RoHS 对应品

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产 品 规 格 书

Product specification

产品名称： 铝电解电容器
Products Name: Aluminum Electrolytic capacitor
产品系列： CD294 系列
Products Series:CD294 Series
客户名 Customer:____*_____
产品部品号Jianghai Part Number： ECS2WBW471MLB300050V

南 通 江 海 电 容 器 股 份 有 限 公 司

Nantong Jianghai Capacitor Co.,Ltd

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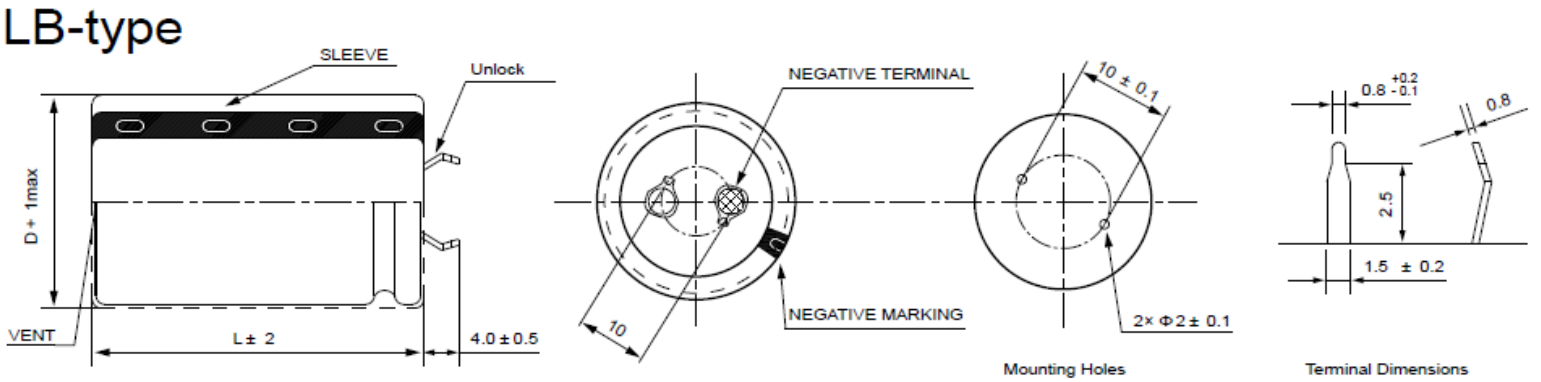
ALUMINUM ELECTROLYTIC CAPACITOR			
RECORD OF REVISION			
REV. NO.	REASON	DATE	REMARKS
A	初版First Edition	201200317	

规格表 SPEC LIST

电性能参数 Electrical Characteristics

Customer P/N				
JIANGHAI PART NUMBEER	ECS2WBW471MLB300050V			
Series	CD294			
Rate voltage（V）	450			
Surge voltage(V)	500			
Capacitance（μF,120Hz,20℃）	470			
Capacitance tolerance (120Hz,20℃)	±20%			
D×L(mm×mm)	30×50			
tan δ (%,120Hz,20℃)	20			
Lc（μA,20℃,5min)	1500			
Rated ripple(Arms,105℃,120Hz)	1.75			
Load life(hrs, 105℃)	2000			

外型图 Dimensions



1、适用范围 Adapt Range

本产品规格书适用于南通江海电容器股份有限公司 CD294 型铝电解电容器产品，该产品满足 GB/T2693-2001 和 JIS C 5102-1994 的要求。

This product specification is adapted to CD294 series Aluminum Electrolytic Capacitors produced according to GB/T2693-2001and JIS C 5102-1994 by Nantong jianghai Capacitor Co.,Ltd

2、使用温度范围 Operating Temperature Range

－25～105℃，

3、浪涌电压 Surge voltage

工作电压(v) Rated voltage	16	25	35	50	63	80	100	160	180	200	250	350	400	450	500	550
浪涌电压(v) Surge voltage	20	32	44	63	79	100	125	200	225	250	300	400	450	500	550	600

4、损耗 Dissipation

工作电压(v) Rated voltage	16	25	35	50	63~100	160~400	450~550
损耗（%） Dissipation factor	50	40	35	30	20	15	20

5、纹波电流系数 Multiplier for ripple current

5.1、频率系数 Frequency Coefficients

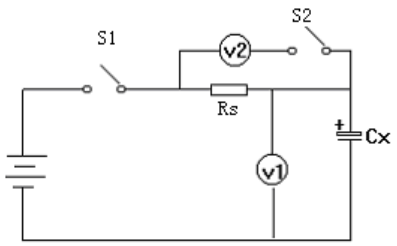
Freq(Hz) / Rated voltage (v)	50/60	120	300	1K	10K	≥40K
10~100	0.95	1.00	1.07	1.13	1.19	1.20
160~250	0.87	1.00	1.17	1.32	1.45	1.50
≥315	0.80	1.00	1.16	1.30	1.41	1.43

5.2、温度系数 Temperature Coefficients

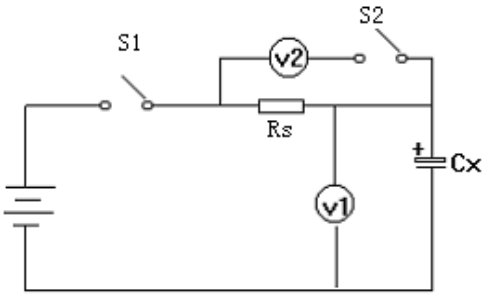
温度 Temperature(℃)	+40	+55	+70	+85	+105
系数 Coefficients	2.7	2.5	2.1	1.7	1.0

6、性能特征:Specifications

性能特性： Performance characteristics

NO	项目 Items	条件 Conditions	技术要求 Specifications
6.1	静电容量 (允许偏差) Capacitance (Tolerance)	测试频率：120 Hz， Measuring frequency: 120 Hz 测试电压：0.5Vrms or less Measuring voltage: 0.5Vrms or less DC bias voltage: +1.5～ 2.0 VDC	见系列规格表 Refer to SPEC LIST
6.2	损耗角正切 (Tan δ) Tangent of angle	测试条件与静电容量相同 Measurement shall be made under the same conditions as those given for the measurement of capacitance	见 4 Refer to 4.
6.3	漏电流 Leakage Current	电容器接 1000±10Ω.的保护电阻施加电压 5 分钟后的测试电流。 The rated voltage shall be applied across the capacitor and its protective resistor which shall be 1000 ± 10 Ω .The leakage Current shall then be measured after an electrification period of 5min. The leakage current shall be calculated by the following equation. 漏电流：（I）=E/Rs Leakage current: E：直流电压表的电压值 Voltage measured with DC voltmeter R_S:标准电阻的电阻值 Resistance of the protective resistor 测定电路 measurement circuit  电压降法(voltage drop method) R_S:标准电阻的电阻值（1000±10Ω） R_S: Protective resistor （1000±10Ω） V1\V2:直流电压表或电子电压表 V1\V2:DC voltmeter or electronic voltmeter S1:开关 switch S2:电压表保护用变换开关 Protective switch for a voltmeter and the test capacitor	0.01CV 或 1.5mA 以下（取小值） Less than 0.01CV or 1.5mA whichever is smaller C：标称静电容量（μF ） Capacitance V：额定电压（V） Rated voltage
6.4	额定纹波电流 Rated ripple current	温度 Temperature ：105±2℃	见系列规格表 Refer to SPEC LIST

