

Reflow Soldering of the MEMS Microphone

BACKGROUND

This application note provides guidance and suggestions for assembling the MEMS microphone package. Parameter and profile details are presented, followed by device footprints, suggested stencil patterns, and PCB land layout patterns for the [ADMP401](#), [ADMP421](#), [ADMP404](#), and [ADMP405](#).

PACKAGE INFORMATION

All MEMS microphone models described in this application note are bottom-ported devices.

PRINTING PARAMETERS

The printing parameters are

- print pressure = 3 kg
- print speed = 30 mm/sec
- squeegee type = metal
- squeegee angle = 60°

STENCIL PARAMETERS

The stencil parameters are

- stencil type = laser cut
- stencil thickness = 3 mils (~75 µm)

SUGGESTED SOLDER PASTE

Indium8.9 (Type 4—alloy composition—96.5Sn/3.0Ag/0.5Cu (SAC305)) is the suggested solder paste.

This paste is an air reflow, no-clean solder paste specifically formulated to accommodate the higher processing temperatures required by the Sn/Ag/Cu, Sn/Ag, and other alloy systems favored by the electronics industry to replace conventional Pb-bearing solders.

PLACEMENT FORCE

The MEMS microphone can be handled using standard pick-and-place and chip shooting equipment. Care should be taken to avoid damage to the MEMS microphone structure as follows:

- Use a standard pickup tool to handle the microphone. Because the microphone hole is on the bottom of the package, the pickup tool can make contact with any part of the lid surface.
- Use care during pick-and-place to ensure that no high shock events above 10,000 g are experienced because such events may cause damage to the microphone.
- Do not pick up the microphone with a vacuum tool that makes contact with the bottom side of the microphone. Do not pull air out of or blow air into the microphone port.
- Do not use excessive force to place the microphone on the PCB.
- The suggested placement force is 500 grams.
- The placement force should not exceed 800 grams.

TABLE OF CONTENTS

| | | | |
|------------------------------|---|-----------------------|---|
| Background | 1 | Reflow Profile..... | 3 |
| Package Information | 1 | Rework | 3 |
| Printing Parameters..... | 1 | ADMP401 | 4 |
| Stencil Parameters | 1 | ADMP421 | 5 |
| Suggested Solder Paste | 1 | ADMP404/ADMP405 | 7 |
| Placement Force..... | 1 | | |

REFLOW PROFILE

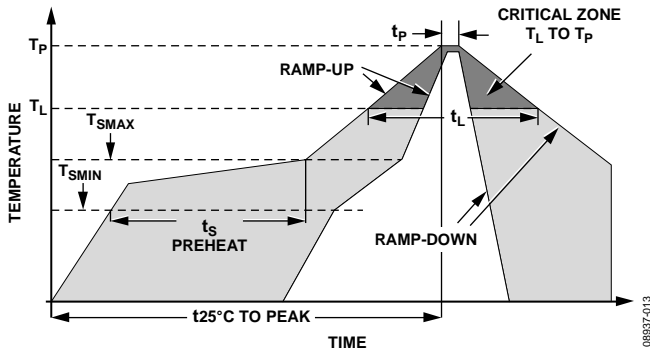


Figure 1. Recommended Soldering Profile Limits

REWORK

The rework process of the MEMS microphone should be carried out using a rework station.

1. Preheat the board to 100°C to 125°C.
2. Place a 6 mm × 6 mm square nozzle over the part.
3. Enable the hot air flow through this nozzle so that the solder becomes liquidous.
4. Use the nozzle to remove the microphone from the substrate.
5. Apply additional solder paste to pad sites using a manually operated dispensing system, such as a syringe with a small-gauge tip.
6. Use a surface-mount placement machine to place the replacement component.
7. Reflow the component on the rework station.

Caution

The MEMS microphone package has a port hole opening at the bottom and is sensitive to solder flux.

Do not use a vapor phase soldering process.

The MEMS microphone device can be damaged if subjected to cleaning processes. The cleaning solvents can enter through the port hole and damage the device.

