福建云星电子有限公司

FUJIAN YUNXING ELECTRONICCOLTD

客户 CUSTOMER：

日期 DATE: 2026/05/19

承认书

SPECIFICATION

商品名称：固态铝电解电容器

Product: Solid Aluminum Electrolytic Capacitors

型号：16V220UF　6.3*5.4 PT　2000H

Sery：16V220UF　6.3*5.4 PT　2000H

云星物料编码：SPT1CM221E06TRVZC

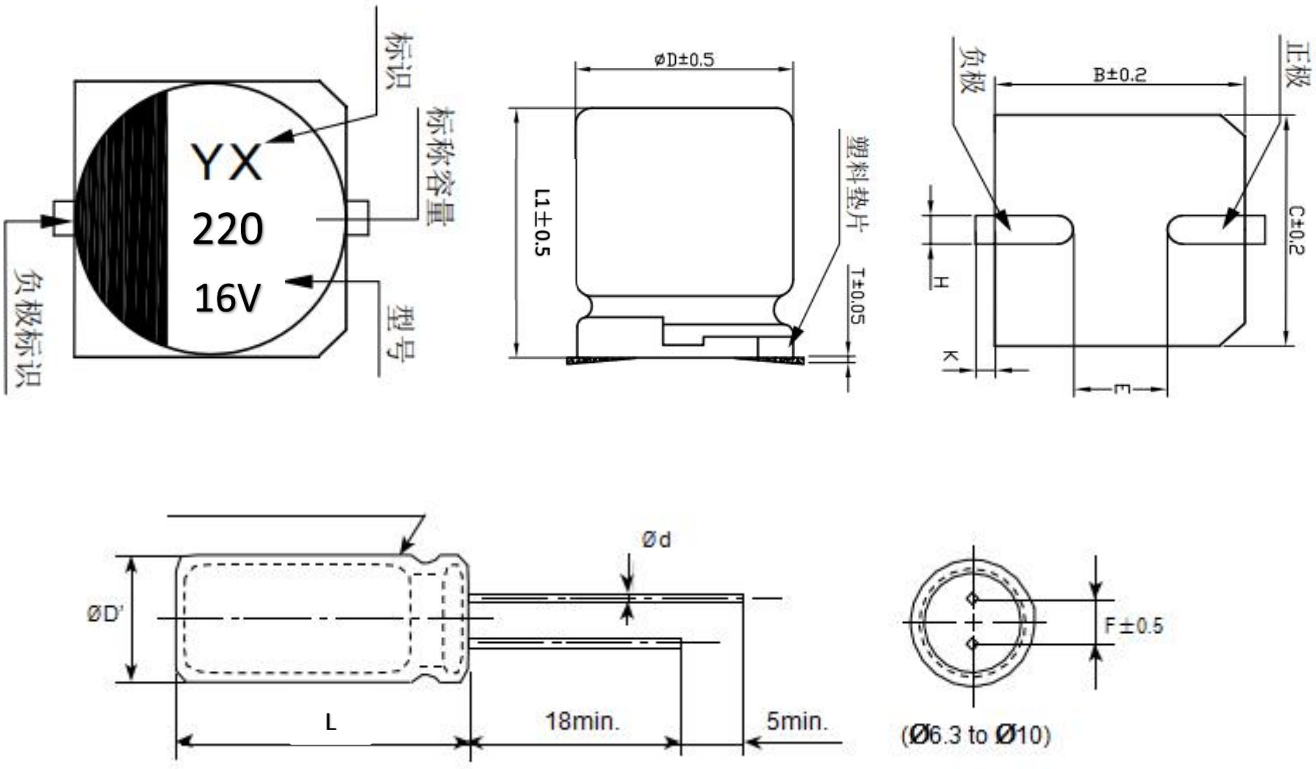
客户物料编码：

请客户确认签章 **APPROVED BY**
承认后请寄回一份 Please Return One Copy with Your Approval

拟制 PREPARED BY	审核 CHECKED BY	批准 APPROVED BY
方真琴	林伟雄	蒋海云

修改记录 REVISION RECORD			
VER 版本	MINUTE OF CHANGES 更改目录	CHECKER 检查人	RELEASE DATE 发行日期
20211213	新建	林伟雄	2026.5.19

● 外型尺寸 Dimensions



ØD	5	6.3	8	10
ØD`	ØD：6.3mm±0.5mm			
L`	L:5.4mm±0.5mm			
L1	L1:6.1mm±0.5mm			
C	C:6.6mm±0.2mm			
E	E:2.4mm±0.5mm			
B	B:6.6mm±0.2mm			
H	H:0.6~0.8mm			

