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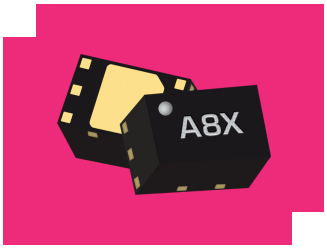
ADM-8350PSM

0.09 - 6 GHz High Dynamic Range Gain Block

DEVICE OVERVIEW

General Description

The ADM-8350PSM is a high-linearity, low noise amplifier capable of providing +22 dBm output power up to 6 GHz. The ADM-8350PSM can serve either as a linear signal amplifier, or as a saturated driver amplifier for H- or S-diode mixers. The amplifier has excellent return losses, gain flatness, and high IP3. The ADM-8350PSM is similar to the ADM-8095. The main difference is that the IP3 is higher for the ADM-8350.



Download s-parameters here

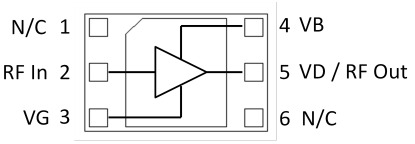
Features

- +22 dBm output power
- +23 dB gain
- +39.5dBm OIP3
- No negative bias required

Applications

- Mobile test and measurement equipment
- Radar and satellite communications
- Driver Amplifier for H and S - Diode Mixers

Functional Block Diagram



Part Ordering Options

Part Number	Description	Package	Packing Size	Green Status	Product Lifecycle	Export Classification
EVB-ADM-8350P	Evaluation Board, 0.09 - 6 GHz High Dynamic Range Gain Block	-	-		Released	EAR99
ADM-8350PSM	0.09 - 6 GHz High Dynamic Range Gain Block	DFN	-	RoHS	Released	EAR99

Table Of Contents

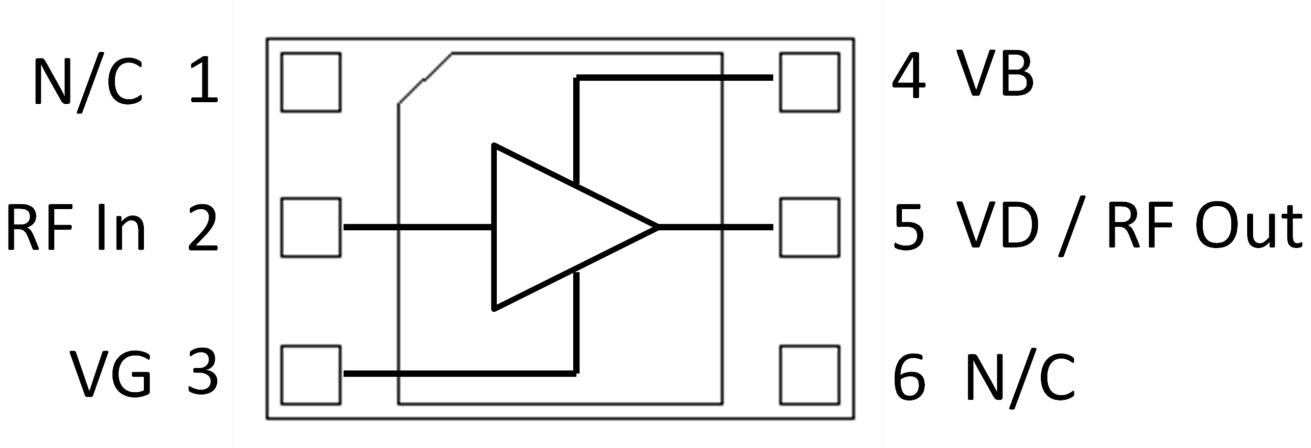
Revision History

Revision Code	Revision Date	Comment
-	2023-02-01	Initial Release

Port Configuration and Functions

Port Diagram

A port diagram of the ADM-8350PSM QFN package is shown below (X-ray view from the top). The pin functions are detailed below.



