

承 認 書

SPECIFICATION

客 戶: (Customer)	华秋
品 名: (Product Name)	铝电解电容器
规 格: (Specifications)	LHS 500V120 μ F D25*35MM
日 期: (Date)	2023 年 5 月 11 日

供應商簽署欄 Supplier confirmation		
PREPARED BY	CHECKED BY	APPROVED BY
		

客戶確認簽署欄 Customer confirmation

珠海華冠電容器股份有限公司

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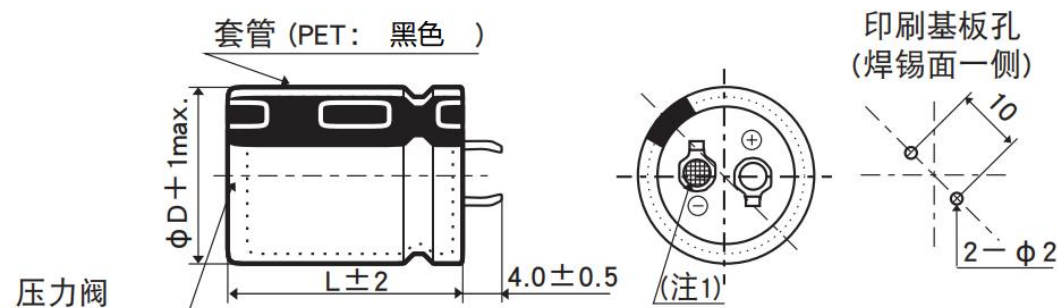
华冠电容规格承认书目录

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1、 Standard Rating 基本参数

●端子代码: LP ($\phi 22 \sim \phi 35$): 标准品



(注1) 阴极端子的铆钉部网眼刻印。 单位 Unit : mm

No.	Customer Part No.	LEAGUER Part No.	Capacitance (μF)	Tolerance on Rated Capacitance (%)	Rated Voltage (Vdc)	Surge Voltage (Vdc)	Operating Temp. Range ($^{\circ}\text{C}$)	$\tan\delta$ (120Hz) (Max)	Leakage Current (μA)(5min.)	Max Ripple Current (A) at 105 $^{\circ}\text{C}$ 120Hz	Endurance at 105 $^{\circ}\text{C}$ (Hours)	Dimensions (mm)	
												ϕD	L
1		LHS2H121MD035LP	120	± 20	500	550	-25~+105	0.20	734.8	0.72	2000	25	35

2、CONDITION OF TEST 测试环境

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：15℃~35℃

相对湿度：45%~75%

大气压力：86kpa~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±1℃

相对湿度：60%~67%

大气压力：86kpa~106kpa

Unless otherwise specified, the standard range of atmospheric conditions for making measurements and tests are as follows

Ambient temperature : 15℃ to 35℃

Relative humidity : 45% to 75%

Air pressure : 86kpa to 106kpa

If there may be doubt on the results, measurements shall be made within the following limits

Ambient temperature : 20±1℃

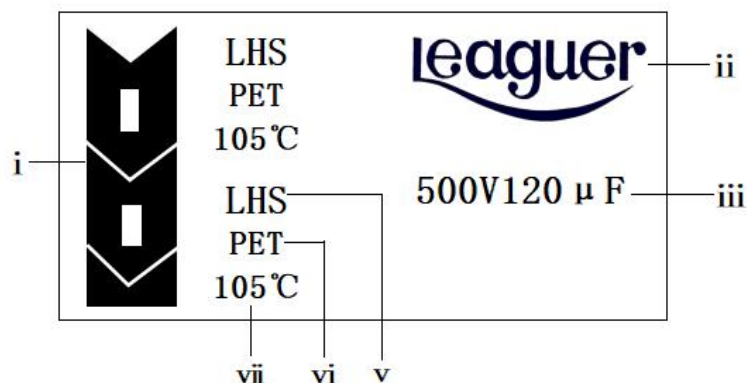
Relative humidity : 60% to 67%

Air pressure : 86kpa to 106kpa

3、Marking 标示

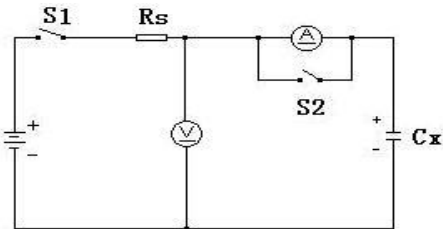
Following items shall be marked on the sleeving; Sleeve color: Black; Marking color: White.

