RoHS

MESSRS:	APPROVAL NO	747-009
	DATE	2015.01.09

ALUMINUM ELECTROLYTIC

CAPACITOR

APPROVAL SHEET

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

USER APPROVAL:

APPROVAL NO.:

样式：H-1001-011 A4 （210×297）

SamYoung Electronics Co., Ltd.

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Specifications of KMG Series

Item	Characteristics		
Rated Voltage Range	6.3 ~ 100V_{DC}	160 ~ 400V_{DC}	450V_{DC}
Operating Temperature Range	- 55 ~ + 105 ℃	- 40 ~ + 105 ℃	- 25 ~ + 105 ℃
Capacitance Tolerance	±20%<M>		(at 20℃，120Hz)

Leakage Current (max.) (at 20 ℃)

The following specifications shall be satisfied when the rated voltage is applied for the required time

≤100V_{DC}	>100V_{DC}
After 1 minute:0.03CV(μA) or 4 μA,whichever is greater After 2 minutes:0.01CV(μA) or 3 μA,whichever is greater Where, C = Nominal capacitance(μF) V = Rated Voltage(V_{DC})	

After 1 minute		After 5 minutes	
C_RV_R≤1000	C_RV_R>1000	C_RV_R≤1000	C_RV_R>1000
0.1C_RV_R+40	0.04C_RV_R+100	0.03C_RV_R+15	0.02C_RV_R+25

Dissipation Factor (TANδ) (20℃，120Hz)

Rated Voltage(V_{DC})	6.3	10	16	25	35	50	63	100	160~250	350~450
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 Characteristics (Impedance ratio at 120Hz)

Rated Voltage(V_{DC})	6.3	10	16	25	35	50	63~160	200~250	350~400	450
Z-25℃/Z20℃	5	4	3	2	2	2	3	3	6	6
Z-40℃/Z20℃	12	10	8	5	4	3	4	5	6	-

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 105℃.(where,1000 hours ≤8Φ)

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℃ after exposing them for 1,000 hours at 105℃ 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 ≤8Φ)

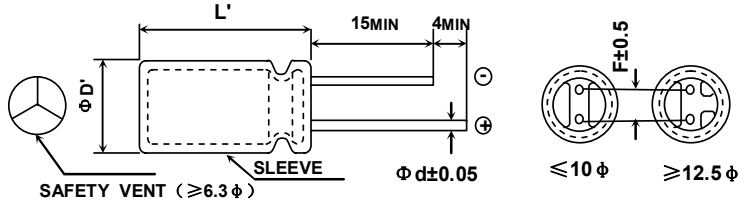
Capacitance change: ≤±20% of the initial value

Tanδ ≤200% of the initial specified value

LC ≤The initial specified value (Where, 200% for ≥ WV 160V_{DC})