信赖性试验：The reliability test

<table>
<tr><th>NO</th><th>项目 Items</th><th>条件 Conditions</th><th>技术要求 Specifications</th></tr>
<tr><td>6.5</td><td>浪涌电压
Surge
Voltage</td><td>在下面规定的温度下，通过指定的浪涌电压，6.0 分钟（充电 30 秒，放电 5 分 30 秒）为一周期，共 1000 次，常温常湿下放置 1-2 小时，达到热平衡状态再进行测定
The capacitor shall be subjected to 1000 cycles at a temperature specified below, each consisting of a charge period of 30＋5s, followed by a discharge period of approx 5min.30 s. And the capacitor shall be stored 1-2 hours under standard atmospheric conditions to obtain thermal stability , after which measurement shall be made
测试电压：见 3
Test voltage: see 3
温度:15～35℃
Test Temperature : 15～35℃
测试回路 Measurement circuit
 

电压降法（voltage drop method）
RS:标准电阻的电阻值（1000±10Ω）
RS: Protective resistor （1000±10Ω）
V1\V2:直流电压表或电子电压表
V1\V2:DC voltmeter or electronic voltmeter
S1:开关 switch
S2:电压表保护用变换开关 Protective switch for a voltmeter and the test capacitor</td><td>漏电流：不超过规定值
Leakage Current:
Not more than the specified value
容量变化：初始值的±15%以内
Capacitance change:
Within ±15% of the initial value
损耗角正切：不超过初始值的 200%
Dissipation Factor :
Within 200%
of the initial value</td></tr>
<tr><td>6.6</td><td>防爆试验
Safety
vent Test</td><td>施加反向直流电流。
Apply a reverse voltage with DC current.
<table><tr><th>壳号
Size</th><th>逆向电流
Inverse current</th></tr><tr><td>≤φ22</td><td>1A</td></tr><tr><td>＞φ22</td><td>10A</td></tr></table></td><td>当防爆阀动作时，电容器应无打火、击穿、燃烧等现象。如果防爆阀 30 分钟未动作，则认为产品合格。
When the vent operated, the capacitor shall not flame although gas discharge or expulsion of a part of the inside element is allowable. If the vent does not operate with the voltage applied for 30 minutes, the test is considered to be passed.</td></tr>
</table>

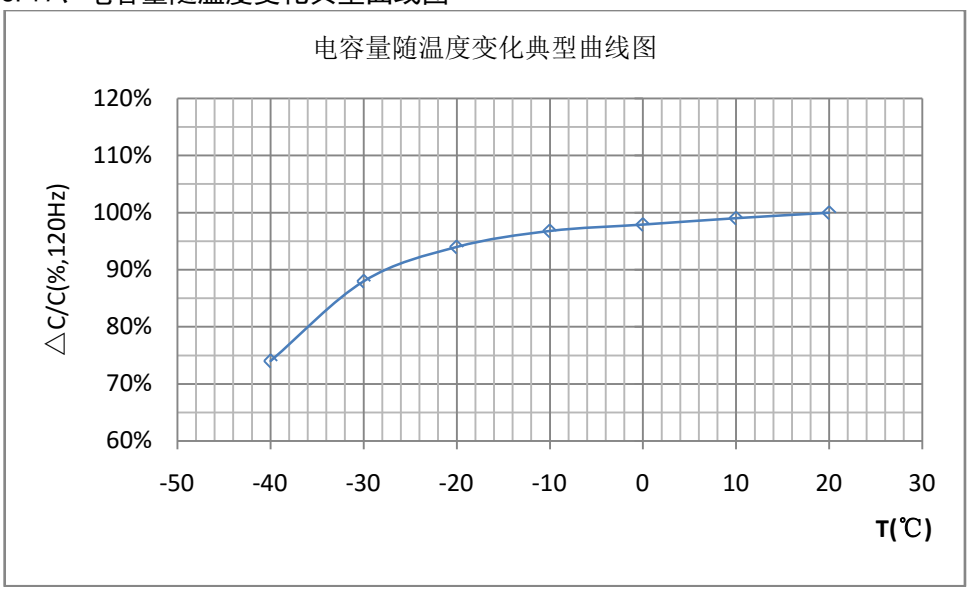
No.	项目 Items	条件 Conditions	技术要求 Specifications
6.7	高温负荷 Load life	在 105±2℃的恒温箱内，电容器施加最大允许纹波电流，施加直流电压和交流电压的峰值的和要等于额定电压，时间 2000 小时，试验结束后，在标准状态下放置 16 小时后进行测试。 The capacitor shall be placed in a circulating air oven at an ambient temperature of 105±2℃。It must not be subjected to direct radiation from heating elements. DC voltage and the rated ripple current shown in table shall be applied for a period of 2000 hours. The sum of the DC voltage and peak AC voltage must not exceed the full rated voltage of the capacitor. It shall be subjected to standard atmospheric for 16 hours, after which measurement shall be made.	漏电流：不超过规定值 容量变化：初测值的±20 % 以内 损耗角正切：不超过规定值的 2 倍 Leakage current : ≤ Initial specified value Capacitance change: Within ±20 % of initial value dissipation factor : ≤ 200% of initial specified value 外观 Appearance :无明显异常 No remarkable abnormality
6.8	高温存储 Shelf life	温度 Temp ：105±2℃ 时间 Time ：1000+36 小时 电压处理：在常温下电容器串联保护电阻（1KΩ），加额定电压 30 分钟，放电，常温放置 24-48 小时后测量。 Condition: The DC rated voltage shall be applied across the capacitor and its protective resistor (1KΩ) for 30 minutes, The capacitor shall then be stored under standard atmospheric conditions for 24－48 hours.	漏电流：不超过规定值 容量变化：初测值的±15 % 以内 损耗角正切：不超过规定值的 1.5 倍 Leakage current : ≤ Initial specified value Capacitance change： Within ±15% of initial value dissipation factor : ≤ 150% of initial specified value 外观 Appearance :无明显异常 No remarkable abnormality
6.9	可焊性 Solder ability	浸渍时间 Solder press time: 2±0.5s 焊接温度 Solder temperature: 245±5℃ 浸渍速度 Speed of immersion 25±2.5mm/sec	浸渍面积 95%以上附着 At least 95% of Circumferential surface of the dipped portion of termination shall be covered with new solder
6.10	耐焊接热 Resistance to soldering heat	浸渍时间和温度 Solder temperature/immersion: 260±5℃持续 10±1 s 或者 350±10℃持续 3.5±0.5s 260±5℃ for 10±1s or 350±10℃ for 3.5±0.5s .	漏电流:不超过规定值 Leakage Current: Not more than the specified value 电容量变化:初测值的±10%以内 Capacitance Change :within±10% of the initial value 损耗角正切;不超过规定值 Dissipation factor: Not more than the specified value 外观 Appearance :无明显异常 No remarkable abnormality
6.11	耐湿性 Resistance of dump heat	温度: 40±2℃ Test Temperature : 40±2℃ 湿度：90-95% RH Relative Humidity: 90-95%RH 时间：240±8hrs 试验后常温放置 24-48 小时 To expose in the atmospheric condition for 24 to 48 hours after completion of test	漏电流：不超过规定值 Leakage Current: Not more than the specified value 电容量变化： i. V>160v 初测值的±10%以内 ii. V≤160v 初测值的±15%以内 Capacitance change: i. V>160v within ±10% of the initial value ii. V≤160v within ±15% of the initial value 损耗角正切:不超过规定值 Dissipation factor: Not more than the specified value 外观:无明显异常 Appearance: No remarkable abnormality

