

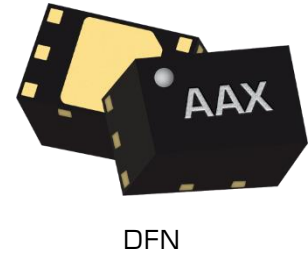
DC – 14 GHz Broadband InGaP SMT Amplifier

AKA-1310PSM

1. Device Overview

1.1 General Description

The AKA-1310PSM is a low-cost, cascadable broadband InGaP HBT amplifier. This is a general-purpose gain block amplifier which provides high P1dB, high OIP3, and a very small form factor. The simple application circuit requires minimal external components, allowing it to be used in a variety of applications.



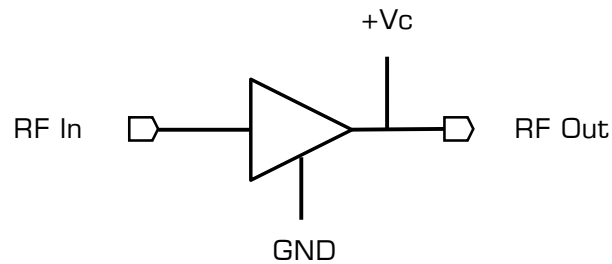
1.2 Features

- Small Form Factor: 1.3 x 2.0mm
- +28 dBm OIP3 up to 6 GHz
- 13 dB Gain at 2 GHz
- Positive Only, Single Supply Operation
- Low-Cost
- [AKA-1310PSM S-parameters](#)

1.3 Applications

- Mobile test and measurement equipment
- Radar and satellite communications
- 5G Transceivers
- Driver Amplifier L-Diode Mixers

1.4 Functional Block Diagram



1.5 Part Ordering Options¹

| Part Number | Description | Package | Green Status | Product Lifecycle | Export Classification |
|---------------|----------------------------------|---------|--------------|-------------------|-----------------------|
| AKA-1310PSM | 1.3 x 2.0 mm Surface Mount | DFN | RoHS | Active | EAR99 |
| EVB-AKA-1310P | Connectorized Evaluation Fixture | Eval | RoHS | Active | EAR99 |

¹ Refer to our [website](#) for a list of definitions for terminology presented in this table.

Table of Contents

| | | | |
|---|---|--|----|
| 1. Device Overview | 1 | 3.3 Recommended Operating Conditions . | 5 |
| 1.1 General Description..... | 1 | 3.4 Sequencing Requirements | 5 |
| 1.2 Features | 1 | 3.5 Electrical Specifications | 6 |
| 1.3 Applications | 1 | 3.6 AKA-1310PSM Typical Performance Plots..... | 7 |
| 1.4 Functional Block Diagram | 1 | 4. Application Information | 9 |
| 1.5 Part Ordering Options..... | 1 | 4.1 AKA-1310PSM Application Circuit ... | 9 |
| 2. AKA-1310PSM Port Configurations and Functions | 3 | 5. Mechanical Data..... | 10 |
| 2.1 AKA-1310PSM Port Diagram..... | 3 | 5.1 AKA-1310PSM Outline Drawing | 10 |
| 2.2 AKA-1310PSM Port Functions..... | 3 | 5.2 AKA-1300PSM Recommended Landing Pattern | 10 |
| 3. Specifications | 4 | 5.3 EVB-AKA-1310P Outline Drawing .. | 11 |
| 3.1 Absolute Maximum Ratings..... | 4 | | 11 |
| 3.2 Package Information | 4 | | |