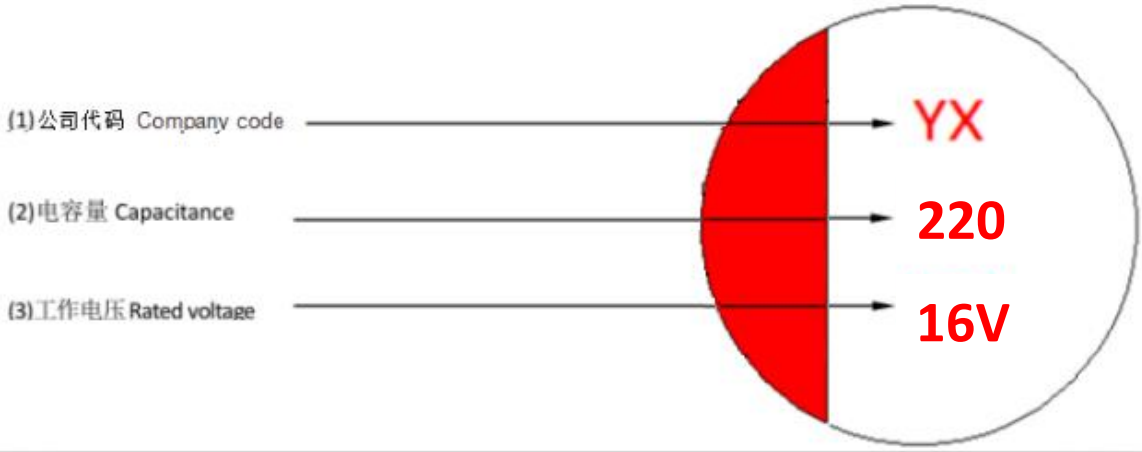
● 电气特性 Characteristics

CAP	WV	SV	Oper. Temp.	D	L	LC	Tanδ	R/C	ESR	Loadlife
(uF)120Hz	(VDC)	VDC	(℃)	(mm	(mm)	MAX(uA)	(MAX)	(MARMS)	(mΩ)	(HOURS)
±20%	/	/	-55~105℃	/	/	2Min	120Hz	105℃,100KHZ	100K HZ	105℃
220	16	18.4	105℃	6.3	5.4	≦704	≦0.12	≦2000	≦50	2000H

纹波电流补偿系数与频率 Compensation factor of ripple current versus frequency

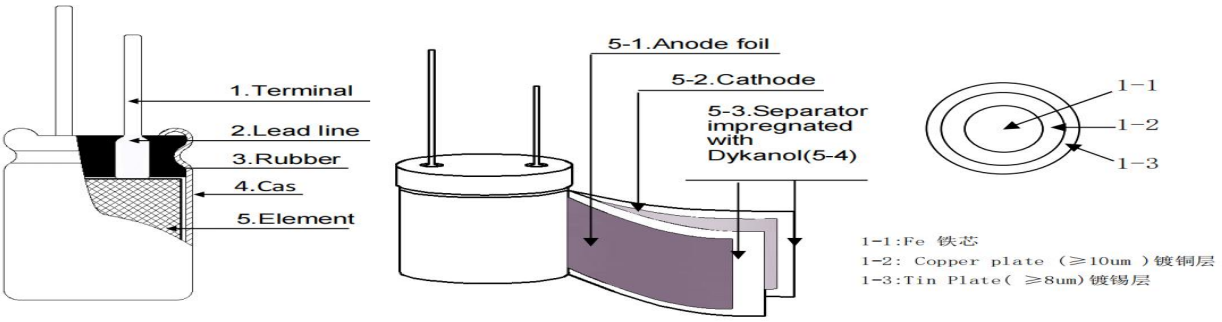
Frequency 频率(Hz)	120≦f＜1K	1K≦f＜10K	10K≦f＜100K	100K≦f≦500K
Coefficient 系数	0.05	0.3	0.7	1.0

标识 Marking



构造图及材料表 Frame drawing and Material list

构造图 Component Structure



材料表 Material list

NO	部件名称 Parts	材料名称 Material	主要供应厂家名称 Main supply Factory
1	CP 线 Terminal	LG3+镀锡铜钢线 Tinned copper-ply wire	建兴/金联富
2	引出线 Lead line	纯度为 99.95%或 99.97%的金属铝片 Aluminum, 99.95% or 99.97%	建兴/金联富
3	橡胶塞 Rubber	丁基橡胶 IIR rubber	浙江天华/鑫庄
4	铝壳 AL-case	99.5%纯度铝 AL －99.5%	奥星/益玺
5	阳极箔 AL － foil(+)	99.98%形成铝箔 Formed AL 99.98%	立墩/富琪
6	阴极箔 AL － foil(-)	98.7%腐蚀铝箔 Formed AL 98.7%	纳诺/力川
7	电解纸 Separstor pape	电解电容器纸 Electrolytic Capacitor paper	仙鹤/日本大福
8	电介质 Dykanol	聚 3，4-乙烯基二氧噻吩 Poly3,4-Ethylene Dioxy Thiophene 含水率：88%	贝利/新宙邦

● 有害物质管制 Hazardous substances control

符合 **RoHS** 指令及 **REACH** 法规要求

物质清单

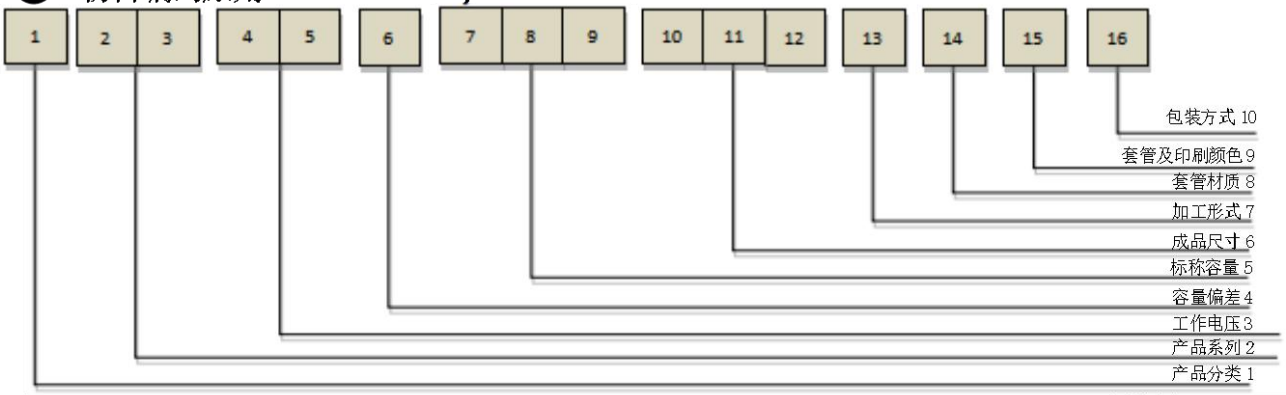
(Material Safety Data Sheet)

