Let Performance Drive

# CMD197

## 1-24 GHz Distributed Driver Amplifier

### Features

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

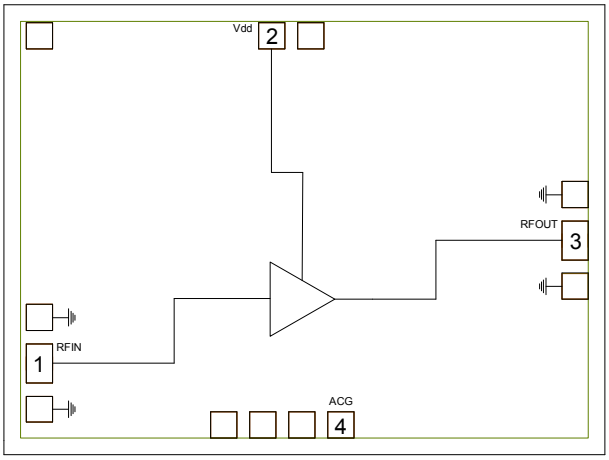
### Applications

- Wideband communication systems
- Microwave radio and VSAT
- Military and space
- Test Instrumentation

### 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 V, $T_A$ = 25 °C, F=10 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 |



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## 1-24 GHz Distributed Driver Amplifier

## *Specifications*

### Absolute Maximum Ratings

| Parameter | Rating |
|---|---|
| Drain Voltage, Vdd | 10 V |
| RF Input Power | +20 dBm |
| Channel Temperature, Tch | 150 °C |
| Power Dissipation, Pdiss | 2.12 W |
| Thermal Resistance | 30.6 °C/W |
| Operating Temperature | -55 to 85 °C |
| Storage Temperature | -55 to 150 °C |

Operation of this device outside the maximum ratings may cause permanent damage.

### Recommended Operating Conditions

| Parameter | Min | Typ | Max | Units |
|---|---|---|---|---|
| Vdd | 5.0 | 8.0 | 9.0 | V |
| Idd | | 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 P1dB | 21 | 25 | | 19 | 23 | | 17 | 21 | | dBm |
| Output IP3 | | 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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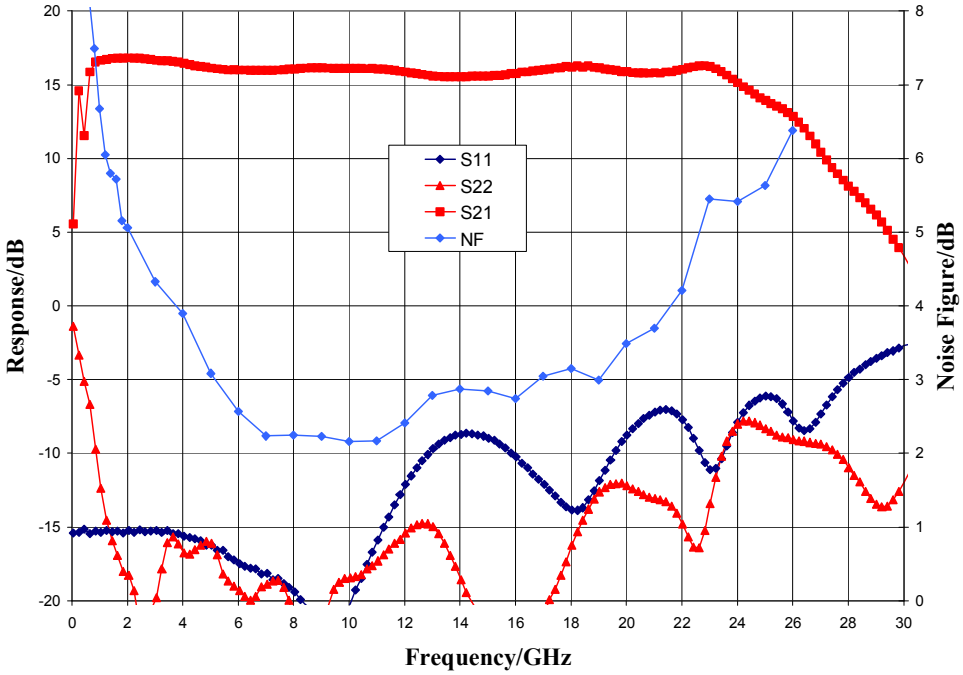
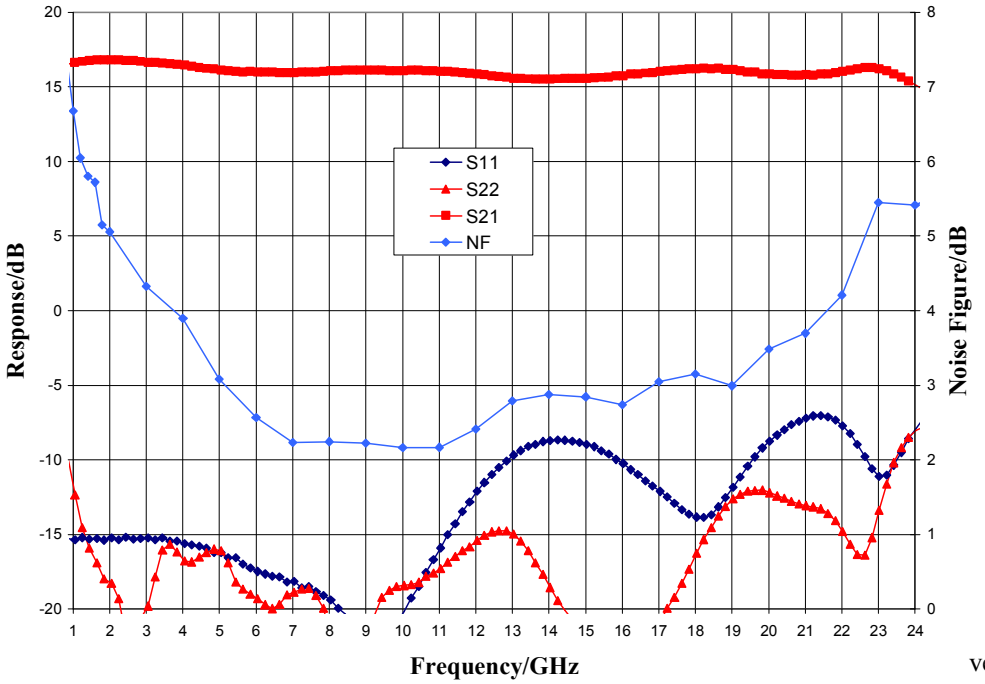
## Typical Performance