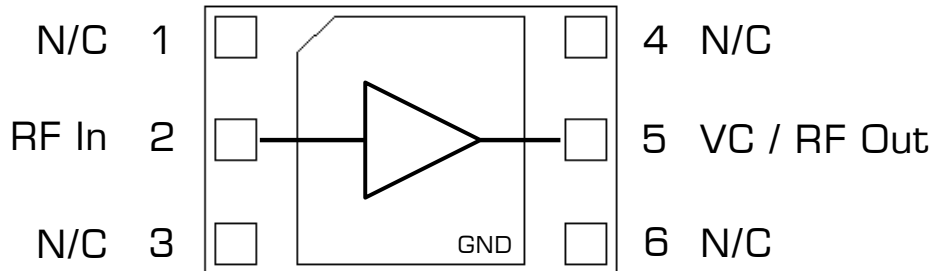
Revision History

| Revision Code | Revision Date | Comment |
|---------------|---------------|---------------------------|
| - | April 2023 | Datasheet Initial Release |

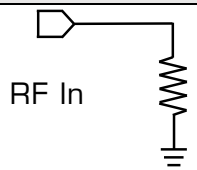
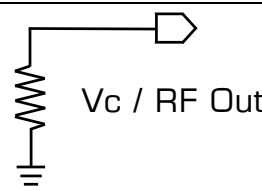


2. AKA-1310PSM Port Configurations and Functions

2.1 AKA-1310PSM Port Diagram

A port diagram of the AKA-1310PSM is shown below.



2.2 AKA-1310PSM Port Functions

| Pin | Function | Description | Equivalent Circuit for Package |
|------------|---|--|---|
| 2 | RF Input | This is the RF Input port of the amplifier die. It is RF matched to 50 Ω and requires an external DC blocking capacitor. |  |
| 5 | RF Output and Positive Collector Voltage Supply | This is the RF Output and positive supply voltage port Vc. It is RF matched to 50 Ω and is DC coupled. An external bias tee is required on this port. |  |
| Paddle | Ground | Package ground paddle must be connected to a DC/RF ground potential with high thermal and electrical conductivity. |  |
| 1, 3, 4, 6 | N/C | These pins are internally no-connects and should be connected to DC/RF ground. |  |

3. Specifications

3.1 Absolute Maximum Ratings

The Absolute Maximum Ratings indicate limits beyond which damage may occur to the device. If these limits are exceeded, the device may become inoperable or have a reduced lifetime.

| Parameter | Maximum Rating | Units |
|---|----------------|-------|
| Positive Bias Current (I _{cc}) | 79 | mA |
| RF Input Power | +10 | dBm |
| Operating Temperature | -40 to +85 | °C |
| Storage Temperature | -65 to +150 | °C |
| Power Dissipation | 366 | mW |
| θ_{Jc} , Junction to Case Thermal Resistance | 179 | °C/W |
| Max Junction Temperature for MTTF > 1E6 hours | 150 | °C |

3.2 Package Information

| Parameter | Details | Rating |
|-----------|--|--------|
| ESD | Human Body Model (HBM), per MIL-STD-750, Method 1020 | 1A |
| MSL | Moisture Sensitivity Level, per J-STD-020 | MSL 1 |
| Weight | AKA-1310PSM, 1.3 x 2.0 mm DFN Package | 7 mg |

3.3 Recommended Operating Conditions

The Recommended Operating Conditions indicate the limits, inside which the device should be operated, to guarantee the performance given in Electrical Specifications. Operating outside these limits may not necessarily cause damage to the device, but the performance may degrade outside the limits of the electrical specifications. For limits, above which damage may occur, see Absolute Maximum Ratings.

| | Min | Nominal | Max | Units |
|--|------|---------|------|-------|
| T _A , Ambient Temperature | -40 | +25 | +85 | °C |
| Positive DC Device Voltage (V _c) | +4.5 | +4.6 | +4.7 | V |
| Positive DC Current (I _{cc}) | 35 | 50 | 60 | mA |

3.4 Sequencing Requirements

There is no sequencing required to power up or power down the amplifier.

