

产品承认书
APPROVAL SHEET

客户料号:

Part Number

客 户:

CUSTOMERS

品 名:

DESCRIPTION

铝电解电容

规 格:

SERIES

FCR150UF16V 4X11

供应商料号

Supplier PN:

FCR016BK151M0411

日 期:

DATE

2023/12/20

发行单位 ISSUE DEPARTMENT	
	
制作 PREPARED BY	洪艳平 Hong Yanping
批准 APPROVED	王大兵 Wang Dabing

客户承认栏 APPROVED COLUMN	
合格 <input type="checkbox"/>	
不合格 <input type="checkbox"/>	
审核 CHECKED	
批准 APPROVED	

贵司确认后, 敬请回签一份 (After your confirmation, please sign back)

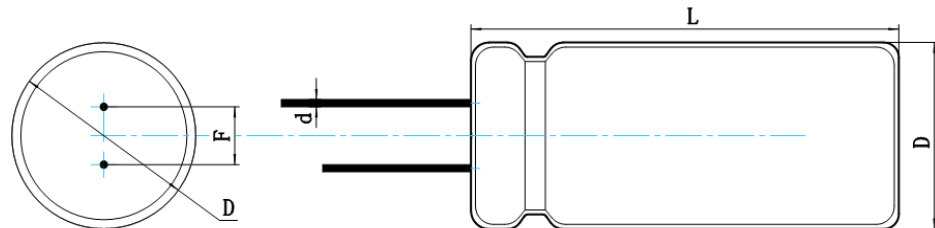
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承认书修订履历表

序号 No.	日期 Date	版本 Version	变更内容 Change Content	制作 Prepared by	批准 Approved
1	2023/12/20	A0	首次发行	洪艳平	王大兵

一. 长脚外形尺寸图 (Dimensions) : 单位: mm



D	4.2	± 0.05
L	11	± 0.8
F	2	± 0.2
d	0.45	± 0.05

二、 部品规格特性表 (电容测试条件: 25±5°C 湿度65%±5%, 容量\损失测试频率120HZ)

NO	客户料号	系列	标准容量	额定电压	尺寸	容量范围	损失角	漏电流	阻抗	寿命	纹波电流	浪涌电压	套管	加工形式	备注
	Part Number	Series	CAP. (uF)	WV (V)	SIZE	Tolerance/120HZ	D. F/120 HZ/25°C	LC(uA)30s	120Hz(Ω)	life(Hrs)	R. C. mA1 00KHZ10 5°C	surge voltage	Sleeve	TP	remark
1		FCR	150	16	4 X 11	-40°C ≥120 25°C ≥140 85°C ≥140	0.16	≤3/-40°C ≤3/25°C ≤8/85°C	≤5.5/-40°C ≤1.5/25°C ≤1.5/85°C	2000	280	20	镀膜	载带封装	
备注		L≤11.9mm													

