					RoHS
				APPROVAL NO	697-006
				DATE	2016.05.18
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		APAC		<u> </u>	
AP	PR	oval	. S	HEET	
CATALO	G TYPE		NHA SE	RIES	
USER PA	ART NO.				
适用	机种				
特记	特 记 事 项			-Free	
				NICS CO.,LTD. EPARTMENT	
	GON	G JANG	SUG		
USER APPROVAL:					
			APPR	OVAL NO.:	
SamYoung(Korea) : 47,SAGI	MAKGOL-R	O,JUNGWON-GU,S	SEONGN	AM-SI,GYEONGGI-DO,F	OREA
SamYoung(China) : No.5 CH/	ANGJIANG	ROAD, PINGDU-CI	TY,SHAN	DONG-PROVINCE,CHIN	
样式:H-1001-011					A4 (210×297)

SamYoung Electronics Co., Ltd.

APPROVAL NO.

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697-006	ALUMINUM ELECTROLYTIC CAPACITOR												
Specifications	of NHA Series												
ltem	Characteristics												
Rated Voltage Range	6.3 ~ 100V _{DC} 160 ~ 400V _{DC} 450 ~ 500VDC												
Operating Temperature Range	- 55 ~ + 105 °C - 40 ~ + 105 °C - 25 ~ + 105 °C												
Capacitance Tolerance	±20% <m> (at 20℃,120Hz)</m>												
	After 1 minute:0.03CV(µA) or 4 µA,whichever is greater After 1 minute After 5 minutes												
Leakage Current	After 2 minutes: 0.01 CV(μ A) or 3 μ A, whichever is greater C _R V _R ≤ 1000 C _R V _R ≤ 1000 C _R V _R ≤ 1000 C _R V _R ≥ 1000												
(at 20 ℃)	Where, C = Nominal capacitance(µF)												
	V = Rated Voltage(V _{DC}) 0.1CrVr+40 0.04CrVr+100 0.03CrVr+15 0.02CrVr+25												
Dissipation Factor (TANδ)	Rated Voltage(VDC) 6.3 10 16 25 35 50 63 100 160~250 350~500												
(20℃,120Hz)	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	Rated Voltage(VDC) 6.3 10 16 25 35 50 63~100 160 200~400 450~500												
	Z (-25°C) /Z (20°C) 5 4 3 2 2 2 3 3 6 6												
(Impedance ratio at 120Hz)	Z (-40°C) /Z (20°C) 12 10 8 5 4 3 4 5 6 -												
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 105° C.(where,1000 hours $\leq 8\Phi$) Capacitance change: $\leq \pm 20\%$ of the initial value Tan δ $\leq 200\%$ of the initial specified value LC \leq The initial specified value												
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to $20^{\circ}C$ after exposing themfor 1,000 hours at $105^{\circ}C$ without voltage applied. (where , 500 hours $\leq 8\Phi$)The rated voltage shall be appled to the capacitors for a minimum of 30 minutes, at least 24 hours and not morethan 48 hours before the measurements.Capacitance change: $\leq \pm 20\%$ of the initial valueTanō $\leq 200\%$ of the initial specified valueLC \leq The initial specified value												
Others	Satisfied characteristics KS C IEC 60384-4												
A. DIMENSIONS OF NHA Series B. MARKING: <u>BROWN</u> SLEEVE, <u>WHITE</u> INK													
L' SAFETY VENT (≥6.3 ΦD 5 6.3 Φd 0.5 0.5	$ \begin{array}{c} 15MIN \\ \hline 16V \\ YOUNG \\ 1000 \\ \mu F \\ \hline 1000 \\ \hline 1000 \\ \mu F \\ \hline 1000 \\ \hline 10$												



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ALUMINUM ELECTROLYTIC CAPACITOR

