



PCB ASSEMBLY GUIDELINES

The purpose of this document is to provide users with guidelines for use of MaxLinear's surface mount devices classified to the levels defined in J-STD-020.

SOLDER REFLOW

PCB (printed circuit board) assembly involves attaching ICs and other components to PCB's by applying heat or thermal energy to solder component's terminals to PCB's contact pads. Solder material is introduced to the joints through solder paste printing or wave soldering. The "solder reflow" is achieved when an appropriate amount of heat or thermal energy is applied to raise the temperature of the solder above its eutectic melting point. Upon completion of the solder reflow and cool-down, a solid solder joint is formed with proper mechanical strength, metallurgical structure, and electrical conductivity.

REFLOW PROFILE & CONTROLLED HEATING

Solder reflow profile should be properly designed and evaluated by the PCB assembly process engineer based on solder paste, heating method, PCB design, thermal mass of the entire board and component sensitivity. During reflow, the component body temperature must not exceed the rated value stated on the caution label. Typical solder reflow profile requirements are listed in Tables 1, 2 and 3 and illustrated in Figure 1.

Table 1: Reflow Temperature Parameters

Profile Feature	Sn-Pb Eutectic Assembly	Pb-Free Assembly
Preheat/Soak		
Temperature Min (T_{SMIN})	100 °C	150 °C
Temperature Max (T_{SMAX})	150 °C	200 °C
Time (t_s) from (T_{SMIN} to T_{SMAX})	60-120 seconds	60-120 seconds
Ramp-up rate (T_L to T_P)	3 °C/second max.	3 °C/second max.
Liquidous temperature (T_L)	183 °C	217 °C
Time (t_L) maintained above T_L	60-150 seconds	60-150 seconds
Peak package body temperature (T_P)	See Table 2	See Table 3
Time (t_P)* within 5 °C of the specified classification temperature (T_C)	20 seconds (Note 1)	30 seconds (Note 2)
Ramp-down rate (T_P to T_L)	6 °C/second max.	6 °C/second max.
Time 25 °C to peak temperature	6 minutes max.	8 minutes max.

Notes

1. Tolerance for peak profile temperature (T_P) is defined as a supplier minimum and a user maximum.
2. All temperatures refer to the center of the package, measured on the package body surface that is facing up during assembly reflow (e.g., live-bug). If parts are reflowed in other than the normal live-bug assembly reflow orientation (i.e., dead-bug), T_P shall be within ± 2 °C of the live-bug T_P and still meet the T_C requirements, otherwise, the profile shall be adjusted to achieve the latter. To accurately measure actual peak package body temperatures, refer to JEP140 for recommended thermocouple use.

Table 2: SnPb Eutectic Process – Peak Reflow Temperature (T_C)

Package Thickness	Volume $mm^3 <350$	Volume $mm^3 \geq 350$
< 2.5 mm	235°C	220°C
≥ 2.5 mm	220°C	220°C

Table 3: Pb-Free Process – Peak Reflow Temperature (T_C)

Package Thickness	Volume $mm^3 <350$	Volume $mm^3 350-2000$	Volume $mm^3 >2000$
< 1.6 mm	260°C	260°C	260°C
1.6-2.5mm	260°C	250°C	245°C
>2.5 mm	250°C	245°C	245°C

Figure 1: Typical Reflow Profile