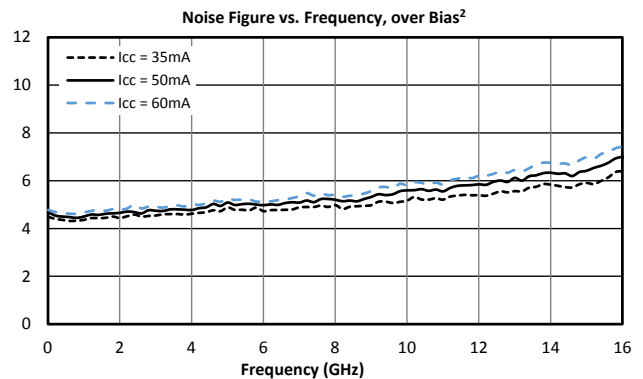
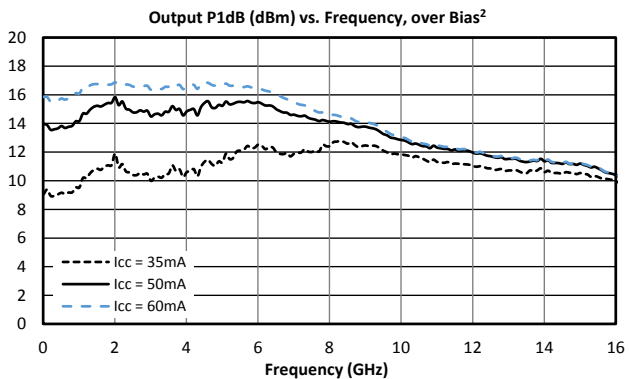
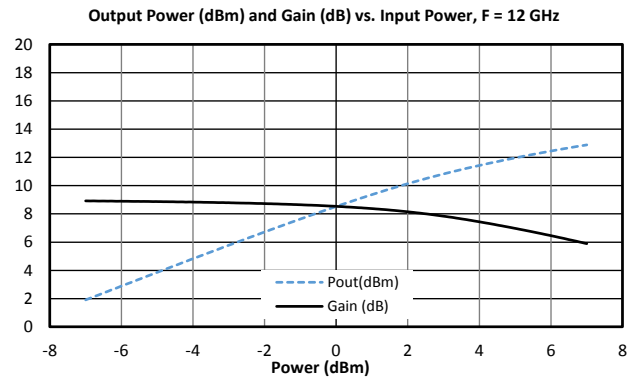
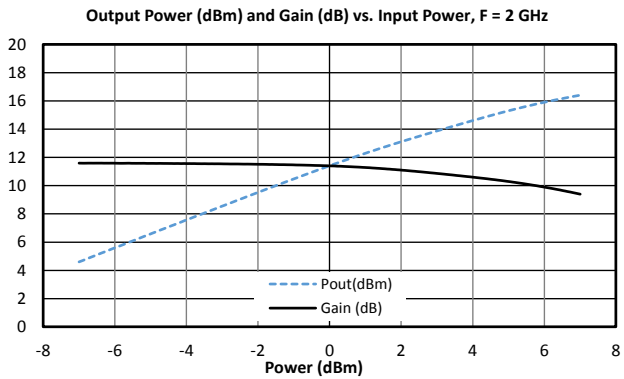
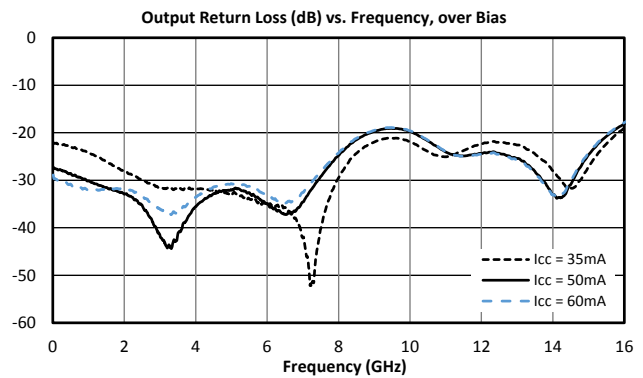
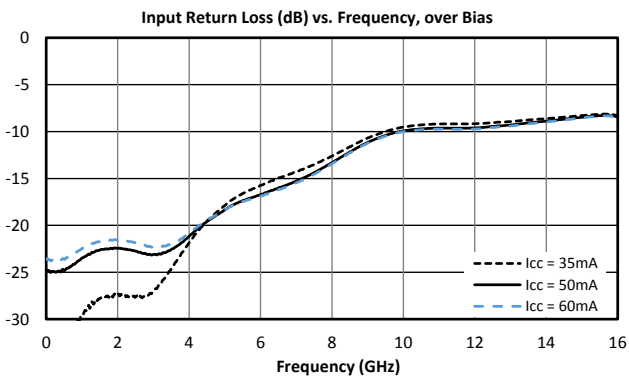
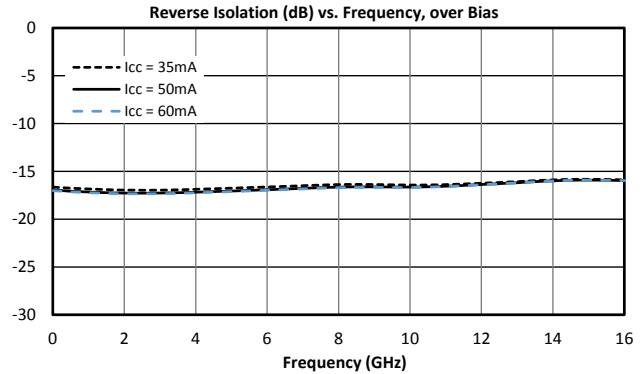
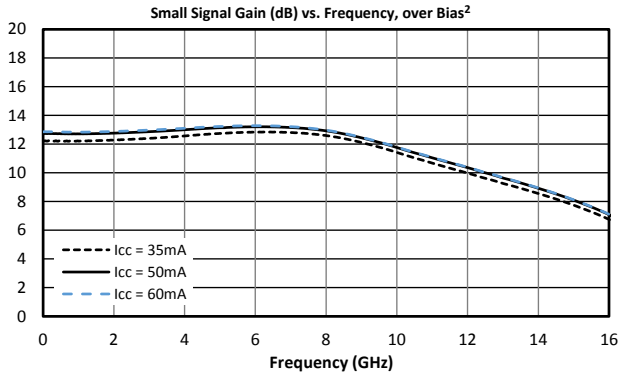
3.5 Electrical Specifications

