The GPCAP is a Conductive Polymer Solid Aluminum Capacitor that uses highly conductive polymer electrolytic material.
Please read the following in order to get the most out of your GPCAP capacitor.

●Designing Device Circuits

1. Types of Circuits Where NPCAPTM Capacitors are Not to be Used.
   The leakage current in conductive polymer solid aluminum capacitors (hereafter called capacitors) may vary depending on thermal stresses during soldering. Avoid the use of capacitor in the following types of circuits:
   1.1. High-impedance circuits that are to sustain voltages.
   1.2. Coupling circuits
   1.3. Time constant circuits
   1.4. Other circuits that are significantly affected by leakage current
2. Circuit Design
   Verify the following before designing the circuit:
   2.1. The electrical characteristics of the capacitor will vary depending on differences in temperature and frequency. You had better design after verifying the scope of these factors.
   2.2. When connecting two or more capacitors in parallel, ensure that the design takes current balancing into account.
   2.3. When two or more capacitors are connected in series, variability in applied voltage may cause over-voltage conditions. Contact Nippon Chemi-Con before using capacitors connected in series.
   2.4. Avoid putting heat generating parts either around the capacitor or on the reverse of the circuit board.
3. Use in High Reliable and Critical Applications
   Consult with Nippon Chemi-Con before using these capacitors in applications involving human life: Aviation/aerospace equipment, Nuclear power equipment, Medical equipment and Automotive equipment, or in applications where capacitor failure could have a major impact.
4. Polarity
   The GPCAP is a polarized solid aluminum electrolytic capacitor.
   Do not apply either reverse voltages or AC voltages to the polarized capacitors, using reversed polarity may cause a short circuit. Refer to the catalog, product specifications or capacitor body to confirm the polarity prior to use.
5. Operating Voltage
   Do not apply a greater than rated voltage, if a voltage greater than the rated voltage is suddenly applied the leakage current increases causing shorting. The peak voltage of superimposed AC voltages (ripple voltages) on DC voltages must not exceed the full rated voltage. While there are specifications for surge voltages exceeding the rated voltage, usage conditions apply, and continued operation for extended periods of time under such conditions cannot be guaranteed.
6. Ripple Current
   Do not apply currents in excess of the rated ripple current. The superimposition of a large ripple current increases the rate of heating within the capacitor. When excessive ripple current is imposed the internal temperature increases which can shorten life and shorting may occur.
7. Operating Temperature
   Use within the stated category temperature range, if used outside this range, characteristics can deteriorate potentially leading to problems.
8. Charging and Discharging the Capacitor
   Do not use the GPCAP capacitor in circuits where the capacitor is repetitively charged and discharged rapidly. Repetitively charging and discharging the capacitor rapidly may reduce the capacitance or may cause damage due to internal heating. Use of a protective circuit to ensure reliability is recommended when rush currents exceed 20A.
9. Leakage current
   The leakage current may increase when the capacitors are subjected to the conditions below. 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,
   9.1. Soldering
   9.2. Testing of high temperature exposure with no voltage applied, high temperature/humidity storage, temperature cycles, etc.

GPCAP是采用了高导电率导电性高分子电解质的固体铝电解电容器。
请注意以下各点，以便使用时可以最大限度地发挥GPCAP的特殊功能。

● 设计方面的注意事项

1. 禁止使用电路
   导电性高分子固体铝电解电容器（以下称为电容器）有可能因焊接时的热应力使其漏电流发生变化。请避免在以下电路中使用。
   1.1. 高电阻电压保持电路
   1.2. 耦合电路
   1.3. 时间常数电路
   1.4. 其他漏电流受影响较大的电路
2. 电路设计
   请确认在以下内容的基础上进行电路设计:
   2.1. 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。
   2.2. 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。
   2.3. 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。
   2.4. 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. 强调安全的产品上的应用
   如果应用在与生命相关的用途（①航空航天用器械 ②原子能用器械 ③医疗用器械 ④车辆用器械）以及因产品的缺陷会给社会带来极大影响的用途上，请务必与本公司协商协议之后使用。
4. 极性
   GPCAP 是有极性的固体铝电解电容器。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。关于极性，请确认产品目录或规格说明书的尺寸图。
5. 外加电压
   请不要外加超过额定电压的电压，因为即使只是一瞬间加载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。请将和直流电压叠加的纹波电压的峰值设定在额定电压以下。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。
6. 纹波电流
   请不要加载超大电流(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。
7. 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。
8. 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因内部发热电容器损坏等。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。
9. 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：
   9.1. 焊接
   9.2. 高温无负载、高温高湿、温度急剧变化等试验

