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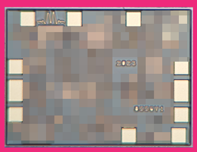
ADM-8556CH

6 - 20 GHz Distributed Amplifier

DEVICE OVERVIEW

General Description

The ADM-8556 is a wideband low noise amplifier capable of providing 24 dB gain and a low 1.3 dB typical noise figure from 6 to 20 GHz. The ADM-8556 is an ideal linear signal amplifier for applications requiring low power consumption and small form-factors. ADM-8556 is available in bare die and connectorized module forms. The amplifier has excellent return losses and gain flatness.



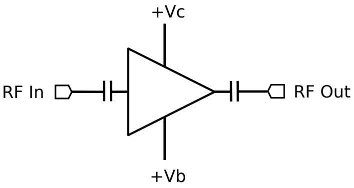
Features

- 24 dB typical gain
- 1.3 dB typical noise figure
- Single Supply, Positive Only Bias
- Low power consumption

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-8556CH	6 - 20 GHz Distributed Amplifier	CH	RoHS REACH	Released	EAR99

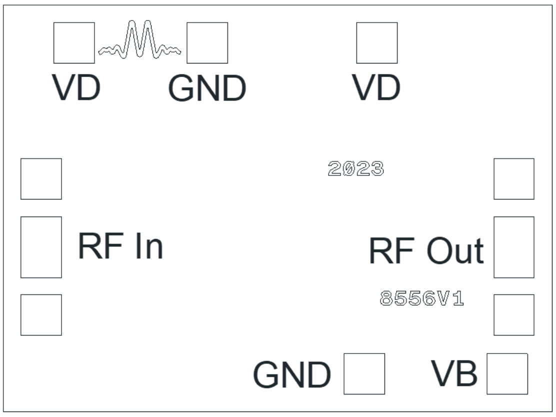
Table Of Contents

Revision History

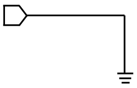
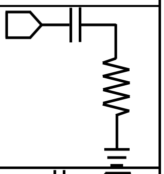
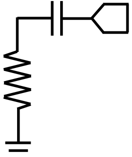
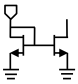
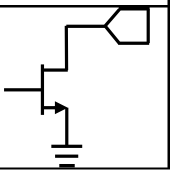
Revision Code	Revision Date	Comment
-	2023-07-01	Datasheet Initial Release

Port Configuration and Functions

Port Diagram



Port Functions

Port	Function	Description	DC Equivalent Circuit
GND	Ground	Housing or ground lug must be connected to a DC/RF ground potential with high thermal and electrical conductivity.	
RF In	RF Input	This is the amplifier's RF Input port. It is RF matched to 50 Ω and has built-in DC blocking capacitors.	
RF Out	RF Output	This is the amplifier's RF Output port. This port is RF matched to 50Ω and has built-in DC blocking capacitors.	
Vb	Positive Bias Pin	The V B pad provides a required positive bias which supplies the current mirror. A higher voltage results in a higher current draw through the VD port. This port should be set to +3V for normal operation.	
Vd	Drain Supply Pin	The VD pin supplies DC voltage to the drain of the amplifier IC This pin is nominally set at +3V with the VD pads bonded together.	

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 Supply Voltage (Vb)	4	V
Drain Current (Id) (RF Applied)	175	mA
Drain Supply Voltage (Vd)	4	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	-55	°C
RF Power Handling	15	dBm

Package Information

Parameter	Details	Rating
Dimensions	-	1.00 x 1.35 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
Ambient Temperature	-40	25	85	°C
Power Supply DC Voltage (Vd)	2.5	3	3.5	V
Power Supply DC Current (Id) (No RF Input)	50	67	86	mA
Bias Supply DC Voltage (Vb)	2.5	3	3.5	V

