

导电性高分子混合型铝电解电容器（后面略称为电容器）是采用导电性高分子和电解液作为混合电解质的电容器。最大限度的发挥了电容器的特长，使用时请注意以下问题。

本目录中记述的电路和“规格书”内容是用于说明我公司产品的动作示例和使用示例，对客户实际使用时的设备系统操作，恕不给予任何保证。

如因使用上述信息导致故障、损害发生，我公司概不负责。

关于“规格书”中记述的我公司产品特性是否适用于贵公司设备系统规格，最终由贵公司判断并承担相应责任。

请贵公司自行采取冗余设计、误动作防止设计等安全设计，以免因我公司产品故障导致人身事故、火灾事故发生。

1. 电路设计中的注意事项

使用电容器时，请在确认安装环境和使用环境后，在电容器产品目录或规格书中规定的电容器额定性能范围内使用。

1) 寿命

电路设计时，请选择与机器寿命相符的电容器；

(1) 电容器的电气特性会根据温度和频率的变动而变化，请在确认该变化量的基础上进行电路设计；

(2) 导电高分子混合型铝电解电容器在如下电路中使用，可能无法充分发挥功能或出现故障，因此请勿在以下电路中使用：

① 耦合电路；

② 时间常数电路；

③ 高阻抗电压保持电路；

④ 相对于额定电压，只施加了极低电压的电路；

⑤ 会受到漏电流极大影响的电路，其他串联多个电容器，并用于特殊用途时请另行咨询。

(3) 请注意利用推定寿命公式计算的结果并非保证值；

(4) 并联两个以上的电容器时，请充分考虑电流平衡（特别是导电高分子混合型铝电解电容器和普通铝电解电容器并联时，更需要考虑。）；

(5) 串联两个以上的电容器时，请充分考虑电压平衡，并将分压电阻器插入，使其与电容器并联；

(6) 在进行机器的寿命设计时，请选择相对于推断值具有充足的余裕的电容器；

(7) 此外，利用推算寿命公式计算的结果超过15年时，以15年为上限。

2) 极性

电容器具有极性，请不要加载反向电压或交流电压。如反极安装，有可能导致电路、压力阀动作等损坏现象。

3) 加载电压

电容器两端加载的总电压请不要超过电容器的额定电压。请将直流电压和叠加的纹波电压峰值的总电压设定在额定电压以下。串联2个以上电容器时，请确保各电容器上施加的电压在额定电压以下，并并联分压电阻器，以备发生漏电流。如果在工作温度范围内、额定电压以下使用，可不用降低电压。虽然规定了超过额定电压的浪涌电压，但有限制条件，不能保证长时间使用。

4) 纹波电流

请不要加载超过额定纹波电流的电流。施加过大纹波电流时，电容器内部发热会变大，导致寿命变短、压力阀动作甚至引起短路等故障。

即使在低于额定纹波电流的条件下使用，当直流偏置电压低时，也有可能造成施加反向电压。请确保在不施加反向电压的条件下使用。

额定纹波电流的频率是有限制条件的。在规定外的频率下使用时，要控制在乘以各系列规定的频率修正系数的值以下。

Conductive Polymer Hybrid Aluminum Electrolytic Capacitors (Hereinafter called capacitor) that uses highly conductive polymer electrolytic materials and electrolyte. Please read the following in order to get the most out of your capacitor.

The circuits described as examples in this catalog and the "delivery specifications" are featured in order to show the operations and usage of our products, however, this fact does not guarantee that the circuits are available to function in your equipment systems.

We are not in any case responsible for any failures or damage caused by the use of information contained herein.

You should examine our products, of which the characteristics are described in the "delivery specifications" and other documents, and determine whether or not our products suit your requirements according to the specifications of your equipment systems. Therefore, you bear final responsibility regarding the use of our products.

Please make sure that you take appropriate safety measures such as use of redundant design and malfunction prevention measures in order to prevent fatal accidents and/or fires in the event of our products malfunction.

1. Device circuits design considerations

Confirm installation and operating requirements for the capacitors, then use them within the performance limits prescribed in this catalog or product specifications.

1) Lifetime

Select the capacitors to meet the service life requirements of device.

(1) Electrical characteristics of a capacitor will change according to the temperature and frequency. Please confirm this change when designing the circuit.