Unless otherwise specified, electrical specifications apply at $T_A=+25^{\circ}\text{C}$, $V_C = +4.6\text{V}$ in a 50Ω system. Typical performance data is measured from EVB unless otherwise stated.

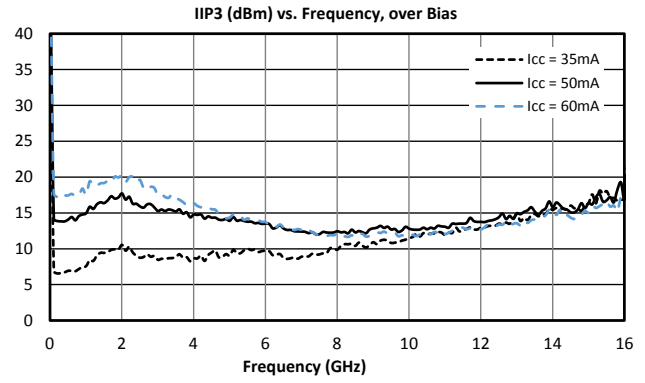
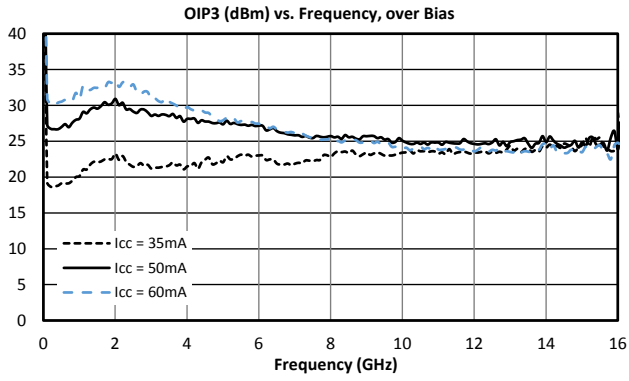
Min and Max limits are guaranteed at $T_A=+25^{\circ}\text{C}$.

