湖南艾华集团股份有限公司

HUNAN AIHUA GROUP CO.,LTD

Tel: (0737)6184466 Fax : (0737)6180493

Http://www.aihuaglobal.com

Customer: 深圳市海宜通科技有限公司

Date: November 29, 2016

SPECIFICATION

Description: Aluminum Electrolytic Capacitors

Customer P/N:

AISHI P/N:Part of NR series

SERIES: NR

ITEM:

No: CRS-S-1611009

APPROVED BY
Please Return One Copy with Your Approval 承认后请寄回一份

PREPARED BY	CHECKED BY	APPROVED BY
李 科 技術中心	李 凯 技術中心	黄遠彬 技術中心

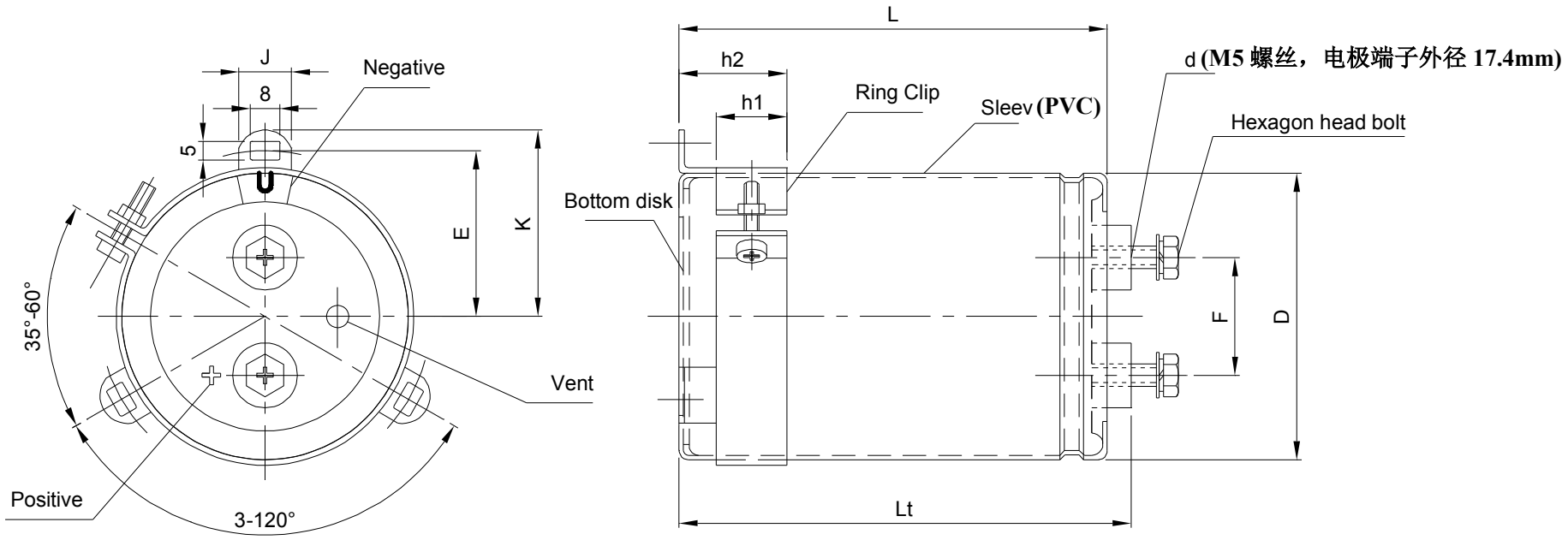


FIG-1

Ring clip mounting (mm)

D	$F^{+0.2}_{-0.4}$	d	E±1	K±1	J±0.5	h1±0.5	h2±0.8
$\Phi 76.9^{+1}_{-0.7}$	31.7	M5	44.5	47.5	14.0	24.0	30.0

Robustness of M5's terminal: tightening torque is 2.0 Nm

TABLE-1

No.	Customer Part No.	Aishi Part No.	Capacitance (uF)	Tolerance on Rated Capacitance (%)	Rated Voltage (Vdc)	Surge Voltage (Vdc)	Operating Temp. Range (℃)	tan δ (120Hz) (Max)	ESR(mΩ) at 20℃ 120Hz(Max)	Leakage Current (uA)(5min)	Max Ripple Current (A) at 85℃ 120Hz	Endurance at 85℃ (Hours)	Dimensions (mm)				Appearance Drawing No.
													ΦD	L^{+3}	$Lt^{\pm 1}$	F	
1		ENR2HM332UF5SS00C	3300	±20	500	550	-25~+85	0.25	45	5000	9.8	2000	76.9	155	161.5	31.7	FIG-1
2		ENR2WM472UB5S00C	4700	±20	450	500	-25~+85	0.2	40	5000	14.0	2000	76.9	115	121.5	31.7	FIG-1

