

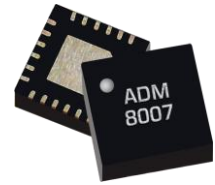
2 - 40 GHz Surface Mount Amplifier

ADM-8007PSM

1. Device Overview

1.1 General Description

The ADM-8007PSM is a high-linearity, high gain, low noise distributed amplifier capable of providing +23 dBm output power up to 38 GHz. When driven with an input power of 0 to +5 dBm, the ADM-8007PSM can provide sufficient LO drive to power all H and most S diode mixers to 40GHz. The amplifier has excellent return losses and gain flatness.



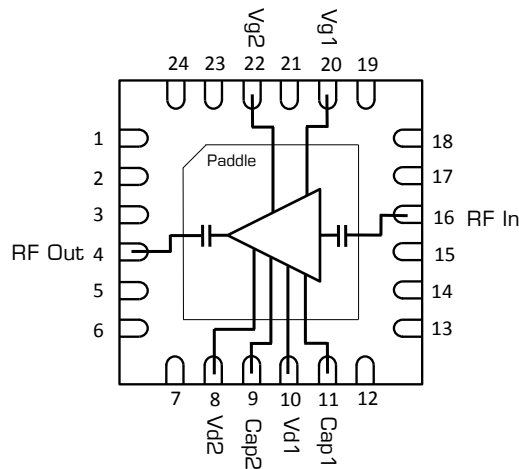
1.2 Features

- +24 dBm output power
- +23 dB gain
- 4dB Noise Figure
- Excellent gain flatness
- No negative bias or bias sequencing
- No external bias tee required
- .s2p S-Parameters: [ADM-8007PSM](#)

1.3 Applications

- Mobile test and measurement equipment
- Radar and satellite communications
- 5G Transceivers
- Driver amplifier H & S – diode mixers

1.4 Functional Block Diagram



1.5 Part Ordering Options¹

Part Number	Description	Package	Green Status	Product Lifecycle	Export Classification
ADM-8007PSM	4x4 mm Surface Mount	QFN	RoHS	Active	3A001.b.2.d
EVB-ADM-8007P	Connectorized Evaluation Fixture	EVAL	RoHS	Active	EAR99

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

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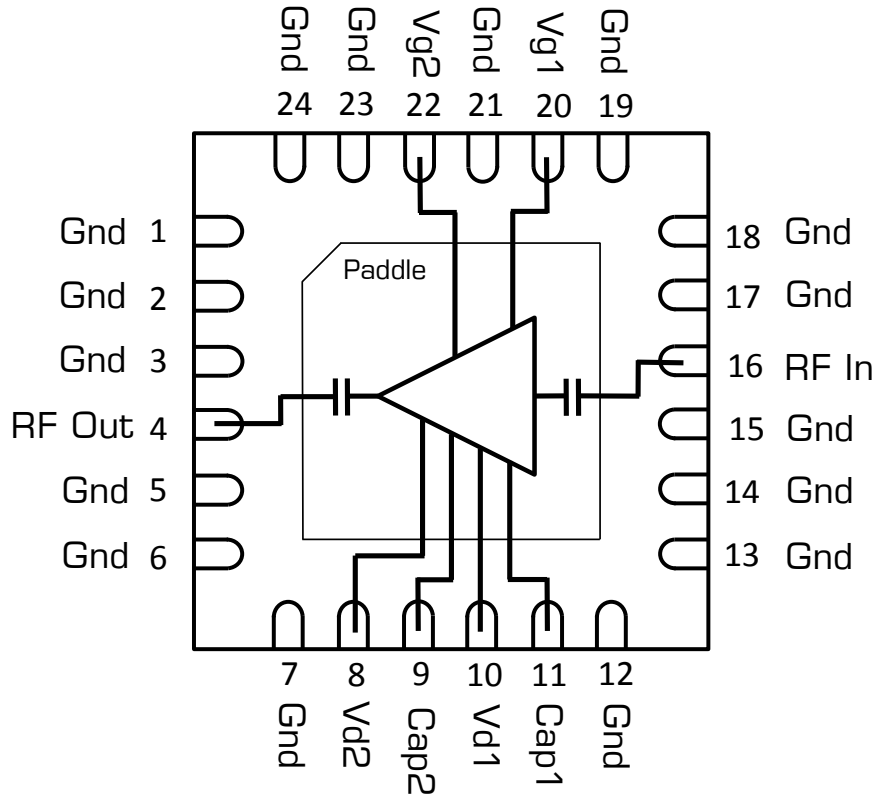
Revision History