批注 [Y.L1]:
正文字体：
中文，宋体，7 号字
英文，Arial，7 号
固定行距 10 磅

批注 [Y.L2]:
标题行字体
字体同上，14 号字体，
固定行高 1.7cm
单倍行距

批注 [Y.L3]: 正文行高为：
1 行/0.5；2 行/0.8；3 行/1.1；
4 行/1.4；5 行/1.7；6 行/2.0；7 行/2.3；
8 行/2.6；9 行/2.9；10 行 3.2；11 行/3.6；12 行/3.9

10. Failures and Service Life
Based on the GB/T 1772 Standard, the failure rate for GPCAP capacitors (with a 60% reliability standard) is as follows:
0.5%/1,000 hours (applied the rate voltage at the upper limit of Category Temperature range)
10.1. Failure Modes
10.1.1. The principal failure mode is wear-out failure, that is, capacitance decreases and ESR increases, and eventually the capacitors become open circuit failure. In addition, short circuit failure may happen with over-voltage and excessive current applied to the capacitors.
10.1.2. The failure rate would be reduced by reducing ambient temperatures, ripple current and applying voltage.
10.1.3. If the short-circuited capacitor, which may be caused by over-voltages higher than the rated voltage or other conditions, has a large amount of current passed through, the aluminum can of the capacitor bulges and might be expelled with odor gas emitted.
10.1.4. The product contains flammable materials. If the short causes a spark it may ignite. Please be careful when installing the product, its position and the layout design.
a).Increase safety by using in conjunction with a protective circuit or protective equipment.
b).Install measures such as redundant circuits so that the failure of a part of the equipment will not cause unstable operation.
10.2. Service Life
GPCAP uses rubber as the sealing material, so the service life depends on the thermal integrity of this rubber. Consequently, it is recommended to use the capacitor at a lower temperature than the maximum temperature for the capacitor category.

11. Capacitor Insulation
Insulation of the capacitor's case is not guaranteed. Ensure electrical insulation between the capacitor case, negative electrode, positive electrode and circuit pattern.

12. Capacitor Usage Environment
Do not use/expose capacitors to the following conditions.
12.1. Oil, water, salty water, take care to avoid storage in damp locations.
12.2. Direct sunlight
12.3. Toxic gases such as hydrogen, sulfide, sulfurous acids, nitrous acids, chlorine and chlorine compounds, bromine and bromine compounds, ammonia, etc.
12.4. Ozone, ultraviolet rays and radiation.
12.5. Severe vibration or mechanical shock conditions beyond the limits advised in the product specification section of the catalog.
The standard vibration condition is applicable to IEC 60384-4.

13. Capacitor mounting
13.1. For the surface mount capacitor, design the solder land on the PC board in accordance with the catalog or the product specification.
13.2. For radial capacitors, design the terminal holes on the PC board to fit the terminal dimension of the capacitor.
13.3. Do not pass any circuit traces beneath the seal side of a capacitor. The trace must pass 1 to 2mm to the side of the capacitor.
13.4. Do not pass any via holes underneath a capacitor on double sided PC board.
13.5. In designing double-sided PC boards, do not locate any copper trace under the seal side of a capacitor

● MOUNTING

1. Installing
1.1. Do not reuse capacitors already assembled in equipment that have been exposed to power.
1.2. The capacitor may have self charge. If this happens, discharge the capacitor through a resistor of approximately 1k before use.
1.3. If capacitors are stored at a temperature of 35℃ or more and more than 75%RH, the leakage current may increase. This may also occur if the capacitors are stored for a longer period than the period which is specified in the catalog or the product specification. In this case, they can be reformed by the voltage treatment through a resistor of approximately 1k.
1.4. Verify the rated capacitance and voltage of the capacitors when installing.
1.5. Verify the polarity of the capacitors.
1.6. Do not use the capacitors if they have been dropped on the floor.
1.7. Do not deform the case of the capacitors.
1.8. Verify that the lead spacing of the capacitor fits the hole spacing in the PC board before installing the capacitors.

