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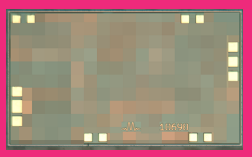
ADM-8007CH

2 - 40 GHz High Gain Distributed Amplifier, Bare Die

DEVICE OVERVIEW

General Description

The ADM-8007CH is a high-linearity, high gain, low noise distributed amplifier capable of providing 23 dB gain, +23 dBm output power and 30 dBm OIP3 over a 2 to 40 GHz band. When driven with an input power of 0 to +5 dBm, the ADM-8007CH can provide sufficient LO drive to power all H and most S diode mixers to 40GHz. The amplifier requires a positive-only bias with no sequencing and has excellent return losses and gain flatness.



Download s-parameters here

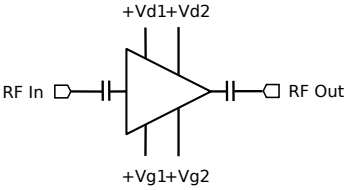
Features

- +23 dBm output power
- +23 dB gain
- 4 dB noise figure
- Excellent gain flatness
- No negative bias or bias sequencing
- No external bias tee required

Applications

- Mobile test and measurement equipment
- Radar
- SATCOM
- 5G transceivers
- Driver Amplifier for H and S - Diode Mixers

Functional Block Diagram



Part Ordering Options

Part Number	Description	Package	Green Status	Product Lifecycle	Export Classification
ADM-8007CH	2 - 40 GHz High Gain Distributed Amplifier, Bare Die	CH	REACH RoHS	Released	3A001.b.2.d
ADM-8007KGD	Known Good Die, 2 - 40 GHz High Gain Distributed Amplifier, Bare Die	CH	REACH RoHS	Released	3A001.b.2.d

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2 - 40 GHz High Gain Distributed Amplifier, Bare Die

Table Of Contents

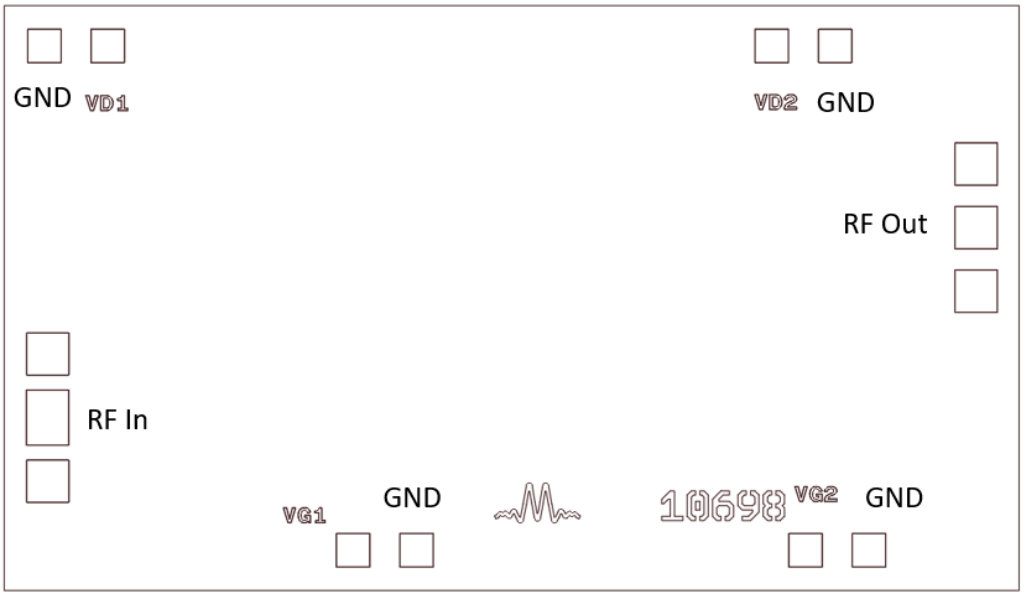
Revision History

Revision Code	Revision Date	Comment
-	2025-10-14	Initial Release

Port Configuration and Functions

Port Diagram

A port diagram of the ADM-8007CH is shown below. The pad functions are detailed in this datasheet.