(2) Capacitors may not be fully functional or fail when used in the following circuits, so do not use them in the following circuits:

① Coupled circuits;

② Time constant circuit;

③ High impedance voltage circuit;

④ A circuit in which a very low voltage is applied relative to the rated voltage;

⑤ For circuits which will be greatly affected by leakage current, series connected with several capacitors and used for special purpose, please consult separately.

(3) The results calculated by the constructive life formula are not guaranteed values;

(4) When connecting more than two capacitors in parallel, please fully consider the current balance (especially when connecting conductive polymer hybrid capacitors with normal capacitors);

(5) When connecting more than two capacitors in series, please fully consider the voltage balance. Connect the shunting resistors with the capacitors in parallel;

(6) When designing the life of the machine, please choose the capacitor with sufficient margin relative to the inferred value;

(7) The upper limit is 15 years if the calculated results exceed 15 years.

2) Polarity

Capacitors are polarized. Never apply a reverse voltage or AC voltage. Connecting with wrong polarity will short-circuit or damage the capacitor with the pressure relief vent opening early on.

3) Operating voltage

Do not apply an over-voltage that exceeds a rated voltage specified for the capacitors.

The total peak value of the ripple voltage plus the DC voltage must not exceed the rated voltage of the capacitors. Capacitors do not require voltage derating within the category temperature. Although capacitors specify a surge voltage that exceeds the full rated voltage, it does not assure long-term use but limited use under specific conditions.

4) Ripple current

Do not apply an over current that exceeds the rated ripple current specified for the capacitors. Excessive ripple current will increase heat production within the capacitors, causing the capacitors to be damaged as follows:

• Shorten lifetime

• Open pressure relief vent

• Short circuit

At the time of low DC bias voltage, reverse voltage may be applied if uses with less than rated ripple current. Please use it as far as the reverse voltage is not applied. The rated ripple current is specified along with a specific ripple frequency. Where using the capacitors at any ripple frequency other than the specified frequency, calculate the allowable ripple current by multiplying the rated ripple current by a frequency compensation factor (Frequency Multiplier) specified for each product series.

5)使用温度

电容的寿命受使用温度的影响，所以请不要在超过上限工作温度的条件下使用电容器。如果超过工作上限温度使用，电容器的寿命会缩短，并导致压力阀动作等破损。不仅限于环境温度及机器内的温度，请确认机器内的发热体（晶体管、电阻等）的辐射热、包括纹波电流自身发热等在内的温度。如果将温度设定得较低，寿命会延长。

6)漏电流

有时候漏电流会因回流焊等的热应力上升，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

7)充放电

在反复快速充放电的电路中，请不要使用通用电容器。如果用于电压差大的充放电电路，或短周期且反复急速充放电的电路中，可能导致静电容量减少，内部发热等损坏。

关于在反复充放电的电路中使用电容器相关事宜敬请咨询我司。

导电高分子混合型铝电解电容器中流过因快速充放电所产生的过大冲击电流时，会导致漏电流大幅上升、开路或短路等不良。请确保冲击电流不要超过10A。

8)电容器故障模式

导电高分子混合型铝电容器是有使用寿命的部件，在一般情况下会发生开路型磨损故障。产品及使用条件的不同有时会同时引发压力阀动作等故障。

但是，在过电压及过电流等超过保证范围的负荷条件使用电容器时，可能会发生短路模式故障。

9)电容器的绝缘

电容器的铝壳非绝缘保证型。电容器的外壳、阴极端子及阳极端子和电路板之间请进行电气绝缘。

10)电容器的使用环境

电容器请不要在以下环境下使用：

(1)直接溅水、盐水、油或处于结雾状态的环境

(2)阳光直接照射的环境

(3)臭氧、紫外线及放射线照射的环境

(4)充满有毒气体（硫化氢、亚硫酸、亚硝酸、氯及其化合物、溴及其化合物、氨等）的环境

(5)有酸性及碱性溶剂溅落的环境

振动或冲击条件超过产品目录或规格说明书规定范围的过激环境（标准振动条件以JIS C5101-4为准）。

11)电容器的配制

电容器使用了以可燃性有机溶剂为主要溶媒的导电性电解液和可燃性电解纸。当电解液万一漏出到印刷线路板上时，会腐蚀电路线路，造成电路线路间的短路，进一步导致冒烟、起火，因此，请在确认以下内容后进行设计。请事先确认以下内容后再进行设计：