<table>
<tr><th>No.</th><th colspan="2">项目 Items</th><th colspan="3">条件 Conditions</th><th>技术要求
Specifications</th></tr>
<tr><td>6.12</td><td colspan="2">耐振性
Resistance to vibration</td><td colspan="3">频率：10-55-10 Hz/分
Frequency: From 10 to 55 Hz and return to 10 Hz, shall be transferred in 1 Min
Total Amplitude: 1.5 mm
条件：X. Y. Z 方向各 2 小时
Direction and duration of vibration: 3 orthogonal directions mutually each for 2 hours Total 6 hours.</td><td>静电容量测试时无接触不良，断线及短路，端子无机械损伤
Capacitance :During the test, measured value to be stabilized (when measured several times within 30min before completion of test) Appearance: No remarkable abnormality
静电容量变化：初始值的±5%以内
Capacitance change:
Within ±5% of the initial value
外观无明显异常
Appearance : No remarkable abnormality</td></tr>
<tr><td>6.13</td><td colspan="2">耐溶剂性
Resisting Solvent</td><td colspan="3">溶剂：异丙醇
Solvent :Isopropyl alcohol
温度：20-25℃
Temperature: 20-25℃
时间：30±5s
Time : 30±5s</td><td>外观：无显著异常
Appearance：
No remarkable abnormality</td></tr>
<tr><td rowspan="5">6.14</td><td rowspan="5">端子强度
Terminal Strength</td><td rowspan="3">拉伸度
Tensile test intensity</td><td>线径
Diameter of terminal (mm)</td><td>拉伸力
Tensile Strength (N)</td><td>维持时间
Continued time</td><td rowspan="5">测定静电容量时，无接触不良，开路和短路现象，另外无机械损伤和端子损伤。
When the capacitance is measured, there shall be no intermittent contacts or open –or short –circuiting .
There shall be no such mechanical damage as terminal damage etc.

LUG TYPE:
拉伸度 2.0kgf 10±1S
Tensile test intensity
2.0kgf 10±1S
弯曲强度 2.5kgf30±5S
Winding intensity
2.5kgf30±5S</td></tr>
<tr><td>0.3<d≤05
0.5<d≤0.8
0.8<d≤1.25</td><td>5
10
20</td><td>10 ± 1 sec</td></tr>
<tr><td rowspan="3">弯曲强度
Winding intensity</td><td colspan="3">2 回合 2 bends</td></tr>
<tr><td>线径
Diameter of terminal (mm)</td><td>弯曲力
Tensile Strength (N)</td><td>锥质量
Awl quality</td></tr>
<tr><td>0.3<d≤05
0.5<d≤0.8
0.8<d≤1.25</td><td>2.5
5
10</td><td>0.25 kg
0.51 kg
1.0 kg</td></tr>
</table>

<table>
<tr>
<td>6.15</td>
<td>高低温特性
Characteristic at High and low temperature</td>
<td>
电容器根据下表的次序处理
The capacitor shall be subjected in turn to the procedures specified below.
<table>
<tr><th>阶段 Step</th><th>温度 Temperature</th><th>时间 Time</th></tr>
<tr><td>1</td><td>20±2℃</td><td>热平衡状态</td></tr>
<tr><td>2</td><td>-40（-25）℃</td><td>*2 hours</td></tr>
<tr><td>3</td><td>20±2℃</td><td>热平衡状态</td></tr>
<tr><td>4</td><td>105℃</td><td>*2 hours</td></tr>
<tr><td>5</td><td>20±2℃</td><td>热平衡状态</td></tr>
</table>
* 电容器放置在每一温度下，待阻抗或电容量稳定后方可测试。
* The capacitor should be stored at each temperature until measured impedance or capacitance are stabilized .
<table>
<tr><td>阶段 2
Step 2</td><td>阻抗比（对阶段 1）
Impedance ratio</td><td>见 6.16 项
refer to No 6.16</td></tr>
<tr><td rowspan="2">阶段 4
Step 4</td><td>静电容量变化率（对阶段 1）
Change in capacitance</td><td>-20～+20%
within -20～+20% of step 1</td></tr>
<tr><td>漏电流
Leakage Current</td><td>规定值 5 倍以下
Less than 500% of the specified value</td></tr>
</table>
阶段 1：测定容量，损耗和阻抗值。
Step 1: Capacitance, Dissipation Factor and impedance shall be measured.
阶段 2：放置 2 小时后，达到热平衡状态再测。
Step 2： After the capacitor being stored for 2 hours, Capacitance, Dissipation Factor and impedance shall be Measured. The measurement shall be made at thermal stability.
阶段 4：放置 2 小时后，达到热平衡状态再测。
Step 4： After the capacitor being stored for 2 hours, Capacitance, Dissipation Factor and impedance shall be Measured. The measurement shall be made at thermal stability.
</td>
</tr>
<tr>
<td>6.16</td>
<td>阻抗特性
Impedance stability</td>
<td>
<table>
<tr><td colspan="2">Rated voltage (V)</td><td>16～100</td><td>160～200</td><td>250～550</td></tr>
<tr><td rowspan="2">Impedance</td><td>Z -25℃/+20℃</td><td colspan="3">4</td></tr>
<tr><td>Z -40℃/+20℃</td><td>15</td><td>---</td><td>---</td></tr>
</table>
</td>
</tr>
</table>

6. 17、电容量随温度变化典型曲线图

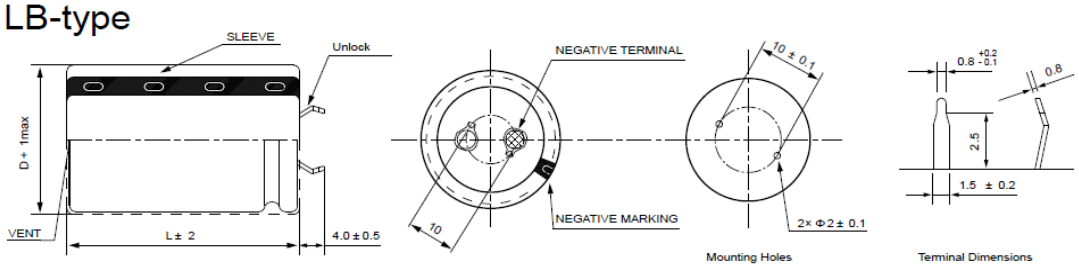


7、标识 Marking

NO.	项目 Item	NO.	项目 Item
1	额定电压 Rated voltage	4	商标 Brand
2	静电容量 Capacitance	5	上限温度 Max temperature
3	极性 Polarity	6	产品系列 Products series