Table 1. Recommended Soldering Profile Limits

| Profile Feature | Sn-Pb | Pb Free |
|---|-----------------|-----------------|
| Average Ramp Rate (T _L to T _P) | 1.25°C/sec max | 1.25°C/sec max |
| Preheat | | |
| Minimum Temperature (T _S MIN) | 100°C | 100°C |
| Maximum Temperature (T _S MAX) | 150°C | 200°C |
| Time (T _S MIN to T _S MAX), t _S | 60 to 75 sec | 60 to 75 sec |
| Ramp-Up Rate (T _S MAX to T _L) | 1.25°C/sec | 1.25°C/sec |
| Time Maintained Above Liquidous (t _L) | 45 to 75 sec | ~50 sec |
| Liquidous Temperature (T _L) | 183°C | 217°C |
| Peak Temperature (T _P) | 215°C +3°C/-3°C | 245°C +0°C/-5°C |
| Time Within 5°C of Actual Peak Temperature (t _P) | 20 to 30 sec | 20 to 30 sec |
| Ramp-Down Rate | 3°C/sec max | 3°C/sec max |
| Time 25°C (t _{25°C}) to Peak Temperature | 5 min max | 5 min max |

ADMP401

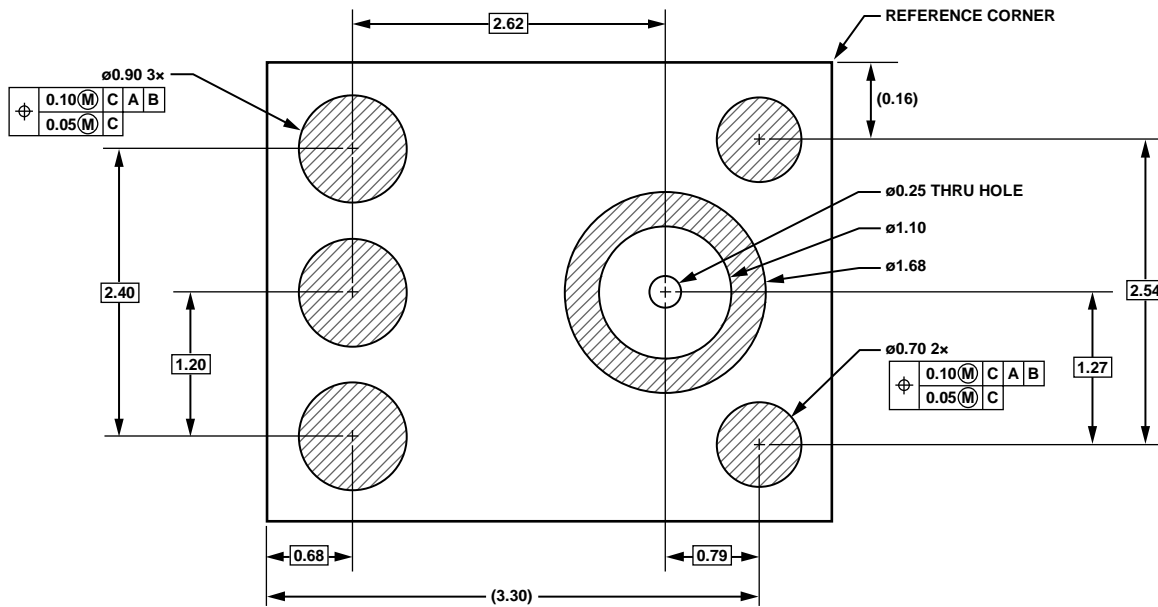


Figure 2. Device Footprint

08937-004

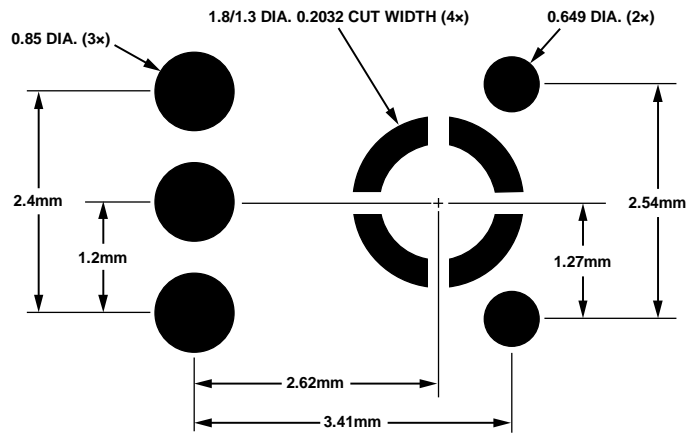


Figure 3. Suggested Stencil Pattern

08937-005