(1)请将印刷电路板的孔间距与电容器的端子间距保持一致；

设计时请不要将配线及电路板靠近电容器的压力阀部分；

(2)横向放置时，请勿使压力阀以及阳极端子朝下；

请避免在电容器的周围以及印刷配线板的背面（电容器的下面）设置发热零部件；

(3)贴片型电容器用印刷配线板的线路，请参照产品目录规格书的推荐尺寸进行设计；

(4)将电容器安装于两面印刷配线板时，电容器的下方请不要设计多余的线路板孔及连接线路板正面的贯穿孔；

(5)将电容器安装于两面印刷配线板时，电容器主体的安装部位请注意不要设置配线线路。

5)Operating temperature (Category temperature)

Do not apply high temperatures that exceed the upper limit of the category temperature range specified for the capacitors. Using the capacitors at temperatures higher than the upper limit will considerably shorten the lifetime of the capacitors and make the pressure relief vent open. The temperature, please confirm the temperature of the capacitors which included the ambient temperature of the device, not only the temperature in the device but also radiant heat of the heating element (power transistor, resistance) in the apparatus, self heating caused by the ripple current. Additionally, please do not place heating element on the back side of the capacitors. In addition, please use the capacitors within category temperature range because the life of the capacitors are affected by the operating temperature. In other words, lowering ambient temperatures will extend the expected lifetime of the capacitors.

6)Leakage current

The leakage current may increase due to thermal stress such as reflow soldering. After that, however, the leakage current will gradually decrease by self-healing action of the dielectric oxide layer when the capacitors are applied with a voltage less than the rated voltage within the Category Temperature range. As the voltage is closer to the rated voltage and the temperature is closer to the upper limit of Category Temperature range, the leakage current decreases faster. The leakage current will increase by the following factors,

(1)Soldering

(2)Testing of high temperature exposure with no voltage applied, high temperature/humidity storage, temperature cycles, etc.

7)Charging and discharging

Do not use capacitors in circuits intended for rapid charge and discharge cycle operations. If capacitors are used in the circuits that repeat a charge and discharge with a large voltage drop or a rapid charge and discharge at short interval cycle, capacitance will decrease and/or the capacitors will be damaged by internal heat generation. Please consult us the capacitors to use for the circuit where rapid charge and discharge is repeated. Please be careful about rush currents. Recommend to install protective circuit.

Make sure that the Impulse current flowing through the capacitor does not exceed 10A.

8)Failure mode of capacitors

Non-solid aluminum electrolytic capacitors have a limited lifetime which ends in an open circuit failure mode, in general. Depending on the product type and operating conditions, the failure mode may involve in opening of the pressure relief vent. But it may lead to shot circuit mode failure when capacitor is used in the overload more than the guarantee ranges including over voltage and the over current.

9)Capacitor insulation

The can case of capacitor does not assure electrical insulation. The outer coating on can case is aimed for indication and does not assure function of the electrical insulation. Electrically isolate the outer can case of a capacitor from the negative terminal, the positive terminal and circuit patterns.

10)Operating conditions

Do not use/expose capacitors to the following conditions:

(1)Direct contact with water, salt water or oil, or high condensation environment.

(2)Direct sunlight

(3)Toxic gases such as hydrogen sulfide, sulfurous acid, nitrous acid, chlorine and its compounds, bromine and its compounds and ammonium.

(4)Ozone, ultraviolet rays or radiation.

(5)Extreme vibration or mechanical shock that exceeds limits in the catalogs or product specifications.

The standard vibration condition is applicable to JIS C 5101-4.

11)Mounting

Capacitors contain paper separators and electric-conductive electrolyte that contains organic solvent as main solvent material, both of which are flammable. If the electrolyte leaks onto a printed circuit board, it can erode the device circuit pattern, may short-circuit the copper traces, smoke and burn. Make sure of designing a PC board as follows:

(1)For radial capacitors, design the terminal holes on the PC board to fit the terminal dimension of the capacitor.

Do not locate any wire or circuit pattern over the pressure relief vent of a capacitor.

