承　　认　　书

PRODUCT SPECIFICATION

No:

客　户：	日　期：2024-08-19
CUSTOMER：	DATE：

品名：　　铝电解电容器

PART NAME：　Aluminum Electrolytic Capacitors

型号/规格：2200UF400V　　系列 SERIES : CD294

Series/ SPEC：

用户承认　User
Approved　by

注：ROHS 指令(2024/95/EC)已对应完毕

Remarks: ROHS instructions (2024/95/EC) complied.

对此承认书确认后，在用户承认栏注明确认印，返传一份与敝公司

After approval, pls sign in the approved by column and post back.

拟　制 Prepared	审　核 Checked	批准 Approved

规格表 Table

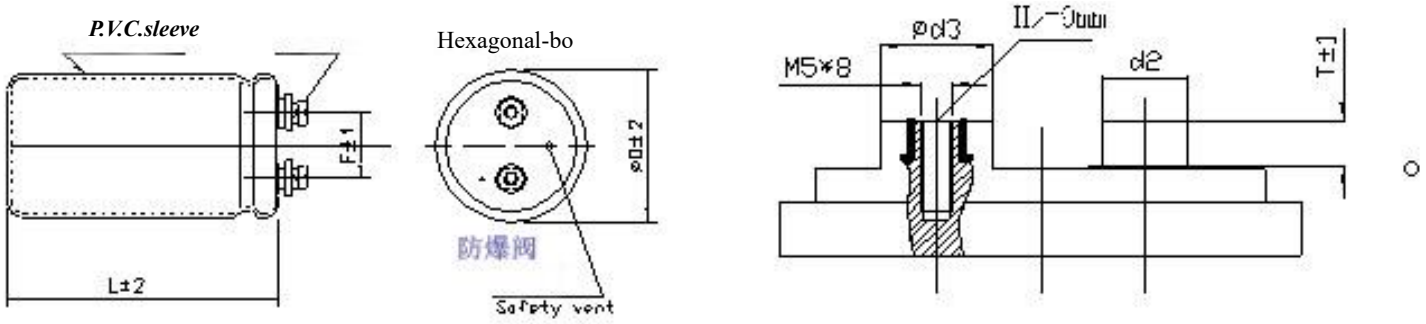
客户代码 Part Number	额定电压 Rated Voltage (VDC)	标称容量 Capacitance (μF)	尺寸 Dimension (D×L, mm)	标称电容量允许正负公差（%）	浪涌电压 Surge Voltage (Vdc	损耗角正切值 tgδ	漏电流 Leakage Current(μA) at 20℃ after 1 minutes	纹波电流 Ripple Current at 85℃ 120Hz (A)	温度寿命 Endurance at 85℃ (Hours)
	400	2200	51*115	-20%~+20%	450V	0.2	8800	7810	8000

1. 适用范围　Adapt Range

本产品规格书适用于电子科技有限公司 CD294 型铝电解电容器产品。

This product specification is adapted to CD294series Aluminum Electrolytic Capacitors produced by　Electronics Co.,Ltd

2. 外形图及尺寸表　Case size table



尺寸图表 Diagram of Dimensions (Unit：mm)

Code	ΦD	L	F	d2±1	d3±1	T
T19	51	115	22	10	10	5.5

3. 使用温度范围 Operating Temperature Range

-25℃～+85℃

4.损耗Dissipation Factor (25℃,120Hz)