NO	部件名称 Parts	材料名称 Material	Cd	Pd	Cr	Hg	PBBs	PBDEs	报告编号 Report No.
1	CP线 Terminal	LG3+镀锡铜钢线 Tinned copper-ply wire	N.D	N.D	N.D	N.D	N.D	N.D	123456
2	引出线 Lead line	纯度为99.95%或99.97%的金属铝片 Aluminum, 99.95% or 99.97%	N.D	N.D	N.D	N.D	N.D	N.D	0
3	橡胶塞 Rubber	丁基橡胶 IIR rubber	N.D	N.D	N.D	N.D	N.D	N.D	0
4	铝壳 AL- case	99.5%纯度铝 AL -99.5%	N.D	N.D	N.D	N.D	/	/	0
5-1	阳极箔 AL - foil(+)	99.98%形成铝箔 Formed AL 99.98%	N.D	N.D	N.D	N.D	N.D	N.D	0
5-2	阴极箔 AL - foil(-)	98.7%腐蚀铝箔 Formed AL 98.7%	N.D	N.D	N.D	N.D	N.D	N.D	0
5-3	电解纸 Separstor pape	电解电容器纸 Electrolytic Capacitor paper	N.D	N.D	N.D	N.D	N.D	N.D	0
5-4	电介质 Dykanol	聚3，4-乙烯基二氧噻吩 Poly3,4-Ethylene Dioxy Thiophene	N.D	N.D	N.D	N.D	N.D	N.D	0

漳州云星电子科技有限公司

ZHANGZHOU YUNXING ELECTRONIC TECHNOLOGY

● 物料编码原则 Part Number System



1.产品分类

产品分类	代码
	1
液态电容	E
固态电容	S

2.系列

系列	代码
GF	GF
CD11-F	CF
CD11-E	CE
GPF	PF
CD11-G	CG
GPH	PH
CD11-H	CH
CD11-B	CB
CD11-130℃	C3
KM	KM
GPS	PS
RS	RS
GRS	GS
RD	RD
GRD	GD
GW	GW
CD11-E	DE
CD11-G	DG
CD11-H	DH
CS	TS
CF	TF
CG	TG
HP	HP
LP	LP
LS	LS
HS	HS
SP	SP
SR	SR
PT	PT
PE	PE

3.工作电压

电压(V)	代码
2.5	0A
6.3	0J
7.5	2J
10	1A
12	2B
14	2X
16	1C
20	1F
25	1E
35	1V
50	1H
63	1J
80	1B
100	1K
120	1I
160	2C
200	2D
250	2E
315	2F
350	2V
400	2G
420	2T
450	2W
500	2H

4.容量偏差

容量偏差	代码
-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
-10~0%	G
-5~+10%	O

5.标称容量

容量 (μF)	代码
0.1	0R1
0.22	R22
0.33	R33
0.47	R47
0.68	R68
1.0	010
2.2	2R2
2.7	2R7
3.3	3R3
4.7	4R7
5.6	5R6
6.8	6R8
10	100
22	220
33	330
47	470
68	680
100	101
180	181
220	221
270	271
330	331
470	471
680	681
820	821
1000	102
1200	122
1500	152
1800	182
2200	222
4700	472

6.产品尺寸

直　　径	代码
4	C
5	D
5.5	B
6.3	E
6.8	A
8	F
10	G
12	J
12.5	W
13	K
16	L
18	M
20	N
22	O
25	P
30	Q
35	R
40	Y
51	S
长度	代码
5	05
7	07
9	09
11	11
12	12
13	13
14	14
15	15
16	16
17	17
20	20
21	21
25	25
26	26
30	30
35	35
40	40
45	45
50	50
60	60
80	80

7.加工形式

规范要求	代码
剪脚 (5φ~22φ)	C
扩脚 (5φ~8φ)	F
成型外 K 脚	W
成型内 K 脚	N
Snap in	K
Horizontal mounting Terminal	M
螺柱式	S
贴片	T
三脚	S
四脚	Y
直脚编带	B
扩脚编带	P
引线	O
折 A	ZA
折 B	ZB
折 Z	ZC

8.套管材质

套管材质	代码
PVC	C
PET	T
无套管	0

9.套管及印刷颜色

套管颜色	代码
绿色	G
黄色	Y
橙色	O
红色	R
紫色	P
黑色	B
棕色	Z
蓝色	L
咖啡色	C
墨绿色	M
透明	T
利华紫	U

10.包装方式

包装方式	代码
散装	S
编带	B
载带	Z
摆盒	H

● 概述 SCOPE

1. 1 概述 SCOPE
本承认书规定了铝电解电容器的技术规范。
This specification contains descriptions of the quality of aluminum electrolytic capacitors.

1. 2 参考标准 APPLICABLE SPECIFICATION
本承认书参考 JISC-5141 和 JISC-5102 制定。
This specification is made based on the Japanese Industrial Standard JISC-5141 Characteristics and JIS C-5102.

1. 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。
Operating temperature range is the range of ambient temperature at which the capacitor can be operated continuously at rated voltage.

