

電解電容器使用上注意事項 1

使用電解電容器時，請注意下列事項：

電解電容器就如下列情形時，會引起特性的劣化

- ◎ 逆向電壓
- ◎ 使用電壓超出工作電壓
- ◎ 電流大於容許紋波電流
- ◎ 急劇的充放電

此時，引起激烈的發熱或氣體產生會從電容器的封口處漏液或者由於內部壓力的上升，造成安全裝置(防爆孔)啓動。最嚴重的是有可能引起爆發或火花產生，造成電容器損壞與可燃物飛散至外部。

1.回路設計應注意事項

(1) 使用環境，裝配環境與容許性能的確認

- ◎請確認使用環境及裝配環境之外，必須參照電容器的型錄和承認書的規定範圍使用。

(2) 使用溫度，紋波電流與壽命

- ◎使用溫度與容許紋波電流須參照型錄和承認書的規定，在電容器之額定性能範圍內使用。

I .使用溫度不可超出最高使用溫度。

II .紋波電流使用不可超過容許的紋波電流。

- ◎設計回路時，煩請選用適合機器本身壽命的電容器。

(3) 回路上的應用

- ◎電解電容器是有極性的，不可使用在逆向電壓與交流電壓，極性反轉的回路，請選用無極性電容器，但無極性電容器不可使用在交流回路上。

◎電容器也不要使用在會重複激烈的充放電回路上，如果必須使用在激烈的充放電回路上使用電容器，那必須另外再商討。

CAUTION FOR PROPER USE OF ALUMINUM ELECTROLYTIC CAPACITORS 1

Upon using Aluminum Electrolytic Capacitors, please pay attention to the points listed below.

When the following types of electrical loads indicated below are applied to Aluminum Electrolytic Capacitors, rapid deterioration of electrical property occurs:

- ◎ reverse voltage
- ◎ voltage exceeds rated working voltage
- ◎ rated ripple current is exceed
- ◎ severe charging/discharging

At such times, severe heat is generated, gas is emitted, then electrolyte leaks from the sealing area, and safety vent (pressure sensitive vent) operates due to internal pressure.

In the worst case, explosion or ignition may occur, and along with destruction of the capacitor combustibles may burst out.

1.CAUTION DURING CIRCUIT DESIGN

(1)OPERATIONAL ENVIRONMENT , MOUNTING ENVIRONMENT AND CONDITIOS.

◎Ensure that operational and mounting conditions Follow the specified conditions detailed in the catalog and specification sheets.

(2)OPERATING TEMPERATURE RIPPLE CURRENT AND LOAD LIFE

◎Operating temperature and applied ripple current should be within the specified value in the catalog or specification sheets.

I .Do not use aluminum electrolytic capacitors at temperature , which exceeds the specified category temperature range.

II .Do not apply excessive current to the capacityors , which exceeds the specified rated ripple current.

◎During circuit design, please ensure that capacitors are selected to match with the lifetime requirements of the application.

(3) APPLICATION

◎ Aluminum Electrolytic Capacitors are normally polarized.Reerse voltage or AC voltage should not be applied. When the polarity of applied voltage is uncertain or when the polarity may flip over, non-polar type capacitors should be used, but the non-polar type cannot be used for AC circuit.

◎ Standard Aluminum Electrolytic Capacitors are not suitable for rapid charge and discharge applications.Consult with HWA KAI about specially designed capacitors for rapid charge and discharge.

(4) 電壓應用

◎電容器使用的電壓不可超過額定的電壓。

(5) 電容器的絕緣

◎電解電容器在下列所提到的位置，回路上要完全隔離。

- I. 鋁殼，負極端子與正極端了在回路圖上排列。
- II. 自立型的輔助端子和其他的負極端子與正極端在回路圖上排列。

◎電解電容器標示用膠管並沒有絕緣保證，在必須有絕緣機能的位置，不要使用，但如有需要絕緣機能之膠管，即必須另外再商討。

(6) 使用環境之限制

◎請不要在下列環境使用電解電容器。

- I. 直接接觸到水，鹽水或油或結露狀態的環境。
- II. 充滿有害氣體的環境如硫化水素、亞硫酸、亞硝酸、氨、阿摩尼亞等。
- III. 臭氧、紫外線與放射線照射的地方。
- IV. 振動或衝擊條件超過承認書規定範圍之過分激烈環境。

