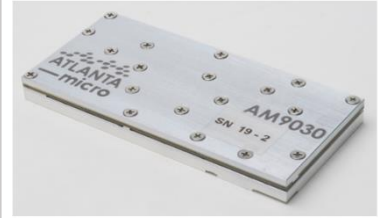
# AM9030 – Upconverter

## 0.9 GHz to 18 GHz Wideband Upconverter Module

**High performance and low SWaP (size, weight and power)**

- Fully integrated upconverter module provides high dynamic range coverage from 0.9 to 18 GHz
- Also provides a bypass path from 10 MHz to 3 GHz for direct spectrum transmission
- Multiple channels can be configured to work together for coherent operation and N-channel applications




**AM9030 is a fully integrated upconverter module that provides high dynamic range coverage from 0.9 GHz to 18 GHz.** The upconverter also provides a bypass path from 10 MHz to 3 GHz for direct spectrum transmission. The heterodyne architecture is designed for high performance and low size, weight, and power (low SWaP) and is mechanically mountable to a host circuit board for use in multi-channel transmit applications.

Sub-octave postselector filters, driver amplifiers, local oscillators, frequency converters, power and control line filtering, temperature sensor, and a control FPGA are included. The analog IF input frequency is centered at 2 GHz with a 1 GHz instantaneous bandwidth. Multiple channels can be configured to work together for coherent operation and N-channel applications. Interfacing to the upconverter is accomplished by simply providing an IF input, DC voltages, frequency reference, SPI control, and connecting the RF output.

### FEATURES

- 0.9 GHz to 18 GHz Frequency Range
- 1-GHz Instantaneous Bandwidth
- 2 GHz IF center Frequency
- 10 MHz to 3 GHz Tuner Bypass Path
- Sub-Octave Output Filter
- Integrated Temperature Sensor
- 6 dB Gain
- Up to +10 dBm Output Power
- +20 dBm OIP3
- +80 dBc Second Harmonic
- +5.0V and +3.3V DC Operation
- 5.5 W Max Power Consumption
- -40C to +85C Operation
- 1.40" x 3.00" x 0.270" (35.6 x 76.2 x 6.8 mm)

**Note: This is an overview version of the AM9030 datasheet. Contact MMIC Sales for the full datasheet: MMICsales@mrcy.com.**

## CONTENTS



## REVISION HISTORY

| Date | Revision | Notes |
|---|---|---|
| April 22, 2020 | 0 | Initial Release. |
| October 11, 2021 | 0.1 | General Corrections. |
| November 16, 2021 | 1 | Updated Datasheet Format. |
| September 6, 2022 | 1.1 | Added Eval Board Ordering Configurations and Information. |
| November 15, 2022 | 2 | Modified Part Description. Added more information to eval board configuration options. |
| August 5, 2024 | 3 | Changed to Mercury branding. No content changes. |
| March 19, 2025 | 4 | Updated specs |

## PART ORDERING DETAILS

| Part Number | Description |
|---|---|
| AM9030-1 | Stand-alone Tuner Module,<br>2.0 GHz IF Input w/ 1 GHz Bandwidth |
| AM9030-1EVAL | Single Channel AM9030-1 Evaluation Board |
| AM9030-1EVAL-2CH | Dual Channel AM9030-1 Evaluation Board |
| AM9018-30TR-EVAL | Dual Channel Transmit/Receive Evaluation Board.<br>Includes one AM9018 18 GHz Receiver Module and one AM9030 18 GHz Transmitter Module on a single evaluation board. |

**Note:** Eval boards include low-dropout regulators, reference distribution circuitry, and control circuitry. All that is required for operation is an input signal, a reference, and a Windows computer for the USB control of the evaluation board. See "Evaluation PC Board" section for more details. The output may be driven into a spectrum analyzer or into an antenna. Contact Mercury for ADC recommendations.

