

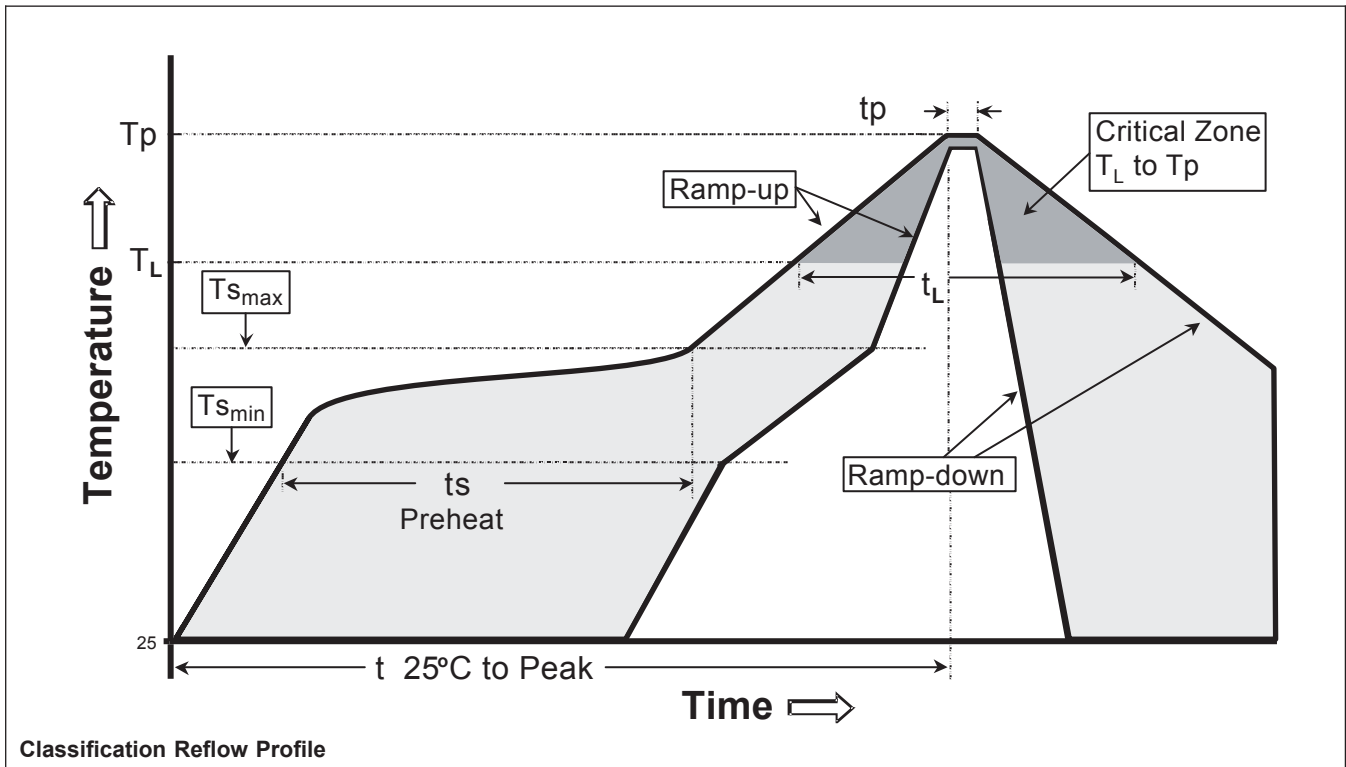


## I. Recommended condition of reflow soldering

**Classification Reflow Profiles**

Profile Feature	Sn-Pb Eutectic Assembly	Pb-Free Assembly
Average Ramp-Up Rate ( $T_{s_{max}}$ to $T_p$ )	3 °C/second max.	3° C/second max.
<b>Preheat</b> <ul style="list-style-type: none"> <li>– Temperature Min (<math>T_{s_{min}}</math>)</li> <li>– Temperature Max (<math>T_{s_{max}}</math>)</li> <li>– Time (<math>t_{s_{min}}</math> to <math>t_{s_{max}}</math>)</li> </ul>	100 °C 150 °C 60-120 seconds	150 °C 200 °C 60-180 seconds
Time maintained above: <ul style="list-style-type: none"> <li>– Temperature (<math>T_L</math>)</li> <li>– Time (<math>t_L</math>)</li> </ul>	183 °C 60-150 seconds	217 °C 60-150 seconds
Peak/Classification Temperature ( $T_p$ )	See Table 4.1	See Table 4.2
Time within 5 °C of actual Peak Temperature ( $t_p$ )	10-30 seconds	20-40 seconds
Ramp-Down Rate	6 °C/second max.	6 °C/second max.
Time 25 °C to Peak Temperature	6 minutes max.	8 minutes max.

**Note 1:** All temperatures refer to topside of the package, measured on the package body surface.



**Table 1-1 SnPb Eutectic Process – Package Peak Reflow Temperatures**

Package Thickness	Volume mm <sup>3</sup> <350	Volume mm <sup>3</sup> ≥ 350
<2.5 mm	240 +0/-5 °C	225 +0/-5°C
≥ 2.5 mm	225 +0/-5°C	225 +0/-5°C

**Table 2-2 Pb-free Process – Package Classification Reflow Temperatures**

Package Thickness	Volume mm <sup>3</sup> <350	Volume mm <sup>3</sup> 350 - 2000	Volume mm <sup>3</sup> >2000
