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发行编号:	CD294 - 2016 - 01 - 22
Issue number:	
发布日期:	2016 年 01 月 22 日
Issued date:	JAN 22 ,2016
客户名称:	
Customer:	

# 产品规格书

## Products specification

产品种类:	铝电解电容器
Products types:	Aluminum Electrolytic Capacitors
产品型号:	CD294
Products series:	
产品规格:	450V 220 $\mu$ F
Specification	

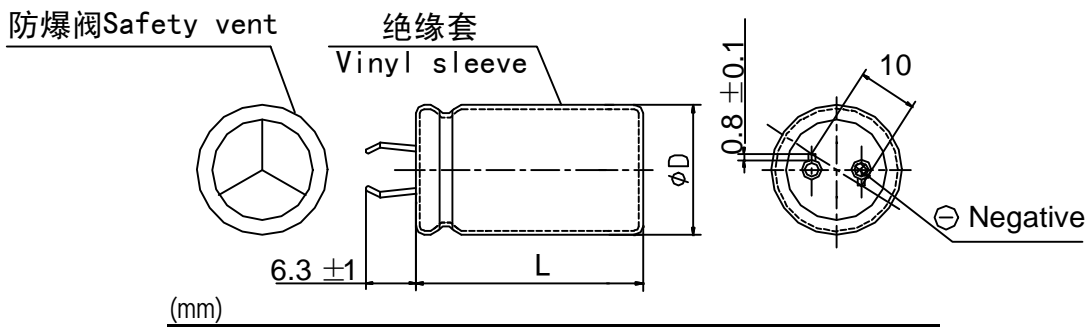
一、适用范围 Adapt range

本产品规格书适用于 CD294 铝电解电容器产品。  
The products specification is adapted to CD294 Aluminum Electrolytic Capacitors

二、技术性能 Specifications

项目 Item	特性 Performance characteristics	
使用温度范围(℃) Operation temperature range	- 25 ~ +105	
额定电压(V) Rated voltage	450	
标称电容量(μ F) Nominal capacitance	220	
标称电容量允许偏差(%) Capacitance tolerance	± 20	
漏电流(μ A) Leakage current	$I \leq 990$	
损耗角正切值(tg δ) Dissipation factor (20℃,100Hz)	$U_R(V)$	450
	$tg \delta (MAX)$	0.20
温度特性 Temperature characteristics (Impedance ratio at 100Hz)	$U_R(V)$	450
	Z-25℃/Z+20℃	$\leq 4$
耐久性 Load life	+105℃，2000 小时 3000 hours at +105℃	
高温贮存 Shelf life	+105℃，1000 小时 1000 hours at +105℃	

