



GENERAL INFORMATION FOR APPLICATION

The following precautions must be observed when using electrolytic capacitors.

1. Circuit Design

- (1) Please make sure that the environmental and mounting conditions to which the capacitor to be exposed are within the conditions specified in this catalogue.
- (2) Operating temperature and applied ripple must be within the specifications.
 - ① The capacitors shall not be used in an ambient temperature which exceeds the operating temperature specified in the specification.
 - ② Do not apply excessive current which exceeds the allowable ripple current.
- (3) Appropriate capacitors which comply with the life requirement of the products, should be selected when designing the circuit.
- (4) Aluminum electrolytic capacitors are polarized. Make sure that no reverse voltage or AC voltage is applied to the capacitors. Please use non-polarized capacitors for a circuit that can possibly see reserved polarity.

Note: Even non-polarized capacitors cannot be used for AC voltage application.

- (5) For a circuit that repeats rapid charging/discharging of electricity, an appropriate capacitor that is capable of enduring such a condition must be used. Welding machines and photo flash are a few examples of products that contain such a circuit. For appropriate choice of capacitors for circuit that repeat rapid charging /discharging, please consult us.
- (6) Make sure that no excess voltage (that is higher than the rated voltage) is applied to the capacitor.
 - ① Please pay attention so that the peak voltage, which is DC voltage overlapped by ripple current, should not exceed the rated voltage.
 - ② In the case where more than two aluminum electrolytic capacitors are used in series, please make sure that applied voltage should be lower than rated voltage and the voltage should be applied to each capacitor equally using a balancing resistor in parallel with the capacitor.
- (7) Outer sleeve of the capacitor is not guaranteed as an electrical insulator. Do not use standard sleeve on a capacitor in applications that require electrical insulation. When the application requires special insulation, please contact our sales office for details.
- (8) Capacitors may fail if they are used under the following conditions:
 - ① Environmental (climatic) conditions
 - (a) Being exposed to water, high temperature & high humidity atmosphere, or condensation of moisture.
 - (b) Being exposed to oil or an atmosphere that is filled with particles of oil.
 - (c) Being exposed to salty water or an atmosphere that is filled with particles of salt.
 - (d) In an atmosphere filled with toxic gases (such as hydrogen sulfide, sulfurous acid, nitrous acid, chlorine, bromine, methyl bromide, ammonia, etc.)
 - (e) Being exposed to direct sunlight, ozone, ultraviolet ray, or radiation.
 - (f) Being exposed to acidic or alkaline solutions.
 - ② Severe vibration and physical shock conditions that exceed our specification.

Vibration test condition:

Vibration frequency range: 10~55~10HZ
 Sweep rate : 10~55~10HZ/minute
 Sweep method : logarithmic
 Amplitude or acceleration: 1.5mm (maximum acceleration is 10G)
 Direction of vibration : X, Y, Z direction
 Testing time : 2 hours per each direction

Shock is not applicable normally.

If a particular condition is required, please contact our sales office.

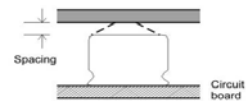
- (9) When designing a circuit board, please pay attention to the following:

- ① Have the hole spacing on the P.C. board match the lead spacing of the capacitor.
- ② There should not be any circuit pattern or circuit wire above the capacitor safety vent.
- ③ Unless otherwise specified, following clearance should be made above the pressure relief vent.

Case Diameter	Clearance Required
φ 6.3 to 16	2mm or more
φ 18 to 35	3mm or more
φ 40 or more	5mm or more

- ④ In case the vent side is placed toward P.C. board (such as end seal vented parts), make a corresponding hole on the P.C. board to release the gas when vent is operated. The hole should be made to match the capacitor vent position.

- (10) The main chemical solution of the electrolyte and the separator paper in the capacitor are combustible. The electrolyte is conductive. When it comes in contact with the P.C. board, there is a possibility of pattern or short circuit between the circuit pattern, which could result in smoking or fire. Do not locate any circuit pattern beneath the capacitor end seal.
- (11) Do not design a circuit board so that heat generating components are placed near an aluminum electrolytic capacitor or reverse



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Side of P.C. board (under the capacitor).

