



QFN Soldering Reflow Guidelines

nAN400-08

Application Note v1.2

1 Introduction

The electronic manufacturing industry uses environmentally safe lead-free, or Green, assembly processes. Factors that should be considered when switching to lead-free soldering materials are:

- Circuit board thickness
- Surface finish
- Fabrication complexity
- Assembly process compatibility

This application note focuses on solder reflow recommendations for QFN packages with Pb-free (Green) finishes.

Note: Nordic Semiconductor only provides Pb-free parts.

Note: The wetting of the package side wall is not guaranteed. This is because the QFN package is by design a “contact down” package. The sidewalls of the leads are not plated since they are exposed by the singulation step, which takes place after the plating. Depending on the surface state of the bare copper the sidewalls of the leads may not wet during soldering. Please see Figure 1 “The QFN package is by design a “contact down” package”.

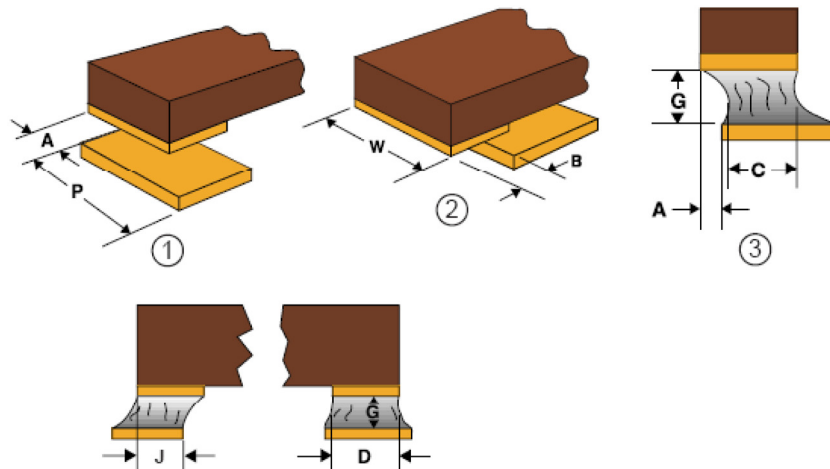


Figure 1 The QFN package is by design a “contact down” package

2 Solder reflow process basics

Lead-free soldering processes have been available for some years and all parts of Nordic Semiconductor are Pb-free.

We recommend using the solder profile as given in **Section 2.1 “Solder reflow profile”** for soldering QFN packages. However, factors such as circuit board thickness, size, other semiconductor packages, passive components and reflow equipment may affect the total profile time.

2.1 Solder reflow profile

Profile feature	Pb-free assembly
Preheat/soak	
Temperature min (T_{smin})	150 °C
Temperature max (T_{smax})	200 °C
Time (t_s) from (T_{smin} to T_{smax})	60-120 seconds
Ramp-up rate (T_L to T_p)	3 °C/ second max.
Liquidous temperature (T_L)	217 °C
Time (t_L) maintained above T_L	60-150 seconds
Peak package body temperature (T_p)	T_p must not exceed 260 °C
Time (t_p)* within 5 °C of the specified classification temperature (T_c), see Figure 2 "Reflow profile" on page 4.	30* seconds
Ramp-down rate (T_p to T_L)	6 °C/ second max.
Time 25 °C to peak temperature	8 minutes max.

- Note:**
- Package thickness < 2.5 mm and volume < 350 mm².
 - All temperatures refer to the center of the package, measured on the package body surface that is facing up during assembly reflow (for example, live-bug).
 - Actual board assembly profiles should be developed based on specific process needs and board designs and should not exceed the parameters in this table.

Table 1 Reflow conditions

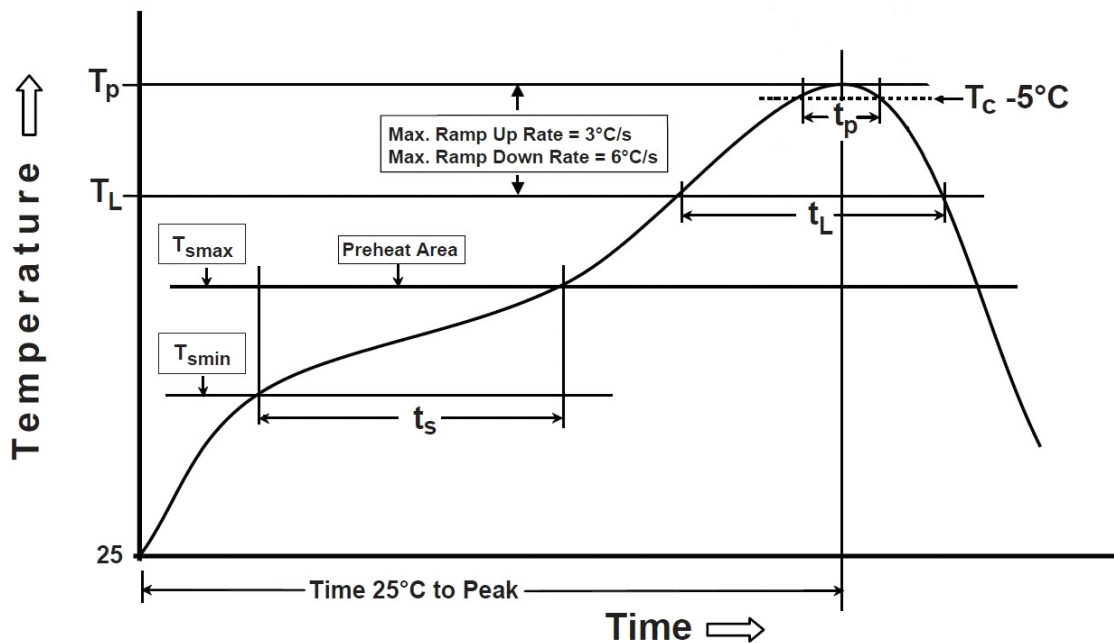


Figure 2 Reflow profile

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Main office: Otto Nielsens veg 12
7052 Trondheim
Norway
Phone: +47 72 89 89 00
Fax: +47 72 89 89 89

Mailing address: Nordic Semiconductor
P.O. Box 2336
7004 Trondheim
Norway



Revision History

Date	Version	Description
November 2013	1.2	Aligned reflow profile with JEDEC
December 2006	1.1	Added note on wetting of package side wall
January 2004	1.0	Initial release

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