

⚠ Precautions for circuit designing

Crucial precautions **Important**

1 Prohibited circuits

- (a) **OS-CON** leakage current may become larger as the following conditions.
- (1) Soldering
 - (2) High temperature no-load test, high temperature and high humidity no-load test, rapidly changing temperature test, etc.
- (b) Avoid the use of **OS-CON** in the following type of circuits because leakage current may increase.
- (1) High-impedance circuits
 - (2) Coupling circuits
 - (3) Time constant circuits
 - (4) Other circuits that are significantly affected by leakage current
- ※ If you plan to use 2 or more **OS-CONs** in a series connection, please contact us before use.

2 Failure and life-span

The failure rate is 0.5% / 1,000h (with a 60% reliability standard) based on JIS C 5003.
The mainly failure modes are as follows.

2-1. Contingency failure

The main causes of failure are thermal stresses cause by the soldering or thermal use environment, along with heat stresses, electrical stresses or mechanical stresses.

The most common failure mode is a short circuit.

(a) Phenomenon after a short circuit

(1) Organic semiconductive type (resin sealing)

- In case of a short circuit, if the pass-through current is 3A or less on $\phi 10$ and 1A or less on $\phi 6.3$, the **OS-CON** becomes heated but no effects are visible even when the current is continuously carried.
- If the short circuit currents exceed the mentioned value above.
The temperature inside will increase and the internal pressure raise.
The liquefied organic semiconductor and odorous gas are released from the space of sealant.
In this case, keep your face and hands away from the area.

(2) Conductive polymer type (rubber sealing)

- In case of a short circuit, if the pass-through current is 1A or less on $\phi 10$, 0.5A or less on $\phi 8$ and 0.2A or less on $\phi 6.3$, the **OS-CON** becomes heated, but no effects are visible even when the current is continuously carried.
- If the short circuit currents exceed the mentioned value above.
The temperature inside the **OS-CON** will increase.
The rubber sealing is turned over and odorous gas is released.
In this case, keep your face and hands away from the area.

(b) In case a short circuit occurs, ensure safety by fully considering the followings.

- (1) If odorous gas is released, turn off the main power of the equipment.
- (2) It may take a few seconds to a few minutes before the organic semiconductor liquefies and an odorous gas produces by the situation. Increase safety by using in conjunction with a protective circuit.
- (3) If the gas comes in contact with eyes, rinse immediately. If the gas is inhaled, gargle immediately.
- (4) Do not lick the electrolyte. If the electrolyte comes in contact with skin, wash it off with soap immediately.
- (5) **OS-CON** contains combustible substances. In case a large current continues to flow after a short circuit, in the worst case, the shorted-out section may ignite. For safety, install a redundant circuit or a protective circuit, etc.

2-2. Wear-out failure (life-span)

When life span exceeded the specified guarantee time of Endurance and Damp heat, electrolyte might insulate and cause electric characteristic changed. This is called an open circuit.

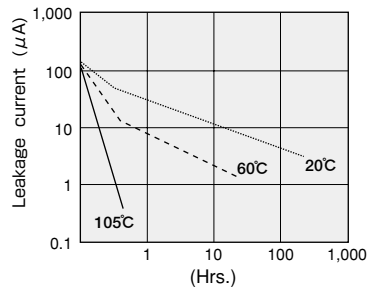
The electric characteristics of capacitance and ESR may possibly change within the specified range in specifications when it is used under the condition of the rated voltage, electric and mechanical performance. Please note it when design.

Other precautions

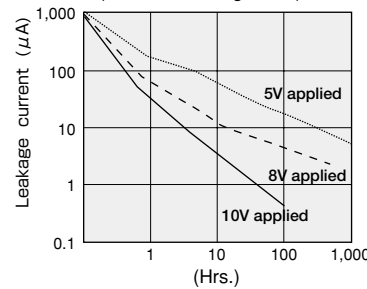
1 Leakage current

Mechanical stress may cause OS-CON leakage current increased. In such a case, leakage current will gradually decrease by applying voltage within the category voltage and the upper category temperature. Then, self-healing speed of leakage current is faster when it is near to the upper category temperature and the category voltage.

OS-CON
leakage current restoration characteristics
10 μ F/16V (16V DC applied)



OS-CON
leakage current restoration characteristics
33 μ F/10V (Ambient temperature: 65°C)
(Measured voltage: 10V)



※A sample that had stress intentionally applied to make the leakage current larger was used to make leakage current recovery easy to understand.

2 Rapid charge and discharge limitation

Excessive rush current due to rapid charge and discharge may pose short circuit or large leakage current, so a protection circuit is recommended to maintain high reliability. Apply a protection circuit when rush current is over 10A. On capacitors that 10 times of the allowable ripple current value is over 10A, a protection circuit should be applied when rush current is over 10 times of the allowable ripple current.

3 Soldering with a soldering iron

(a) Soldering condition should be under the following ranges.

	Soldering iron temperature	time
Soldering condition	400 \pm 10 $^{\circ}$ C	within 5s.