**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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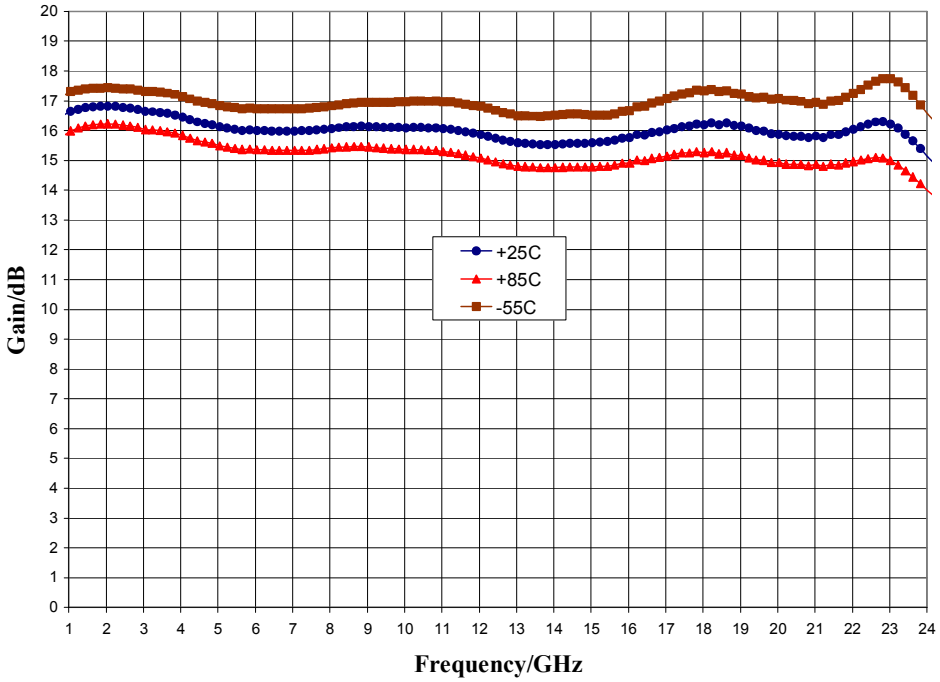
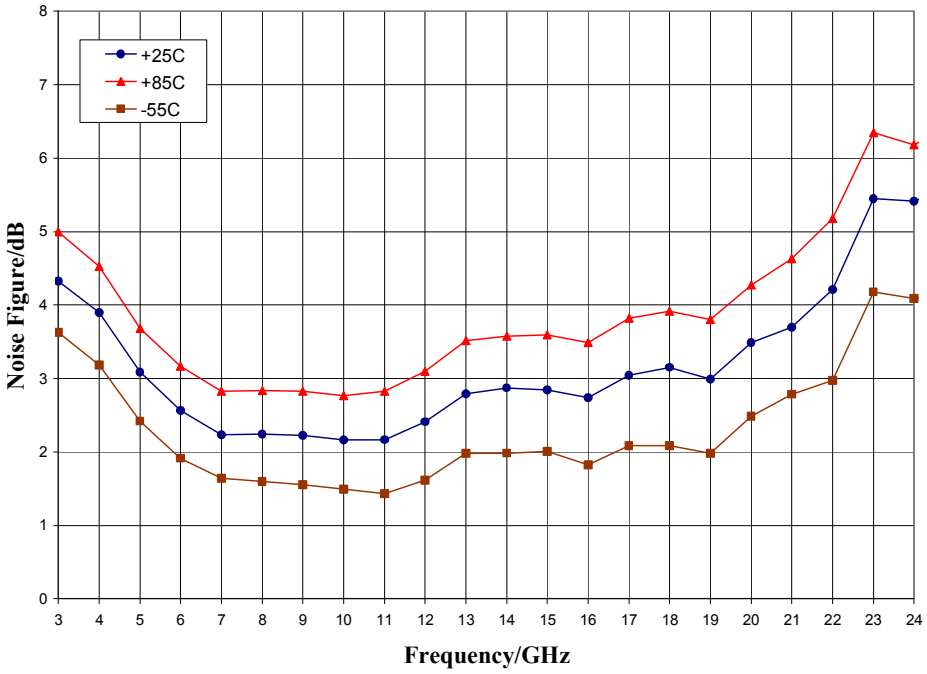
## *Typical Performance*

