

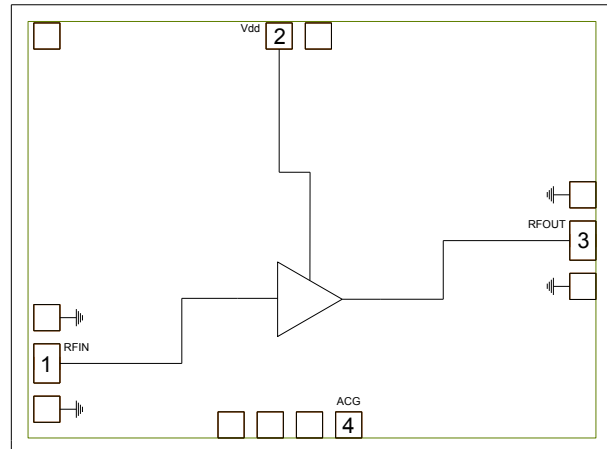
Features

- ▶ Wide bandwidth
- ▶ High linearity
- ▶ Single positive supply voltage
- ▶ On chip bias choke

Description

The CMD197 is a wideband GaAs MMIC driver amplifier ideally suited for military, space and communications systems where small size and high linearity are needed. At 10 GHz the device delivers greater than 16 dB of gain with a corresponding output 1 dB compression point of +22 dBm and an output IP3 of 32 dBm. The CMD197 is a 50 ohm matched design which eliminates the need for RF port matching and includes an on chip bias choke. The CMD197 offers full passivation for increased reliability and moisture protection.

Functional Block Diagram



Electrical Performance - $V_{dd} = 8.0 \text{ V}$, $T_A = 25 \text{ }^\circ\text{C}$, $F = 10 \text{ GHz}$

Parameter	Min	Typ	Max	Units
Frequency Range		1 - 24		GHz
Gain		16		dB
Input Return Loss		20		dB
Output Return Loss		18		dB
Output P1dB		22		dBm
Output IP3		32		dBm
Supply Current		225		mA

Specifications

Absolute Maximum Ratings

Parameter	Rating
Drain Voltage, V _{dd}	10 V
RF Input Power	+20 dBm
Channel Temperature, T _{ch}	150 °C
Power Dissipation, P _{diss}	2.12 W
Thermal Resistance, Θ_{JC}	30.6 °C/W
Operating Temperature	-55 to 85 °C
Storage Temperature	-55 to 150 °C

Exceeding any one or combination of the maximum ratings may cause permanent damage to the device.

Recommended Operating Conditions

Parameter	Min	Typ	Max	Units
V _{dd}	5.0	8.0	9.0	V
I _{dd}		225		mA

Electrical performance is measured at specific test conditions. Electrical specifications are not guaranteed over all recommended operating conditions.

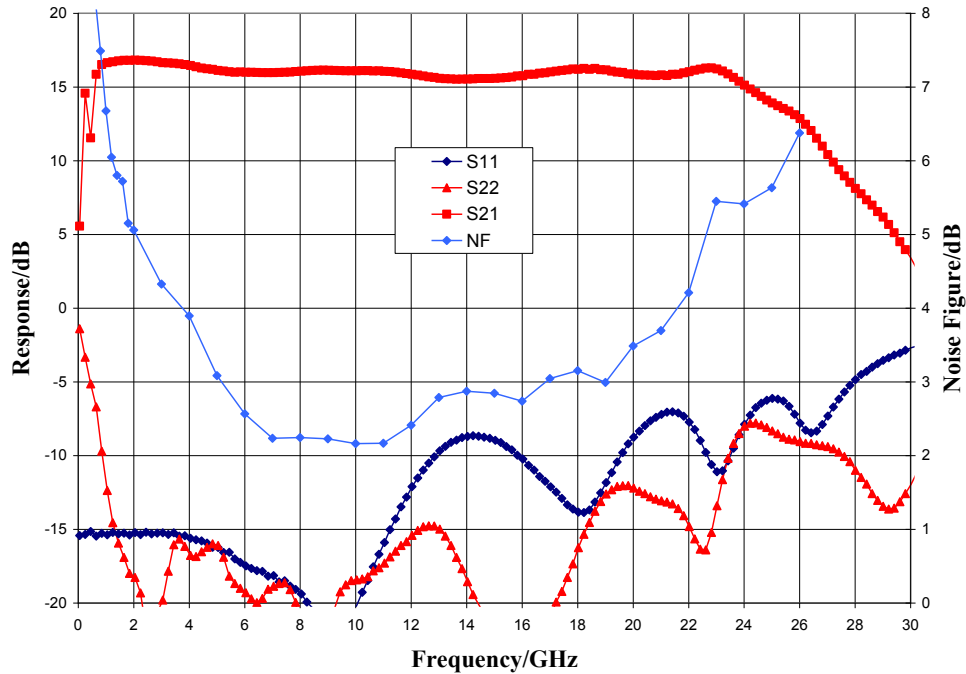
Electrical Specifications, V_{dd} = 8.0 V, T_A = 25 °C

