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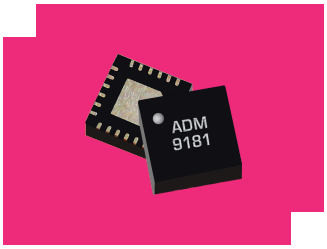
ADM-9181PSM

DC - 26 GHz Distributed Amplifier

DEVICE OVERVIEW

General Description

The ADM-9181PSM is a wideband distributed amplifier capable of providing 14.5 dB gain and +31 dBm OIP3 from 100MHz to 22 GHz. The ADM-9181PSM is an ideal linear signal amplifier for applications requiring low power consumption and small form-factors. The amplifier has excellent return losses and gain flatness.



Download s-parameters here

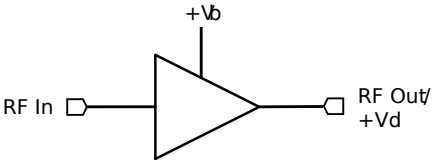
Features

- 14.5dB typical Gain
- +31dBm typical OIP3
- Flat gain response
- Excellent return losses

Applications

- Communication Systems
- Test and Measurement Equipment
- Satellite Communications
- Electronic Warfare

Functional Block Diagram



Part Ordering Options

Part Number	Description	Package	Green Status	Product Lifecycle	Export Classification

Table Of Contents

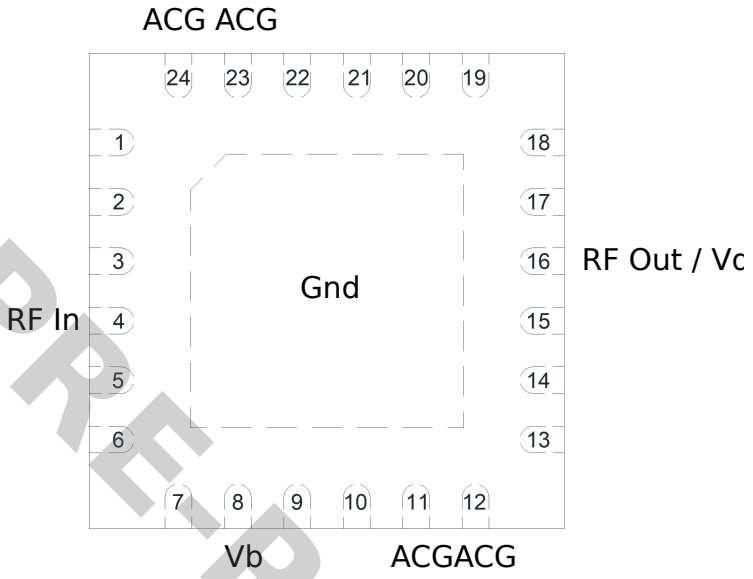
Revision History

Revision Code	Revision Date	Comment
-	2024-08-14	Initial Release

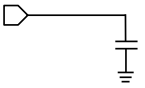
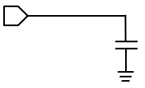
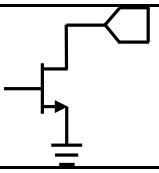
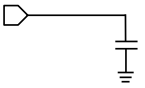
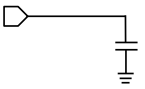
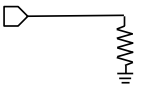
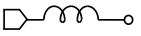
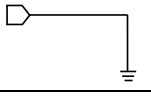
Port Configuration and Functions

Port Diagram

Below is a top down ("x-ray") view of the ADM-9181PSM.



