

# INA Bonding Configurations

## Application Bulletin 0007

### Introduction

This Application Bulletin provides assembly information for the INA family of MagIC™ MMIC low noise amplifiers. Three chip geometries are covered: INA-01100, INA-02100, and INA-03100.

### Substrate Layout and Wire Bond Lengths

The most important facet of an INA series MMIC circuit layout is grounding. PROPER GROUNDING IS MANDATORY due to the high gain and circuit topology of these MMICs.

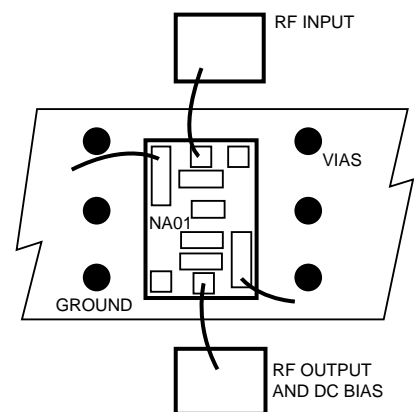
INA series devices are two stage amplifiers. Each stage has a separate emitter bond pad. For proper assembly, a wire bond is used to connect each emitter bond pad to a top-side area of ground metalization on the substrate. This area in turn is connected to the bottom-side system-ground through via holes. The key to proper performance is to insure that the impedance presented by the path from top-side metalization to system-ground (i.e. impedance of the vias) is less than the impedance of the path back through the emitter of the other stage. This is necessary to prevent oscillations.

Thus the bond wires from both emitter bond pads to top-side ground metalization should use medium loops. Extremely short bonds would promote oscillations. Long bond wires result in significant gain roll-off at higher frequencies, and may degrade the impedance match.

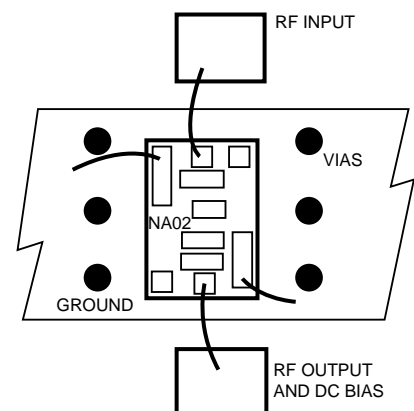
Bond wires connecting to the input and output bond pads are much less critical. Normally, these wires are kept short to minimize impact on input and output VSWRs. Output bond wire is also the DC bias connection to the MMIC.

### Bonding Configurations

Figures 1 through 3 show typical bonding configurations for INA-01100, INA-02100, and INA-03100 geometries. Detailed information on die attach and wire bonding procedures can be found in Hewlett-Packard Application Note AN-A005: *Transistor Chip Use*, and in the

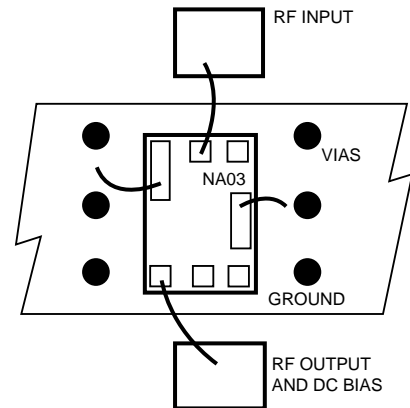


**Figure 1. INA-01100 Typical Bonding Configuration**



**Figure 2. INA-02100 Typical Bonding Configuration**

Communications Components Designer's Catalog. Information on typical circuit use can be found in Application Note AN-S012: *MagICTM Low Noise Amplifiers*.



**Figure 3. INA-03100 Typical Bonding Configuration**

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