Automotive Relays Application Recommendations
Processing Information

PC Board Relays:
Important Facts about Processing

Our relays can be processed in most commercial soldering and washing systems. The following **IEC** categories apply.

Relays for mounting on printed circuits

Solderability of wire and flat terminals in accordance with: **IEC 68 2-20**; Test Ta: method 1, aging 3: 4 hours at 155°C; dewetting Test Tb: Resistance to soldering heat, test method: 1A

Solderability of SMT terminals in accordance with: **IEC 68 2-58**; dewetting Resistance to soldering heat

Immersion cleanable relays: PC board relays

Protection class IP 67 in accordance with **IEC 529**; sealing conforms with **IEC 68 2-17**; Test Qc: method 2, 70°C for 1 min.

1 Assembling the PC board (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 PC board 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
Flux 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 flux should merely touch the bottom of the PC board. It should be set in a way that it cannot flood onto the top of the PCB. This is particularly critical if the PCB is dual traced and there are unused holes under the body of the unsealed relay. If there is any doubt about the fluxing process, fully sealed relays (plastic or hermetically sealed) should be used. Or the relays should be soldered by hand after the rest of the PC board is complete.

3 Preheating
The preheating temperature for drying the flux should not exceed 100°C on top of the PC board.

Note: Flux which has not completely dried will "explode" when immersed in the soldering wave and may get inside an open relay.

4 Processing on wave solder lines
Figures 4.1, 4.2 and 4.3 show the maximum permissible temperatures at the pins according to CECC 00802. For solder we recommend cored solder EN29454-1, type 1.1.3, 1.2.3, 2.2.3 (F-SW 32... 34) Proportion of flux: 2.5 percent by weight.

4.1 Single wave soldering

4.2 Dual wave soldering — 1st wave, 2nd wave
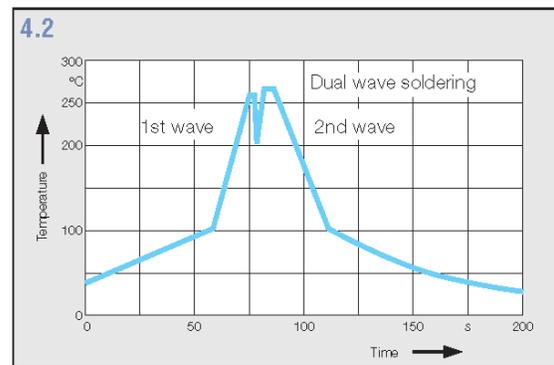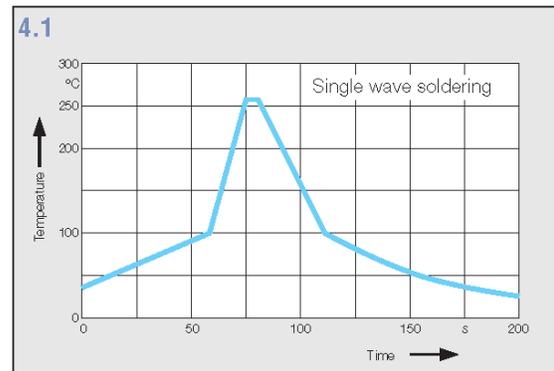
• **Lead free** processing
The components are ELV/RoHS/WEEE compliant. Processing of relays under lead free conditions may have impact on relay parameters. We recommend that lead free processes should be carried out using SnAgCu-solder. For further information please contact our engineering support. All specifications subject to change.

5 Cooling

After flow soldering, the assemblies should be cooled in order to reduce thermal stress and to minimize the pressure differential between the inside of the relay and the atmosphere at sealed relays. If not performing as prescribed, the relay sealing could break, cleaning fluid with dissolved flux will be sucked inside the relay. Ingress of flux 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 PC board. This helps the environment. If cleaning is necessary, certain precautions have to be taken.

• Unsealed relays

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 bad for open relays because of the risk of corrosion, especially inside the coil.

• Sealed relays

Only fully sealed relays should be immersion cleaned. **Even then the PCB should be allowed to cool before the washing process in order not to damage 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 environmentally friendly than CFC's. 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 acetone, ethyl acetate, aqueous alkalines, phenolic combinations, thinner-based solvents, chlorosene based solvents, trichlene-based solvents and chlorine. Fluor-based cleaning solvents like Freon are forbidden today.

7 Protective coating of assembled PC boards

For varnishing of assembled PC boards, we recommend one-component lacquers (polyurethane-based).The area between relay bottom and board must be free of lacquer. We recommend the usage of a selective coating technology. Do not use any immersion procedure. For the right choice of lacquer, please contact our engineering support.

Never use coatings containing silicone (also see item 9 Silicone below). The drying temperature of the oven should not exceed 70°C. Take special care with THR (Through-Hole-Reflow) relays (protection class IP 54 with open vent hole).

8 Hand soldering

For hand soldering please refer to the following standard: ANSI/J-STD-001. Temperature of soldering iron 300-350°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. Silicone atmosphere can diffuse through the relay housing and cause contact failures. Substances containing silicone are for example grease and hand cream.