※ Refer to page 6 Considerations when soldering

- (b) When the lead terminal for radial lead type must be processed because the lead pitch and the PCB holes in spacing do not match, process it without any stresses to OS-CON before soldering.
- (c) Solder without any excessive stresses to OS-CON itself.
- (d) When an OS-CON has been soldered once and needs to be removed, remove it after the solder has been completely melted.
- (e) Do not let the tip of the soldering iron touch the OS-CON itself.

4 Flow soldering

(a) Soldering condition should be under the following ranges.

Recommended flow soldering condition

	Temperature	Time	Flow number
Preheating	120 $^{\circ}$ C or less (ambient temperature)	120 sec. or less	1 time
Soldering condition	260 + 5 $^{\circ}$ C or less	10 + 1 sec. or less	2 times or less ※1

※ 1. When soldering 2 times, immersion time should be 10 + 1 sec. or less.

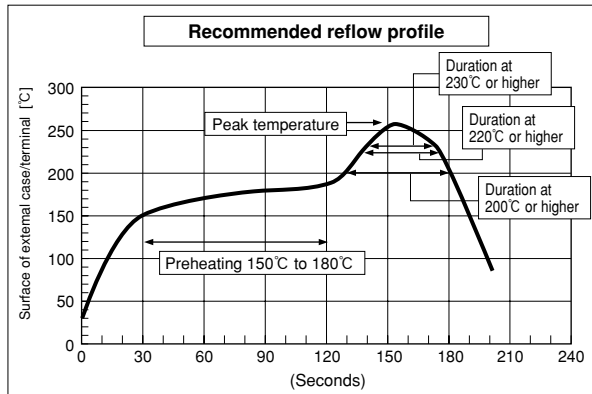
※ Refer to page 6 Considerations when soldering

- (b) Do not apply flow soldering to SMD type.
- (c) Do not solder OS-CON itself by submerging it in melted solder. Solder the opposite side that the OS-CON is mounted on.
- (d) Note that flux does not adhere to anywhere except the lead terminal.
- (e) Note that other components do not fall over and touch the OS-CON when soldering.

5 Reflow soldering

(a) Soldering condition should be under the following ranges.

Recommended reflow soldering condition



Item	Series	
	Conductive polymer electrolyte SMD type	
Peak temperature (max)	250°C	260°C
Preheat	150°C to 180°C 90 ±30 sec.	
200°C over time (max)	60 sec.	60 sec.
220°C over time (max)	50 sec.	50 sec.
230°C over time (max)	40 sec.	40 sec.
Reflow number	twice or less	Only 1 time

※ All temperatures are measured on the topside of the Al-can and terminal surface.

- (b) Do not apply reflow soldering to Radial Lead type.
- (c) Please contact SANYO for setting VPS condition.

6 Handling after soldering

Do not subject the OS-CON to excessive stress as follows.

- (a) Do not tilt, bend or twist OS-CON.
- (b) Do not move the PCB with catching OS-CON itself.
- (c) Do not dump the OS-CON with objects.
- (d) When stacking PCBs, make sure that the OS-CON does not touch other PCBs or components.

7 Cleaning PCB

Check the following items before washing PC board with these detergents: high quality alcohol-based cleaning fluid such as Pine-α ST-100S, clean thru 750H, 750L, 710M, 750K or Techno Care FRW 14 through 17 or detergents including substitute freon as AK-225AES or IPA.

- (a) Use immersion or ultrasonic waves to clean within 2 minutes on Polymer conductive type and within 5 minutes on Organic semiconductive type.
- (b) The temperature of the cleaning fluid should be less than 60°C.
- (c) Watch the contamination of the detergent as conductivity, pH, specific gravity, water content, etc.
- (d) Do not store the OS-CON in a location subject to gases from the cleaning fluid or in an airtight container after cleaning.
- (e) Dry the PCB or OS-CON with hot air that should be less than the maximum operating temperature.
- (f) Please note that Indication may disappear when rubbing print side after washing as a cleaner.
- (g) Please contact SANYO for details about detergents, cleaning methods and about detergents other than those listed above.

8 Fixatives and coating materials

- (a) Select the appropriate covering and sealant materials for OS-CONS. In particular, make sure the fixative, coating and thinner do not contain acetone.
- (b) Before applying a fixative or coating, completely remove any flux residue and foreign matter from the area where the board and OS-CON will be jointed together.
- (c) Allow any detergent to dry before applying the fixative or coating.
- (d) Please contact SANYO for fixative and coating heat curing conditions.

9 Storage conditions

Open the bags just before mounting and use up all products once opened. For keeping a good solderability, store the OS-CON as follows.

		Before unsealing	After unsealing
SMD type※1		Within 24 month after shipment from factories	Within 30 days from opening (packaged with carrier tape)
Radial lead type	Bag packing product	Within 30 month after shipment from factories	Within 7 days from opening
	Taping product	Within 24 month after shipment from factories	

※1 The JEDEC J-STD-020 Rev.C Standard is not applicable.

※ Please contact SANYO for Organic Semiconductor type.