工作电压 Rated voltage(v)	400
损耗角正切(tg δ) Tangant of angle	0.2

5. 浪涌电压 Surge voltage

工作电压 Rated voltage(v)	400
浪涌电压 Surge voltage(v)	450

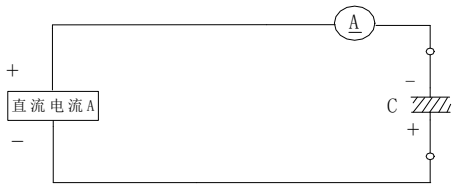
6. 纹波电流系数Multiplier for ripple current

6.1 频率系数 Frequency Coefficients

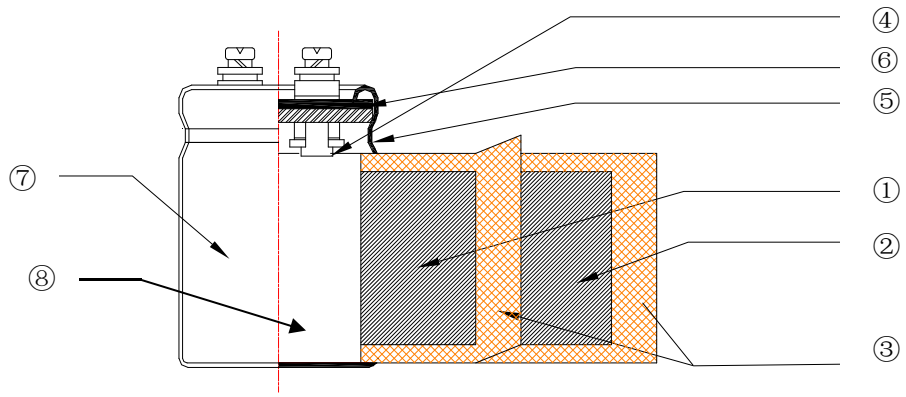
Frequency(Hz)	50	100(120)	300	1K	≥10K
Factor	0.7	1.0	1.10	1.30	1.40

7. 性能特征：Specifications

No	项目 Item	试验条件 Test Conditions	性能要求 Requirements	
7.1	静电容量 (允许偏差) Capacitance (Tolerance)	测试频率：120 HZ ， Measuring frequency : 120 HZ 测试电压：0.5 Vrms or less Measuring voltage : 0.5Vrms or less DC bias voltage : +1.5～ 2.0 V DC	静电容量允许偏差 ±20% Capacitance Tolerance ±20%	
7.2	损耗角正切(tg δ) Tangant	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项 Refer to table 4.	
7.3	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±10Ω.The leakage Current shall then be measured after an electricantion period of 5mins.	0.01CV或5.0mA以下取小值；（5mins） Less than 0.01CV or 5.0mA whichever is smaller（5mins） C：标称静电容量（uF ） Capacitance V：额定电压（V） Rated voltage	
7.4	浪涌电压 Surge Voltage	温度 15~35℃，充电 30 秒，放电 5 分 30 秒，共循环 1000 次 At 15~35℃, 1000 cycles of 30s on and 330s off.	无可见损伤 No visible damage	
			Δ C/C	≤±10%
			tg δ	≤初始规定值 Initial specified value
			I	≤初始规定值 Initial specifed value
7.5	耐久性 Load Life	+85℃施加额定电压 8000 小时，恢复 16 小时后： After applying rated voltage 2000 hours at +85℃and then resumed 16 hours.	Δ CC	±10%初始测量值以内 ±10% of the initial measured value
			tg δ	≤200%初始规定值 2times of the initial specified value
			I	≤初始规定值 Initil specified value
7.6	高温贮存 Shelf Life	+85℃，1000 小时贮存后，加额定工作电压处理 30 分钟,恢复 16 小时后： After storage for 1000 hours at +85℃,U_R to be applied for 30 minutes and then resumed 16 hours.	Δ C/C	±10%初始测量值以内 ±10% of the initial measured value
			tg δ	≤200%初始规定值 2 times of the initial specified value
			I	≤初始规定值 Initial specified value
7.7	稳态湿热 Stable Humidity	IEC 68 –2 试验 Ca：+40℃，湿度 90~95%，不施加电压 21 天， IEC 68 –2 Test Ca:21 days at 40℃ ,RH 90 to 95 %,no voltage applied.	无可见损伤和电解液漏出，且标志清晰 No visible damage; no leakage of electrlyte; marking legible.	
			Δ C/C	≤±10%
			tg δ	≤120%初始规定值 1. 2 times of the initial specified value
			I	≤120%初始规定值 1. 2 times of the initial specified value

7.8	耐振性 Resistance to vibration	IEC 68 – 2 试验 Fc：频率范围 10~55Hz，振幅为 0.35mm，持续时间为 3×0.5 小时。 IEC 68 – Test Fc : Frequency:10~55Hz; Amplitude:0.35mm;3 direction ,0.5 hours rer direction.	无可见损伤和电解液漏出，且标志清晰，电容量变化率≤±5%。 No visible damage ; no leakage of electrolyte; marking legible ; ΔC/C≤±5%.
7.9	防爆试验 Safety vent Test	直流反向电压 DC Inverse voltage  Ⓐ 直流电流表 C:试验电容器 直流电流：10A DC Current:10A	(1) 不允许出现爆炸和着火 （Not appear detonate and be on fire） (2) 防爆装置要打开，不允许从封口卷边处释放气（Vent should be opened, the gas not be allowed be set free from rubber） (3) 不允许出现电容器外壳和芯子飞溅的危险状态（the case and the pistil of the capacitor can't be splashed） 在试验中如果试验时间经历 30 分钟后不释放气体，则可认为合格 （ It's is not eligible if the vent can't be open when the test be lasted out for 30 minutes.）

