

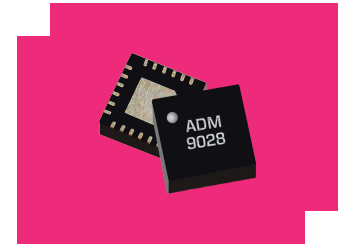
# ADM-9028PSM

## 300kHz - 26 GHz Distributed Amplifier

### DEVICE OVERVIEW

#### General Description

The ADM-9028PSM is a wideband distributed low noise amplifier capable of providing 16 dB gain and +24 dBm OIP3 from 10MHz to 26 GHz and a low 2.5 dB typical noise figure from 6 to 20 GHz. The ADM-9028PSM is an ideal linear signal amplifier for applications requiring low power consumption and small form-factors. ADM-9028PSM is DC coupled with the low end limited by the blocking capacitors. Available in a surface mount 4x4mm QFN package. The amplifier has excellent return losses and gain flatness.



[Download s-parameters here](#)

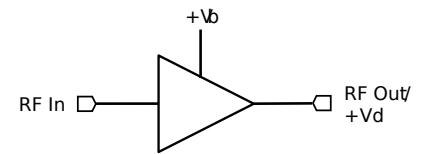
#### Features

- 16 dB typical gain
- Flat gain response across frequency
- +24dBm typical OIP3
- Single Supply, Positive Only Bias
- Low power consumption
- DC coupled RF input and output

#### Applications

- Test and Measurement Equipment
- Radar and satellite communications

#### Functional Block Diagram



#### Part Ordering Options

Part Number	Description	Package	Green Status	Product Lifecycle	Export Classification
ADM-9028PSM	300kHz - 26 GHz Distributed Amplifier	QFN	RoHS REACH	Released	EAR99
EVB-ADM-9028P	Evaluation Board, 300kHz - 26GHz Distributed Amplifier	EVB	REACH RoHS	Released	EAR99

## Table Of Contents

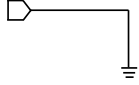
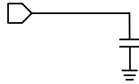
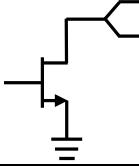
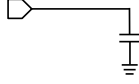
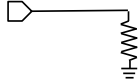
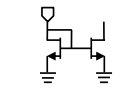
- **Device Overview**
  - General Description
  - Features
  - Applications
  - Functional Block Diagram
- **Port Configuration and Functions**
  - Port Functions
- **Revision History**
- **Specifications**
  - Absolute Maximum Ratings
  - Package Information
  - Recommended Operating Conditions
  - Sequencing Requirements
  - Electrical Specifications
  - Typical Performance Plots
  - Performance Plots vs Temperature
  - Performance Plots vs Input Power
- **Operation**
  - Application Information
  - Application Circuit
  - Application Circuit Description
- **Mechanical Data**
  - Outline Drawing
- **Footprint Image**
- **Evaluation Board**
  - Evaluation Board Outline Drawing

## Revision History

Revision Code	Revision Date	Comment
-	2024-07-09	Initial Release

## Port Configuration and Functions

**Port Functions**

Port	Function	Description	DC Equivalent Circuit
1-3, 5-8, 11-15, 17-22, 24	Non-connect (NC)	These pins are not internally connected. Datasheet performance is measured with these pins connected to ground.	-
Paddle	Ground	Ground pad should be connected to RF/DC ground with high electrical and thermal conductivity.	
Pin 10	Off-Chip Cap Port 1	Pin 10 provides additional off chip bypass capacitance. A 0.1uF capacitor is recommended.	
Pin 16	Drain Supply / RF Output	Pin 16 serves as the RF output and drain voltage supply pin for the amplifier. DC voltage is applied through an external choke inductor or bias-tee. The nominal DC voltage at this pin should be set to +6V. This pin is internally RF matched to 50 Ohms and requires an external DC blocking capacitor.	
Pin 23	Off-Chip Cap Port 2	Pin 23 provides additional off chip bypass capacitance. A 100pF + 0.1uF capacitor combination is recommended.	
Pin 4	RF Input	Pin 4 is the amplifier's RF Input pin. It is RF matched to 50 Ω and requires an external DC blocking capacitor.	
Pin 9	Positive bias	Pin 9 provides a required positive bias which supplies the current mirror. A higher voltage results in a higher current draw through the VD / RF Out port. This port should be set to +3V for normal operation.	

## Specifications

### 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. 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	Unit
Bias Current (Ib)	10	mA
Bias Voltage (Vb)	6.5	V
Drain Current (Id) (RF Applied)	120	mA
Drain Supply Voltage (Vd)	8.5	V
Maximum Operating Temperature for MTTF > 1E6 hours	85	°C
Maximum Storage Temperature	125	°C
Minimum Operating Temperature for MTTF > 1E6 hours	-40	°C
Minimum Storage Temperature	-65	°C
RF Power Handling	23	dBm

### Package Information

Parameter	Details	Rating
Dimensions	-	4 x 4 mm
Moisture Sensitivity Level	-	MSL 1

### 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.

Parameter	Min	Nominal	Max	Unit
Power Supply DC Voltage (Vd)	5	6	8	V
Ambient Temperature	-40	25	85	°C
Power Supply DC Current (Id) (No RF Input)	36	50	63	mA
Positive DC Bias Voltage (Vb)	2	3	3	V