Port Functions

Port	Function	Description	Equivalent Circuit for Package
1,6	N/C	Pin 1 and Pin 6 are internally no-connects and should be connected to DC/RF ground.	-
2	RF Input	Pin 2 is the RF Input port of the amplifier. It is internally RF matched to 50 Ω and requires an external DC blocking cap.	-
3	Vg	Pin 3 is an external bias resistor connection. The gate is internally biased by the Vd supply, therefore a supply voltage should not be applied to Vg. The default resistor is 1kΩ shunt to GND.	-
4	Vb	Pin 4 is the current mirror DC voltage supply port that controls the drain current. The VB supply should be tied to the VD supply through an external supply. Increasing the current will increase OIP3 at the expense of efficiency. The default series resistor is 1.5kΩ to optimize gain, output power, and efficiency when VB and VD are both tied to 5V.	-
5	Vd / RF Out	Pin 5 is the RF Output port and is also the Vd port providing the main power supply to the amplifier. This pin is DC coupled and requires an external bias-T or discrete choke and DC blocking capacitor. This port is RF matched to 50 Ω. DC voltage at this pin should be set to 5V for normal operation.	-
Paddle	Gnd	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
Drain Current (Id) (No RF Applied)	120	mA
Drain Supply Voltage (Vd)	6.5	V
Maximum Operating Temperature for MTTF > 1E6 hours	85	°C
Maximum Storage Temperature	125	°C
Max Junction Temperature for MTTF of >1E6 hours	175	°C
Max Power Dissipation for MTTF of > 1E6 hours	1	W
Minimum Operating Temperature for MTTF > 1E6 hours	-40	°C
Minimum Storage Temperature	-65	°C
RF Input Power	15	dBm
θ_Jc, Junction to Case Thermal Resistance	85	ºC/W

Package Information

Parameter	Details	Rating
Weight	Package name: DFN	0.007g
Dimensions	-	1.3x2 mm

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
Input Power for Saturation	2	4	6	dBm
Power Supply DC Voltage (Vd)	3	5	6	V
Ambient Temperature	-40	25	85	°C
Power Supply DC Current (Id) (No RF Input) [1]	46	84	102	mA

[1] Recommended operating current conditions without RF input applied.

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.

Electrical Specifications

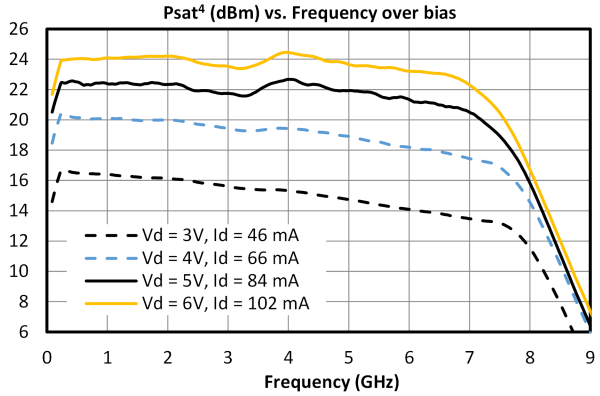
Unless otherwise specified, electrical specifications apply at TA=+25°C, Vd = Vb = 5 V.

Parameter	Test Conditions	Minimum Frequency (GHz)	Maximum Frequency (GHz)	Min	Typ	Max	U
Small Signal Gain	Vd = 5 V, Pin = -20 dBm	0.09	6	21	23	-	
Noise Figure	Vd = 5 V, Pin = -20 dBm	0.09	3	-	1.8	-	
Noise Figure	Vd = 5 V, Pin = -20 dBm	3	6	-	2.5	-	
Saturated Output Power	Vd = 5 V	0.09	6	20	22	-	d
Output IP3	Vd = 5 V, Pin = -15 dBm per tone, 10 MHz tone spacing	0.09	6	-	39.5	-	d
Input IP3	Vd = 5 V, Pin = -15 dBm per tone, 10 MHz tone spacing	0.09	6	-	17	-	d
Output IP2	Vd = 5 V, Pin = -15 dBm per tone, 10 MHz tone spacing	0.09	6	-	37	-	d
Output P1dB	Vd = 5V	0.09	6	-	22	-	d
Input Return Loss	Vd = 5 V, Pin = -20 dBm	0.09	6	-	15	-	
Output Return Loss	Vd = 5 V, Pin = -20 dBm	0.09	6	-	14	-	
Reverse Isolation	Vd = 5 V, Pin = -20 dBm	0.09	6	-	28	-	
Input Power for Saturation	Vd = 5V	0.09	6	2	4	-	d
DC Supply Quiescent Current (Idq)	Vd = 5 V, no RF input	0.09	6	-	84	-	