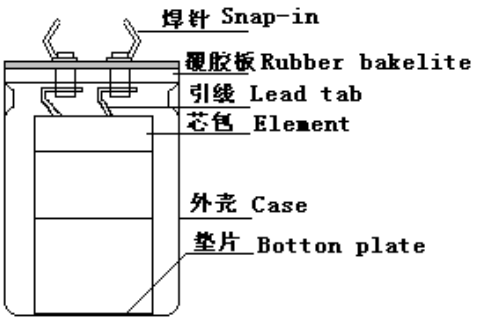
8、外型图 Dimensions

LB-type

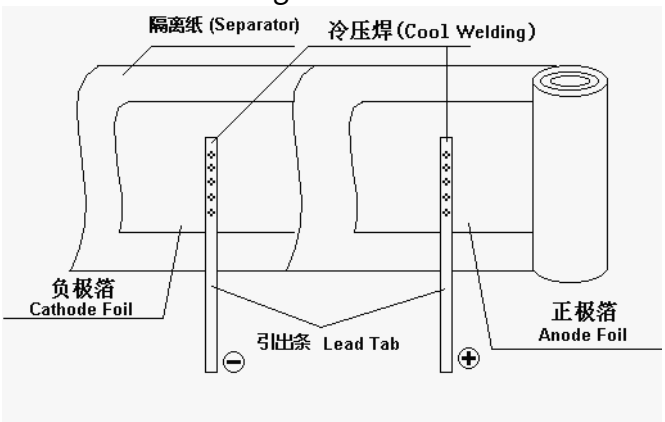


9、 构造图及材料表(Frame drawing and Material table)

9.1、构造图(Frame drawing)



9.2、芯包分解图 (Element drawing)



9.3、材料表(Material Table)

No	构成部件 Parts	材质 Material	供应商 Supply Factory	No	构成部件 Parts	材质 Material	供应商 Supply Factory
1	铝壳 Case	铝 Aluminum	海邦电子 中天配件	6	引线条 Lead Tab	铝 Aluminum	JCC
2	套管 Sleeve	PVC	无等高新，苏州顺鹏	7	正极箔 Anode Foil	铝 Aluminum	内蒙海立，海昱电子，凤翔海源
3	封口板 End seal board	覆胶板(EPT) Rubber Bakelite 黄铜镀锡 Brass Electroplate with TIN	海邦电子，嘉能电子	8	负极箔 Cathode Foil	铝 Aluminum	K-JCC，BECROMAL
4	垫片 Bottom plate	聚氯乙烯 Polyvinyl Chloride	荣昌电子	9	电解液 Electrolyte	有机溶剂 Organic Solvent	江海电容器有限公司
5	隔离纸 Separator	电解电容器纸 Electrolytic Capacitors Paper	NKK，KAN				

10、Part Number System for Snap in/Lug

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
E	C	S	1	C	B	W	8	2	2	M	V	N	2	2	0	0	2	5	V
Capacitor Type Code		Terminal Type Code	Rated Voltage Code(V)		Serial Code		Capacitance Code(μF)			Capacitance Tolerance Code(%)	Lead Form Code		Dimension Code						Sleeve Code
EC= Electrolytic Capacitor		Snap in	S	10	1A	CD291	PE	0.1		0R1	+20	A	LA	22×25		220025			PET	E
				16	1C	CD292	PF	0.22		R22	-8		LB	22x30		220030			PVC	V
				18-20	1D	CD293	BZ	0.33		R33	+20	C	LP	22x35		220035				
		Lug	L	25	1E	CD294	BW	0.47		R47	-3		VN	22x40		220040				
				35	1V	CD295	BC	1		1R0	+30	F	SA	22×45		220045				
				40	1G	CD296	KC	2.2		2R2	0		LI	22×50		220050				
				50	1H	CD297	BB	3.3		3R7	+20	H	VA	25×25		250025				
				63	1J	CD299	PG	4.7		4R7	-5		VB	25x30		250030				
				80	1K	CD29C	QC	10		100	+10	K	HD	25x35		250035				
				100	2A	CD29D	HR	22		220	-10		FT	25x40		250040				
				110	A2	CD29G	BA	33		330	+15	L	RW	25x45		250045				
				120	2B	CD29H	QH	47		470	-15		LW	25x50		250050				
				125	1B	CD29L	QL	68		680	+20	M	PC	30x25		300025				
				140	B2	CD29S	PJ	82		820	-20		HX	30x30		300030				
				160	2C	CD29E	QE	100		101	+30	Q	PD	30x35		300035				
				180	2K	CDPC	FC	120		121	-10		PW	30x40		300040				
				200	2D	CDIN	KT	150		151	+20	R	HG	30x45		300045				
				220	2T	CD60	QD	180		181	0		PE	30x50		300050				
				250	2E	CD17	HS	220		221	+50	S	SB	35x25		350025				
				275	2I	CD295A	CA	330		331	-20			35x30		350030				
				280	L2			470		471	+50	T		35x35		350035				
				300	2L			560		561	-10			35x40		350040				
				315	2F			680		681	+75	U		35x45		350045				
				330	2U			820		821	-10			35x50		350050				
				350	2V			1000		102	+20	V		35x60		350060				
				360	2N			1500		152	-10			35x70		350070				
				385	2J			2200		222	+100	P		35x80		350080				
				400	2G			4700		472	0			35x90		350090				
				415	2P			5600		562				40x50		400050				
				420	2X			6800		682				40x60		400060				
				450	2W			10000		103				40x70		400070				
				470	2M			22000		223				40x80		400080				
				500	2H			33000		333				40x90		400090				
				550	2Y			68000		683				40x100		400100				
				575	2Z									45x50		450050				
				600	2S									45x60		450060				
				630	J2									45x70		450070				
														45x80		450080				
														45x90		450090				
														45x100		450100				
														45x105		450105				
														50.8x70		508070				
														50.8x80		508080				
														50.8x90		508090				
														50.8x95		508095				
														50.8x100		508100				
														50.8x105		508105				

Note 1:

1. The number from 14th to 16th defines the diameter of capacitor.
2. The 14th number is the tenth digit.
3. The 15th number is the single digit.
4. The 16th number is on the right of the float point.

Note 2:

1. The number from 17th to 19th defines the high of capacitor .
2. The 17th number is the hundredth digit.
3. The 18th number is the tenth digit.