(7) 裝配的環境設計

◎要把電容器裝設在電路板上前，請事先確認以下內容再來設計。

- I. 電容器之端子線距離要與電路板之孔距一致。
- II. 在電容器之安全裝置（防爆孔）上面，不要設計配線或回路。
- III. 電容器之安全裝置（防爆孔）上機，請依照型錄和承認書之規定把間隙空出來。
- IV. 當電路板上的電容器之安全裝置（防爆孔）啓動時，可在安全裝置（防爆孔）打孔使氣體流出。
- V. 螺絲型電容器之端子處，不可朝下。如要橫放電容器時，正極端子須在上面。

(4) APPLIED VOLTAGE

◎Do not exceed the rated voltage of capacitors.

(5) INSULATION

◎Aluminum Electrolytic Capacitors should be electrically isolated form among the following points.

I .Aluminum case, cathode lead wire, anode lead wire, and circuit pattern.

II .Auxiliary terminals of snap-in type, anode terminal, outward terminal and circuit pattern.

◎The PVC sleeve of Aluminum Electrolytic Capacitors is not recognized as an insulator, and therefore, the standard capacitor should not be used in a place where insulation function is needed. Please consult with HWA KAI should you require a higher grade of insulating.

(6) CONDITIONS OF USE

◎The following environment should be avoided when using Aluminum Electrolytic Capacitors.

I .Damp conditions such as water, saltwater spray, or oil spray or fumes. High humidity or humidity condensation situations.

II .Hazardous gas/fumes such as hydrogen sulfide, sulfurous acid gas, nitrous acid, chlorine gas or ammonia.

III .Exposure to ozone , ultraviolet rays or radiation.

IV .Severe vibration or shock, which exceeds the condition,specified in the catalog or specification sheets.

(7) CONSIDERATION TO ASSEMBLY CONDITION

◎In designing a circuit, the following matters should be ensured in advance to the capacitor's assembly on the printed wiring board (PW board).

I .Design the appropriate whole spacing to match thelead pitch of capacitors.

II .Do not locate any wiring and circuit patterns directly above the capacitor's vent.

III .Ensure enough free space above the capacitor's vent.The recommended space is specified in the catalog or specification sheets.

IV .In case the capacitor's vent is facing the PW board, make a gas release hole on PW board.

V .The sealing side of the screw terminal type should not face down in the application. When the capacitors are mounted horizontally, the anode screw terminals must be positioned at the upper side.

(8) 電路設計的考慮

- ◎電容器封口部下方，不可配置回路。
- ◎電容器的周邊與電路板內側（電容器下方）避免用發熱零件。

(9) 其他

- ◎依溫度與頻率的變動，電容器的電氣特性會有所變化。請確認此變化後再來設計回路。
- ◎在兩層的電路板上裝配電容器時，電容器下方不要有多餘的配線孔，和正反面接續用之貫穿也要避免設計。
- ◎使用螺絲端子型時，鎖緊之轉距請參照型錄與承認書規格值內使用。
- ◎使用電容器兩個以上並聯時，應考慮電流之平衡。
- ◎使用電容器兩個以上串聯時，應考慮電壓之平衡和插入並聯用分壓電阻。

(8) CONSIDERATION TO CIRCUIT DESIGN

- ◎Any copper lines or circuit patterns should not be laid under the capacitor .
- ◎Parts, which radiate heat, should not be placed close to or reverse side of the Aluminum Electrolytic Capacitors on the PW board.

(9) OTHERS

- ◎Performance of electrical characteristics of Aluminum Electrolytic Capacitors are affected by variation of operating temperature and frequency. Consider this variation when designing the circuit.
- ◎Excessive holes and connection hole between both sides on the PW board should be avoided around or under the mounting area of the Aluminum Electrolytic Capacitors on double sided or multiplayer PW board.
- ◎Torque of tightening screw terminals should not exceed the specified maximum value, which is described in the catalog or specification sheets.
- ◎Consider current balance when 2 or more Aluminum Electrolytic Capacitors are connected in parallel.
- ◎Use bleeder resistors when 2 or more Aluminum Electrolytic Capacitors are connected in series. In this case, the resistors should be connected parallel to the capacitors.