Port Functions

Port	Function	Description	DC Equivalent Circuit
GND	Ground	DC and RF Ground is provided through the backside of the die.	-
RF In	RF Input	RF In is the amplifier RF input. This pin is internally DC blocked and RF matched to 50 Ohms.	-
RF Out	RF Output	RF Out is the amplifier RF output. This pin is internally DC blocked and RF matched to 50 Ohms.	-
Vd1	Drain Supply Pad	Vd1 is the DC supply pin for the amplifier's input stage.	-
Vd2	Drain Supply Pad	Vd2 is the DC supply pin for the amplifier's output stage.	-
Vg1	Gate Bias Voltage Pad	Vg1 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.	-
Vg2	Gate Bias Voltage Pad	Vg2 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.	-

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 Current (Ig1)	45	mA
Bias Current (Ig2)	45	mA
Bias Voltage (Vg1)	5	V
Bias Voltage (Vg2)	5	V
Drain Current (Id1)	133	mA
Drain Current (Id2)	266	mA
Drain Supply Voltage (Vd1)	8	V
Drain Supply Voltage (Vd2)	8	V
Maximum Operating Temperature for MTTF > 1E6 hours	125	°C
Maximum Storage Temperature	150	°C
Max Junction Temperature for MTTF of 1E6 hours	175	°C
Max Power Dissipation for MTTF of 1E6 hours	1.6	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	30	°C/W

Package Information

Parameter	Details	Rating
ESD	50 to < 125 Volts	HBM 0A

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 Voltage (Vg2)	-	4	5	V
Power Supply DC Current (Ig2) (No RF Input) [1]	-	11	14	mA
Power Supply DC Current (Id2) (No RF Input) [2]	-	185	250	mA
Power Supply DC Voltage (Vd2)	-	4	5	V
Power Supply DC Current (Ig1) (No RF Input) [3]	-	9	11	mA
Power Supply DC Voltage (Vd1)	-	5	6	V
Power Supply DC Current (Id1) (No RF Input) [4]	-	50	83	mA
Power Supply Voltage (Vg1)	-	2.5	3.5	V
Input Power for Saturation	0	1	8	dBm
Ambient Temperature	-40	25	85	°C

[1][3] Recommended operating current conditions without RF input applied. Bias current into Vg pin.
[2][4] Recommended operating current conditions without RF input applied. Bias current into Vd pin.

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

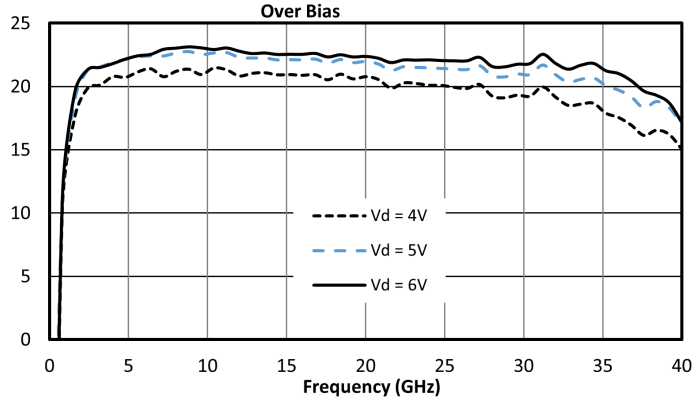
Unless otherwise specified, electrical specifications apply at TA=+25°C, Vd1,Vd2= 5 V, Vg1=3.5V, Vg2=4V. Min and Max limits apply only to our connectorized units and are guaranteed at TA=+25°C