Port Functions

Port	Function	Description	Equivalent Circuit for Package
11	ACG	Pin 11 is used to provide additional off-chip bypass capacitance. A 0.1uF capacitor should be placed between this pin and ground for normal operation.	
12	ACG	Pin 12 is used to provide additional off-chip bypass capacitance. A 100pF capacitor should be placed between this pin and ground for normal operation.	
16	RF Out / Vd	Pin 16 connects to the drain of the amplifier and serves as both the RF output port and the DC supply for the amplifier. This pin requires an external bias-tee and should be connected to +6V for normal operation.	
23	ACG	Pin 23 is used to provide additional off-chip bypass capacitance. A 0.1uF capacitor should be placed between this pin and ground for normal operation.	
24	ACG	Pin 24 is used to provide additional off-chip bypass capacitance. A 100pF capacitor should be placed between this pin and ground for normal operation.	
4	RF Input	Pin 4 is the amplifier's RF input pin. This pin is internally RF matched to 50 Ohms and requires an external DC blocking capacitor.	
8	Vb	Pin 8 provides positive DC bias voltage to the amplifier. This pin is internally connected to a current mirror controlling amplifier drain current. A higher voltage on this pin results in higher current draw through the Vd / RF out pin. The voltage on this pin should be set to +3V for normal operation.	
All Others	Non-connect (NC)	Pins other than those specifically called out in this table are not internally connected to the amplifier die. These pins should be connected to ground for normal operation. Datasheet performance is measured on an evaluation board with these pins grounded.	
Paddle	Gnd	The package ground paddle must be connected to a DC/RF ground potential with high thermal and electrical conductivity.	

Specifications

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	Unit
Bias Supply Voltage (Vb)	6.5	V
Drain Current (Id) (No RF Applied)	250	mA
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
Positive Drain Supply Voltage (Vd)	8	V
RF Input Power	15	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
Ambient Temperature	-40	25	85	°C
Positive DC Bias Voltage (Vb)	2	3	4.4	V
Positive DC Voltage (Vd)	4	5	6	V
Positive DC Current (Id) (No RF Input)	82	130	190	mA

Electrical Specifications

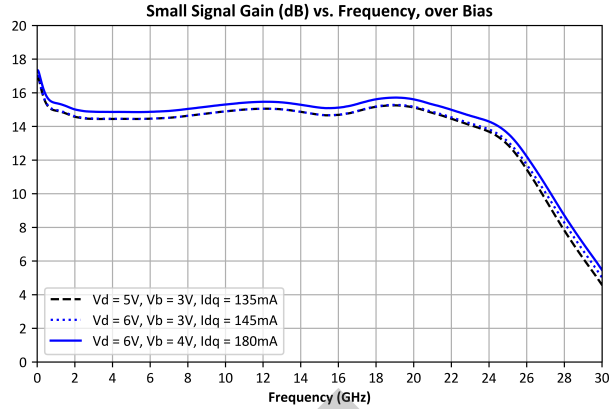
Unless otherwise specified, electrical specifications apply at TA=+25°C, Vd = 6V, Vb = 3V.

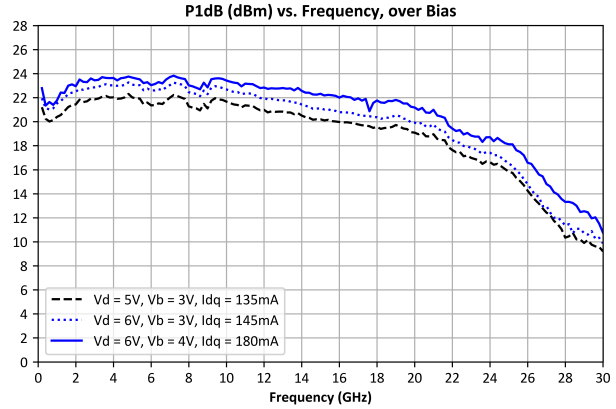
Parameter	Test Conditions	Minimum Frequency (GHz)	Maximum Frequency (GHz)	Min	Typ	Max	Unit
Small Signal Gain	Vd = 6V, Vb = 3V, Pin = -20dBm	0.1	26	-	14.5	-	dB
Noise Figure	Vd = 6V, Vb = 3V, Pin = -20dBm	0.1	6	-	6	-	dB
Noise Figure	Vd = 6V, Vb = 3V, Pin = -20dBm	6	26	-	3.2	-	dB
Output IP3	Vd = 6V, Vb = 3V	0.1	26	-	31	-	dBm
Input IP3	Vd = 6V, Vb = 3V	0.1	26	-	17	-	dBm
Output IP2 [1]	Vd = 6V, Vb = 3V	0.1	13	-	38	-	dBm
Input IP2 [2]	Vd = 6V, Vb = 3V	0.1	13	-	24	-	dBm
Output P1dB	Vd = 6V, Vb = 3V	0.1	16	-	22	-	dBm
Output P1dB	Vd = 6V, Vb = 3V	16	26	-	19	-	dBm
Input Return Loss	Vd = 6V, Vb = 3V, Pin = -20dBm	0.1	26	-	15	-	dB
Output Return Loss	Vd = 6V, Vb = 3V, Pin = -20dBm	0.1	26	-	18	-	dB
Reverse Isolation	Vd = 6V, Vb = 3V, Pin = -20dBm	0.1	26	-	37	-	dB