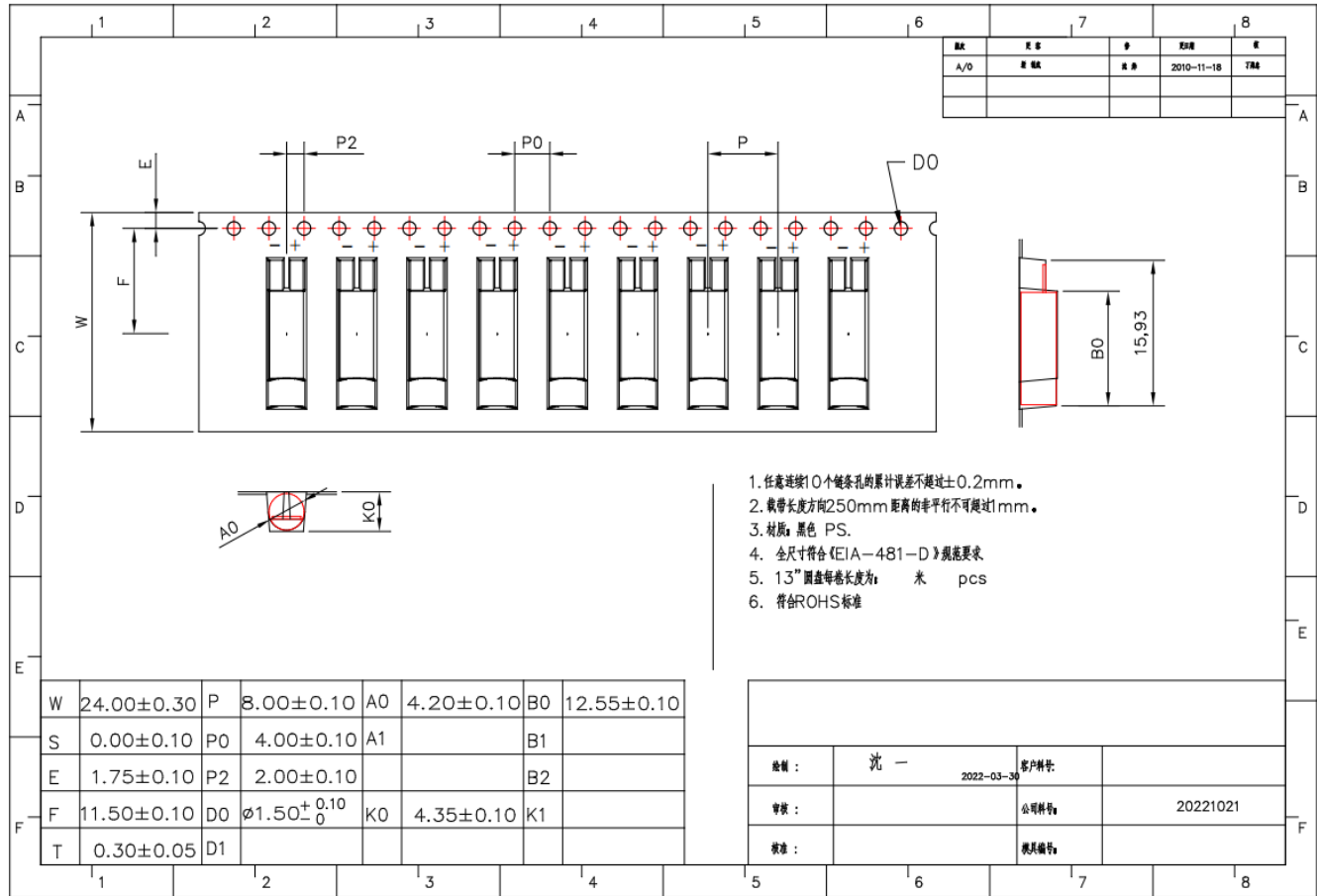
纹波电流系数 (Multiplier for ripple current) :

Freq	50Hz/60Hz	120Hz	1KHz	10KHz	50~100KHz
CAP≤10	0.47	1	1.45	1.65	1.7
10<CAP≤100	0.52	1	1.36	1.48	1.53
100<CAP≤1000	0.58	1	1.25	1.35	1.38