(2)Avoid locating any heat source components near capacitors or on the opposite side of the PC board under capacitors.

(3)Design the solder land on the PC board in accordance with the catalog or the product specification.

(4)In designing a double-sided PC board, do not locate any through-hole via or unnecessary hole underneath a capacitor.

(5)In designing a double-sided PC board, do not print any circuit pattern underneath a capacitor.

12)在强调安全的产品上的应用

在涉及人生安全的用途、因设备故障、误动作、缺陷可能对人生安全和财产造成损害的用途，或可能会对社会造成巨大影响的以下特定用途使用本产品时，请于使用前与我公司联系，在协商后进行使用：

- (1)航空航天设备
- (2)核能设备
- (3)医疗设备
- (4)运输设备（汽车、列车、船舶等）
- (5)交通机构控制设备
- (6)防灾防盗设备
- (7)公共性较高的信息处理设备
- (8)海底设备
- (9)其他特定用途设备

2.安装注意事项

1)组装时

(1)对组装到设备上的已经通电的电容器，请勿再次使用。除了定期检修时为检测电气性能而拆卸的电容器外，均不能再次使用；

(2)即使将电容器放电后，端子间仍有可能产生电压。此时，请通过1KΩ的电阻器进行放电；

(3)在超过室温35°C、湿度75%RH的条件下，超过产品目录书或规格说明书的规定期限进行长期保存时，电容器的漏电流可能增大。此时，请通过1KΩ的电阻进行电压处理；

(4)安装前，请确认电容器的额定规格（静容量及额定电压）；

(5)安装前请确认电容器的极性；

(6)请勿将电容器跌落到地面，请勿使用跌落后的电容器；

(7)安装时请勿使电容器变形；

(8)请确认电容器的端子和印刷线路板的孔间距尺寸一致后，再进行安装；

(9)不可对电容器施加产品目录或规格说明书规定的机械强度上的力。自动装配机在吸附、装配及位置对准时，或者切割端子时都有可能产生应力，请注意它的冲击力。

2)焊接时

(1)利用烙铁焊接时，请确认以下内容：

①焊接条件（温度、时间）不可超出目录书或规格书中规定范围；

②烙铁请不要触碰到电容器的主体；

③利用烙铁进行修整时，如需要先将已焊接的电容器卸下，请将焊锡充分熔化后再拆卸，避免电容器端子受力。

(2)进行波峰焊时，请确认以下内容：

①进行焊接时，请勿将电容器本体浸入到熔融的焊剂中。请插入印刷线路板作为阻隔，只对放电容器侧反面的基板表面进行焊接。

②焊接条件（预热、焊接温度、端子浸渍时间）不可超出目录书或规格书中规定的范围；

③端子部以外的部分，请不要有焊剂附着；

④进行焊接时，请注意避免其他部件翻倒接触到电容器。

(3)进行回流焊时，请确认以下内容：

①焊接条件（预热、焊接温度、时间、回流焊次数）请不要超出规格书中的规定范围；

②使用红外线加热器时，由于红外线吸收率根据电容器的颜色及材料的不同而不同，请注意加热的程度；另外，回流焊的加热器种类及位置的不同，电容器承受的温度会有差异，请注意加热程度。

(4)焊剂的选择

在无卤类焊剂中，有一些虽然不含离子型卤化物，但却含有大量非离子型卤化物，当这类化合物进入电容器时，将与电解液发生化学反应，可能产生与清洗后结果相同的不良影响。故请选用不含有非离子型卤化物的焊剂。

(5)焊接后的处理

①请不要使电容器的主体倾斜、倒地或扭曲；

②请不要抓住电容器的主体搬运电路板；

12) Using capacitors for significantly safety-oriented applications

Consult with us in advance of usage of our products in the following listed applications.

(1)Aerospace equipment

(2)Nuclear power equipment .

(3)Medical equipment

(4)Transport equipment (automobiles, trains, ships, etc.)

(5)Transportation control equipment

(6)Disaster prevention / crime prevention equipment

(7)Highly publicized information processing equipment

(8)Submarine equipment

(9)Other applications that are not considered general-purpose applications.