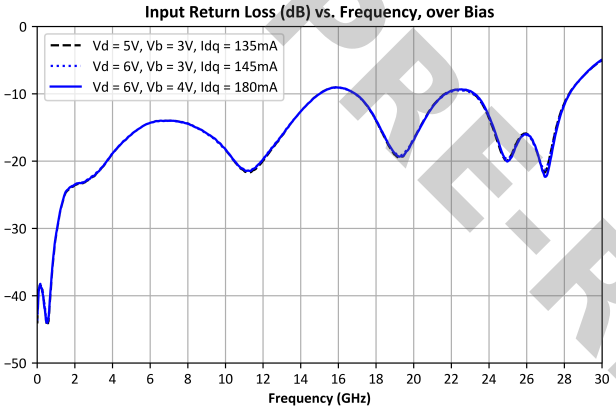
[1][2] IP2 is specified up to an input frequency of 13GHz where the IM2 product becomes attenuated by the frequency response of the amplifier.

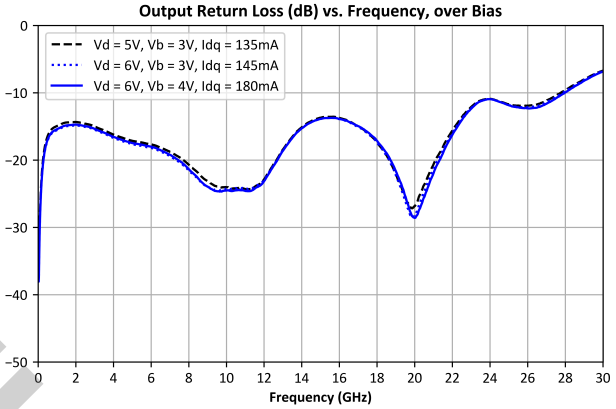
Performance Plots vs Bias

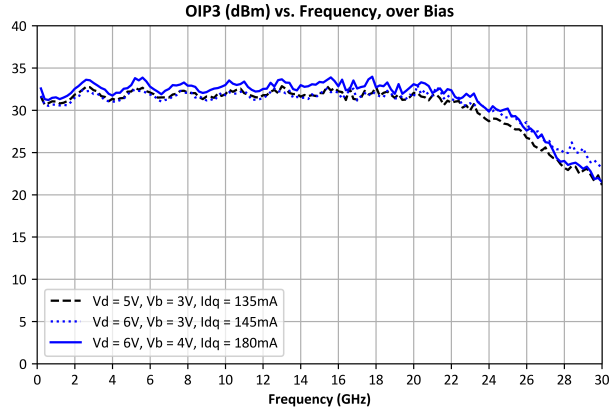
Performance shown vs frequency and bias conditions with PCB trace losses de-embedded.