- (12) Please refer to the recommended land size in this catalogue when you design in surface mount capacitors.
- (13) Electrical characteristics may vary depending on changes in temperature and frequency. Please consider the variation when you design circuits.
- (14) When you install more than 2 capacitors in parallel, consider the balance of current following in to the capacitor.
- (15) While mounting capacitors on double side P.C. board, the capacitors should be away from those unnecessary base plate holes and connection holes.

2. Mounting

- (1) Once a capacitor has been assembled in the set and power applied, do not attempt to re-use the capacitor in other circuits or application.
- (2) Electric potential between positive and negative terminal may exist as a result of returned electromotive force, so please discharge the capacitor using 1k Ω resistor.
- (3) Leakage current of the parts that have stored for more than 2 years may increase. When leakage current has increased, please perform a voltage treatment using a 1k Ω resistor.
- (4) Please confirm ratings and polarity before installing capacitor on the P.C. board.
- (5) Do not drop the capacitors on the floor, nor use a capacitor that was dropped.
- (6) Be careful not to deform the capacitor during installation.
- (7) Please confirm that the lead spacing of the capacitor matches the pad spacing of the P.C. board prior to installation.
- (8) Please pay attention that the clinch force is not too strong when capacitors are placed and fixed by an automatic insertion machine.
- (9) Please pay attention to the mechanical shock to the capacitor by suction nozzle of the automatic insertion machine or automatic mounted, or by product checker, or by centering mechanism.
- (10) Hand soldering:
 - ① Solder condition shall be confirmed to be within the specifications.
 - ② If it is necessary that the leads must be formed due to a mismatch of the lead space to hole space on the board, bend the lead prior to soldering without applying too much stress to the capacitor.
 - ③ If you need to remove parts which were soldered, please melt the solder enough so that stress is not applied to lead.
 - ④ Please pay attention so that solder iron does not touch any portion of capacitor body.
- (11) Flow soldering (wave solder):
 - ① Aluminum capacitor body must not be submerged into the solder bath.
 - ② Soldering condition must be confirmed to be within specification.
 - ③ Please avoid having flux adhere to any portion except the terminal.
 - ④ Please avoid contact between other components and the aluminum capacitor.
- (12) Reflow soldering (SMD only):
 - ① Please follow "Reflow Soldering Condition" in this catalogue.
 - ② When an infrared heater is used, please pay attention to the extent of heating, since the absorption rate of infrared, will vary due to difference in the color and size of the capacitor.
- (13) Do not tilt lay down or twist the capacitor body after the capacitor are soldered to the P.C. board.
- (14) Do not carry the P.C. board by grasping the soldered capacitor.
- (15) Please do not allow anything to touch the capacitor after soldering. If P.C. board are stored in stack, please make sure P.C. board or the other components do not touch the capacitor. The capacitor shall not be effected by any radiated heat from the soldered P.C. board or other components after soldering.
- (16) Cleaning
 - ① Do not clean capacitors with halogenated cleaning agent. However, if it is necessary to clean with halogenated cleaning agent, please contact our sales office.
 - ② Recommended cleaning method:
Applicable: Any type, any ratings
Cleaning agents:
Based alcohol solvent cleaning agent: Isopropyl Alcohol
Based water solvent cleaning agent:
Premium alcohol solvent type: Pine Alpha ST-100S, Techno Care FRW14~17, Sanelek B-12
Surfactant type: Clean through 750H/750L/710M
Alkaline saponification agent: Aqua cleaner 210SEP
Cleaning conditions:
Total cleaning time shall be within 5 minutes by immersion, ultrasonic or other method. Temperature of the cleaning agent shall be 60 $^{\circ}$ C or lower. After cleaning, capacitors should be dried using hot air for minimum of 10 minutes along with the P.C. board. Hot air temperature should be below the maximum operating temperature of the capacitor. Insufficient dry after water rinse may cause appearance problems, sleeve shrink, bottom-plate bulge and such.
 - ③ Avoid using ozone destructive substances for cleaning agents to concern about global environment.
- (17) Fixing Material and Coating Material
 - ① Do not use any affixing or coating materials, which contain halide substance.