8. 材料表　Frame drawing and materials



序号 No.	部件名称 Parts	材料名称 Material	主要供应商 Main supplier
1	阳极箔 AL – foil(+)	铝 Aluminum	/众和 /Zhonghe
2	阴极箔 AL – foil(-)	铝 Aluminum	飞乐/佳信 Feile/JiaXin
3	电解纸 Separator pape	电解电容器纸 Electroytic Cpacitor paper	凯恩/SPO KAN/SPO
4	引箔条 Screw Terminal	铝 Aluminum	天杰/飞乐 Tianjie/Feile
5	铝壳 AL-case	铝 Aluminum	奥星/飞辰 Aoxin//feichen
6	盖板 Cover	酚醛树脂+合成橡胶 P.F + Synthetic rubber	南通嘉能 Nantong jianeng
7	套管 Sleeve	PVC	顺鹏/嘉宾发 Suzhoushunpeng/Jiabingfa
8	电解液 Electrolyte	化学试剂 Chemical	新宙邦 Xinzhoubang

10. 铝电解电容器的使用注意事项 Guidelines For Using Aluminum Electrolytic Capacitor

为使您获得电解电容器的最佳性能和延长电解电容器的使用寿命，在使用电解电容器前，请务必阅读本注意事项。

Upon using Aluminum Electrolytic Capacitors， please proper handing and observing to following important points will insure optimum capacitor performance and long life.

10.1 直流电解电容器是有极性的 DC electrolytic capacitors are polarized.

确定极性，极性标志在电容器的基体上。以免因极性反可能引起电路短路或电容器损坏，当极性不固定或不确定的，使用双极性电容器。注意直流电解电容器不能使用于交流。

Make sure of the polarity. The polarity is marked on the body of the capacitor .Application of the reversed voltage cause a short circuit or damage to the capacitor. Use bipolar capacitors when the polarity is not determined or unknown. Note that DC electrolytic capacitors can not be used for AC application.

10.2 使用电压不要大于额定电压 Do not apply voltage greater than rated voltage.

使用电压大于额定电压，漏电流会增大，可能损坏电容器。建议工作电压为额定电压的百分之七十～八十，电容器在建议的工作电压下使用可延长电容器的寿命。

If a voltage exceeding the rated voltage is applied, the leakage current will increase, which damage the capacitor. Recommended working voltage is 70 to 80 percent of tatted voltage. Using capacitors at recommended working voltage prolongs capacitor life.

10.3 不要使过量的纹波电流通过电容器 Do not allow excessive ripple current through the capacitor.

流过电容器的纹波电流超过许可值，将会引起电容器发热，电容量减少，损害电容器。通过电容器的纹波电流不要大于允许值。

The flow of ripple current over permissible ripple current will cause heat of the capacitor, which may decrease the capacitance and damage the capacitor. Ripple current on the capacitor must be at or bellow allowable level.

10.4 快速的充放电电路中，使用专门设计的电容器 Use specially designed capacitors for the circuits where charge and discharge are frequency repeated.

在经受快速的周期性充放电电路中，电容器可能受损害，它的寿命因容量下降、温升等原因而缩短，在这种电路中，一定要使用专门设计的电容器。

In the circuit subjected to rapid charge cycles, capacitors may be damaged; its life may be shortened by capacitance decrease, heat rise, ect. Be sure and use special capacitors in these applications.

10.5 工作温度范围 Operating temperature range.

电容器的特性随工作温度而变化，在温度较高的情况下，容量、漏电流增大，损耗减少；在低温情况下，容量和漏电流下降，损耗增大。电容器在较低的温度下使用会确保延长寿命。

The characteristics of capacitors change with the operating temperature. The capacitance and leakage current increase and tgδ decrease at higher temperatures. The capacitance and leakage current decrease and tgδ at increase lower temperature. Usage at lower temperature will ensure longer life.

