Important Facts about Processing PCB Relays

Our relays can be processed in commercial soldering and washing installations (if classified as washable). They cover the following regulations:

Flux tight type relays; open relays without cover:

- Solderability according to IEC 68 2-20, Test Ta, method 1, aging 3: 4 hours at 155°C, dewetting
- Resistance to soldering heat according to IEC 68 2-20, test Tb, test method 1A

Sealed type open vent hole relays:

- Solderability according to IEC 68 2-58; dewetting
- Resistance to soldering heat according to IEC 68 2-58

Sealed type washable relays:

- Such relays are capable of being automatically soldered and subsequently undergoing a washing process to remove flux residues without allowing the ingress of flux or washing solvents
- Sealing complies to IEC 68 2-17; Test Qc: method 2, the relay will withstand a bubble test at 70°C for 1 min
- See also item 6. Chemical Cleaning

1. Assembly on the PCB

Relays are high precision components that are sensitive to mechanical stress and abusive handling. Care must be taken when handling the relay during all stages of production. Do not exert any pressure on the pins. After assembling the relays onto the PCB the relay pins must not be bent for attachment. Bending the pins may affect the relay parameters and on immersion the sealing maybe damaged for cleanable relays. If attachment is necessary before soldering, we recommend an external arrangement such as a pressure plate or similar.

2. Fluxing Open and Dustproof Relays

Fluxer must not penetrate into the relay. It could deposit impurities onto open relays and system failures would occur. When using open or dustproof relays the fluxer should merely touch the bottom of the PCB. It should be set in a way that it cannot flood onto the top of the PCB. This is particularly critical if multilayer PCB are used and there are unused holes under the body of the unsealed relay. If there is any doubt about the fluxing process, sealed type washable or hermetic type relays should be used.

Recommended flux (with non corrosive residue): type F-SW 32 to 34 to EN 29454-1 (ISO 9454-1).

3. Preheating

The preheating temperature for drying the flux should not exceed 100°C on top of the PCB.

Note: Flux which has not completely dried might "explode" when immersed in the soldering wave and may get inside an open relay. This could create solder balls generating short circuits on the PCB.

4. Processing on Soldering Lines

- SnPb processing

Fig. 4.1, 4.2 and 4.3 show the maximum permissible temperatures at the terminals according to CECC 00802 and IPC/JEDEC J-STD-020C.

Fig. 4.1

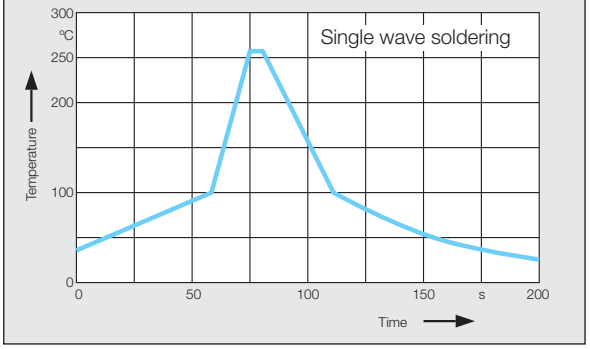


Fig. 4.2

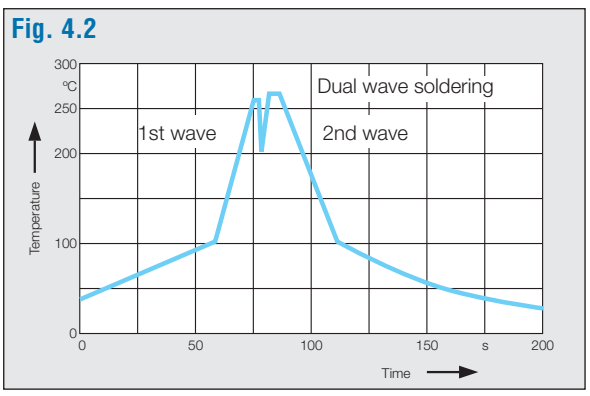
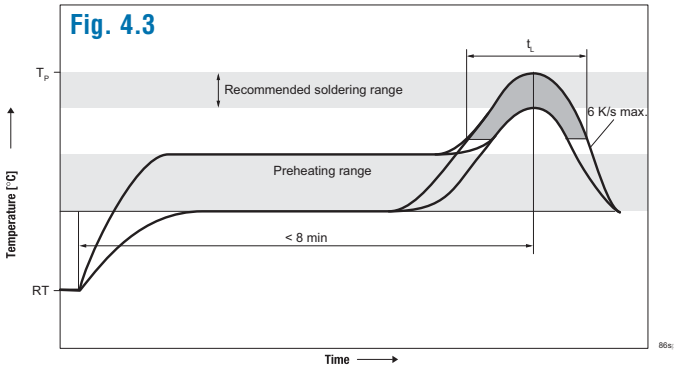


Fig. 4.3



For SnPb Eutectic Process we recommend a maximum peak temperature Tp < 225°C. For Pb-free processing we recommend a maximum temperature Tp < 245°C. These soldering temperature profiles indicate the Pad/Pin temperature.