Parameter	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	Units
Frequency Range	1 - 6			6 - 18			18 - 24			GHz
Gain	13.5	16.5	19.5	13	16	19	13	16	19	dB
Noise Figure		3.5			2.5			4		dB
Input Return Loss		16			10			8		dB
Output Return Loss		17			17			12		dB
Output P _{1dB}	20	25		20	23		17	21		dBm
Output IP ₃		35			32			31		dBm
Supply Current	170	225	280	170	225	280	170	225	280	mA
Gain Temperature Coefficient		.012			.012			.012		dB/°C
Noise Figure Temperature Coefficient		.011			.011			.011		dB/°C

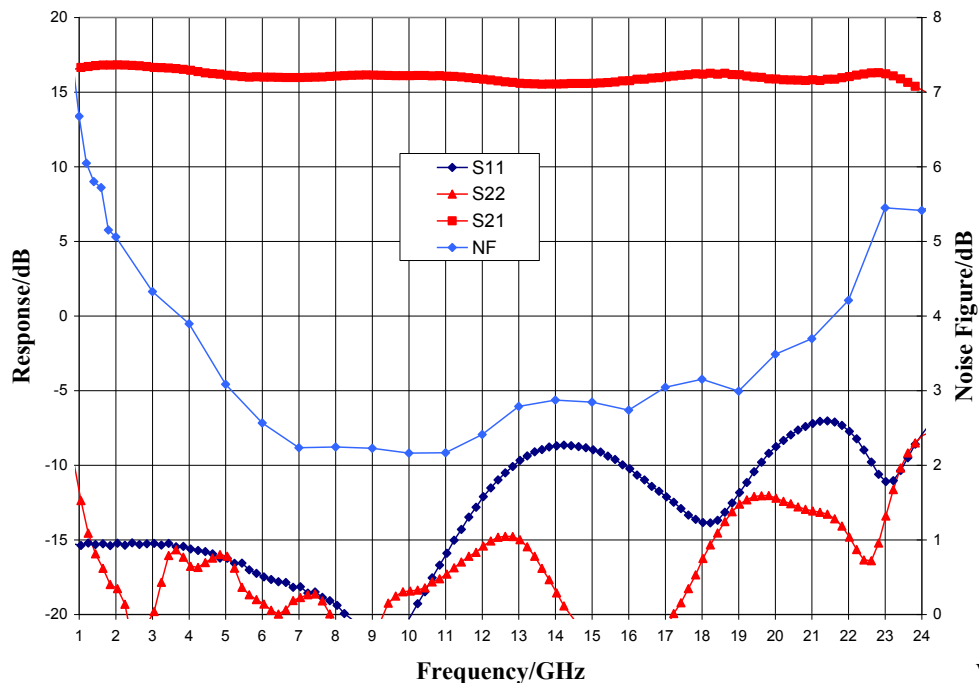
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Typical Performance