Sequencing Requirements

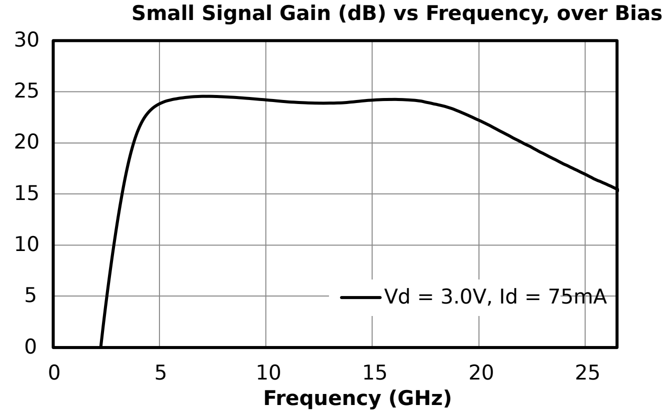
There is no sequencing required to power up or power down the amplifier.

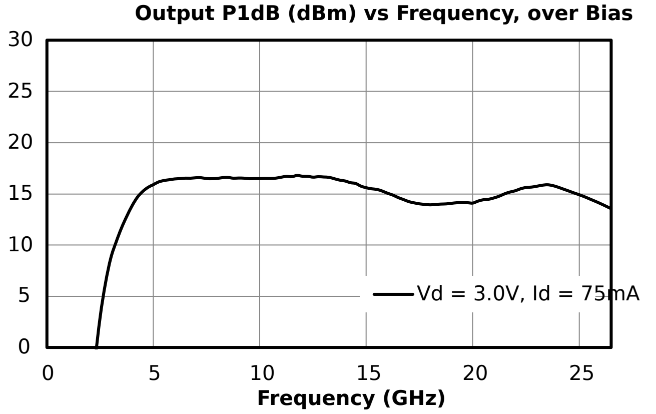
Electrical Specifications

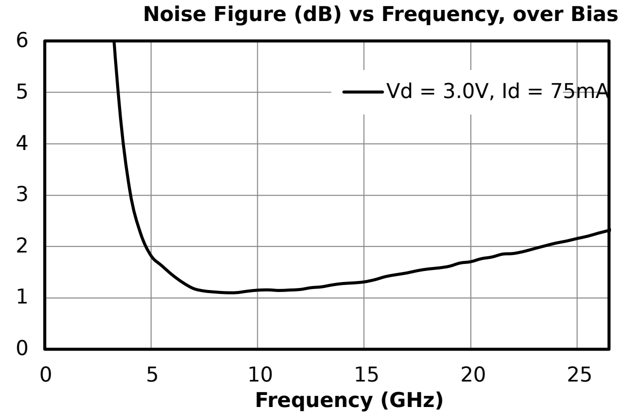
Unless otherwise specified, electrical specifications apply at TA=+25°C, Vd = 3, Id = 75mA.

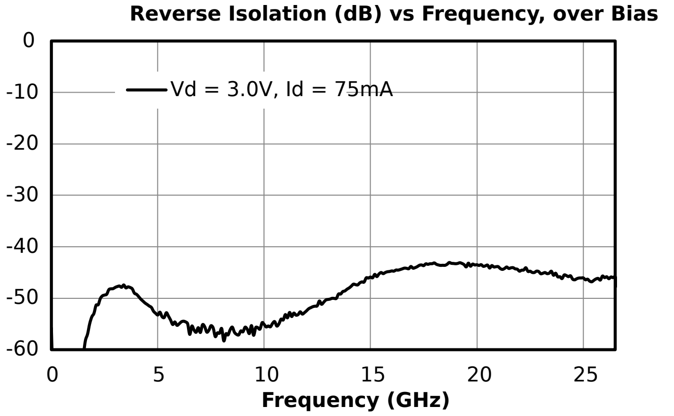
Parameter	Test Conditions	Minimum Frequency (GHz)	Maximum Frequency (GHz)	Min	Typ	Max	Unit
Output Power	-	6	20	-	17	-	dBm
Small Signal Gain	Vd = 3V, Id = 75mA, Pin = -20 dBm	15	20	18	22	-	dB
DC Supply Quiescent Current (Idq)	Vd = 3V, Id = 75mA, no RF input	6	20	-	75	-	mA
Input Return Loss	Vd = 3V, Id = 75mA, Pin = -20 dBm	6	20	-	15	-	dB
Noise Figure	Vd = 3V, Id = 75mA, Pin = -20 dBm	6	20	-	1.3	-	dB
Output IP3	Vd = 3V, Id = 75mA, Pin = -20 dBm	6	20	-	27	-	dBm
Output P1dB	Vd = 3V, Id = 75mA	6	20	-	16	-	dBm
Output Return Loss	Vd = 3V, Id = 75mA, Pin = -20 dBm	6	20	-	23	-	dB
Reverse Isolation	Vd = 3V, Id = 75mA, Pin = -20 dBm	6	20	-	50	-	dB
Small Signal Gain	Vd = 3V, Id = 75mA, Pin = -20 dBm	6	15	20	24	-	dB