### Sequencing Requirements

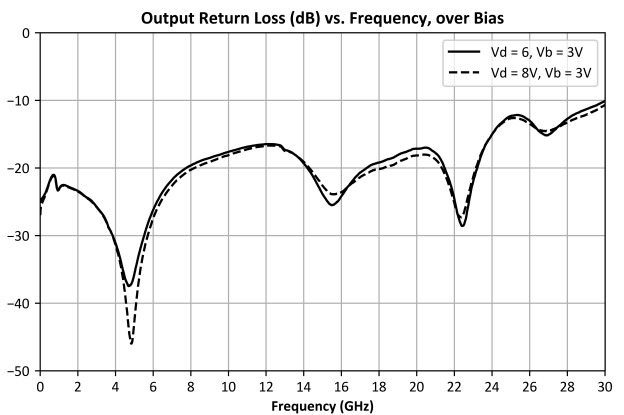
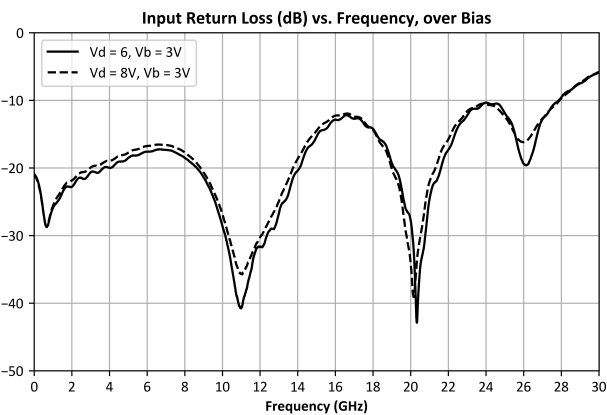
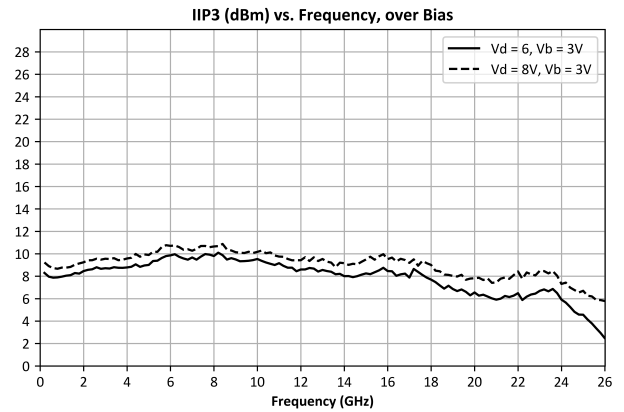
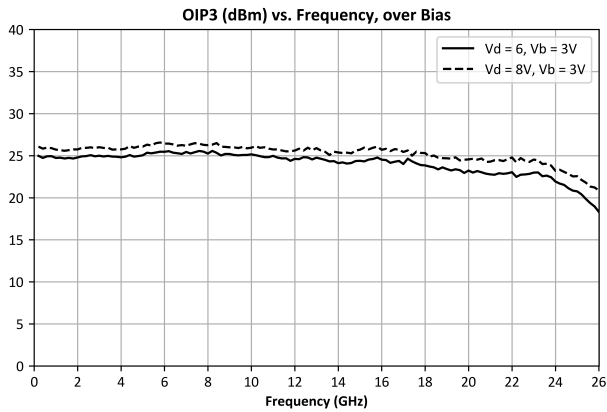
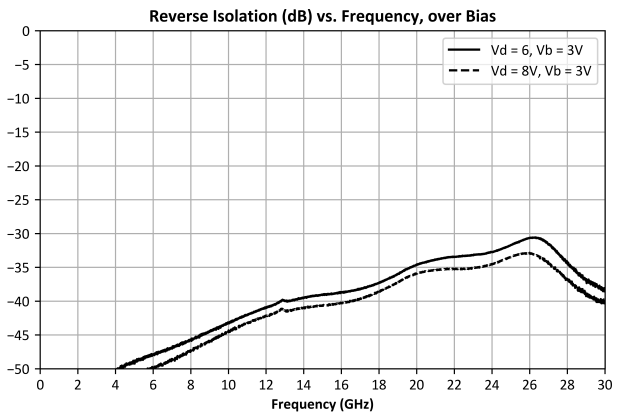
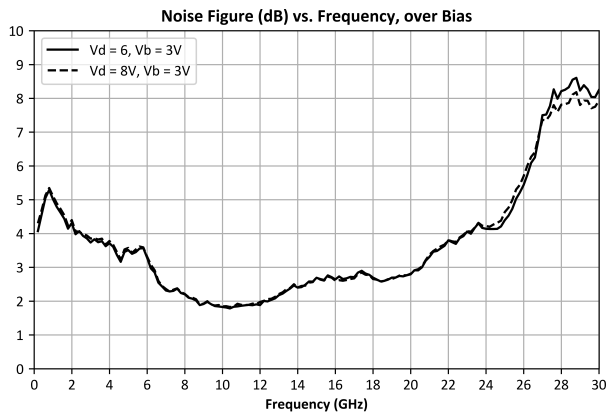
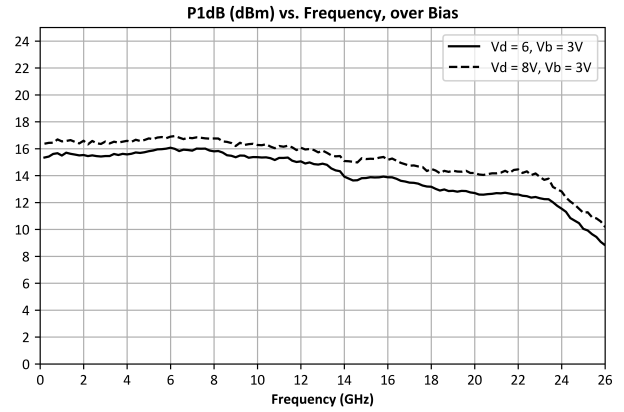
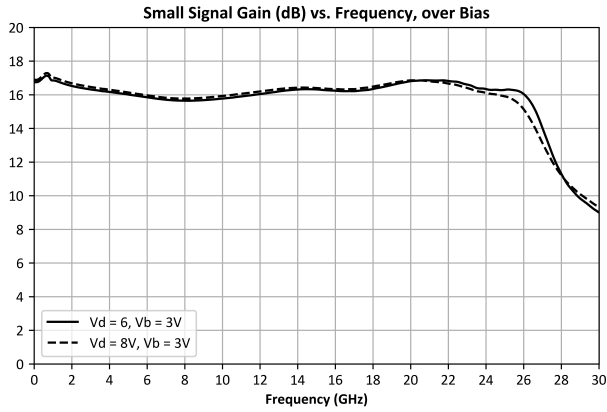
There is no sequencing required to power up or power down the amplifier.