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




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



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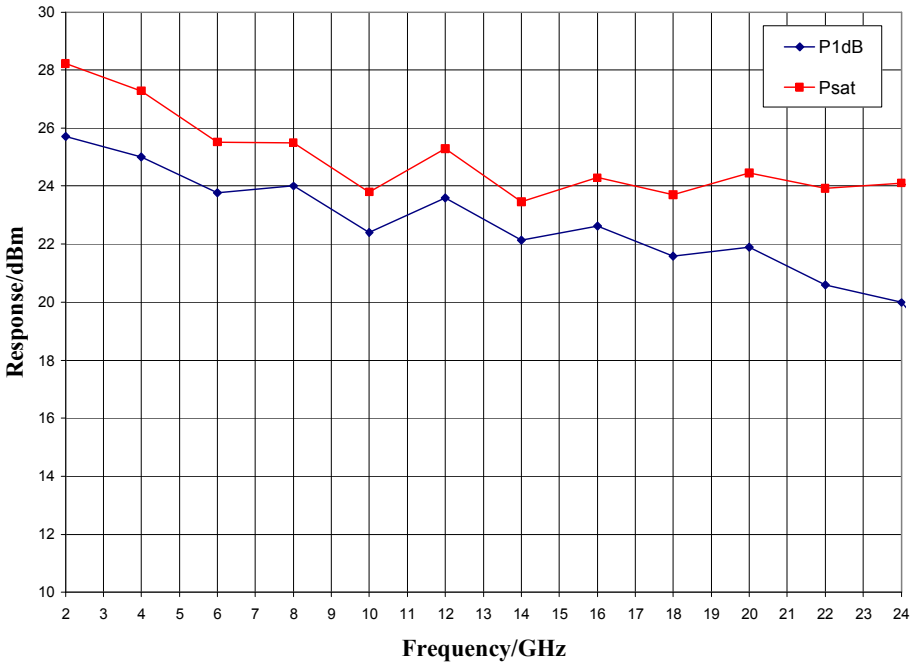
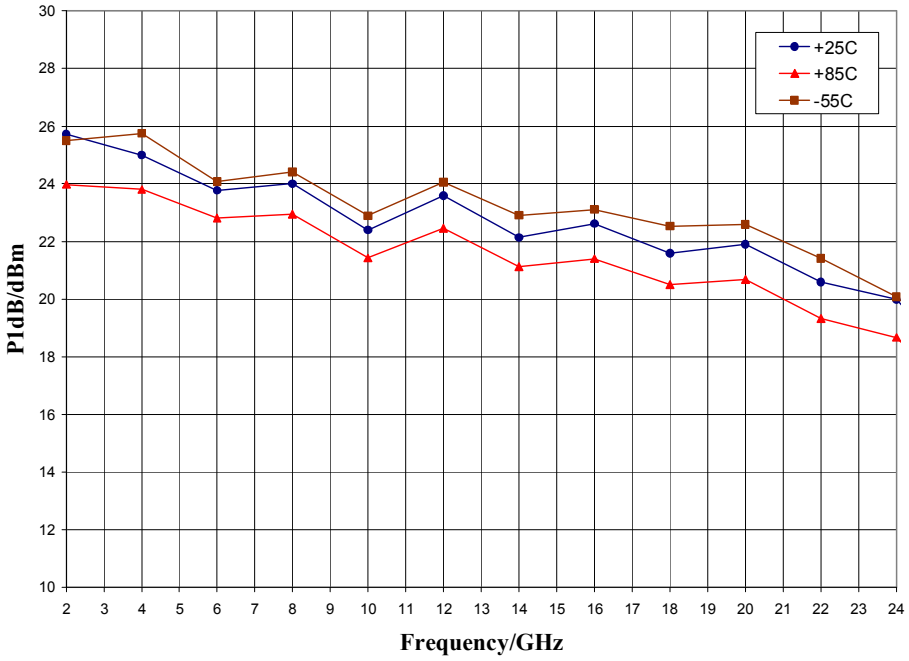
## *Typical Performance*

