



Tech Note  
SMD PRODUCT SOLDERING  
PROCEDURE

DOC00381 REVISION D

Written by:	Manufacturing
Date:	5/8/08

Initial Release and all Subsequent Revisions

Approved by:	Quality Review
Date:	1/30/15

## REVISION HISTORY

**REVISION A – 5/8/08 – OBSOLETE**

New Procedure for MP00001, 2 & 4 Products

**REVISION B – 9/29/08 – OBSOLETE**

Revised and Updated Procedure

**REVISION C – 1/20/09 – OBSOLETE**

Updated Formatting

**REVISION D – 1/30/15 – RELEASED**

Updated Formatting

## TABLE OF CONTENTS

1.0	Scope.....	4
2.0	Required Components, Materials, and Tools.....	4
3.0	Precautions .....	4
4.0	Procedure.....	5
4.1	Aligning a Memsense SMD to a Receiving or Mating Device .....	5
4.2	Immobilization of the Receiving or Mating Device .....	7
4.3	Alignment and Tack Soldering of an SMD to a Mating Device .....	7
4.4	Soldering the Remaining SMD Pin Connections.....	9
4.5	Cleaning and Inspection .....	9
5.0	References .....	9

## 1.0 SCOPE

This hand soldering guideline and instruction procedure applies to the TriRate (MP00001), AccelRate (MP00002) and MAG3 (MP00004) products. The purpose of this procedure is to provide hand soldering guidelines and instructions for installing an SMD on an end use product.

## 2.0 REQUIRED COMPONENTS, MATERIALS, AND TOOLS

- Memsense SMD (eg. TriRate, AccelRate or MAG3 device)
- End Use Device that the Memsense SMD is being soldered to. The device should have land pattern similar to that shown in Figure 5 of the product datasheet to accept the SMD product.
- Materials and Tools Required
  - Soldering Iron
  - Flux (Kester TSF Tacky Flux)
  - Solder (Kester No-Clean-245, SN63Pb37, 0.020 diameter)
  - Kapton Tape (to secure the SMD device to its end use product)
  - Flux-Off
  - Alcohol

## 3.0 PRECAUTIONS

Stresses above those listed below in Table 1 - Absolute Maximum Ratings, may cause permanent damage to an SMD. Care should be exercised in handling SMD's to avoid potential damage. Drops onto hard surfaces can cause shocks of greater than 2000 g and exceed the Absolute Maximum Rating of the device.

All Memsense SMD products are static sensitive and should only be handled in ESD-Safe environments.

**Table 1.** Absolute Maximum Ratings

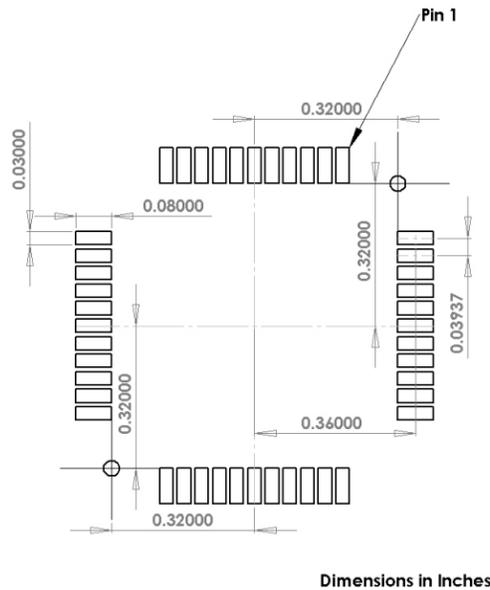
Parameter	Rating
Acceleration (Any Axis, Unpowered, 0.5 ms)	2000 g's
Storage Temperature	-65°C to +150°C

Large thermal stresses can cause the SMD device to reflow internally and permanently damage the device. Therefore, care should be taken to minimize the amount of heat applied to the device. Furthermore, once the SMD is soldered to the End Use Device, NEVER attempt to remove by de-soldering. In many cases, this can cause premature failure of the device.