10. 故障和使用寿命
GPCAP 的故障率适应 GB/T 1772 标准，信赖性水准为 60%，具体如下。
0.5% / 1,000 小时（工作上限温度、加载额定电压）

10.1. 故障模式
10.1.1. 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。有时候也会偶发因过大电压和超大电流导致的短路模式。
10.1.2. 通过降低周围温度、纹波电流、加载电压可以减少故障率。
10.1.3. 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铝壳膨胀或剥落，发出臭气。
10.1.4. 构成产品的材质中含有可燃物质，短路部位有可能因为电火花等而起火。产品的安装方法、位置、图形设计等请考虑以下设计方面的注意点，确保绝对安全。
a).设置保护电路、保护装置，确保设备安全。
b).设置冗长电路等， 以便设备不会因为单个的故障而不稳定。
10.2. 寿命
GPCAP 的封装材料因使用了橡胶，高温导致的橡胶老化等左右了电容器的寿命，因此，使用时请注意降低温度。请注意利用推定寿命公式计算的结果并非保证值。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量的电容器。此外，利用推定寿命公计算的结果超过 15 年时，以 15 年为

11. 电容器的绝缘
电容器的铝壳未保证绝缘。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。

12. 电容器的使用环境
电容器请不要在以下环境下使用。
12.1. 直接溅水、盐水及油，或者处于结露状态的环境
12.2. 阳光直接照射的环境
12.3. 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
12.4. 臭氧、紫外线及放射线照射的环境
12.5. 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，标准的振动条件，以 IEC 60384-4 为准。

13. 电容器的配置
13.1. 贴片型电容器印刷配线板的焊盘图形请参照产品目录或规格说明书的规定进行图形设计。
13.2. 引线型请将电容器的端子间隔和印刷配线板的孔间隔对准。
13.3. 请不要在电容器的封口部下面进行电路配线。如果电容器附近配线，请确保线路间隔在 1mm（可以的话 2mm）以上。
13.4. 两面印刷配线板上安装电容器时，设计时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。
13.5. 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。

● 电容器安装

1. 组装时
1.1. 已经成套组装并通过电的电容器请勿再次使用。
1.2. 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。
1.3. 在超过室温 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。
1.4. 安装前请确认电容器的额定规格（静电容量及额定电压）
1.5. 安装前请确认电容器的极性。
1.6. 请勿使用跌落到地板等上的电容器。
1.7. 安装时请勿使电容器变形。
1.8. 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。

1.9. Do not apply any mechanical force in excess of the limits prescribed in the catalog or the product specification of the capacitors. Avoid subjecting the capacitor to strong forces, as this may break the electrode terminals, bend or deform the capacitor, or damage the packaging, and may also cause short/open circuits, increased leakage current, or damage the appearance. Also, note the capacitors may be damaged by mechanical shocks caused by cut the lead wire, the vacuum/insertion head, component checker or centering operation of an automatic mounting or insertion machine.

2. Heat Resistance during Soldering

Ensure that the soldering conditions meet the specifications recommended by Gajitone. Note that the leakage current may increase or capacitance may decrease due to thermal stresses that occur during soldering, etc. Furthermore, the leakage current which rose gradually decreases, when voltage is applied at below the category upper limit temperature. Additionally the self repairing action is faster when voltage near the rated voltage rather than at a higher voltage is applied at below the category's upper temperature limit.

2.1. Verify the following before using a soldering iron:

2.1.1. That the soldering conditions (temperature and time) are within the ranges specified in the catalog or product specifications.

2.1.2. That the tip of the soldering iron does not come into contact with the capacitor itself.

2.2. Verify the following when flow soldering:

2.2.1. Do 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.

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

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

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

2.3. Verify the following when reflow soldering:

2.3.1. Soldering conditions (preheat, solder temperature and soldering time) should be within the limits prescribed in the catalogs or the product specification.