Broadband Performance, $V_{dd} = 8.0$ V, $I_{dd} = 225$ mA, $T_A = 25$ °C



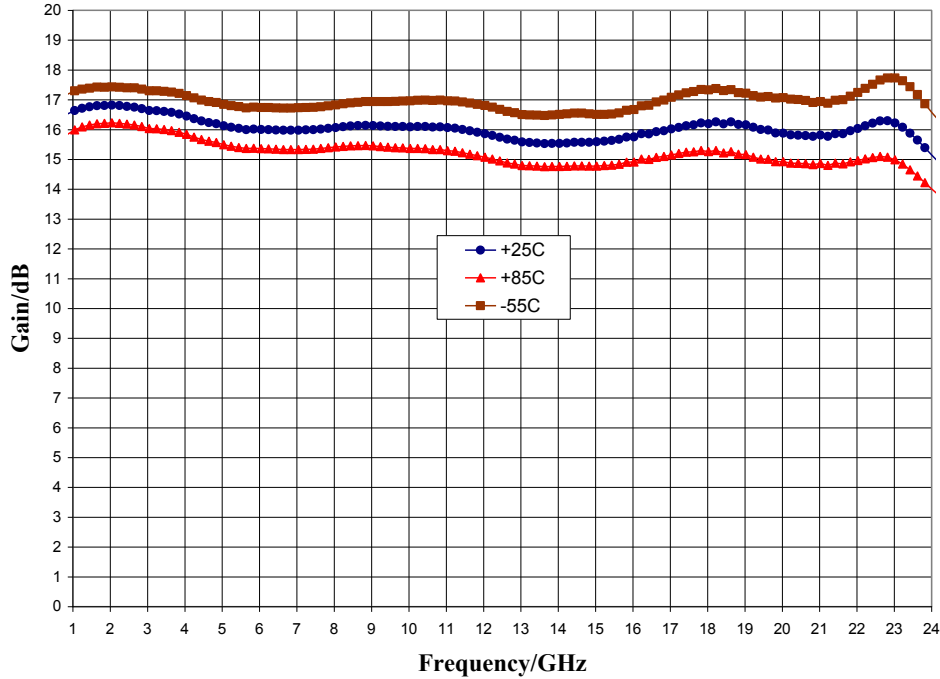
Narrow-band Performance, $V_{dd} = 8.0$ V, $I_{dd} = 225$ mA, $T_A = 25$ °C



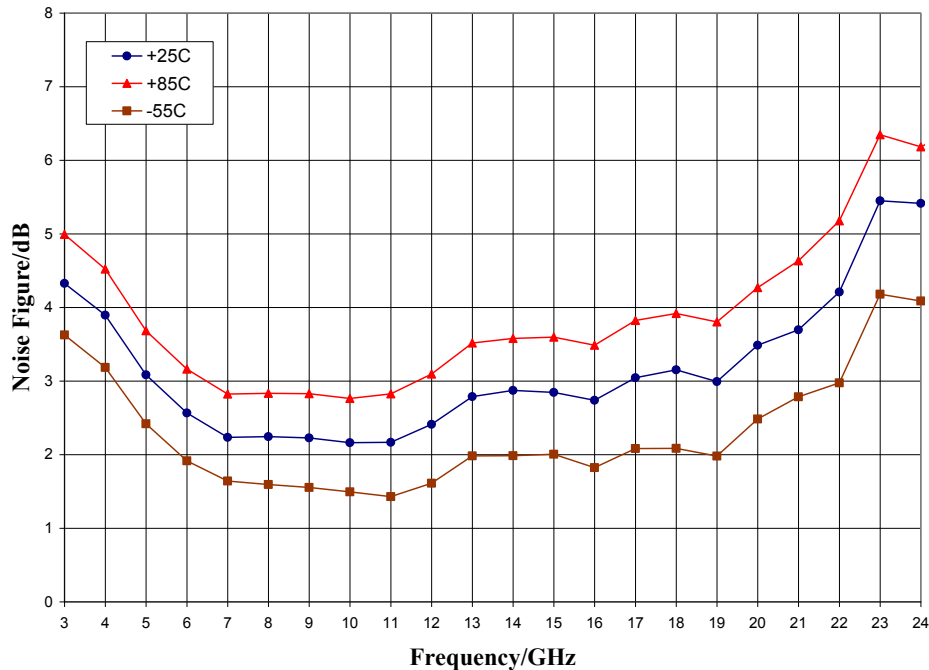
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Typical Performance