2.Installation

1)Assembling

(1)Do not try to reuse the capacitors once assembled and electrified

(2)Capacitors may have been spontaneously recharged with time by a recovery voltage phenomenon. Capacitors may produce recovery voltage higher than aluminum electrolytic capacitors and conductive polymer aluminum solid capacitors. In this case, discharge electricity through approximately 1kΩ before use.

(3)If capacitors have been stored at any conditions more than 35°C and 75%RH for long storage periods of time more than the limits specified in the catalogs or product specifications, they may have high leakage current. In this case, make pre-conditioning by applying the rated voltage through a resistor of approximately 1kΩ.

(4)Confirm the rated capacitance and voltage of capacitors before installation.

(5)Confirm the polarity of capacitors before installation.

(6)Do not try to use the capacitors that were dropped to the floor and so forth.

(7)Do not deform the can case of a capacitor.

(8)Verify that the lead spacing of the capacitor fits the hole spacing in the PC board before installing the capacitors.

(9)Do not apply excessive mechanical force to capacitors more than the limits prescribed in the catalogs or product specifications. Avoid excessive mechanical force while the capacitors are in the process of vacuum-picking, placing and positioning by automatic mounting machines or cutting the lead wires by automatic insertion machines.

2)Soldering and heat resistance

(1)For soldering using a soldering iron, consider the following conditions:

①Soldering conditions (temperature and time) should be within the limits prescribed in the catalogs or product specifications.

②Do not touch the body of a capacitor with the hot tip of the soldering iron.

③When trimming with soldering iron, if it is necessary to remove the welded capacitor first. Please melt the solder tin fully before removing, to avoid force on capacitor terminals.

(2)Verify the following when flow soldering:

①Do not dip the body of a capacitor into the solder bath only dip the terminals in. The soldering must be done on the reverse side of PC board.

②Soldering conditions (preheat, solder temperature and dipping time) should be within the limits prescribed in the catalog or the product specifications.

③Do not apply flux to any part of capacitors other than their terminals

④Make sure the capacitors do not come into contact with any other components while soldering.

(3)For reflow soldering, consider the following conditions:

①Soldering conditions (preheat, reflow temperature and time) should be within the limits prescribed in the catalogs or product specifications.

②When using the infrared heater and setting its temperatures, adjust the heating levels taking into consideration that the color and materials of a capacitor vary in their infrared absorbance.

(4)Flux selection

Some halogen-free fluxes contain large amounts of nonionic halides, although they do not contain ionic halides. When these compounds enter the capacitor, they react with the electrolyte and may have the same adverse effects as after cleaning. Therefore, please use the flux that does not contain nonionic halides.

(5)Handling after soldering

①Do not tilt, push down or twist the body of the capacitor.

②Do not grab the body of the capacitor to carry the assembly board.

③请不要让其他物体碰到电容器（当重叠放置线路板时，请不要使线路板或其他零部件碰到电容器）

④安装好电容器的线路板不可掉落。

(6)基板清洗

①电容器不可用以下清洗剂进行清洗：

卤素类溶剂：可能导致电容器故障

碱性类溶剂：可能导致电容器密封铝壳腐蚀

萘烯类、石油类溶剂：可能导致封口橡胶老化

二甲苯：可能导致封口橡胶老化

丙酮：印刷标示脱落

②需要进行清洗时，请不要超出产品目录和规格书规定的范围；请特别注意超声波清洗条件。

③清洗电容器时，请进行清洗剂的污染管理（电导率、PH、比重、含水量等）。清洗后，请不要保管在清洗液或密封的容器中。此外，请用热风（电容器工作上线温度以下）吹10分钟以上进行充分干燥，避免线路板及电容器上有残留清洗液。

④一般情况下，电容器很容易和卤素离子发生反应（特别是氯离子），因使用的电解质和封装材料等的不同，反应的程度有所差异，但当一定量的卤素离子侵入到电容器内部时，会导致电容器在使用过程中发生腐蚀反应，并引起漏电流大幅增加，发热，压力阀动作、开路等破坏性故障。