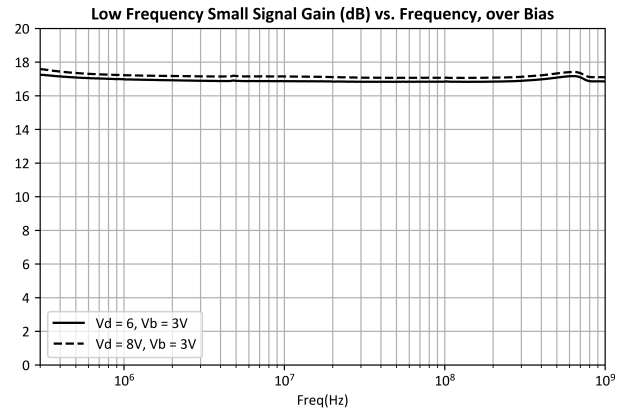
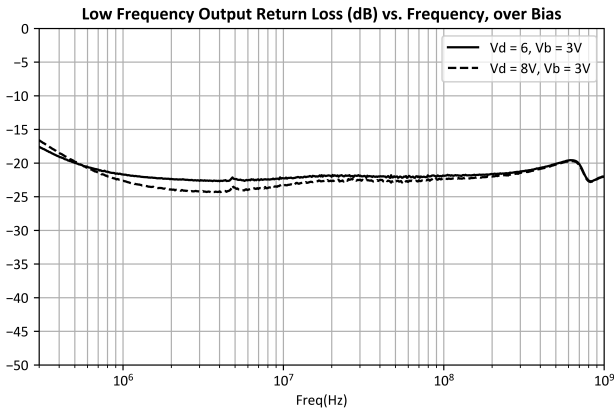
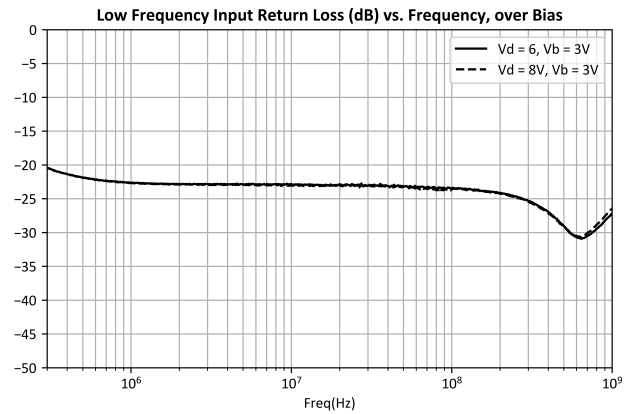
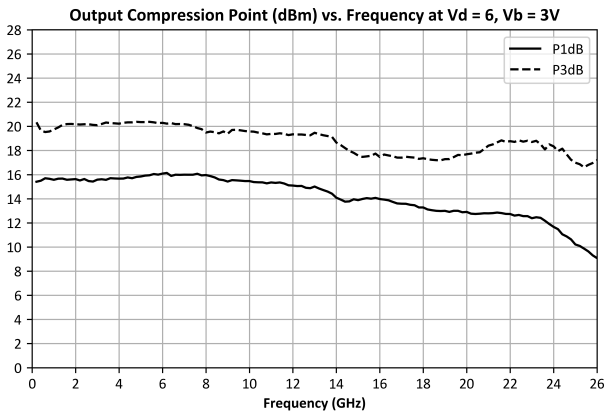
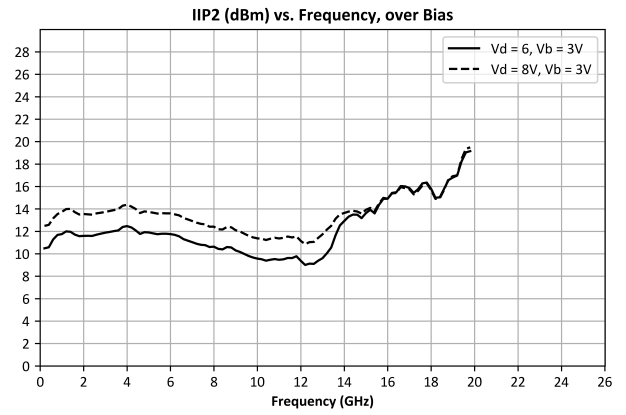
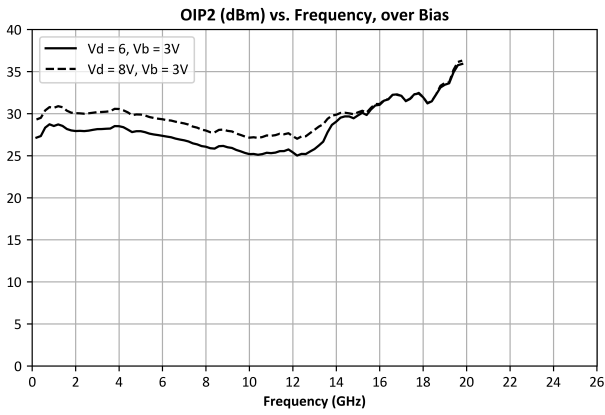
**Electrical Specifications**

Unless otherwise specified, electrical specifications apply at TA=+25°C, Vd = 6V, Vb = 3V.