Gain vs. Temperature, $V_{dd} = 8.0$ V



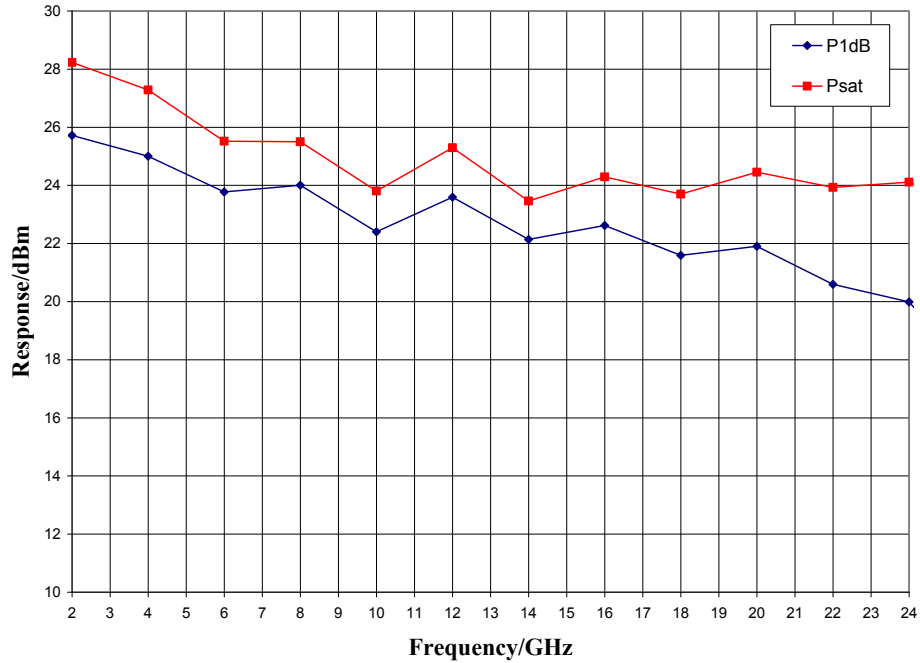
Noise Figure vs. Temperature, $V_{dd} = 8.0$ V



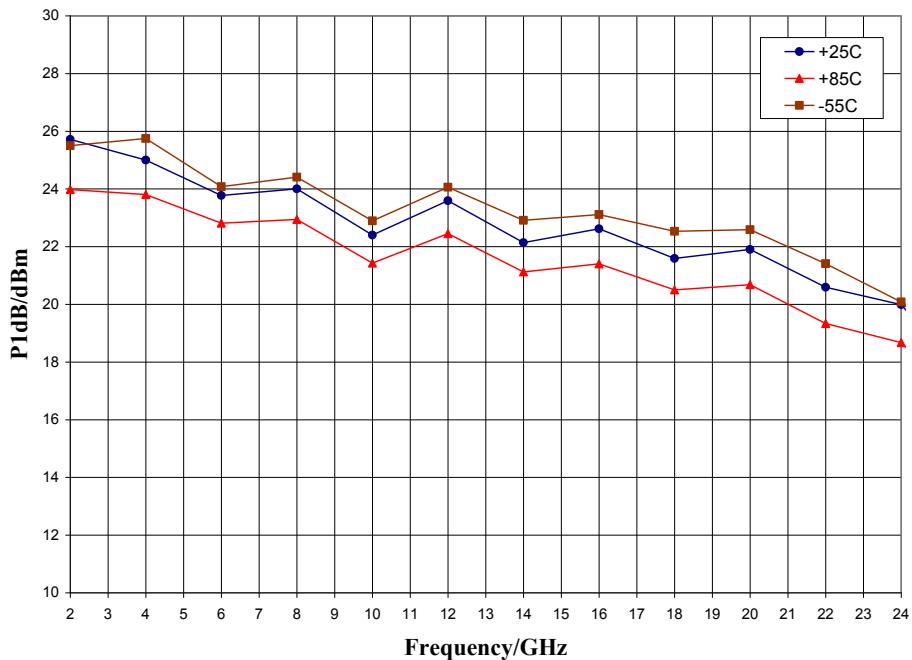
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Typical Performance