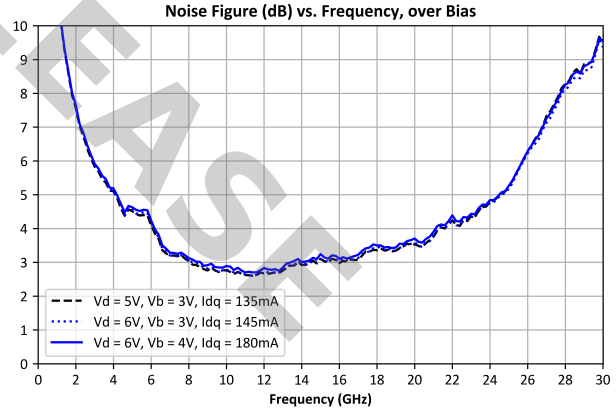


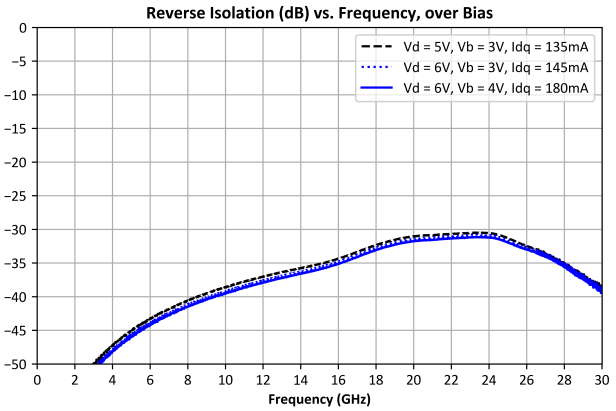






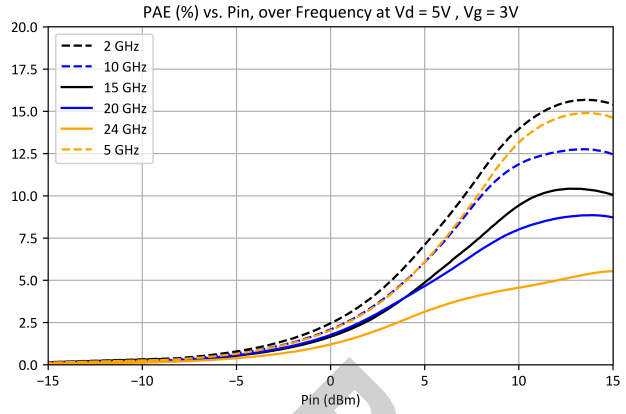


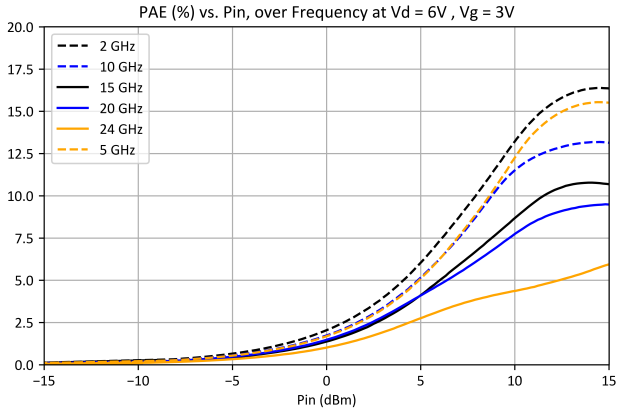


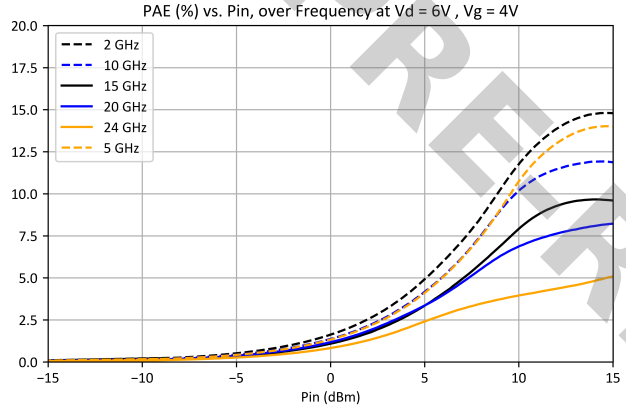