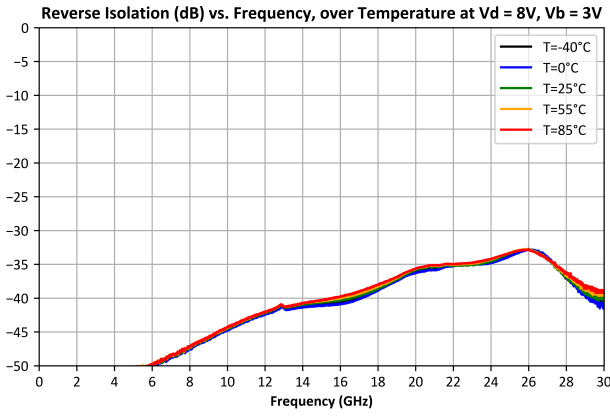
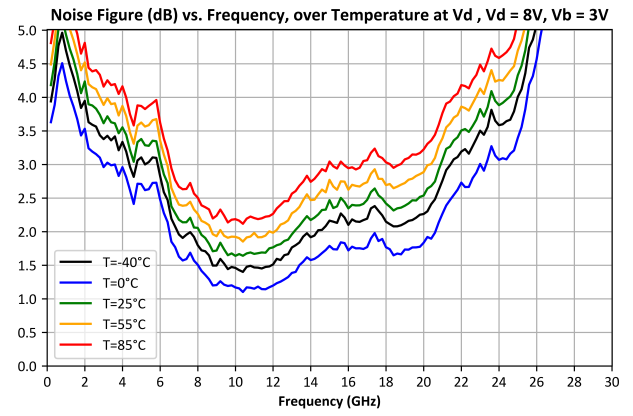
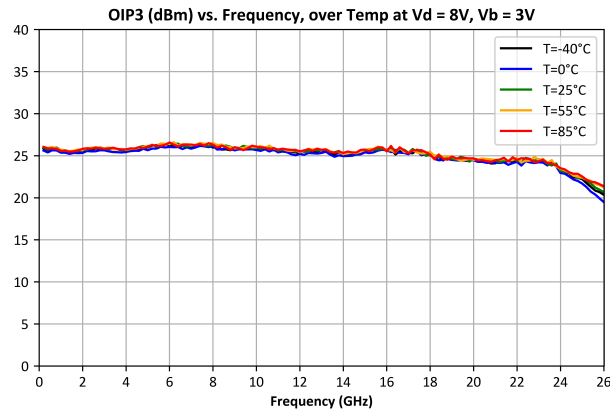
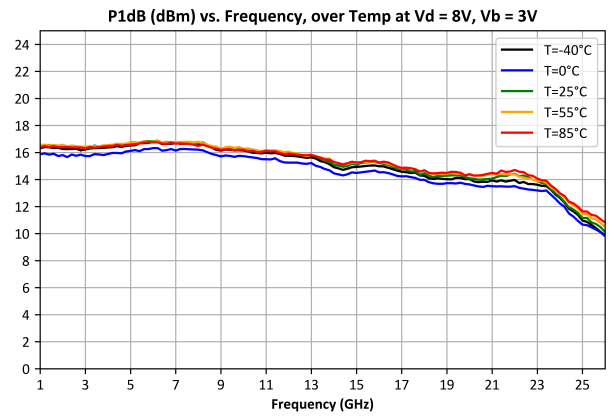
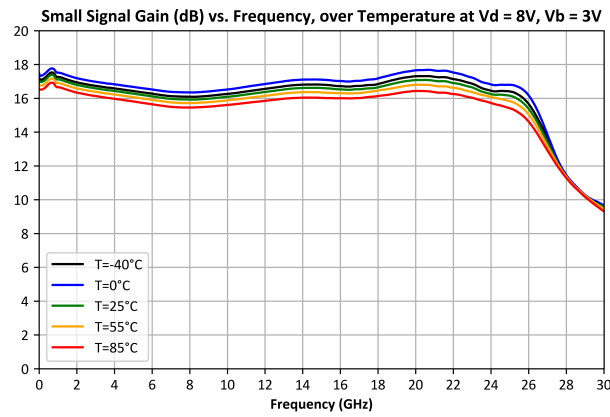
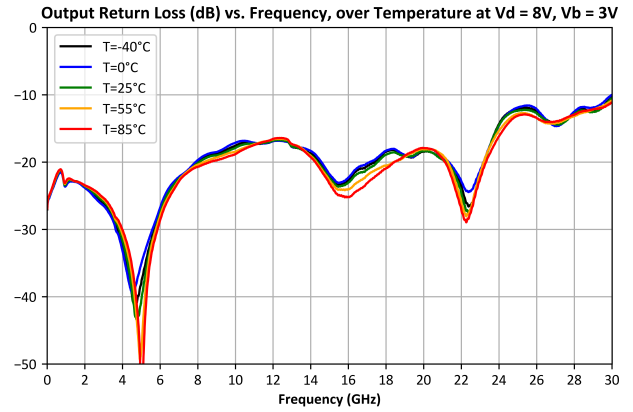
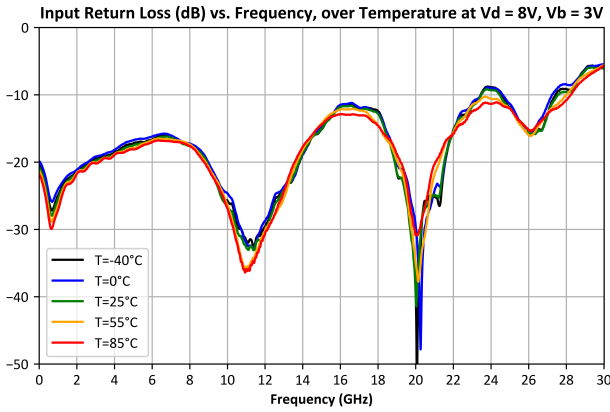
Parameter	Test Conditions	Minimum Frequency (GHz)	Maximum Frequency (GHz)	Min	Typ	Max	Unit
Output Power	-	2	20	-	20	-	dBm
Small Signal Gain	Vd = 6V, Vb = 3V, Pin = -20dBm	0.0003	0.01	-	17	-	dB
DC Supply Quiescent Current (Idq)	Vd = 6V, Vb = 3V, No RF input	0.01	26	-	50	-	mA
Input Return Loss	Vd = 6V, Vb = 3V, Pin = -20dBm	0.0003	26	-	20	-	dB
Noise Figure	Vd = 6V, Vb = 3V, Pin = -20dBm	0.01	6	-	4	-	dB
Noise Figure	Vd = 6V, Vb = 3V, Pin = -20dBm	20	26	-	4	-	dB
Noise Figure	Vd = 6V, Vb = 3V, Pin = -20dBm	6	20	-	2.5	-	dB
Output IP3	Vd = 6V, Vb = 3V, Pin = -20dBm	0.01	26	-	24	-	dBm
Output P1dB	Vd = 6V, Vb = 3V	0.01	26	-	14.5	-	dBm
Output Return Loss	Vd = 6V, Vb = 3V, Pin = -20dBm	0.0003	26	-	20	-	dB
Reverse Isolation	Vd = 6V, Vb = 3V, Pin = -20dBm	0.0003	26	-	40	-	dB
Small Signal Gain	Vd = 6V, Vb = 3V, Pin = -20dBm	0.01	26	14	16	-	dB