Revision Code	Revision Date	Comment
-	September 2022	Initial Release
A	October 2022	Package Drawing Updated
B	April 2023	Reliability Limits Updated

2. ADM-8007 Port Configurations and Functions

2.1 ADM-8007PSM Port Diagram

A port diagram of the ADM-8007PSM QFN package is shown below (X-ray view from the top). The pin functions are detailed in section 2.2 of this datasheet.



2.2 ADM-8007PSM Port Functions

Pin	Function	Description
4	RF Out	Pin 4 is the amplifier RF output. This pin is internally DC blocked and RF matched to 50 Ohms.
8	Vd2	Pin 8 is the DC supply pin for the amplifier's output stage.
9	Cap2	Pin 9 provides an off-chip AC ground for the output stage. This pin may be left OPEN but should NOT be connected GND. Leaving this pin OPEN will cause some degradation in gain and linearity below 5GHz.
10	Vd1	Pin 10 is the DC supply pin for the amplifier's input stage.
11	Cap1	Pin 11 provides an off-chip AC ground for the input stage. This pin may be left OPEN but should NOT be connected GND. Leaving this pin OPEN will cause some degradation in gain and linearity below 5GHz.
16	RF In	Pin 16 is the amplifier RF input. This pin is internally DC blocked and RF matched to 50 Ohms.
20	Vg1	Pin 20 provides bias for an internal current mirror that sets the current draw for amplifier input stage. Increasing current will increase gain at the expense of efficiency. The default series resistor (270 Ohms) is chosen to optimize gain, output power and efficiency when Vg1 and Vd1 are both tied to 5V.
22	Vg2	Pin 22 provides bias for an internal current mirror that sets the current draw for amplifier output stage. Increasing current will increase gain at the expense of efficiency. The default series resistor (82.5 Ohms) is chosen to optimize gain, output power and efficiency when Vg2 and Vd2 are both tied to 5V.
1-3, 5-7, 12-15, 17-19, 21, 23, 24	NC	These pins are not internally connected. Datasheet performance is measured with these pins connected to PCB RF ground.
Paddle	Gnd	The package ground paddle must be connected to a DC/RF ground potential with high thermal and electrical conductivity.

3. Specifications

3.1 Absolute Maximum Ratings

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

Reliability limits are individual, instantaneous catastrophic limits only. Functional operation limits are indicated below. Operation of the device at multiple absolute maximum limits or for extended periods at a single limit can cause degradation and damage to the device.

Parameter	Maximum Rating	Units
Drain Supply Voltage (Vd)	+8	V
Drain Current (Id)	400	mA
Bias Voltage (Vg)	+8	V
Bias Current (Ig)	95	mA
RF Input Power	+15	dBm
θ_{JC} , Junction to Case Thermal Resistance	30	°C/W
Max Power Dissipation for MTTF of 1E6 hours at 85°C Baseplate Temperature	1.6	W
Max Junction Temperature for MTTF of 1E6 hours at 85°C Baseplate Temperature	175	°C
Operating Temperature for MTTF of 1E6 hours at 85°C Baseplate Temperature	-40 to +85	°C
Storage Temperature	-65 to +125	°C

3.2 Recommended Operating Condition

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.

Recommended Operating Conditions	Min	Nominal	Max	Units
T _A , Ambient Temperature	-40	+25	+85	°C
Power Supply DC Voltage (Vd)	+3	+5	+6	V
Power Supply DC Voltage (Vg)	+3	+5	+6	V
Power Supply DC Current (I _d) (No RF Input) ²	121	218	259	mA
Power Supply DC Current (I _g) (No RF Input) ³	11	19	23	mA
Input Power for Saturation	+0	+1	+8	dBm

3.3 Supply Sequencing Requirements

There is no sequencing required to power up or power down the amplifier. The amplifier must have an output load connected during operation.