● 主要特性表 MAIN SPECIFICATIONS

<table>
<tr><th>项目 Item</th><th>主要特性 Performance Characteristics</th></tr>
<tr><td>使用温度范围
Operating Temperature Range</td><td>-55℃~+105℃</td></tr>
<tr><td>额定工作电压范围
Rated Voltage Range</td><td>2.5~16V.DC</td></tr>
<tr><td>静电容量允许偏差
Capacitance Tolerance</td><td>±20%（M，+20℃，120Hz）</td></tr>
<tr><td>浪涌电压
Surge Voltage</td><td>Rated Voltage x 1.15V</td></tr>
<tr><td>漏电流
Leakage current</td><td>0.2CV/2Min</td></tr>
<tr><td>损失
Dissipation Factor</td><td>120Hz/0.12</td></tr>
<tr><td>高低温的阻抗比
Characteristics of lmpedance at Low,high Temperature</td><td>Z(-55℃)/Z(+20℃) ≤1.25 (at-55℃,100KHz)
Z(105℃)/Z(+20℃) ≤1.25 (at105℃,100KHz)</td></tr>
<tr><td>VF</td><td>VF>1.25VR</td></tr>
<tr><td>高温负荷特性
Endurance</td><td>在 105℃ 环境中施加额定工作电压 2000 小时后,电容器的性能符合下面要求：
The specifications shall be satisfied when the capacitors are restored to 20℃after the rated voltage is applied for 2000 hours at 105℃.
<table>
<tr><td>外观
Appearance</td><td>没有明显变化
No significant damage</td></tr>
<tr><td>容量变化
Capacitance Charge</td><td>小于初始值的±20%
≤±20% of the initial specified value</td></tr>
<tr><td>损失
DF</td><td>小于初始值的 150%
≤±150% of the initial specified value</td></tr>
<tr><td>阻抗
ESR</td><td>小于初始值的 150%
≤±150% of the initial specified value</td></tr>
<tr><td>漏电流
Leakage current</td><td>小于初始值
≤the initial specified value</td></tr>
</table></td></tr>
</table>

<table>
<tr><th>项目 Item</th><th>主要特性 Performance Characteristics</th></tr>
<tr><td>湿热稳定性
Damp Heat,Steady State</td><td>在 60℃,湿度为 90~95%，无直流电的环境中放置 1000 小时后,电容器的性能符合以下的要求：
The specifications shall be satisfied when the capacitors are restored to 20℃ sfter subjecting them to store at 60℃,90 to 95% RH for 1000 hours,without DC applied.
<table>
<tr><td>外观
Appearance</td><td>没有明显变化
No significant damage</td></tr>
<tr><td>容量变化
Capacitance Charge</td><td>小于初始值的±20%
≤±20% of the initial specified value</td></tr>
<tr><td>损失
DF</td><td>小于初始值的 150%
≤±150% of the initial specified value</td></tr>
<tr><td>阻抗
ESR</td><td>小于初始值的 150%
≤±150% of the initial specified value</td></tr>
<tr><td>漏电流
Leakage current</td><td>小于初始值
≤the initial specified value</td></tr>
</table></td></tr>
<tr><td>浪涌电压
Surge Voltage</td><td>在 105℃，电阻为 1KΩ的环境下充电 30 秒和在不充电情况下放置 5 分钟 30 秒，循环操作 1000 次，电容器的性能符合以下的要求：
The capacitors shall be subjected to 1000 cycle each consisting of charge with the surge voltages specified at 105℃ for 30 seconds through a protective resistor (R=1KΩ) and discharge for 5 minutes 30 seconds.
<table>
<tr><td>外观
Appearance</td><td>没有明显变化
No significant damage</td></tr>
<tr><td>容量变化
Capacitance Charge</td><td>小于初始值的±20%
≤±20% of the initial specified value</td></tr>
<tr><td>损失
DF</td><td>小于初始值的 150%
≤±150% of the initial specified value</td></tr>
<tr><td>阻抗
ESR</td><td>小于初始值的 150%
≤±150% of the initial specified value</td></tr>
<tr><td>漏电流
Leakage current</td><td>小于初始值
≤the initial specified value</td></tr>
</table></td></tr>
</table>

贮存 Shelf Life	保存期限：1 年，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：5 至 35℃；相对湿度：45 至 85%；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±2℃；相对湿度：60 至 70%；大气压力：86kpa 至 106kpa。 Storage life：1year，Unless otherwise specified, the standard range of atmospheric conditions for making measurements and tests are as follows. Ambient temperature: 5 to 35℃ Relative humidity: 45 to 85% Air pressure: 86kpa to 106kpa. If there may be doubt on the results, measurements shall be made within the following limits. Ambient temperature: 20±2℃ Relative humidity: 60 to 70% Air pressure: 86kpa to 106kpa.		
可焊性 Solderability	焊料槽温度为 235±5℃， 浸渍深度占整个引出线的 90%， 浸渍持续时间为 2 秒 Tank temperature ：235±5℃; lead wire; Impregnating depth:2s.	引出端的镀层良好，焊料自由流动，引出端湿润。 浸渍面积 90%以上附着焊锡 The lead wire is coated by tin and wet. At least 90% of Circumferential surface of the dipped portion of termination shall be covered with new solder	
耐溶剂性 Resisting Solvent	溶剂：异丙醇 Solvent :Isopropylalcohol 温度：20-25℃ 时 间 ：30±5s Temperature: 20-25℃ Time : 30±5s	外观：无显著异常 Appearance :No remarkable abnormality	
耐振性 Resistance to vibration	频率：10-55-10 Hz/分 Frequency :From 10 to 55 Hz and returnto 10 Hz,shall be transferred in 1Min 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.	无可见损伤和电解液漏出，且标志清晰 No visible damage; no leakage of electrolyte; marking legible	
		ΔC/C ≤±5%	
耐焊接热 Resistance to soldering heat	方法：焊料槽温度为 260±5℃，浸渍深度 6mm 浸渍持续时间为 10 秒。 Tank temperature:260±5℃; Impregnating depth:6mm; Impregnating time:10s.	无可见损伤 No visible damage	
		ΔC/C	≤±10%
		tg δ	≤初始规定值 Not more than specified value
		I	≤初始规定值 Not more than specified value

