⚠ Precautions of POSCAP for automotive

1. Precautions of POSCAP for automotive

1.1 Crucial precautions

(1) This “Precautions of POSCAP for automotive” specifies the performance, characteristics, and functions of a single unit of POSCAP under the circumstances defined in the specification. Panasonic does not guarantee the performance, characteristics and functions of your product that POSCAP is used. POSCAP can be used only under the circumstances defined in the specification. Panasonic neither take any responsibilities nor compensate for any damages or losses if POSCAP is used under conditions that exceed the specification defined in the specification.

(2) It is necessary for you to conduct evaluation tests that are required for your product in order to verify symptoms or situations which cannot be predicted by testing POSCAP alone. Make sure to conduct the evaluation test with your product installed POSCAP in the worst condition of use case. Panasonic will not take any responsibilities for damages and failures caused in following cases.
  (a) Using POSCAP without sufficient evaluation tests conducted by your company.
  (b) Using POSCAP beyond the condition defined in the specification (e.g., maximum rating, range of operating conditions, etc.) for any length of time.
  (c) Using POSCAP in violation of any precautions and instructions in these precautions and the specification.

(3) Panasonic will not take any responsibilities for any accidents involving human lives, smoke/fire accidents, or accidents damaging other articles due to failure of POSCAP itself or failure of your products caused by POSCAP, if your company uses POSCAP without sufficient safety designs.

(4) When the specified contents are to be modified after this product specification is approved by your company approved these Product Specifications, only the items on which both the parties have agreed in writing shall be valid. In addition, if there is any discrepancy between the contents of these product specifications and those of the Basic Transaction Agreement, the latter shall have priority.

(5) Reproducing or copying the specification, in whole or in part, without permission by Panasonic is prohibited.

(6) Do not use POSCAP exceeding the operation temperature range defined in the specification. Do not use POSCAP exceeding the range of vibration (frequency and total amplitude) defined in the specification.

(7) If non-conformity to this product specification at the time of delivery of POSCAP is discovered within 18 months from the factory shipment date of POSCAP (excluding non-conformity that can be identified at the acceptance inspections), and if Panasonic receives notification with the detailed descriptions of such non-conformity from you and concludes that Panasonic is responsible for such non-conformity, Panasonic will discuss with you and replace the defective products free of charge.

(8) In no event shall the total liability held by Panasonic to you for damage arising out of or in connection with the failures/ defects or any other issues of POSCAP, where Panasonic is obviously liable for such damages according to the descriptions of this Product Specification and/or any other agreements between Panasonic and you, exceed an aggregate payment made by you to Panasonic with respect to the particular part number of the POSCAP relates to such damages during a period of 12 months preceding the occurrence of such damages.

(9) Panasonic will not take any responsibilities when damages or failures occurred in the following situation.
  (a) If POSCAP is used deviating from the range of the conditions specified in the specification.
  (b) If damages or failures are caused by design flaws in your applications.
  (c) If damages and failures are caused by a phenomenon which is impossible to predict with technology in practical used at the time POSCAP is delivered.
  (d) In case of a damage which could be avoided if your product had a function, structure, etc. that should have been implemented according to the idea commonly accepted in the industry when POSCAP is used in your product.
  (e) In case of a natural disaster or the inevitability.

1.2 Precaution for circuit design

POSCAP for automotive is high reliability product for automotive application. However there are possibilities of short or open circuit failure, which conductive polymer tantalum solid capacitor inherently has.
Please note the following points in order to take full advantage of the POSCAP's performance appropriately and ensure the most stable quality possible.

1.2-1 Check the rated characteristics

When POSCAP is used in your circuit design, check rated characteristics of POSCAP defined in the specification, and use POSCAP within the range of rated characteristics.

1.2-2 Prohibited circuit

If POSCAP is used in the following circuits, failures can occur. Use of POSCAP is prohibited in the following circuits.

(1) High impedance voltage retention circuits
(2) Coupling circuit
(3) Time constant circuits
(4) Circuits greatly affected by leakage current
(5) Use of multiple POSCAP connected in series

1.2-3 Polarity

POSCAP has polarities.
Reverse voltage shall not be applied to POSCAP. If reverse voltage is applied to POSCAP, it can be shorted out, catch fire or emit smoke.

1.2-4 Over voltage

Do not apply higher voltage to POSCAP than rated voltage which can cause short circuit, catch fire or emit smoke.
The maximum voltage applied to POSCAP, which includes variation, ripple or transient voltages, shall not exceed the rated voltages.

1.2-5 Fast charge and discharge

Use protection circuits to protect POSCAP from excessive rush current. If excessive rush current is applied to POSCAP, (e.g. in case POSCAP is charged or discharged rapidly), short circuit, catch fire, emit smoke will occur or leakage current will increase.