為顧及安全性，所以使用電子機器時，請考慮電容器之故障情形，從設計面來確保安全性。

- ◎利用保護回路、保護裝置來確保系統安全性。
- ◎利用攏長回路來確保系統安全化。

From the perspective of the importance of safety with electronic equipments and circuits, please observe safety measures in light of capacitor failure modes at the design stage.

- ◎System to promote safety in circuit care and protective equipment.
- ◎System to promote safety with redundant circuits, etc.

2.裝配之注意事項

(1) 裝配前應有的知識

- ◎裝配在電路板上已通電之電容器，不再使用定期點檢時電容器要拆卸下來，否則不能再使用（電解電容器在到達使用巔峰時，無法重複使用）。
- ◎電解電容器有時會有在起電壓（殘留電壓），此時請用 1K Ω 的電阻來放電。
- ◎電解電容器經長期放置，其洩漏電流可能增大，此時請用 1K Ω 的電阻來進行電壓（充電）處理。

2.CAUTION FOR ASSEMBLING CAPACITORS

(1)CAUTION BEFORE ASSEMBLY

- ◎Aluminum Electrolytic Capacitors cannot be recycled after mounting and applying electrical characteristics at the periodical inspection should only be recycled for the same position.
- ◎Aluminum Electrolytic Capacitors may accumulate charge naturally during storage. In this case, discharge through a 1K Ω resistor before use.
- ◎Leakage current of Aluminum Electrolytic Capacitors may be increased during long storage time. IN this case, the capacitors should be subject to voltage treatment though a 1K Ω resistor before use.

(2) 裝配時-1

- ◎請先確認電容器之規格（容量與額定電壓）後再裝配。
- ◎請確認極性後再裝配。
- ◎電容器不要掉落到地面，如果掉落盡可能不要使用。
- ◎電容器如變形，請不要使用。

(3) 裝配-2

- ◎請先確認電容器之端子線距離與電路板孔距是否一致後再裝配。
- ◎自立型電容器，請裝配到與電路板密合狀況，不要浮在上面。
- ◎使用自動插件機時，固定端子線的夾具力量，注意力道不可強。
- ◎請注意自動插件機及裝著機之衝擊力不可太強。
- ◎如有預期的振動及衝擊時，在裝配時請利用接著劑或輔助工具補強。

(4) 焊錫條件

- ◎焊錫條件（溫度、時間）請依照型錄和承認書的規定。
- ◎端子線距離與電路板孔距不一樣時，在焊錫前先將端子線加工，對電容器本體沒有壓力之加工。
- ◎焊錫時須要拆下電容器且使用手拆除時，電容器之端子線在沒有壓力的方式下進行，須要先行溶解錫塊後才能進行。
- ◎焊槍不可接觸到電容器本體。

(5) 焊錫的流程

- ◎電容器本體不可浸到焊錫液。
- ◎焊錫條件（預備加熱、焊錫溫度、浸端子時間）請在承認書之規定範圍內。
- ◎焊錫時助溶劑不可沾到端子線以外的部份。其他的東西不要傾倒面接觸到電容器。

(2)IN THE ASSEMBLY PROCESS-1

- ◎Ensure rated voltage and capacitance of the capacitors before mounting.
- ◎Ensure the capacitor's polarity before mounting.
- ◎Do not use a capacitor which has been dropped onto a hard surface.
- ◎Do not use a capacitor with damaged or dented cases or seals.

(3)IN THE ASSEMBLY PROCESS-2

- ◎Capacitors should be mounted after confirmation that hole spacing on PW board matches the lead pitch of the capacitors.
- ◎The snap-in type of capacitors should be mounted firmly on the PW board without a gap between the capacitor body and the surface of PW board.
- ◎Avoid excessive force when clinching lead wire during auto-insertion process.
- ◎Avoid excessive shock to capacitors by automatic insertion machine, during mounting, parts inspection or centering operation.
- ◎Please utilize supporting material such as strap or adhesive to mount capacitors to PC board when it is anticipated that vibration or shock is applied.