纹波温度系数 Multiplier for ripple current vs temperature

Temperatrue(°C)	45	60	70	85	105
Multiplier	2.10	1.90	1.65	1.4	1.00

加工模具号: JP0606

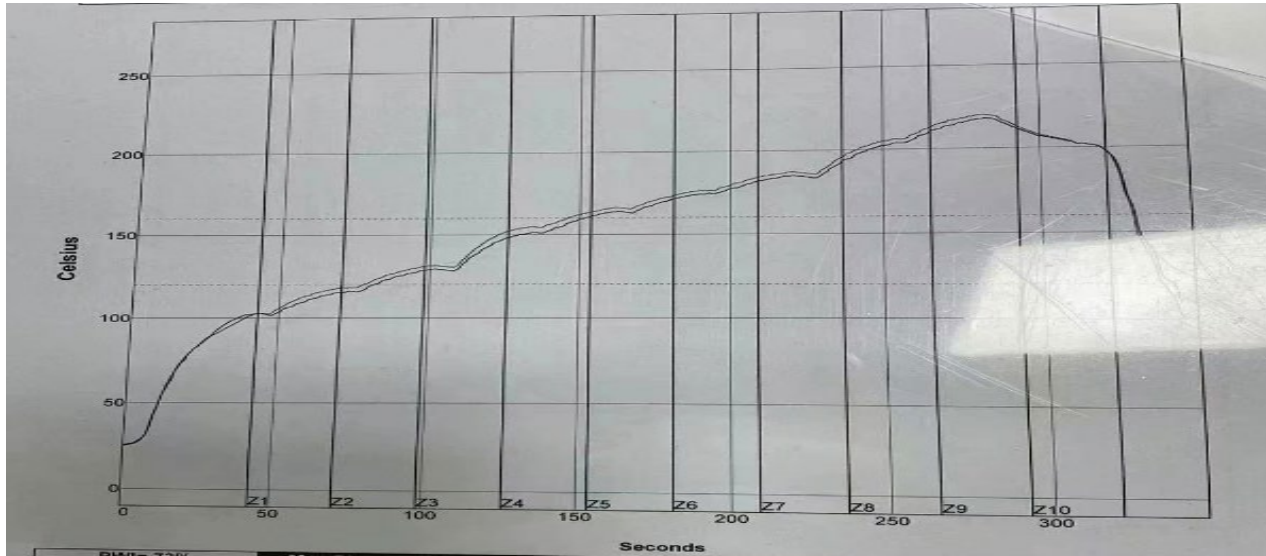


- 任意连续10个链条孔的累计误差不得超过±0.2mm。
- 载带长度方向250mm距离的非平行不得超过1mm。
- 材质: 黑色 PS.
- 全尺寸符合《EIA-481-D》规范要求。
- 13" 圆盘每卷长度为: 米 pcs
- 符合ROHS标准

三. 回流焊温度曲线 Setpoints (Celsius):

Zone	1	2	3	4	5	6	7	8	9	10
Top	110	120	130	160	170	180	190	210	225	190
Bottom	110	120	130	160	170	180	190	210	225	190

Conveyor Speed (inch/min): 31.5



四.材料表 (Material table)

NO.	构成部件 Component	材质 Material	关键参数 Data	供应商 Supplier
1	正极箔 Al Foil(+)	高纯铝 Aluminum	耐压 ≥ 21 VF	KDK
			比容 ≥ 88 uF/cm ²	KDK
2	负极箔 Al Foil(-)	高纯铝 Aluminum	耐压 ≥ 1 V	冠业
			比容: 350 uF/cm ²	Guanye
3	引出线 Lead line	铝线Aluminum	化成电压 ≥ 160 V	众用
		多层金属	镀锡层厚度: >10 uM	Zhongyong
4	电解纸 Separator	有机纤维 Cellulose	密度: 0.45 g/cm ³	凯恩
			击穿电压: N/A	Kaien
5	电解液 Electrolyte	有机物 Organic Matter	闪火电压 ≥ 100V	新宙邦 Xinzhoubang
6	胶塞 Rubber	有机化合物 Organic compounds	绝缘电阻 ≥ 1000MΩ	天台祥和 Tiantaixianghe
7	铝壳 Case	铝 Aluminum	防爆压力: N/A ± 5 kg/cm ²	联亿 Lianyi
8	套管 Sleeve	镀膜		

备注: 本电容满足ROHS2.0 ; REACH; HF 等要求. 禁用环境管理物质.