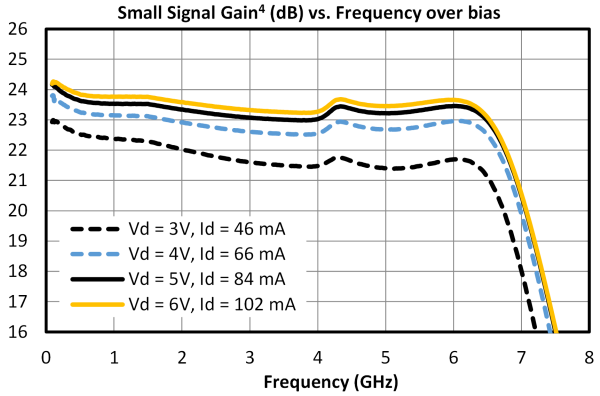
ADM-8350PSM Typical Performance Plots

[4] Data is scalar de-embedded with thru-line fixture.

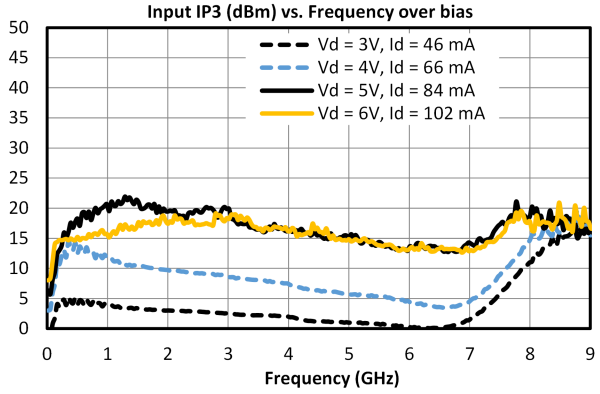
Psat[4] (dBm) vs. Frequency over bias



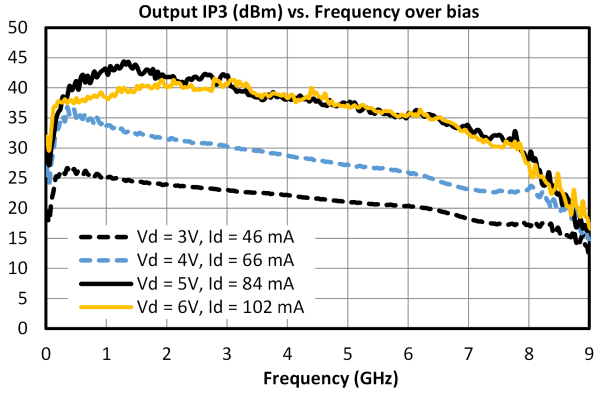
Small Signal Gain[4] (dB) vs. Frequency over bias