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	6.3	10	16	25	35	50	63	80	100	160	200	250	350	400	420	450	500
0.1				_		5X11	5X11		5X11				_				
0.22						2.1 5X11 3.2	3.2 5X11 4.3		3.6 5X11 4.8								
0.33						5X11	5X11		5X11								
0.47						6.3 5X11	7.2 5X11 11		7.8 5X11 12	6.3X11	6.3X11	6.3X11	6.3X11 12				
0.68						10 5X11	5X11		5X11	12 6.3X11	12 6.3X11	12 6.3X11 15	6.3X11				
1						12 5X11 13	13 5X11 15		14 5X11 16	14 6.3X11 14	15 6.3X11 15	6.3X11 17	15 6.3X11 18	6.3X11 19		6.3X11 14	6.3X
						5X11 18	5X11 19		5X11 21	6.3X11 20	6.3X11 24	6.3X11 27	8X11.5 29	6.3X11 28		6.3X15 16	8X11 22
2.2						16	19		21	20	24	21	29	8X11.5 30		8X11.5 25	22
3.3						5X11 30	5X11 33		5X11 34	6.3X11 35	6.3X11 36	6.3X11 37	8X11.5 38	10X12.5 41	1	10X12.5 35	10X1 32
						50					50	57		1		10X12.5 35	8X11 22
4.7				5X11 25	5X11 27	5X11 37	5X11 39		5X11 40	6.3X11 41	6.3X11 43	8X11.5 45	8X11.5 45	10X12.5 48		10X16 42	10X1 40
				23	21	57	- 55							10X12.5 59		10X16 55	
6.8				5X11 31	5X11 33	5X11 44	5X11 48		5X11 49	8X11.5 52	8X11.5 54	8X11.5 56	10X16 62	10X16 65		10X20 59	10X2 55
				51	55		40			52	54	50	10X12.5 64	10X16 78		10X16 69	33
10			5X11 35	5X11 37	5X11 40	5X11 54	5X11 59		5X11 59	8X11.5 60	8X11.5 62	10X16 74	10X20 79	10X20 86		10X20 76	12.5X 72
				- 57			- 55			00	02		13	00		12.5X20 80	12
15																12.5X20 85	12.5X 72
18	1									8X11.5 60					1		1 '2
		5X11 48	5X11 53	5X11 56	5X11 67	5X11 79	5X11 87		6.3X11 100	10X16 111	10X16 113	10X20 127	12.5X16 138	10X25 157		12.5X25 136	16X2 132
22							6.3X11 87					/	12.5X20 150	12.5X16			102
							<u> </u>							140 12.5X20 157			
22														12.5X20 157			
33	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	12.5X25 189	16X20 210		12.5X30 189	16X3 178
									8X11.5 171					12.5X30 265		16X25 223	
47	5X11 61	5X11 66	5X11 77	5X11 80	5X11 101	6.3X11 133	6.3X11 146		8X15 189	10X20 202	12.5X20 220	12.5X25 238	16X20 246	16X25 280		16X31.5 240	18X3 200
																18X20 215	
56					5X11 110											18X25 268	
											12.5X20 265			16X31.5 376		18X20 290	
68														16X35.5 384		18X31.5 338	
	5X11 69	5X11 83	5X11 92	5X11 113	6.3X11 138	6.3X11 156	8X11.5 207		10X16 264	12.5X20 274	12.5X25 288	16X20 300	16X31.5 348	18X20 300		18X35.5 349	
													0.0	18X25 340			
82											12.5X20 380			16X31.5 376			
				5X11 141			8X11.5 235		10X16 280					16X31.5 376		18X31.5 400	