## SPECIFICATIONS

### Absolute Maximum Ratings

| | Test Cond Minimum | | Maximum |
|---|---|---|---|
| RF Input Power | Continuous Wave | | 0.25 W |
| +5.0 VDC Supply | | | +5.5 V |
| +3.3 VDC Supply | | | +3.6 V |
| Operating Temperature | | -40 C | +85 C |
| Storage Temperature Range | | -55 C | +150 C |

**Note:** Any device operation beyond the Absolute Maximum Ratings may result in permanent damage to the device. The values listed in this table are extremes and do not imply functional operation of the device at these or any other conditions beyond what is listed under Recommended Operating Conditions. Any part subjected to conditions outside of what is recommended for an extended amount of time may suffer from reliability concerns.

### Handling Information

| | Minimum | Maximum |
|---|---|---|
| Storage Temperature Range (Recommended) | -50 C | +125 C |

Mercury products are electrostatic sensitive.
Follow safe handling practices to avoid damage.

### Recommended Operating Conditions

| | Minimum | Typical | Maximum |
|---|---|---|---|
| Operating Case Temperature | -40 C | | +71 C |

### DC Electrical Characteristics

(T = 25 °C unless otherwise specified)

| Param | Testing Conditions | Min | Typical | Max |
|---|---|---|---|---|
| +5 VDC Supply | | +4.8 V | +5.0 V | +5.2 V |
| +3.3 VDC Supply | | +3.2 V | +3.3 V | +3.5 V |
| +5 VDC Current | | | | 0.42 A |
| +3.3 VDC Current | | | | 1.1 A |
| Power Dissipated | | | | 5.5 W |
| Logic Level Low | | 0 V | | +0.8 V |
| Logic Level High | | +2.0 V | | +3.5 V |

## RF Performance[1]

(T = 25 °C unless otherwise specified)

| Param | Testing Conditions | Min | Typical | Max |
|---|---|---|---|---|
| Frequency Range | Heterodyne Path | 0.9 GHz | | 18 GHz |
| | Bypass Path | 10 MHz | | 3 GHz |
| Instantaneous Bandwidth | | | 1.0 GHz | |
| IF Center Frequency | | | 2.0 GHz | |
| Tune Frequency Range | | 1.4 GHz | | 17.5 GHz |
| Tuning Step Size | | | 5 MHz | |
| Frequency Reference | External 100 MHz (note 3) | -2dBm (0.5Vpp) | +6dBm | +13.5dBm (3Vpp) |
| Output IP3 | | | +20 dBm | |
| Output Second Harmonic | | | 70 dBc | |
| Output P1dB | | | 8 dBm | |
| Image Rejection | | 70 dB | | |
| IF Rejection | Stopband Relative to Passband | 50 dB | 60 dB | |
| LO Radiation | Measured at RF Output | | -80 dBm | -50 dBm |
| Gain | Measured at Tune Freq. | | 6 dB +/-2dB | |
| Gain Control [1] | | | 16 dB | |
| Tuning Speed | | | 100 µs | 450 µs[2] |
| Phase Noise | 1 kHz Offset | | -90 dBc/Hz | |
| | 10 kHz Offset | | -100 dBc/Hz | |
| | 100 kHz Offset | | -100 dBc/Hz | |
| | 1 MHz Offset | | -106 dBc/Hz | |
| | 10 MHz Offset | | -127 dBc/Hz | |