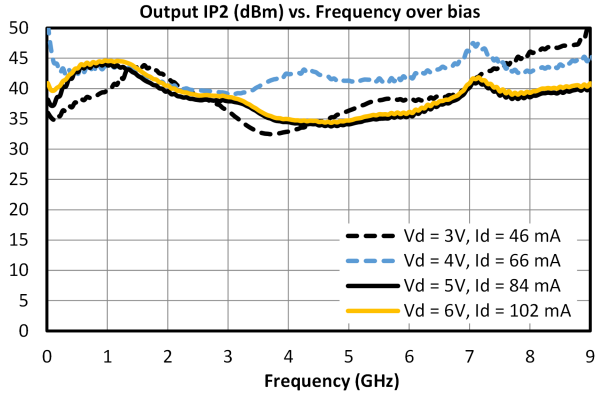
Input IP3 (dBm) vs. Frequency over bias



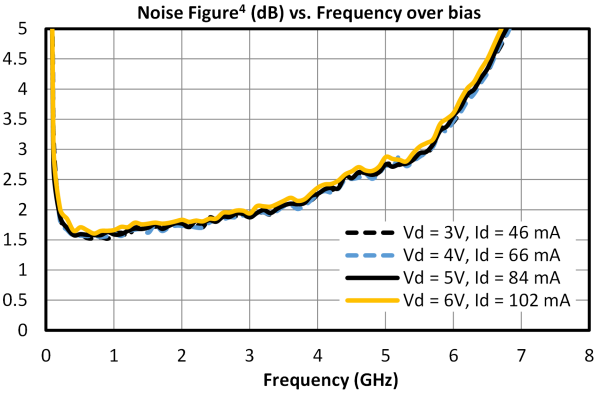
Output IP3 (dBm) vs. Frequency over bias

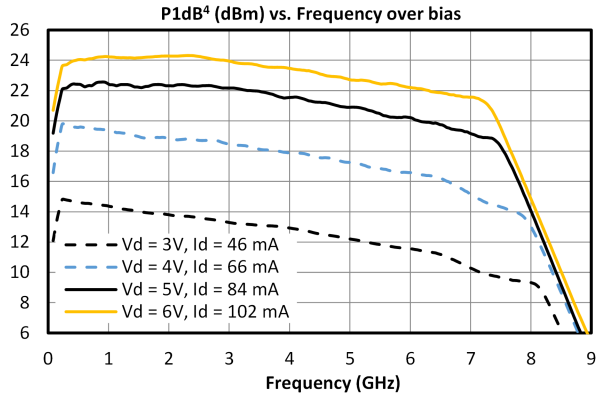


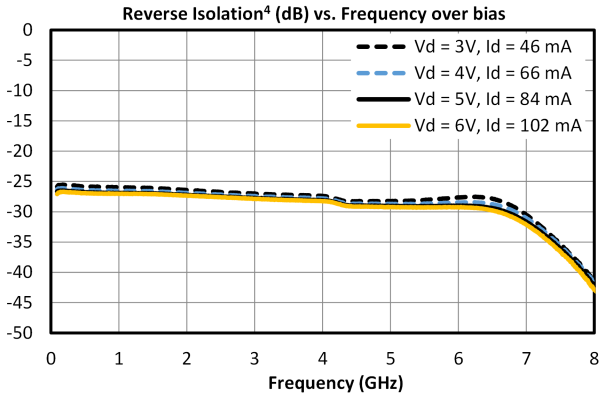
Output IP2 (dBm) vs. Frequency over bias

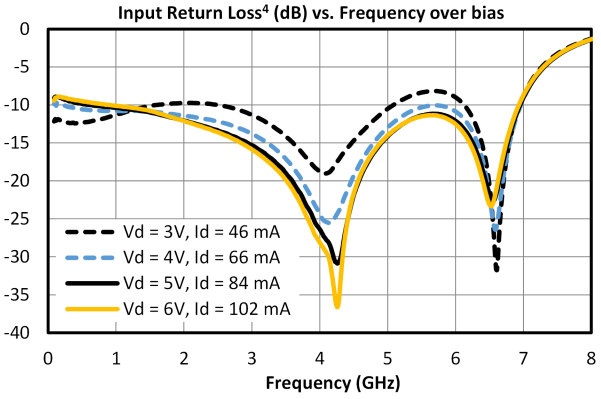


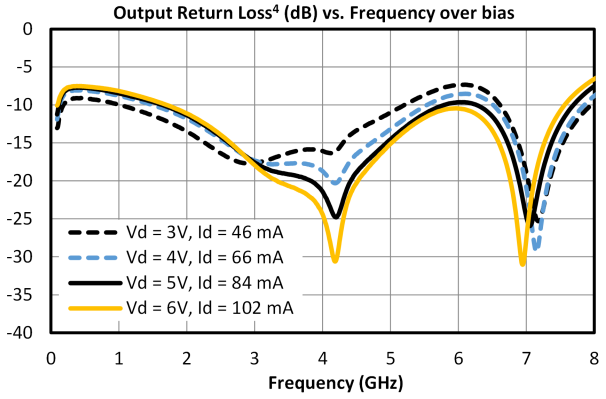
Noise Figure[4] (dB) vs. Frequency over bias