² Recommended operating current conditions without RF input applied. Bias current into Vd pin.

³ Recommended operating current conditions without RF input applied. Bias current into Vg pin.

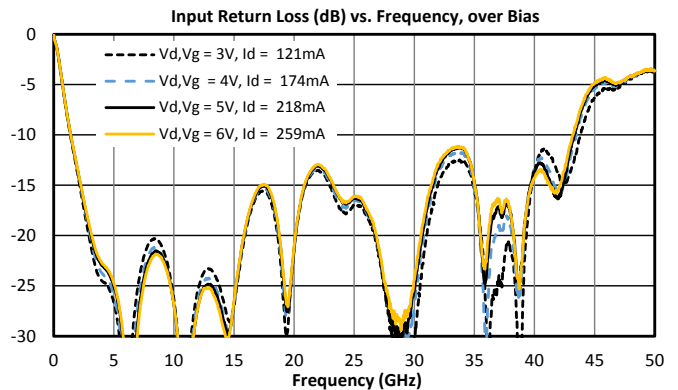
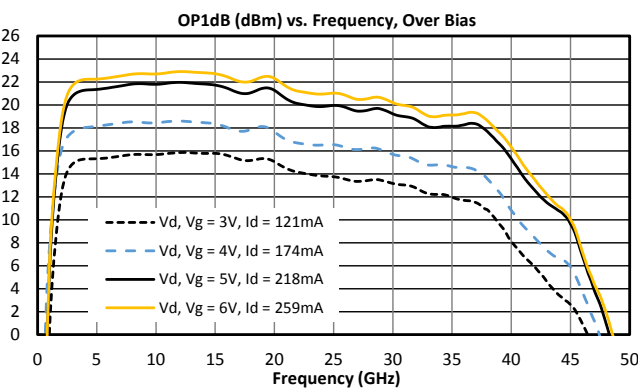
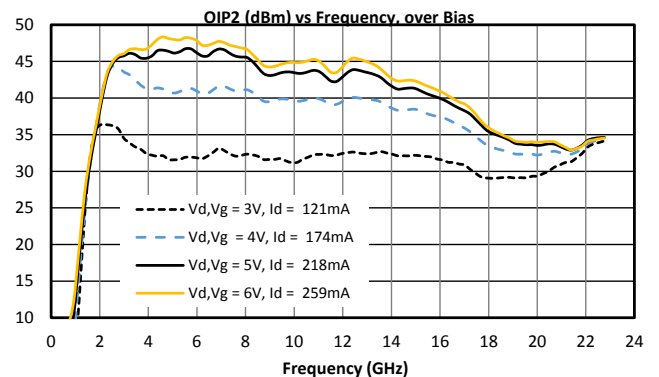
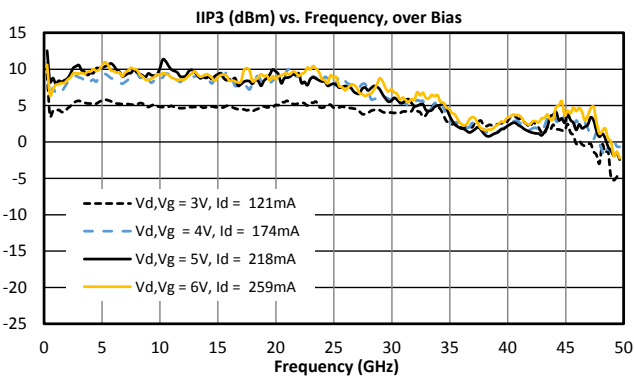
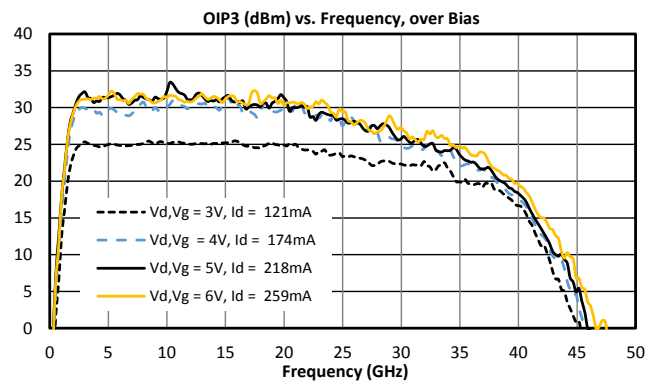
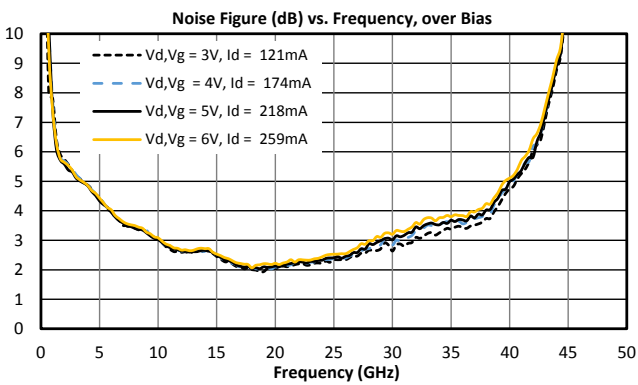
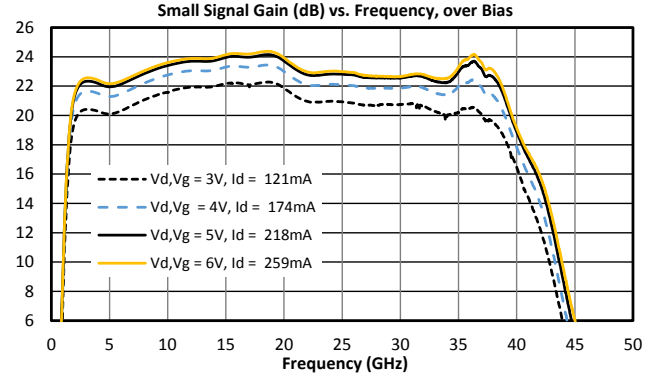
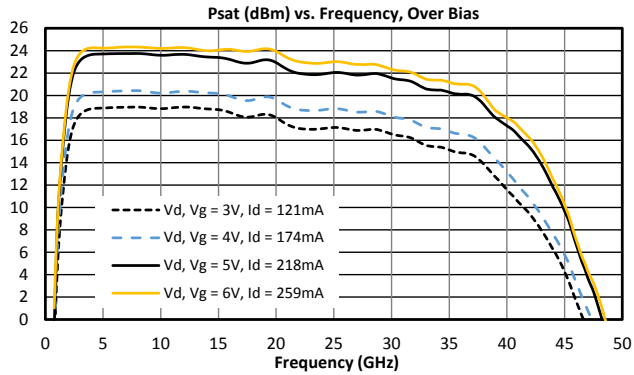
3.4 Electrical Specifications