| Parameter | Test Conditions | Frequency | Min | Typical | Units | |
|--|--|----------------|---------------|---------|-------|----|
| Small Signal Gain | $V_C = +4.6\text{ V}$, $I_{CC} = 50\text{ mA}$ | 0.1 – 6.0 GHz | 11 | 13 | dB | |
| | | 6.0 – 14.0 GHz | 8 | 11 | | |
| Output P1dB | | 2.0 – 6.0 GHz | 12 | 14 | dBm | |
| | | 6.0 – 14.0 GHz | 11 | 13 | | |
| Input Return Loss | | 0.1 – 14.0 GHz | | | 15 | dB |
| Output Return Loss | | | | | 30 | |
| Reverse Isolation | | | | | 17 | |
| Noise Figure | | | 0.1 – 6.0 GHz | | 5 | |
| | | | 6.0 – 14 GHz | | 6 | |
| Output IP3 (OIP3) | | 0.1 – 6.0 GHz | | +28 | dBm | |
| | | 6.0 – 14 GHz | | +24 | | |
| DC Supply Quiescent Current (I_{CC}) | $V_C = +4.6\text{V}$, No RF Input | | | 50 | mA | |

3.6 AKA-1310PSM Typical Performance Plots



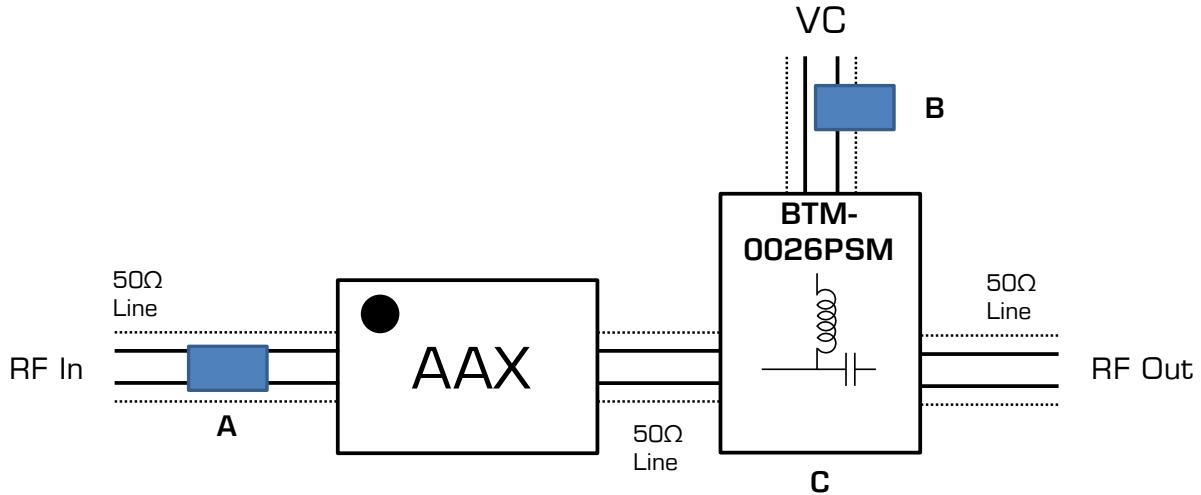
² Measured data is scalar de-embedded using a 2x thru fixture.



4. Application Information

4.1 AKA-1310PSM Application Circuit

Below is the recommended application circuit for the AKA-1310PSM.