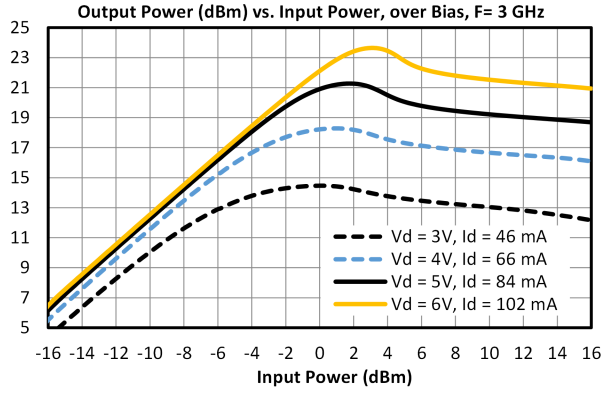


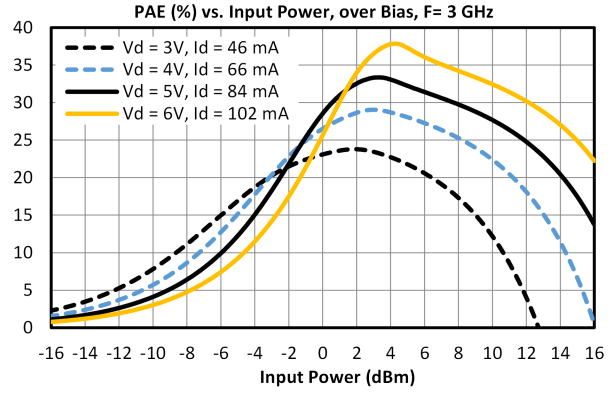


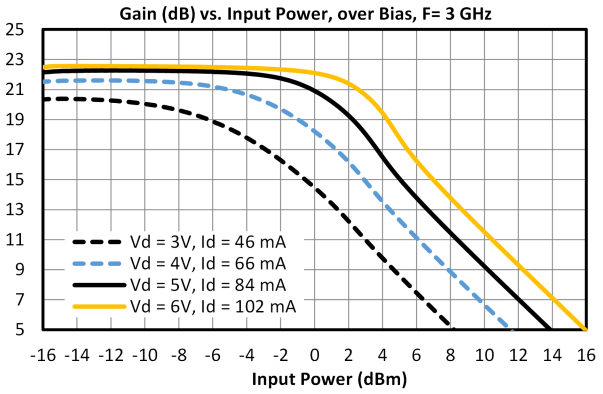


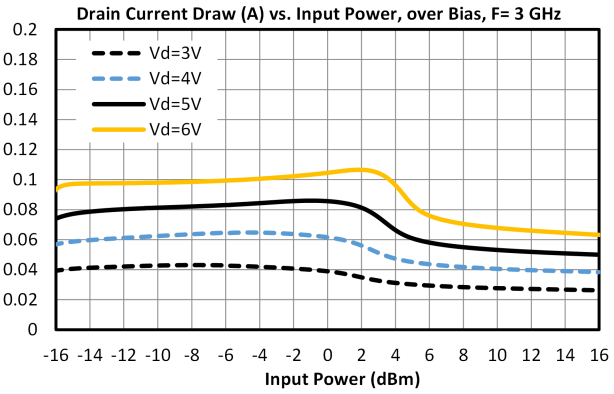










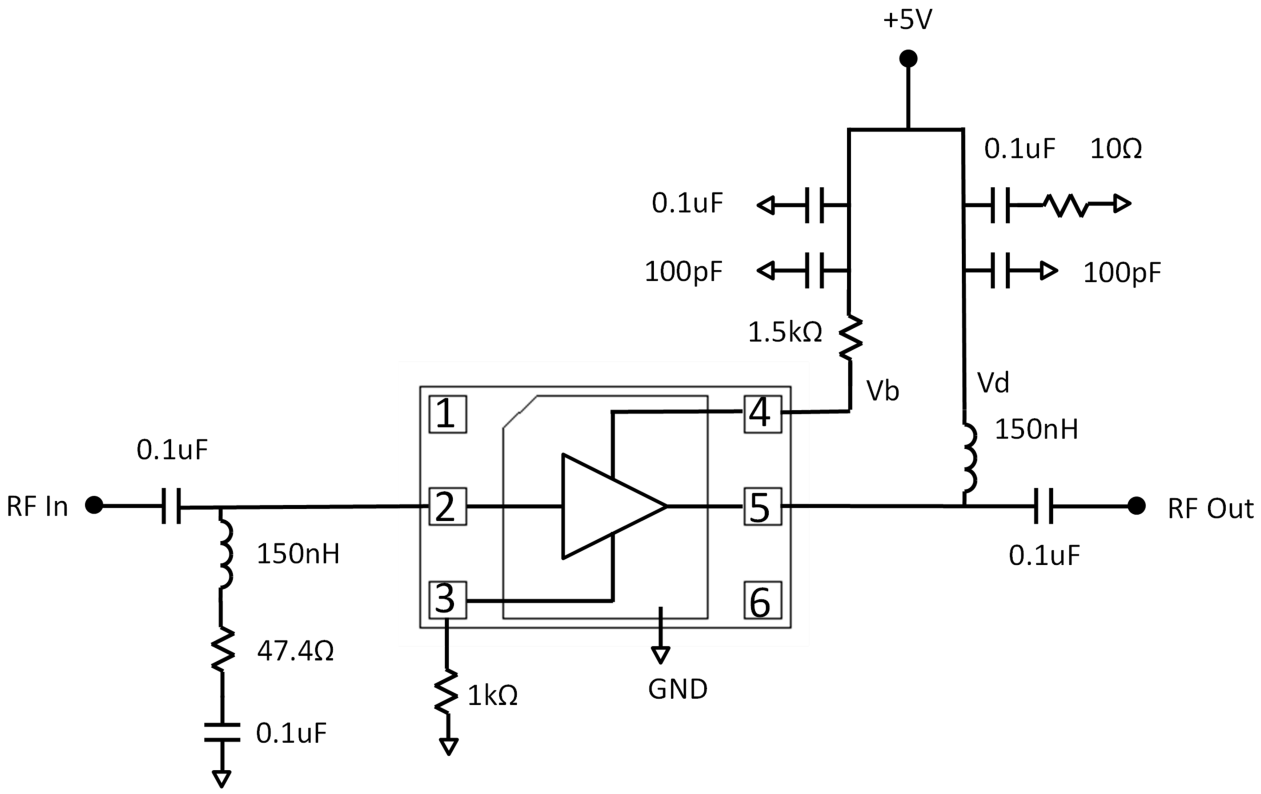


Application Information

Application Circuit

Below is the recommended application circuit for the ADM-8350PSM. DC power is supplied to RF Out/Vd pin 5 via a 150 nH choke inductor. Vb is also supplied through a 1.5kΩ resistor tied to the Vd power supply. Supply bypassing is provided by 100pf and 0.1uF capacitors. Drain current Id is controlled by applying voltage to Vb pin4. Drain current Id is adjusted proportionally to the current flowing into pin 4 where the default 1.5kΩ is set to maximize linearity. Amplifier performance is optimized for improved IP3 performance using the external gate resistor on the Vg line. A supply voltage should not be applied to Vg. The ADM-8350PSM requires an RF input matching network at RF In pin 2 as shown. DC blocking capacitors are also required at RF input and output pins as shown. Note that EVB-ADM-8350P does not include DC blocking capacitors and must be externally blocked. See Section 5.4 for more details on the EVB circuit layout and component values. Contact support@markimicrowave.com if you would like help creating an alternative application circuit for your system's requirements.