Parameter	Test Conditions	Minimum Frequency (GHz)	Maximum Frequency (GHz)	Min	Typ	Max	Unit
DC Supply Quiescent Current (Idq) (Drain + Bias Current)	Vd1, Vd2 = 5V, Vg1= 3.5V, Vg2= 4V no RF input	-	-	-	237	-	mA
Input IP3	Vd1, Vd2 = 5V, Vg1= 3.5V, Vg2= 4V Pin = -15 dBm per tone, 10 MHz tone spacing	2	27	-	11	-	dBm
Input IP3	Vd1, Vd2, Vg1, Vg2 = 5 V Pin = -15 dBm per tone, 10 MHz tone spacing	27	40	-	6	-	dBm
Input Power for Saturation	Vd1, Vd2 = 5V, Vg1= 3.5V, Vg2= 4V	27	40	-	0	-	dBm
Input Power for Saturation	Vd1, Vd2 = 5V, Vg1= 3.5V, Vg2= 4V	2	27	-	2	-	dBm
Input Return Loss	Vd1, Vd2, Vg1, Vg2 = 5 V Pin = -20 dBm	2	40	-	20	-	dB
Noise Figure	Vd1, Vd2 = 5V, Vg1= 3.5V, Vg2= 4V Pin = -20 dBm	8	27	-	3	-	dB
Noise Figure	Vd1, Vd2 = 5V, Vg1= 3.5V, Vg2= 4V Pin = -20 dBm	2	8	-	5	-	dB
Noise Figure	Vd1, Vd2 = 5V, Vg1= 3.5V, Vg2= 4V Pin = -20 dBm	27	40	-	4.2	-	dB
Output IP2	Vd1, Vd2 = 5V, Vg1= 3.5V, Vg2= 4V Pin = -15 dBm per tone, 10 MHz tone spacing	12	20	-	45	-	dBm
Output IP2	Vd1, Vd2 = 5V, Vg1= 3.5V, Vg2= 4V Pin = -15 dBm per tone, 10 MHz tone spacing	2	12	-	49	-	dBm
Output IP3	Vd1, Vd2 = 5V, Vg1= 3.5V, Vg2= 4V Pin = -15 dBm per tone, 10 MHz tone spacing	2	27	-	33	-	dBm
Output IP3	Vd1, Vd2 = 5V, Vg1= 3.5V, Vg2= 4V Pin = -15 dBm per tone, 10 MHz tone spacing	27	40	-	25	-	dBm
Output P1dB	Vd1, Vd2 = 5V, Vg1= 3.5V, Vg2= 4V	27	40	-	19	-	dBm
Output P1dB	Vd1, Vd2 = 5V, Vg1= 3.5V, Vg2= 4V	2	27	-	21	-	dBm
Output Return Loss	Vd1, Vd2 = 5V, Vg1= 3.5V, Vg2= 4V Pin = -20 dBm	2	40	-	22	-	dB
Reverse Isolation	Vd1, Vd2 = 5V, Vg1= 3.5V, Vg2= 4V Pin = -20 dBm	2	40	-	60	-	dB
Saturated Output Power	Vd1, Vd2 = 5V, Vg1= 3.5V, Vg2= 4V	27	40	-	21	-	dBm
Saturated Output Power	Vd1, Vd2 = 5V, Vg1 = 3.5V, Vg2 = 4V	2	27	-	23	-	dBm
Small Signal Gain	Vd1, Vd2 = 5V, Vg1= 3.5V, Vg2= 4V Pin = -20 dBm	2	40	-	23	-	dB

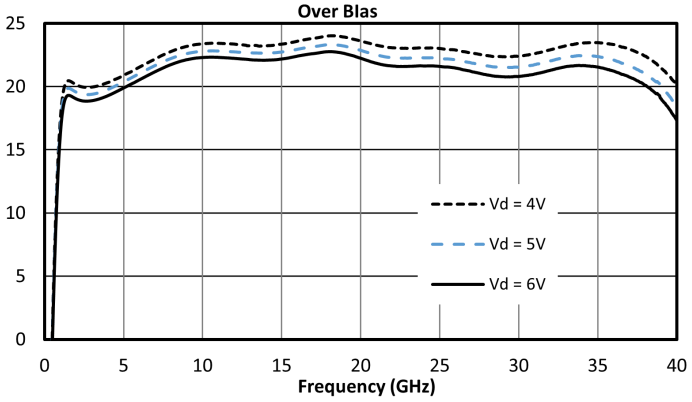
Data taken with gate voltages adjusted to 220 mA Idq.