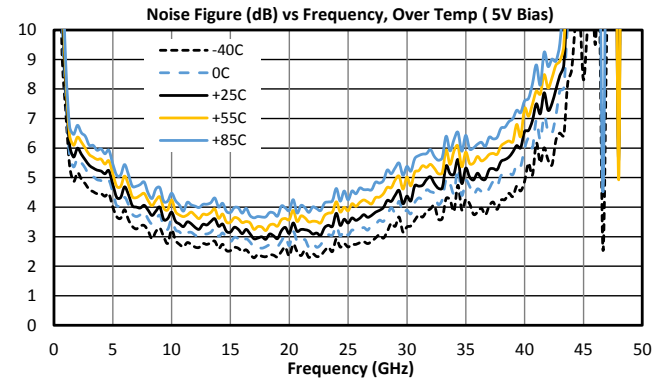
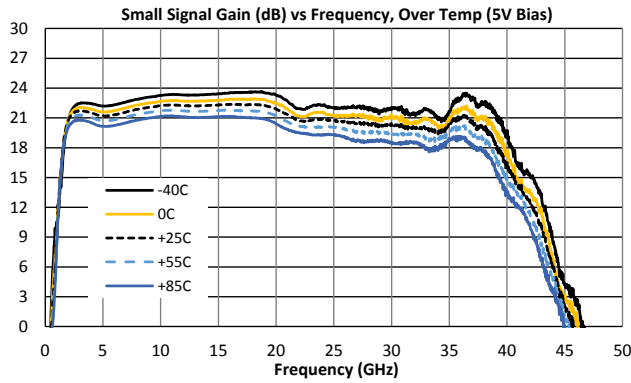
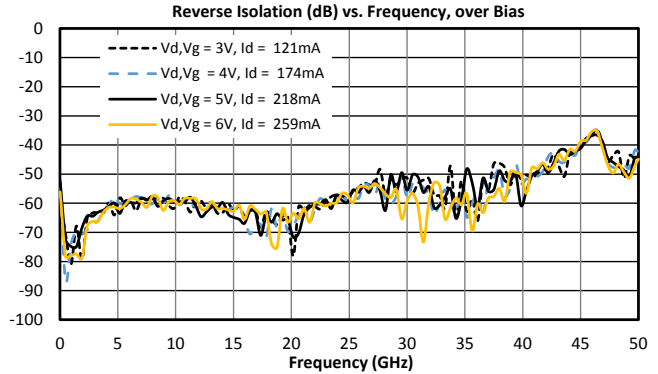
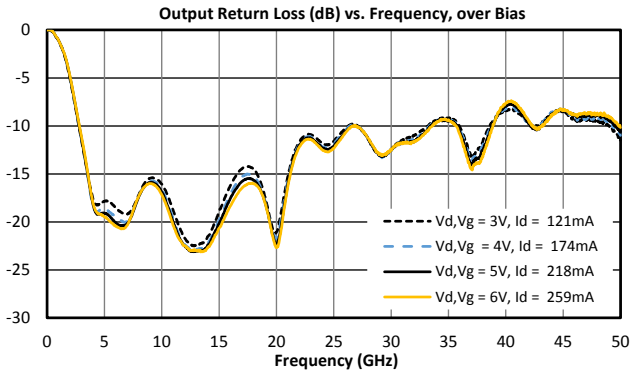
Unless otherwise specified, electrical specifications apply at $T_A=+25^{\circ}\text{C}$, $V_{d1}, V_{d2}, V_{g1}, V_{g2} = 5\text{ V}$.