2.3.2. The heat level should be appropriate. (Note that the thermal stress on the capacitor varies depending on the type and position of the heater in the reflow oven, and the color and material of the capacitor.)

2.3.3. Please consult us about Vapor phase soldering (VPS).

2.3.4. Except for the surface mount type, reflow soldering must not be used for the capacitors.

2.4. Do not reuse a capacitor that has already been soldered to PC board and then removed. When using a new capacitor in the same location, remove the flux, etc. first, and then use a soldering iron to solder on the new capacitor in accordance with the specifications.

2.5. Confirm before running into soldering that the capacitors are SMD for reflow soldering.

3. Handling After Soldering

Do not apply any mechanical stress to the capacitor after soldering onto the PC board.

3.1. Do not lean or twist the body of the capacitor after soldering the capacitors onto the PC board.

3.2. Do not use the capacitors for lifting or carrying the assembly board.

3.3. Do not hit or poke the capacitor after soldering to PC board. When stacking the assembly board, be careful that other components do not touch the aluminum electrolytic capacitors.

3.4. Do not drop the assembled board.

4. Cleaning PC boards

4.1. Do not wash capacitors by using the following cleaning agents. Solvent resistant capacitors are only suitable for washing using the cleaning conditions prescribed in the catalog or the product specification. In particular, ultrasonic cleaning will accelerate damage to capacitors.

a). Halogenated solvents; cause capacitors to fail due to corrosion.

b). Alkali system solvents; corrode (dissolve) an aluminum case.

c). Petroleum system solvents; cause the rubber seal material to deteriorate.

d). Xylene; causes the rubber seal material to deteriorate.

e). Acetone; erases the markings.

CFC alternatives or the other cleaners above; please consult with us

4.2. Verify the following points when washing capacitors.

4.2.1. Monitor conductivity, pH, specific gravity and the water content of cleaning agents. Contamination adversely affects these characteristics.

1.9. 请不要在电容器上施加超过产品目录或规格说明书所规定机械强度的力。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可能产生应力，请注意它的冲击力。

2. 焊接时的焊接耐热

焊接条件请设定在本公司的推荐条件范围内。因焊接等的热应力，有可能漏电流会上升，容量减少。如果在工作上限温度以下加载电压，则上升的漏电流会逐渐减小。此外，漏电流利用自我修复作用改善的速度，越接近工作上限温度及额定电压自我修复越快。

2.1. 利用烙铁进行焊接时，请确认以下内容。

2.1.1. 焊接条件（温度、时间）请设定在产品目录或规格说明书规定的范围内。

2.1.2. 请不要将烙铁的烙铁头接触到电容器的本体。

2.2. 进行波峰焊时，请确认以下内容。

2.2.1. 进行焊接时，请勿将电容器主体浸入到熔融的焊料中。插入印刷配线板，只对有电容器一侧的相反侧背面进行焊接。

2.2.2. 焊接条件不可超出产品目录或规格说明书中规定的范围。

2.2.3. 除端子部以外，不可附着有焊剂。

2.2.4. 进行焊接时，要注意避免其他部件翻倒接触到电容器。

2.3. 进行回流焊时，请确认以下内容。

2.3.1. 焊接条件（预热、焊接温度、时间）不可超出产品目录或规格说明书中规定的范围。

2.3.2. 回流炉的加热器种类及位置，甚至电容器的颜色和材质都有可能影响到电容器受到的温度应力，请注意加热的程度。

2.3.3. 关于汽相焊（Vapor Phase Soldering）的焊接方法，请另外与我们联系。

2.4. 被安装过一次的电容器在拆下来之后请勿再次使用。在同一地方重新安装电容器时，请在清除焊剂等之后，用烙铁在规定范围的条件下安装。

2.5. 请注意，除了贴片型以外， 其他类型电容器不可进行回流焊接。

3. 焊接后的处理

焊接后不可施加以下机械应力。

3.1. 不可将电容器主体倾斜、倒地或扭曲。

3.2. 不可抓电容器的本体搬运基板。

3.3. 不可让其他物体碰撞到电容器。此外，当叠加放置基板时，不可使基板或其他部件碰到电容器。

3.4. 不可掉落已安装好电容器的基板。

4. 基板清洗

4.1. 电容器不可用以下清洗剂进行清洗。需要清洗的时候，请设定在产品目录或规格说明书的规定范围内。请特别注意超声波清洗的条件。换代氟利昂或者其他洗净药剂请事先咨询我们。