Typical Performance Plots

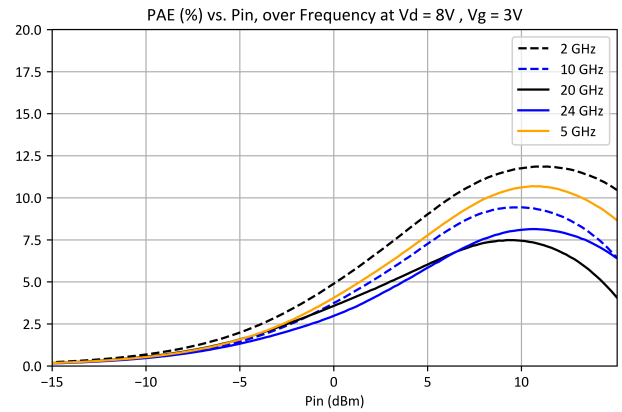
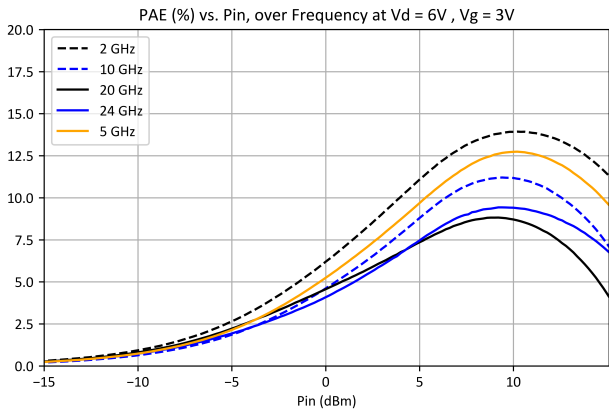
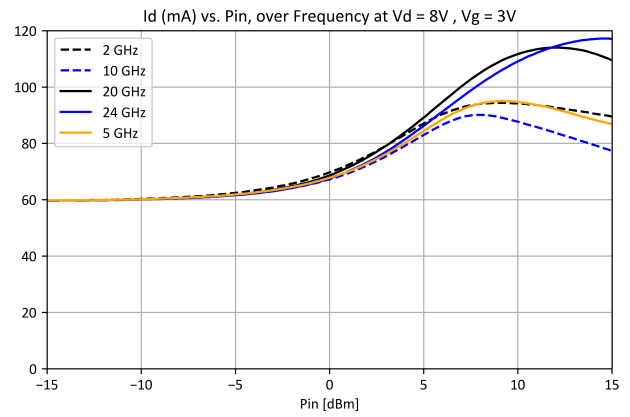
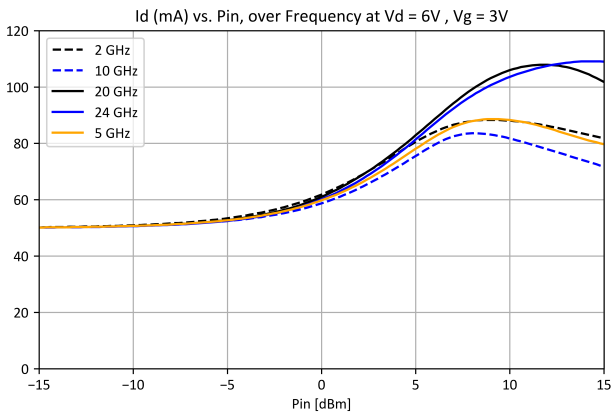
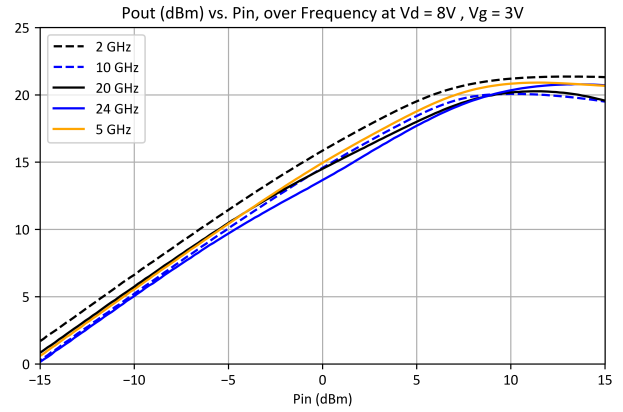
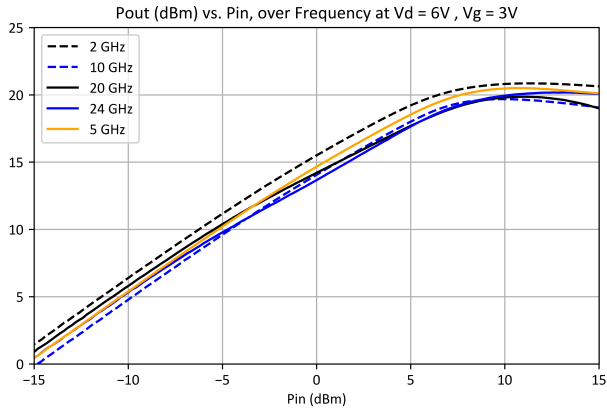




