

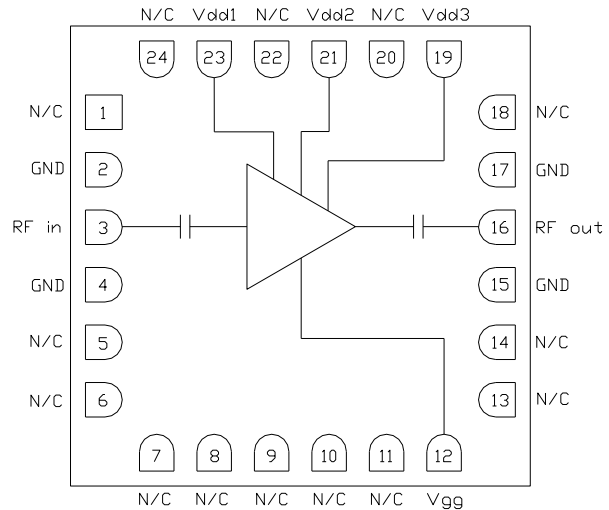
Features

- ▶ Wide bandwidth
- ▶ High linearity
- ▶ Low current consumption
- ▶ Pb-free RoHs compliant 4x4 mm SMT package

Description

The CMD187C4 is a wideband driver amplifier housed in a leadless surface mount package that is ideally suited for military, space and communications systems where small size and high linearity are needed. At 10 GHz the device delivers greater than 22 dB of gain with a corresponding output 1 dB compression point of +13 dBm and an output IP3 of 30 dBm. The CMD187C4 is a 50 ohm matched design which eliminates the need for external DC blocks and RF port matching. This amplifier is the perfect alternative to higher cost hybrid amplifiers.

Functional Block Diagram



Electrical Performance - $V_{dd} = 3.0\text{ V}$, $V_{gg} = 2.0\text{ V}$, $T_A = 25\text{ }^\circ\text{C}$, $F=10\text{ GHz}$

| Parameter | Min | Typ | Max | Units |
|--------------------|--------|------|-----|-------|
| Frequency Range | 2 - 20 | | | GHz |
| Gain | | 22.5 | | dB |
| Input Return Loss | | 22 | | dB |
| Output Return Loss | | 15 | | dB |
| Output P1dB | | 13 | | dBm |
| Output IP3 | | 30 | | dBm |
| Supply Current | | 115 | | mA |

Specifications

Absolute Maximum Ratings

| Parameter | Rating |
|--------------------------------------|---------------|
| Drain Voltage, V _{dd} | 5 V |
| Gate Voltage, V _{gg} | 3 V |
| RF Input Power | +20 dBm |
| Channel Temperature, T _{ch} | 150 °C |
| Power Dissipation, P _{diss} | 655 mW |
| Thermal Resistance | 99 °C/W |
| Operating Temperature | -40 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 |
|-----------------|-----|-----|-----|-------|
| V _{dd} | 3.0 | 3.0 | 5.0 | V |
| I _{dd} | | 115 | | mA |
| V _{gg} | | 2.0 | | V |

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

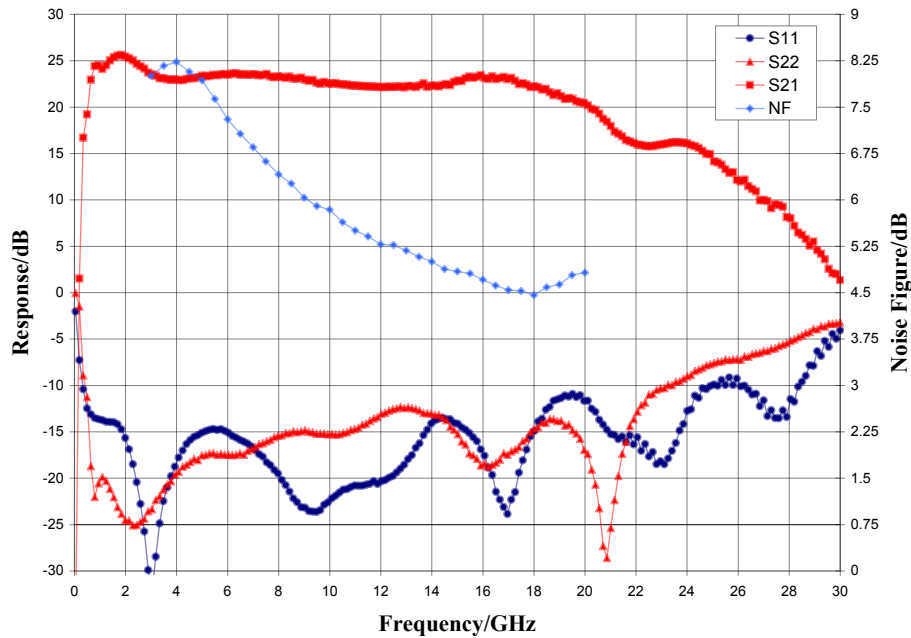
Electrical Specifications, V_{dd} = 3.0 V, V_{gg} = 2.0 V, T_A = 25 °C