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




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



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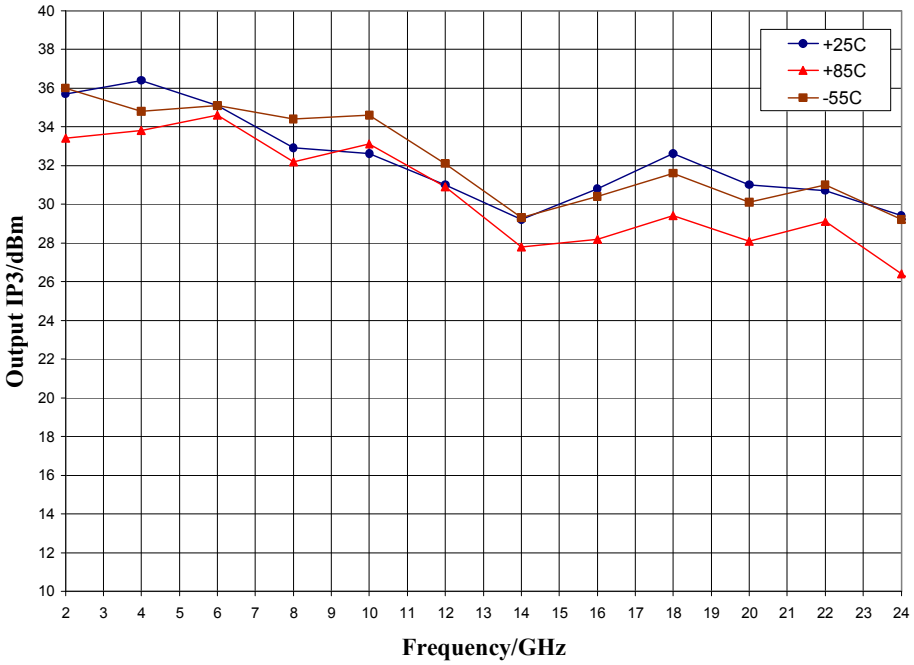
## *Typical Performance*