4. The 19th number is the single digit.

For example:
CD296 16V6800μF ±20% VN 22*25 PVC
Code: ECS1CKC682MVN220025V

11、Attachment

南通江海禁用限用物质标准

序号	禁用物质名称	最大含量标准 PPM 或 mg/kg	备注
1	Cadmium and －compounds (镉及其化合物)	5	
2	Mercury and －compounds (汞及其化合物)	2	
3	Pb and compounds (铅及其化合物)	90	
4	Cr VI (六价铬)	75	
5	PBBEs, poly brominated biphenyl ethers (聚溴化苯醚) /PBDE	10	
6	PBBs, poly brominated biphenyl (聚溴化苯)	10	
7	PCBs, poly chlorinated biphenyl (聚氯化苯)	10	
8	PCTs, poly chlorinated terphenyls (聚氯烃)	10	
9	PCP, Pentachlorophenol (五氯酚)	10	
10	All types Asbestos (所有类型石棉)	10	
11	CFCS, Chlorofluorocarbons (氟氯化碳)	0	
12	HCFCs, Hydrogenated chlorofluorocarbons (加氢氟氯化碳)	0	
13	CHCs, Chlorinated hydrocarbons (氯烃化合物)	0	
对于所供产品的包装材料还需满足下列标准：			
14	Cadmium, Mercury, Lead and Chromium VI (镉、汞、铅和铬的总和)	100	参考 94/62/EC
15	PVC and PVC blends (PVC 和 PVC 混合物)	1000	
补充要求： 此标准未列明的其它重金属和化学物质含量标准以各个国家为准；			

* 欧盟 Rohs 指令规定的豁免不在上面标准之内。

* 环保物料定义：满足上述标准，并且已经无铅化；

* 参考文件：94/62/EC(包装材料与包装废气物指令)、2002/95/EC(Rohs 指令)
91/157/EEC(电池及蓄电池标准)、91/338/EEC(镉含量指令)
EN71-3(欧盟玩具重金属标准)

12. Application Guidelines

12-1. Circuit Design

(1) Please make sure the application and mounting conditions to which the capacitor will be exposed are within the conditions specified in the catalog or alternate product specification (Referred as to specification here after).

(2) Operating temperature and applied ripple current shall be within the specification.

The capacitor shall not be used in an ambient temperature which exceeds the operating temperature specified in the specification.

Do not apply excessive current which exceeds the allowable ripple current.

(3) Appropriate capacitors which comply with the life requirement of the products should be selected when designing the circuit.

(4) Aluminum electrolytic capacitors are polarized. Make sure that no reverse voltage or AC voltage is applied to the capacitors. Please use bi-polar capacitors for a circuit that can possibly see reversed polarity.

Note: Even bi-polar capacitors can not be used for AC voltage application.

(5) For a circuit that repeats rapid charging/discharging of electricity, an appropriate capacitor that is capable of enduring such a condition must be used. Welding machines and photoflash are a few examples of products that contain such a circuit. In addition, rapid charging/discharging may be repeated in control circuits for servomotors, In which the circuit voltage fluctuates substantially.For appropriate choice of capacitors for circuit that repeat rapid charging/discharging, please consult us.

(6) For conductive polymer solid capacitors, the leakage current may become greater even if the soldering conditions adhere to the specification requirements. Therefore, do not use such capacitors in the following circuits because trouble or failure may occur.

a)High impedance circuits
b)Coupling circuits
c)Time constant circuits
d)Do not use the capacitors in circuits except those above if changes in the leakage current affects circuit operations.

12.铝电解电容器应用指南：

12-1， 电路设计

（1）首先，请确定电容器的使用和安装条件是否(必须)符合样本所供选择的产品规格中所规定的条件；

（2）工作温度和施加的纹波电流必须符合规范中的要求。

电容器使用时的环境温度不能超过产品规格中规定的工作温度

施加的纹波电流不得超过允许值

（3）在设计电路时，必须选择符合其使用寿命要求的合适的电容器

（4）铝电解电容器是有极性的，因此要确保不对电容器施加反向电压或交流电压，在可能会出现反向电压的场合，建议使用双极性电容器。

注意：即使是双极性电容器，也不能应用在使用交流电压的场合。

（5）对于需要反复充放电的电路而言，那就必须使用能承受这种工作环境的合适电容器。像焊接机、闪光灯等设备当中就有这样的电路。此外，在诸如伺服电机等控制电路中，会出现反复的快速充放电，电路中的电压波动很大。因此如要选择反复快速充放电电路中用合适电容器，请与我们联系。

（6）导电性高分子型固体铝电解电容器在电路使用中由于焊接等原因会导致漏电流增大，因此不推荐应用于以下电路。

a)高阻抗电路
b)耦合电路
c)时间常数电路
d)受漏电流影响较大的电路

(7) It is said that to restrain output ripple current, the output smoothing capacitor of the switching power supply is suitable to use the smaller ESR capacitor. However when the low ESR capacitor is used, the phenomenon sometimes occurs that is called the abnormal oscillation of output voltage.

（7）选用开关电源的输出平滑电容器时，为了抑制输出纹波电压，所选用电容器的等效串联电阻(ESR)越小越好，然而使用 ESR 小的电容器有可能发生输出电压的异常振荡。

30 degrees to 40 degrees or more of Phase margin is thought as a necessity to inhibit the oscillation of output voltage with a general negative feed-back circuit. The Phase margin is numerical value how much the minimum value of the Phase is distant from-180 degrees. The smaller the Phase margin gets, the higher the possibility to oscillate by the characteristic dispersion and temperature change of the component will be.

为防止输出电压发生振荡，在一般负反馈线路上，相位需要留有 30～40 度以上的余量。相位的余量是指相位的下限值至-180 度的数值，相位的余量越小，构件的性能差及温度变化引起振荡的可能性越大。

By doing Phase compensation with the feed-back circuit of the error amplifier the oscillation of output voltage can be inhibited.

通过利用误差放大器反馈线路的相位修正，可以防止输出电压的振荡。

(8) Make sure that no excess voltage (that is, higher than the rated voltage) is applied to the capacitor.

（8）确保电容器不能在过压状态下工作（即高于额定电压）

Please pay attention so that the peak voltage, which is DC voltage overlapped by ripple current, will not exceed the rated voltage.

请注意峰值电压，即由直流电压叠加纹波电流的电压，不能超过额定电压；

In the case where more than 2 aluminum electrolytic capacitors are used in series, please make sure that applied voltage will be lower than rated voltage and the voltage be will applied to each capacitor equally using a balancing resistor in parallel with the capacitors.

在要串联使用 2 个以上电容器的场合，施加的电压要低于额定电压，并用一个均衡电阻与电容器并联，使电压平均地施加到每个电容器上。

(9) Outer sleeve of the capacitor is not guaranteed as an electrical insulator. Do not use a standard sleeve on a capacitor in applications that require the electrical insulation. When the application requires special insulation, please contact our sales office for details.

（9）电容器外面的套管不能保证做绝缘之用，所以在需要将其作为电绝缘的应用场合，这些电容器不能使用一般标准的套管。假如你的应用场合需要特殊绝缘的话，请与我们的销售部联系了解详细情况。

(10) Capacitors may fail if they are used under the following conditions:

（10） 在下列条件下使用的电容器很可能会导致失效

①Environmental (climatic) conditions

①环境条件

a. Being exposed to water, high temperature & high humidity atmosphere, or condensation of moisture.

a. 接触水，高温高湿度气候，或易产生冷凝水的地方；

b. Being exposed to oil or an atmosphere that is filled with particles of oil.

b. 接触油，或充满油气的地方；

c. Being exposed to salty water or an atmosphere that is filled with particles of salt.

c. 接触盐水，或充满盐尘的地方；

d. In an atmosphere filled whith toxic

d. 含有有毒气体的场合（如盐酸、硫酸、

gasses (such as hydrogen sulfide, sulfurous acid, nitrous acid, chlorine, bromine, methyl bromide, ammonia, etc.)