Application Circuit

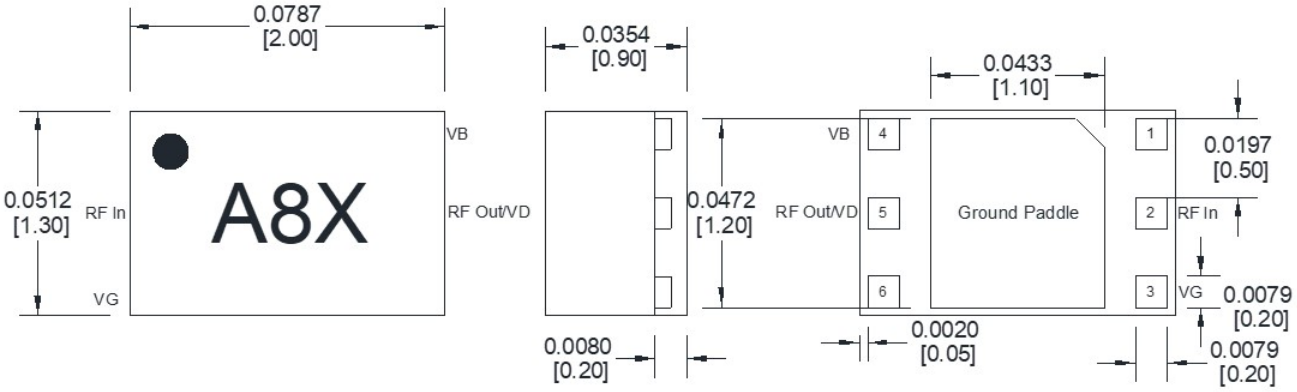


Mechanical Data

Outline Drawing

All dimensions are typical

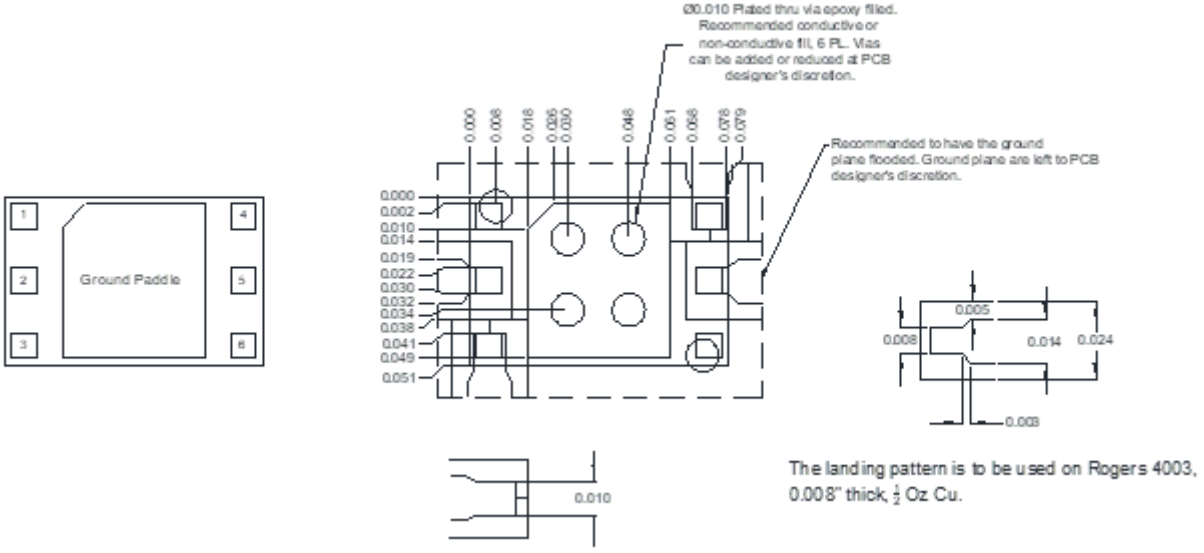
Pad #	Function
1	N/C
2	RF In
3	VG
4	VB
5	RF Out/VD
6	N/C



Notes (unless otherwise specified):

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

Footprint Image



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