Application Note 001

Solder Reflow of Surface Mount Packages

Introduction

The purpose of this document is to outline the proper practices for the solder reflow of Aeroflex / Metelics' surface mount semiconductor and passive components. The following recommendations are based upon the internal manufacturing procedures established at Aeroflex / Metelics. As with any process, extensive qualification should be performed prior to implementing into a manufacturing environment.

Material Handling & Storage

In order to achieve a reliable bond the mating surfaces must be clean and contaminant free. Properly store materials in a dry atmosphere, preferably a Nitrogen purged desiccator cabinet. Chemical and/or plasma cleaning can be used to remove surface contaminants which will improve solder wetting. As with all semiconductors processing proper ESD safety precautions should be observed.

Solder Attachment

Whether using a solder paste or a solder preform, a typical reflow process will consist of the following steps:

1. **Preheat** – A slow ramp-up from ambient temperature which allows the component and substrate to gradually heat up. Ramp rate will vary depending upon the composition of the solder. See manufacturer's datasheet for time and temperatures.
2. **Equalization** – Point at which the preheat temperature has been achieved. This temperature should be approximately 20-40ºC below reflow temperature. A dwell time can be added to allow for a uniform temperature across the assembly.
3. **Reflow** – Ramp up to liquidous temperature of the solder. Time at reflow should be as brief as possible to keep from stressing the component and the solder joint.
4. **Cool Down** – A gradual cool down of the assembly. Ramp-down should be as fast as possible without causing thermal shock to the components.

Example Solder Profile		
Profile Step	**SnPb Eutectic**	**Lead-Free (SnAgCu)**
Ramp Rate	0.5-2.0ºC/sec*	0.5-2.0ºC/sec*
Preheat (soak)	Reference manufacturers datasheet for time and temperatures	
Temperature Min. (Tsmin)		
Temperature Max. (Tsmax)		
Time (tsMIN to tsMAX)		
Time Above Liquidus (TAL) Temperature (TL) Time (tL)	30-90 sec.*	
Peak Temperature (Tp)	205-220ºC*	235-245ºC*
Cool-down Rate	4ºC/sec.max*	4ºC/sec.max*

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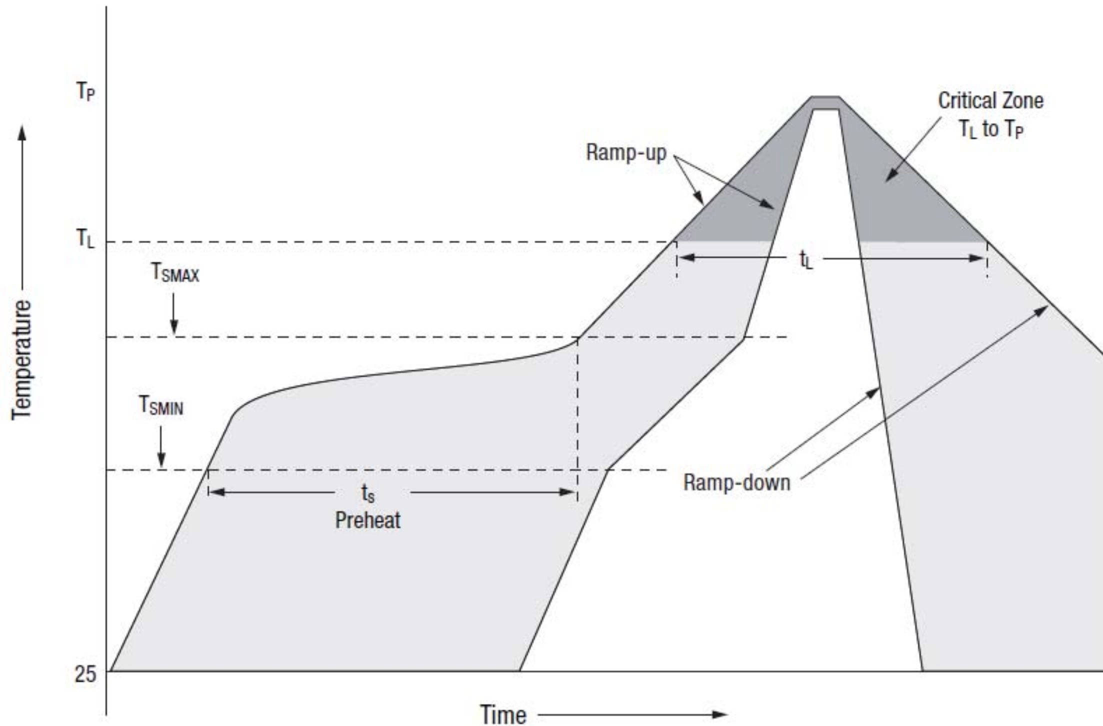

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