**Performance Plots vs Temperature**



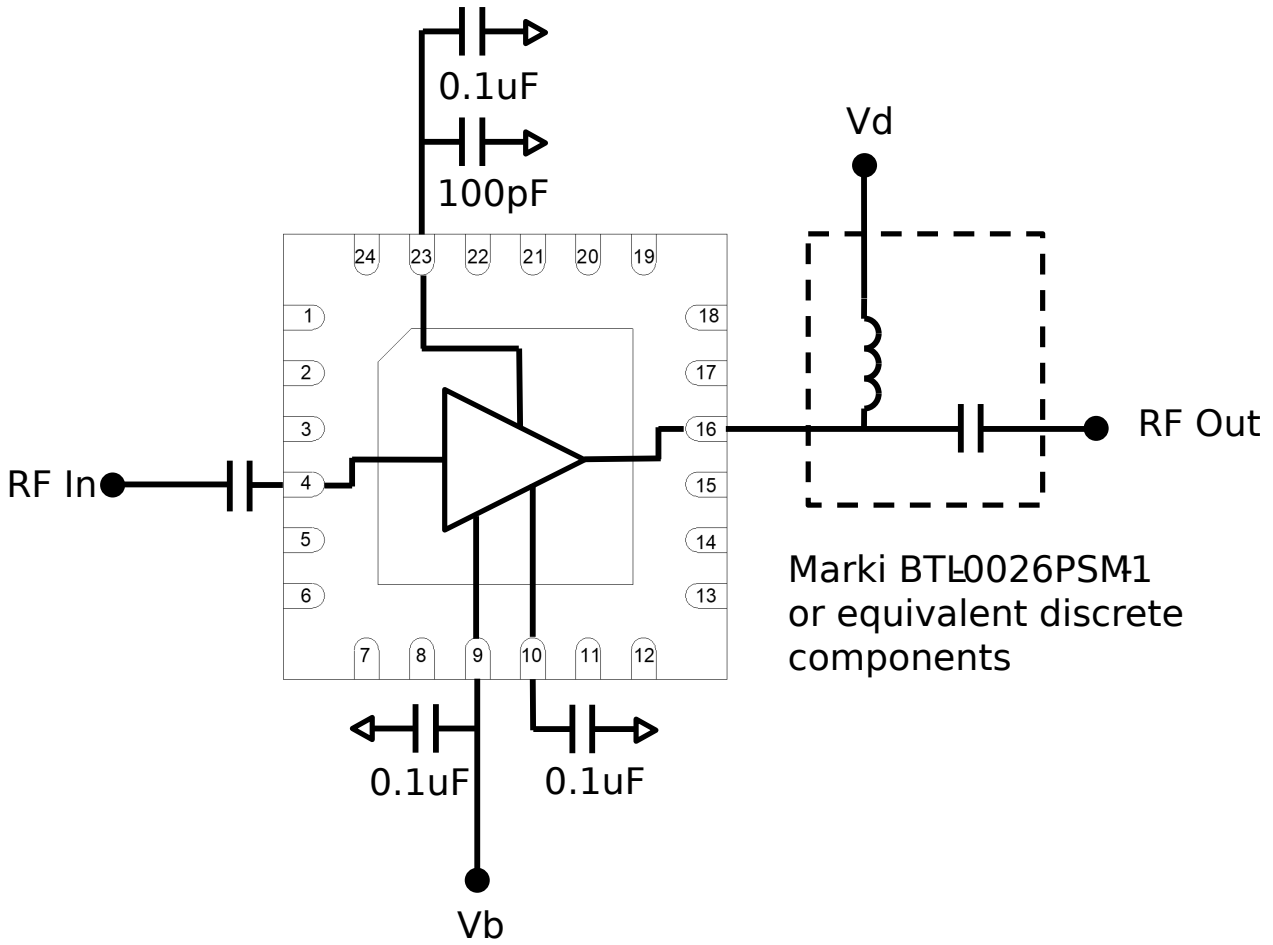
**Performance Plots vs Input Power**



### **Application Information**

Below is the recommended application circuit for the ADM-9028PSM.

**Application Circuit**



### Application Circuit Description

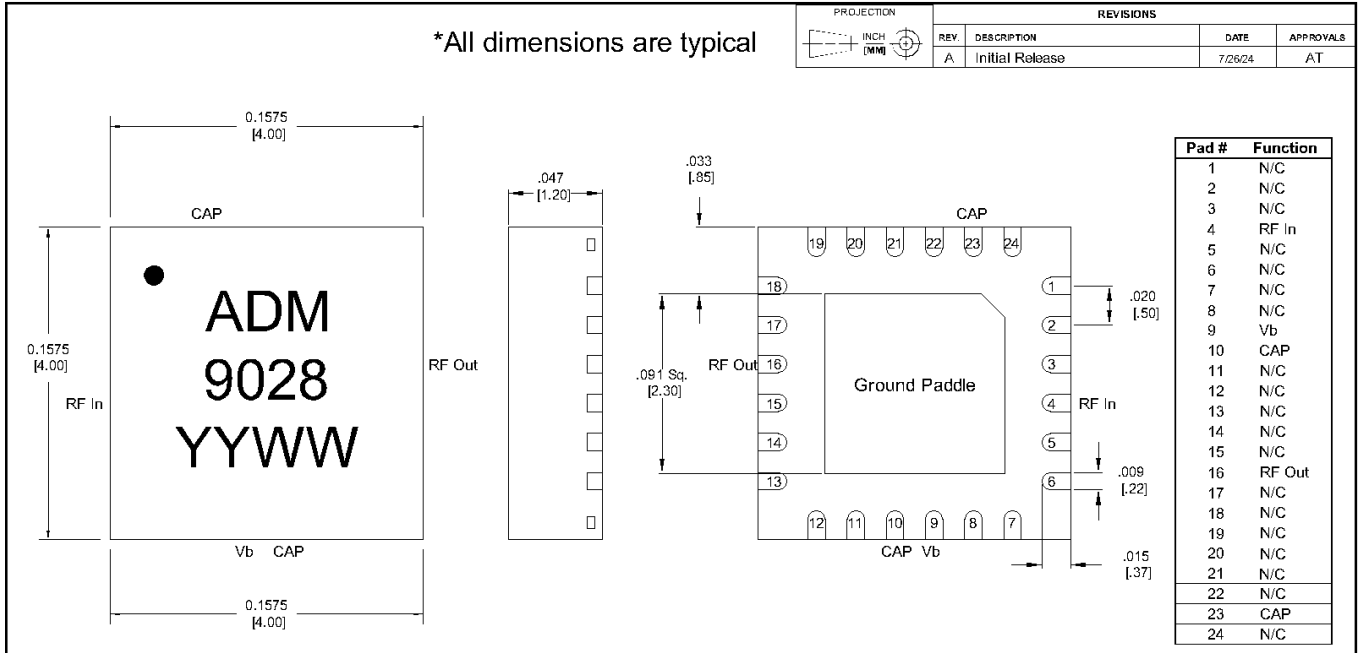
Above is the recommended application circuit for the ADM-9028PSM. Multiple DC power supply bypassing capacitors are shown around the part. CAP pin 23 requires a 0.1uF+100pF bypass capacitor combination. CAP pin 10 requires a 0.1uF bypass capacitor. DC bias voltage is supplied to the Vb pin across a 0.1uF bypass capacitor. Drain supply voltage Vd is supplied to RF Out/Vd pin 16 through an external choke inductor or bias-tee. DC blocking capacitors are required at the RF input (4) and output (16) pins. To extend low frequency performance, additional bypass capacitance should be added to pins 9 and 23 with a wideband bias tee at the output and sufficiently large input blocking cap to not impede RF signal at the frequency of interest. Datasheet performance was measured using the bypassing scheme shown above and external wideband test equipment bias tees.