● 试验方法及要求 Tests

<table>
<tr><th>项目 Item</th><th>试验条件 Test Conditions</th><th>性能要求 Performance</th></tr>
<tr><td>端子强度
Terminal Strength</td><td>抗拉强度:
沿电容器端子引线方向施加拉力(如下表)，10±1秒
<table><tr><td>引线 直径Φ</td><td>0.45</td><td>0.5</td><td>0.6</td><td>0.8</td><td>1.0</td></tr><tr><td>拉力N</td><td colspan="2">5</td><td colspan="2">10</td><td>20</td></tr></table>Tensile strength of terminal: A static load(stated in the table above)shall be applied to theterminal in the axial direction and acting in a direction awayfromthe body for 10±1 sec..
端子抗弯强度:在电容器引线施加固定重力（如下表），然后，将电容体弯折 90°后回到原位，再向相反方向弯折 90°后回到原位。上述过程在5 秒内完成。
<table><tr><td>引线 直径Φ</td><td>0.45</td><td>0.5</td><td>0.6</td><td>0.8</td><td>1.0</td></tr><tr><td>拉力N</td><td colspan="2">2.5</td><td colspan="2">5</td><td>10</td></tr></table>Bending strength of terminal: Hang the specified dead weight(stated in the table above),then bend the body through 90°, return to the original position. Next bend it in opposite direction through 90° with the same speed,again return to the original position. Complete this operation in about 5 sec.</td><td>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 nointermittent contacts or open –or short –circuiting .There shall be no such mechanical damage etc.as terminal damage</td></tr>
<tr><td>压力释放
Pressure relief</td><td>直流试验 D.C. test 施加同额定电压相等的反电压。 Reversed polarity D.C. rated voltage shall be applied tothe capacitor.
注:
1. 试验开始 30 Min 后,防爆装置不动作时,停止试验。
2. 该规定适用于铝壳直径 6.3mm 以上的电容器.
Note:
1. When the pressure relief device does not open even 30 minafter commencement of this test, the test may be ended.
2. This requirement applies to capacitors with a diameter of 6.3mm or more</td><td>防爆装置释放时，无燃烧、无爆炸或铝壳和封口材料的分离。
The pressure relief device shall open in such a way asto avoid any danger of fire or explosion of Capacitorelements .</td></tr>
</table>

● 使用注意事项（固体电解质铝电解电容器）

设计方面的确认事项

1、禁止使用电路 固体电解质铝电解电容器（以下简称电容器）有可能因焊接时的热应力使其漏电流发生变化。请避免在对 漏电流敏感电路中使用。

①高电阻电压保持电路

②耦合电路

③时间常数电路

2 电路设计 请在确认以下内容的基础上进行电路设计。

①随着温度及频率的变化，电容器的电气特性会随之变化。请在确认这些变化之后进行电路的设计。

②当并联 2 个以上的电容器时，请在设计电路时考虑电流的平衡。

③当串联 2 个以上的电容器时，因加载电压存在差异，有可能加载过电压，请使用的时候另行咨询我们

④请勿在电容器的周围以及印刷配线板的背面安装发热部件。

3、极性 固体电解质铝电解电容器是具有极性的电容器。请不要加载反向电压或交流电压。如果安装时极性弄反 有可能导致电路在初始状态短路。

4、加载电压 请不要加载超过额定电压的电压，因为即使电容器只是一瞬间承受超过额定电压的电压，也会导致漏电 流增加和发生短路故障。请将和直流电压迭加的纹波电压峰值设定在额定电压以下。

5、纹波电流 请不要叠加超大电流（超过额定纹波电流的电流）。当过大的纹波电流叠加时，可能导致内部的发热量 增大，寿命缩短，发生短路故障等。

6、使用温度 如果在超出工作温度范围的环境下使用，会导致性能老化及发生故障，请在工作温度范围内使用。

7、充放电 请不要在反复急速充放电的电路中使用。如果使用在反复急速充放电的电路中，可能导致静电容量减少 及电容器因内部发热损坏等。当高峰电流值超过了 20A 时，为了保持信赖性，建议使用保护电路。

8、漏电流 有时候漏电流会上升，但如果在工作温度内加载电压，则会通过利用自我修复作用逐渐减少。此外，此 时的漏电流减少的速度，越接近工作上限温度及额定电压就越快。 漏电流上升的原因如下： ①焊接

②高温无负载、高温高湿、温度急剧变化等试验

9、故障及寿命

（1）故障模式

①产品温度上升引起的静电容量减少及 ESR 的上升引起的开放模式磨损是主要的故障模式。

②由于加载超过额定电压的电压引起短路和通电电流过大的时候，会因内压的上升而使得

●通过降低周围温度、纹波电流、加载电压可以减少故障率。

●设置保护电路、保护装置，确保设备安全。

◆Attention before using One、Confirm before design

1、Can not be used in below circuits Conductive polymer aluminum solid electrolytic capacitors(Hereinafter called capacitor) is possible to lead its leakage current to be changed by the thermal stress while soldering. Therefore, please do not use capacitor in a circuit with sensitive leakage current.

① Do not use capacitor in a high resistance and high voltage keeping circuit.

② Do not use capacitor in a coupling circuit.

③ Do not use capacitor in a time constant circuit.

2、Circuit design Please confirm below contents before design a circuit.

① Before design a circuit, please note that characteristics of capacitor will be changed along with the change of temperature and freqency.

② Please consider the current balance when 2 or more capacitors have to be paralleled in a circuit.

③ Please connect us while 2 or more capacitors are series in circuit as it's possible that overvoltage would be applied

④ Please do not assemble heat generation components around the capacitor or at the back side of PCB.

3、Polarity Conductive Polymer Aluminum Solid Electrolytic Capacitor is with polarity. Please do not apply a reverse voltage or current. Short-circuit will happen to the capacitor if assemble in a reverse polarity.

4、Load a voltage Please do not load an over rated voltage as even just for a while, it will cause leakage current increasing and of short-circuit. Please set a peak value of ripple voltage which added DC voltage under the rated voltage.

5、Ripple current Please do not load an overcurrent(a current over rated ripple current). While an over ripple current is applied, which will make heat amount inside of capacitor larger, life shorter, short-circuit happened, etc.

6、Working temperture Function aging and failure does happen if use capacitor in an ambient temperature over rated working temperature. Please use capacitor in the range of working temperature.

7、Charge and discharge Please do not use capacitor in a repeated rapid charging and discharging circuit. If use it in a repeated rapid charging and discharging circuit it will cause capacitance reduction or inside failure by heat generation. If peak current is over 20A，Protection Circuit application is suggested in order to keep its reliability.