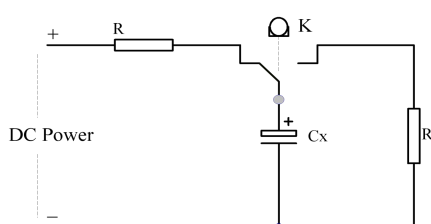
电容器的套管上印刷以下内容;套管颜色：黑色；标记颜色：白色。



- | | | |
|-------|-------------------------------|----------|
| i . | Negative Polarity | 负极标示 |
| ii . | LEAGUER | 商标 |
| iii . | Rated Voltage and Capacitance | 额定电压&容量 |
| iv . | Negative Polarity | 负极端子标识 |
| v . | Series | 系列代码 |
| vi . | PET | 套管材质标识 |
| vii . | 105℃ | 产品使用上限温度 |

4、Electrical Requirements 电性能要求

序号 No.	项目 Item	测试方法 Test method	性能 Performance																	
4.1	额定工作电压 Rated voltage		16V.DC~550V.DC																	
4.2	电容量 Capacitance	测试频率: 120Hz(±20%) 测试电路: 串联等效 测试电压: 0.5Vrms 以下 Measuring frequency: 120Hz±20% Measuring circuit : Series equivalent circuit Measuring voltage : 0.5Vrms or less	容量范围: 68 μ F ~47000 μ F 容量偏差: -20%~+20% Range of Capacitance: 68 μ F ~47000 μ F Capacitance tolerance: -20%~+20%																	
4.3	损失角正切值 Dissipation factor	测试条件与 4.2 电容量测试相同 Testing conditions are the same as 6.2 for capacitance																		
		W.V	16	25	35	50	63~100	160~250	400~550											
		Tg δ	0.50	0.40	0.35	0.30	0.20	0.15	0.20											
4.4	漏电流 Leakage current	在电容器两端施加额定工作电压, 并串联 1000±100 Ω 电阻, 在施加规定时间电压后, 测量漏电流。 测试电路如下图: The rated voltage shall be applied across the capacitor and its protective resistor shall be 1000±100 Ω . The leakage current shall then be measured after an electrification period of schedule time. Measurement circuit  Rs: Protective resistor(1000±100 Ω) DC ammeter DC voltmeter S1: Switch S2: Protective switch for an ammeter	16V~550V: $I\leq 3 \sqrt{CV}$ (5 分钟后) 16V~550V: $I\leq 3 \sqrt{CV}$ (after 5 min) I: 漏电流 (μ A) C: 容量 (μ F) V: 额定工作电压 (V) I: Leakage current(μ A) C: Capacitance(μ F) V: Rated voltage (V)																	
4.5	低温特性 Low Temperature Characteristics (at 120Hz)	<table><tr><td>WV</td><td>16~100</td><td>160~250</td><td>315~550</td></tr><tr><td>Z_{-25℃}/ Z_{+20℃}</td><td>4</td><td>4</td><td>8</td></tr><tr><td>Z_{-40℃}/ Z_{+20℃}</td><td>10</td><td>-</td><td>-</td></tr></table>							WV	16~100	160~250	315~550	Z _{-25℃} / Z _{+20℃}	4	4	8	Z _{-40℃} / Z _{+20℃}	10	-	-
WV	16~100	160~250	315~550																	
Z _{-25℃} / Z _{+20℃}	4	4	8																	
Z _{-40℃} / Z _{+20℃}	10	-	-																	