⑤由于环境问题（臭氧层破坏引起的气候变暖，环境破坏），使用新溶剂替代过去的氟利昂113（二氯二氟甲烷等）、氯甲烷、三氯乙烷进行清洗时，请勿超出容许条件的范围。

(7)固定剂、涂层剂

①请不要使用含卤素类溶剂的固定材料和涂层剂；

②电容器上使用固定剂和涂层剂时，请确认以下内容：

a.线路板和电容器封口之间不可残留有焊接残渣或污垢；

b.在涂固定剂或涂层剂之前，请先干燥清洗液。且封口处不能全部被堵住，电容器封口部完全被树脂堵住时，因电容器内部的压力无法有效释放，可能会引发险情；

c.当固定剂或涂层剂中的卤素离子过多时，可能会导致电容器异常；

d.固定剂、涂层剂中使用的个别种类溶剂，可能会导致电容器表面发生变化，请务必注意。

(8)关于熏蒸处理

在电子设备类进出口时，可能需要用溴化甲烷等卤化物进行熏蒸处理。此时，如果电容器接触到溴化甲烷等卤素化合物，电容器可能会发生和基板清洗类似的腐蚀现象。故在对电容器及装配了电容器的机器进行熏蒸处理时，亦或者将经过熏蒸处理的托盘等用作包装材料时，请充分注意避免电容器暴露在卤素环境中。

3. 配套使用中的注意事项

1) 请不要直接接触电容器的端子；

2) 电容器的端子之间不可有导体以免造成短路。此外，请不要把酸性及碱性溶液等导电性溶液溅到电容器上；

3) 请确认装配了电容器的成套电路的安装环境，请不要在以下环境中使用：

①直接溅水或油到电容器上、结露的环境

②阳光直接照射的环境

③臭氧、紫外线及放射线照射的环境

④充满有毒气体（硫化氢、亚硫酸、亚硝酸、氯及其化合物、溴及其化合物、氨等）的环境

⑤振动或冲击条件超过产品目录或规格书规定范围的环境

4. 保养检查注意事项

1) 请定期检查使用于工业设备上的电容器。对电容器进行保养检查时，请务必先切断设备电源，并使电容器内储存的电充分放干净。当使用万用表检测时，请先确认万用表的极性后再使用。

2) 请按以下内容进行定期检查：

③Do not hit anything against the capacitor. When stacking the assembled boards, do not put any of the PC boards or other components against the capacitor.

④Do not drop the assembled board.

(6)Cleaning assembly boards

①Do not clean capacitors with the following cleaning agents:

• Halogenated solvents: cause capacitor failures due to corrosion.

• Alkali system solvents: corrode (dissolve) the aluminum can case.

• Terpene and petroleum system solvents: deteriorate the rubber seal materials.

• Xylene: deteriorates the rubber seal materials as well.

• Acetone: erases the markings printed on a capacitor.

②Where cleaning is necessary, use only solvent resistant type capacitors that have been assured for the cleaning within the specific cleaning conditions prescriber in the catalogs or product specifications. In particular, carefully set up the conditions for ultrasonic cleaning system. Consult us regarding alternative CFCs or other cleaners before use.

③Where cleaning the capacitors, confirm the following conditions:

• Control the contamination (the conductivity, pH, specific gravity, water content, etc.) of the cleaning agents.

• After the cleaning, do not leave the capacitors (assembly boards) in an environment of cleaning agent-rich or in a closed container. Sufficiently evaporate the residual cleaning agent from the assembly boards and the capacitors by forced hot air at temperatures less than the upper limit of category temperature range for more than 10 minutes.

④In general, aluminum electrolytic capacitors are sensitive to contamination of halogen ions (particularly to chlorine ions). Depending on the properties of the electrolyte and rubber seal materials used in a capacitor, the halogen ions lead up to catastrophic failures on the capacitor. Where the inside of a capacitor has been contaminated with more than a certain amount of halogen ions and the capacitor is in use, the corrosion reaction of aluminum occurs. The corrosion causes the capacitor to have a significant increase in leakage current with heat produced, open the pressure relief vent and become open circuit mode failure.

⑤Due to global environmental issues (greenhouse effects and other environmental destruction by depletion of the ozone layer), the conventional cleaning solvents of CFC 113, Trichloroethylene and 1,1,1-trichloroethylene were replaced by substitutes.

(7)Adhesives and coating materials

①Do not use any adhesive or coating materials containing halogenated solvents.