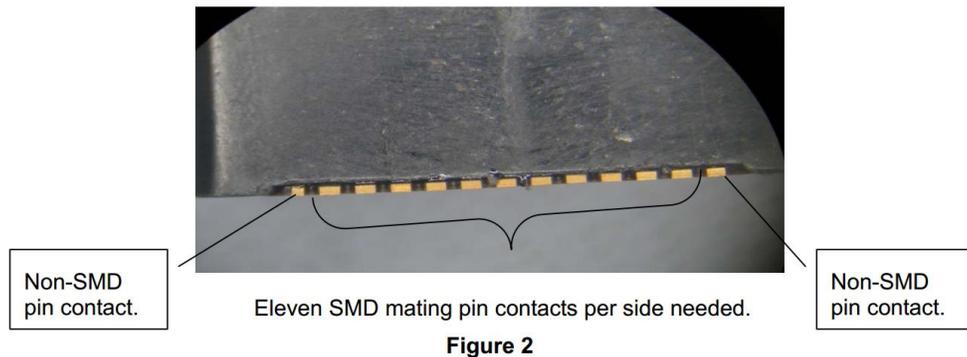
## 4.0 PROCEDURE

### 4.1 ALIGNING A MEMSENSE SMD TO A RECEIVING OR MATING DEVICE

The recommended receiving or mating device PCB pad layout for a Memsense SMD is shown in Figure 1. Note that the recommended PCB pad layout has 11 pads per side. The significance of this is that when a Memsense SMD is viewed from the side (and not the bottom), the SMD may appear to have one or two additional contacts on any given side of the SMD. In reality, the SMD has only 11 contacts per side, matching the recommended PCB pad layout. This fact, if not known, could cause the misalignment of pin contacts when mating the Memsense SMD to any given receiving device.<sup>1</sup>

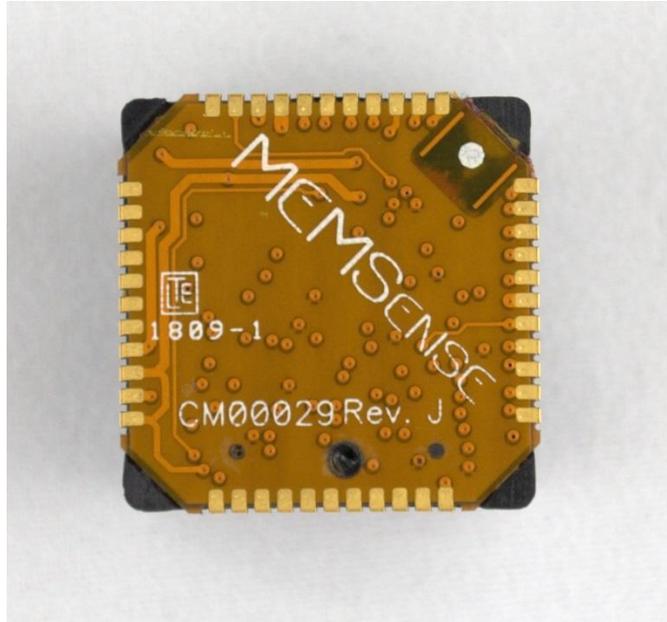


**Figure 1.** Memsense SMD recommended PCB Pad Layout



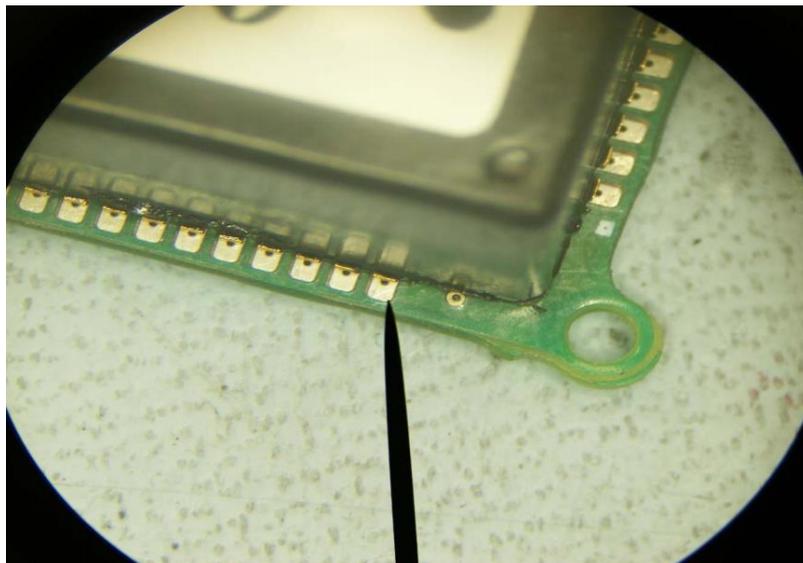
<sup>1</sup> On any given Memsense SMD, when viewed from the side (and not the bottom), the number of pin contacts may appear to be 11, 12, or 13. Only 11 are actual pin contacts.

When aligning the Memsense SMD to its mating device, verify the SMD pin contacts by viewing the SMD from the bottom. The difference between the side view and the bottom view of the SMD can be seen in Figures 2 and 3. For reasons stated above, do not use a 'side view' of the SMD to determine the actual mating pin contacts.