Min and Max limits apply only to our connectorized units and are guaranteed at $T_A=+25^{\circ}\text{C}$

Parameter	Test Conditions	Frequency	Min	Typical	Units
Saturated Output Power	$V_{d1}, V_{d2}, V_{g1}, V_{g2} = 5\text{ V}$	2 GHz – 27 GHz		+23	dBm
		27 GHz – 40 GHz		+21	dBm
Small Signal Gain	$V_{d1}, V_{d2}, V_{g1}, V_{g2} = 5\text{ V}$ $P_{in} = -20\text{ dBm}$	2 GHz – 40 GHz		23	dB
Input Return Loss				20	
Output Return Loss				15	
Reverse Isolation				50	
Noise Figure				4	
Input IP3	$V_{d1}, V_{d2}, V_{g1}, V_{g2} = 5\text{ V}$ $P_{in} = -15\text{ dBm}$ per tone, 10 MHz tone spacing	2 GHz – 27 GHz		+9	dBm
		27 GHz – 40 GHz		+6	
Output IP3		2 GHz – 27 GHz		+30	
		27 GHz – 40 GHz		+25	
Output IP2		2 GHz – 12 GHz		+45	
		12 GHz – 22 GHz		+37	
Output P1dB		2 GHz – 27 GHz		+19	
		27 GHz – 40 GHz		+16	
Input Power for Saturation	$V_{d1}, V_{d2}, V_{g1}, V_{g2} = 5\text{ V}$	2 GHz – 27 GHz		+2	
		27 GHz – 40 GHz		+0	
DC Supply Quiescent Current (I_{dq}) (Drain + Bias Current)	$V_{d1}, V_{d2}, V_{g1}, V_{g2} = 5\text{ V}$ no RF input			237	mA