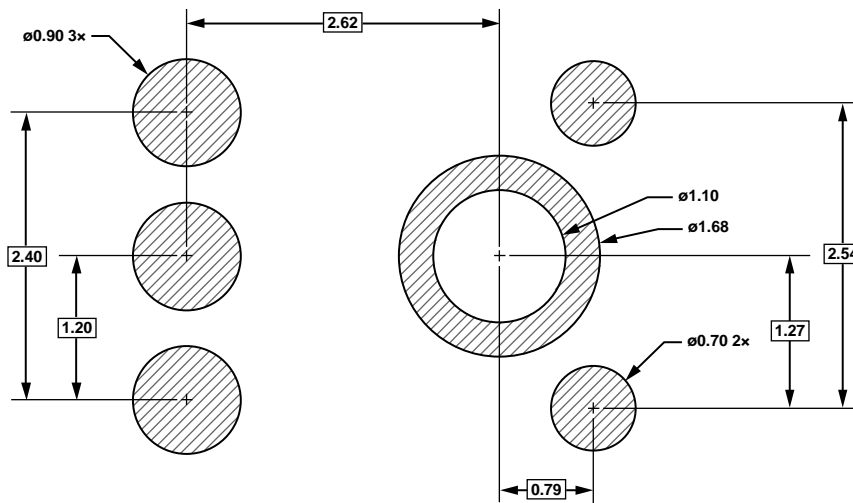


Figure 4. PCB Land Pattern Layout

08937-006

ADMP421

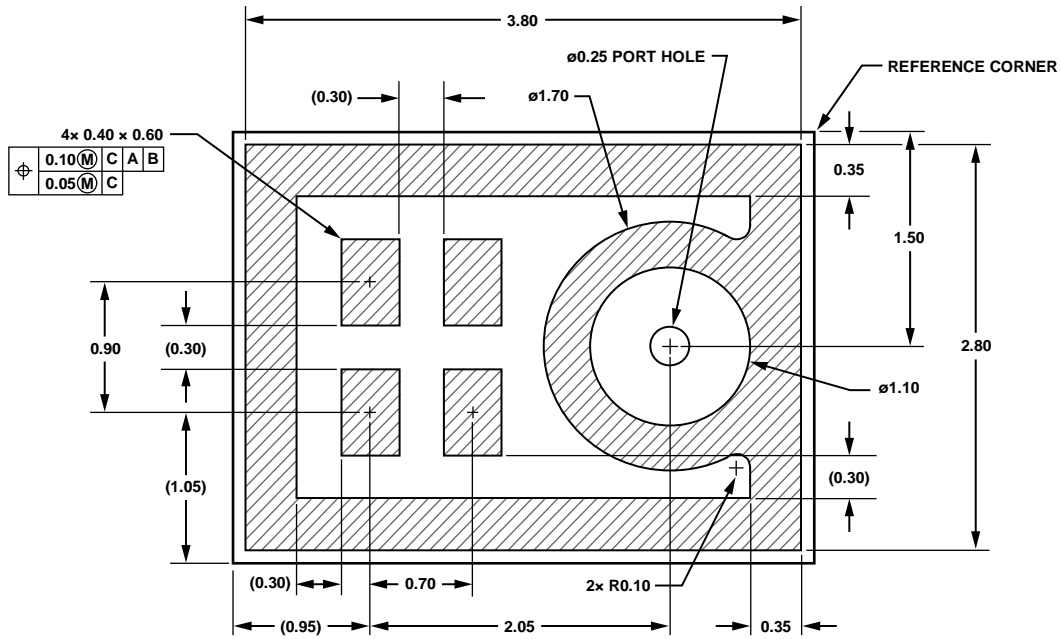


Figure 5. Device Footprint

08937-007

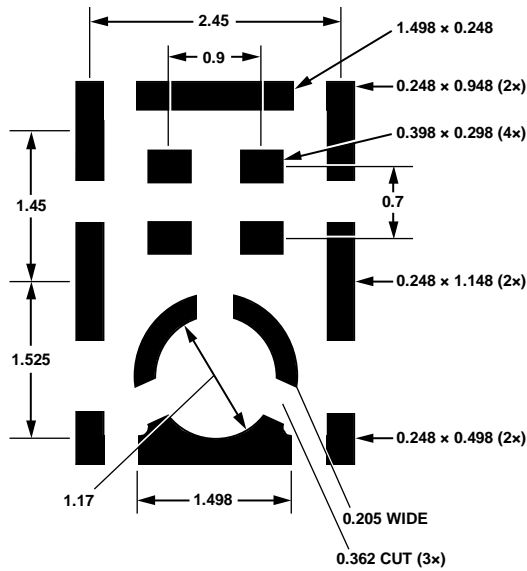


Figure 6. Suggested Stencil Pattern

08937-008

ADMP404/ADMP405

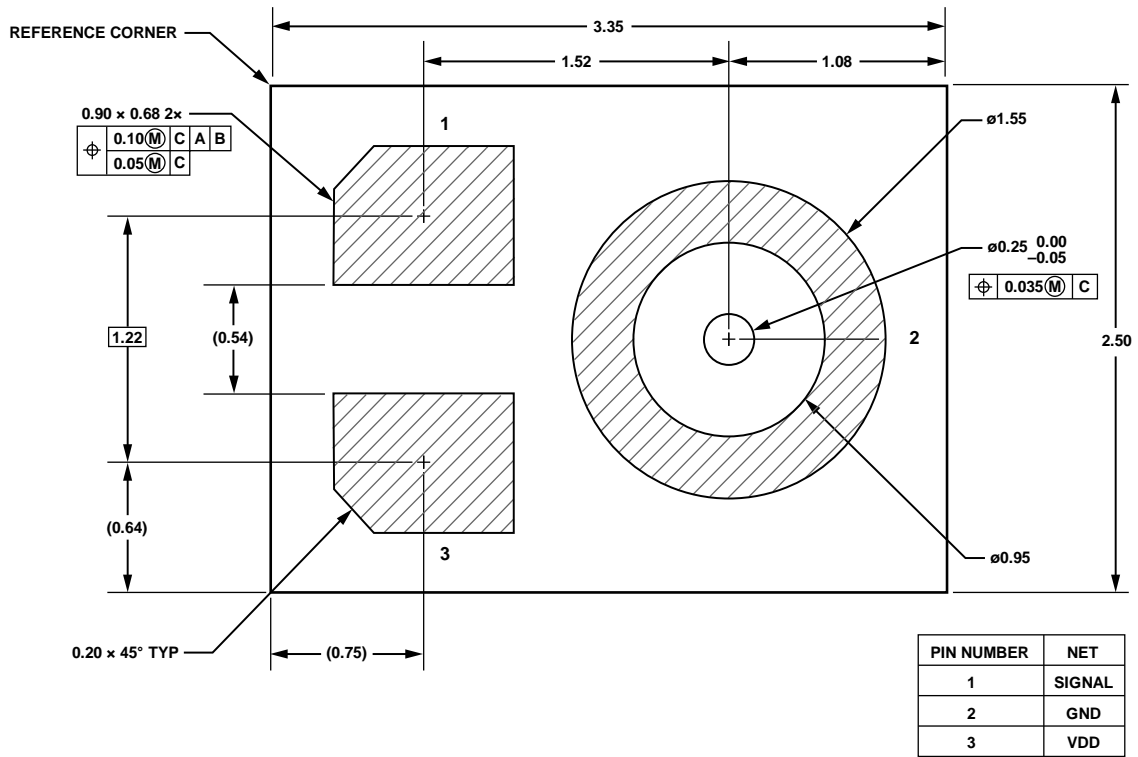


Figure 8. Device Footprint

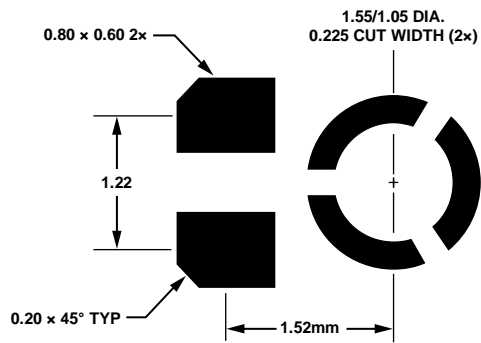


Figure 9. Suggested Stencil Pattern

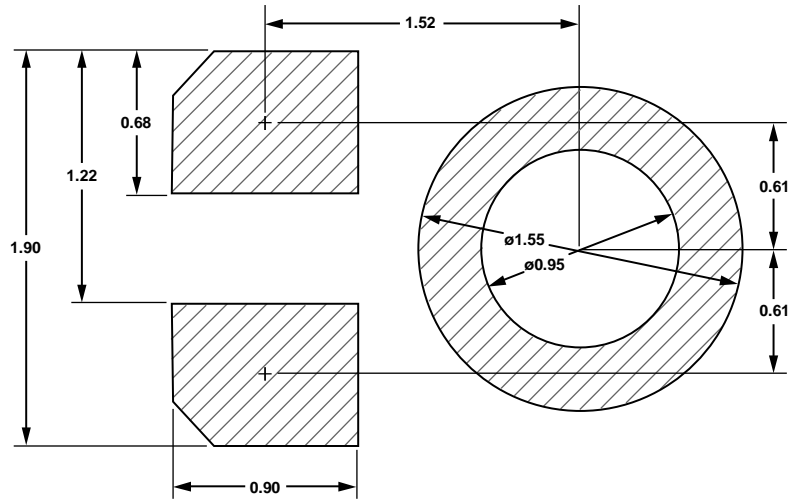


Figure 10. PCB Land Pattern Layout

08937-012