Solder plus Support

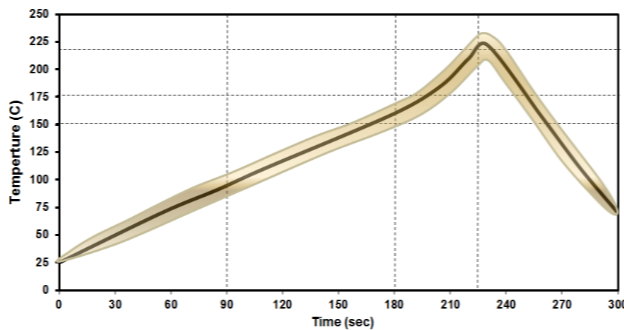
TIN/LEAD ALLOYS

REFLOW PROFILE GUIDELINES

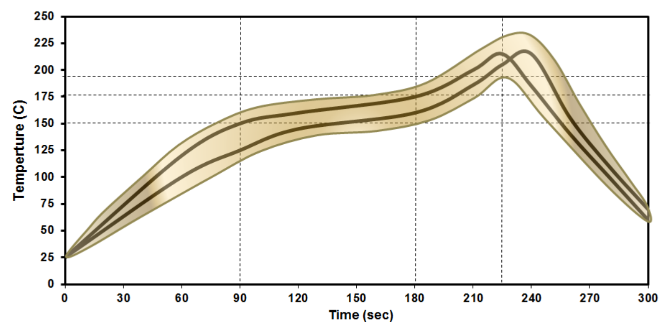
The information provided is a guideline only. Your profile will depend upon many factors including customer requirements, component limitations, oven characteristics, board layout, etc. Ultimately, quality requirements should drive the process, not adherence to these guidelines.

Ideally, profile measurements are to be collected on a populated assembly with the reflow profile recorded for each product being processed. It is common for the same profile settings to be used for multiple assemblies. Reflow profile data should be collected, analyzed and recorded for each assembly part number at the beginning of individual production runs.

There are two basic profile types: Ramp-Soak-Spike (RSS) and Ramp-To-Spike (RTS). RTS profiles are suitable for use in most applications for enhanced solder performance. RSS profiles are appropriate when the assembly has a large thermal mass or large ΔT.



Typical **RTS** Profile
Profile Length: 3-3.5/4.5 minutes from 50°C to peak 210-230°C
Ramp Rate: 0.7-1.8°C per second
Time Above Liquidus: 60 seconds ± 15 seconds
Cool Down Rate: within 4°C per second



Typical **RSS** Profile
Profile Length: 3-3.5/4.5 minutes
Preheat: 2-3°C per second for 60-90 seconds
Soak: 150-200°C for 30-90 seconds
Spike to Peak: 1.5-2°C per second
Peak: 210-230°C
Time Above Liquidus: 60 seconds ± 15 seconds
Cool Down Rate: within 4°C per second

Wetting Improvement

Wetting issues, whether component (lead-free) or substrate related can be improved through profiling. If the wetting issue is global, it can often be improved with proper profiling technique. If the wetting issue is component specific, it is likely a plating issue with the component/substrate. Profiling can be manipulated to improve wetting, but may affect other devices on the assembly. A general approach is to shorten the profile to as little as three (3) minutes and to increase the peak temperature by 10-15°C.

Contact AIM Technical Staff for Profiling Assistance and Process Support

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WWW.AIMSOLDER.COM INFO@AIMSOLDER.COM
USA +1 401-463-5605 CANADA +1 514-494-2000 MEXICO +52 656-630-0032 ASIA +86 755-2993-6487 EUROPE +48 42-663-60-04

TROUBLESHOOTING

	Possible Cause											
Issue	Preheat Rate Is Too High	Preheat Rate Is Too Low	Soak Zone Too Long or Too High	Soak Zone Too Short or Too Cool	Excessive Time Above Liquidus (TAL)	Insufficient Time Above Liquidus (TAL)	Peak Temp Too High	Peak Temp Too Low	Cooling Rate Too Fast	Cooling Rate Too Slow	Profile Too Long	Profile Too Short
Dark residue	✓						✓					
Brittle solder joints						✓		✓			✓	✓
Frosty solder joint										✓		
Component deformation/ damage							✓					
Crazing of residue									✓			
De-wetting	✓		✓		✓		✓					
Joints/visible solder spheres						✓					✓	✓
Grainy solder joints	✓		✓		✓		✓	✓		✓	✓	✓
Excess residue						✓		✓				✓
Flux/solder paste spatter	✓											
Malleable/ weak solder joint					✓					✓		
Poor or non-wetting						✓		✓			✓	✓
Popcorning/ component damage	✓											
Solder balls/solder beads		✓										
Thermal shock/ component damage									✓			
Tombstoning			✓	✓					✓			
Voiding						✓		✓				

This defect information is specific to potential causes that are reflow profile related. Soldering defects can be caused by a myriad of other process/material variables. Please consult AIM Technical Support for targeted process and profiling assistance.

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