客户 CUSTOMER	0	系列 SERIES	FCR	数量 Q'TY (pcs)	100	使用温度 TEPM	-40~+105
客户料号 CUSTOMER P/N		容量 CAP/UF	150	容量范围 TOL%	如承认书第三页	测试温度 TEST TEMP (°C)	25±5
供应商料号 ECOND P/N	FCR016BK151M0 411	电压 WV (V)	16	纹波电流 rms (mA)	280	测试湿度 TEST HUMIDITY	65%
胶管标示 MARK	镀膜	尺寸 SIZE	4X11	其他要求 OTHERS	TP: 载带封装		

电气性能测试数据 DATA OF CAPACITOR

项目 ITEM	容量 CAP.	损失角 DF (%)	漏电流 LC (uA)		阻抗 ESR (Ω)	本体尺寸 SIZE (mm)		加工尺寸
测试条件 CONDITION	120Hz	120Hz	60S/25 °C	60S/85 °C	120Hz (Ω)	D	L	卡尺
最大值 MAX SPEC	180.0	≤ 0.16	≤ 3/25 °C	≤ 8/85 °C	≤ 1.5/25°C	4.2± 0.05	11± 0.8	TP: 载带封装 ± 0.5
最小值 MIN SPEC	140.0							
1	148.1	0.1180	1.31	6.51	1.063	4.19	10.69	
2	150.1	0.1210	1.29	6.21	1.054	4.20	10.70	
3	148.2	0.1200	1.06	6.56	1.035	4.18	10.71	
4	148.8	0.1210	0.97	6.41	1.078	4.19	10.72	
5	149.5	0.1220	1.10	6.51	1.032	4.20	10.70	
6	150.1	0.1200	1.12	6.48	1.042	4.18	10.69	
7	149.5	0.1210	1.21	6.50	1.035	4.19	10.69	
8	150.2	0.1230	1.16	6.49	1.034	4.20	10.70	
9	149.7	0.1210	1.24	6.50	1.038	4.18	10.71	
10	150.3	0.1220	1.18	6.40	1.042	4.19	10.69	
平均值 AVG	149.5	0.1209	1.164	6.457	1.045	4.19	10.70	
散差 (R)	2.2	0.0050	0.34	0.35	0.046	0.02	0.03	
判定结果 DECIED	OK	OK	OK	OK	OK	OK	OK	

LCR METER容量测试仪名称: 致新ZX8517BT

电流测试仪名称: 致新ZX6589

ESTIMATION		承认 APPROVED		制作 TEST BY	
<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO	王大兵		洪艳平	