Typical Performance Plots

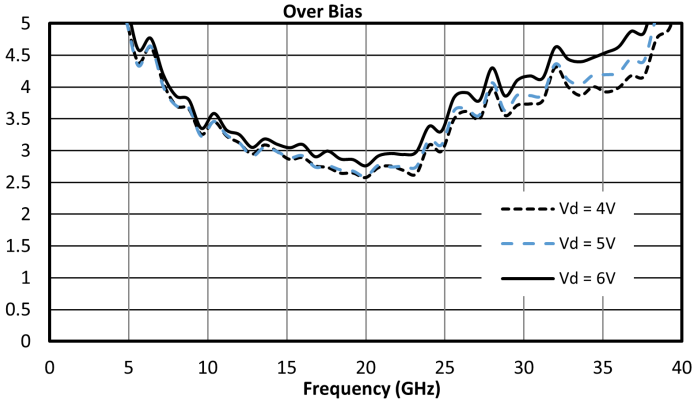
P3dB (dBm) vs Frequency, Over Bias



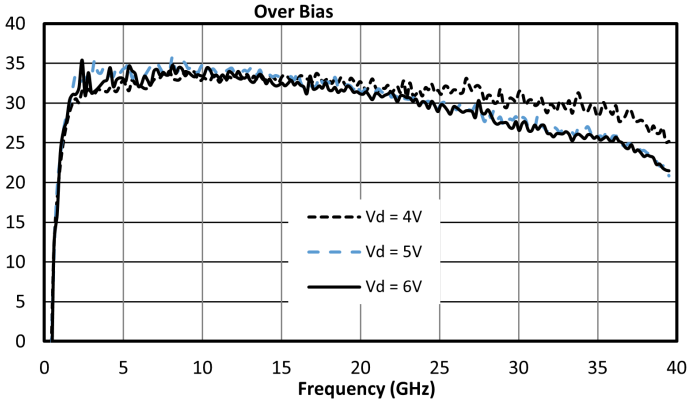
Small Signal Gain (dB) vs Frequency, Over Bias



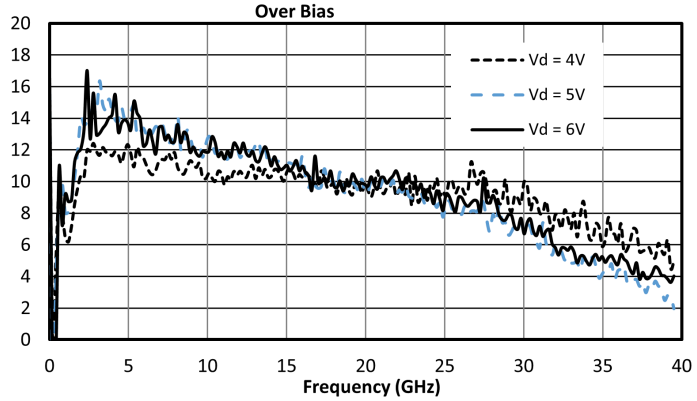
Noise Figure (dB) vs Frequency, Over Bias