Output Power, $V_{dd} = 8.0$ V



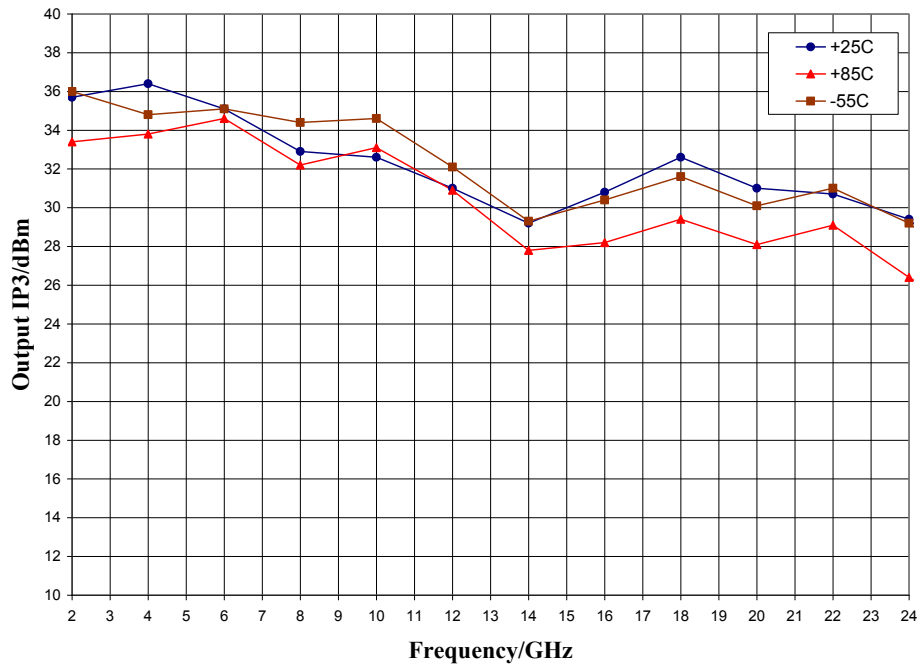
P1dB vs. Temperature, $V_{dd} = 8.0$ V



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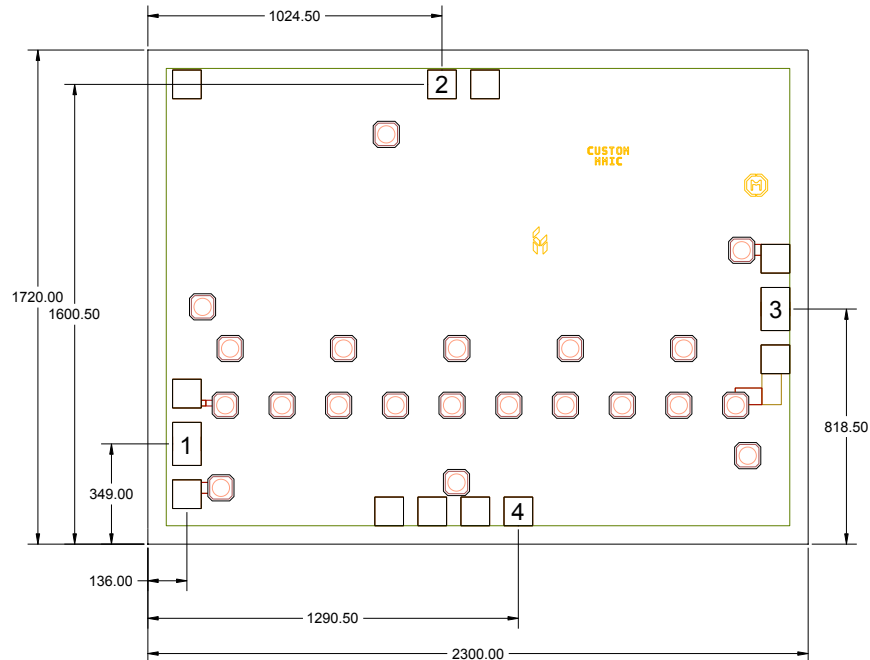
Typical Performance

Output IP3, $V_{dd} = 8.0\text{ V}$



Mechanical Information

Die Outline (all dimensions in microns)