三、外形图及尺寸表 Case size table



$D^{+1.0}_0$	30
$L^{+2.0}_0$	40

#### 四、试验方法及要求 Tests

项目 Item	试验条件 Test Conditions	性能要求 Requirements	
浪涌电压 Surge Voltage	温度+15~+35℃, 施加规定的浪涌电压, 充电 30 秒, 放电 5 分 30 秒, 共循环 1000 次。 At +15~+35℃, applying the Us 1000 cycles of 30s on and 330s off.	无可见损伤 No visible damage	
		$\Delta C/C$	$\leq \pm 15\%$
		$\tan \delta$	$\leq$ 初始规定值 Initial specified value
		I	$\leq$ 初始规定值 Initial specified value
耐久性 Load Life	+105℃, 额定电压施加额定纹流电流 3000 小时, 恢复 16 小时后: After applying rated voltage with the rated ripple current for 3000 hours at +105℃ and then resumed 16 hours:	$\Delta C/C$	$\leq \pm 20\%$
		$\tan \delta$	$\leq 200\%$ 初始规定值 Initial specified value
		I	$\leq$ 初始规定值 Initial specified value
高温贮存 Shelf Life	+105℃, 1000 小时后, 施加额定电压 30 分钟, 于 24 至 48 小时时间测试。 +105℃, 1000 hours. No voltage applied. After test: $U_R$ to be applied for 30 minutes, 24 to 48 hours before measurement:	$\Delta C/C$	$\leq \pm 20\%$
		$\tan \delta$	$\leq 200\%$ 初始规定值 Initial specified value
		I	$\leq$ 初始规定值 Initial specified value
引出端强度 Tension Strength	IEC 68-2 试验 Ua: 拉力 10N, 10 秒 IEC 68-2 Test Ua: Loading force 10N for 10s	无可见损伤且标志清晰 No visible damage marking legible.	
可焊性 Solder ability	IEC 68-2-20 试验 Ta 方法 1: 焊料槽温度为 $235 \pm 5^\circ\text{C}$ , 浸渍深度离本体 $1.5 \pm 0.5\text{mm}$ , 浸渍持续时间为 $2 \pm 0.5$ 秒。 IEC 68-2-20 Test Ta means1: Tank temperature: $235 \pm 5^\circ\text{C}$ , Impregnating depth: off substance $1.5 \pm 0.5\text{mm}$ , Impregnating time: $2 \pm 0.5\text{s}$ .	引出端的良好镀层, 焊料自由流动, 引出端湿润。 Tin and wet coat the lead wire.	
耐焊接热 Resistance to soldering heat	IEC 68-2-20 试验 Tb 方法 1A: 焊料槽温度为 $260 \pm 5^\circ\text{C}$ , 浸渍深度离本体 $1.5 \pm 0.5\text{mm}$ , 浸渍持续时间为 $10 \pm 1$ 秒。 IEC 68-2-20 Test Tb means 1A: Tank temperature: $260 \pm 5^\circ\text{C}$ , Impregnating depth: off substance $1.5 \pm 0.5\text{mm}$ , Impregnating time: $10 \pm 1\text{s}$ .	无可见损伤, 标志清晰, 电容量变化率 $\leq \pm 5\%$ 。 No visible damage, marking legible, $\Delta C/C \leq \pm 5\%$ .	
稳态湿热 Stable Humidity (Steady state)	IEC 68-2 试验 Ca: +40℃, 湿度 90~95%, 不施加电压 21 天。 IEC 68-2 Test Ca: 21days 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 electrolyte, no marking legible.	
		$\Delta C/C$	$(\leq 100\text{V}): \leq \pm 15\%; (> 100\text{V}): \leq \pm 10\%$
		$\tan \delta$	$\leq 120\%$ 初始规定值 Initial specified value
		I	$\leq$ 初始规定值 Initial specified value
耐振性 Resistance to vibration	IEC 68-2 试验 Fc: 频率范围 10~55Hz, 振幅为 0.75mm, 持续时间为 $3 \times 2$ 小时。 IEC 68-2 Test Fc: Frequency: 10~55Hz, Amplitude: 0.75mm, 3 direction, 2 hours per direction.	无可见损伤和电解液漏出, 且标志清晰, 电容量变化率 $\leq \pm 5\%$ 。 No visible damage, no leakage of electrolyte, no marking legible, $\Delta C/C \leq \pm 5\%$ .	

#### 五、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 handling and observing to following important points will insure optimum capacitor performance and long life.

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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。避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用于交流。

Make sure of the polarity. The polarity is marked on the body of the capacitor. Application of the reversed voltage may 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.

2. 双极性电容器 Bipolar capacitors

只适用于脉动电路和极性反转电路中，不适用于纯交流和高纹波电路中。

They are used only in pulse circuits as well as polarity reverse circuits but not applicable in pure AC or high ripple current.

3. 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 rated voltage. Using capacitors at recommended working voltage prolong capacitor life.

4. 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，一般不超过额定值的 80%。

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 below allowable level, generally not more than 80% of the rated current.