10.6 核对工作频率 Check operating frequency.

电解电容器的容量通常是在 100Hz 或 120Hz 下测得的。然而要记住容量随频率的升高而下降，tg δ 随频率的升高而增大，并使周围温度升高。

The capacitance of electrolytic capacitors is usually measured at 100Hz or 120Hz. However, remember that capacitance decrease and tgδ increase as the applied frequency becomes higher whereas the ambient temperature becomes higher.

10.7 长时间存放的电容器，在使用前加额定直流电压处理 Apply rated DC voltage treatment to the capacitors which have been stored for a long time .

长时间的存放，实际对电容器的容量和 tg δ 没有多大的影响，然而往往会使漏电流增大，耐压降低。长时间存放后的电容器处理，首先逐渐施加直流电压至额定电压，然后再使用。

Long periods of storage have virtually no effect on a capacitor’s capacitance and tgδ. Such periods tend however, to increase leakage current and decreases withstand voltage. After removing capacitors from long-duration storage, first apply a gradually increasing DC voltage to rated voltage and then use them.

10.8 电容器外壳与阴极端是不绝缘的 The capacitor case is not insulated from the cathode terminal.

电容器外壳与阴极端是通过电解液连接的，如果电容器的外壳必须与线路绝缘，则电容器的安装位置处，一定要采取绝缘措施。

The capacitor’s case and cathode terminal connect through the electrolyte. If the case is to be completely insulated, that insulation must be at the capacitor’s mounting point.

10.9 电容器的端子或引线上不要施加过大的力 Do not apply excessive force to the terminals and leads.

过大的力施加到端子和引线上， 可能引起引线的断裂或端子分裂，转而会引起内部连接的破坏。

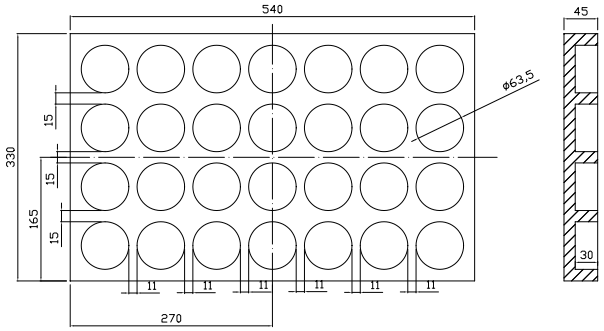
The excessive strong force applied to the terminals and lead wires may cause leads to break or terminals to separate and, in turn, cause the internal contact to fail.

11.螺栓包装顺序 Packing sequence for screw capacitors

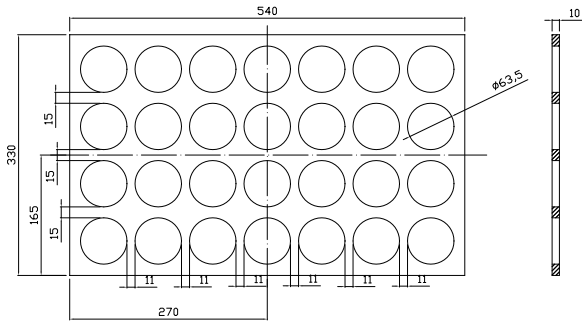
一、带孔珍珠棉 PE Foam with Holes

1. φ63.5

Part 1（SSZL540W330T403）



Part 2（SSZL540W330T103）

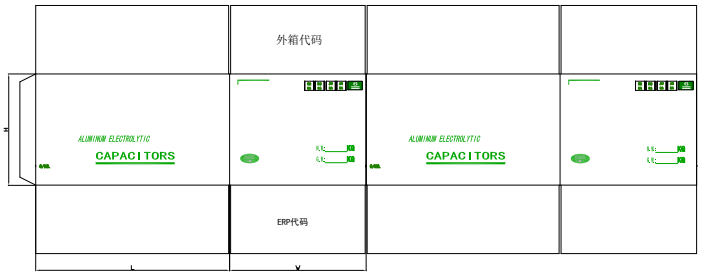


注：Remarks:

1. 材料：珍珠棉；Material: PE Foam
2. 圆心定位尺寸公差±0.3mm；Size tolerance of the center positioning of the cycles: ±0.3mm
3. 其它未注明公差±0.5mm；others unspecified tolerance: ±0.5mm
4. 套件组成：部件 1+部件 2+部件 1。components: part 1 + part 2 + part 1