**Output IP3, $V_{dd}$ = 8.0 V**



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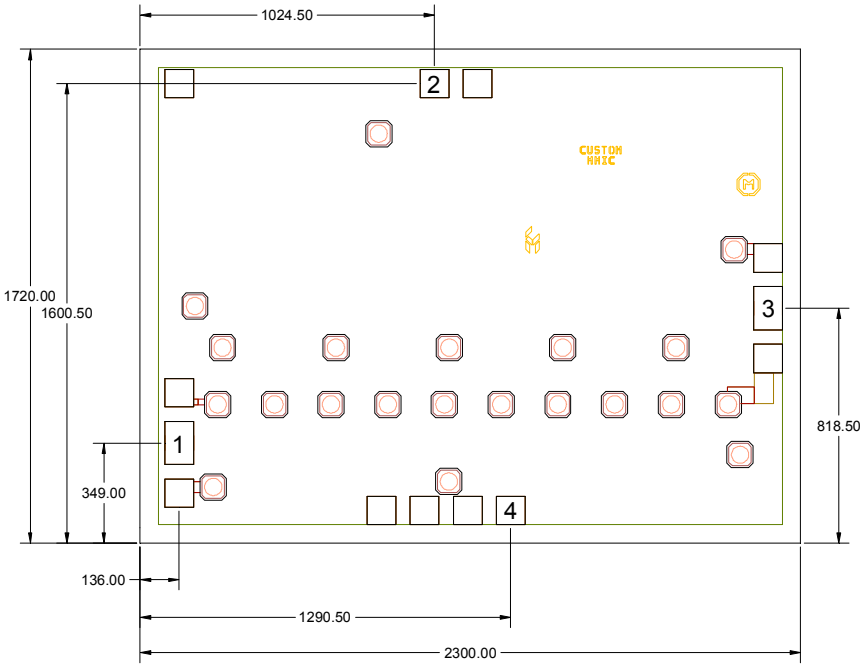
## *Mechanical Information*

**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 are 100 microns square



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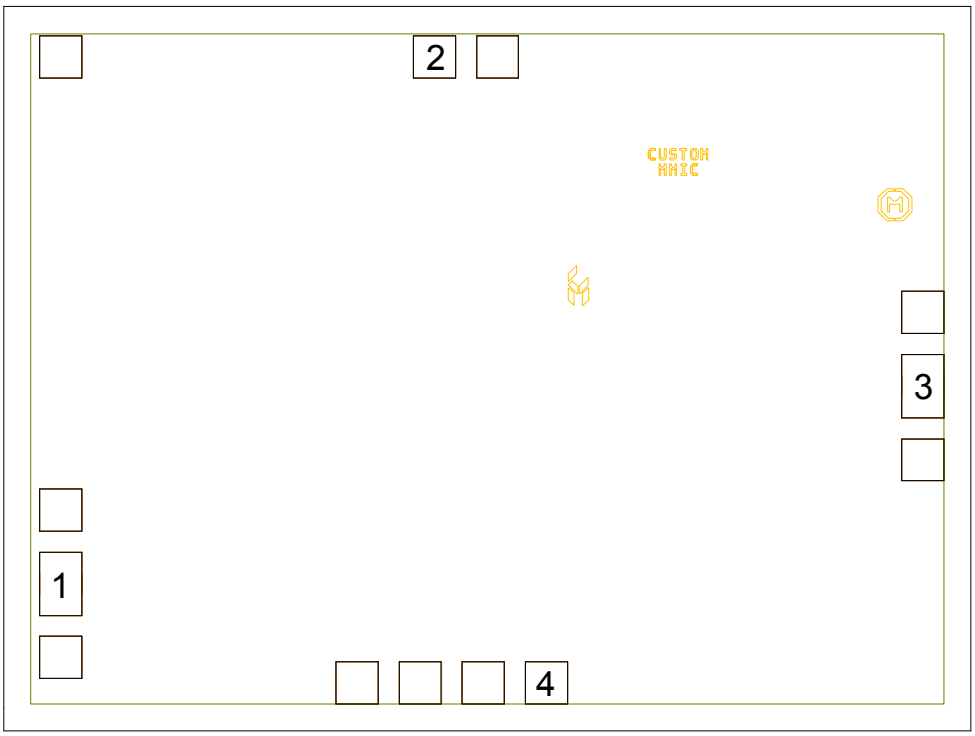
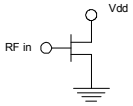
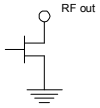
## *Pad Description*

### Pad Diagram




### Functional Description

| Pad | Function | Description | Schematic |
|---|---|---|---|
| 1 | RF in | 50 ohm matched input<br>External DC block required |   |
| 2 | Vdd | Power supply voltage<br>Decoupling and bypass caps required | |
| 3 | RF out | 50 ohm matched output<br>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*