(4)SOLDERING

- ◎Soldering conditions (temperatures, times) should be within the catalog or specification sheets.
- ◎In case lead wire reforming is needed due to inappropriate pitch between capacitor and holes on PW board, stress to the capacitor should be avoided.
- ◎In case soldered capacitor has to be withdrawn from the PW board by soldering irons, the capacitor should be removed after solder has melted sufficiently in order to avoid stress to the capacitor or lead wires.
- ◎Soldering iron should never touch the capacitors body.

(5)FLOW SOLDERING

- ◎Do not dip capacitor's body into melted.
- ◎Soldering condition (preheat, soldering temperature, dipping time) should be within the specified standard, which is described in the catalog or specification sheets.
- ◎Flux should not be adhered to capacitor's body but only to its terminals.
- ◎Other devices which are mounted near capacitor's should not touch the capacitor's.

(6) 回流焊錫

- ◎ 焊錫條件（預備加熱、焊錫溫度、浸端子時間）請參考型錄與承認書。
- ◎ 使用紅外線電熱管時，電容器的材質會因紅外線吸收率不一樣而改變，加熱時請注意。
- ◎ 電容器的回流次數，請以一次為主，如需二次回流請再商討。

(7) 焊錫後處理

- ◎ 焊在電路板之電容器本體不要傾斜或扭曲。
- ◎ 把電容器焊在電路板後，不可把電容器當把手來移動電路板。
- ◎ 電路板焊上電容器後，不要碰撞到其他東西。

(8) 電路板之洗滌

- ◎ 電容器不可用鹵素溶劑來洗滌，有需要洗滌時須使
用耐洗滌用電容器，請依型錄與承認書之規定範圍內。
- ◎ 洗滌耐洗滌用電容器時請確實做到洗滌劑的污染管理（電導度、PH、比重、水份量）。
- ◎ 耐洗滌用電容器洗滌後不放在洗滌液的環境和密閉容器中。
- ◎ 以洗滌後，電路板與電容器用熱風吹 10 分鐘以上，使其乾燥，此熱風溫度要在最高使用溫度以下。

(9) 固定材料、塗料劑

- ◎ 不要使用鹵素固定劑或塗料劑來固定電容器。
- ◎ 使用固定材料和塗料劑前，電路板和電容的封口部，不可以有助溶劑之殘渣和污穢物。
- ◎ 使用洗滌劑須先乾燥後，才可使用固定材料和塗料劑，不要塞住封口表面。

(6) REFLOW SOLDERING

- ◎ Reflow soldering conditions (preheat, soldering temperature, dipping time) should follow the specified standard, which are described in the catalog or specification sheets.
- ◎ Heating standard should depend on surface of the capacitor color or materials when infrared ray is used because the capacitor's head absorption depends on the surface color or materials. Check heat condition.
- ◎ Standard Aluminum Electrolytic Capacitors cannot withstand two or more reflow processes. Consult with HWA KAI when two or more reflow processes are needed.

(7) HANDLING AFTER SOLDERING

- ◎ Do not bend or twist the capacitor's body after soldering on PW board.
- ◎ Do not pick-up or move PW board by holding the soldered capacitors.
- ◎ Do not hit the capacitors and isolate capacitors from the PW board or other device when stacking PW boards in store.

(8) PW BOARD CLEANING

- ◎ Standard Aluminum Electrolytic Capacitors should be free from halogen Ted solvents during PW board cleaning after soldering. Use solvent proof capacitors and follow the specified cleaning condition when halogen Ted solvents are used.
- ◎ Solvents should have well controlled conductivity, PH, specific gravity and water contents during the cleaning of solvent proof capacitors.
- ◎ Cleaned PW board with capacitors should not be kept in solvent environment or no ventilated places. Let PW board containing capacitors after cleaning dry with hot blast fully. the temperature of such breeze should be under the upper category temperature of capacitors.