2. 螺栓包装标准 Packing Standard of Screw Capacitors

1）. 包装箱 Carton



Unit：mm

ERP Code	L±2	W±2	H+2-0
PC5FCHSO010	**550**	**340**	**160**
PC5FCHSO020	**550**	**340**	**195**
PC5FCHSO030	**550**	**340**	**225**
PC5FCHSO040	**550**	**340**	**260**
PC5FCHSO050	**550**	**340**	**290**

螺栓产品的包装数量及相关要求 Packing Qty and Relative Requirement

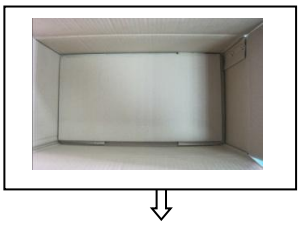
产品尺寸 (Size)		Carton		Paper board	PE Foam （Part 1）	PE Foam （Part 2）	Discharging foil	layer	PCS/ ctn
D.mm	L	L.mm	Code						
φ90	L	155	PC5FCHSO020	SSAL540W325T6	SSZL540W330T504	—	SPD590000 00	1	15

3. 包装示意图 Packing

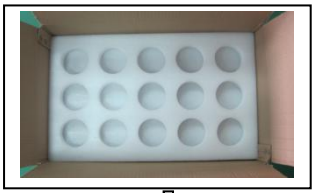
Preparation before packing

Bottom sealed in H type

Place a paper board in the bottom



Put in PE foam



Put in discharging foil

Put in capacitors (upside down)

Put in PE foam

Seal in H type

注： Remarks:

1. 产品高度≥140㎜时，加加固珍珠棉（部件 2）。when the length of capacitors is ≥140mm, add PE foam part 2
2. 产品在整个包装、运输过程都须倒置。capacitors should be upside down during the whole packing & delivery.
3. 不满箱时用相应的间隔板填满。when the carton is not full, fill in with relative materials

有害物质管理目录表

区分	物质名称(中文名)	物质名称 (英文名)	有害物质包含与否	
			有	无
Level A-I	铅以及它的化合物	Lead and its compounds		ND
	镉以及它的化合物	Cadmium and its compounds		ND
	水银以及它的化合物	Mercury and its compounds		ND
	六价铬以及它的化合物	Hexavalent chromium and its compounds		ND
	多溴化的联苯	Polybrominated biphenyls		ND
	聚溴二苯醚	Polybrominated diphenylethers		ND
Level A-II	多氯化联苯(PCB)	Polychlorinated biphenyls (PCB)		无
	多氯化萘 (PCN)	Polychlorinated naphthalenes (PCN)		无
	聚氯三联苯(PCT)	Polychlorinated terphenyls (PCT)		无
	氯化涂石蜡(SCCP)	Short-chain Chlorinated paraffins (SCCP)		无
	石棉以及它的化合物	Asbestos and its compounds		无
	臭气层破坏物质	Ozone Depleting Substances		无
	偶氮化合物	Azo compounds		无
	镍以及它的化合物	Nickel and its compounds		无
	有机锡类化合物	Specific Organic tin compounds		无
	砷以及它的化合物	Arsenic and its compounds		无
	甲醛	Formaldehydes		无
Level B	氯化乙烯树脂	Poly vinyl chloride(PVC)		无
	邻苯二甲酸盐	Phthalates		ND
	铍以及它的化合物	Beryllium and its compounds		无
	锑以及它的化合物	Antimony and its compounds		无
	硒以及它的化合物	Selenium and its compounds		无
	钯以及它的化合物	Palladium and its compounds		无
	铋以及它的化合物	Bismuth and its compounds		无
	其它氯类难燃剂	Other chlorinated flame retardants		无
	其它溴类难燃剂	Other brominated flame retardants		无

Note.

1. 原则上按照公司的管理规定，但由管理总部提出按根据 Buyer 等交易商的要求制定的另行有害物质管理目录来执行的要求时，应优先按照管理总部的管理目录来记载。

When executing the additional requirements about the Management List of Hazardous Substance which are requested by buyers, the management list of the headquarter should be taken in priority.

2. 确认合作企业现在是否在使用这类物质，应纪录使用与否。

Confirm whether the current cooperative enterprises are using the above substances and take records.