溶剂	不良影响
卤素类溶剂	电容器产生电触导致故障
碱性类溶剂	铝壳腐蚀（溶解）
石油类溶剂	封口橡胶老化
二甲苯	封口橡胶老化
丙酮	标示消失

换代氟利昂或者其他洗净药剂请事先咨询我们。

4.2. 清洗电容器时，请确认以下内容。

4.2.1. 请进行清洗剂的污染管理(电导度、pH、比重、含水率等)。

4.2.2. Be sure not to expose the capacitors under solvent rich conditions or keep capacitors inside a closed container. In addition, please dry the solvent sufficiently on the PC board and the capacitor with an air knife (temperature should be less than the maximum rated category temperature of the capacitor) for 10 minutes. Aluminum electrolytic capacitors can be characteristically and catastrophically damaged by halogen ions, particularly by chlorine ions, though the degree of the damage mainly depends upon the characteristics of the electrolyte and rubber seal material. When halogen ions come into contact with the capacitors, the foil corrodes when a voltage is applied. This corrosion causes an extremely high leakage current which results venting and an open circuit.

5. Precautions for using adhesives and coating materials

5.1. Do not use any adhesive and coating materials containing halogenated solvent.

5.2. Verify the following before using adhesive and coating material.

a). Remove flux and dust left over between the rubber seal and the PC board before applying adhesive or coating materials to the capacitor.

b). Dry and remove any residual cleaning agents before applying adhesive and coating materials to the capacitors. Do not cover over the whole surface of the rubber seal with the adhesive or coating materials.

c). For permissible heat conditions for curing adhesives or coating materials, please consult with us.

d). Covering over the whole surface of the capacitor rubber seal with resin may result in a hazardous condition because the inside pressure cannot be completely released. Also, a large amount of halogen ions in resins will cause the capacitors to fail because the halogen ions penetrate into the rubber seal and the inside of the capacitor.

e). Some coating materials, it cannot be implemented to the capacitor. Please note change on the surface might be caused according to the kind of solvents used for mounting adhesives and coating agents.

6. Fumigation

In many cases when exporting or importing electronic devices, such as capacitors, wooden packaging is used. In order to control insects it may become necessary to fumigate the shipment. Precautions during “Fumigation” using halogenated chemical such as Methyl Bromide must be taken. Halogen gas can penetrate packaging materials such as cardboard boxes and vinyl bags. Penetration of the halogenated gas can cause corrosion of Electrolytic capacitors. Nippon Chemi-Con gives consideration to the packaging materials not to require the Fumigation. Verify whether the assembled PC board, products and capacitors themselves are subjected to Fumigation during their transportation or not.

4.2.2. 清洗后的电容器，请不要保管在清洗液或密封的容器中。此外，请用热风（工作上限温度以下的）吹 10 分钟以上进行充分干燥，避免基板及电容器上残留有清洗液。一般情况下铝电解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的不同，反应的程度有所差异，但是，当一定量的卤素离子侵入到内部，将导致使用过程中发生腐蚀反应，从而导致漏电流大幅增加，发热，开路等破坏性故障。

5. 固定剂、涂层剂

5.1. 请不要使用含有卤素类溶剂的固定剂和涂层剂。

5.2. 电容器上使用固定剂和涂层剂时，请确认以下内容。

a). 印刷配线板和电容器封口之间不可残留有焊剂残渣及污垢。

b). 在涂固定剂和涂层剂之前，请先干燥清洗液。且封口处不可全部被堵住。

c). 有关固定剂和涂层剂的热硬化条件，请咨询我们。

d). 电容器的封口部完全被树脂堵住时，因电容器内部的内压无法有效释放，将会引发险情。此外，当固定剂和涂层剂中的卤素离子过多时，该成分会通过封口橡胶侵入电容器内部，导致异常发生，有关事项请咨询我们。

e). 固定剂和涂层剂中使用的有些种类的溶剂，有时会造成电容器变化现象，请务必注意。

6. 熏蒸处理

在电子设备类进出口时，有时需用溴化甲烷等卤素化合物进行熏蒸处理。此时，如果铝电解电容器接触到溴化甲烷等卤素化合物，会和「基板清洗」一样，有产生卤素离子而发生腐蚀反应的危险。

