

Introduction

This application note describes recommended practices and guidelines for the successful assembly of M/A-COM VCOs and Synthesizers using automated solder reflow techniques. Incorrect handling, storage, reflow and cleaning may damage the components.

Handling and Storage Precautions

M/A-Com VCOs and Synthesizers are static and moisture sensitive and are packaged accordingly. Appropriate handling precautions should be observed.

The typical shelf life of these components once removed from the protective reel bag is 168hrs. Exposure to static electricity or over voltage may cause defects in the product or degrade it's reliability. Components should also be stored in such a way so

as to avoid exposure to corrosive, salty or dusty atmospheres, high humidity, direct sunlight and strong electric fields.

Solder Pad Layout

Each VCO and Synthesizer data sheet recommends a solder pad layout based on IPC standards. Deviation from these recommended layouts can adversely effect the solder joint strength and integrity.

Component Construction

All M/A-Com VCOs and Synthesizers are designed to withstand solder reflow conditions, as recommended in this application note.

The table below details the construction of M/A-Com VCOs and Synthesizers.

Component Construction

Substrate	Type	Plating Construction	Cover Material
FR-4	Leadless	Electroless Nickel Immersion Gold ENIG	Brass (nickel plated)

Solder Selection

When selecting solder paste, parameters such as flux type, particle size and metal content should also be considered. The solder paste should be carefully selected to suit all of the relevant process parameters being used.

M/A-Com VCOs and Synthesizers are designed to work with most recommended reflow profiles for the SAC305/SAC405 type solders, and are fully compatible with the standard reflow profiles used for the SN60, SN62 and SN63 solder pastes, including no-clean pastes.

Solder Screen Guidelines

A solder screen or stencil is required to screen the minimum amount of solder paste onto the pads of the footprint. This amount or thickness will directly affect the quality of the solder joint. The optimum thickness is 0.18 mm to 0.25 mm (0.007 inch to 0.010 inch).

Silk screen techniques can control paste thickness well enough to keep it in the optimum range; the thickness being a function of the screen mesh, emulsion thickness and printer set up parameters. A stencil technique can also achieve similar results by using a stencil made of 0.2 mm (0.008 inch) thick brass or stainless steel.

The stencil or screen opening should be the same size as the pads on the footprint (1:1 registration), excluding any solder resist mask areas.

Component Placement

M/A-Com VCOs and Synthesizers are designed for placement using automatic Pick and Place equipment. Component placement is critical to negate shorts caused by solder bridging.

* Restrictions on Hazardous Substances, European Union Directive 2002/95/EC.

General Soldering Precautions: Lead-Free Soldering Process

Relation of qualification profile and actual production profile

The profiles listed in this document are not production reflow profiles, but are related to those profiles with an added margin of safety to account for oven variation, temperature drift, and product variation and process robustness.

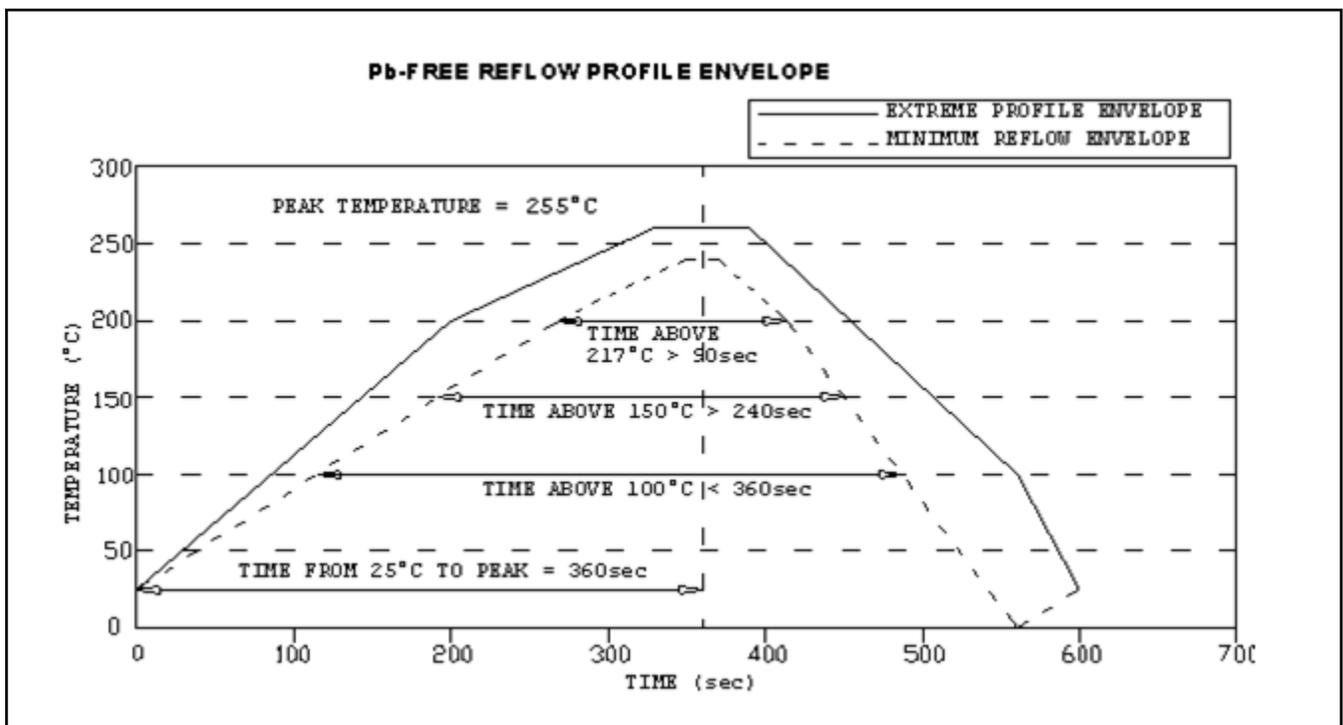
The actual profile used in production will be dictated primarily by the solder composition selected.

Process Requirements

To minimize the thermal stress to which these components are subjected. Always preheat the printed circuit board (failure to do so can cause excessive thermal shock and stress that can result in damage to the component).

The ovens used should be 100% convection reflow.

We recommended 90 seconds above 217°C with a maximum temperature not to exceed 260°C.



Condition

Average ramp-up rate (30°C to 217°C)
 > 100°C
 > 150°C
 > 217°C
 Peak Temperature
 Cool-down rate (Peak to 50°C)
 Time from 30°C to 255°C

All temperatures shown are +5/-0°C

Exposure

less than 3°C / second
 between 360-600 seconds
 at least 240 seconds
 at least 90 seconds
 255°C at least 15 seconds
 less than 6°C / second
 no greater than 360 seconds