

## Basic De-soldering Process for QFN SMT Devices

Microsemi products achieve high levels of performance in part due to a carefully designed interface between external connectors and internal components. As a result, specific handling precautions must be observed for device reliability and optimum performance.

### Scope

This document covers recommended de-soldering process for air cavity QFN SMT devices (e.g., SMT driver amplifiers).

### Introduction

Many Microsemi high performance optical driver amplifier design uses air cavity QFN SMT packages. Care must be used if one wants to de-solder the amplifier (a.k.a., device) from the application's printed circuit board (PCB) assembly without damaging the PCB assembly or the device. The package top cover (a.k.a., package lid included the side walls) is epoxy sealed onto the amplifier's substrate. If the package lid is subjected to excess heat during the de-soldering process, the epoxy used to hold down the lid onto the device's PCB substrate will weaken and the lid can come loose from externally applied forces when trying to remove the device from the PCB assembly. It is recommended to remove the device from the PCB assembly by using a pair of tweezers to pick the part up from the base of the device (i.e., PCB substrate), seeing figure 1.

Below is an example of the cross-section of an air cavity QFN device.

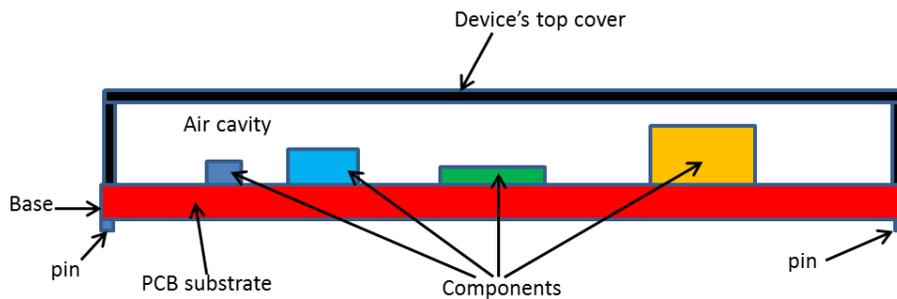


Figure 1. Example of driver amplifier cross-sectional

### Recommended Guideline

Below is the guideline recommendation for de-soldering SMT devices with air cavity (e.g., SMT driver amplifiers) from the PCB assembly.

#### Bake

Before reworking the PCB assembly, bake the PCB assembly to remove any residual moisture, if excess residual moisture is present on the PCB assembly.

#### Component Removal

Use thermocouples to help monitor the temperature on the top and bottom of the PCB assembly near the device to be de-soldered. Do not exceed 250°C.

Microsemi recommends using a de-soldering rework station using two heat sources to de-solder the SMT amplifier from the PCB assembly; one hot heat source applied to the top and one hot heat source applied to the bottom of the PCB assembly. See figure 5.

- 1) Use a heat shield to protect the device's top lid cover from excess heat during the de-soldering process. A typical heat shield has radiant heat reflected material on one side and adhesive on the other side. Heat shield materials come in many forms and sizes. Select a heat shield that has a minimum rating of 500°C. Figure 2 shows an example of a heat shield tape. A search on the internet will help you discover heat shield suppliers.



Figure 2. **Example of heat shield tape**

Cut a small piece of the heat shield tape/material to cover the top lid surface of the device. Do not cover the package device's soldering pins.

- 2) Next, select a hot air nozzle tip to match the QFN SMT device's package dimension size. Select a nozzle that will direct the hot air to the soldering pins of the device package and not onto the top lid surface of the device package. This nozzle will be used with the top heating source. Figure 3 shows examples of different sizes of hot air nozzle tips.



Figure 3. **Examples of hot air nozzle tips**

- 3) Install the hot air nozzle tip to your heating output on the top side heater. Do not turn on the top heater at this time.
- 4) Mount the PCB assembly to the PCB rework station where heating is available to the bottom of the PCB assembly. This is used to preheat the bottom of the PCB assembly before applying heat to the soldering pins of the SMT device. Those PCB preheater workstations come in many forms and sizes. A search on the internet will provide a list of the suppliers.

Mount the reworked PCB assembly just above the bottom heater fixture. It is recommended setting the bottom heater temperature to the PCB assembly between 100°C to 150°C. For now, leave the bottom heater off. See figure 4 for examples of the PCB rework stations with preheater.



Figure 4. Examples of PCB rework stations with preheater from the bottom

- 5) Apply flux to the SMT device's soldering pins if needed.
- 6) Turn on the bottom heater to the PCB assembly, (from step 4 above).
- 7) When the bottom of the PCB reaches the desired temperature, then apply heat (e.g., PCB rework station, heat gun with fixture, or equivalent) with the preselected hot air nozzle tip from step 2 to the top of the SMT device. Do not let the hot nozzle tip touch the PCB surface or the device. It should be about 3mm to 4mm above the device. Use a timer to set the timing for heating up the PCB assembly/SMT device; it should be similar to a soldering reflow temperature profile used in an automated soldering reflow oven. Figure 5 show examples of PCB rework stations.

Do not exceed 250°C on the QFN SMT device and no more than about 30 to 60 seconds at the peak temperature.



Figure 5. Examples of PCB rework stations (heating available from the top and bottom)

- 8) When the solder is melted (i.e., liquidus temperature, depended on the solder used) on the device's soldering pins, pick up the device from the base of the package (i.e., device's substrate), removing it from the PCB assembly. Do not pick up the device using the lid cover of the device package; the lid cover may come off and the device's substrate may stay in-place on the PCB assembly.
- 9) After removing the SMT device from the PCB assembly, clean the PCB assembly.



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