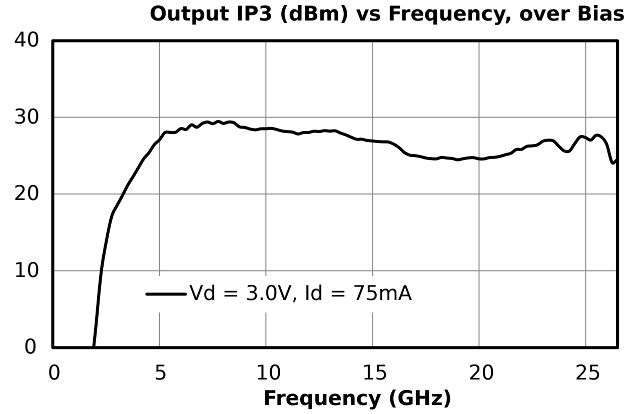
Typical Performance Plots

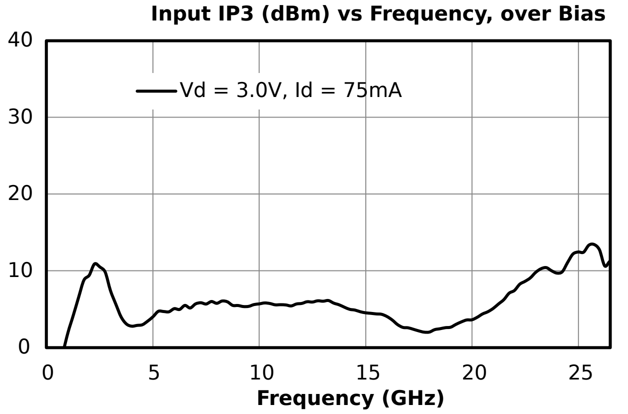


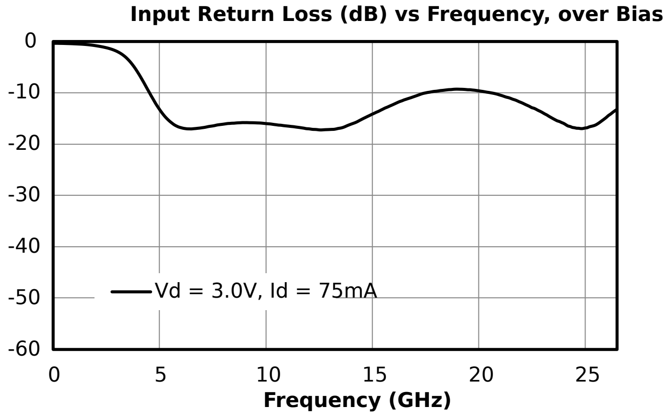


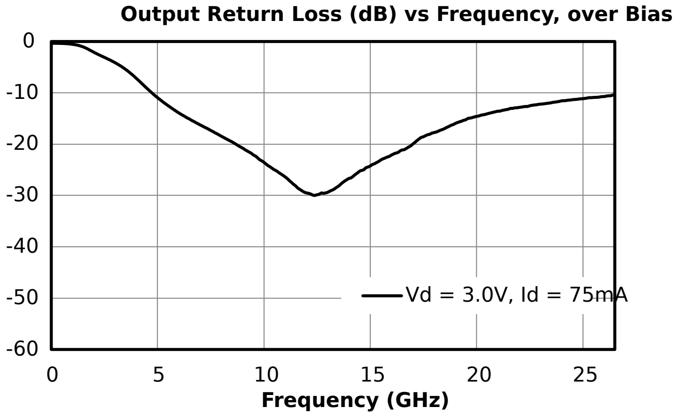




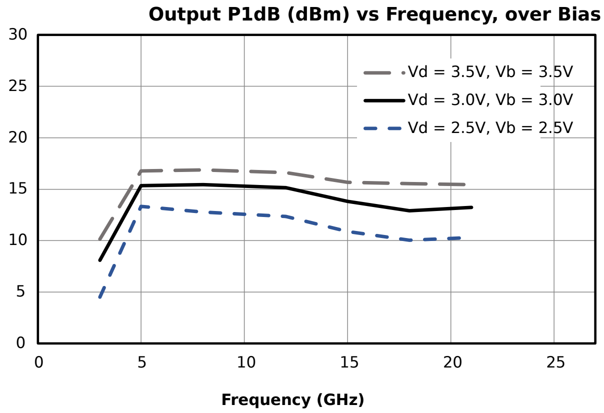


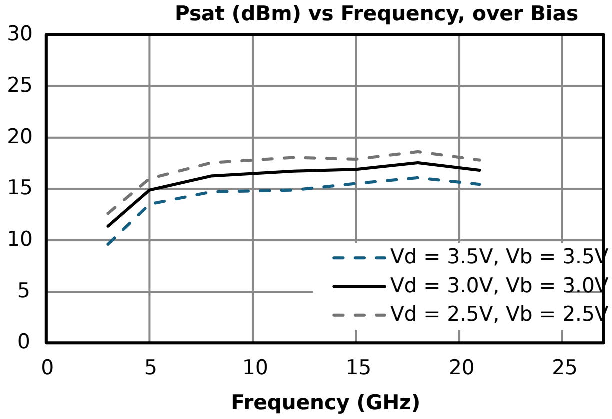






Typical Performance Plots - Measured on ADM-8556PC Module

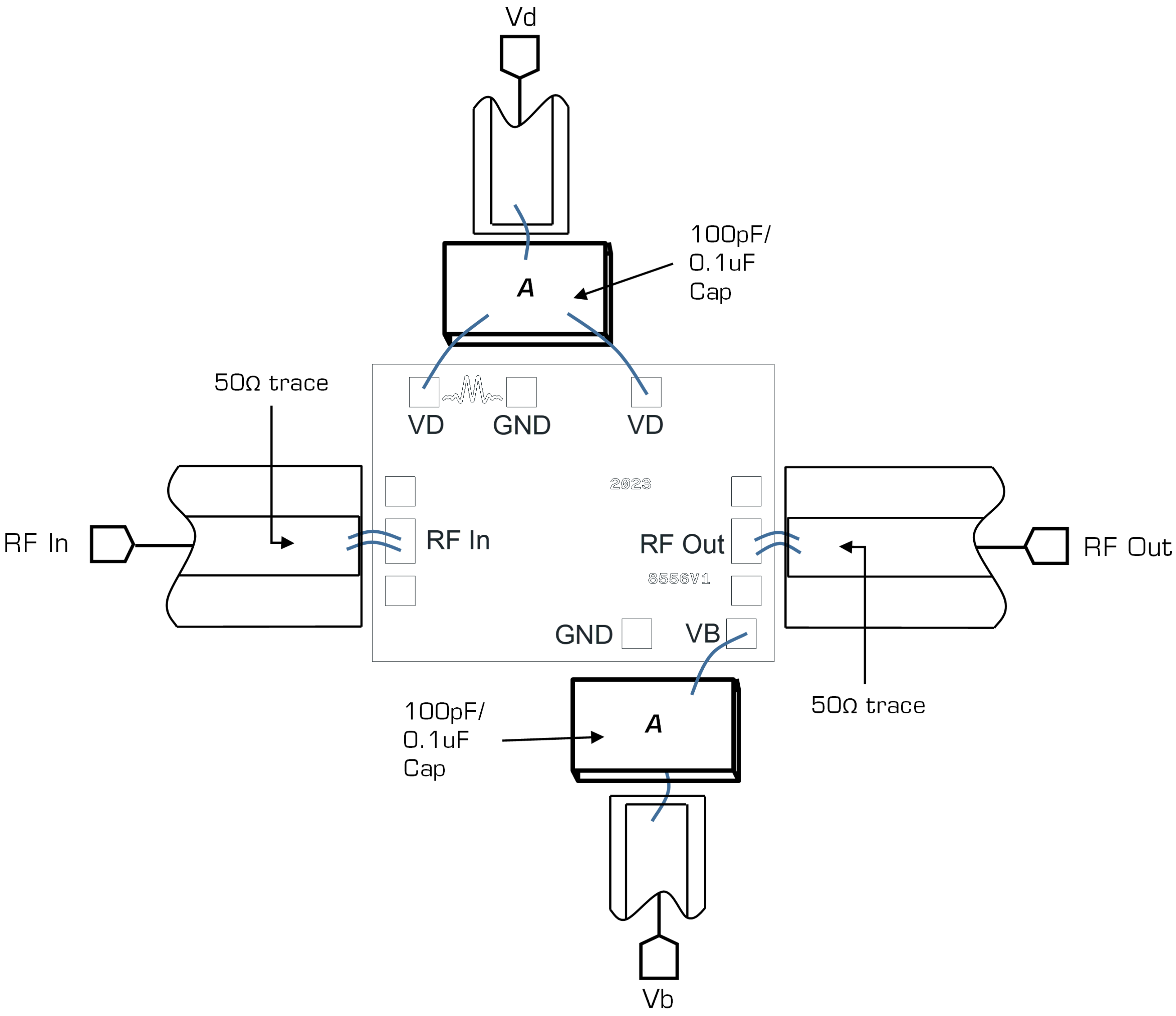




Application Information

Below is the recommended application circuit for the ADM-8556CH.

Application Circuit



Application Circuit Description

Designator	Description	Sample Part Number
A	Presidio 100 pF + 0.1uF Capacitor	MVB4080X104ZGH5C1B

Die Mounting Recommendations

Mounting and Bonding Recommendations

Mounting and Bonding Recommendations