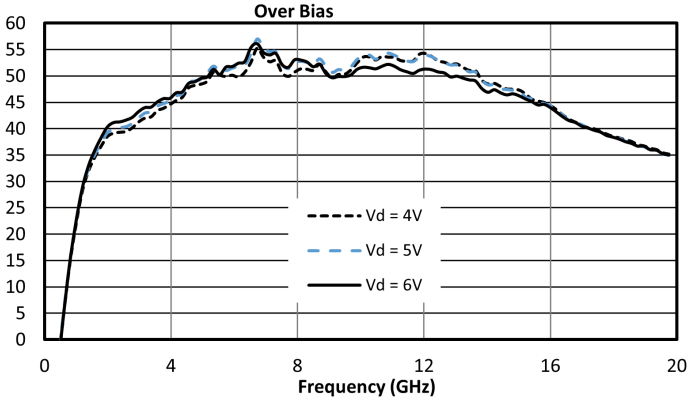
OIP3 (dBm) vs Frequency, Over Bias



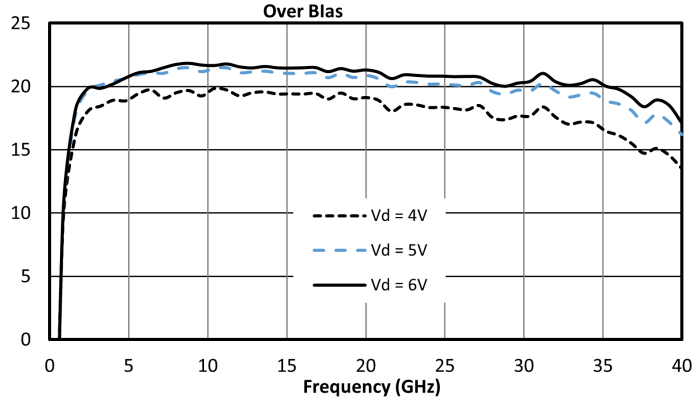
IIP3 (dBm) vs Frequency, Over Bias



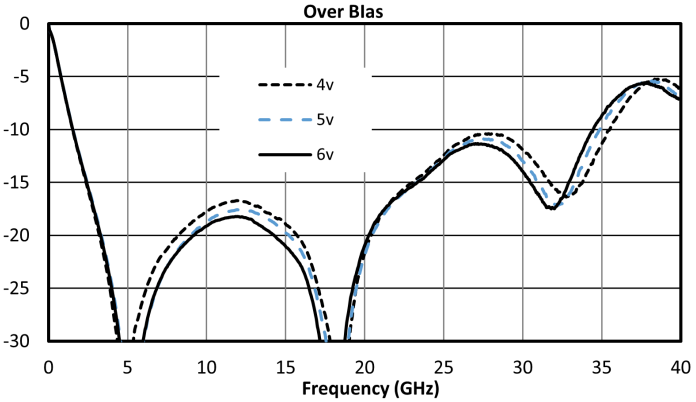
OIP2 (dBm) vs Frequency, Over Bias



P1dB (dBm) vs Frequency, Over Bias



Input Return Loss (dB) vs Frequency, Over Bias



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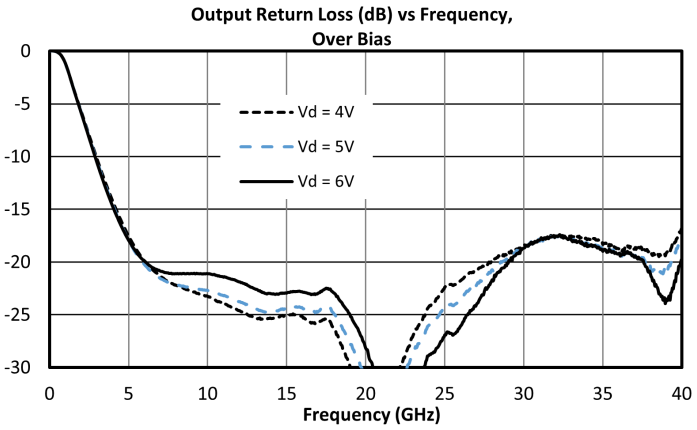
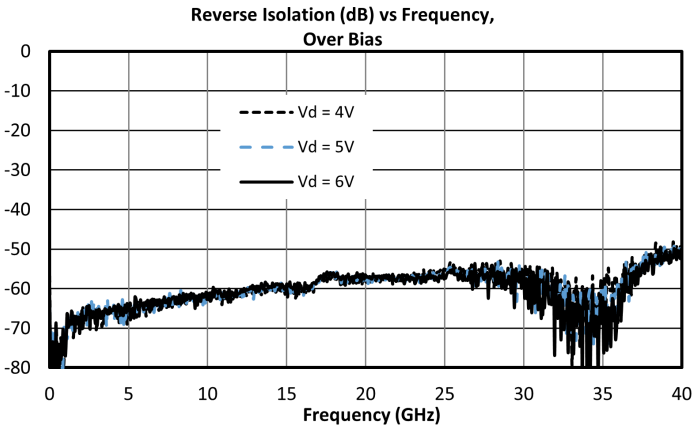