8、Leakage current Leakage current will increase sometimes，but which will decrease due to restoring itself with application of voltage at the working temperature. Besides, reduction speed of leakage current will be faster and faster while closer to upper limited temperature rated voltage. The reason why leakage current increase is below:

① Soldering

②High temperature without load 、High humidity and temperature 、Temperature change shirply and test ect.

9、Failure and Life

Failure Mode

① Capacitance reduction by temperature increasing and open model failure by ESR increasing are the major failure mode.

② While an over rated voltage or overcurrent is applied, that lead inner pressure increasing. It need

● to cut down its failure rate by reduce the ambient temperature, ripple current or loading voltage.

● to assure safety of equipment by setting protective circuit or device.

一、寿命推算

*Lx = Lo*10^((To-Tx) /20)*

Lx：在实际使用条件中推算的寿命(小时)

Lo：工作在额定工作电压和最高工作温度下的寿命（小时）

To：电容最高工作温度（℃）

Tx：实际使用时的周围温度（℃）

※ 推算壽命以 15 年為上限，超過 15 年的以 15 年計之

二、电容器的绝缘

电容器的外壳和阴极端子及阳极端子和电路型板之间请进行电气绝缘。

11、电容器的使用环境

电容器请不要在以下环境中是使用。

①直接溅水，盐水及油，或者结露状态的环境

②阳光直接照射的环境

③充满有害气体（硫化氢、亚硫酸、亚硝酸、氯及其化合物、溴及其化合物、氨等）环境

④臭氧、紫外线及放射线照射的环境

⑤振动或冲击条件超过产品目录或规格说明规定范围的过激环境

三、电容器的配置

①请将电容器的端子间隔和印刷配线板的孔间隔对准。

②请不要在电容器的封口部下面进行电路配线。如果电容器附件配线，请确保线路间隔在 1mm(可以的话 2mm)以上。

③两面印刷配线板上安装电容器时，设计时应注意电容器下方不可有多余的基板孔或表里连接用贯通孔。

④两面印刷配线板上装配电容器时，电容器主体的安装部位不可有配线线路。

四、安装

1、组装时

①已经成套组装并通过电的电容器请勿再次使用。

②电容器内可能产生再生电压。此时，请通过 1KΩ左右的电阻进行放电。

③在超过常温 35℃、湿度 75%RH 的条件下，超过产品目录或规格说明书的规定期限进行长期保管时，电容器的

漏电流有可能增大。此时，请通过 1KΩ左右的电阻放电后使用。

④安装前请确认电容器的规格（静电容量及额定电压）

⑤安装前清确认电容器的极性。

⑥请勿使用跌落到地板等上的电容器。

⑦安装时请勿使电容器变形。

⑧请确认电容器的端子间隔和印刷配线板孔间隔是否对准后，再进行安装。

⑨请不要在电容器上施加过大机械强度的力。

如果在电容器上施加过强的力，电极端子会折断或变形，从而影响到安装。此外，还有可能导致短路、断线、漏电流增大和外包装破损等。自动装配机在对准吸附安装位置以及切断引线时也有坑内产生应力，请注意它的冲击力。

2、焊接时的焊接耐热

（1）电铬铁焊接

焊接时，其焊接时间和焊接温度不应超过 10 秒钟及 260 摄氏度。注意不要将焊锡附在端子以外的电容器表面上；

电烙铁等高温发热装置应与电解电容器塑料外壳保持适当的距离，以防止过热造成塑料破裂。

（1）Lifetime Estimation

*Lx = Lo*10^((To-Tx) /20)*

Lx : Estimated life time at operating temperature

Lo :Expected life period (hrs) at maximum operating temperature allowed

To : Maximum operating temperature (℃)

Tx : Actual ambient temperature (℃)

※ The estimated life is limited to 15 years, if it exceeds 15 years，take 15 years as standard.

2、Insulation to Capacitor

Electrical insulation should be made between case and negative terminal, positive terminal and PCB.

11、Using environment of capacitor

Do not use capacitor in below environment

①Under the environment of splash water directly,salt water and oil .

② an environment will be exposed to direct sunlight

③ an environment with hazardous gas or fumes (such as H2S、H2SO3、HNO2、Cl & chloride、Br & bromide、NH3、etc）

④ an environment with O3 ,ultraviolet ray and radiation exposure

⑤ an environment with serious shake or shock condition over specified range in catalogue.

12、Circuit route design concerning capacitor on PCB

① Distance between terminals of capacitor must fit distance between holes on PCB.

② Please do not design a circuit route through the capacitor covering area on PCB. If it is necessary, please keep space to be 1mm（2mm if possible）or more.

③ If capacitor will be assembled onto a double-layer PCB, please note that hole should not be in the capacitor covering area on the PCB. Connection should be with Through Hole.

④ If capacitor will be assembled onto a double-layer PCB, circuit route can not go through the capacitor cover area on PCB.

Two、Assembly

1、Assembly

① Please do not use a capacitor which had been ever assembled and charged before.

② Inside capacitor may regenerate electricity. Please discharge it with a 1KΩ resistor.

③ Storage in a environment over 35℃ and 75%RH for a long time over the term specified in catalogue or datasheet, static electricity maybe generate inside capacitor. Please use it after discharged with a 1KΩ resistor.

④ Please confirm the specification of capacitor（capacitance and rated voltage) before assembly.

⑤ Please confirm the polarity of capacitor before assembly.

⑥ Please do not use a capacitor which ever dropped on the floor.

⑦ Please do not deform capacitor during assembly.

⑧ Please confirm distance between terminals of capacitor if fit the distance between holes on PCB before assembly.

⑨ Please do not apply an over physical stress during assembly.

If not, over physical stess will make terminals to be broken or deformed as well as make capacitor to be short-circuit, connection broken, leakge current increasing, sleeving damaged,etc.