Status	File Description	Component No./ Rev
Released	Approval Sheet- NR	CRS-2016NR/ 01

1 概述 SCOPE

本承认书规定了"NR"系列螺柱式铝电解电容器的技术规范。

This specification covers "NR" series screw terminal aluminum electrolytic capacitors

2 参考标准 APPLICABLE SPECIFICATION

本承认书参考 JIS-C-5101-1 和 JIS-C-5101-4 制定。

The specification consulted the institute of JIS-C-5101-1 and JIS-C-5101-4.

3 工作温度范围 OPERATING TEMPERATURE RANGE

工作温度范围是电容器在施加额定工作电压条件下，可以长期可靠工作的环境温度范围。

-25℃~+85℃ (160V.DC~500V.DC)

Operating temperature range is the range of ambient temperature at which the capacitor can be operated continuously at rated voltage.

-25℃~+85℃ (160V.DC~500V.DC)

4 测试环境 CONDITION OF TEST

如果没有其他规定，标准的测试、检验环境条件如下所示：

环境温度：15℃至 35℃

相对湿度：45%至 75%

大气压力：86kpa 至 106kpa

如果对测试结果有异议，可以在以下条件测试：

环境温度：20±1℃

相对湿度：60%至 67%

大气压力：86kpa 至 106kpa

Unless otherwise specified, the standard range of atmospheric conditions for making measurements and tests are as follows.

Ambient temperature ： 15℃ to 35℃

Relative humidity ： 45% to 75%

Air pressure ： 86kpa to 106kpa

If there may be doubt on the results, measurements shall be made within the following limits.

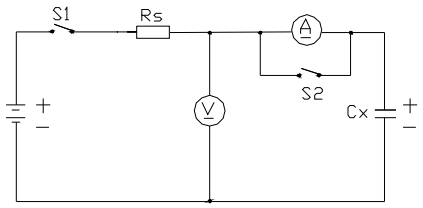
Ambient temperature ： 20±1℃

Relative humidity ： 60% to 67%

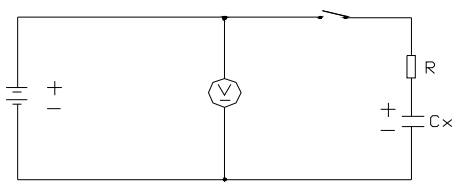
Air pressure ： 86kpa to 106kpa

5 产品特性 PRODUCT CHARACTERISTICS

5.1 电气特性 ELECTRICAL CHARACTERISTICS

序号 No.	项目 Item	测试方法 Test method	性能 Performance
5.1.1	额定工作电压 Rated voltage		160V.DC~500V.DC
5.1.2	电容量 Capacitance	测试频率：120Hz±20% 测试电路：串联等效 测试电压：0.5Vrms 以下+1.5~2.0VDC Measuring frequency: 120Hz±20% Measuring circuit: Series equivalent circuit Measuring voltage: 0.5Vrms or less +1.5 to 2.0 VDC	容量范围： 1000uF ~18000uF 容量偏差：-20%~+20% Range of Capacitance: 1000 uF ~18000uF Capacitance tolerance: -20%~+20%
5.1.3	损失角正切值 Dissipation Factor	测试条件与 5.1.2 电容量测试相同 Testing condition are the same as 5.1.2 for capacitance	DF 见表 1 DF: See Table 1.
5.1.4	漏电流 Leakage current	在电容器两端施加额定工作电压，并串联 1000±100Ω电阻，在施加电压 5 分钟后，测量漏电流。 测试电路如下图： The rated voltage shall be applied across the capacitor and its protective resistor which shall be 1000±100Ω. The leakage current shall then be measured after an electrification period of 5 min.. Measurement circuit  Rs: Protective resistor(1000±100Ω) DC ammeter DC voltmeter S_1: Switch S_2: Protective switch for an ammeter	I=0.02CV 或 5 mA 取较小值（5 钟，25℃） I：漏电流（μA） C：容量（μF） V：额定工作电压（V） I=0.02CV or 5 mA whichever is smaller. (at 25℃,after 5inutes) I: Leakage current（μA） C: Nominal capacitance（μF） V: Rated voltage（V）

