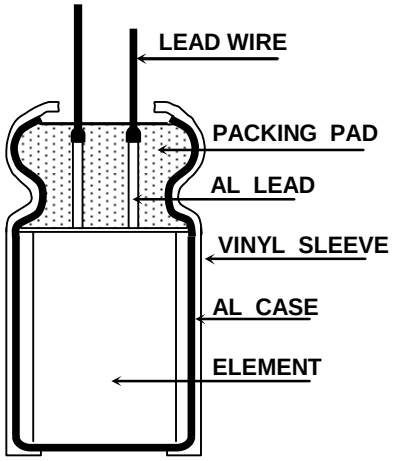
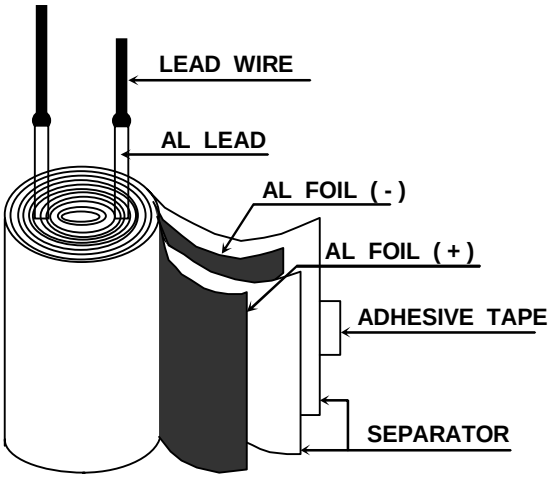
STRUCTURE AND MATERIALS





CE04 TYPE

*MINIATURE SIZED TYPE CAPACITORS COMPONENT

PART NAME	MATERIALS	VENDER
LEAD WIRE	TINNED COPPER - PLY WIRE(Pb-FREE)	SAMATRON (KOREA/CHINA) IL KWANG
AL LEAD	ALUMINUM 99.92 % OVER	IL KWANG (KOREA/CHINA) SAM ATRON
PACKING PAD	SYNTHETIC RUBBER OR BAKE PAD(Pb-FREE)	SUNG NAM (KOREA/CHINA) TIAN TAI (CHINA)
SLEEVE	P.V.C （POLY VINYL CHLORIDE）	SUNG NAM (KOREA/CHINA) MOO DEUNG
AL CASE	ALUMINUM 99.0 % OVER	D.N TECH (KOREA/CHINA) HA NAM (KOREA/CHINA) AO XING (CHINA)
AL FOIL ⊕	FORMED ALUMINUM 99.9 % OVER	K.D.K / JCC / MATSUSHITA (JAPAN) BECROMAL (ITALY) ALUKO / SAM YOUNG (KOREA) ECHO / INTERTEC SATMA (FRANCE) HUAFENG / HISTAR (CHINA) YINGKELAI / HUAFENG / HEC LUXON / LITON (TAIWAN)
AL FOIL ⊖	ETCHED ALUMINUM 98.0 % OVER	K.D.K (JAPAN) ALUKO / K-JCC (KOREA) AFT / YINGKELAI / SHENGHONG (CHINA)
SEPARATOR	INSULATION PAPER	N.K.K / M.F.G / DAIFUKU (JAPAN) SPO (GERMANY) MHD (AMERICA) KAN (CHINA)
ADHESIVE TAPE	POLY PROPYLENE FILM	DAI IL (KOREA) NITTO (JAPAN)

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 C6035 KS C6421(JIS C5102,JIS C5141)

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 C6421,the test shall be conducted 1000 cycles at room temperature for the capacitors of characteristic W of KS C6421 or at the maximum operating temperature for the capacitors of characteristics B and C of KS C6421 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 C6421.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 6035, KS C 6421， (JIS C 5102，JIS C 5141)

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. Therefore, for ordinary capacitors, the cleaning materials of alcohol system had to be used. However, the solvent proof type capacitors of Samyoung Elec. Can withstand cleaning by some halogenated solvents shown:

(rated voltage≤100 V_{DC} only)

*** FREON TE® OR TES®**

Cleaning method: One of immersion, ultrasonic or vap or cleaning.
Maximum cleaning time: 5 minutes(where, KRE,SRM is 2 minutes)

*** 1,1,1-Trichlorethane**

Cleaning method: immersion cleaning at the normal temperature
Maximum cleaning time: 5 minutes(where, KRE,SRM is not assured)

— Caution —

* When the lead space of the capacitor is different from the hole space of the PC board to be mounted , use the lead forming type capacitor to prevent stress on seal.
* Consult for flux to be used and other cleaning conditions.
(Freon TE and TES are registered trademarks of Dupont,Inc.)

*** Influence of cleaning solvent for aluminum electrolytic capacitor.**

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. However, if general types of aluminum electroytic capacitors,whose seal constructions are not solvent-proof, are cleaned with such solvents, the solvents may gradually penetrate the seal portion and erode. 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:

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

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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