In some cases the ambient temperature may be greatly increased on top of the relay component. In this case the component temperature should not exceed 260°C. Check for specific mounting conditions. In addition the time, parameter t_L in fig. 4.3, should be below 150 s.

- Leadfree processing
  The components are ELV/RoHS/WEEE compliant. Processing of relays under leadfree conditions may have impact on relay parameters. We recommend that leadfree processes should be carried out using SnAgCu-solder. For further information please refer to the IPC/JEDEC J-STD-020C.

5. Cooling Post Soldering

After flow soldering, the assemblies should be cooled in order to reduce thermal stress and to minimize the pressure difference between inside and outside of the relay. Do not cool down by using cold liquids or aerosols. If not performing as prescribed, the relay sealing could break, cleaning fluid with dissolved flux might be sucked inside the relay. Ingress of liquids into the relay can lead to failures in operation.

6. Chemical Cleaning

In modern PCB assembly, less and less cleaning is used.

Note: If the recommended flux is used, there is no need to wash the PCB. This helps the environment. If cleaning is necessary, certain precautions have to be taken.

- Flux tight type relays/
  relays with open vent hole (THR)
  Only the base of the PCB (soldering side) should be cleaned to prevent penetration of solvent and dissolved flux into the relay. Any other cleaning method involving potential contamination of unsealed relays should be avoided. Acidic fluxes are not suitable for open relays due to the risk of corrosion, especially inside the coil.
- Sealed type washable/hermetic relays
  Only sealed relays should be washed carefully to remove flux residues without allowing the ingress of flux or washing solvents. Nevertheless the PCB should be allowed to cool prior to the washing process to avoid damaging of the seal due to thermal shock or pressure differential.

  When using high pressure cleaning processes, special care has to be taken to avoid any ingress into the relay. Liquids under high pressure can damage the seal of the relay. Modern cleaning equipment uses water or alkaline solutions, which are more environment-friendly than chlorofluorocarbons (CFC). If other cleaning solvents are used, ensure that the chemicals are suitable for the relay.
  The use of unsuitable solvents can cause cracking or discoloring of the plastic parts. Suitable solvents include isopropyl alcohol (alcohol-based solvents), water with wetting agents. Unsuitable solvents are e.g. acetone, ethyl acetate, aqueous alkalines, phenolic combinations, thinner-based solvents, chlorosenebased solvents, trichlene-based solvents and chlorine. Fluor-based cleaning solvents like Freon are prohibited nowadays.

7. Protective Coating of Assembled PCB

Do not coat flux type relays. Sealed type open vent hole could only be partly coated.

For varnishing of assembled PCB, we recommend one-component lacquers (epoxy-based). If using a polyurethane based lacquer, check if the solvent damages the relay.

We recommend a coating technology, that avoids uncured varnish in the surrounding of the relay.

Do not allow de-varnishing of PCB for repair.
If unavoidable the relay has to be replaced in addition by a new one.

We recommend a drying oven temperature of 70°C. The temperature should not exceed the maximum temperature range specified in the datasheets.

8. Hand Soldering

For hand soldering please refer to the following standard: ANSI/J-STD-001.

Temperature of soldering iron 300 to 350°C.
Soldering time < 2 s.

9. Silicone

Silicone and its derivatives are not allowed in the material of any relay subcomponent. Materials containing silicone or its derivatives cannot be used in any form in or near to the processing and packaging of subcomponents and the final relay assembly.

Contamination can occur with

- Volatile silicones
- Silicone aerosols
- Silicone fluids

The volatility of silicone materials depends on temperature, molecular weight and structure. Arcing, i.e. by switching relays or rotating motors, degrades silicone species into siliceous compounds that deposit as an insulating abrasive layer on the contact surface. This layer generates either contact resistance increase in relays or failure in electrical motors due to abrasion of the collector. It must be pointed out that all silicone-based materials before and after cure have a certain percentage of silicone volatiles.

In standard materials, this varies from 0.5 to 3%, but it can be even more in some very low viscosity conformal coatings (“The use of silicon materials in close proximity of electrical motors and mechanical relays”; e-Drive Magazine Dec. 2005/Jan. 2006; Vol. 6, Is. 6).

In addition silicone aerosols and volatile silicones can diffuse through the relay housing. Substances containing silicone are for example grease and hand cream.