序号 No.	项目 Item	测试方法 Test method			性能 Performance
4.6	Characteristics at High and Low Temperature 高低温特性	Step	Test Temperature	Time	阶段 2 阻抗比：相对于阶段 1 比值小于 4.5 中的值 Step2 Impedance ratio: relative to Step2, the ratio is less than the value in 4.5 阶段 4 漏电流：小于或等于规定值的 5 倍 Step4 Leakage Current : Less than 500% of the specified value
		1	20±2℃	-	
		2	-25±3℃	2 hours	
		3	20±2℃	15min	
		4	105±2℃	2 hours	
阶段 1：测量容量和阻抗（ z 20℃ 120Hz±20%） 阶段 2：电容器恒温贮存 2 小时，在热平衡状态测阻抗（ z -25℃ 120Hz±20%） 阶段 4：电容器恒温贮存 2 小时，在热平衡状态测漏电流 Step 1:Capacitance and impedance shall be measured. （ z 20℃ 120Hz±20%） Step 2:After the capacitor being stored for 2 hours, impedance shall be measured at thermal stability. （ z -25℃ 120Hz±20%） Step 4:After the capacitor being stored for 105℃ 2 hours, leakage current shall be measured. The measurement shall be made at thermal stability					
4.7	耐浪涌电压 Surge Test	对电容器施加浪涌电压，每充电 30s，放电 5min30sec，连续循环 1000 次后测量。 测试温度：15~35℃。 After surge voltage(the value of page 2) applied at a cycling rate of 30 seconds charge and 5.5 minutes discharge 1000 successive test cycle. Test temperature:15~35℃.			漏电流：≤第 2 页规定值 Leakage Current : Less than the specified value of page 2 容量变化：与初始测量值比变化率 ±15%范围内 Capacitance Change : Within ±15% of the initial measured value 损耗角正切值：规定值的 130%。 Tangent of Loss Angle : Less than 130% of specified value
		Test circuit  Note: This requirement is applicable only to instantaneous over voltage which may be applied to terminals of capacitor, therefore, not applicable to such over voltages as often applied.			
4.8	可焊性 Solderability	温度： 230±2℃ 浸入时间： 2±0.5sec 助焊剂：约 25%的松香溶于酒精 Temperature : 230±2℃ Immersing Time: 2±0.5sec Flux: Approx. 25% rosin in Ethanol			引线端子表面 90%以上的面积附着新焊料。 More than 90% of the terminal surface shall be covered with new solder.

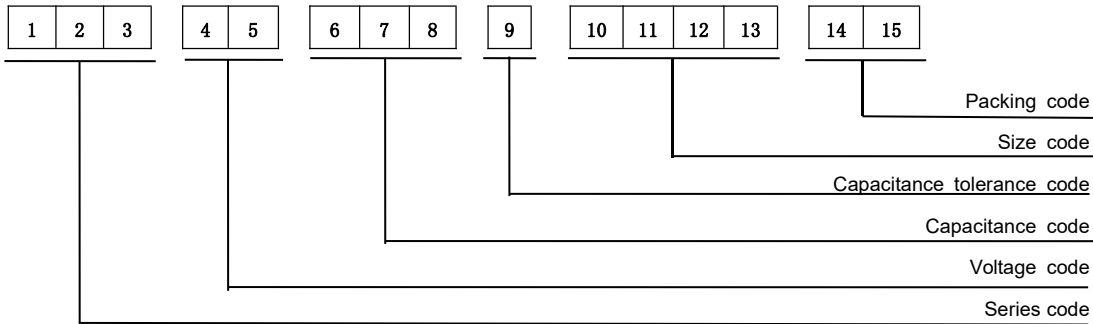
序号 No.	项目 Item	测试方法 Test method	性能 Performance
4.9	振动 Vibration	频率：10 到 55 Hz，每分钟互换 振幅：0.75mm 在互相垂直的 3 个方向上，每个方向振动 2 小时，共 6 小时。 Frequency: 10~55Hz reciprocation for 1 min Total amplitudes: 0.75mm Direction and during of vibration: 3 orthogonal directions, Mutually each for 2hrs total 6hrs	容量：在测试的 30 分钟内，电容量测试值无明显变化 外观：无可见损伤 容量变化：容量变化率在 $\pm 10\%$ 范围内 Capacitance : Within 30 minutes of the test, the capacitance test value has no obvious change Appearance: No significant change can be observe Capacitance change : Within $\pm 10\%$ of initial measured value
4.10	耐焊接热 Resistance to soldering heat	焊槽法：Solder bath method: 焊锡温度： $260 \pm 5^\circ\text{C}$ Solder bath temperature : $260 \pm 5^\circ\text{C}$ 浸入时间： 10 ± 1 秒 Immersion time : 10 ± 1 sec. 电路板 : 1.6mm Printed wiring board: 1.6mm	外观：无可见损伤 容量变化：容量变化率在 $\pm 10\%$ 范围内 Appearance: No significant change can be observe Capacitance change : Within $\pm 10\%$ of initial measured value
4.11	稳态湿热 Resistance to damp heat (steady state)	电容器放置在温度 60°C 、湿度 90~95% 的环境下 500 ± 6 小时，然后放置在标准环境中恢复 1-2 小时 Capacitors shall be exposed for 500 ± 6 hrs in an atmosphere of 90~95% R.H. at 60°C . And then the capacitor shall be subjected to standard atmospheric conditions for 1-2 hours, after which measurements shall be made.	容量变化：与初始测量值比变化率在 $\pm 20\%$ 范围内。 损耗角正切值： $\leq$ 规定值的 1.5 倍 漏电流： $\leq$ 规定值 外观：无可见损伤 Capacitance Change: Within $\pm 20\%$ of the initial measured value Tangent of Loss Angle : Less than 150% of the specified value Leakage Current : Less than the specified value Appearance : No significant change can be observed.
4.12	高温负荷寿命 High Temperature Unload Life Test	温度： $105 \pm 2^\circ\text{C}$ 试验持续时间：2000 小时。 施加电压：额定电压 试验完成后，电容器在测量前应在室温中恢复 16 小时。 Test Duration: 2000hours。 Applied Voltage: Rated Voltage After subjected to the test, the capacitors shall be left at the room temperature for 16 hours prior to the measurement.	容量变化：与初始测量值比变化率在 $\pm 20\%$ 范围内。 损耗角正切值： $\leq$ 规定值的 2 倍 漏电流： $\leq$ 规定值 外观：无可见损伤 Capacitance Change: Within $\pm 20\%$ of the initial measured value Tangent of Loss Angle : Less than 200% of the specified value Leakage Current : Less than the specified value Appearance: No significant change can be observed.