本公司在进出口的时候，采用的是无需熏蒸处理的包装方式。客户在进出口电子设备，半成品及铝电解电容器单体的时候，请注意有无熏蒸处理，最终的包装形态等（即使用瓦棱纸箱、塑料等进行包装，熏蒸气体还是有侵入内部的危险。）

● The Operation of Devices

1. Do not touch the capacitor terminals directly.

2. Do not short-circuit the terminal of a capacitor by letting it come into contact with any conductive object. Also, do not spill electric-conductive liquid such as acid or alkaline solution over the capacitor.

3. Do not use capacitors in circumstances where they would be subject to exposure to the following materials:

1). Oil, water, salty water or damp location.
2). Direct sunlight.
3). Ozone, ultraviolet rays or radiation.
4). Toxic gases such as hydrogen sulfide, sulfurous acid, nitrous acid, chlorine or its compounds, and ammonium.
5). Severe vibration or mechanical shock conditions beyond the limits prescribed in the catalog or product specification. The standard vibration condition is applicable to IEC 60384-4.

● Maintenance Inspection

1. Make periodic inspections of capacitors that have been used in industrial applications. Before inspection, turn off the power supply and carefully discharge the electricity in the capacitors. Verify the polarity when measuring the capacitors with a volt-ohm meter. Do not apply any mechanical stress to the terminals of the capacitors.

2. The following items should be checked during the periodic inspections.

2.1. Significant damage in appearance

2.2. Electrical characteristics: leakage current, capacitance, tanδ and other characteristics prescribed in the catalog or product specification.

We recommend replacing the capacitors if the parts are out of specification.

●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. 请不要放置导电体在端子之间造成短路。并且也请不要使用酸性或碱性等导电体溶液在电容上。

3. 请确认电容器装配的机种设置环境，不要在以下环境下使用。

3.1. 直接溅水或油到电容器上的环境。

3.2. 阳光直射到电容器的环境。

3.3. 臭氧、紫外线及放射线照射的环境。

3.4. 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。

3.5. 振动或冲击条件超过产品目录或规格说明书规定范围的环境，标准的振动条件，以 IEC 60384-4 为准。

●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的时候，请先切断设备的电源，放掉电容器内的存储电。当用万能表检查时，请先确认万能表的极性后再使用。并且，请注意不要让引线端子等受到应力的影响。有无明显的外观异常，同防爆瓣开启、漏液等等。

2. 请按以下内容进行定期检查。

2.1. 外观有无明显异常

2.2. 电气性能（漏电流、静电容量、损失角的正切值及产品目录或规格说明书中规定的项目）

当以上内容确认有异常时，请确认电容器的规格，并进行替换等恰当的处理。

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

注: 以上所提供的设计及特性参数仅供参考，任何修改不作预先通知，如有使用上任何疑问，请在采购前与我们联系，以便提供技术上的协助.

● Contingencies

1. If gas has vented from the capacitor during use, there is a short circuit and burning, or the capacitor discharges an odor or smoke, turn off the main power supply to the equipment or unplug the power cord.
2. If there is a problem with the capacitor or a fire breaks out, the capacitor may produce a burning gas or reactive gas from the outer resin, etc. If this happens, keep your hands and face away from the gas. If vented gas is inhaled or comes into contact with your eyes, flush your eyes immediately with water and/or gargle. If vented gas comes into contact with the skin, wash the affected area thoroughly with soap and water.

● 发生意外时

1. 设备使用时，当电容器产生了气体，短路引起了燃烧，或者产生了恶臭和发出烟雾时，请切断设备的主电源，或者从插座上拔下电源线的插头。
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。

● STORAGE

1. We recommend the following conditions for storage.
   Store capacitors in a cool, dry place. Store at a temperature between 5 and 35℃, with a humidity of 75% or less.
   SMD products are sealed in a special laminated aluminum bag. Use all capacitors once the bag is opened. Return unused capacitors to the bag, and seal it with a zipper. Please refer to (Table -1) for storage conditions. Be sure to follow our recommendations for reflow soldering.