试验项目 Test item

NO	项目 Items	条件 Conditions	规格 Specifications														
1	Maximum permissible ripple current	Temperature: $105 \pm 2^\circ\text{C}$ Voltage :DC.Voltage+peak ripple voltage \leq Rated voltage. Ripple frequency:120Hz	Refer to table														
2	Surge	Temperature: $105 \pm 2^\circ\text{C}$ Applied voltage: see specification "ON" position : 30 seconds "OFF" position :5 minutes 30 seconds. Duration : 1000 cycles	1.No electrical or mechanical damage. 2.Capacitance change within $\pm 15\%$. 3.D.F.smaller than specification volue. 4.Leakage current smaller than specification volue.														
3	Temperature Cycle	<table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td rowspan="5" style="text-align: center; vertical-align: middle;">One Cycle</td> <td style="text-align: center;">Temperature($^\circ\text{C}$)</td> <td style="text-align: center;">Time (minutes)</td> </tr> <tr> <td style="text-align: center;">Rated low category temperature ± 3</td> <td style="text-align: center;">30 ± 3</td> </tr> <tr> <td style="text-align: center;">25°C</td> <td style="text-align: center;">3MAX</td> </tr> <tr> <td style="text-align: center;">Rated low category temperature ± 3</td> <td style="text-align: center;">30 ± 3</td> </tr> <tr> <td style="text-align: center;">25°C</td> <td style="text-align: center;">3MAX</td> </tr> <tr> <td colspan="3" style="text-align: center;">Total number of cycles: 5</td> </tr> </table>	One Cycle	Temperature($^\circ\text{C}$)	Time (minutes)	Rated low category temperature ± 3	30 ± 3	25°C	3MAX	Rated low category temperature ± 3	30 ± 3	25°C	3MAX	Total number of cycles: 5			1.No appearance defect. 2.Capacitance change within $\pm 5\%$ 3.D.F.smaller than specification value. 4.Leakage current smaller than specification value.
One Cycle	Temperature($^\circ\text{C}$)	Time (minutes)															
	Rated low category temperature ± 3	30 ± 3															
	25°C	3MAX															
	Rated low category temperature ± 3	30 ± 3															
	25°C	3MAX															
Total number of cycles: 5																	
4	Resistance to Soldering Heat	Warm up time : 120 ± 2 seconds to reach $120 \pm 2^\circ\text{C}$ Solder bath temperature: $260 \pm 5^\circ\text{C}$. Solder bath composition: Sn-96.5%. Ag-3.0% Cu-0.5% Immersion depth: 1.5 to 2.0mm Immersion duration: 10 ± 1 seconds	1.No appearance defect. 2.Capacitance change within $\pm 5\%$ 3.D.F.smaller than specification value. 4.Leakage current smaller than specification value														
5	Solder Ability	Solder bath temperature: $235 \pm 5^\circ\text{C}$. Solder bath composition: Sn-96.5%. Ag-3.0% Cu-0.5% Immersion depth: 1.5 to 2.0mm Immersion duration: 10 ± 1 seconds	A minimum of 95% the immersed surface is to be coated with the new solder														

试验项目 Test item

NO	项目 Items	条件 Conditions	规格 Specifications	
6	Low Temperature Characteristics(Max. Impedance Ratio)	working Voltage (v)	6.3 10 16 25 35 50 63 100	
		Impedance Z-40°C/+20°C	8 6 4 3 3 3 3 3	
7	High Humidity storage	Temperature:40±2°C Relative humidity :90 to 95% Duration : 240±8 hours	1.No electrical or mechanical damage. 2.Capacitance change within ±15%. 3.D.F.smaller than specification volue. 4.Leakage current smaller than specification volue.	
8	Vent	Conduct under normal lighting for lab work		
		Capacitor diameter	Applied current(A) Minutes	
		Less than 22.4mm	1 within 30	
More than 22.5mm	10			
9	Terminal strength	tensile strength	Time(s) Diameter(mm) Load(kg)	
			10±1	0.5 0.5
				0.6 to 0.8 1
		0.8 2		
	winding strength	cycle	2 bends	
10	Vibration	Frequency range : 10 Hz to 55 Hz Amplitude :1.5 mm Cycle definition:10Hz to 55 Hz and back to 10Hz Cycle duration :1 minute. Duration :2 hours per direction (3directions)	1.No electrical or mechanical damage 2.No appearance damage	
11	Endurance	Capacitors are placed in an oven and applied voltage for 2000 hours at 105°C.After being restored to 25°C, capacitors shall meet the specifications.	1.Capacitance change within ±20% of the initial value. 2.D.F.change within ±200% of the specified value. 3.Leakage current smaller than specification value.	
12	Shelf Life	Capacitors are placed in an oven for 1000 hours at 105 °C without applying rated working voltage.After being restored to 25°C,capacitors shall meet the specifications	1.Capacitance change within ±20% of the initial value. 2.D.F.change within ±200% of the specified value. 3.Leakage current within ±200% of the specification value.	

13. 使用注意事项

1、Aluminum electrolytic capacitor has polarity. The polarity is marked on body of the capacitor. If polarity is connected in the wrong direction, the circuit will be shortened and the capacitor may be damaged. In the circuits where the polarity is unknown or constantly change, am bipolar capacitor should be used. Please note that the am bipolar capacitors described in this catalog must not be used in AC applications.