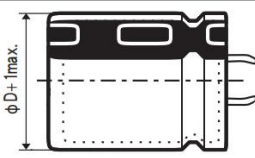
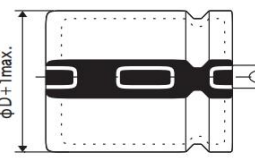
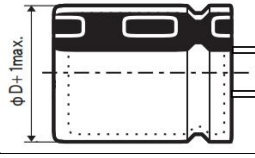
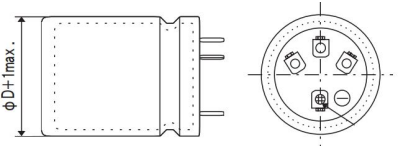
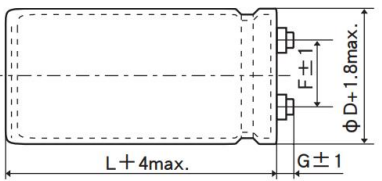
序号 No.	项目 Item	测试方法 Test method	性能 Performance
4.13	高温储存 High Temperature Unload Life Test	温度: $105\pm 2^{\circ}\text{C}$ 试验持续时间: 1000 小时 试验完成后, 电容器在测量前应在室温中恢复 16 小时。 Test Temperature: $105\pm 2^{\circ}\text{C}$ Test Duration: 1000 hours After subjected to the test, the capacitors shall be left at the room temperature for 16 hours prior to the measurement.	容量变化:与初始测量值比变化率在 $\pm 20\%$ 范围内。 损耗角正切值 : $\leq$ 规定值的 2 倍 漏电流 : $\leq$ 规定值的 2 倍 外观:无可见损伤 Capacitance Change: Within $\pm 30\%$ of the initial measured value Tangent of Loss Angle : Less than 200% of the specified value Leakage Current : Less than 200% of the specified value Appearance: No significant change can be observed.
4.14	防爆试验 Safety vent	在电容器两极施加反向工作电压, 其中通过的电流为 1 A, 在测试时防爆装置应能在 30 分钟内动作。 The capacitor shall be subjected to a reverse D.C. voltage equal to the rated D.C.voltage. The current flowing through the capacitor shall be 1A. If the vent does work with the voltage applied for 30 minutes, the test is considered to be passed.	上述过程中应无引线、铝箔等散射, 无火花产生。 The safety vent is actuated under the test conditions, thereby preventing terminals, metal pieces, etc, of the capacitor from scattering due to burst, the case from separating from the seal packing, or the capacitor from producing flame.