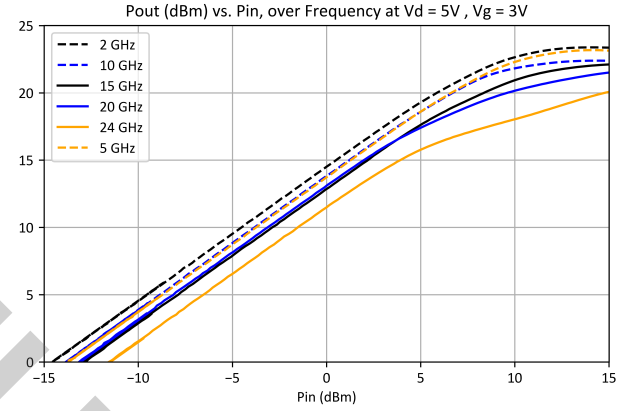
Performance Plots vs Input Drive Level

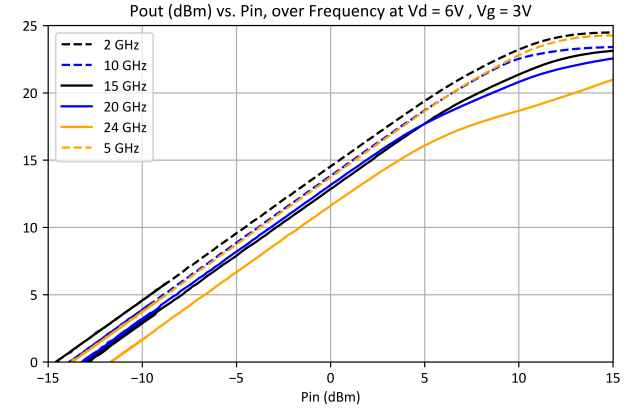
Performance shown vs RF input drive level, frequency and bias. PCB trace losses are included in these measurements.