**Figure 3.** Memsense SMD bottom view. Notice 11 pins per side.

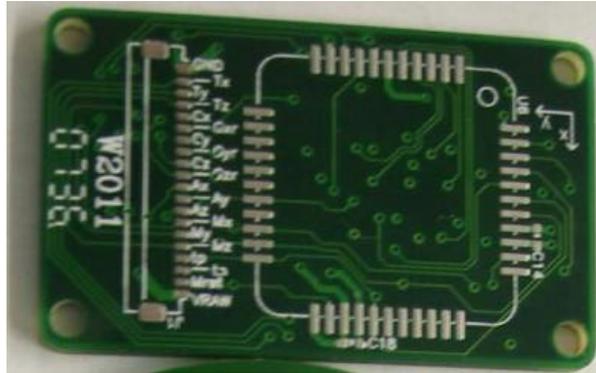
See Figure 4 for proper pin contact alignment requirements of a Memsense SMD to any given receiving or mating device.



**Figure 4.** Pin contact alignment of a Memsense SMD to a receiving or mating device.

## 4.2 IMMOBILIZATION OF THE RECEIVING OR MATING DEVICE

Figure 5 provides an example of a Memsense receiving device to which Memsense SMD's are installed.



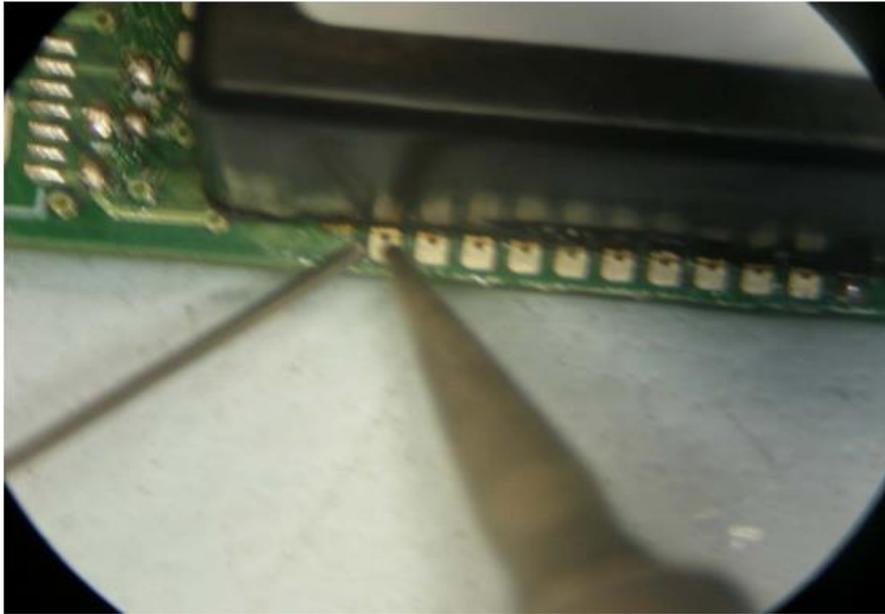
**Figure 5.** Receiving (mating) PCB example

Depending on the size of the receiving or mating device PCB, it may be helpful and/or necessary, to immobilize the receiving PCB. This greatly aids and assists in alignment and soldering of the Memsense SMD to the receiving PCB.