Marki MMICs should be attached directly to a ground plane with conductive epoxy. The ground plane electrical impedance should be as low as practically possible. This will prevent resonances and permit the best possible electrical performance. Datasheet performance is only guaranteed in an environment with a low electrical impedance ground.

Mounting - To epoxy the chip, apply a minimum amount of conductive epoxy to the mounting surface so that a thin epoxy fillet is observed around the perimeter of the chip. Cure epoxy according to manufacturer instructions.

Wire Bonding - Ball or wedge bond with 0.025 mm (1 mil) diameter pure gold wire. Thermosonic wirebonding with a nominal stage temperature of 150 °C and a ball bonding force of 40 to 50 grams or wedge bonding force of 18 to 22 grams is recommended. Use the minimum level of ultrasonic energy to achieve reliable wirebonds. Wirebonds should be started on the chip and terminated on the package or substrate. Bond wire inductance will improve return loss. Bondwire inductance in the range of 30pH to 200pH will improve performance.

Circuit Considerations – 50 Ω transmission lines should be used for all high frequency connections in and out of the chip. Wirebonds should be kept as short as possible, with multiple wirebonds recommended for higher frequency connections to reduce parasitic inductance. In circumstances where the chip more than .001” thinner than the substrate, a heat spreading spacer tab is optional to further reduce bondwire length and parasitic inductance.

Handling Precautions

General Handling

Chips should be handled with care using tweezers or a vacuum collet. Users should take precautions to protect chips from direct human contact that can deposit contaminants, like perspiration and skin oils on any of the chip's surfaces.