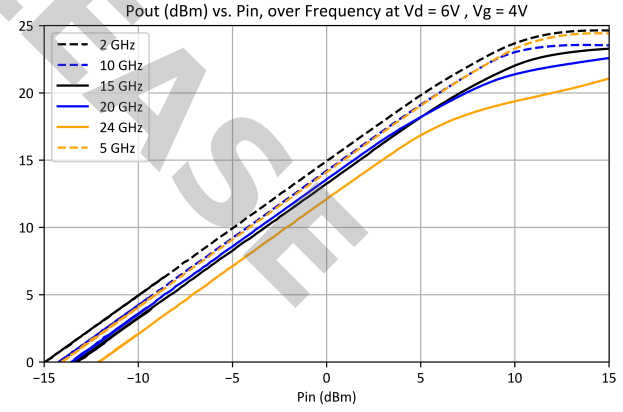


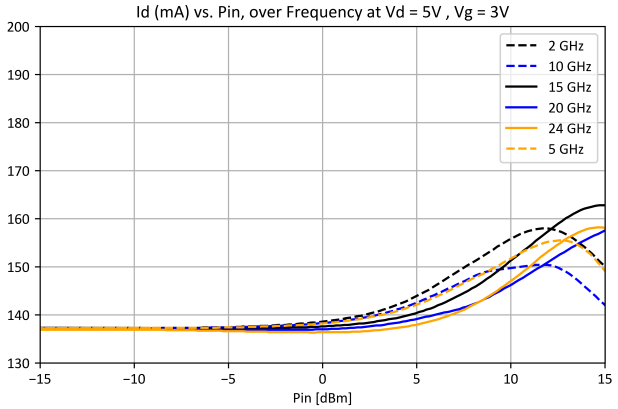


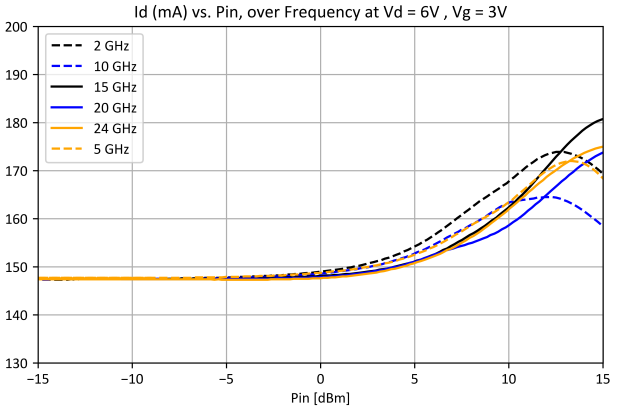


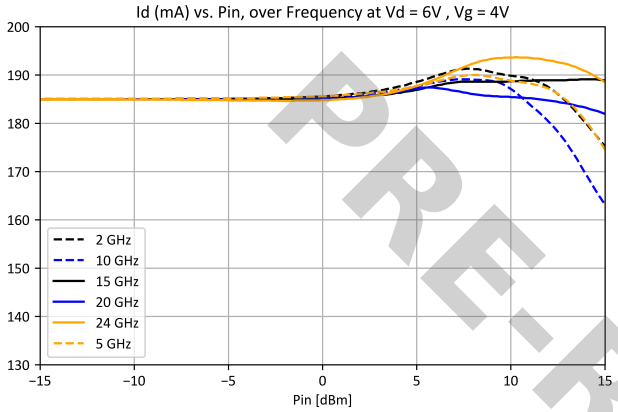




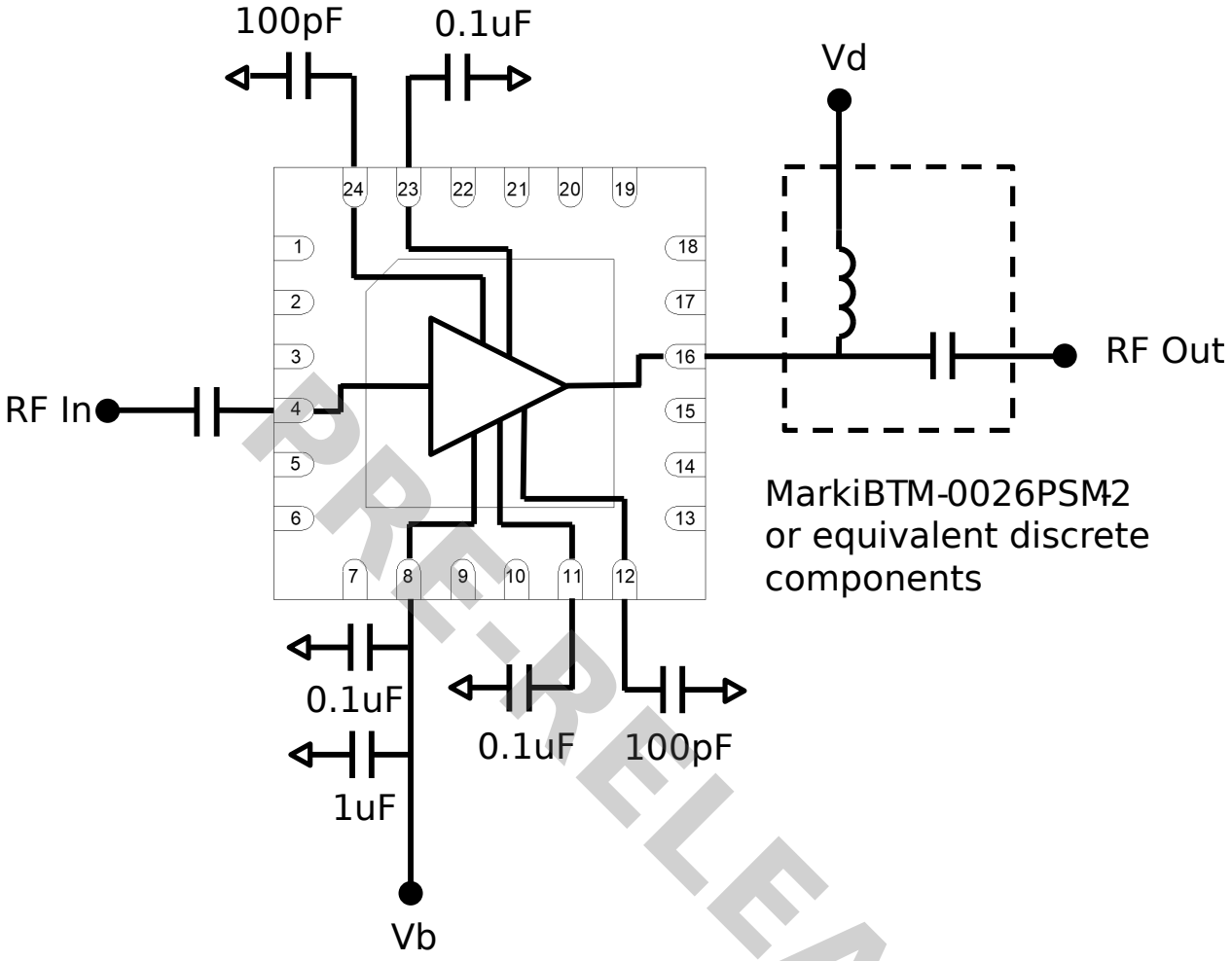








Application Circuit



Application Circuit Description

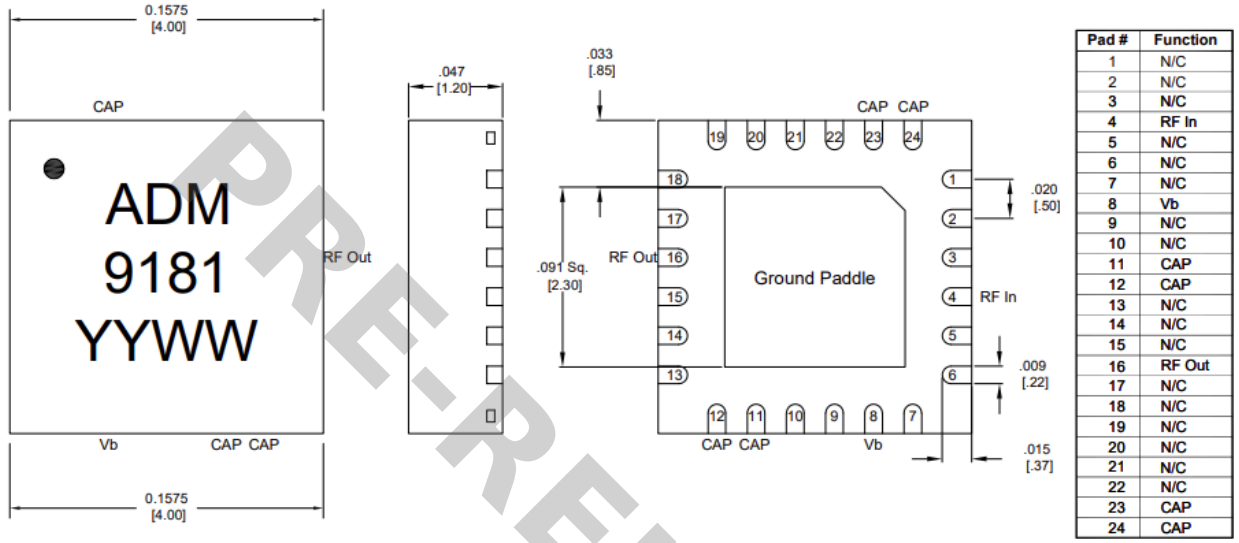
Above is the recommended application circuit for the ADM-9181PSM. Multiple DC power supply bypassing capacitors are shown around the part. ACG (AC Ground) pins 12 and 24 require a 100pF bypass capacitor. ACG pins 11 and 23 require a 0.1uF bypass capacitor. DC bias voltage is supplied to the Vb pin across 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 8 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