普通铝电解电容器是有极性的，其极性在电容器上标出，在使用时注意不要接反；如果接反，则电容器在短路状态，使电容器受到损坏；在极性不明或是极性经常变动的电路中，则使用双极性电容器。请注意，目录中的双极性电容器不一定能使用在交流电路中。

2、Do not apply DC voltage exceeding the rated working voltage of the capacitor. when a capacitor is used at a higher voltage than rated working voltage, leakage current increase and the capacitor's life is shortened. 70%-80% of the working voltage is recommended for the sake of capacitor usage life. When AC voltage is superimposed to DC voltage, the sum of the DC voltage and the peak AC voltage should not exceed the rated working voltage of the capacitor.

施加于电容器两端的直流电压不能高于额定的工作电压，当电容器上施加的电压高于额定工作电压时，漏电流会增大，电容器的寿命会缩短。推荐电容器的实际工作电压不要超过其额定工作电压的70%-80%使用，这样有助于延长电容器的使用寿命。当交流电压叠加在直流电压上时，直流电压和交流电压峰值之和不能超过电容器的额定工作电压。

3、Do not apply ripple current exceeding the rated max ripple current. Excessive heat can result if too much ripple current is applied. Excessive heat can shorten the life of the capacitor and in some cases failure may occur. The peak value of the ripple current should be less than the DC voltage.

施加在电容器上的纹波电流不要超过额定纹波电流范围；如果纹波电流过大，产品会过热，从而造成电容器的恶化，寿命缩短；施加的纹波电压要低于直流电压。

4、General aluminum electrolytic capacitor is not suitable for frequent charging and discharging, otherwise the capacitor maybe damaged because of over heating. Specified capacitors can be designed to meet the requirements.

普通的铝电解电容器不适用于频繁的充放电，如果频繁的充放电，会使电容器过热而导致失效或损坏。特殊设计的电容器才可以满足此要求。

5、The life of an aluminum electrolytic capacitor is greatly affected by the ambient temperatures. The lower the operating Temperature the longer the life expectancy of the capacitor. In general, the Arrhenius'rule can be applied to aluminum electrolytic capacitor: which says the life of a capacitor decrease half when operating temperature increase 10°C

电容器的寿命受到周围环境温度的影响很大，在室温下使用可保证有较长的寿命。铝电解电容器的寿命与环境温度的关系遵从阿伦尼亚斯原则，即：环境温度每升高10°C，寿命会降低一半。

6、When capacitors are soldered on the board, the sleeve maybe result the secondary shrinkage due to excessive heat. Please take note: the melted temperature should be lower 350°C and the time less 3 seconds. If melted solder comes in direct contact with the sleeping, the sleeve will be damaged Please avoid this situation.

电容器焊接到线路板上时，套管会因为温度过高而发生二次收缩。请注意：手工焊接时，焊接温度应低于350°C，时间少于3秒。请避免烙铁头直接与套管接触，否则套管将损坏。

7、The vent needs a space to work well make the space above the vent ,the space required is depending up on the case diameter. Following is the recommended space:

防爆阀需要有一个空间才能有效，该空间在防爆阀正上方，大小其决于铝壳尺寸。

8、Do not apply excessive force to the lead and terminal .Do not pick out capacitor by force after soldering to the PC board, dot not move the Pc board by picking the capacitor.