②Make sure of the following conditions before applying adhesive or coating materials to a capacitor,

a.No flux residue nor stain is left between the rubber seal of a capacitor and PC board.

b.Dry the capacitor to remove residual cleaning agents before applying adhesive and coating materials. Do not cover up the entire surface of the rubber seal of the capacitor with adhesives or coating materials.

c.where the adhesive and coating materials contain a large amount of halogen ions, the halogen ions will contaminate the inside of the capacitor through the rubber seal materials, causing the capacitor to become a failure.

d.Depending on solvent materials that the adhesive or coating materials contains, note that the surface of a capacitor may change in appearance.

(8)Fumigation

In exporting or importing electronic devices, they may be exposed to fumigation with halide such as methyl bromide. Where the capacitors are exposed to halide such as methyl bromide, the capacitors will be damaged with the corrosion reaction with halogen ions in the same way as cleaning agents.

3. Precautions during operation of devices

1) Never touch the terminals of a capacitor directly with bare hands.

2) Do not short-circuit between the capacitor terminals with anything conductive. Also, do not spill any conductive liquid such as acid or alkaline solution over a capacitor.

3) Confirm environmental conditions where the device will be placed. Do not use the device in the following environmental conditions:

①Water or oil spatters, or high condensation environment.

②Direct sunlight.

③Ozone, ultraviolet rays or radiation.

④Toxic gases such as hydrogen sulfide, sulfuric acid, nitrous acid, chlorine and its compounds, bromine and its compounds and ammonium.

⑤Severe vibration or mechanical shock conditions beyond the limits prescribed in the catalog or product specification.

4. Maintenance inspections

1) For industrial use capacitors, make periodic inspections of the capacitors. Before the inspections, turn off the power supply of the device and discharge the electricity of the capacitors. Where checking it by a volt-ohm meter, confirm the polarity beforehand. Do not apply mechanical stress to the terminals of the capacitors during inspection.

2) Characteristics to be inspected

①外观有无明显异常；

②电气性能（静电容量、损失角正切值、漏电流以及ESR等产品规格书中规定的项目）；当以上内容有异常时，请确认电容器的规格，并进行替换等恰当的处理。

5.紧急情况

1)一定尺寸以上的电容器，为了降低异常的压力装配有压力阀。发现配套设备中使用的电容器的压力阀动作过程中有气体溢出时，请切断设备的电源或拔下电源插头。

2)当电容器压力阀动作时，会喷出超过100°C的高温气体，请不要将脸部靠近。万一喷出的气体不慎进入眼睛或吸入时，请立刻用清水洗眼、漱口，严重时请及时就医。当电解液液附在皮肤上时，请用肥皂水冲洗。

6.保存条件

1)请将电容器置于温度在5~35°C、湿度在75%RH以下的环境中存放。

2)为保持良好的焊接性，保存期限原则上为出厂后2年以内；

3)请尽量以密封包装状态保存；

4)请避免在以下环境中保存：

①溅水、高温高湿及结露的环境；

②溅油、或充满气体油成分的环境

③溅盐水、或充满盐水的环境

④充满酸性有毒气体（硫化氢、亚硫酸、亚硝酸、氯、溴、溴化甲烷等）的环境

⑤充满氨气等碱性气体的环境

⑥酸性及碱性溶剂的环境

⑦阳光直射、或臭氧、紫外线及放射线照射的环境

⑧有振动或冲击的环境中

7.废弃处理

1)废弃电容器时，请交给专业的工业废弃物处理厂进行焚烧或填埋处理。焚烧处理时，请用800°C以上的高温，避免产生卤素气体等有害气体。此外，为了防止电容器爆炸，请在电容器上开孔或者充分碾压碎之后再焚烧；

2)废弃电容器时，请确认其是否已被完全放电。

8.关于AEC-Q200

AEC是Automotive Electronics Council(车载电子零部件评议会)的简称，是由美国的主要汽车制造商和电子零部件制造商设立，现在由电装、零部件各制造公司构成的行业团体。负责电子零部件的可靠性试验及认定标准试验的标准化工作。

AEC-Q200是被动元器件的认定用可靠性试验标准，规定了各类元器件的试验项目及试验数量等。其中也规定了我公司主要产品“铝电解电容器”的可靠性试验的标准。

应以车载客人为主的客人试验要求，我公司可以按照要求提供铝电解电容器基于AEC-Q200标准的试验结果。

电子零部件制造商单独无法单纯的判断[AEC-Q200认定]。我公司针对对象产品，会做出[基于]、[符合]、[可使用]等说法的判断。但个别客户，个别规格的产品，需要按照[可靠性试验计划]实施评价试验。详情请另寻咨询。