*All dimensions are typical



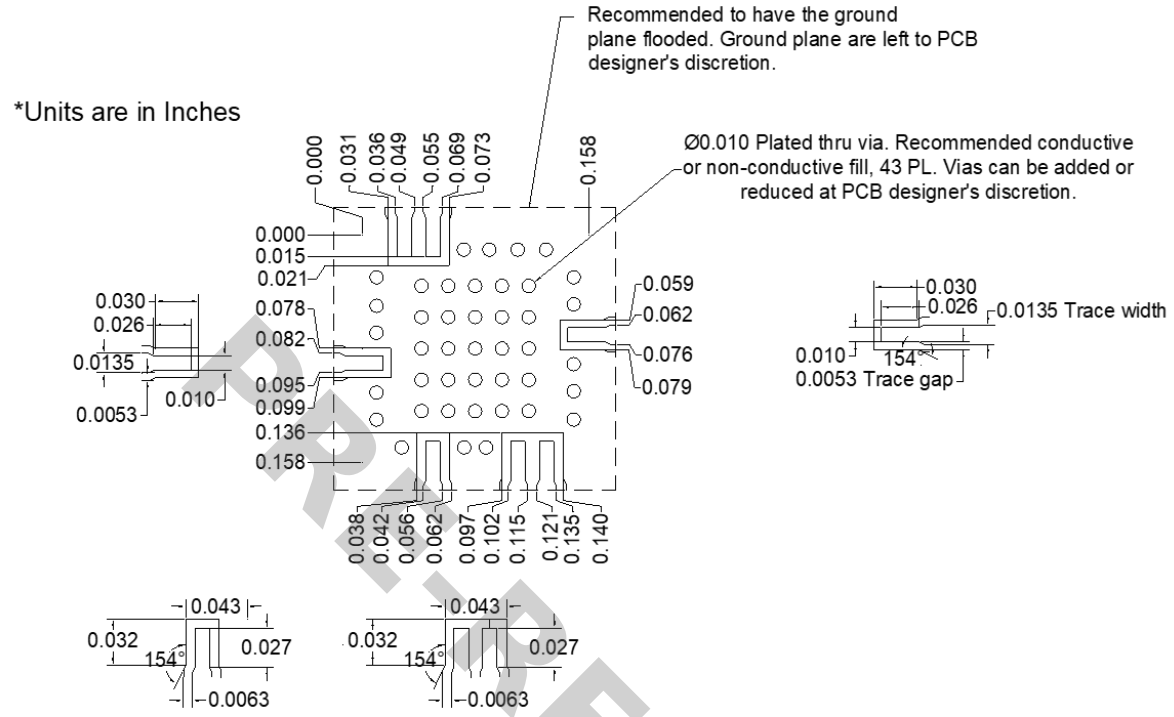
Pad #	Function
1	N/C
2	N/C
3	N/C
4	RF In
5	N/C
6	N/C
7	N/C
8	Vb
9	N/C
10	N/C
11	CAP
12	CAP
13	N/C
14	N/C
15	N/C
16	RF Out
17	N/C
18	N/C
19	N/C
20	N/C
21	N/C
22	N/C
23	CAP
24	CAP

Notes (unless otherwise specified):

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

Footprint Image

Download : Footprint Drawing



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