100														18X25 340			
100	5X11 90	5X11 100	5X11 125	6.3X11 159	6.3X11 168	8X11.5 229	10X12.5 251		10X20 349	12.5X25 360	16X20 366	16X25 405	16X35.5 447	18X31.5 415		22X30 414	
							10X16 255							18X40 461			
120			5X11 125		8X11.5 180						16X20 380	18X25 411		18X31.5 437	18X31.5 380	18X40 425	
120											12.5X30 330	18X31.5 470					
150										16X20 505				18X31.5 437			
														18X35.5 439			
180											18X20 558			18X40 605			
								12.5X16 480				18X31.5 690					
220	5X11 153	5X11 170	6.3X11 213	238	8X11.5 294	10X12.5 395	10X16 474		12.5X20 572	16X25 656	16X31.5 684	710	22X45 780				
		6.3X11 194		8X11.5 260	0.221-	4011-5	403777		4010	403/03	40100-	18X40 730					
	6.3X11 216	6.3X11 239	6.3X11 265	6.3X11 293	8X15 398	10X16 529	10X20 633		16X20 810	18X31.5 848	16X35.5 700	22X40 900					
330				8X11.5							18X35.5 866						
				340	8720					18724 5	18X40 880						
	6 37/11	6 0 1 1		8X11.5 406	8X20 420	10,702	10 510-	10 5:00-	10205	18X31.5 848	18X40 880						
470	6.3X11 258	6.3X11 286	8X11.5 366	8X15 447	10X16 547	10X20 690	12.5X20 886	12.5X25 890	16X25 1072	22X35 1130	22X40 1156						
				10X12.5 471	12.5X16		16X20				18X45						
560			8X11.5		12.5X16 600 10X20		16X20				900						
680	8X11.5	8X11.5	8X11.5 366 8X15	10X16	10X20 580 12.5X16	12.5X20	12.5X25		16X31.5	22X45							
	365	405	455	620	777	973	12.5825	16X31.5	16X31.5	1463							
820				10X16		12.5X20	16X25	16X31.5									
1000	8X11.5	8X15	10X16	10X16 680 10X20	12.5X20	12.5X20 973 12.5X25	16X25 1565 16X31.5	18X31.5	18X40								
	443 8X15	542	680	821	1023	12.5725	1580	1600	2020								
1200	490					16X31.5	16X40										
1500	10X16	10X20	12.5X20	12.5X25	16X25	1424 16X31.5	1650 18X35.5										
2200	772	886	1108	12.5A25 1297 12.5X30	1497	1724	1938										
3300	10X20	12.5X20	12.5X25	12.5X30 1330 16X25	16X31.5	18X35.5			CASES	ZE ØD X	(mm)						
	10X20 1032	12.5X20 1205	12.5825	16X25 1646 16X25	16X31.5	2260	*		Rated Ri	ZE ØD X pple Curre	ent (mArm	s) at 105	℃,120Hz				
4700	12.5X20	12.5X25	16X20	16X25 1646 16X31.5	18X35.5												
4700	12.5X20 1280	12.5X25 1492 16X25	16X20 1610 16X31.5	16X31.5 2012 18X35.5	18X35.5 2335 18X40												
	12 5 100		10/01.5	10735.5	10740		1	1	1	1				1	1	1	
6800	12.5X25 1554	1824	2081	2452	2642												
	12.5X25	16X25 1824 16X31.5 2082	2081 18X31.5 2365	2452 18X40 2692	2642												