5. 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 and discharge cycles, capacitors may be damaged, its life may be shortened by capacitance decrease, heat rise, etc. Be sure and use special capacitors in these applications.

6. 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， $\text{tg } \delta$  减少；在低温情况下，容量和漏电流下降， $\text{tg } \delta$  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  $\text{tg } \delta$  decrease at higher temperatures. The capacitance and leakage current decrease and  $\text{tg } \delta$  increase at lower temperature. Usage at lower temperature will ensure longer life.

7. 使用温度与寿命的关系 Relationship between temperature and life.

电容器的寿命与其使用的温度有关，一般来说，使用温度降低 10℃，其寿命是额定温度下的 2 倍，计算公式如下：

Life of capacitors has relationship with its used temperature .Generally, if the used temperature is reduced 10℃ ,life is prolonged twice at rated temperature. Here is calculating format:

$$L_2 = L_1 \times 2^{\frac{T_1 - T_2}{10}}$$

L1—额定温度下的寿命

Life at rated temperature

T1—额定使用温度

Rated used temperature

L2—实际温度下的寿命

Life at actual temperature

T2—实际使用温度

Actual used temperature

8. 核对工作频率 Check operating frequency.

电解电容器的电容量通常是在 100Hz 或 120Hz 下测得的。然而要记住容量随频率的升高而下降， $\text{tg } \delta$  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  $\text{tg } \delta$  increase as the applied frequency becomes higher whereas the ambient temperature becomes higher.

9. 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  $\tan \delta$  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  $\tan \delta$ . Such periods tend; however, to increase leakage current and decrease withstand voltage.

After removing capacitors from long-duration storage, first apply a gradually increasing DC voltage to rated voltage and then use them.

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

电容器的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.

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

过大的力施加到端子或引线上，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.

12. 浸焊料后，线路板的清洗 Cleaning of the circuit board after solder dipping.

清洗线路板以去除焊剂或其它附着物。为了保护塑料套管，印刷标志以及封口材料不被破坏，电容器不能用卤化物或类似溶剂作为电容器清洗用，如三氯乙烯，二甲苯或酮类等。建议使用的清洗溶剂为：甲醇，异丙醇，乙醇，异丁醇，石油醚，丙醇和一般的洗涤剂。

Cleaning circuit boards to remove flux or other extraneous matter. To ensure protection for sleeve, marking and sealing materials on capacitor body, capacitor should never be washed or cleaned by halogen agents or solvents such as trichlorethylene, xylene or acetone etc. Recommended cleaning solvents. Methanol, isopropanol ethanol, isobutanol, petroleum ether, propane and/or commercial detergents.

13. 焊接时注意温度和持续的时间 Be cautious of the temperature and duration when soldering.

烙铁应与电容器的塑料绝缘套管保持一定的距离。当电容器浸于焊料槽时，建议温度在 260℃ 以内，时间不要超过 10 秒钟，以避免电容器元件受损。

Soldering irons should be kept away from the vinyl-insulated sleeves of capacitor. When the capacitor dipped in solder bath, recommendable within 260℃ and 10 seconds to avoid damage of capacitor unit.

14. 印刷线路板上孔的布局 Hole positions on the circuit board.

设计印刷线路板时，安装孔距应等于引线间距，当孔距大于或小于引线间距时，安装电容器时，将有应力作用到引线上，可能引起短路，电路损坏，漏电流增大。

另外，焊料可能通过所打的孔及后加工零件的引线孔溅落到塑料套管上，造成损伤，所以要认真考虑孔的布局。

When designing a circuit board, space the position holes equally to the space between lead wires. When the spacing is either greater than or less than the capacitor's leads, mounting the capacitor will apply to the leads, causing short circuits, broken circuits, and increased current.

Otherwise, through-holes on the circuit board as well as lead holes of post-process parts can result in solder splashing onto the vinyl sleeve, causing damage. Consider hole positions carefully.