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- ② Remove flux and any contamination, which remains in the gap between the end seal and P.C. board.
- ③ Please dry the cleaning agent on the P.C. board before using affixing or coating materials.
- ④ Please do not apply any material all around the end seal when using affixing or coating materials.

There are variations of cleaning agents, fixing and coating materials, so please contact those manufactures or our sales office to make sure that the material would not cause any problems.

(18) Other

Wooden package material may be subjected to fumigation by a halogen (e.g. methyl bromide) before they are exported in order to protect them against pests. If devices with aluminum electrolytic capacitors or capacitors themselves are fumigated or packed with the pallet that is fumigated, the capacitors may internally corrode due to the halogen contents of fumigation agents.

3. In The Equipment

- (1) Do not directly touch terminal by hand.
- (2) Do not short between terminals by conductor, nor spill conductible liquid such as alkaline or acidic solution on or near the capacitor.
- (3) Please make sure that the ambient conditions where the set is installed don't have any of the following conditions:
 - ① Where capacitors are exposed to water, high temperature & high humidity atmosphere, or condensation of moisture.
 - ② Where capacitors are exposed to oil or an atmosphere that is filled with particles of oil.
 - ③ Where capacitors are exposed to salty water, high temperature & high humidity atmosphere, or condensation of moisture.
 - ④ The atmosphere is filled with toxic acid gasses (e.g. hydrogen sulfide, sulfurous acid, nitrous acid, chlorine, bromine, methyl bromide, etc.).
 - ⑤ The atmosphere is filled with toxic alkaline gasses (e.g. ammonia).
 - ⑥ Where capacitors are exposed to acidic or alkaline solutions.
 - ⑦ Since shrinkage, bulging and/or crack could be seen on outer sleeve of capacitor when capacitors are used in atmosphere where condensation of moisture occurs, please confirm their adaptation before the use. The condensation of moisture could occur when temperature cycling test/rapid change of temperature test is performed, in this case, aforementioned sleeve problem could be seen.

4. Maintenance and Inspection

Please periodically inspect the aluminum capacitors that are installed in industrial equipment. The following items should be checked:

- (1) Appearance: Remarkable abnormality such as vent operation, leaking electrolyte etc.
- (2) Electrical characteristic: Capacitance, dielectric loss tangent, leakage current etc., which are specified in this catalogue.

5. In an Emergency

- (1) If you see smoke due to operation of safety vent, turn off the main switch or pull out the plug from the outlet.
- (2) Do not draw your face to the safety vent since gas over 100℃ will be emitted when the safety vent operates. If the gas has entered your eyes, please flush your eyes immediately in pure water. If you breathed the gas immediately wash out your mouth and throat with water.
- (3) Do not ingest electrolyte. If your skin is exposed to electrolyte, please wash it away using soap and water.

6. Storage

- (1) Do not keep capacitor in high temperature and high humidity.

Storage conditions should be:

Temperature : +5℃ ~ +35℃

Humidity : lower than 75%

Place : Indoor

- (2) Avoid ambient conditions where capacitors can be covered with water, brine or oil.
- (3) Avoid ambient conditions where capacitors are exposed to poisonous gases such as hydrogen sulfide, sulfurous acid, nitrous acid, chlorine, ammonium etc.
- (4) Do not keep capacitor in conditions that expose the capacitor to ozone, ultraviolet ray or radiation.
- (5) Store capacitors in a packed condition as much as possible.

7. Disposal

- (1) Please dispose capacitors in either of the following ways:
 - ① Incinerate (at a temperature of 800℃ or higher) capacitors after crushing parts or making a hole on the capacitor body.
 - ② If incineration is not applicable, hand them over to a waste disposal agent and have them buried in a landfill.
- (2) When removing a capacitor from the circuit board or when disposing of capacitor, please ensure that the capacitor is properly discharged.

8. Others

- (1) The products meet or exceed quality standards specified by JIS-C-5141 and with the reliability requirements refer to JIS-C-5102.
- (2) None of ozone depleting chemicals (ODC) under the Montreal Protocol is used in our manufacturing process.