(9) ADHESIVES AND COATING MATERIALS

- ◎ Do not use halogen Ted adhesives and coating materials to fix Aluminum Electrolytic Capacitors.
- ◎ Flux between the surface of the PW board and sealing of capacitors should be cleaned before using adhesives or coating materials.
- ◎ Solvents should be dried up before using adhesives or coating materials. Do not cover up all the sealing area of capacitors with adhesives or coating materials, make coverage only partial.

3.配置使用中應注意事項

- ◎不要直接施加加重力於電容器之端子線。
- ◎不要讓電容器端子間的導電體短路。有酸和堿之導電性水溶液不要接觸電容器。
- ◎請確認裝配電容器設定之環境。

4.維修

- ◎產業用機器之電容器，要定期檢查，檢查內容如下：
 - I.外觀：防爆孔開否，漏液等明顯的異常。
 - II.電氣之性能：洩漏電流、容量、損失角和型錄上以及承認書規定之項目。

5.突發狀況處理

- ◎設備使用中電容器防爆孔動作啓動或氣體跑出來時，關閉設備主電源或拔掉插頭。
- ◎電容器防爆孔動作時，會噴出超過 100°C 的氣體，不要靠近噴出的氣體，如跑入眼睛或吸入時，請立即用水沖洗。電解液接觸到皮膚時，請用肥皂清洗。

6.儲存條件

- ◎不可以把電解電容器放在高溫、高溫環境下，請保存在室溫 5°C~35°C，75°C 相對濕度以下。
- ◎電解電容器不可直接接觸水、鹽及油。
- ◎也不可放在充滿有毒氣體環境下。
- ◎也不可放在臭氧、紫外線與放射線照射的地方。

3.CAUTION DURING USE OF CAPACITORS IN SETS

- ◎Do not touch the terminals of capacitors.
 - ◎Do not connect electrical terminals of the capacitor.
- Keep the capacitors free from conductive solution, such as acid, alkali and so on.
- ◎Ensure the operational environment of the equipment in which the capacitor has been built is within the specified condition mentioned in the catalog or specification sheets.

4.MAINTENANCE

- ◎ Periodical inspection should be carried out for the capacitors, which industrial equipment. Check the following points at the inspection.
 - I. Visual inspection check pressure relief open or leakage of electrolyte.
 - II. Electrical characteristics : leakage current , capacitance, dissipation factor and the other points which are mentioned in the catalog or specification sheet.

5.EMERGENCY ACTION

- ◎When the pressure relief vent is open and some gas blows out form the capacitor, please turn the main switch of the equipment off or pull out the plug from the power outlet immediately.
- ◎ During pressure relief vent operation, extremely hot gas(over 100°C) may blow out form the capacitors. Do not stand close to the capacitors. In case of eye contact,flush the open eye(s)with large amount of clean water immediately. In case of ingestion, gargle with water immediately, do not swallow. Do not touch electrolyte but wash skin with soap and water in case of skin contact.

6.STORAGE CONDITION

- ◎Aluminum Electrolytic Capacitors should not be stored in high temperatures or where there is a high level of humidity. The suitable storage condition is 5°C~35°C and less than 75% in relative humidity.
- ◎Aluminum Electrolytic Capacitors should not be stored in damp conditions such as water, saltwater spray or oil spray.
- ◎Do not store Aluminum Electrolytic Capacitors in an Environment full of hazardous gas(hydrogen sulfide, sulfurous acid gas, nitrous acid , chlorine gas or ammonia).
- ◎Aluminum Electrolytic Capacitors should not be stored under exposure to ozone, ultraviolet rays or radiations.

7. 丢弃时

◎要丟棄電容器時，請依下列方法：

- I .針電容器打洞後充分搗碎燒毀。
- II .不燒毀時，請專門的產業廢棄物者來處理。

7.DISPOSAL

◎Please take either of the following actions in case of Disposal.

- I .Incineration(high temperature of more than 800°C) after crushing the capacitor's body.
- II .Consignment to specialists of industrial waste.

詳細參考資料

請參閱：日本電子機械工業會規格（EIAJ）

RCR-2367A

（電子機器用固定鋁質電解電容器在使用上應注意事項指導方針）

1995 年 3 月制定

1999 年 3 月修訂

For further details

Please refer to: EIAJ RCR-2367A (Guideline of atrabiliar for fixed aluminum).