■ 额定纹波电流频率系数 Coefficient of Frequency for Rated Ripple Current

Frequency Rated Voltage	120Hz	1KHz	10KHz	100KHz
$\leq 100\text{V}$	1.00	1.13	1.19	1.20
160~250V	1.00	1.32	1.45	1.50
$\geq 315\text{V}$	1.00	1.30	1.41	1.43

5、PART NO SYSTEM 物料编码



1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
Series code			Voltage (V)	Code	Capacitance (μF)		Code	Tol.(%)	Code	Size		Code	Packing		Code
LHS			16	1C	39		390	±5%	J	22×20		C020			LP
LHA			25	1E	47		470	±10%	K	22×25		C025			
LHK			35	1V	56		560	±15%	Y	22×30		C030			
LHL			50	1H	68		680	±20%	M	22×35		C035			
LHM			63	1J	100		101	-10~-30%	Q	22×40		C040			LT
FTT			80	1K	220		221	Others	T	22×45		C045			
FTH			100	2A	330		331			22×50		C050			LG
			160	2C	470		471			25×25		D025			
			180	2J	680		681			25×30		D030			
			200	2D	1000		102			25×35		D035			
			220	2P	2200		222			25×40		D040			LF
			250	2E	3300		332			25×45		D045			
			315	2F	4700		472			25×50		D050			
			330	2U	6800		682			30×25		E025			
			350	2V	10000		103			30×30		E030			SW
			400	2G	22000		223			30×35		E035			
			420	2M	33000		333			30×40		E040			
			450	2W	47000		473			30×45		E045			
			500	2H						30×50		E050			
			550	2J						35×25		F025			
										35×30		F030			
										35×35		F035			
										35×40		F040			
										35×45		F045			
										35×50		F050			

6. Storage and Shipment 储存与运输

6.1 储存: 铝电解电容器应贮存于阴凉通风、清洁、干燥的库房内, 空气中不得有腐蚀气体和环境中微生物污染, 不得接触有机溶剂。

Storage: The aluminum electrolytic capacitor should be stored in a shady and cool, clean and dried. Storeroom, And the air can not have corrosion gas and environment microbial contamination, may not touch the organic solvent.

6.2 运输: 包装好的产品均能承受汽车、火车、轮船和飞机等运输工具的不利因素。运输时, 应注意防水和机械损伤。运输中应防止雨雪淋袭和强烈震动。不得与有毒害、有异味、有腐蚀性物品混装。搬运时小心轻放, 避免包装箱损伤破裂。

Shipment: For packaged products should can be endured all kinds of transport factors such as cars, trains, ships and planes. Please pay attention to avoid waterproof and mechanical damage issues in transporation. It also should prevent the rain and snow shower and strong vibration attacks in transit. May not have a poisonous and peculiar smell, corrosive goods mixed packing. Handling should be carefully handled and avoid injury package burst.

7. Packing 包装

7.1 包装箱尺寸及数量 (Dimension and qty of packing container)

产品尺寸 (直径 mm) Dimension(parameter/mm)	$\phi 22 \sim \phi 25$	$\phi 30 \sim \phi 35$
每箱数量(PCS) Qty/ctn	340	208

7.2 铝电解电容器的外包装箱上应清晰标出:

The outer carton of aluminum electrolytic capacitor should be marked clearly for the following:

- A. 产品型号 Series
- B. 规格: 标称电容量、容量允许偏差、额定电压
Specification : Capacitance, Capacitance Tolerance, Rated Voltage
- C. 产品尺寸 Dimension
- D. 生产批号 Production lot#
- E. 数量 Qty
- F. 客户料号(客户有要求时) Clients part# (When it's needed)
- G. 客户订单号(客户有要求时) Clients order# (When it's needed)

8、OTHER REMARKS 其它说明

8.1 铝电解电容器使用注意事项 IMPORTANT INFORMATION ON THE APPLICATION OF ALUMINUM ELECTROLYTIC CAPACITORS

(1)直流铝电解电容器应按正确的极性使用 DC aluminum electrolytic capacitors are normally polarized

当直流铝电解电容器按反极性接入电路时，电容器会导致电子线路短路，由此产生的电流会引致电容器损坏。若电路中有可能在负引线施加正电压，请选无极性产品。

When reverse voltage is applied on DC aluminum electrolytic capacitor ,the circuit will be short out and the capacitor will be damaged due to abnormal current flows through the capacitor. Please use non- polar types of capacitors when the positive voltage is applied on the cathode terminal.

(2)在额定工作电压以下使用 Use capacitor within rated voltage

当电容器上所施加电压高于额定工作电压时，电容器的漏电流将上升，其电气特性将在短时期内劣化直至损坏。请注意电压峰值勿超出额定工作电压。

When capacitor is used at higher voltage than the rated voltage, leakage current may increase and characteristics may be drastically deteriorated and damaged in a short period. Please take extra caution that the peak voltage should not exceed the rated voltage.