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貼片式鋁電解電容器使用“注意事項”

使用貼片式鋁電解電容器需留意事項：

1. 電路設計

- (1) 確保電容器使用和安裝條件在本公司產品目錄的規定範圍內。
- (2) 工作溫度和施加的紋波電流應在本公司產品目錄的規定範圍內。
 - ①不可在超出最高使用溫度的溫度下使用。
 - ②不可接通超過最大允許的額定紋波電流。
- (3) 在設計電路時，應選擇符合壽命要求的產品。
- (4) 貼片式鋁電解電容器分正負極，不應加反向電壓或交流電壓。對可能出現反向電壓的電路，應選擇無極性電容器。注意：即使無極性電容器，也不能直接用於交流電路。
- (5) 對需要快速充放電的電路，請選用與使用條件相符的鋁電解電容器。作為快速充放電電路的產品有電焊機、相機閃光燈等。
對於選擇使用於快速充放電電路的鋁電解電容器，可以向我們諮詢。
- (6) 請確認不要有超載電壓（超過額定電壓的電壓）通過電容器。
 - ①直流電壓和紋波電流量加後的峰值電壓不應超過額定工作電壓。
 - ②若兩個以上電容器串聯，應確保施加電壓低於額定值，而且要並聯一個平衡電阻，以使每個電容器所加電壓相等。
- (7) 電容器膠管不能保證絕緣，不能將電容器上的膠管做絕緣用途。若有絕緣要求，請與我們銷售部門聯繫。
- (8) 如果在以下環境中使用，可能會導致電容器故障：

①周圍環境（耐氣候性）條件

- (a) 直接與水接觸、高溫高濕或結露的環境。
- (b) 直接與油接觸或充滿油霧的環境。
- (c) 直接與鹽水接觸或充滿鹽分的環境。
- (d) 充滿有毒氣體（如硫化氫、亞硫酸、氯氣、溴氣、溴甲烷、氨氣等）的環境。
- (e) 置於日照、臭氧、紫外線或放射線照射的環境。
- (f) 直接與酸性或鹼性溶劑接觸的環境。

②嚴重的振動及機械沖擊超過本公司產品目錄的規定範圍。

振動的測試條件如下：

振動頻率範圍：10～55～10HZ

振動循環頻率：10～55～10HZ/分鐘

振動周圍頻率：對數

振幅或加速度：1.5MM（最大加速度為 10G）

振動方向：X，Y，Z 方向

測試時間：每個方向 2 小時

沖擊一般不適用。

如有特殊要求，請與我們銷售部門聯繫。

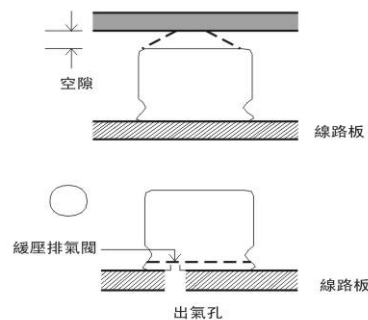
(9) 設計電路板時，應注意下列事項：

- ①確保 PC 板上的焊點間距與電容器引線間距相符。
- ②電容器的防爆閥上端盡量避免配線及安裝其他元件。
- ③除非另有說明，電容器的防爆閥上端應留有如下間的間距：

鋁殼直徑	留出空隙
Φ 6.3 ~ 16	2mm 或以上
Φ 18 ~ 35	3mm 或以上
Φ 40 或以上	5mm 或以上

- ④當排氣閥對著 PC 板時（如膠蓋的排氣閥），應在 PC 板上與電容器排氣閥相對應的位置上開一小孔，以釋放當排氣閥打開之後所流出的氣體。

- (10) 電解液主要化學溶劑及電解紙為易燃物，且電解液導電。當電解液與 PC 板接觸時，可能會腐蝕 PC 板上的線路，或造成短路，以至生煙或著火。因此在電容器封口下面不應有任何線路。