「Technical Report Electronic Industries Association of Japan in march 1995, revised edition in march 1999」.

電解電容器使用上注意事項 2

1.極性標示

在使用電容器時應先確認避免使用在交流電壓或逆向電壓上,其極性標示如下:

- (1) 電容器本體的側面，有條狀及箭頭為負極。
- (2) 電容器端子線較為負極。
- (3) 自立型或大型電容器在壓花上有 ⊗ 記號為負極。

2.電容器之安全裝置（防爆孔）

鋁質電解電容器加上逆向電壓或超載電壓時，加上使用超過型錄規定的容許紋波電流，時造成異常、安全裝置動作、電解液含高溫氣體會跑出來之設計。

- ◎在電容器之安全裝置（防爆孔）不要配線或回路。
- ◎鋁殼安全裝置（防爆孔）動作時，防爆孔會膨脹。裝置電路板時不要與上蓋接觸，若無空隙安全裝置很難動作。其預留空隙如下：

直徑	Body Dia	6.3 φ ~16 φ mm	18 φ ~35 φ mm	40 φ mm~
空隙	Space	2mm MIN.	3mm MIN.	5mm MIN.

3.電壓處理

以下為長時間放置之成品，電壓處理方式：

- ◎先初期檢測、將電容器連接 1KΩ 保護電阻，再以相當額定電壓之直流電壓充電 1 小時，在使用 1Ω 電阻放電。

4.紋波電流

- (1) 當施加紋波電流時，其直流電壓與交流電壓不可超過額定電壓（工作電壓），亦不可施加逆向電壓。
- (2) 周圍溫度係數與壽命時間有一定的比率，如要過到預期的壽命其紋波電流不可超過其容許的紋波電流，在使用時應多加注意。

CAUTION FOR PROPER USE OF ALUMINUM ELECTROLYTIC CAPACITORS 2

1.Polarity Marking of Electrolytic Capacitors

Please confirm the polarity to avoid applying any reverse voltage or AC voltage to the capacitors. Polarity is indicated as below:

- (1) Negative polarity is indicated on the side of body by means of a stripe or an arrow.
- (2) On radial leaded Aluminum Electrolytic Capacitors, the shorter lead is the negative terminal.
- (3) On Snap-In and Lug Terminal type capacitors, the knurled rivet [⊗] indicates the negative terminal.

2.Mounting Capacitors with pressure relief Vent

Aluminum Electrolytic Capacitors are designed to open the pressure relief vent and release hot as including electrolyte through it, in abnormal cases such as when reverse voltage or excess voltage was applied, or when ripple current exceeding the permissible value has flown into capacitors.

- ◎Do not design to locate any wiring or circuit pattern around the capacitor's pressure relief vent.
- ◎The pressure relief vent bulges before the vent operation. Ensure enough free space directly above the capacitor's vent as shown in the below table so that bulged vent never touches to an object such as the case on cover of the set. the pressure relief vent will not open without the appropriate free space.

3.Voltage Treatment

The following voltage treatment should be done on the capacitors than have been stored for a long time.

- ◎Voltage Treatment prior to the initial measurement, the capacitors shall be applied with a DC voltage which is equal to the Rated Voltage of the capacitor through a resistor of about 1kΩ in series for 1 hour, and then discharged through resistor of about 1kΩ/Volt.

4.Ripple Current

- (1) The combined value of D.C. voltage and the peak A.C. voltage shall not exceed the rated voltage and shall not be reverse voltage.
- (2) The temperature coefficient shows a limit of ripple current exceeding the rated ripple current that can be applied to a capacitor at each temperature when the life expectancy of a capacitor comes to be nearly equal to the lifetime at the upper category temperature.

5. 電路板洗淨

(1) 100WV 以下製品可在 60°C 以下浸漬或使用超音波洗淨，時間要在五分鐘內（5L，7L 製品三分鐘），更要選擇適合的洗滌溶劑。且要徹底的洗淨及乾燥。其溶劑如下：

ST-100S 型（荒川化學工業）

750 型（花王）

IPA（異丙醇）

◎有關破壞臭氧層及危害地球環境的洗淨劑避免使用。

5.PW Board Cleaning

(1) PW board can be immersed or ultrasonically cleaned using suitable cleaning solvents for up to 5 minutes (5L and 7L is up to 3 minutes) and up to 60°C maximum temperatures about 100WV following. The board should be thoroughly rinsed and dried. Recommended cleaning solvent include Pine :

Alpha ST-10-0S

Clean-thru 750H

IPA (isopropyl alcohol).