(3)作快速充放电使用 Sudden charge and discharge

当常规电容器被用作快速充电用途,其使用寿命可能会因为容量下降,温度急剧上升等而缩减。

When aluminum electrolytic capacitors for general purpose-use are employed in rapid charge and discharge application, its life expectancy may be shortened resulted from capacitance decrease, heat rise, etc.

(4)电容器贮存 Storage of the capacitor

①请保管在室温 5~35℃，湿度 75%以下的环境。

we recommend the following conditions for storage: Ambient temperature: 5~35℃ ,Ambient humidity: <75%RH;

(a)产品储存期限: ≤12 个月; Storage life: ≤ 12 months;

(b) 产品储存期限>12 个月时，需充电后再使用;

If storage life >12 months, the products need to be charged again before using;

(c) 存放时间超过 2 年的电解电容器应报废处理;

If Storage time > two years, the products need to be discarded;

(5)施加纹波电流应小于额定值 Use capacitor within rated ripple current

施加纹波电流超过额定值后，会导致电容器体过热，容量下降，寿命缩短。所施加纹波电压的峰值应小于额定工作电压。

If excessive ripple current is applied on the capacitor, which will result in generating excessive heat inside, reducing capacitance and shortening life of capacitor. Therefore the peak value of the ripple voltage should be less than the rated value.

(6)使用环境温度 Ambient temperature

铝电解电容器的使用寿命会受到环境温度的影响。据科学统计，使用环境温度下降 10℃其使用寿命增加 1 倍。

Life of aluminum electrolytic capacitor is affected by the ambient temperature. It is generally known that the life doubles for each 10℃ decrease in temperature.

(7)引出线强度 Tensile strength of lead wire

当拉力施加到电容器引出线，该拉力将作用于电容器内部，这可能导致电容器内部短路，开路或漏电流上升。在电容器焊装到电路板，请勿强烈摇动电容器。

When a strong force is applied to the lead wires or terminals, stress is put on the internal connections, which may result in short circuit, open circuit or leakage current increase. Therefore it is not advisable to bend or handle a capacitor after it has been soldered to the PC board.

(8) 焊接过程耐热性 Heat resistance at the soldering process

铝电解电容器装至电路板进行浸焊或波峰焊时，其塑料套管可能因焊接时间过长、温度过高而发生破裂或二次收缩。

During soldering process, secondary shrinkage or sleeve crack may occur when soldering temperature is too high or soldering time is too long.

(9) 电路板的安装孔孔距及安装位置 Hole pitch and position of PC board

电路板安装孔的设计应与产品说明书的引线脚距相一致，如果将电容器强行插入孔距不配套的电路板，那么会有应力作用于引出线，这可能导致短路或漏电流上升。

When designig a PC board , its hole pitch should be designed to coincide with the lead pitch (lead spacing) of the capacitor specified in the catalog or specifications. When a capacitor is forcibly inserted into an unmatched hole pitch, a force will put on the leads and which could result in a short circuit or increased leakage current.

(10) 关于焊接以后的清洗 Cleaning after soldering

① 电容器不能用卤化有机物系列的清洗剂进行清洗。如果必须进行清洗，请使用能够保证电容器质量的清洗剂。

The aluminum electrolytic capacitors should be free of halogenated solvents during board cleaning after soldering. Use solvent proof capacitors when halogenated solvents are used.

② 对于能够保证电容器质量的清洗剂，清洗后请不要在清洗溶液或者密封容器中保管。清洗后的电容器请和电路板一起在热风下干燥 10 分钟以上，热风的温度不可高于电容器规定上限温度。

After cleaned with the solvent which can guarantee the quality of capacitors, the capacitors should not be kept in solvent environments of non-ventilated places. Let the capacitors after cleaning dry with hot blast fully above 10mins and the temperature of hot blast should not be over than specified upper limit of that of capacitors.

(11) 关于固定剂以及镀层（涂层剂）Adhesives、fixative and coating materials(coating agent)

① 请不要使用含有卤化有机物系列的固定剂及镀层（涂层剂）。

Do not use halogenated adhesives and coating materials to fix aluminum electrolytic capacitors.

② 请不要让固定剂及镀层（涂层剂）将电容器封口部位（端子一侧）全部封住。

Do not cover up all the sealing area of capacitors with adhesives、fixative or coating materials (coating agent), make coverage only partial.

8.2 符合 RoHS RoHS compliance

符合欧盟 RoHS 的最新标准，若客户有特殊要求，按照双方签订的相关协议为准。

Completely in accordance with the latest standard of RoHS or relevant agreements reached by both parts if customer has special requirements.