硝酸、氯、溴、甲基溴、氨等）；

e. Being exposed to direct sunlight, ozone, ultraviolet ray, or radication

e. 直接暴露在有阳光、臭氧、紫外线或辐射的环境中；

f. Being exposed to acidic or alkaline solutions

f. 接触酸碱溶液。

②Under severe conditions where vibration and/or mechanical shock exceed the applicable ranges of the specifications.

②在震动或机械冲击超过指标规定范围的那些恶劣环境下

(11) When designing a P.C. board, please pay attention to the following:

（11） 当在设计印刷线路板时，请注意下列事项：

①Have the hole spacing on the P.C. board match the lead spacing of the capacitor.

①电路板上的开孔间距必须与电容器引线的间距相匹配；

②There should not be any circuit pattern or circuit wire above the capacitor pressure relief vent.

②在电容器的防爆阀上方，不应有任何电路走线图形或导线；

③ Unless otherwise specified, following clearance should be made above the pressure relief vent.

③除非另有规定，否则防爆上方应留出下列间隙：

Case Diameter	Clearance Required
6.3~16mm	2mm or more
18~35mm	3mm or more
40mm or more	5mm or more

外壳直径	须留间隙
Φ6.3~16mm	≥2mm
Φ18~35mm	≥3mm
40 或 40mm 以上	≥5mm

④In case the vent side is placed toward P.C. board (such as end seal vented parts), make a corresponding hole on the P.C. board to release the gas when vent is operated. The hole should be made to match the capacitor vent position.

④如果防爆阀是朝着印刷线路板方向的（例如防爆阀在盖板上的电容器），则要在线路板上相应的开一个孔，可使阀打开后的气体排出。这个孔必须对准电容器防爆的位置

⑤ Screw terminal capacitors must be installed with their end seal side facing up. When you install a screw terminal capacitor in a horizontal position, the positive terminal must be in the upper position.

⑤安装螺丝终端电容器时，必须将装盖板的面朝上。当水平方向安装螺丝终端电容器时，必须将正极终端放在上面。

(12) The main chemical solution of the electrolyte and the separator paper used in the capacitors are combustible. The electrolyte is conductive. When it comes in contact with the P.C. board, there is a possibility of pattern corrosion or short circuit between the circuit pattern which could result in smoking or catching fire.
Do not locate any circuit pattern beneath the capacitor end seal.

（12） 电解液中使用的化学溶液和电容器中的电解纸都是易燃品，而且电解液是导电的，一旦它与电路板接触，就有可能会造成电路板上的走线图形腐蚀，或走线图形之间的短路，最终导致冒烟或起火。

(13) Do not design a circuit board so that heat generating components are placed near an aluminum electrolytic capacitor or reverse side of P.C. board (under the capacitor).

（13） 在设计线路板时，在其正反两面上均不要让电容器靠近发热元件；

(14) Electrical characteristics may vary depending on changes in temperature and frequency. Please consider this variation

（14） 电性能的改变与温度和频率有关，所以在设计电路时要考虑这些变化因素；

when you design circuits.

(15) When you mount capacitors on the double-sided P.C. boards, do not place capacitors on circuit patterns or over on unused holes.

（15） 当在双面线路板上安装电容器时，要让开线路图形和还未使用的插孔；

(16) The torque for terminal screw or brackets screws shall be within the specified value in specifications.

（16） 终端螺丝或支架螺丝的力矩应符合规格书上规定的值；

(17) When you install more than 2 capacitors in parallel, consider the balance of current flowing through the capacitors. Especially, When a solid conductive polymer aluminum electrolytic capacitor and a standard aluminum electrolytic capacitor are conected in parallel, special consideration must be given.

（17） 当你并联安装 2 个以上电容器时，要考虑流经电容器的电流的平衡，特别是当并联固体聚合物铝电解电容器和标准的铝电解电容器时，要给予这方面特别的考虑；

(18) If more than 2 aluminum electrolytic capacitors are used in series, make sure the applied voltage will be lower than the rated voltage and that voltage will be applied to each capacitor equally using a balancing resistor in parallel with each capacitor.

（18） 如果串联使用 2 个以上的电容器时，要确保施加的电压小于额定电压，并要采用一个与每个电容器并联的均衡电阻使该电压均匀地施加到每个电容器上。

12-2. Mounting

12-2 安装

(1) Once a capacitor has been assembled in the set and power applied, Even if a capacitor is discharged, an electric potential(recovery voltage) may exist between the terminals.

（1） 一旦电容器装上机器，并接通电源，即使电容器已放过电，但是在两个终端之间仍存在一个电位差（再生电压）；

(2) Electric potential between positive and negative terminal may exist as a result of returned electromotive force, so please discharge the capacitor using a 1 k resistor.

（2） 正极和负极之间的电位差也可能是由返回的电动势所造成的，所以一定要用一只 1K 电阻实施放电；

(3) Leakage current of the parts that have been stored for more than 1 year may increase. If leakage current has increased, please perform a voltage treatment using 1 k resistor.

（3） 存放 1 年以后的电容器漏电流可能会增加，如果漏电流增大了，请用一只 1K 电阻进行电压处理；

(4) Please confirm ratings before installing capacitors on the P.C. board.

（4） 在把电容器装上电路板之前，请首先确认一下其额定值；

(5) Please confirm polarity before installing capacitors on the P.C. board.

（5） 在把电容器装上电路板前，请对极性进行确认；

(6) Do not drop capacitors on the floor, nor use a capacitor that was dropped.

（6） 不要让电容器掉落到地板上，也不能使用掉到地板上的电容器；

(7) Do not damage the capacitor while installing.

（7） 安装时千万不能损坏电容器；

(8) Please confirm that the lead spacing of the capacitor matches the hole spacing of the P.C. board prior to installation.

（8） 安装之前确认一下电容器引线间距是否与线路板的孔距相匹配；

(9) Snap-in type capacitor should be installed tightly to the P.C. board (allow no gap between the P.C. board and bottom of the capacitor).

（9） 焊片式电容器要紧靠线路板安装（电容器的底部和线路板之间不留间隙）；

（10） 当用自动插件机安装和固定电

(10) Please pay attention that the clinch force is not too strong when capacitors are placed and fixed by an automatic insertion machine.

(11) Please pay attention to that the mechanical shock to the capacitor by suction nozzle of the automatic insertion machine or automatic mounter, or by product checker, or by centering mechanism.

(12) Hand soldering.

①Soldering condition shall be confirmed to be within the specification.

②If it is necessary that the leads must be formed due to a mismatch of the lead space to hole space on the board, bend the lead prior to soldering without applying too much stress to the capacitor.

③If you need to remove parts which were soldered, please melt the solder enough so that stress is not applied to lead.

④Please pay attention so that solder iron does not touch any portion of capacitor body.

(13) Flow soldering (Wave solder)

①Aluminum capacitor body must not be submerged into the solder bath. Aluminum capacitors must be mounted on the "top side" of the P.C. board and only allow the bottom side of the P.C. board to come in contact with the solder.

②Soldering condition must be confirmed to be within specification.

Solder temperature: 260 ± 5°C , Immersing lead time:10 ± 1 second, Thickness of P.C. board : 1.6mm.