**Mechanical Data**

**Outline Drawing**

Download : [Outline 2D Drawing](#) | [Outline 3D Drawing](#) | [Outline 3D STP](#)


\*All dimensions are typical



Pad #	Function
1	N/C
2	N/C
3	N/C
4	RF In
5	N/C
6	N/C
7	N/C
8	N/C
9	Vb
10	CAP
11	N/C
12	N/C
13	N/C
14	N/C
15	N/C
16	RF Out
17	N/C
18	N/C
19	N/C
20	N/C
21	N/C
22	N/C
23	CAP
24	N/C

**Notes (unless otherwise specified):**

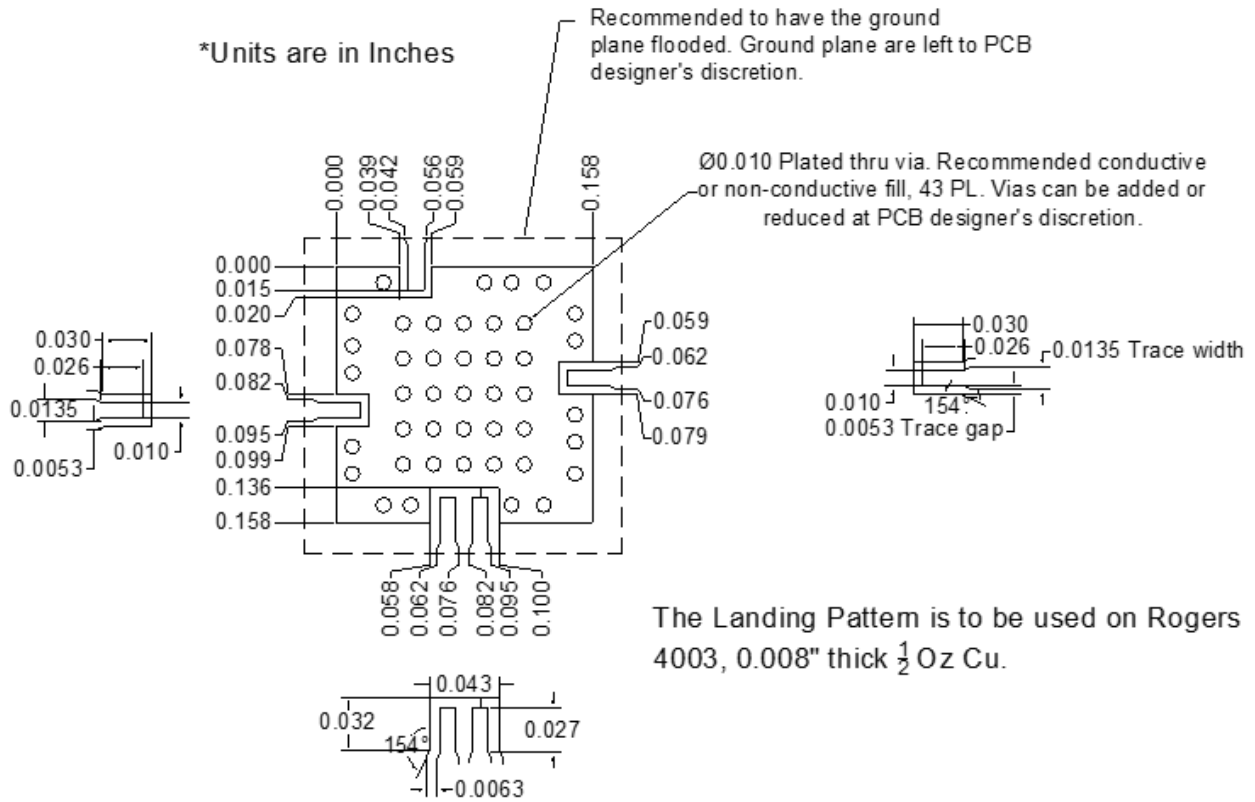
- Substrate material is LCP.
- I/O Leads and Die Paddle are 0.05 micron Au over 0.02 microns Pd over 0.5 microns Ni.
- All unconnected pins should be connected to PCB RF ground.