Others Satisfied characteristics **KS C IEC 60384-4**

A. DIAGRAM OF DIMENSION

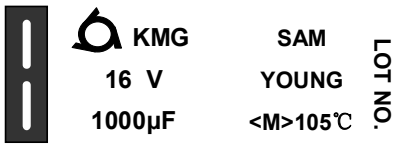


When ΦD≤8,ΦD'≤ΦD+0.5,and L'≤L+1.5

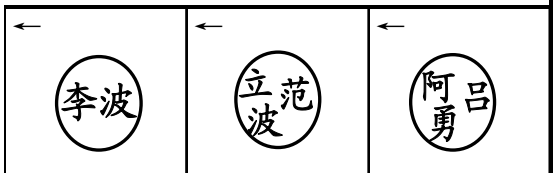
When ΦD>8,ΦD'≤ΦD+0.5,and L'≤L+2.0

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	2.5	3.5	5	5	7.5	7.5

B. MARKING: BROWN SLEEVE, WHITE INK



FRONT VIEW OF CAPACITOI BACK VIEW OF CAPACITOR



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RATINGS OF KMG SERIES

WV / CAP	6.3	10	16	25	35	50	63	100	160	200	250	350	400	450
0.1						5X11 2.1	5X11 3.2	5X11 3.6						
0.22						5X11 3.2	5X11 4.3	5X11 4.8						
0.33						5X11 6.3	5X11 7.2	5X11 7.8						
0.47						5X11 10	5X11 11	5X11 12	6.3X11 12	6.3X11 12	6.3X11 12	6.3X11 12		
0.68						5X11 12	5X11 13	5X11 14	6.3X11 14	6.3X11 15	6.3X11 15	6.3X11 15		
1						5X11 13	5X11 15	5X11 16	6.3X11 16	6.3X11 17	6.3X11 17	6.3X11 18	6.3X11 19	8x11.5 16
2.2						5X11 18	5X11 19	5X11 21	6.3X11 22	6.3X11 24	6.3X11 27	8X11.5 29	8X11.5 30	10X12.5 28
3.3						5X11 30	5X11 33	5X11 34	6.3X11 35	6.3X11 36	8X11.5 37	8X11.5 38	10X12.5 41	10X16 38
4.7				5X11 25	5X11 27	5X11 37	5X11 39	5X11 40	6.3X11 41	8X11.5 42	8X11.5 45	10X12.5 47	10X16 49	10X20 45
													8x11.5 39	
6.8														10X16 54
				5X11 31	5X11 33	5X11 44	5X11 48	5X11 49	8X11.5 52	10X12.5 59	10X12.5 60	10X16 62	10X16 65	10X20 59
10			5X11 35	5X11 37	5X11 40	5X11 54	5X11 59	6.3X11 61	10X12.5 71	10X12.5 72	10X16 74	10X20 79	10X20 86	12.5X20 84
22													12.5X20 148	
		5X11 48	5X11 53	5X11 56	5X11 67	5X11 79	5X11 87	6.3X11 100	10X20 117	10X20 119	10X20 127	12.5X20 150	12.5X25 163	16X25 151
33													12.5X30 221	
	5X11 52	5X11 56	5X11 60	5X11 75	5X11 80	5X11 97	6.3X11 122	8X11.5 144	10X20 156	10X20 158	12.5X20 184	16X25 200	16X25 222	16X31.5 203
47													16X20 250	16X35.5 254
	5X11 61	5X11 66	5X11 77	5X11 80	5X11 101	6.3X11 133	6.3X11 146	10X12.5 199	12.5X20 218	12.5X20 220	12.5X25 238	16X25 265	16X31.5 290	18X25 190
68	5X11 69	5X11 83	5X11 92	5X11 113	6.3X11 138	8X11.5 189	8X11.5 207	10X16 264	12.5X25 287	16X20 293	16X25 318	16X31.5 348	18X35.5 392	18X31.5 235
													18X20 290	
82														18X31.5 254
100							8X11.5 235							
	5X11 90	5X11 100	5X11 125	6.3X11 159	6.3X11 168	8X11.5 229	10X12.5 251	10X20 349	12.5X25 360	16X25 386	16X31.5 422	18X31.5 450		
120										12.5X35 440				
220										16X31.5 684				
	5X11 153	5X11 170	6.3X11 213	8X11.5 277	8X11.5 294	10X12.5 395	10X16 474	12.5X25 662	16X31.5 680	18X35.5 705	18X40 730			
330	6.3X11 216	6.3X11 239	8X11.5 308	8X11.5 340	10X12.5 419	10X16 529	10X20 633	16X20 810	18X35.5 863					
470	6.3X11 258	6.3X11 286	8X11.5 366	10X12.5 471	10X16 547	10X20 690	12.5X20 886	16X25 1072						
					10X20 547									
680	8X11.5 365	10X12.5 472	10X12.5 480	10X16 620	12.5X16 777	12.5X20 973	12.5X25 1160	18X31.5 1410						
1000	8X11.5 443	10X12.5 571	10X16 680	10X20 821	12.5X20 1023	12.5X25 1287	16X25 1565	18X40 2020						
2200				12.5X20 1160	16X20 1394									
	10X20 817	10X20 886	12.5X20 1108	12.5X25 1297	16X25 1497	16X35.5 1884								
3300	10X20 1032	12.5X20 1205	12.5X25 1389	16X25 1646	16X35.5 1950	18X35.5 2260	← CASE SIZE ØD X L(mm)							
							← Permissible Ripple Current (mArms/105℃,120Hz)							
4700	12.5X20 1280	12.5X25 1492	16X25 1740	16X31.5 2012	18X35.5 2335									
6800	12.5X25 1554	16X25 1824	16X31.5 2081	18X35.5 2452										
10000	16X25 1897	16X35.5 2201	18X35.5 2527											
15000	16X35.5 2344	18X35.5 2606												

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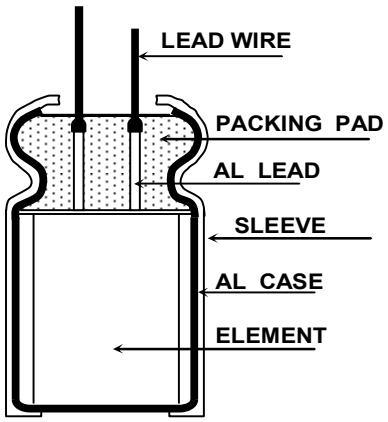
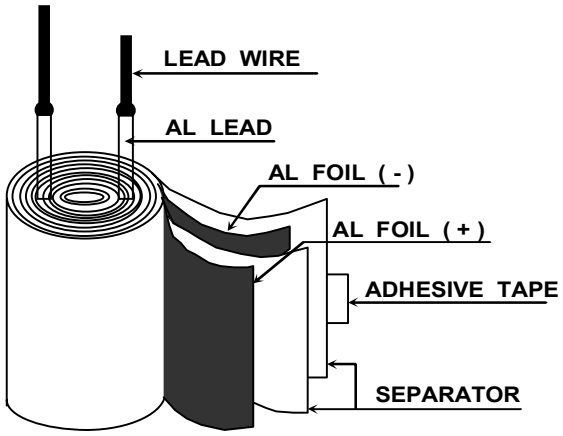
STRUCTURE AND MATERIALS





CE04 TYPE

MINIATURE SIZED TYPE CAPACITORS COMPONENT

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

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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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