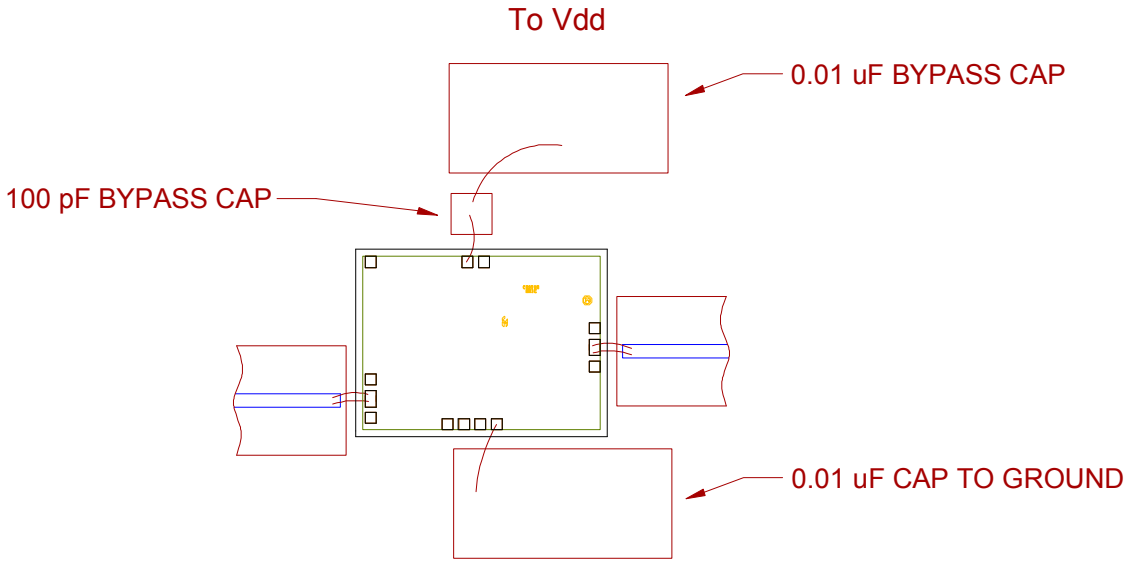
### Assembly Guidelines

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 um 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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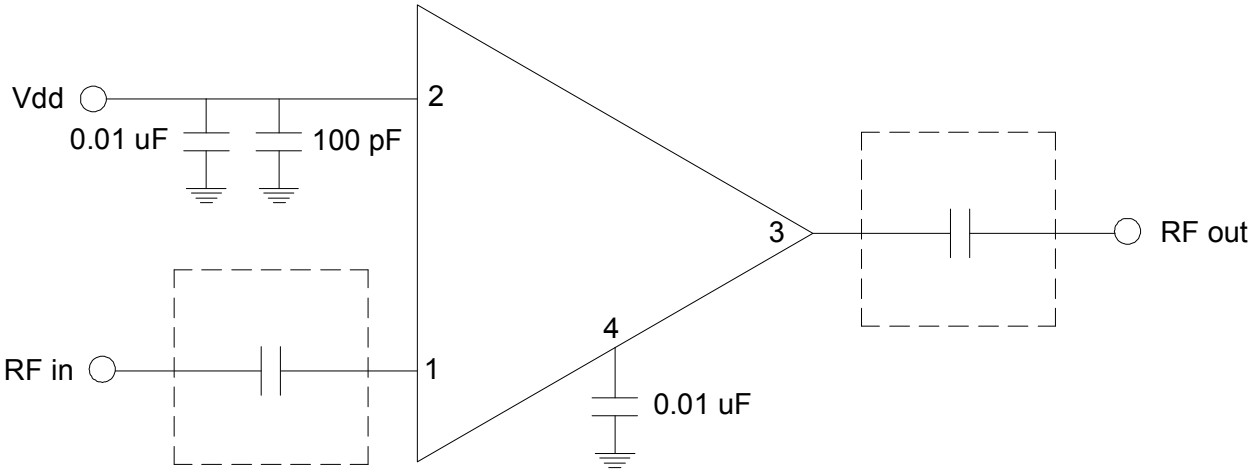
## *Applications Information*

### 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.



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