Status	File Description	Component No./ Rev
Released	Approval Sheet- NR	CRS-2016NR/ 01

<table>
<tr><th>序号
No.</th><th>项目
Item</th><th>测试方法
Test method</th><th>性能
Performance</th></tr>
<tr><td>5.1.5</td><td>温度特性
Temperature Characteristic</td><td>
<table>
<tr><th>阶段</th><th>温度</th><th>时间</th></tr>
<tr><td>1</td><td>20±2℃</td><td>--</td></tr>
<tr><td>2</td><td>-25，$^{+0}_{-3}$-40℃</td><td>2h</td></tr>
<tr><td>3</td><td>20±2℃</td><td>15min.</td></tr>
<tr><td>4</td><td>85$^{+3}_{-0}$℃</td><td>2h</td></tr>
</table>
阶段 1：测量容量（|C| 20℃ 120Hz±20%）
阶段 2：电容器恒温贮存 2 小时，在热平衡状态测容量（|C|-25，-40℃ 120Hz±20%）
阶段 4：电容器恒温贮存 2 小时，在热平衡状态测电容量
Step 1:Capacitance and impedance shall be measured.
（|C| 20℃ 120Hz±20%）
Step 2:After the capacitor being stored for 2 hours, impedance shall be made at thermal stability.
（|C|-25，-40℃ 120Hz±20%）
Step 4:After the capacitor being stored for 2 hours, capacitance shall be measured. The measurement shall be made at thermal stability.</td><td>阶段 2：
容量与阶段 1 容量相比，不大于表 2 要求。
阶段 4：
容量变化应在初值的±20%范围内
Step 2: capacitance ratio
Ratio to the value at step shall be not more than the value given table-2
Step 4:Variation of capacitance
Within±20%of the value at Step 1.</td></tr>
<tr><td>5.1.6</td><td>耐浪涌电压
Surge Test</td><td>施加表 1 所列浪涌电压，充电 30±5 秒，放电 5.5±0.5 分钟作为一个周期，共进行 1000 次。
测试温度：15℃-35℃
然后在标准大气条件下放置达到热稳定，测试各参数
Application of DC surge Voltage stated at table-1,
1000 times of charging for 30±5 sec., discharging with a period of 5.5±0.5 min..
Test temperature: 15℃-35℃
And the capacitor shall be stored under standard atmospheric conditions to obtain thermal stability, after which measurements shall be made.</td><td>容量变化：在初始值的±20%以内。
损耗角正切值不大于 200%的表 1 规定值。
漏电流：达到 5.1.4 要求
Capacitance change:
With±20% of the initial value.
Dissipation factor:
Not more than 200% of the specified value in Table-1.
Leakage current:
To satisfy No.5.1.4</td></tr>
<tr><td></td><td></td><td colspan="2">Test circuit
 

Note: This requirement is applicable only to instantaneous over voltage which may be applied to terminals of capacitor, therefore, not applicable to such over voltages as often applied.</td></tr>
</table>

5.2 机械特性 MECHANICAL PERFORMANCE

序号 No.	项目 Item	测试方法 Test method	特性 Performance
5.2.1	振动试验 Resistance to Vibration	依据 JIS C 5101-1-4.17 试验。 在 3 个互相垂直的方向分别施加 2 小时振动，共 6 小时 频率：10~55Hz 振幅：1.5mm 振速：1 分钟内振速 10~55~10Hz To comply with JIS C 5101-1-4.17 Direction and duration of vibration: 3 orthogonal directions mutually each for 2h, Total 6h. Vibration Frequency Range:10~55Hz Peak to peak amplitude:1.5mm Sweep rate:10to55to10Hz in about 1 min	测量电容器应无接触不良开路或短路，无可见机械损伤。 When the capacitors is measured there shall be no intermittent contacts, or open or short-circuiting There shall be no such mechanical damage.