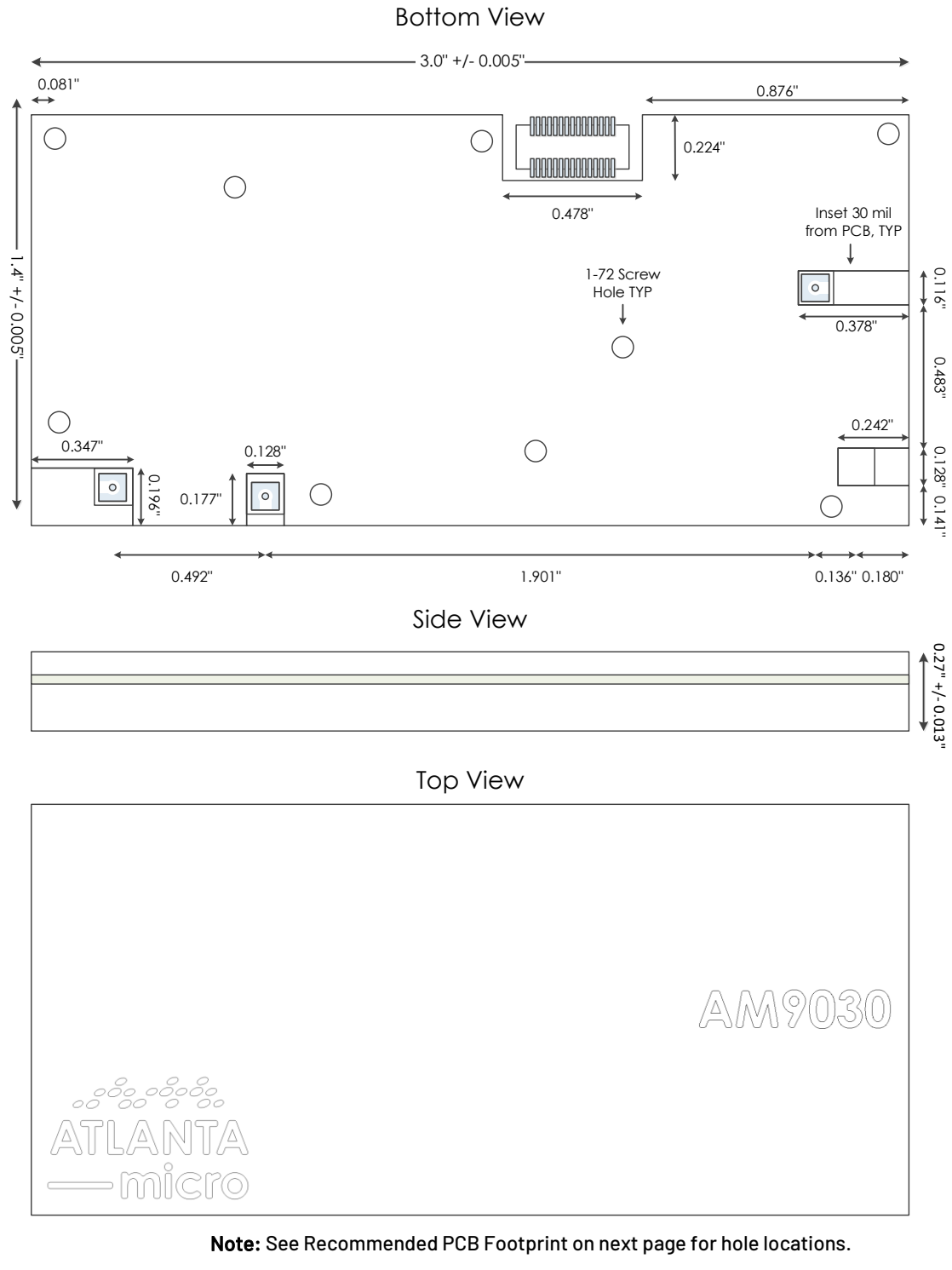
**Note 1:** Additional gain control beyond calibrated gain, in 1 dB steps. Heterodyne path only.

**Note 2:** Longest tune speed is seen when switching from Fc <= 5500 to Fc > 5500 or from Fc > 5500 to Fc <= 5500. Switching between center frequencies in either Fc <=5500 range or Fc > 5500 range will follow typical tuning speed.

**Note 3:** External reference input impedance is 50 ohms. Tolerant of sine wave or square wave input. Reference waveform may affect spurious and phase noise performance.