9.环境有害物质对应

本公司产品符合RoHS环保指令的有害物质相关法规（个别产品可能含有免除含有的限制物质。有关特殊法规的负荷情况，请另行咨询。）。。

10.产品目录内容

产品目录中的内容可能未经提示而变更，请事先了解。此外，产品目录上的数据只是代表值，不保证性能。

有关详细内容，请参照《电子设备用固定铝电解电容器使用事项指南JEITA RCR-2367D（2019年3月）》。

①Significant damage in appearance: vent opening, electrolyte leakage, etc.

②Electrical characteristics: Leakage current, capacitance, $\tan\delta$, ESR and other characteristics prescribed in the catalogs or product specifications. If finding anything abnormal on the characteristics above, check the specifications of the capacitor and take appropriate actions such as replacement.

5.Contingencies

1)A capacitor with more than a certain case size has the pressure relief vent functioning to escape abnormal gas pressure increase. If gas expels from a venting capacitor, disconnect the power supply of the device or unplug the power supply cord.

2)The gas expelled from a venting capacitor is more than 100°C. Never expose your face to the capacitor. If your eyes are exposed to the gas or you inhale it, immediately flush your eyes and/or gargle with water. If the electrolyte comes in contact with the skin, wash with soap and water.

6.Storage

1)Do not store capacitors at high temperature or high humidity. Store the capacitors indoors at temperatures of 5 to 35°C and humidities of less than 75%RH.

2)In principle, aluminum electrolytic capacitors should be used within 2 years after production.

3)Keep capacitors packed in the original packaging material wherever possible.

4)Avoid the following storage environmental conditions:

①Water spattering, high temperatures, high humidity or condensation environment.

②Oil spattering or oil mist filled.

③Salt water spattering or salt filled.

④Acidic toxic gases such as hydrogen sulfide, sulfuric acid, nitrous acid, chlorine, bromine and methyl bromide filled.

⑤Alkaline toxic gases such as ammonium filled.

⑥Acid or alkaline solutions spattering.

⑦Direct sunlight, ozone, ultraviolet rays or radiation.

⑧Extreme vibration or shock loading.

7.Capacitor disposal

1)Please consult with a local organization for the proper disposal of industrial waste. For incinerating capacitors, apply a high temperature incineration (over 800°C). Incinerating them at temperatures lower than that may produce toxic gases such as chlorine. To prevent capacitors from explosion, punch holes in or sufficiently crush the can cases of the capacitors, then incinerate.

2)When you discard a capacitor, make sure it is fully discharged.

8.About AEC-Q200

The Automotive Electronics Council (AEC) was originally established by major American automotive related manufactures. Today, the committees are composed of representatives from the sustaining Members of manufacturing companies in automotive electrical components. It has standardized the criteria for “stress test qualification” and “reliability tests” for electronic components.

AEC-Q200 is the reliability test standard for approval of passive components in Automotive applications. It specifies the test type, parameters and quantity, etc. for each component. The criteria of the reliability tests such as for our main products, “Aluminum Electrolytic Capacitors” are described in this standard.

Pursuant to the customer’s specific testing requirements, CHANG submits the test results according to AEC-Q200 for Aluminum Electrolytic Capacitors used in automotive applications on request.

An electronic component manufacturer cannot simply claim that their product is “AEC-Q200 Qualified”. It can be claimed “Compliant”, “Capable”, “Available”, etc., however each component must be tested per each users “Qualification Test Plan” in order to claim AEC-Q200 status. Please contact us for more information.

9.Response to the Substances of Concern

CHANG aims for developing products that meet laws and regulations concerning substances of concern. (Some products may contain regulated substances for exempted application)

10.Catalogs

Specifications in the catalogs are subject to change without notice. Test data shown in the catalogs are not assured as the whole performance values, but typical values. For more details, refer to JEITA RCR-2367D (March 2019) with the title of “Safety Application Guide for fixed aluminum electrolytic capacitors for use in electronic equipment”.