5.3 耐久性测试 ENDURANCE PERFORMANCE

序号 No.	项目 Item	测试方法 Test method	特性 Performance
5.3.1	稳态湿热 Resistance to damp heat (Steady state)	依据 JIS C 5101-1-4.22 进行试验 试验温度：40±2℃ 试验时间：1344±8h 相对湿度：90~95% 试验后，电容器在标准大气条件下 1~2 小时，然后测试参数 To comply with JIS C 5101-1-4.22 Test temperature : 40±2℃ Test time : 1344±8h Relative humidity: 90~95% After completion of test, the capacitor shall be subjected to standard atmospheric conditions for 1 to 2 hours, after which measurements shall be made.	容量变化：在初始值±10%范围内 损失角正切值：满足表 1 要求 漏电流：满足 5.1.4 要求 外观：无异状 Variation of capacitance: Within ±10% of the initial value Dissipation factor: To satisfy Table 1. Leakage current: To satisfy No.5.1.4 Appearance: No remarkable abnormality.
5.3.2	高温负荷试验 Load life test	试验温度：+85±2℃，施加额定电压和额定纹波电流 试验时间：2000^{+72}_{-0} h Application of the rated voltage and the rated ripple current, Test temperature:85±2℃ Test time:2000^{+72}_{-0} h	容量变化：在初始值±20%范围内 损失角正切值：不超过表 1 所列规定值的 200% 漏电流：满足 5.1.4 需求 外观：无异状 Variation of capacitance: Within ±20% of the initial value. Dissipation factor: Not more than 200% of the specified value in Table 1. Leakage current: To satisfy No.5.1.4 Appearance: No remarkable abnormality.

序号 No.	项目 Item	测试方法 Test method	特性 Performance
5.3.3	高温贮存试验 Shelf life test	在 85±2℃环境下无负荷贮存 1000 $^{+48}_{-0}$ h, 至少恢复 16 小时后。 The capacitors are then stored with no voltage applied at a temperature of 85±2℃ for1000 $^{+48}_{-0}$ h and then resumed 16 hours.	容量变化：初始值±20%范围内。 损失角正切值：不超过表 1 所列规定值的 150%。 漏电流：满足 5.1.4 需求。 外观：无异状 Variation of capacitance: Within ±20% of the value before test. Dissipation factor: Not more than 150% of the specified value in Table 1. Leakage current: To satisfy No.5.1.4 Appearance: No remarkable abnormality.
5.3.4	防爆试验 Safety vent	在电容器两极施加反向工作电压，其中通过的电流为 1 A(ΦD≤22.4mm)，10A(ΦD＞22.4mm)在测试时防爆装置应能在 30 分钟内动作。 D．C．Application test The capacitor shall be subjected to a reverse D.C. voltage equal to the rated D.C. voltage. The current flowing through the capacitor shall be 1A (ΦD≤22.4mm)， 10A(ΦD＞22.4mm) If the vent does not operate with the voltage applied for 30 minutes, the test is considered to be passed.	上述过程中应无引线、铝箔等散射，无火花产生。 The vent device is actuated under the test conditions, thereby preventing terminals, metal pieces, etc, of the capacitor from scattering due to burst, the case from separating from the seal packing, or the capacitor from producing flame.