<1.6 mm	260 +0 °C *	260 +0 °C *	260 +0 °C *
1.6 mm - 2.5 mm	260 +0 °C *	250 +0 °C *	245 +0 °C *
≥2.5 mm	250 +0 °C *	245 +0 °C *	245 +0 °C *

\* Tolerance: The device manufacturer/supplier shall assure process compatibility up to and including the stated classification temperature (this means Peak reflow temperature +0 °C. For example 260 °C+0°C) at the rated MSL level.

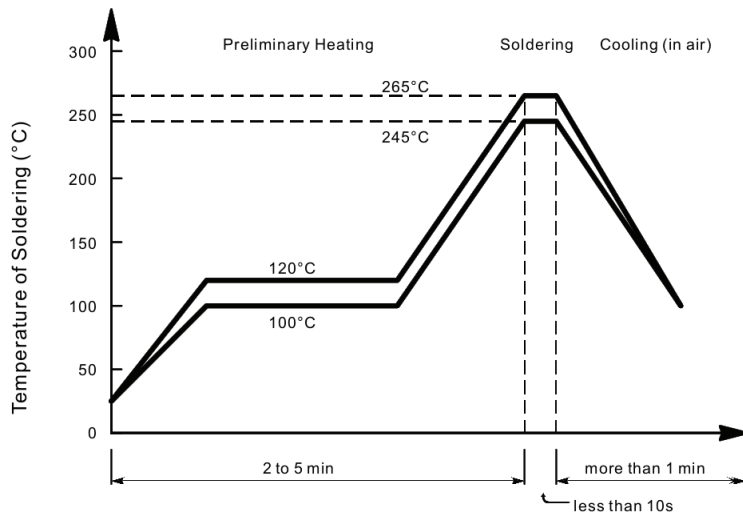
**Note 1:** The profiling tolerance is + 0 °C, -X °C (based on machine variation capability) whatever is required to control the profile process but at no time will it exceed - 5 °C. The producer assures process compatibility at the peak reflow profile temperatures defined in Table 2.2.

**Note 2:** Package volume excludes external terminals (balls, bumps, lands, leads) and/or nonintegral heat sinks.

**Note 3:** The maximum component temperature reached during reflow depends on package thickness and volume. The use of convection reflow processes reduces the thermal gradients between packages. However, thermal gradients due to differences in thermal mass of SMD packages may still exist.

**Note 4:** Components intended for use in a “lead-free” assembly process shall be evaluated using the “lead free” classification temperatures and profiles defined in Tables 1.1, 2.2 whether or not lead free.

## II. Recommended condition of wave soldering



## III. Recommended condition of hand soldering

- Temperature: 370°C
- Time: 3s max.
- Times: one time