Soldering and Cleaning Instructions for Inductors

GENERAL

Vishay offers a wide product selection of inductors and transformers in a variety of packages. This document provides instructions on mounting for the different types of packages, specifically on the different methods of soldering.

If the device is to be mounted near heat-generating components, consideration must be given to the resultant increase in ambient temperature.

SOLDERING INSTRUCTIONS

Protection against overheating is essential when a device is being soldered. Therefore, the connection wires or PCB traces should be left as long as possible. The maximum permissible soldering temperature is governed by the maximum permissible heat that may be applied to the package.

The maximum soldering iron (or solder bath) temperatures are given in the individual Datasheets. During soldering, no forces must be transmitted from the pins to the case (e.g., by spreading the pins).

SOLDERING METHODS

There are several methods for soldering devices onto the substrate. The following list is not complete.

(a) Soldering in the Vapor Phase

Soldering in saturated vapor is also known as condensation soldering. This soldering process is used as a batch system (dual vapor system) or as a continuous single vapor system. Both systems may also include a pre-heating of the assemblies to prevent high temperature shock and other undesired effects.

(b) Infrared Soldering

By using infrared (IR) reflow soldering, the heating is contact-free and the energy for heating the assembly is derived from direct infrared radiation and from convection.

The heating rate in an IR furnace depends on the absorption coefficients of the material surfaces and on the ratio of component's mass to an As-irradiated surface.

The temperature of parts in an IR furnace, with a mixture of radiation and convection, cannot be determined in advance. Temperature measurement may be performed by measuring the temperature of a certain component while it is being transported through the furnace.

The temperatures of small components, soldered together with larger ones, may rise up to 280 °C.

Influencing parameters on the internal temperature of the component are as follows:

- Time and power
- Mass of the component
- Size of the component
- Size of the printed circuit board
- Absorption coefficient of the surfaces
- Packing density
- Wavelength spectrum of the radiation source
- Ratio of radiated and convected energy

As a general rule of thumb, maximum temperature should be reached within 360 s and time above solder liquids temperature should be reached in less than 180 s.

Temperature/time profiles of the entire process and the influencing parameters are given. The IR reflow profile is shown in Figure 1.

(c) Wave Soldering

In wave soldering one or more continuously replenished waves of molten solder are generated, while the substrates to be soldered are moved in one direction across the crest of the wave. Maximum soldering temperature should not exceed 260 °C for 20 s.

(d) Iron Soldering

This process cannot be carried out in a controlled situation. It should therefore not be used in applications where reliability is important. There is no SMD classification for this process.

(e) Laser Soldering

This is an excess heating soldering method. The energy absorbed may heat the device to a much higher temperature than desired. There is no SMD classification for this process at the moment.

(f) Resistance Soldering

This is a soldering method which uses temperature controlled tools (thermodes) for making solder joints. There is no SMD classification for this process at the moment.

TYPICAL REFLOW SOLDERING PROFILE

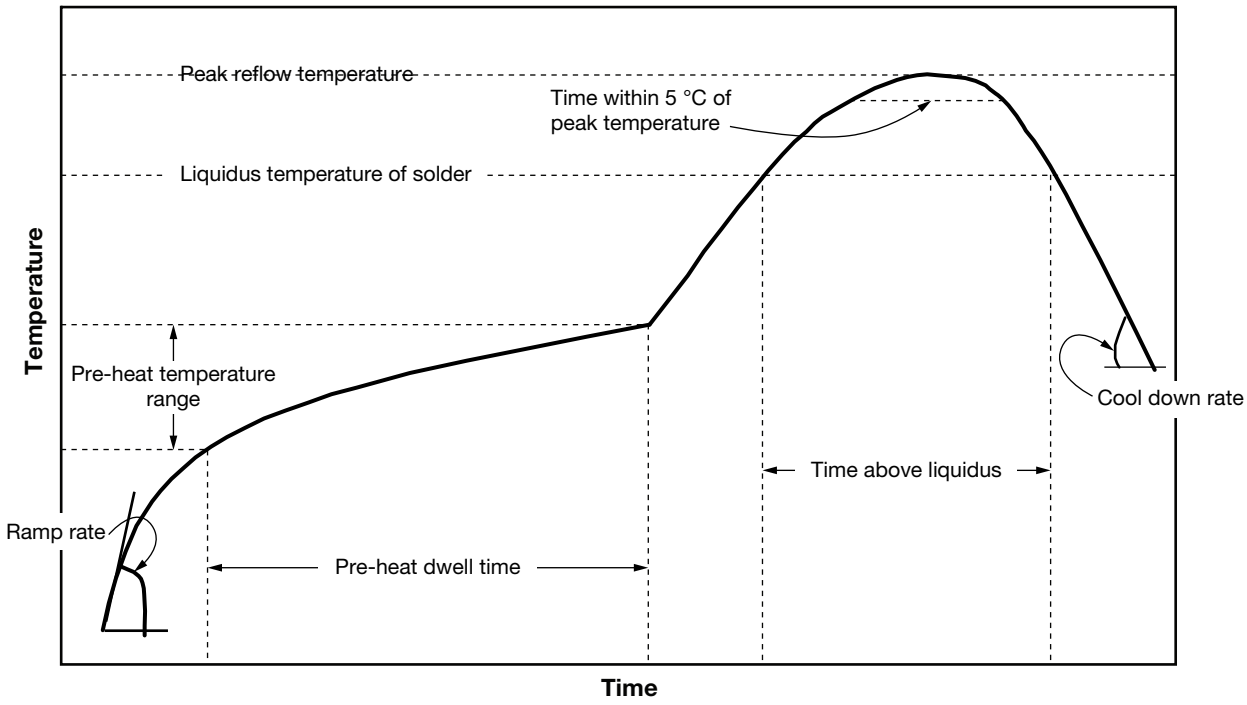

Fig. 1 - Infrared reflow soldering (SMD package)

LEAD (Pb)-FREE SOLDER (SnAgCu) REFLOW PROFILE ATTRIBUTES	
PROFILE ATTRIBUTE	**PROFILE ATTRIBUTE**
Peak reflow temperature	255 (± 5) °C
Time within 5 °C of peak temperature	30 s max.
Liquidus temperature of solder	~ 217 °C
Cool down rate	6 °C/s max.
Time above liquidus	60 s to 150 s
Preheat temperature range	150 °C to 200 °C
Preheat dwell time	60 s to 120 s
Ramp rate	3 °C/s max.

CLEANING INSTRUCTIONS

A no clean solder system is recommended for Vishay inductors. Certain cleaning solutions, such as non-linear alcohols, acid-based or solvent-based agents can degrade the part strength and should be avoided. If cleaning must be performed, an isopropyl alcohol is recommended. Water-based chemicals such as VIGON® N 600 and N 680 may also be used.

It is recommended that any residual cleaning chemicals be thoroughly rinsed with de-ionized water and immediately followed by a thorough warm air dry cycle to avoid oxidation. Electronic components should be tested for compatibility with any cleaning solution before production assembly.