CTC-020 Soldering Profile

Overview

The soldering process is the means by which electronic components are mechanically and electrically connected to a Printed Circuit Board (PCB) assembly. Following good soldering practices will prevent component reliability issues as well as insure a robust electrical and mechanical connection to the PCB assembly.

All process mentioned here are Restriction of Hazardous Substances Directive (RoHS) qualified. All InterFET plastic encapsulated packages are RoHS compliant devices with a Matte Tin (Sn) plating finish over with a Copper alloy A194 lead frame. All InterFET metal can packages are RoHS compliant devices with a 40um minimum Au finish over a Copper alloy A194 lead frame.

Generating a proper soldering profile has many variables that are outside of the control of InterFET as an electrical component manufacturer. Board size, thermal reliefs, ground layers, copper weights, component densities, components sizes, heating zones, cooling zones, along with the type of solder paste and flux accumulatively factor into the soldering profile. InterFET recommends using JEDEC standard J-STD-020 as a starting point for a soldering profile for the reflow process. Improper temperature ramp times and excessive maximum temperatures can impose thermal shock on a component leading to reliability issues.

Flow Soldering Process (Wave Soldering)

Wave soldering is still widely used for through hole devices and for boards with a mix of surface mount and through hole components. Surface mount components can be wave soldered successfully if proper ramp times and maximum temperature limits and times are met. Typically surface mount components must be adhesive mounted before passing the solder wave.

Solder Dip Process

The temperature change in a solder dip process is significantly more extreme than the standard wave solder or reflow solder profile. This process forces an excessive amount of thermal shock on surface mount components that can lead to component reliability issues. For these reasons InterFET does not recommend a solder dip process on any of our surface mount components.

Reflow Soldering Process

Reflow soldering is the most common process for surface mount components. Infrared reflow is the preferred process over Vapor phase due to the environmental restrictions on Vapor phase.

Soldering Process Phases

There are four process phases in soldering; Preheat, Soak, Reflow, and Cool-Down.

The Preheat process is very important in any kind of soldering process. Abrupt changes in a components temperature can lead to reliability issues. To avoid this thermal shocking of components, proper preheating ramp times and temperatures must be maintained.

The temperature Soaking process is recommended in order to get all components of varying thermal mass to the same temperatures prior to the reflow phase.

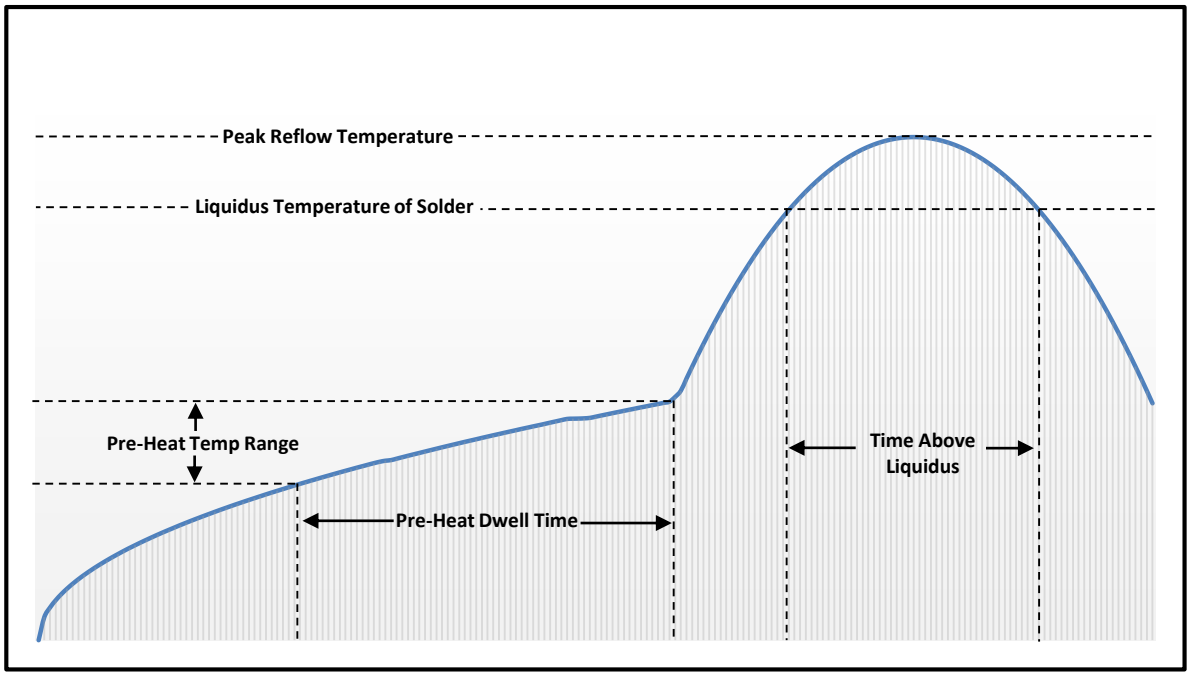
Soldering Process Phases (Continued)

In the Reflow phase the temperature rises to a level sufficient to reflow the solder and to allow the flux to wick the surface oxides and contaminants away form the melting solder. The range of the peak soldering temperature depends on several factors. The minimum soldering temperature range should be at least 5-10°C higher than the melting point of the plating alloy. The maximum soldering temperature should be at least 5-10°C lower than the melting temperature of any plastic materials of the components. The devices must be held at the reflow temperature long enough to ensure the proper solder flow of the component leads. But, the soldering time needs to be kept at a minimum to avoid possible damage to the components.