| Parameter | Min | Typ | Max | Min | Typ | Max | Units |
|--------------------------------------|--------|------|-----|---------|------|-----|-------|
| Frequency Range | 2 - 18 | | | 18 - 20 | | | GHz |
| Gain | 20 | 23 | 27 | 18 | 21.5 | 24 | dB |
| Noise Figure | | 6 | | | 4.6 | | dB |
| Input Return Loss | | 15 | | | 11 | | dB |
| Output Return Loss | | 15 | | | 13 | | dB |
| Output P1dB | 11 | 13.5 | | 11 | 13.5 | | dBm |
| Output IP3 | | 28 | | | 27 | | dBm |
| Supply Current | 80 | 120 | 160 | 80 | 120 | 160 | mA |
| Gain Temperature Coefficient | | 0.02 | | | 0.02 | | dB/°C |
| Noise Figure Temperature Coefficient | | 0.01 | | | 0.01 | | dB/°C |

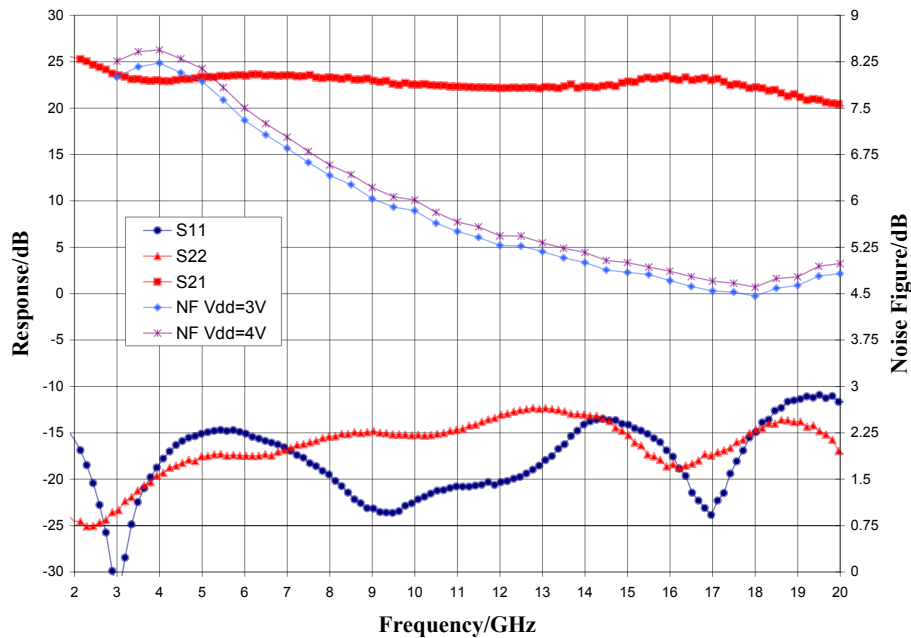
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Typical Performance

Broadband Performance, $V_{dd} = 3.0\text{ V}$, $V_{gg} = 2.0\text{ V}$, $I_{dd} = 115\text{ mA}$, $T_A = 25\text{ }^\circ\text{C}$