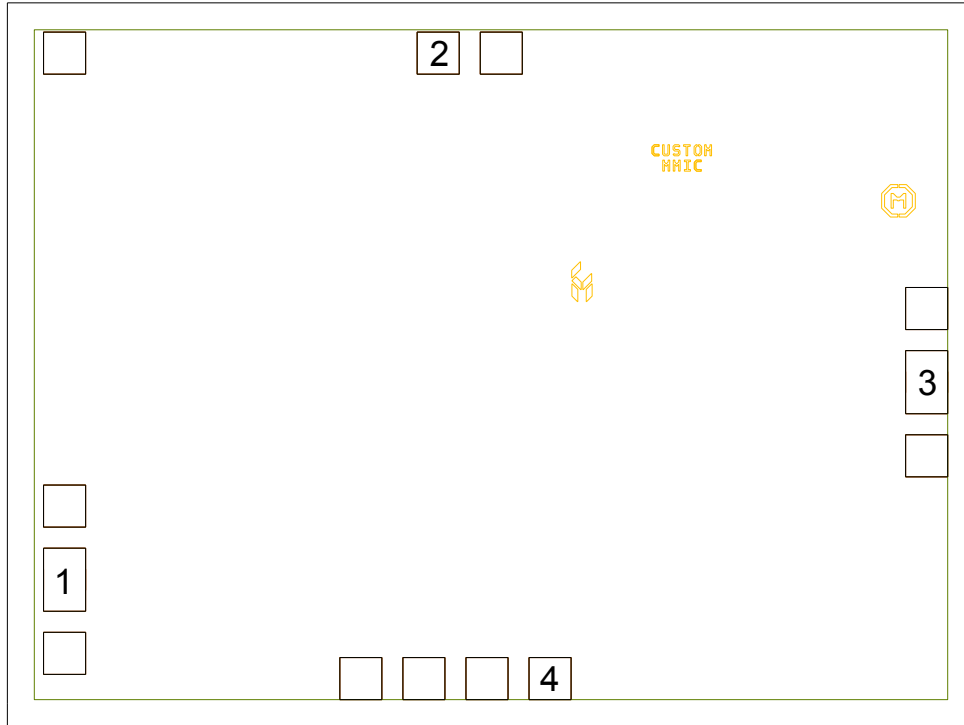


Notes:

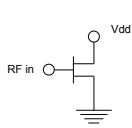
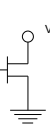
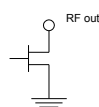

1. No connection required for unlabeled pads
2. Backside is RF and DC ground
3. Backside and bond pad metal: Gold
4. Die is 85 microns thick
5. DC bond pads (2, 4) are 100 x 100 microns
6. RF bond pads (1, 3) are 100 x 150 microns

Pad Description

Pad Diagram



Functional Description

Pad	Function	Description	Schematic
1	RF in	50 ohm matched input External DC block required	
2	Vdd	Power supply voltage Decoupling and bypass caps required	
3	RF out	50 ohm matched output External DC block required	
4	ACG	Low frequency termination. Attach bypass capacitor per application circuit	
Backside	Ground	Connect to RF / DC ground	