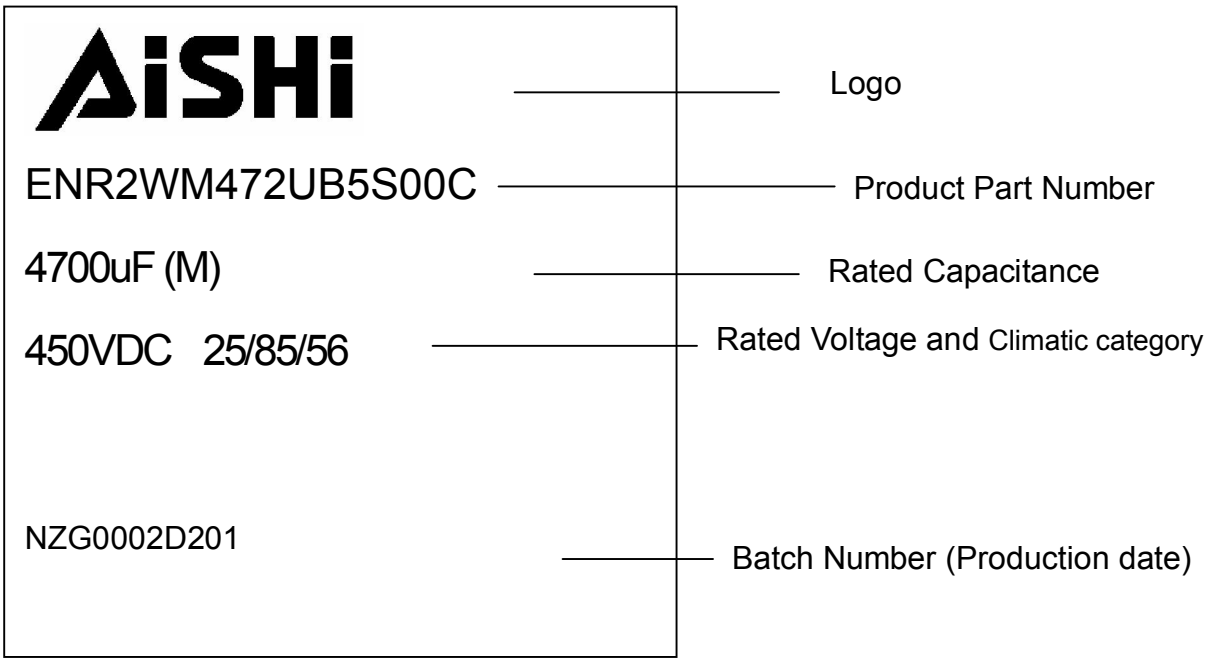
※ 表 2（TABLE 2）

容量变化 Capacitance change	额定工作电压 Rated voltage (v)	160 to 500
	|C|-25℃/|C|20℃	≥0.7

6 标记 MARKING

6.1 The following information should be included on the marking
6.1.1 The polarity on the cover disk and the sleeve
6.1.2 Rated capacitance
6.1.3 Rated voltage
6.1.4 Production date
6.1.5 Logo of Aishi
6.1.6. Type of Aluminum electrolytic capacitor

e.g.



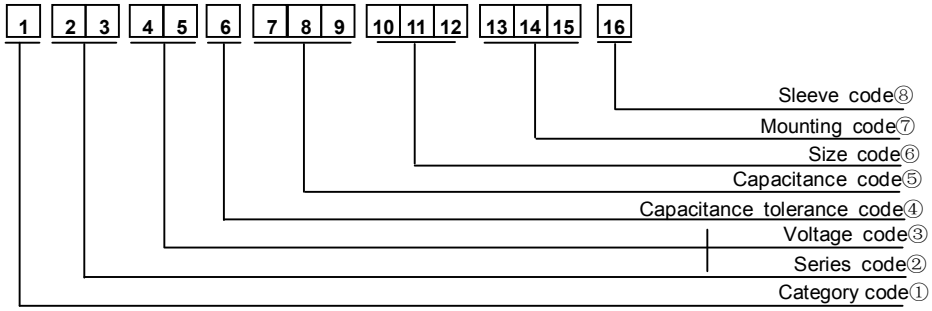
6. 2 标记颜色 Marking color

套管颜色：黑
标记颜色：白
Sleeve color : Black
Marking color: White

7 纹波电流频率因子 RIPPLE CURRENT FREQUENCY COEFFICIENT

Rated voltage (Vdc)	Case diameter (mm)	Frequency(Hz)				
		50	120	300	1k	3k
350 to 500	Φ51.6 to Φ90	0.8	1.0	1.1	1.3	1.4

8. Part Number System of the Screw Terminals



①Category

Type	Code
	1th
Electrolytic Capacitor	E

②Series code

Series name	Code	
	2 th	3 th
NR	N	R
NX	N	X
NE	N	E
NS	N	S
NF	N	F

③Voltage code

WV(V)	Code	
	4th	5th
4	0	G
6.3	0	J
10	1	A
16	1	C
25	1	E
35	1	V
40	1	G
50	1	H
63	1	J
80	1	B
100	1	K
160	2	C
180	2	L
200	2	D
220	2	N
250	2	E
315	2	F
350	2	V
380	2	P
400	2	G
420	2	T
450	2	W
500	2	H
550	2	J
600	2	K

④Capacitance

Tol. (%)	Code
	6th
-10～+10	K
-20～+20	M
-10～+30	Q
-10～+50	T
-10～+20	V
-0～+20	A
-0～+30	
-5～+20	C
-10～-20	B
-5～+5	D
-0～+10	E
-5～-20	F
-15～+5	N