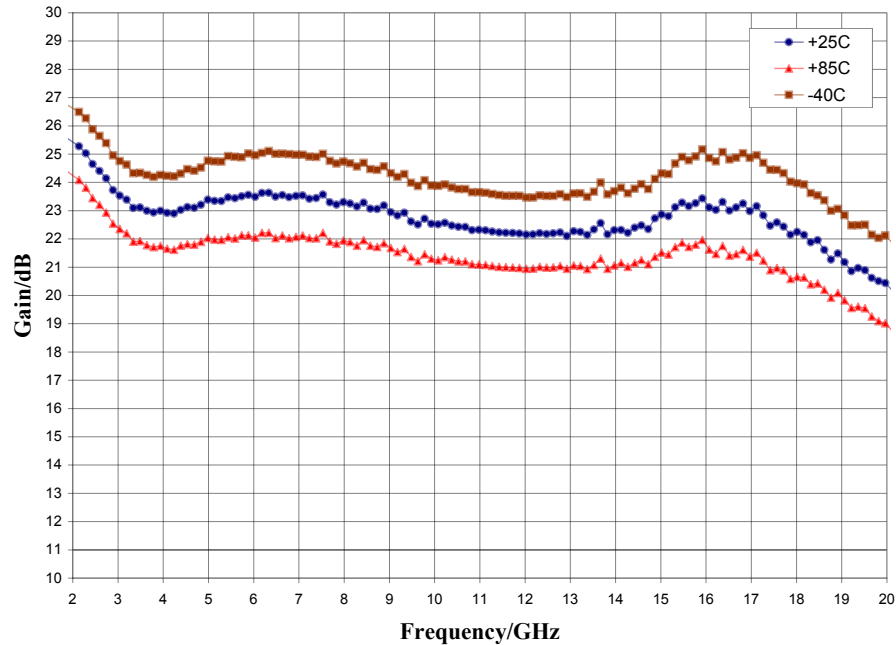
Narrow-band Performance, $V_{dd} = 3.0\text{ V}$, $V_{gg} = 2.0\text{ V}$, $I_{dd} = 115\text{ mA}$, $T_A = 25\text{ }^\circ\text{C}$



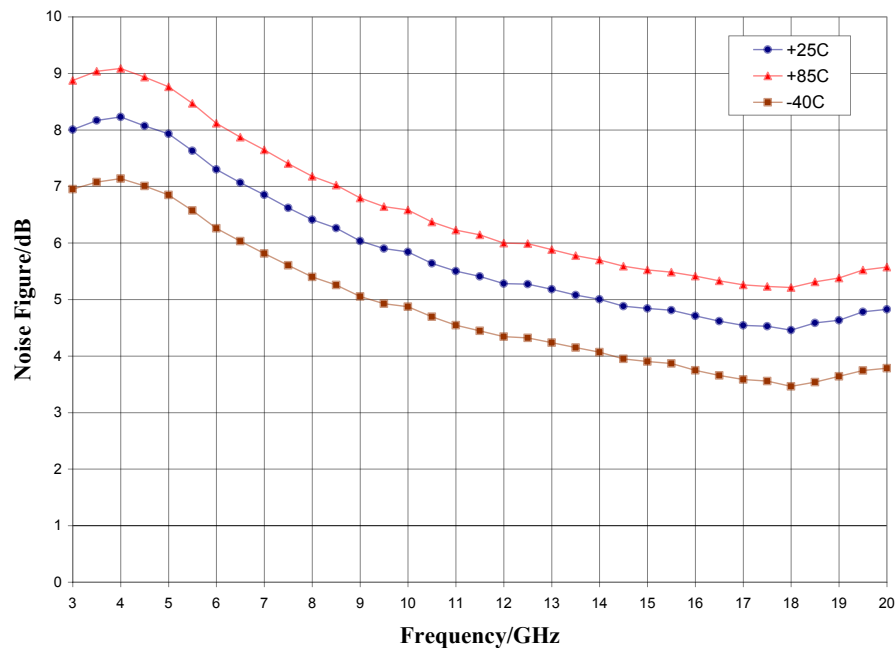
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Typical Performance