## MECHANICAL DETAILS

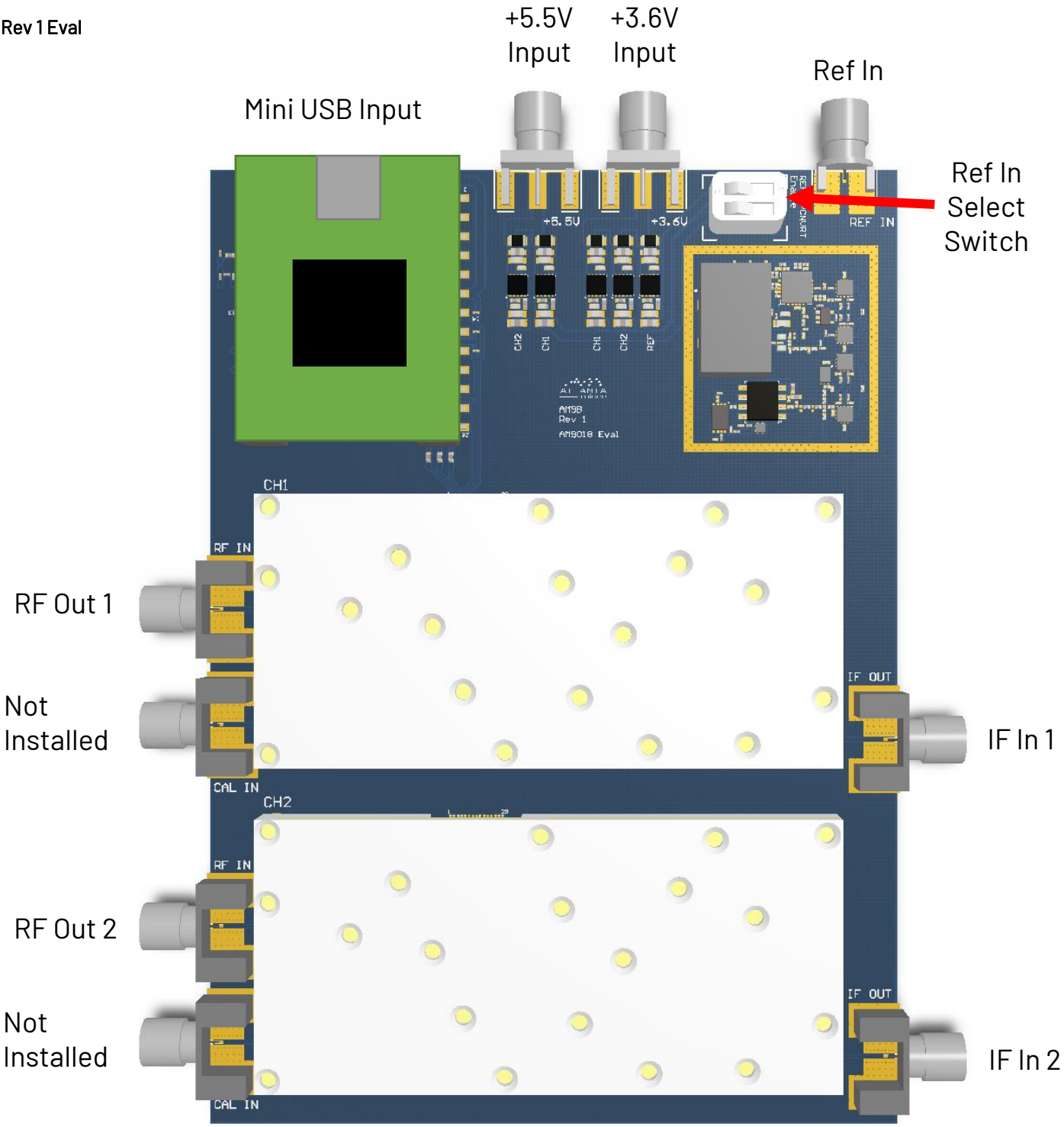
### Mechanical Drawing




**Note:** See Recommended PCB Footprint on next page for hole locations.

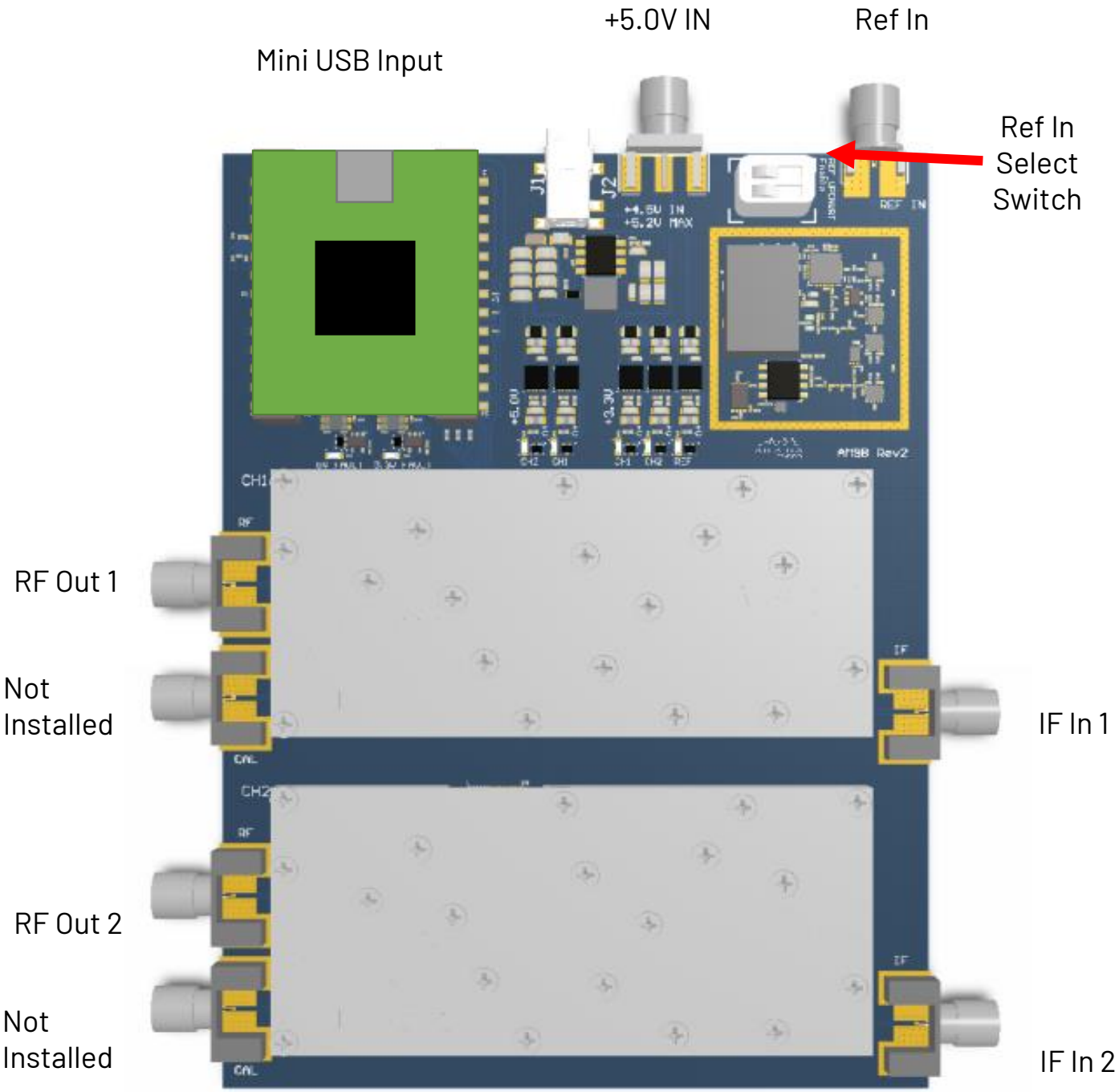
## EVALUATION PC BOARD

**Rev 1 Eval**




***Note 1:** Evaluation Board supports up to two tuners to test phase coherent operation if desired.

**Rev 2 Eval**




***Note 1:** Evaluation Board supports up to two tuners to test phase coherent operation if desired.

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