<p>UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES ARE:</p> <p>FRACTIONS DECIMALS ANGLES + .002 / - .001 .004 .01 30°</p> <p>MATERIAL: As Noted</p> <p>FINISH: As Noted</p>	<p>NOTES:</p> <p>DRAWN BY: AT</p> <p>DATE: 5/1/24</p>	 <p>Outline 4mm QFN Amplifier</p> <p>SIZE: <b>A</b> CAGE CODE: <b>0UC32</b> DWG. NO.: <b>ADM-9028PSM</b></p> <p style="text-align: right;">SHEET 1 OF 1</p>
---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	-------------------------------------------------------	------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

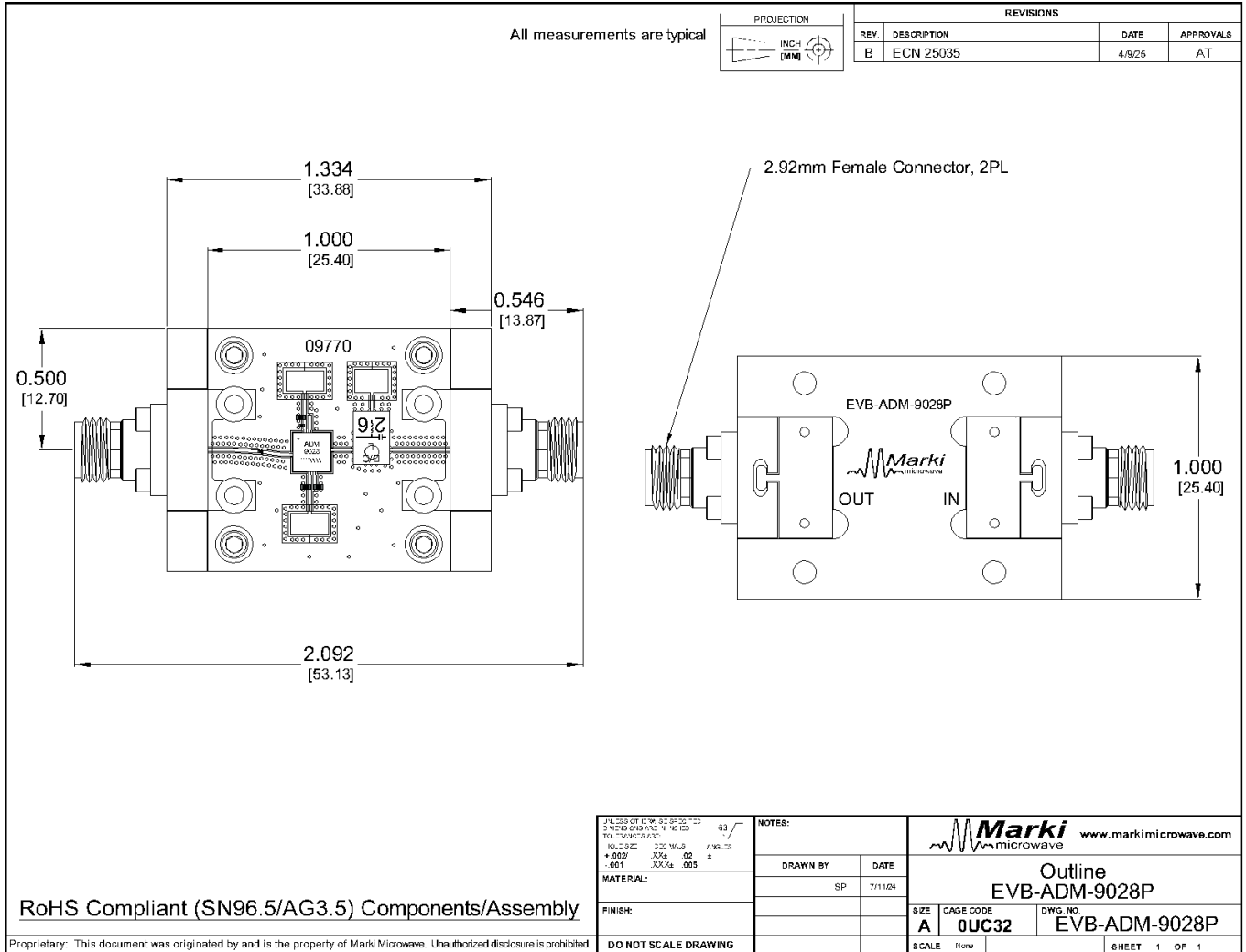
Proprietary: This document was originated by and is the property of Marki Microwave. Unauthorized disclosure is prohibited. **DO NOT SCALE DRAWING**

Footprint Image

Download: [Footprint Drawing](#)



**Evaluation Board - Outline Drawing**



**DISCLAIMER**

MARKI MICROWAVE, INC., ("MARKI") PROVIDES TECHNICAL SPECIFICATIONS AND DATA (INCLUDING DATASHEETS), APPLICATION OR OTHER DESIGN ADVICE, WEB TOOLS, AND OTHER INFORMATION AND RESOURCES "AS IS" AND WITH ALL FAULTS. MARKI DISCLAIMS ALL WARRANTIES, EXPRESS OR IMPLIED, INCLUDING, WITHOUT LIMITATION, ANY IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, OR NON-INFRINGEMENT.

These resources are intended for developers skilled in the art designing with Marki products. You are solely responsible for (1) selecting the appropriate products for your application, (2) designing, validating, and testing your application, and (3) ensuring your application meets applicable standards and other requirements. Marki makes no guarantee regarding the suitability of its products for any particular purpose, nor does Marki assume any liability whatsoever arising out of your use or application of any Marki product.

Marki grants you permission to use these resources only for development of an application that uses Marki products. Other reproduction or use of these resources is strictly prohibited. No license is granted to any other Marki intellectual property or to any third-party intellectual property. Marki reserves the right to make changes to the product(s) or information contained herein without notice.

MARKI MICROWAVE and T3 MIXER are trademarks or registered trademarks of Marki Microwave, Inc. All other trademarks used are the property of their respective owners.

© 2024, Marki Microwave, Inc