3.5 ADM-8007PSM Typical Performance Plots

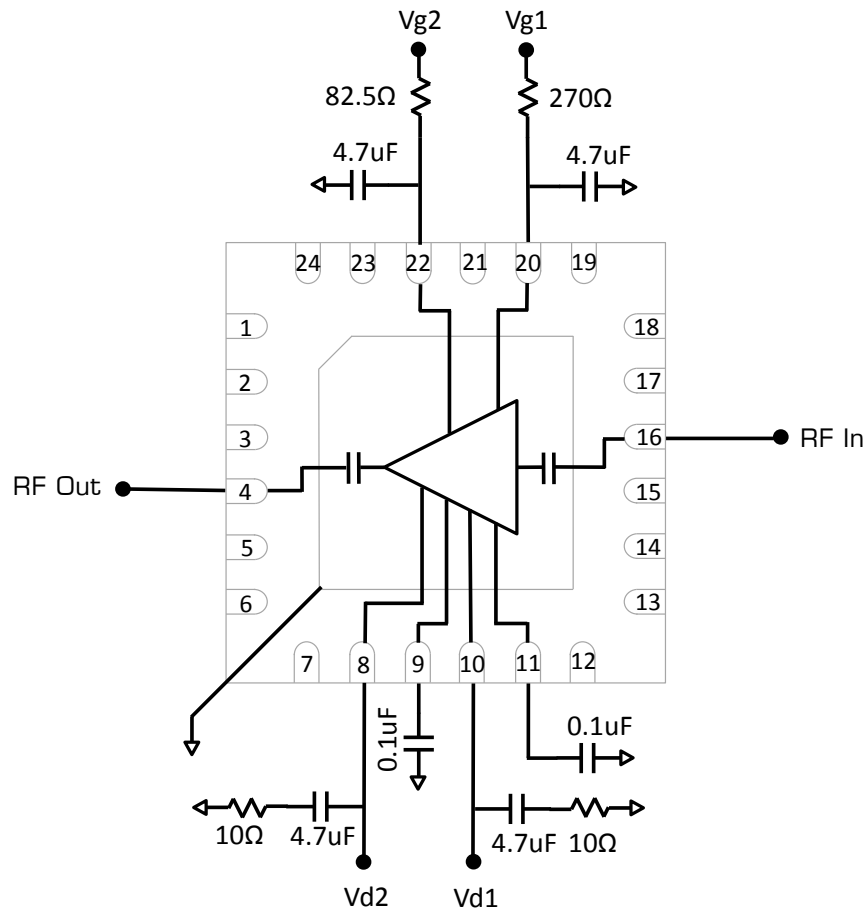




4. Application Information

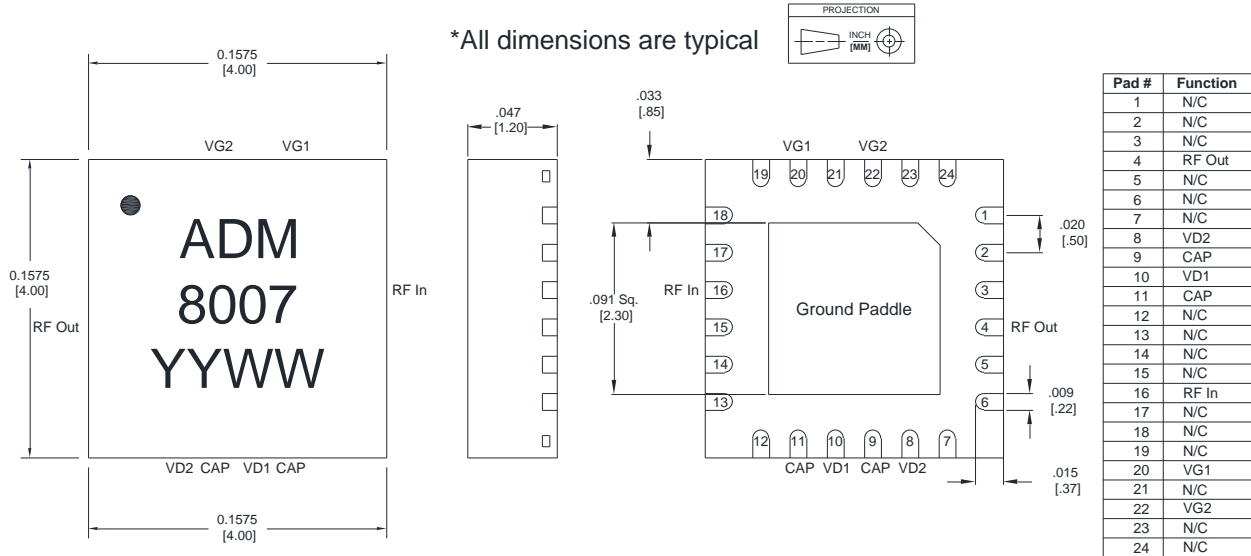
4.1 Application Circuit

Below is the recommended application circuit for the ADM-8007PSM. The resistors connected along the Vg1 and Vg2 pathways are there to set the bias currents as shown in the performance plots in the previous section. Customers can choose to adjust these values based on their specific application's performance and power requirements. In general, increasing the values of these resistors will reduce current consumption on both the Vd and Vg lines, but will reduce gain and will have a slight impact on other performance parameters compared to those shown in the previous section. Contact support@markimicrowave.com if you would like help creating an alternative application circuit for your system's requirements.