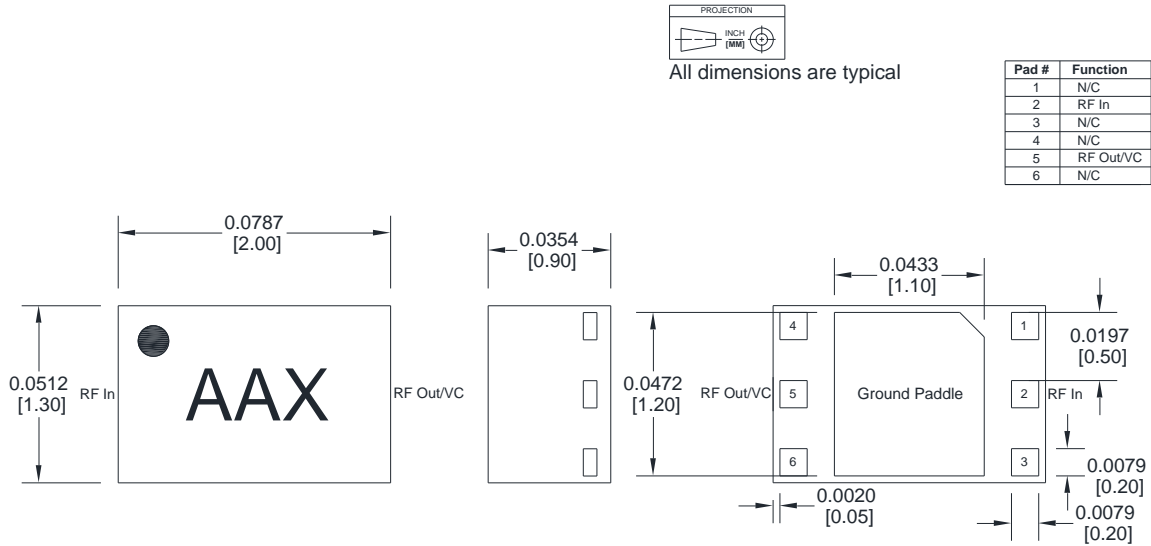


The RF input and output should be soldered to 50Ω traces. This amplifier requires external DC blocking on the input and output in addition to positive collector biasing on the output. The [BTM-0026PSM](#) is recommended to bias and DC the amplifier for its small 2.25 x 3.7mm footprint and excellent insertion loss performance.

| Designator | Description | Sample Part Number |
|------------|--|-----------------------------|
| A | 0201 0.1 μ F SMT Capacitor | --- |
| B | 0201 0.1 μ F SMT Capacitor | --- |
| C | Marki Surface-Mount Mini Bias Tee; 10 MHz – 26 GHz | BTM-0026PSM |