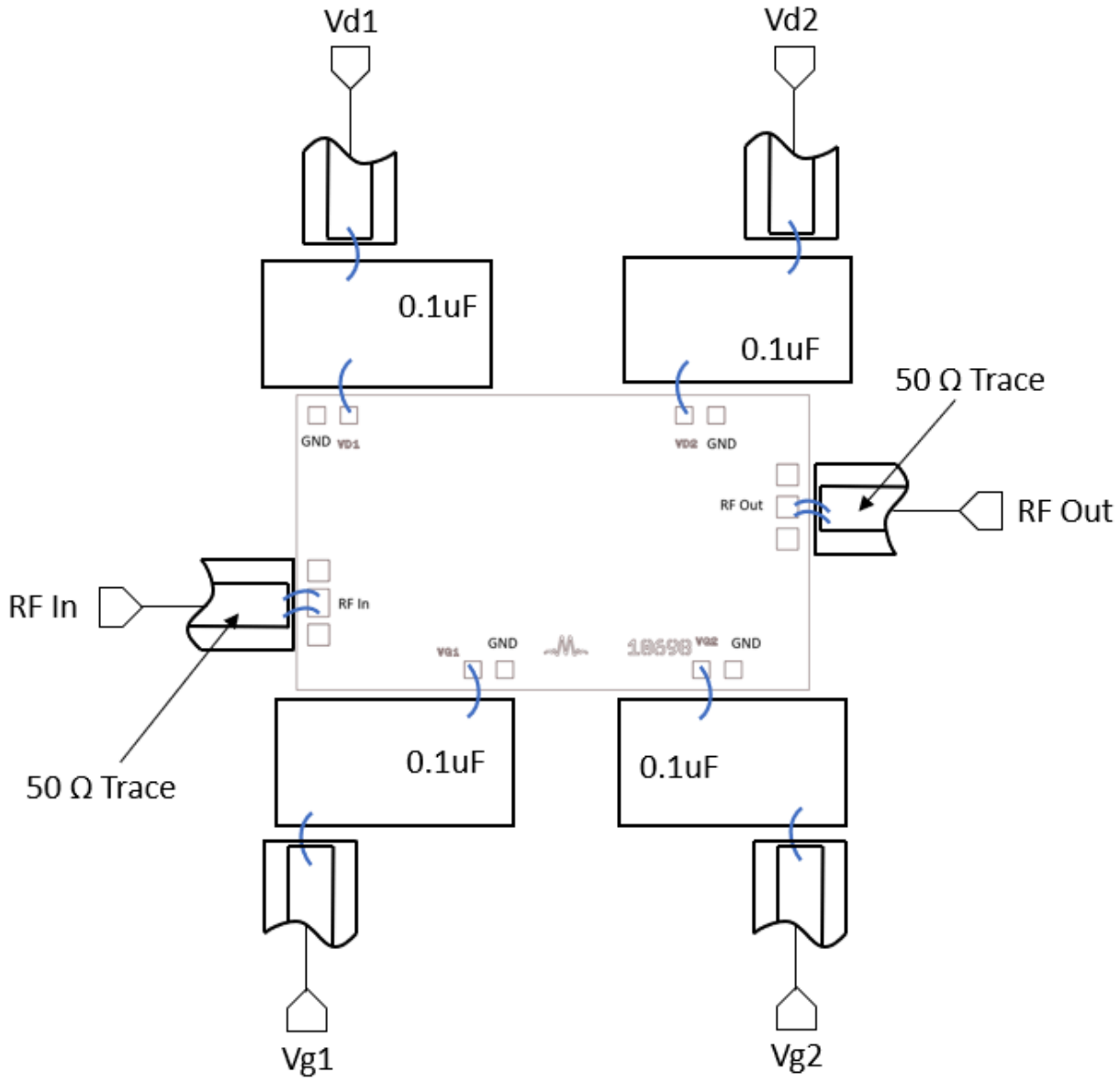
Application Information

Application Circuit

Below are the recommended application circuits for the ADM-8007CH. 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.