The Cool-Down phase is the time period after the peak soldering period where the assembly is returned to room temperatures. In order to avoid an abrupt temperature changes to components, a controlled temperature gradient cool down period is recommended over a free air Cool-Down.

Reflow Soldering Profile

The following are reference values for the RoHS and halogen-free soldering profiles.

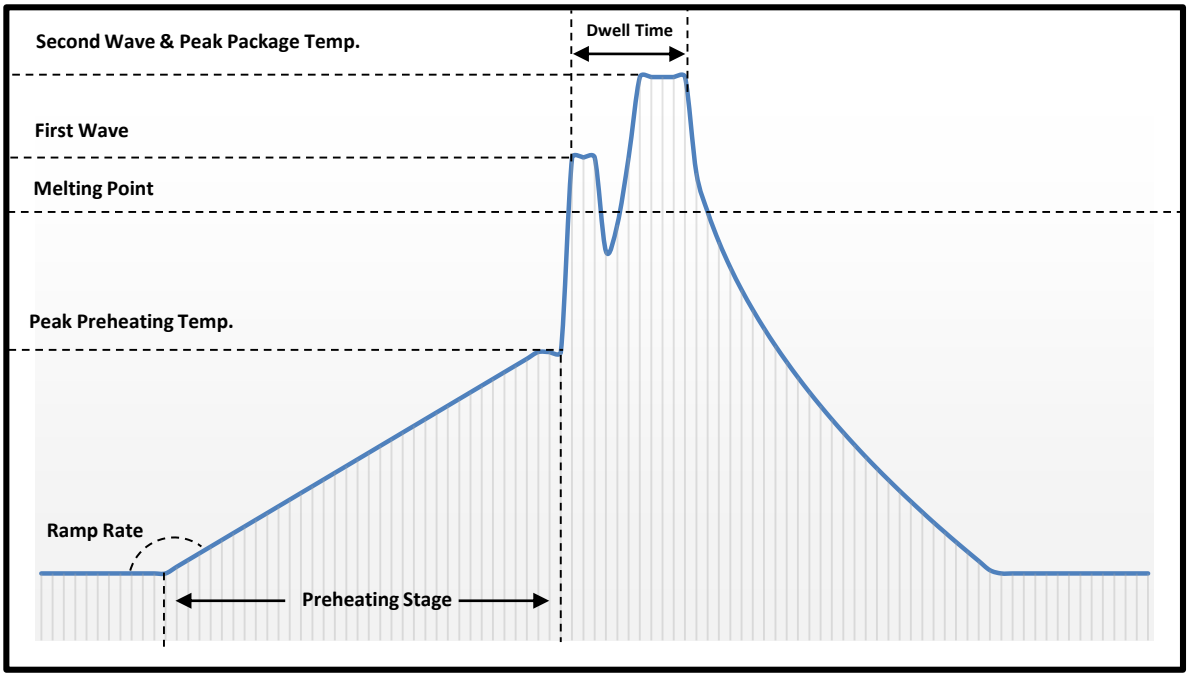


Reflow Attributes (reference values only)

Attribute	Value	Unit
Peak Reflow Temperature	255 (+/- 5)	°C
Time Above Liquidus	30s max	Seconds
Liquidus Temperature of Solder	~ 217	°C
Pre-heating Range	150 to 200	°C
Pre-heating dwell Time	60s to 120s	Seconds
Maximum Ramp Rate	3/s max	°C

Wave Soldering and Selective Wave Soldering Profile

The following are reference values for the RoHS and halogen-free wave soldering profiles for the dual-wave soldering process. Do not exceed a maximum of 2 wave solder cycles.



Wave Solder Attributes (reference values only)

Attribute	Value	Unit
Peak Temperature	255 (+/- 5)	°C
Maximum Dwell Time	10s max	Seconds
Liquidus Temperature of Solder	~ 217	°C
Pre-heating Range	90 to 130	°C
Pre-heating dwell Time	60s to 120s	Seconds
Maximum Pre-heating Ramp Rate	3/s max	°C
Maximum Ramp-Down Rate	5/s max	°C

Soldering Iron Rework

Only temperature controlled soldering iron should be used for rework. The maximum temperature should not exceed 300°C. The soldering iron tip should only contact the component leads or the PCB land pads and never come into contact with the component body. The component lead should not be exposed to a soldering iron temperature of 300°C for longer that 5 seconds.