◎The use of ozone depleting cleaning agents are not recommended in the interest of protecting the environment.

洗淨劑 Cleaning Solvents	洗淨條件 Cleaning Condition
荒川化學工業 ST-100S Pine alpha ST-100S 花王-750H Clean-thru 750H 異丙醇 IPA IPA (isopropyl alcohol)	100WV 以下製品可在 60°C 的液中浸漬、蒸汽、超音波的組合作業不可超過五分鐘。(5L, 7L 製品三分鐘) Is less than 5 minutes by dipping, steam, ultrasonically cleaned and these combinations. (5L and 7L is up to 3 minutes)

(2) 下列溶劑避免使用：

◎鹵素系溶劑：造成電容器內部腐蝕。

洗淨劑會直接侵入電容器內部，洗淨劑因分解反應所產生的氯離子與鋁反應面發生腐蝕現象。由其 1-1-1 三氯乙烷絕對避免使用。

◎強鹼系溶劑：造成鋁箔腐蝕。

◎石油系溶劑：造成封口橡膠劣化。

◎二甲苯系溶劑：造成封口橡膠劣化。

◎丙酮系溶劑：造成指示消失。

(3) 電路板洗淨後其電容器封口處及電路板會殘留少許洗淨劑，必須強制乾燥，其溫度不可超出電容器使用溫度上限。

(4) 洗滌劑的污染管理（電導度、PH、比重、水份量）是非常重量的。其含氯量越高其污染程度越高，造成電容器腐蝕越高。

(2) Avoid using the following solvent groups unless specifically allowed for in the specification;

◎Halogenated cleaning solvents: Except for solvent resistant capacitor types, halogenated solvents can permeate the seal and cause internal capacitor corrosion and failure. For solvent resistant capacitors, carefully follow the temperature and time requirements of the specification. 1-1-1 dichloromethane should never be used on any aluminum electrolytic capacitor.

◎Alkali solvents: Could attack and dissolve the aluminum case.

◎Petroleum based solvents: Deterioration of the rubber seal could result.

◎Xylenes: Deterioration of the rubber seal could result.

(3) A thorough drying after cleaning is required to remove residual cleaning solvents, which may be trapped between the capacitor and the circuit board. Avoid drying temperatures, which exceed the upper category temperature of the capacitor.

(4) Monitor the contamination levels of the cleaning solvents during use by electrical conductivity, PH, specific gravity, or water content. Chlorine levels can rise with contamination and adversely affect the performance of the capacitor.

6. 電解液與電解紙為可燃物

鋁質電解電容器之電解液，電解紙為可燃物又電解液有導電性，附著在電路板上會造成腐蝕，可能造成短路，引起煙火或火花，電容器之裝配方法、位置、回路設計等，請注意。

7. 煙熏處理、鹵素系為難燃料

以下條件會引起鋁質電解電容器內部電極、鋁殼及端子表面產生腐蝕：

- (1) 消毒木材的薰蒸處理環境。
- (2) 鹵素系與製品共存環境下使用。

6. Electrolytic and Separator paper are Flammable

Electrolyte and separator paper used in Aluminum Electrolytic Capacitors are flammable. Also, Electrolyte is electrically conductive. Therefore, in case Electrolyte gets contact with PC board, it may cause corrosion of circuit between patterns, and may lead to smoke generation or ignition at the worst cases. Please make considerations to the above risk in designing circuit patterns and determining the mounting method and mounting location of capacitors.

7. Fumigation and halogenated flame retardant

It may cause corrosion of internal electrodes, aluminum cases and terminal surface when the following conditions exist.

- (1) Fumigation of wooden pallets before shipment to disinfect.
- (2) Existence of components or parts that contain halogenated flame retardant agent together with capacitors.