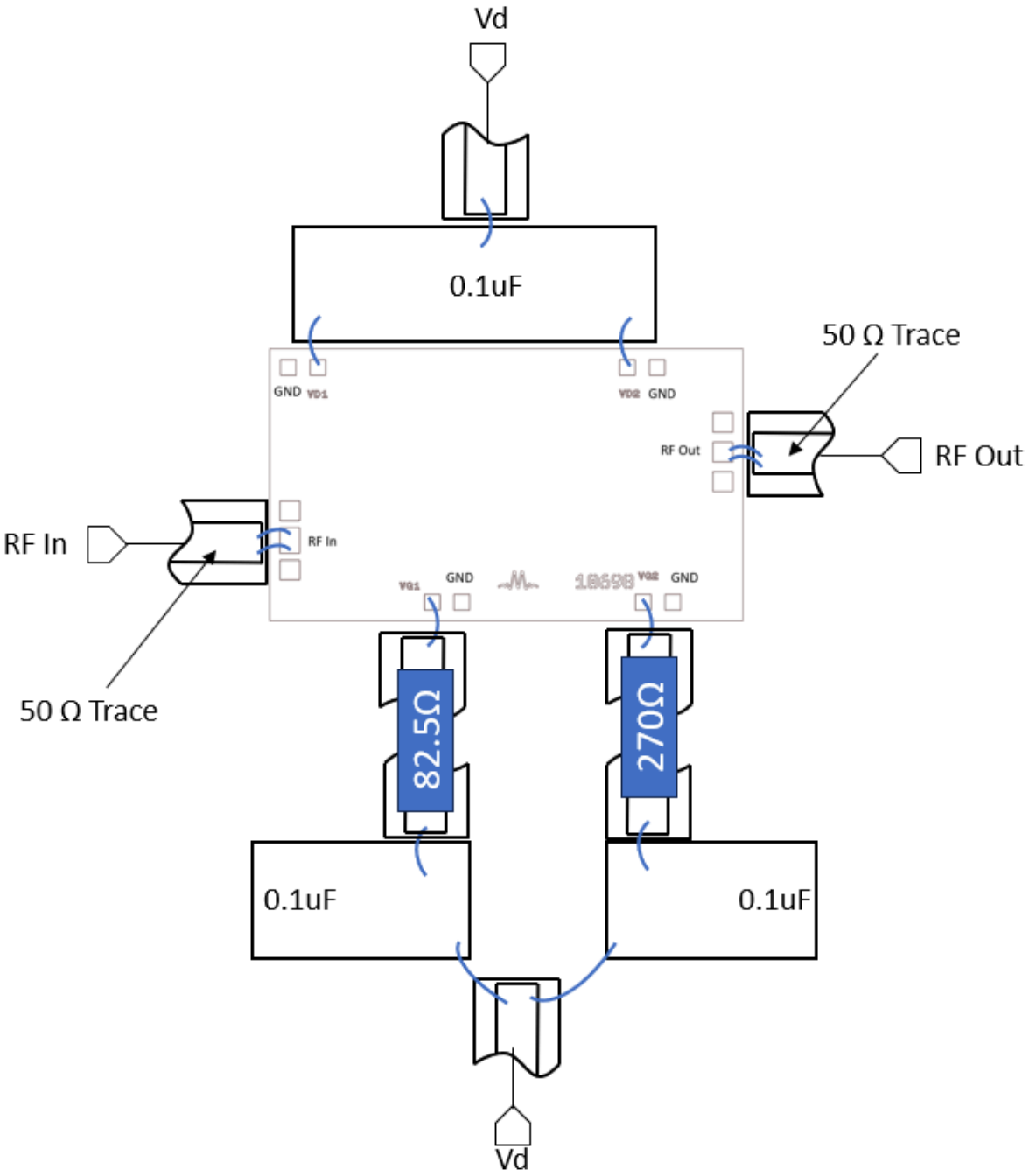
Application Circuit (Independent Supplies)

The application circuit below is provided for independent Vd1, Vd2, Vg1, and Vg2 sources.