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- (11) 設計線路板向背應確保發熱元器件不靠近鋁電解電容器或 PC 板的另一面（電容器下面）。
- (12) 當使用片式電容器進行設計時，請參考本公司產品目錄中推薦的安裝尺寸。
- (13) 設計線路板時應考慮到電性能隨溫度和頻率變化而變化。
- (14) 當兩個以上電容器並聯時，應考慮到通過這些電容器的電流平衡。
- (15) 在雙面線路板上安裝電容器時，電容器的安裝位置應避開多餘的基板孔和過孔。

2. 安裝

- (1) 一旦電容器經過安裝及加載，不要再試圖用於其他線路板或其他用途。
- (2) 當電容器產生再生電壓時，需通過 1kΩ 左右的電阻進行放電。
- (3) 對儲存較長時間（超過 2 年）的電容器，其漏電流可能會增大。若漏電流增大，請使用 1kΩ 左右電阻做充電處理。
- (4) 將電容器安裝在 PC 板上之前，請確認其規格（靜電容量及額定電壓等）與極性。
- (5) 請不要將電容品掉在地上，或不要使用掉在地上的電容器。
- (6) 安裝時請不要損傷電容器。
- (7) 安裝前，請確認電容器引線與 PC 板上的孔距相吻合。
- (8) 請留意自動插入的機械手力量不宜過大。
- (9) 請注意貼片機的吸頭、產品檢測夾具或對中裝置對電容器的機械衝擊。
- (10) 手工焊接：
 - ① 焊接條件（溫度、時間）不可超過規格書所規定的範圍。
 - ② 如果因引線間距和線路板的孔距不一致而需要對引線加工時，在焊接前不可使用過大的力度來扭動電容器的引線。
 - ③ 如果要卸下焊接好的電容器，請將焊劑充分溶化後再拆卸，以免電容器的端子受到拉力。
 - ④ 請勿將烙鐵接觸到電容器的本體。
- (11) 波峰焊：
 - ① 不要將電容器本身浸入到焊錫溶液中。
 - ② 焊接條件（溫度、時間、次數）必須按規定說明執行。
 - ③ 注意不要將焊錫附著在端子以外。
 - ④ 焊接時，不要讓其他產品倒下碰到電容器上。
- (12) 回流焊（只適用於表面貼裝）：
 - ① 請遵守本產品目錄中的“回流焊條件”。
 - ② 當使用紅外線加熱時，請注意加熱程度，因為紅外線吸收率隨電容器顏色和大小的不同而改變。
- (13) 電容器焊接在 PC 板上後，不要傾斜或扭動電容器。
- (14) 不要抓住焊接後的電容器搬動 PC 板。
- (15) 請在焊接後不要讓任何物品與電容器接觸。如 PC 板堆放儲存，請確保 PC 板及其他零部件不與電容器接觸。
焊接後的電容器不應受任何已焊接 PC 板或其他零件熱輻射的影響。
- (16) 清洗
 - ① 不要用鹵化物清洗劑清洗電容器。
 - ② 推薦清洗方法：
 - 使用範圍：任何類型及規格
 - 清洗劑：
 - 乙醇類清洗劑：Isopropyl Alcohol（異丙醇）
 - 水性清洗劑：
 - 高級乙醇類：Pine Alpha ST-100S, Techno Care FRW14~17, Sanelek B-12
 - 介面活性劑類：Clean through 750H/750L/710M
 - 碱性皂化類：Aqua cleaner 210SEP
 - 清洗方法：浸泡、超聲波或其他方法的總清洗時間應在 5 分鐘內。清洗劑溫度應在 60℃ 或以下。清洗後，應將電容器與板一起用熱風吹至少 10 分鐘至吹幹。熱風溫度應低於電容器工作溫度。水洗後若不充分吹幹，可能導致外觀不良，如膠管收縮，座板凸起等。
 - ③ 避免使用破壞臭氧層的清洗劑以保護環境。
- (17) 固定劑、塗層劑
 - ① 請勿使用任何含有鹵素的固定劑或塗層劑。
 - ② 線路板和電容器封口膠之間，不可留有焊劑殘渣及污垢。