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Applications Information

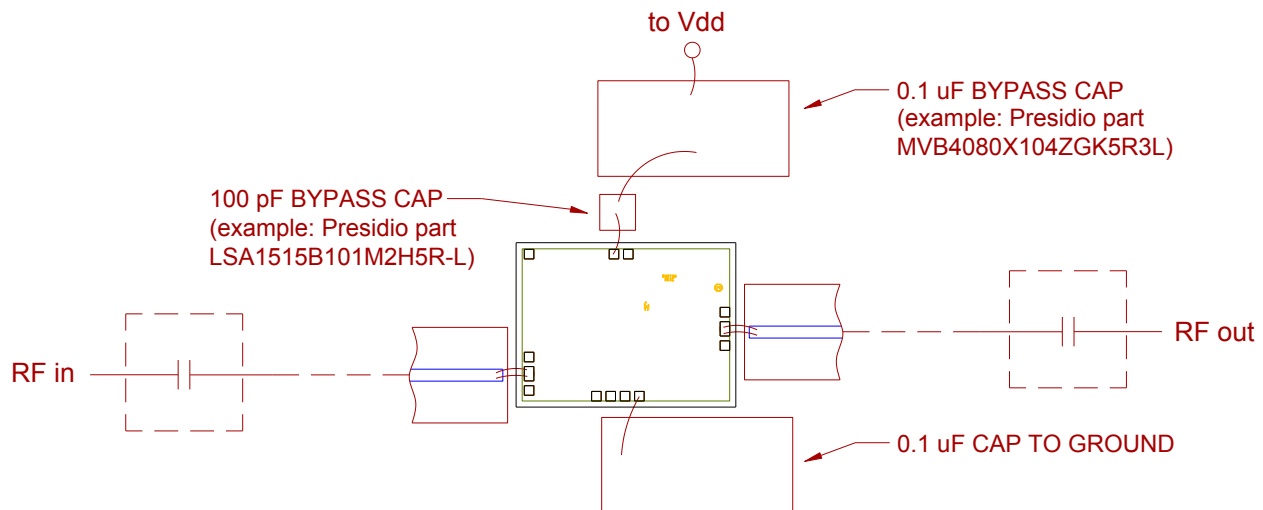
Assembly Guidelines

The backside of the CMD197 is RF ground. Die attach should be accomplished with electrically and thermally conductive epoxy only. Eutectic attach is not recommended. Standard assembly procedures should be followed for high frequency devices. The top surface of the semiconductor should be made planar to the adjacent RF transmission lines, and the RF decoupling capacitors placed in close proximity to the DC connections on chip.

RF connections should be made as short as possible to reduce the inductive effect of the bond wire. Use of a 0.8 mil thermosonic wedge bonding is highly recommended as the loop height will be minimized. The RF input and output require a double bond wire as shown.

The semiconductor is 85 μm thick and should be handled by the sides of the die or with a custom collet. Do not make contact directly with the die surface as this will damage the monolithic circuitry. Handle with care.

Assembly Diagram

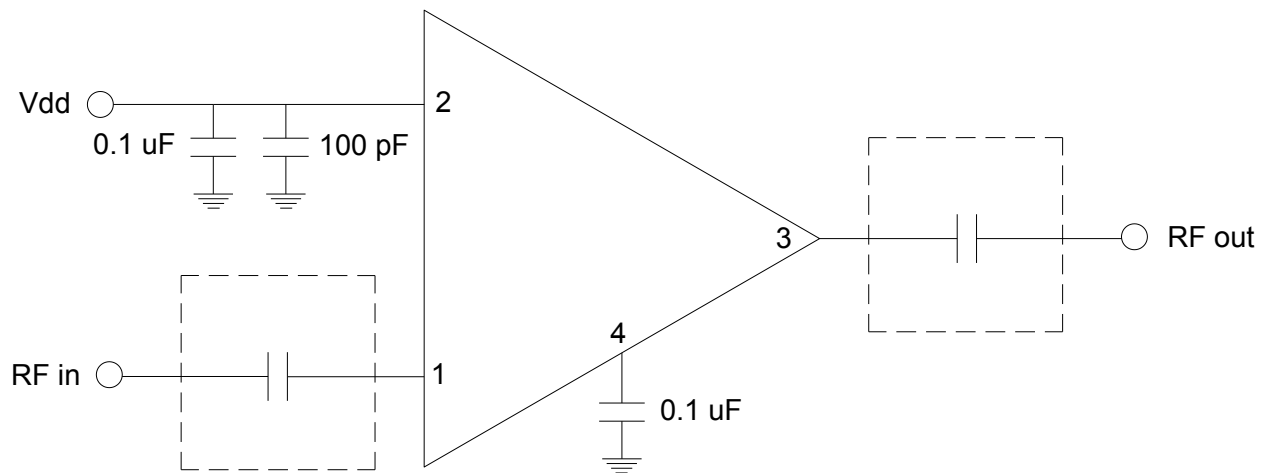


GaAs MMIC devices are susceptible to damage from Electrostatic Discharge. Proper precautions should be observed during handling, assembly and test.

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Applications Information

Application Circuit



Biasing and Operation

The CMD197 is biased with a single positive drain supply. Performance is optimized when the drain voltage is set to +8.0 V.

Turn ON procedure:

1. Apply drain voltage V_{dd} and set to +8 V

Turn OFF procedure:

1. Turn off drain voltage V_{dd}

RF power can be applied at any time.