1.2-6 Ripple current

Do not apply higher current than maximum allowable ripple current.
In case higher current is applied to POSCAP than allowable ripple current, POSCAP can heat up internally, which accelerates degradation of electrical characteristics or can cause short circuit, catch fire, emit smoke.
Beside ambient temperature around your product and also inside of your product, excessive thermal stress (e.g. Radiant heat of component such as transistors or resisters and conducted heat via printed circuit board) shall not be applied to POSCAP.

1.2-7 Parallel connection

A large ripple current can be applied to the POSCAP when it is used in parallel connection with other capacitor, and it can cause short circuit, catch fire or emit smoke. Select other capacitors very carefully.

1.2-8 Electrical characteristics variation

The electrical characteristics of POSCAP will be changed by variations in temperature and frequency.
Design your circuit carefully with considering the electrical characteristics under actual usage condition of your product.

1.2-9 Failure mode

There are chance failure (short mode) and wear-out failure (open mode). Chance failure occurs mainly, but also war-out failure can be accelerated by heat.

1.2-10 Safety design and precautions

・Short circuit failure.
Please follow the instructions below and ensure safety.
(1) If POSCAP has a tendency to short circuit, the safety design should include a protection circuit to interrupt the current supply to POSCAP.
(2) Make sure that the protection circuit trips before POSCAP starts emitting smoke.
(3) If the smoke comes into your eyes, rinse immediately. If the smoke is inhaled, gargle immediately.
(4) With consideration for functional safety of your product, you have to install a redundant circuit or a protection circuit and conduct maintenances regularly in order to bring your product to a stop safely or to minimize damage.

・Wear-out failure
Please note the following instructions for wear-out failure.
(1) In case POSCAP is used under the conditions that exceeds the specified guarantee time for endurance, temperature, moisture and the sudden temperature change, changes in electrical characteristics will become larger and can cause open mode failure as a result. This occurs since the increase in resistance of electrolyte (degradation) will be accelerated.
(2) The electrical characteristics such as capacitance and ESR of POSCAP change even under the electrical and mechanical condition specified in the specification. Please be aware of this point when you design.

1.2-11 Land pattern

・Please refer to the recommended land pattern in the specification.
・If you use double-sided board, do not design via holes nor through holes underneath POSCAP.

1.3 Operation precaution

1.3-1 Soldering

The soldering conditions should be within the range specified in the specification. Higher peak temperature or longer heating time than the one specified in the specification can increase leakage current and ESR, or cause short circuit, catch fire or emit smoke. The flow soldering, VPS (Vapor phase soldering) and hot plate soldering are not accepted. Do not reuse POSCAP that was removed from a board.

1.3-2 Substrate cleaning

Please contact Panasonic if you need to clean substrate. It may change POSCAP characteristic or its external appearance depends on the cleaning method or cleaning solution.

1.3-3 Operating environment restrictions

Do not use the POSCAP in the following environments.

(1) Places where water, salt water or oil can directly fall on it and places where condensation may form.
(2) Places filled with corrosive gas for capacitors (hydrogen sulfide, sulfurous acid, chlorine, ammonia, etc.).
(3) Places susceptible to ozone, ultraviolet rays and radiation.
(4) Places under severe environment where POSCAP can get vibration or impact that exceeds the condition specified in the specification.
(5) Place where POSCAP would be exposed to the direct rays of the sun.

1.3-4 Storage condition

Store POSCAP under the following condition. The storage life of POSCAP is 18 months after shipment from factories, with MBB (Moisture barrier bag) unopened.

- Temperature : 15 ℃ to 35 ℃
- Humidity : below 75%RH
- Place : The place where POSCAP will not be exposed to the direct rays of the sun.
- Product condition : Original reel and unopened MBB

Open MBB just before you mount POSCAP on the board. Use POSCAP within the floor life.
Please refer to the floor life level in the below chart. You cannot use POSCAP after this floor life even though the MBB is resealed. If POSCAP will be stored longer than the floor life, the outer resin or the inner element can be damaged by thermal stress during soldering process due to absorbed moisture.

Floor life		
Level	Time	Condition
3	168 hours	≦30 ℃ / 60 %RH

Although the floor life level is described, POSCAP is not compliant with IPC/JEDEC STANDARD J-STD-020 and J-STD-033.

1.3-5 Others

(1) Do not attempt to dismantle or alter POSCAP.
(2) Do not throw POSCAP into the fire nor put it close to fire.
(3) If POSCAP is dropped, do not use it since it may get damaged.
(4) As to the disposal of POSCAP, check and follow the disposal instruction in each country or region where POSCAP is used in your product.
(5) On export of POSCAP, the procedures for export in accordance with the regulations regarding export such as Foreign Exchange and Foreign Trade Act, are required.
(6) The technical information on the specification provides specification of POSCAP. It is not intended to guarantee non-infringement of third party right, intellectual property right and any other rights which Panasonic or any third party have. Panasonic shall not be held responsible for any troubles relating to third party right arising from usage of POSCAP.
(7) Panasonic will not take any responsibilities in case your company resells POSCAP to other company. If your company receive any claims from the company you resell to, please cover the charge by your company.