⑤Capacitance code

Cap (μF)	Code		
	7th	8th	9th
100	1	0	1
220	2	2	1
330	3	3	1
470	4	7	1
680	6	8	1
1000	1	0	2
2200	2	2	2
3300	3	3	2
4700	4	7	2
6800	6	8	2
10000	1	0	3
22000	2	2	3
33000	3	3	3
68000	6	8	3

⑥Size code

ΦD	Code
	10th
30	Q
35	R
40	Y
51.6	S
64.3	T
76.9	U
91	V
100	A

L	Code	
	11th	12th
50	5	0
60	6	0
80	8	0
96	9	6
100	A	0
115	B	5
120	C	0
130	D	0
140	E	0
155	F	5
157	F	7
160	G	0
170	H	0
200	K	0
220	M	0
236	N	6
250	P	0

⑦Mounting Code

Specification	Code	Size	
	13th	14th	15th
Ring clip mounting Standard design	A	0	0
threaded stud Standard design	B	0	0
Ring clip mounting Special design	S	*	*
threaded stud Special design	T	*	*

⑧Sleeve Code

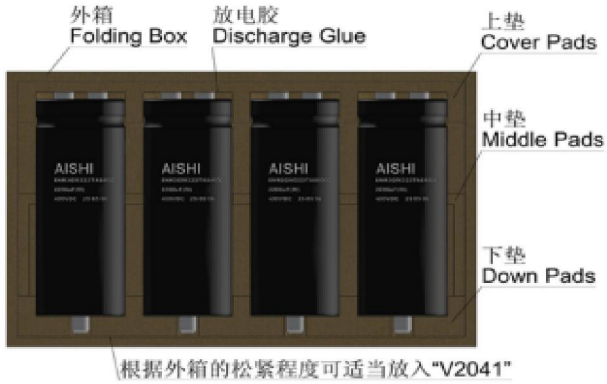
Sleeve	Code
	16th
PVC	C
PET	T

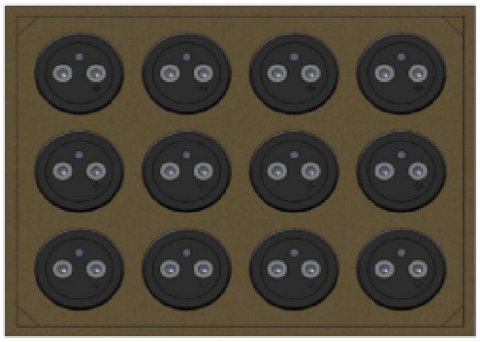
9 包装 PACKING

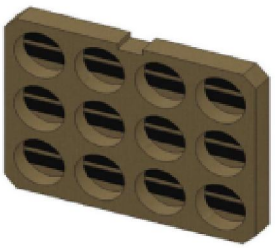
9.1 包装按下图包装方式

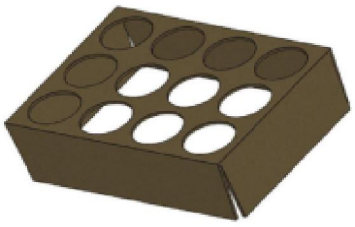
Bulk packing capacitors are packed into inner BOX and cartons according to the following drawing.

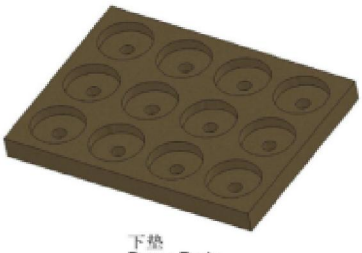
ΦD	数量 quantity	Packing Height 外箱高度（长*宽*高）
φ51.6	24	399*299*126/266
Φ64.3	15	399*299*126/266
Φ76.9	12	399*299*126/266
Φ91	8	399*299*126/266
Φ100	6	399*299*126/266











10 其它说明 OTHERS

10.1 铝电解电容器使用注意事项

IMPORTANT INFORMATION ON THE APPLICATION OF ALUMINUM ELECTROLYTIC CAPACITORS

(1)直流铝电解电容器应按正确的极性使用 DC electrolytic capacitors are polarized

当直流铝电解电容器按反极性接入电路时，电容器会导致电子线路短路，由此产生的电流会引致电容器损坏。若电路中有可能在负引线施加正电压，请选无极性产品。

When reverse voltage is applied on DC electrolytic capacitors, the circuit will be short-out because of the improper application and the capacitors will be damage due to abnormal current flows through the capacitors .Please use no polarized capacitors in the circuit where the positive voltage may be applied to the cathode terminal.

