Reflow Profiling Guide

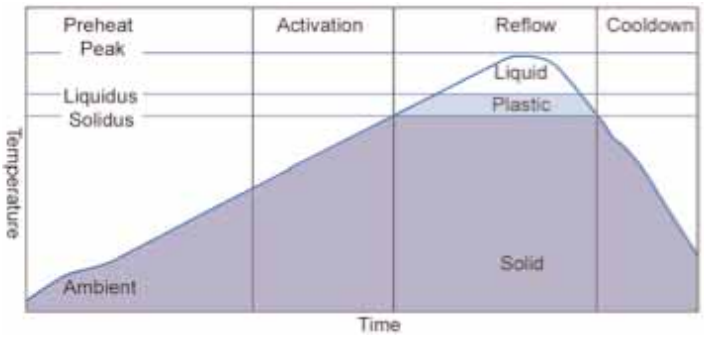
Introduction

EFD solder pastes produce high quality solder joints across a wide heating process range. As a rule, the shorter the profile, the better the solder paste will perform. There is no advantage to a profile centered within the time ranges given below for printed circuit board (PCB) reflow profiling.

The soldering process involves three inputs: surfaces to be soldered, solder paste, and heat. No single profile is ideal for all products and heating methods. A good profile will not exceed the maximum recommended reflow time at the hottest point on the product. The minimum cycle time to reflow a solder joint can be as low as half a second with laser heating.

Because of the variety among solderable devices and reflow equipment, it is often necessary to deviate from the guidelines given here. If you have questions, we recommend you contact Technical Support at 800-338-4353.

Typical Circuit Board Reflow Process



Preheat: Temp: Room temp to 130°C (approx. 110°C increase). Ramp rate: ½° to 3°C per second **(recommend approximately 1°C per second)**. Duration: 37 to 220 seconds, average 110 seconds. During preheat, low boiling point solvents and moisture are evaporated slowly to prevent spattering. The flux transitions from a gel state to a fluid state and spreads out on the product, covering the surfaces to be cleaned.

Activation: Temp: 130°C to alloy solidus (increase varies by alloy). Ramp rate: ½° to 3°C per second **(recommend approximately 1°C per second)**. Duration: varies by alloy. The flux cleans the surfaces to be soldered. Excessive time in the activation range will use up available flux activity and may result in non-wetting, de-wetting, solder balls, and other related solder defects.

Reflow: Temp: alloy solidus to peak at 15° to 40°C above liquidus and back down to solidus (increase varies by alloy). Ramp rate: ½° to 2°C per second **(recommend approximately 1°C per second)**. Duration: 20 to 120 seconds for most alloys, average 45 seconds. Soldering begins upon reaching the solidus temperature of the alloy being used. For maximum joint strength, a peak temperature of 15° to 40°C above the liquidus must be reached.

NOTE: If you have problems with "tombstones" or unacceptable product temperature variation, temperature stabilization should start at 5° to 15°C below alloy solidus and end at 5° to 15°C above alloy solidus (10° to 30°C degree range). Ramp rate will usually need to be less than 1°C. Thermally uniform product may require as little as 5 seconds, while thermally diverse products may require over a minute.

Cool down: Cool to safe temperature prior to handling. Ramp rate: less than 4°C per second. Cooling too rapidly can cause Coefficient of Thermal Expansion (CTE) mismatch stress related damage.

Total Time: 100 to 360 seconds from oven entrance to end of the Reflow stage for products and alloys. Average time: 210 seconds for Sn63/Pb37 and 245 seconds for SAC305(Sn96.5/Ag3.0/Cu0.5).

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