Application Circuit (Single DC Supply)

The circuit below is recommended for applications using a single DC power supply. Using a 82.5 Ohm on Vg1 and a 270 Ohm resistor on Vg2 allows for a 5V supply on all DC lines.



ADM-8007CH

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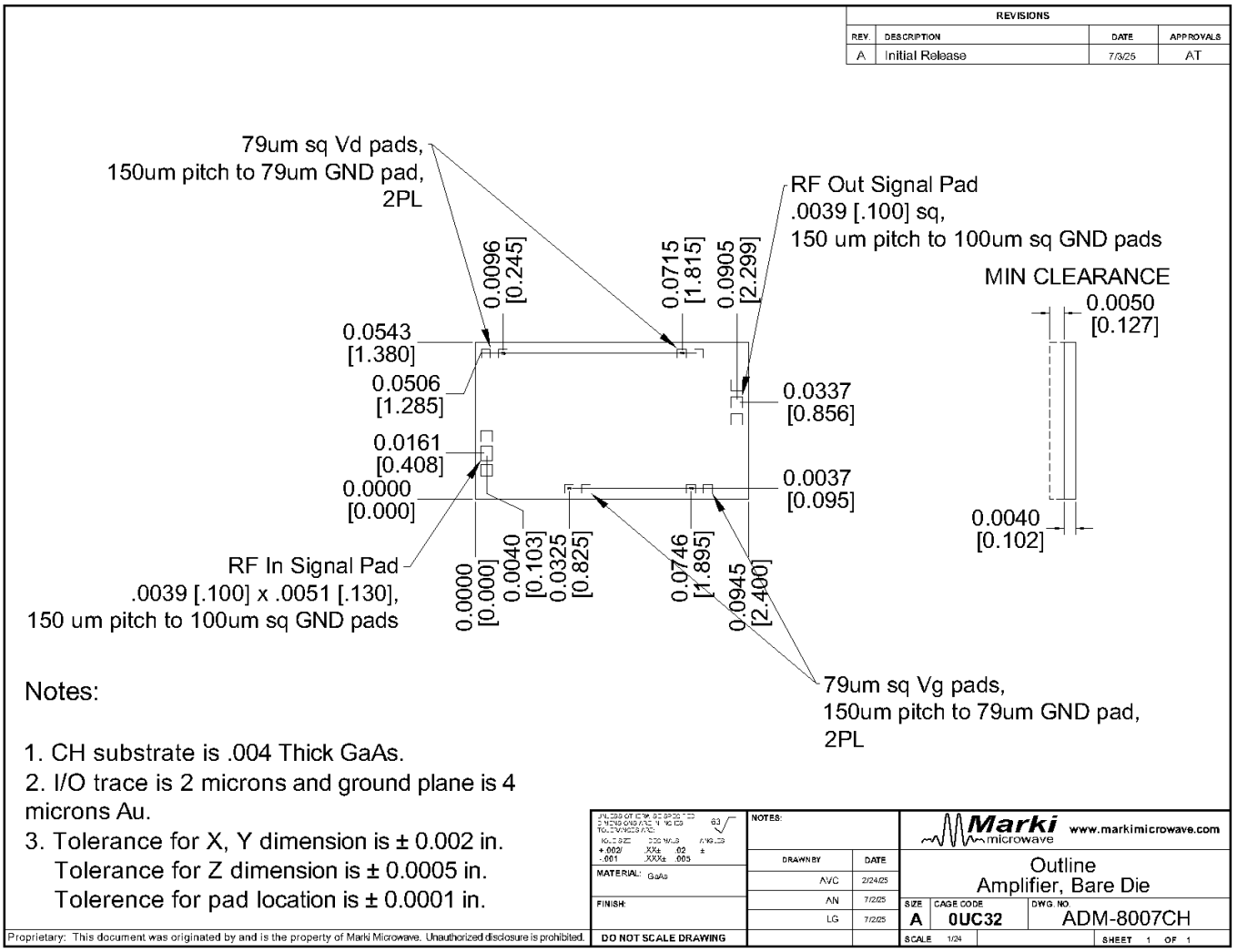
Mechanical Data

Outline Drawing

Download : Outline 2D Drawing



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