③Please avoid having flux adhere to any portion except the terminal.

④ Please avoid contact between other components and the aluminum capacitor.

(14) Reflow soldering (SMD only)

①Soldering condition must be confirmed to be within specification.

Pre-heationg : Less than 150°C, 90 seconds max. Max. temperature at capacitor top during reflow : 230°C

The duration for over 200°C temperature at capacitor top: 20 seconds max.

The duration from the pre-heat temperature to peak temperature of reflow varies due to changes of the peak temperature.

②When an infrared heater is used, please pay attention to the extent of heating since the absorption rate of infrared, will vary due to difference in the color of the capacitor body, material of the sleeve and capacitor

容器时，请注意夹持力不能太大；

（11） 请注意由自动插件机或产品检查仪或中心定位机所产生的振动对电容器的影响；

（12） 手工焊接

①焊接条件必须符合规范的要求；

②如果由于引线间距和线路板上的孔距不匹配需要引线成型的话，则必须在焊接前弯好引线，而不能对电容器施加太多的应力；

③如需要拆下焊好的电容器，则要让焊锡充分熔化，使引线不受任何应力；

④请注意不能让烙铁接触电容器本体；

（13） 波峰焊

①电容器本体不能浸入锡缸，铝电解电容器必须装在线路板的上面，只允许线路板的反面与焊锡接触；

②焊接条件必须符合规格书规定的指标值：

焊锡温度小于 260±5℃，引线浸没时间小于 10±1 秒，线路板厚度不小于 1.6mm

③除了终端外，其他部分均不能沾上助焊剂

④要防止电容器与其他元器件接触

（14） 回流焊

①焊接条件必须符合规格书规定的指标值：

预热：小于 150℃，最多 90 秒；回流焊过程中电容器顶部的最高温度为 230℃，在电容器顶部超过 200℃的时间最多为 20 秒；从预热温度到回流焊峰值温度的时间随峰值温度的改变而变化。

②使用红外加热器时，应注意加热的程度，因为电容器本体的颜色，套管材料和电容器大小等方面的差异会使红外线的吸收率产生变化；

size.
③The number of reflow time for SMT aluminum electrolytic capacitors shall be one time. If this type of capacitor has to be inevitably subjected to the reflow twice, enough cooling time between the first and second reflow (at least more than 30 minutes) shall be taken to avoid consecutive reflow. Please contact us if you have questions.

③表面贴装用铝电解电容器能承受的回流焊次数是一次，如果这种电容器一定要进行第二次回流焊的话，那么在第一次和第二次回流焊之间要有足够的冷却时间（至少 30 分钟以上），不能连续进行回流。如有问题请与我们联系。

(15) Soldering flux
There are non-halogen types of flux that do not contain ionic halides, but contain many non-ionic halides. When these non-ionic halides infiltrate the capacitor, they cause a chemical reaction that is just as harmful as the use of cleaning agents. Use soldering flux that does not contain non-ionic halides.

（15） 焊锡、助焊剂
有不含离子卤化物而含有许多非离子卤化物的非卤型助焊剂，当这些非离子卤化物渗入电容器之后会引起一种化学反应，其结果就会象使用了清洁剂一样对电容器造成损害，所以要采用不含非离子卤化物的助焊剂。

(16) Do not tilt lay down or twist the capacitor body after the capacitors are soldered to the P.C. board.

（16） 电容器焊到线路板上之后，不要将电容器倾倒或扭曲。

(17) Do not carry the P.C. board by grasping the soldered capacitor.

（17） 拿线路板时，不要抓住焊好的电容器。

(18) Please do not allow anything to touch the capacitor after soldering. If P.C. board are stored in a stack, please make sure P.C. board or the other components do not touch the capacitor.
The capacitors shall not be effected by any radiated heat from the soldered P.C. board or other components after soldering.

（18） 不要让焊好的电容器碰到其他任何东西。如果要将线路板堆放储存的话，要确保线路板或其他元件不要碰到电容器。电容器不能受焊好的线路板或其他焊好的元器件的热辐射影响。

12-3. In the equipment
(1) Do not directly touch terminal by hand.

12-3．设备中
（1） 不要用手直接接触电容器的终端

(2) Do not short between terminals with conductor, nor spill conductible liquid such as alkaline or acidic solution on or near the capacitor.

（2） 不要用导体在两个终端之间进行短路，也不能把诸如酸碱溶液等导电液体泼近或泼到电容器上。

(3) Please make sure that the ambient conditions where the set is installed will be free from spilling water or oil, direct sunlight, ultraviolet rays, radiation, poisonous gases, vibration or mechanical shock.

（3） 要确保安装设备的环境条件要远离水、油、阳光的直接照射，紫外线、辐射、有毒气体、振动或机械冲击。

12-4. Maintenance Inspection
Please periodically inspect the aluminum capacitors that are installed in industrial equipment. The following items should be checked:

12-4．保养检查
请定期检查安装在工业设备中的铝电解电容器必须检查下列内容

①Appearance : Remarkable abnormality such as

① 外观，：是否有明显的异常，如防爆阀打开，漏液等；

vent operation, leaking electrolyte etc.
② Electrical characteristic: Capacitance, dielectric
loss tangent, leakage current, and items specified in the specification.

12-5. In an Emergency

(1) If you see smoke due to operation of safety vent, turn off the main switch or pull out the plug from the outlet.

(2) Do not bring your face near the capacitor when the pressure relief vent operates. The gasses emitted from that are over 100^{o}C.

If the gas gets into your eyes, please flush your eyes immediately in pure water.
If you breathe the gas, immediately wash out your mouth and throat with water.
Do not ingest electrolyte. If your skin is exposed to electrolyte, please wash it away using soap and water.

12-6. Storage

(1) lt is recommended to keep capacitors between the ambient temperatures of 5^{o}C to 35^{o}C and a relative humidity of 75% or below.
(2) Confirm that the environment does not have any of the following conditions:
①Where capacitors are exposed to water, high temperature & high humidity atmosphere, or condensation of moisture.
②Where capacitors are exposed to oil or an atmosphere that is filled with particles of oil.
③Where capacitors are exposed to salty water, high temperature & high humidity atmosphere, or condensation of moisture.
④The atmosphere is filled with toxic acid gasses (e.g. hydrogen sulfide, sulfurous acid, nitrous acid, chlorine, bromine, methy bromide, etc.)
⑤ The atmosphere is filled with toxic alkaline gasses (e.g. ammonia)
⑥Where capacitors are exposed to acidic or alkaline solutions.

12-7. Disposal

Take either of the following methods in disposing of capacitors.
Make a hole in the capacitor body or crush capacitors and incinerate them.
If incineration is not applicable, hand them over to a waste disposal agent and have them buried in a landfill.