		Before unsealing	After unsealing
SMD type		Within 6 month after shipment	Within 30 days from opening
Radial type	Bag packing	Within 12 month after shipment	Within 7 days from opening
	Taping	Within 6 month after shipment	

2. Store the capacitors in a location free from direct contact with water, salt water, and oil. Where capacitors can be covered with water, brine or oil.
3. Store in a location where the capacitor is not exposed to toxic gas, such as hydrogen sulfide, sulfurous acid, nitrous acid, chlorine or chlorine compounds, bromine or other halogen gases, methyl bromide or other halogen compounds, ammonia, or similar.
4. Store in a location where the capacitor is not exposed to ozone, ultraviolet radiation, or other radiation.
5. It is recommended to store capacitors in their original packaging wherever possible.

● 储存的条件

1. 请按照以下保管条件保管电容器。
   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。
   SMD 品（贴片型）密封在专用的铝层压袋内。已经拆包的产品请尽可能用完。如果不能一次用完，请将之放回袋内，并密封拉口部。
   ＊ SMD 品（贴片型）的回流条件建议使用本公司条件。
   保管期限请参照下表。

		开封前	开封后
贴片型		交货后 6 个月	开封后 30 天内
引线型	袋装品	交货后 12 个月	开封后 7 天内
	带装品	交货后 6 个月	

2. 请不要将电容器保管在直接溅水、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、亚硝酸、氯及其化合物、溴等卤素气体、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、紫外线及反射线照射的环境下。
5. 请尽可能包装好保管。

● DESPOSAL

Please dispose capacitors in either of the following ways:

1. Incinerate capacitors (high temperature of more than 800℃) after making a hole on the capacitor body.
2. Bury capacitors in the ground.
   Please have a disposal specialist do it.

● 废弃处理

要将电容器废弃处理时，请依下述方法其一实行。

1. 将电容器开孔，或是压扁后做高温焚化处理(800)度以上。
2. 不使用焚化处理时，请交给专门的产业废弃处理业者做掩埋处理。

The above mentioned material is according to EIAJ, RCR 2367A (revised in march, 2002), titled “Guideline of notable for Fixed Aluminum Electrolytic Capacitors for use in Electrolytic Equipment”. Please refer to the book for details.

● DESPOSAL

● 废弃处理

The capacitance of the GPCAP is getting smaller as time goes with endurance test. This means wear-failure of the GPCAP is open mode, which is a main failure factor. The life time is different by each operating temperature and self-heating by ripple current. The following formula is used to to estimate the presumptive lifetime of the GPCAP at ambient temperature Tx (℃). The result of the following estimation is not guaranteed but presumptive values based on actual measurement. The estimated life-span is limited up to 15 years.
高分子固体铝电解电容的静电容量会随着时间的推移而减小，最终形成开路。因此，此类型的故障模式为容量减少而引起的损耗故障。产品寿命会由于的工作环境温度和纹波电流通过时产生的自身发热温度而异。根据环境温度 Tx (℃)，通过下列公式可以推算出其寿命。由此推算得出的结果，是依据实测结果的推算值，不是保证值。产品的最长使用期限是 15 年。

$$Lx = Lo \times 10^{\frac{To - Tx}{20}}$$

Where:
Lx : Life expectance (h) in actual use (temperature Tx)　预期使用寿命
Lo : Guaranteed (h) at maximum temperature in use　在最高工作温度下的保证时间
To : Maximum operating temperature (℃)　最高工作温度
Tx : Temperature in actual use (ambient temperature of the GPCAP) (℃)　实际工作温度
Please contact us about the presumptive lifetime of the GPCAP used at the ambient temperature of 125℃
由于封口橡胶的耐热特性，关于 105℃以上环境的预期使用寿命推测，请另行联系我们。

Note: All design and specifications are for reference only and is subject to change without prior notice. If any doubt about safety for your application, Please contact us immediately for technical assistance before purchase.
注: 以上所提供的设计及特性参数仅供参考，任何修改不作预先通知，如有使用上任何疑问，请在采购前与我们联系，以便提供技术上的协助.