(2)在额定工作电压以下作用 Use capacitor within rated voltage

当电容器上所施加电压高于额定工作电压时，电容器的漏电流将上升，其电气特性将在短时内劣化损坏。请注意电压峰值勿超出额定工作电压。

When capacitor is used at higher voltage than the rated voltage, leakage current increases, characteristics drastically deteriorate and damage in a short period may occur as a result. Please take extra caution that the peak voltage should not exceed the rated voltage.

(3)作快速充放电使用 Charge and discharge application

当常规电容器被用作快速充电用途,其使用寿命可能会因为容量下降，温度急剧上升等而缩减。

When aluminum electrolytic capacitors for general purpose are employed in rapid charge and discharge application, its life expectancy may be shortened by capacitance decrease, heat rise, etc.

(4)电容器贮存 Store the capacitor

当铝电解电容器作了长期贮存后，其漏电流通常升高，贮存温度愈高，漏电流上升愈快。因此应注意贮存环境，在电容器上施加电压后，漏电流值将不断下降，如铝电解电容器的漏电流值上升对电路有不良影响的，请在使用前充电处理。

Increased leakage current is common in aluminum capacitors which have been stored for long period of time. The Higher the storage temperature, the higher the leakage current increase, therefore please take precautions concerning the storage location. The leakage current decreases gradually as voltage is applied to the capacitor. In cases where increased leakage current causes problems in the circuit, apply voltage (aging) before using.

(5)施加纹波电流应小于额定值 Ripple current applied to capacitor should not exceed the rated value

施加纹波电流超过额定值后，会导致电容器体过热，容量下降，寿命缩短。所施加纹波电压的峰值应小于额定工作电压。

Excessive heat will reduce capacitance and result in shortened life of capacitor if ripple currents exceeding the specified rated value are applied. The peak value of the ripple voltage should be less than the rated voltage.

(6)使用环境温度 Ambient temperature

铝电解电容器的使用寿命会受到环境温度的影响。据科学统计，使用环境温度下降 10℃其使用寿命增加 1 倍。

The ambient temperature affects life of the aluminum electrolytic capacitor. It is generally stated, that life doubles for each 10℃ decrease in temperature.

(7) 关于焊接以后的清洗 Cleaning after soldering

① 电容器不能用卤化有机物系列的清洗剂进行清洗。如果必须进行清洗，请使用能够保证电容器质量的清洗剂。

The aluminum electrolyte capacitors should be fee halogenated solvents during board cleaning after soldering. Use solvent proof capacitors when halogenated solvents are used.

② 对于能够保证电容器质量的清洗剂，清洗后请不要在清洗溶液或者密封容器中保管。清洗后的电容器请和

电路板一起在热风下干燥 10 分钟以上，热风的温度不可高于电容器规定上限温度。

After cleaned with the solvent which should proof the quality of capacitors, the capacitors should not be kept in solvent environments of non-ventilated places. Let the capacitors after cleaning dry with hot blast fully above 10mins and the temperature of hot blast should not be over than specified upper limit of capacitors.

(8) 关于固定剂以及镀层（涂层剂）Adhesives、fixative and coating materials(coating agent)

① 请不要使用含有卤化有机物系列的固定剂及镀层（涂层剂）。

Do not use halogenated adhesives and coating materials to fix aluminum electrolytic capacitors.

② 请不要让固定剂及镀层（涂层剂）将电容器封口部位（端子一侧）全部封住。

Do not cover up all the sealing area of capacitors with adhesives、fixative or coating materials(coating agent), make coverage only partial

10.2 符合 RoHS　　RoHS compliance

本产品（包括所有构件）完全符合欧盟 RoHS 要求，即 6 种有害物质的最大含量均不超过如下要求：

This product (including all components)is according to the standard of RoHS , it means the max contents of six harmful material not over the following request

Cd（镉）- 100PPM　　Pb（铅）-1000PPM　　Hg（汞）-1000PPM

Cr^{+6}（6 价铬）-1000PPM　　PBBs（多溴联苯）-1000PPM　　PBDEs（多溴联苯醚）-1000PPM