5. Mechanical Data

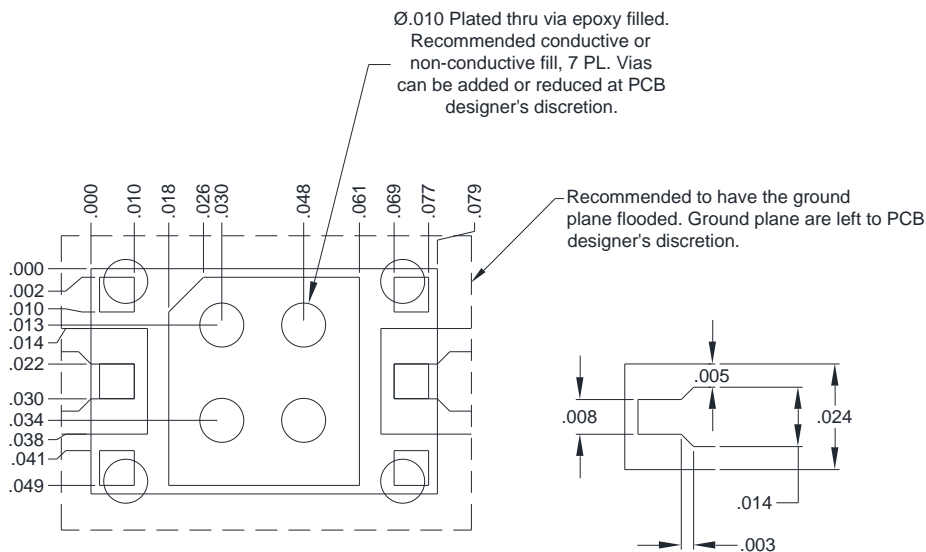
5.1 AKA-1310PSM Outline Drawing



Notes (unless otherwise specified):

- Substrate material is LCP.
- I/O Leads and Die Paddle are (from base to finish):
 - Ni: 0.5 microns MIN
 - Pd: 0.02 microns MIN
 - Au: 0.05 microns MAX
- All unconnected pins should be connected to PCB RF ground.

5.2 AKA-1300PSM Recommended Landing Pattern



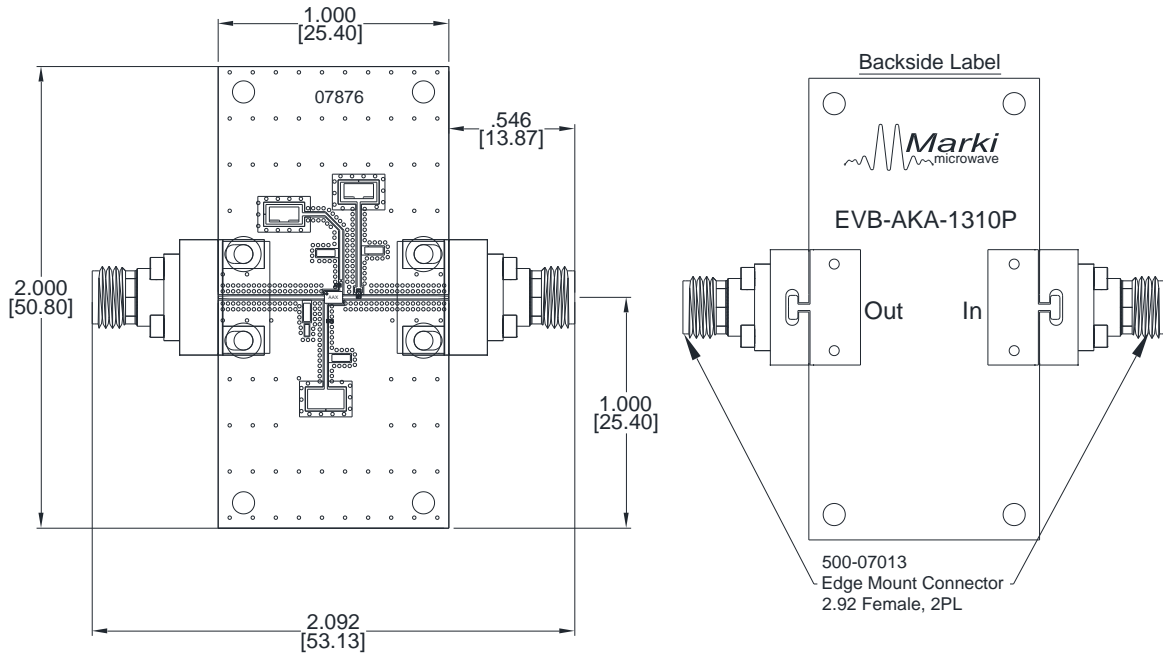
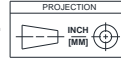
The landing pattern is to be used on Rogers 4003, 0.008" thick, 1/2 Oz Cu.

DFN-Package Surface-Mount Landing Pattern

[Click here for a DXF of the above layouts.](#)
[Click here for leaded solder reflow.](#) [Click here for lead-free solder reflow](#)

5.3 EVB-AKA-1310P Outline Drawing

All Dimensions are typical.



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