Please be careful the assembling stress during assembling in auto-assembly machine.

2、Soldering heat resistance

（1）Soldering with iron probe

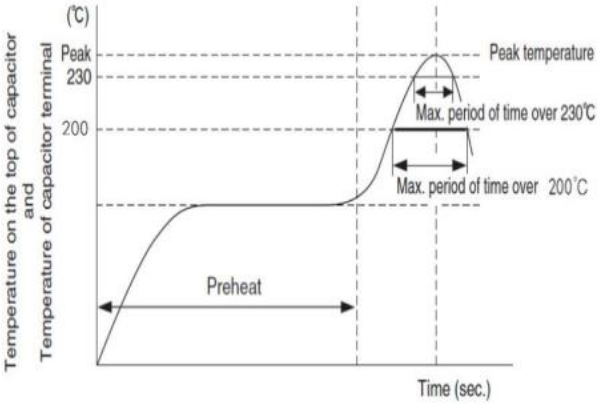
During soldering, time and temperature can not exceed 10 seconds and 260℃，as well as soldering tin can not adhere onto any part of capactor furface except terminals. Heat generating devices such as Soldering Iron are kept away from plastic sleeving of capacitor. If not, over heat will crack it

（2）Flow soldering（not suitable for SMD parts）

Please follow below flow soldering conditions

Step	Temperature	time	times
Preheat	under 120℃	< 120 sec	1
Solder	260±5℃	< 10 sec	1 or 2

（3）Reflow soldering (for SMD parts only)



Voltage range(Vd	Preheat	Time maintained above 200℃	Time maintained above 230℃	Peak temp.	Reflow number
2.5 to 10V	150 to 180℃120 sec. max.	90 sec. max.	50 sec. max.	260℃max.	1-ocnylcyle
				250℃max.	2-cycles allowed
12 to 25V		90 sec. max.	50 sec. max.	240℃max.	1-ocnylcyle
		80 sec. max.	40 sec. max.	240℃max.	2-cycles allowed
Note:The sencond reflow soldering shall be applied after the temperature of capacitors decreases down to the room temperature.					

3、After soldering Can not withstand a physical stress that：make capacitor fall down,turn around or make it touch PCB or other components on PCB.

4、PDB cleaning after soldering：

cleaning agent	method of cleaning
Pine Alpha ST-100S	Clean by immersion and ultrasonic, as well as the temperature of the cleaning agent shall be lower than 60℃ 。 Cleaning time should be within 5 minutes. After cleaning, PCB with capacitors should be dried with hot air for 10 minutes. (Temperature of hot air shoud be under the specified max temperature of the
Clean Through 750H	
IPA	
Aqua Cleaner 210SEP	

（1）Cleaning agent for capacitors should not contain any Alkali solvent,petroleum,base solvents, xylene,acetone.
（2）In order to protect the environment，the solvents should be serious management (such as conductivity, PH, special gravity and water contents).
（3）According to the different way of cleaning, maybe cause a blur of the marking.
5、Please confirm using adhesives and coating materials as follow：
（1）Do not use halogenated adhesives and coating matericials to fix capacitors.
（2）Flux between the supface of the PCB and sealing of Capacitors should be clean before using adhesives and coating materials.
（3）Please clean remains of agent and dry PCB before using adhesives and coating materials.
（4）Do not cover up all of the sealing area of the capacitors before using adhesives or coating materials.
6、Fumigation
While import or export electronic equipments, sometimes it need to do fumigation with halide such as Methyl Bromide.
If capacitor is touched by halide such as Methyl Bromide during which. That maybe lead corrosive reaction caused by halide ion just like 【PCB cleaning】
Our capacitors are packed without fumigation during import and export. Customers: please pay attention to the fumigation, final packing while import and export electronic equipments.
(During fumigation, there is risk that halide ion will go inside even packed with paper carton, plastic, etc.)
Three、Maintenance and checking
1、Please regularly check capacitors inside industrial equipment. Before doing maintenance and checking to capacitors,
please turn off the power and discharge capacitors. Please confirm polarity of multimeter while checking capacitor with it.
2、Please check capacitor based on below:
① Obvious abnormal appearance or not.
② Electrical characteristics (Capacitance、Dissipation Factor、Leakage current)and product catalogue.
If abnormal was found, please replace it by a new one with the same specification.

四、紧急情况
1、设备使用时，当电容器产生了气体，短路引起了燃烧，或者产生恶臭和发出烟雾时，请切断设备的主电源，或者从插座上拔了电源线的插头。
2、当电容器异常或者燃烧时，有可能外包装树脂等燃烧和分解产生气体。因此，请不要将脸和手靠近。当喷出的气体进入眼睛，或吸入的时候，请马上用水洗眼、漱口。当粘附在皮肤上时，请用肥皂冲洗。
五、保管
请按照以下保管条件保管电容器。
1、不可将电容器保管在高温、高湿环境下。请保管在室温 5～35℃、湿度 75%以下的环境。
保管期限请参照下表。

Items	拆包前	拆包后
SMD 品（贴片型）	制作后 2 年内	自拆封日起 1 个月内
引线型	制作后 2 年内	——

2、请不要将电容器保管在溅水、盐水及油的环境下。
3、请不要将电容器保管在充满有害气体（硫化氢、亚硫酸、压硝酸、氯及其化合物、溴及其化合物、溴化甲烷等卤素化合物、氨等）环境下。
4、请不要将电容器保管在臭氧、紫外线及放射线照射的环境下。
5、请尽可能包装好保管。
五、废弃处理
请交给专业的工业废弃物处理厂进行处理。

六、有害物质限用指令（RoHS）

我司产品符合欧盟对有害物质限用之规定。

铅（Pb）	≤1000ppm
汞（Hg）	≤1000ppm
镉（Cd）	≤100ppm
铬（Cr）	≤1000ppm
多溴化联苯（PBBs）	≤1000ppm
多溴联苯醚（PBDEs）	≤1000ppm

无卤声明

我司产品符合下列卤素含量限制

溴（Br）	900ppm
氯（CL）	900ppm
氯（CL）	1500ppm

Four、Emergency

1、If capacitor generated gas,smell, smoke or got burning from short-circuit, please turn off the main power source or pull out the plug from the electric outlet. 2、Do not bring your face or hands near the emitting gas from capacitor when sealing rosin of an abnormal capacitor was burning or decomposing. If the gas gets into your eyes or you breathe the gas, please flush your eyes or rinse your mouth and throat with clean water immediately. If the gas splash onto your skin, please wash it away with soap and water immediately.

