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MICROWAVE CORPORATION

GUIDELINE FOR AUTOMATED REFLOW SOLDERING PROCESS FOR DCO, DXO AND DBO SERIES OF VOLTAGE CONTROLLED OSCILLATORS

Forward

The guidelines provided in this application note comply with JEDC J-STD-020 and describe the basic surface-mounting assembly requirements for solder reflow of voltage controlled oscillators and synthesizers manufactured by Synergy Microwave Corporation. Optimum yields are achieved by careful optimization of the heating profile to allow for package size limitations.

Peak Reflow Temperature

Determining the maximum allowable peak reflow temperature is a process that involves consideration of the package volume and thickness for both SnPb and Pb-free soldering processes as described in Table I below:

Table I. Package peak reflow temperature (Tp)

Reflow Process	Thickness	Volume	
		<350 mm^3	
SnPb	>2.5 mm	225°C +0/-5°C	
Pb-Free	>2.5 mm	260°C +0/-5°C	

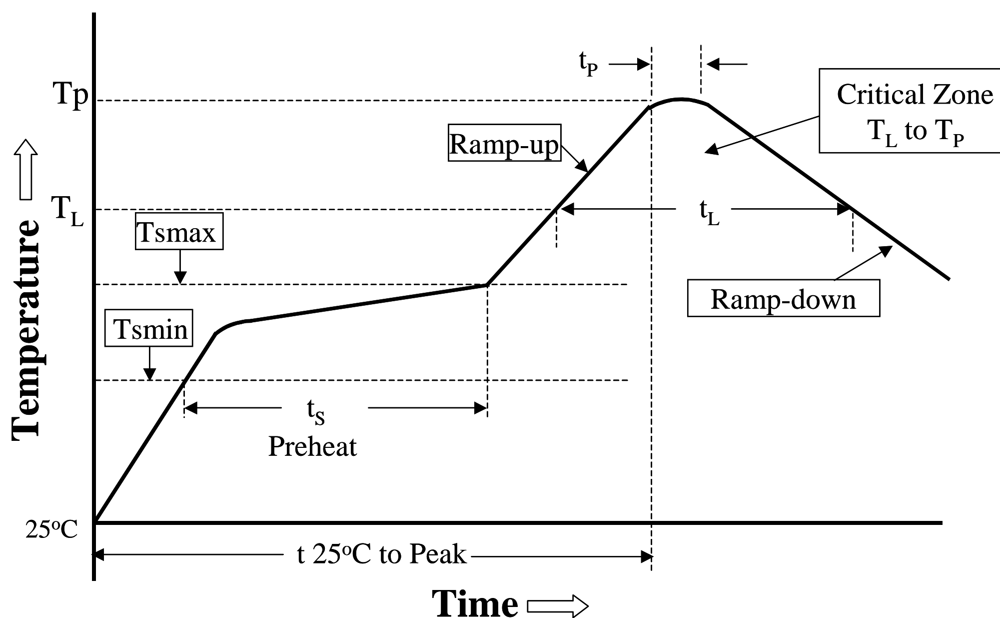

Figure 1. Temperature reflow profile

Table II. Reflow profile parameters

Reflow Profile Feature	SnPb Eutectic Assembly	Pb-Free Assembly
Average ramp-up rate (Tsmax to Tp)	3^oC/second max.	3^oC/second max.
Preheat -Minimum Temperature (T_{Smin}) -Maximum Temperature (T_{Smax}) -Time (T_{Smin} to T_{Smax})	100^oC 150^oC 60 – 120 seconds	150^oC 200^oC 60 – 180 seconds
Time maintained above: -Minimum Temperature (T_L) -Time (t_L)	183^oC 60 – 150 seconds	217^oC 60 – 150 seconds
Peak Temperature (Tp)	Per Table I	Per Table I
Time within 5^oC of actual peak temperature (tp)	10-30 seconds	20-40 seconds
Ramp-down rate	6^oC/second max.	6^oC/second max.
Time at 25^oC to Peak Temperature	6 minutes max.	8 minutes max.

Consideration for maximum reflow temperature limits– One reflow pass

All parts are soldered internally with solder having a reflow temperature melting point of 235 ºC. If the maximum reflow profile does not exceed 228 ºC, no special cooling precautions are required. In cases where the application requires the solder profile to exceed 228 ºC (Never to exceed 260 ºC!), care has to be taken so that the module will not be exposed to any vibration, as the molten solder can shift component placement. The molten solder must be allowed to solidify with no vibration until the device cools down to below 220 ºC. This allows for any residual heat trapped in the device to cool below the solder melting temperature, which is usually hotter inside the device.

For technical assistance contact:

Synergy Microwave Corporation
201 McLean Boulevard
Paterson, NJ 07504
Tel. 973-881-8800
Fax 973-881-8361
Email: info@synergymwave.com

- Recommended Solder Reflow profile for Pb-Free Process -