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			APPROVAL NO
ALUMINU	JM ELECTROLYTIC CAP	ACTIORS	697-006
STRUCTURE	E AND MATERIALS		
	AL LEAD AL LEAD AL LEAD SLEEVE AL CASE ELEMENT		<u>(-</u>) FOIL (+) ADHESIVE TAPE SEPARATOR
CE04 TYPE		_	
	SIZED TYPE CAPACITORS COM		
PART NAME	MATERIALS	VENDER	
		KISTRON	(KOREA/CHINA
LEAD WIRE	TINNED COPPER - PLY WIRE(Pb-FREE)	KOHOKU	(JAPAN/CHINA)
		NANTONG HONG YAN	- ()
		KANG WON AUTO FIT	(CHINA)
AL LEAD	ALUMINUM 99.92 % OVER	NAN TONG HUI FENG NANTONG HONG YAN	
	ALOWINOW 99.92 % OVER	KOHOKU	(JAPAN/CHINA
		KISTRON	(KOREA/CHINA
		SUNG NAM	(KOREA/CHINA (KOREA/CHINA
PACKING PAD	SYNTHETIC RUBBER	CCW/ZHE JIANG TIAN	•
FACKING FAD		ZHE JIANG TIAN HUA	(CHINA)
		MOO DEUNG	(KOREA/CHINA
		SUZHOU QILIAN	(ROREA/OTIMA
SLEEVE	P.E.T(Poly Ethlylene Terephthalate Resin)	SHUN PENG PLASTIC	(CHINA)
		YUN LIN PLASTIC	(CHINA)
		ZHANG JIA GANG LIAN	
		LIN AN AO XING	(CHINA)
AL CASE	ALUMINUM 99.0 % OVER	NANTONG CHUANGJI	. ,
		DONG NAM	•
		D.N TECH/HA NAM	(KOREA/CHINA
		K.D.K/JCC/MATSUSHI	ΓA (JAPAN)
		SAM YOUNG	(KOREA)
		BECROMAL	(ITALY)
-		SATMA	(FRANCE)
AL FOIL \oplus			(1101102)
	FORMED ALUMINUM 99.9 % OVER	HEC	
	FORMED ALUMINUM 99.9 % OVER	HEC XINJIANG JOINWORL) (CHINA)
	FORMED ALUMINUM 99.9 % OVER	XINJIANG JOINWORLD	. ,
	FORMED ALUMINUM 99.9 % OVER	XINJIANG JOINWORLE HUAFENG / NANTONG	/RAOIO
	FORMED ALUMINUM 99.9 % OVER	XINJIANG JOINWORLD	/RAOIO (TAIWAN)
		XINJIANG JOINWORLE HUAFENG / NANTONG LUXON/LITON K-JCC	/RAOIO (TAIWAN) (KOREA)
	ETCHED ALUMINUM 99.9 % OVER	XINJIANG JOINWORLE HUAFENG / NANTONG LUXON/LITON	/RAOIO (TAIWAN) (KOREA) (JAPAN) HONG
		XINJIANG JOINWORLE HUAFENG / NANTONG LUXON/LITON K-JCC K.D.K	/RAOIO (TAIWAN) (KOREA) (JAPAN) HONG (CHINA)
		XINJIANG JOINWORLE HUAFENG / NANTONG LUXON/LITON K-JCC K.D.K AFT/INCULCU/SHENG	/RAOIO (TAIWAN) (KOREA) (JAPAN) HONG EILO
AL FOIL 🔿	ETCHED ALUMINUM 98.0 % OVER	XINJIANG JOINWORLE HUAFENG / NANTONG LUXON/LITON K-JCC K.D.K AFT/INCULCU/SHENG ELECON/WU JIANG FI KAN/LUNAN	/RAOIO (TAIWAN) (KOREA) (JAPAN) HONG EILO (CHINA)
		XINJIANG JOINWORLE HUAFENG / NANTONG LUXON/LITON K-JCC K.D.K AFT/INCULCU/SHENG ELECON/WU JIANG FI KAN/LUNAN SPO	/RAOIO (TAIWAN) (KOREA) (JAPAN) HONG EILO (CHINA) (GERMANY)
AL FOIL 👄 SEPARATOR	ETCHED ALUMINUM 98.0 % OVER	XINJIANG JOINWORLE HUAFENG / NANTONG LUXON/LITON K-JCC K.D.K AFT/INCULCU/SHENG ELECON/WU JIANG FI KAN/LUNAN	/RAOIO (TAIWAN) (KOREA) (JAPAN) HONG EILO (CHINA)



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 execceeding 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.

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)

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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 ₂ CI ₃ F ₃	Freon TF,Daiflon S-3
Fluorotrichloromethane	CCI₃F	Freon-11,Daiflon S-1
1,1,1-Trichloroethane	F2H3Cl3	Chloroethane
Trichloroethylene	C ₂ HCI ₃	Trichiene
Methyl Chloride	CH ₃ CI	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°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:

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

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

 $AI_2O_3 + 6H^+ + 6X^- \rightarrow 2ALX_3 + 3H_2O$

AIX₃ is dissociated with water:

 $ALX_3 + 3H_2O \rightarrow AL (OH)_3 + 3H^+ + 3X^-$

****MANUFACTURING SITE**

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