不要对电容器的引线或引出端施加应力，当电容器焊接到PCB板上后，不要强行取出电容器，不要提着电容器来搬动PCB板。

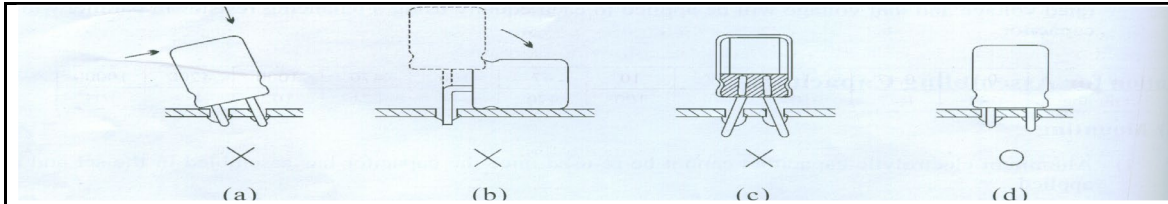
Following examples are typical stress to capacitors to be prevented.: 以下电容器受力典型例子

(a) Do not lean after soldered. 焊接后产品不要倾斜

(b) Do not bend the capacitor after soldering. 焊接后不要弯倒电容器

(C) Mismatch of the terminals and the install holes on the PC board. 引出端间距不合PC板上安装孔

(d) Correct installation way. 正确的安装方式



9、The aluminum case is not insulated from the cathode. Do not locate any copper or any via hole under the aluminum capacitors, on the PC board. Also, the dummy terminal is not insulated from the cathode. The dummy terminal must not be connected electrically to the anode. Other wise, both cases may cause a short circuit.

铝壳与阴极是不绝缘的，在PCB板上，不要在铝电解电容器下设任何导线，辅助端子和阴极也不是绝缘的，辅助端子和阳极一定不要有电的连接，否则产品将会造成短路。

10、The capacitor shall storage in the condition of normal temperature ,non-acid ,non-alkali and normal humidity. If the capacitors have been stored for a longtime and leakage current is a critical parameter ,the parts can be re formed by applying voltage before using them.

电容器要贮存在常温、常湿、无酸、无碱的环境下，并且要避免阳光直射，如果电容器贮存超过6个月以上时，通常其漏电流有增大，对使用寿命有影响，在使用时请串排上1KΩ之保护电阻，使其持续负载额定工作电压30分钟。

11、When move, check and use the aluminum electrolytic capacitor, do it carefully to avoid distortion, damage, appearance, or performance.

铝电解电容器在搬动、检验及使用，要轻拿轻放，请避免由外力的原因使产品变形、碰伤，影响其外观和电气性能。

2. 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 more than five minutes. The rated surge voltage is as follows:

浪涌电压是短时间内电容器可以承受的最大直流过电压，在5分钟的连续间隔里，该直流电压施加在电容器上的时间大约不超过30秒；电容器的浪涌电压见试验项目2.0。

13、Please do not use capacitors in the following circumstances:

- a) directly with water, salt and oil in contact, or more than 75% relative humidity environment;
- b) an environment filled with harmful gases (sulfide, H₂S₀₃, HNO₂, Cl₂, ammonia, etc.);
- c) placed in sunlight, O₃, UV rays and radioactive substances in the environment;
- d) the impact of vibration and harsh environments;
- c) use of halogen-fixed, resin-coated curing agent capacitors.

The use of other fixatives, coating agents, ask the customer to confirm the following:

- a) Thermal variation caused by the capacitor shorten the life span;
- b) curing agent and the capacitor body's chemical reactions.

请不要在所述环境下使用电容器：

使用其他固定剂、涂层剂时，请客户确认以下内容：

- b) 充满有害气体环境（硫化物、H₂S₀₃、HNO₂、Cl₂、氨水等）；
- c) 置于日照、O₃、紫外线及有放射性物质的环境；
- d) 振动及冲击的恶劣环境；
- c) 使用含卤素的固定剂、树脂涂层剂固化电容器。

使用其他固定剂、涂层剂时，请客户确认以下内容：

- a) 电容器散热变差所造成的寿命缩短；
- b) 固化剂与电容器本体的化学反应。

Announce: If you have not carried on the standard on the standard operation according to the operating instructions, our company will not undertake any res passivity.

声明：如果您不按我们的使用说明进行规范操作，我们将不承担任何责任。