② 电性能： 容量，tgδ、漏电流和规范中规定的项目

12-5． 在紧急情况下

（1） 如果你看到防爆阀打开后冒出的烟雾，请立即关掉电源，将插头从插座上拔下。
（2） 当防爆阀打开时，不要将脸凑近电容器，因为从里面散发出来的气体温度可达 100^{o}C 以上，如果气体冲进你眼睛的话，请立即用纯水冲洗眼睛。

如果吸入这种气体的话，请马上用水清洗眼睛和喉咙。 请不要咽下电解液，如果皮肤接触到了电解液 ，请用水和肥皂将它洗净。

12-6．储存

(1)建议将电容器储存在 5 ~35 ^{o}C 和相对湿度小于 75%的环境中。

(2)确认储存环境中不会出现下列情况：
①有水，高温高湿或有水凝结

②接触油，或充满油污气

③有盐水，高温高湿，或有水凝结

④空气中含有毒酸气（如硫化氢、硫酸、亚硝酸、氯、溴、甲基溴等）

⑤空气中含有毒碱气（如氨）

⑥电容器置于酸碱溶液中。

12-7．废弃处理

电容器的废弃处理可采用下列任何一种方法进行：
在电容器壳体上打个孔或将其敲碎后焚烧掉，如果焚烧不可行的话，请将这些电容器交给废品处理代理商找地方埋掉。

13、生产工场

Manufatory and address

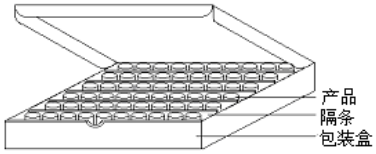
南通江海电容器股份有限公司
Nantong jianghai Capacitor Co.,Ltd

地址：江苏省南通市平潮镇通扬南路 79 号
ADD: NO.79, Tongyang South Road, Pingchao Town, Nantong City ,Jiangsu Province, P.R. China

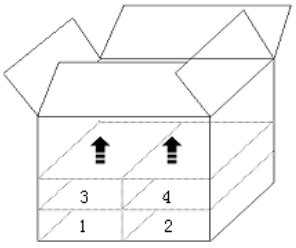
14. 包装 Package

14.1 φ20～φ40 产品装盒方法见图

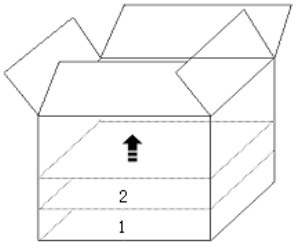
The package method of φ20～φ40 is as below:



装盒方法



装箱方法



装箱方法

14.2 φ20～φ40 产品包装内外箱尺寸、包装数量一览表

The size of inbox and outbox and package qty for φ20～φ40 is as below:

注：在外箱中配用内盒时加相宜的填料，填料材料采用 7mm 瓦楞纸板，供应商 Supply Factory 南通友谊包装制品有限公司、南通大吉包装制品有限公司

壳 号	代 码	内盒尺寸（外径）	数量只	隔条尺寸 厚度 2mm	发泡膜填料 厚度 5mm	代 码	外箱尺寸 (内径)	装盒数盒/箱	箱装数量只/箱
20×20/25	NL2025	275×185×48	100	270×35	265×170	WL2040	385×285×310 填料尺寸 370×260×7	12	1200
20×30	NL2030	275×185×48		270×40				12	1200
20×35	NL2040	275×185×58		270×45				10	1000
20×40				270×48				10	1000
20×45/50	NL2050	275×185×68		270×58		WL2050	385×285×370	10	1000
22×20/25	NL2230	300×195×48		290×35	290×180	WL2230	410×304×220 填料尺寸 390×290×7	8	800
22×30				290×40				8	800
22×35/40	NL2240	300×195×58		290×48			410×304×200	6	600
22×45/50	NL2250	300×195×68		290×58		WL2250	310×210×290 填料尺寸 290×190×7	4	400
22×55/60/65	NL2265	300×195×80		290×72		WL2265	310×210×340		
22×70/75	NL2270	300×195×90		290×80		WL2270	310×210×380		
25×20-25	NL2530	340×215×48		331×35	331×200	WL2530	350×225×310 填料尺寸 330×220×7	6	600
25×30				331×40				6	600
25×35/40	NL2540	340×215×58		255×48				5	500
25×45/50	NL2550	340×215×68		331×58		WL2550	350×225×290	4	400
25×55/60	NL2560	340×215×78		331×68		WL2560	350×225×250	3	300
25×65/70	NL2570	340×215×90		331×80		WL2550	350×225×290		
30×20/25	NL3030	315×180×48	50	305×35 4片	305×170	WL3040	385×325×265 填料尺寸 375×310×7	10	500
30×30				305×40 4片				10	500
30×35	NL3040	315×180×58		305×45 4片				8	400
30×40				305×50 4片			380×325×260	8	400
30×45/50	NL3050	315×180×68		305×58 4片		WL3050	380×325×230	6	300
30×55/60	NL3060	315×180×78		305×60 4片		WL3060	380×325×170	4	200
30×65/70	NL3070	315×180×90		305×80 4片		WL3070	380×325×190	4	200
35×20/25	NL3525	365×205×42		355×32 4片	345×195	WL3525	375×220×260	6	300
35×30	NL3530	365×205×50		355×42 4片		WL3540	375×220×320 填料尺寸 350×220×7	6	300
35×35/40	NL3540	365×205×60		355×55 4片				5	250
35×45/50	NL3550	365×205×70		355×60 4片		WL3550	375×220×300	4	200
35×55/60	NL3560	365×205×80		355×70 4片		WL3560	375×220×260	3	150
35×65/70	NL3570	365×205×90		355×80 4片		WL3570	375×220×290	3	150
35×75/80	NL3580	365×205×105		355×90 4片		WL3580	375×220×330	3	150
40×30/40	NL4035	415×225×58		400×55 4片	400×210	WL4040	435×255×260 填料尺寸 400×230×7	4	200

14.3 焊片式产品井字格条包装数量、包装箱尺寸一览表：

The package quantity and package size:

壳 号 D×L	内盒尺寸 A×B×H	隔条尺寸	发泡膜\填料尺寸 厚度为 5-10mm	外箱尺寸 A×B×H	层数	包装总数
25×68	305×160×80	285×76×3 150×76×3	295×150×5	325×350×275	3	300 只
25×90	305×160×110	285×105×3 150×105×3		315×340×340		
30×65-70	345×185×90	340×80×3 170×80×3	340×170×5	360×400×220	2	200 只
30×75-80	345×185×105	340×90×3 170×90×3			2	200 只
35×65-70	240×240×90	224×70×3	200×200×10	490×269×220	2	100 只
35×75-80	240×240×105	224×90×3		490×269×235		
35×85-90	240×240×115	224×100×3		490×269×255		
35×95-100	240×240×125	224×95×3		490×269×285		
35×110-120	240×240×145	224×125×3		490×269×320		
40×45-50	240×240×70	224×45×3	230×230×5	490×260×180	2	
40×55-60	240×240×80	224×70×3			2	
40×65-70	240×240×90	224×80×3			2	
45×70	250×250×100	230×80×3	240×240×10	530×270×230	2	
45×80	250×250×105	230×85×3			2	
45×105	250×250×135	230×115×3		530×270×300	2	
50×80	280×280×105	270×85×3	265×265×10	580×300×230	2	
50×105	280×280×135	270×115×3		580×300×300	2	

注： 供应商 Supply Factory 南通友谊包装制品有限公司、南通大吉包装制品有限公司

14.4 外包装标签样式：