Five、Storage

Please store capacitors according to below conditions: 1、Indoor storage at a place with ambient temperature of 5℃ to 35℃, and relative humidity lower than 75%. Storage terms:

Storage terms:

Item	Before unpack	After unpack
SMD Type	SMD Type	within 1 months since unpack
Radial type	Within 2 years after production	----------

2、Pls don't keep it under the environment of jawp ,salt water and oil.

3、Please do not store capacitor in an environment with hazardous gas or fumes (such as H2S、H2SO3、HNO2、Cl & chloride、Br & bromide、NH3、etc）

4、Please do not store capacitor in an environment with O3 ,ultraviolet ray and radiation exposure

5、Please keep its package as good as possible.

Six、Scrap

Send them to the industrial waste processing plant.

Ssven、Restriction of Hazardous Substance Direcive（RoHS）

Our products are RoHS compliant.

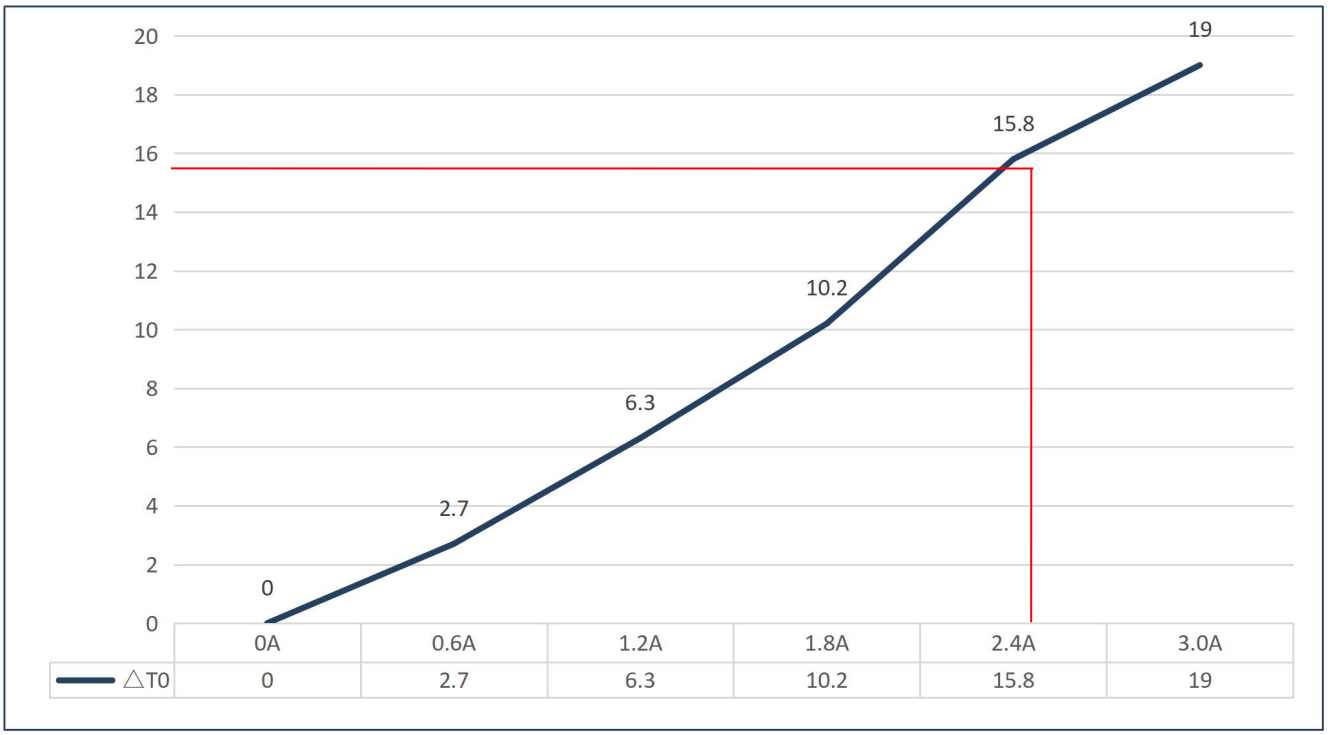
（Pb）	≤1000ppm
（Hg）	≤1000ppm
（Cd）	≤100ppm
（Cr）	≤1000ppm
（PBBs）	≤1000ppm
（PBDEs）	≤1000ppm

Halogen-free Statement

Our products are below halogen content limit compliant.

（Br）	900PPM
（Br）	900PPM
（Br）	1500PPM

紋波溫升曲線圖									
特性	CAP(uF): ①215 ②216 DF(%): ① 0.024 ② 0.027 ESR(mΩ): ①17.3 ②17.8 LC(uA): ①12 ②16								
试验条件	Freq =100KHz Temp =105℃								
RC(A)	Vdc+Vac(Rms）	△T0(表面溫升)							
		△T	=	電容溫度	-	環境溫度	=	溫升	单位
0.6A		△T0	=	107.7	-	105	=	2.7	℃
1.2A		△T0	=	111.6	-	105.3	=	6.3	℃
1.8A		△T0	=	116	-	105.8	=	10.2	℃
2.4A		△T0	=	120.8	-	105	=	15.8	℃



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