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③在使用固定劑或塗層劑之前，盡可能有殘留洗淨成份，進行乾燥處理，使印刷孔不堵塞。

④在使用固定劑或塗層劑時，請勿將之塗滿整個電容器的封口膠部分。

固定劑和塗層劑的種類很多，為避免發生問題，可向相關材料廠家或聯繫我們的銷售部門諮詢詳情。

(18) 薰蒸處理

作為出口時的防蟲措施，有時會使用鹵化物（如甲基溴）進行薰蒸處理。將鋁電解電容器及裝配有鋁電解電容器的電子產品直接薰蒸或將進行薰蒸處理的木材用於托架時，由於薰蒸劑中含有鹵素，可能會導致電容器的內部引起腐蝕反應。

3. 安裝後

- (1) 不要直接用手接觸電容器正負極。
- (2) 不要在正負極之間用導體短接，也不要將電容器上或附近濺撒導電液體，如酸堿溶液等。
- (3) 請確認所安裝的電容器不要處於以下環境：
 - ①直接與水接觸、高溫高濕或易結露的環境。
 - ②直接與油接觸或充滿油霧的環境。
 - ③直接與鹽水接觸、高溫高濕或易結露的環境。
 - ④充滿鹽酸有機氣體（如硫化氫、亞硫酸、亞硝酸、氯氣、溴氣、溴甲烷等）的環境。
 - ⑤充滿有毒的城必氣體（如氨氣等）的環境。
 - ⑥直接與酸性或碱性溶劑接觸的環境。
 - ⑦結露環境有可能導致膠管發生收縮、膨脹、破裂，因此在使用時請充分進行確認。此外，因溫度劇烈變化，高溫高濕試驗等而結露時，也可能會導致同樣的膠管異常。

4. 維護和檢驗

請定期檢驗安裝在工業設備上的電容器，檢驗項目如下：

- (1) 外觀：明顯缺陷，如防爆閥打開，漏液等。
- (2) 電性能：電容量，損耗角正切，漏電流等，具體請參見本產品目錄中的詳細規格資料。

5. 緊急情況

- (1) 如看到防爆閥打開冒煙，要立即關掉總開關或拔掉插頭。
- (2) 不要將臉朝向防爆閥，因當防爆閥打開時，將有超過 100℃ 的氣體噴出。若氣體進入眼中，應立即用純水沖洗眼睛；若吸入氣體，應立即用水清洗口腔和喉嚨。
- (3) 不要吞食電解液。若皮膚沾上電解液，請用肥皂和水清洗乾淨。

6. 儲存

- (1) 不要將電容器儲存在高溫和高濕度的地方。儲存環境應為：

溫度：+5℃～+35℃

相對濕度：<75%

儲存場所：室內

- (2) 避免儲存在有水、鹽水或油的環境中。
- (3) 避免儲存在有毒氣體（如硫化氫、亞硫酸、亞硝酸、氯及氨等）的環境中。
- (4) 避免電容器接觸臭氧、紫外線或輻射。
- (5) 盡可能的把電容器保存在原來的封裝袋裏。

7. 處置

- (1) 請用下列任何一種方法處理電容器：
 - ①在電容器的殼體上開孔或完全解體破開後置於火中焚毀（用 800℃ 或更高的溫度）。
 - ②電容器不作焚毀時，交給工業垃圾機構進行填埋處理。
- (2) 當廢棄電容器或從線路板上卸下時，於生產過程中不使用破壞臭氧層之藥品。

8. 其他

- (1) 本公司之產品品質依據 JIS-C-5141 標準考核，其信賴性試驗方法依據 JIS-C-5102 之規範標準。
- (2) 本公司依據蒙特利爾協議書之規定，於生產過程中不使用破壞臭氧層之藥品。

NOTE: All designs and specifications are for reference only and are subject to change without prior notice. If any doubt about safety for your application, please contact us immediately for technical assistance before purchase.

注：以上所提供的設計及特性參數僅供參考作用，任何修改不作預先通知。如果在使用上有疑問，請在採購前與我們聯絡，以便提供技術上的協助。