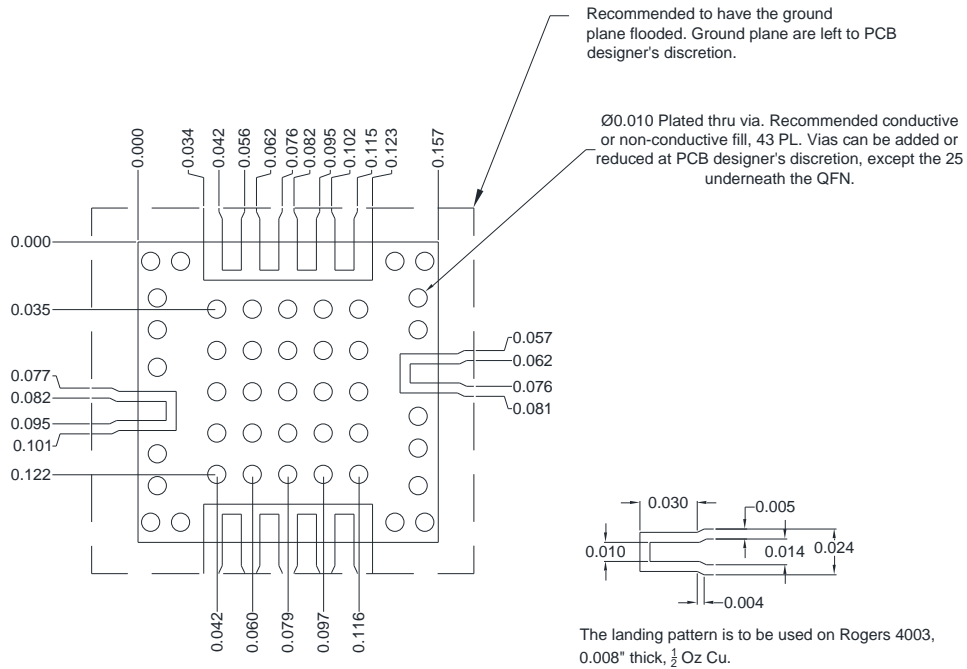
5. Mechanical Data

5.1 ADM-8007PSM Package Outline Drawing



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

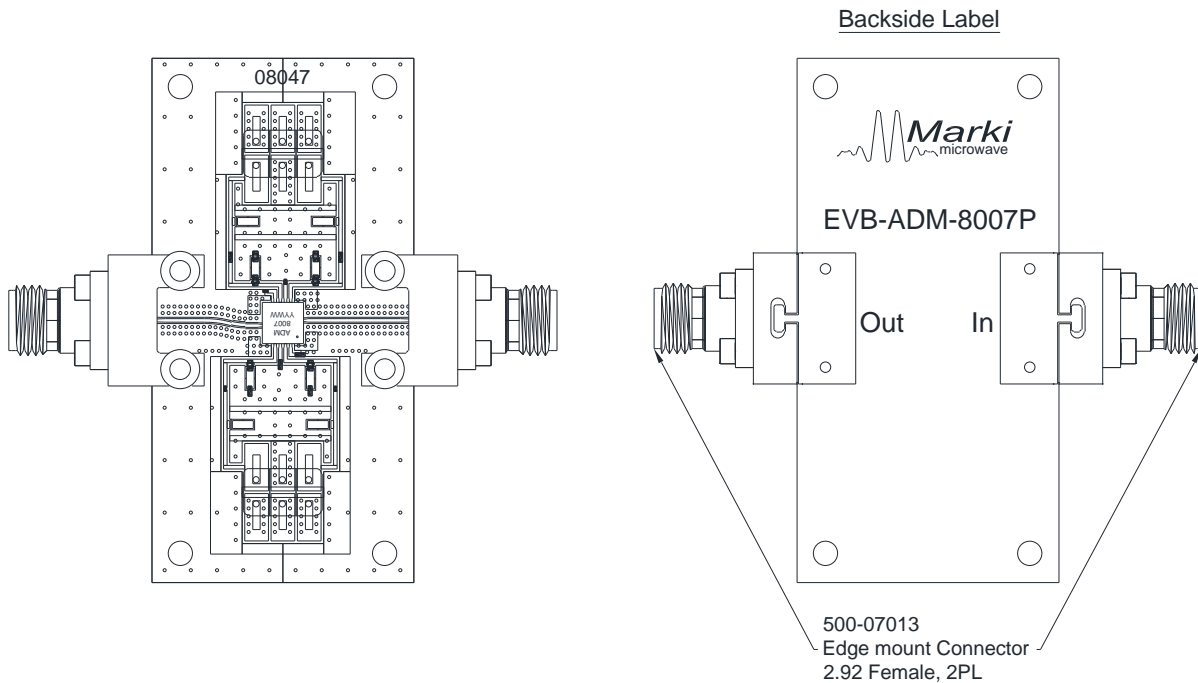
5.2 ADM-8007PSM Recommended Landing Pattern



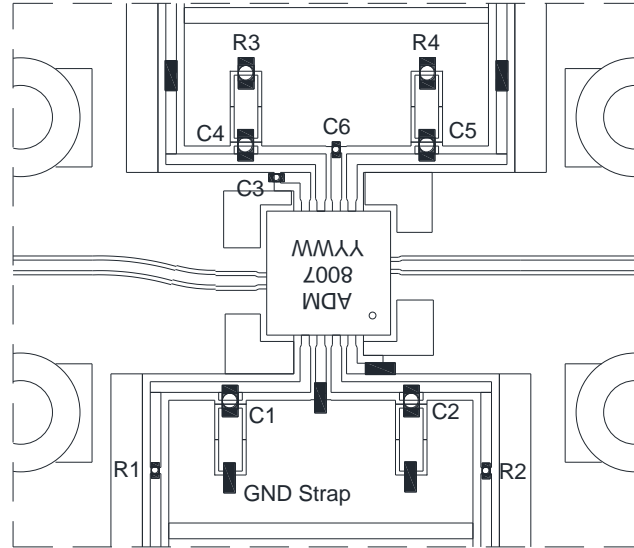
Note: Additional pins may be added or defined in soldermask to help with self-alignment of the package during assembly.

5.3 EVB-ADM-8007P Outline Drawing

(Note orientation of IC on PCB. The IC is mounted 180° rotated to accommodate standard left to right input to output signal flow.)



5.4 EVB-ADM-8007P Bill of Materials



Reference	Manufacturer	Description	Qty
RF In, RF Out	Southwest	(PN:1492-04A-5) Connector, Edge Mount, 2.9mm F	2
DC Headers	Various	C-grid Header (6-pin)	2
R1	Various	0201 Res 270Ω	1
R2	Various	0201 Res 82.5Ω	1
R3, R4	Various	0402 Res 10Ω	2
C1, C2, C4, C5	Various	0402 Cap 4.7uF	4
C3, C6	Various	0201 Cap 0.1uF	2
GND Strap	Various	Copper Ribbon 15 mil Pb/Sn	6
U1	Marki	(PN: ADM-8007PSM) 1.5-38GHz, 21dBm Amplifier	1