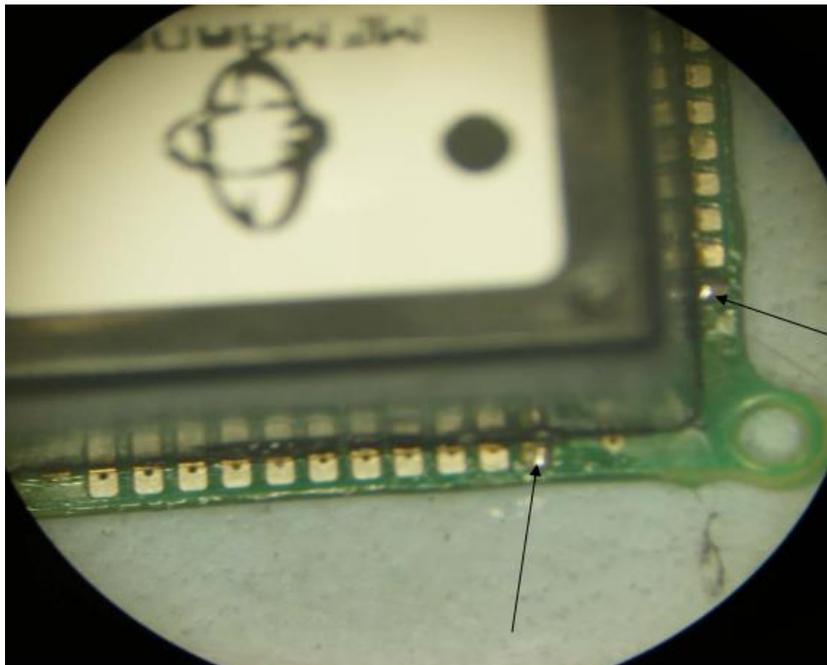
## 4.3 ALIGNMENT AND TACK SOLDERING OF AN SMD TO A MATING DEVICE

- After proper alignment, tack solder the SMD to the receiving or mating device on two sides as shown in Figures 6 and 7.
- Use generous amounts of flux on the pads of the receiving or mating device that an SMD is being attached to.
- When soldering the SMD to the receiving or mating device, set the temperature of the soldering iron to 650°F.
- During the soldering operation, the soldering iron tip should only touch the pads of the receiving or mating device PCB pads that the SMD is being attached to.
- Hold the soldering iron at a 45° angle to the receiving or mating board contact pin surface when soldering the SMD to the receiving device, then feed the wire solder in from the opposite side, as shown in Figure 6. This should prevent any overheating of the SMD or any physical damaging to its housing.
- Use IPC-A-610, 8.2.13 Plastic Quad Flat Pack – No Leads (PQFN) soldering requirement guidelines when soldering the SMD to any given receiving or mating device. Note 5 of 8.2.13 states that “Toe (end) surfaces (of Leadless or No-Lead Exposed Pad devices) are not required to be solderable”. And, also, “Toe fillets are not required”. This distinctly indicates that the ‘standard’ and usual requirement of a concave wetted solder fillet is not necessary for the Leadless or No-Lead Exposed Pad devices. Attempting to achieve such a solder connection between the SMD pin contact(s) and the receiving or mating PCB pads, could lead to overheating of the SMD, physical damage to the SMD housing, and / or damaging its lead connections or its associated mating PCB pad(s).

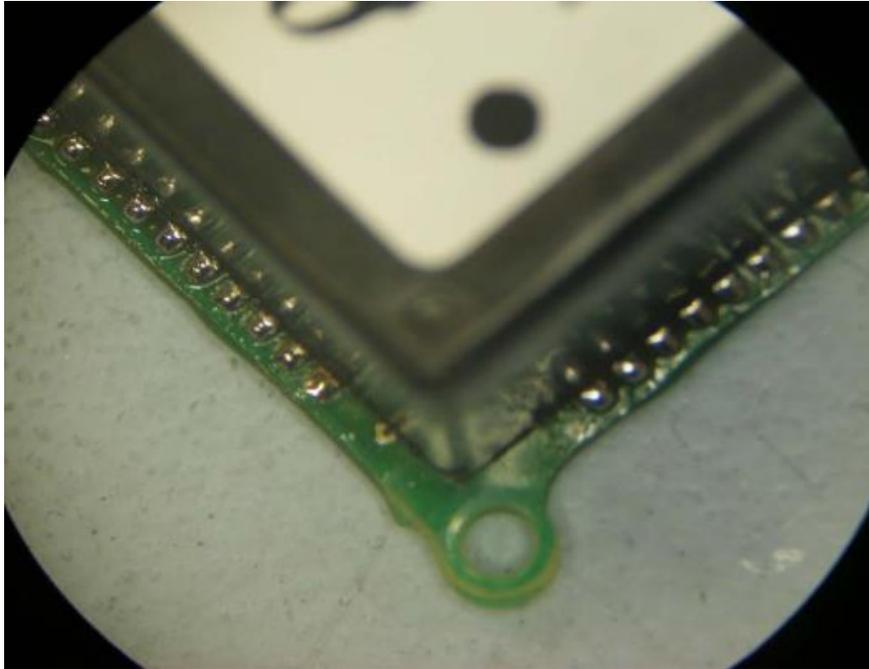
- If the SMD pin contacts and receiving device PCB pad(s) are misaligned after tack soldering, use two soldering irons to reheat simultaneously the two tack soldered contact points before attempting to adjust and / or align the SMD pin(s) to the receiving or mating device PCB pad(s). Make sure both tack solder connections are heated to a solder reflow condition before attempting to move or realign the SMD. Otherwise, if forced movement of the SMD is attempted, the SMD pins could shear off.



**Figure 6.** Soldering technique used to attach an SMD to a mating device



**Figure 7.** Opposite side tack soldering example of a Memsense SMD to a mating PCB



**Figure 8.** An example of a soldered SMD pin connections

#### 4.4 SOLDERING THE REMAINING SMD PIN CONNECTIONS

Once the Memsense SMD and the receiving or mating device are properly aligned, solder the remaining pin to pad mating connections on all four sides of the SMD. Figure 8 shows a fully soldered device.

#### 4.5 CLEANING AND INSPECTION

Some excess potting compound may flow out from the Memsense SMD when heat is generated during the soldering operation. After the soldering operation has been completed, clean-up can be accomplished by using “Flux-Off” or Alcohol.

#### 5.0 REFERENCES

- IPC-A-610 Revision D, February 2005, Acceptability of electronic assemblies