Static Sensitivity

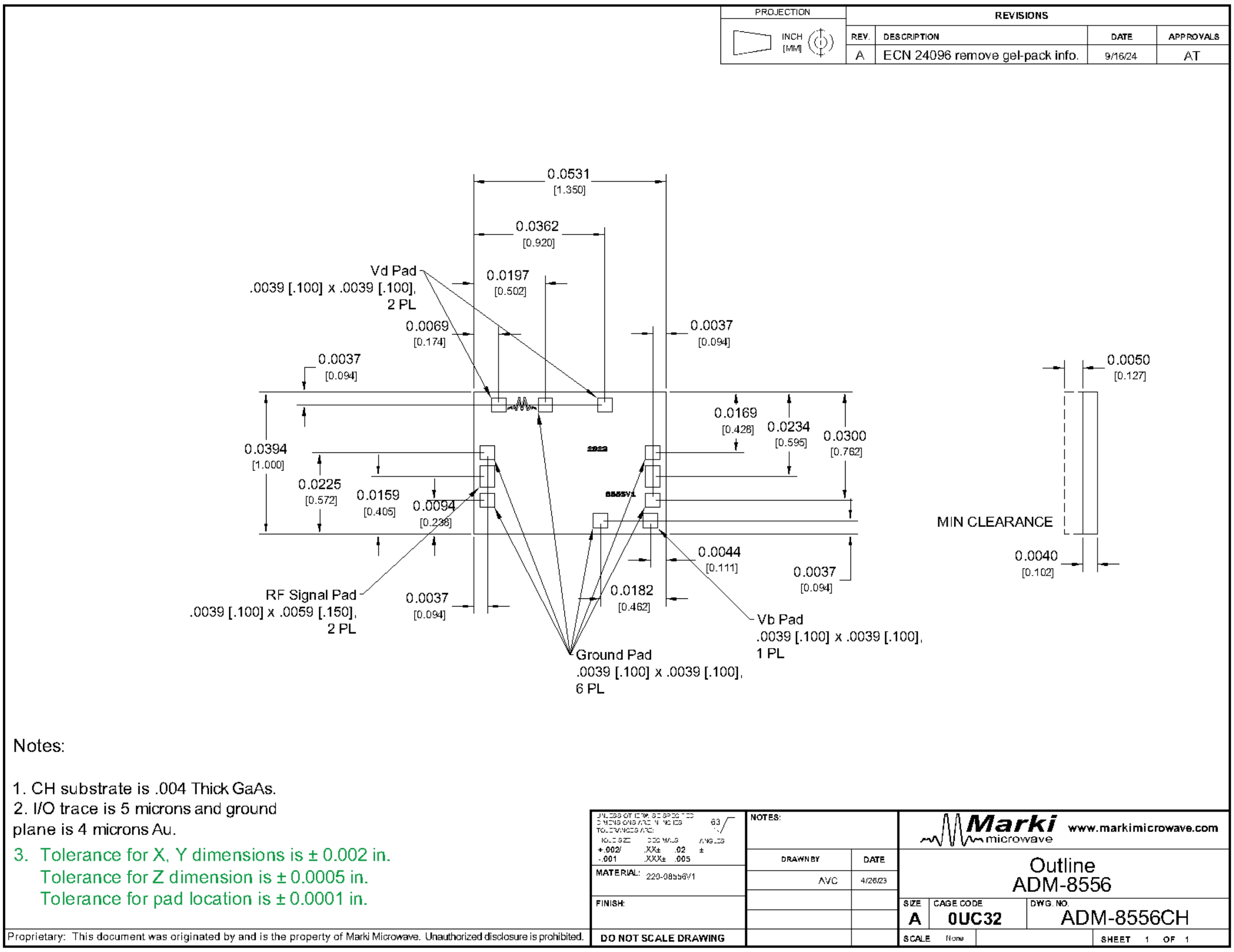
GaAs MMIC devices are sensitive to ESD and should be handled, assembled, tested, and transported only in static protected environments.

Cleaning and Storage: Do not attempt to clean the chip with a liquid cleaning system or expose the bare chips to liquid. Once the ESD sensitive bags the chips are stored in are opened, chips should be stored in a dry nitrogen atmosphere.

Mechanical Data

Outline Drawing

Download : Outline 2D Drawing



Notes:

1. CH substrate is 0.004 thick GaAs.
2. I/O trace is 5 microns and ground plane is 4 microns Au.
3. Tolerance for X, Y dimensions is ± 0.002 in.
4. Tolerance for Z dimensions is ± 0.0005 in.
5. Tolerance for pad location is ± 0.0001 in.

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