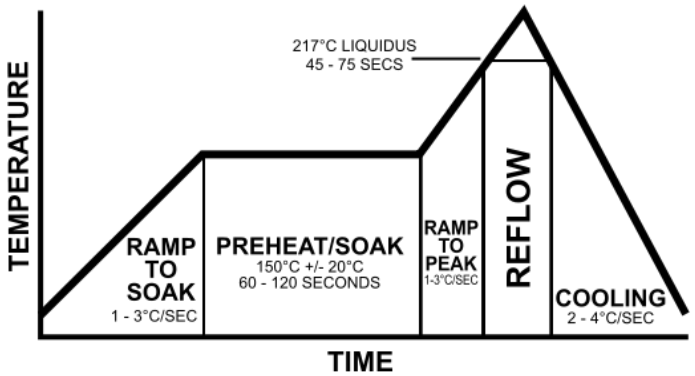
Application Note: XGA301 for reflow ovens

Introduction:

Reflow soldering is the most common form of attaching surface mount components to printed circuit boards (PCBs). The solder paste is applied and then the pcb is subjected to a controlled heating and cooling profile to minimise defects. There are generally distinct phases or zones in the oven each with a distinct thermal profile; pre-heat, (thermal) soak, reflow and cooling (see below), sometimes the ramping up time of the temperature is also controlled. The PCBs travel along a conveyor belt from one end to the other passing through each zone.

Ceramic or infra-red heaters (or a combination) are commonly used to radiate heat to the solder. The term “reflow” is used because the solder is melted and then is heated again and it re-flows. Modern systems do not always need to cool the solder and reheat, but simply make sure the re-flow temperate is surpassed in the process. It is critical not to heat the components past a temperature that will cause damage.



http://en.wikipedia.org/wiki/Reflow_soldering#/media/File:RSS_Components_of_a_Profile1.svg

A graphical example of convection reflow oven.
http://en.wikipedia.org/wiki/Reflow_oven

To minimize oxidation on the soldered surfaces, some ovens perform the reflow phase under a blanket of nitrogen (N2) to ensure an oxygen-free environment.

(O2 < 10ppm).

This process further reduces defects in the product. Monitoring the oxygen allows control of the N2 feed to ensure product quality and also a saving on gas consumption. Either zirconium-oxide or galvanic electrochemical sensors can be used to measure the O2.

Pros & Cons:

Zirconia

- Virtually non-depleting technology
- Sensors have a very fast response time

Any hydrocarbons will burn on the sensor and consume O2, providing a false low reading and may require a scrubber to be fitted in line which will slow the speed of response.

Electrochemical

- Does not see interference from other gases (CO2 is not present in this process)
- Sensors are cheap to replace.

Slow to drop down to ppm levels (actual level can be lower than reading)
Has to recover from exposure to air or high levels of O2

XGA301A1 Key Features:

- Zirconia or galvanic electrochemical sensor for trace oxygen measurements.
- 2 fully programmable alarm circuits (voltage free contacts)
- Programmable analogue outputs (0-10V and 4-20mA)
- Easy calibration (user selectable gases),
- RS232 communications with Windows based data-logging software.
- Optional internal pump – user settable from 0 – 1.2L/min
- Rectus quick-connect fittings available to reduce sample times if moving from one oven to another.
- Only 3.5Kgs, so moving from one oven to the next is easy.

Summary:

The XGA301 is well placed to measure trace oxygen in reflow ovens with two technologies available giving the user a choice. It is easily transportable between sample points or can be used as an online measurement. Having an intuitive HMI and simple calibration means that customers new to the model will be up and running quickly.

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