Gain vs. Temperature, $V_{dd} = 3.0\text{ V}$, $V_{gg} = 2.0\text{ V}$



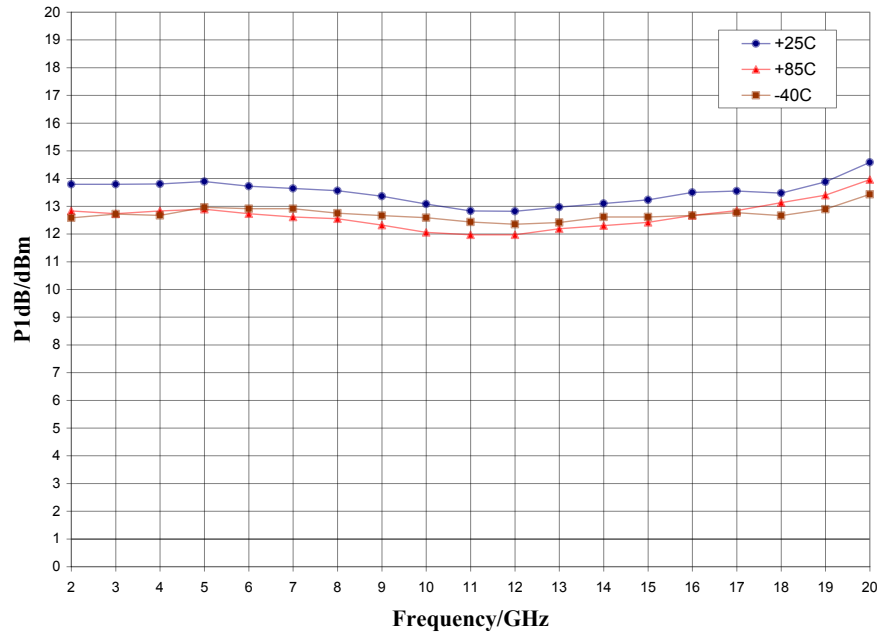
Noise Figure vs. Temperature, $V_{dd} = 3.0\text{ V}$, $V_{gg} = 2.0\text{ V}$



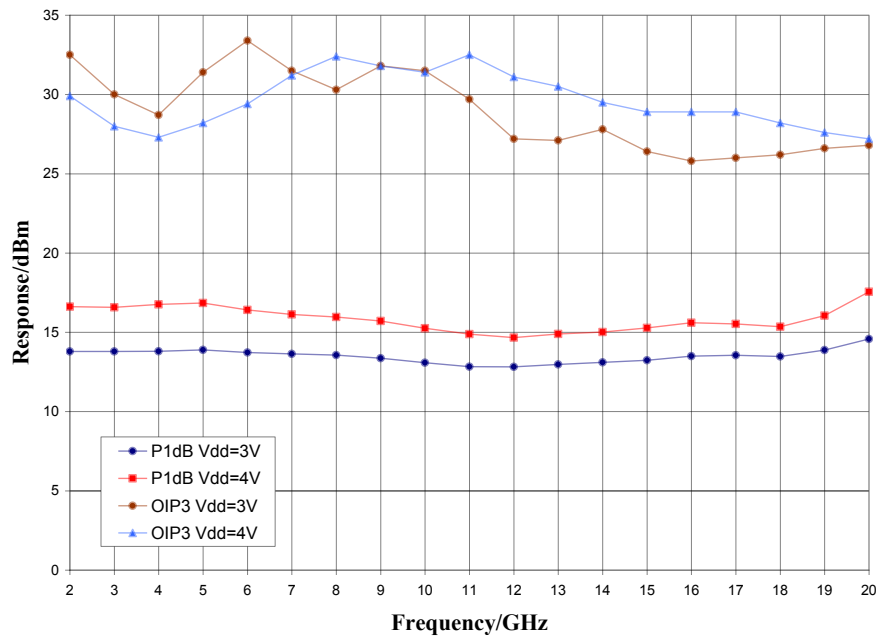
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Typical Performance

P1dB vs. Temperature, $V_{dd} = 3.0\text{ V}$, $V_{gg} = 2.0\text{ V}$



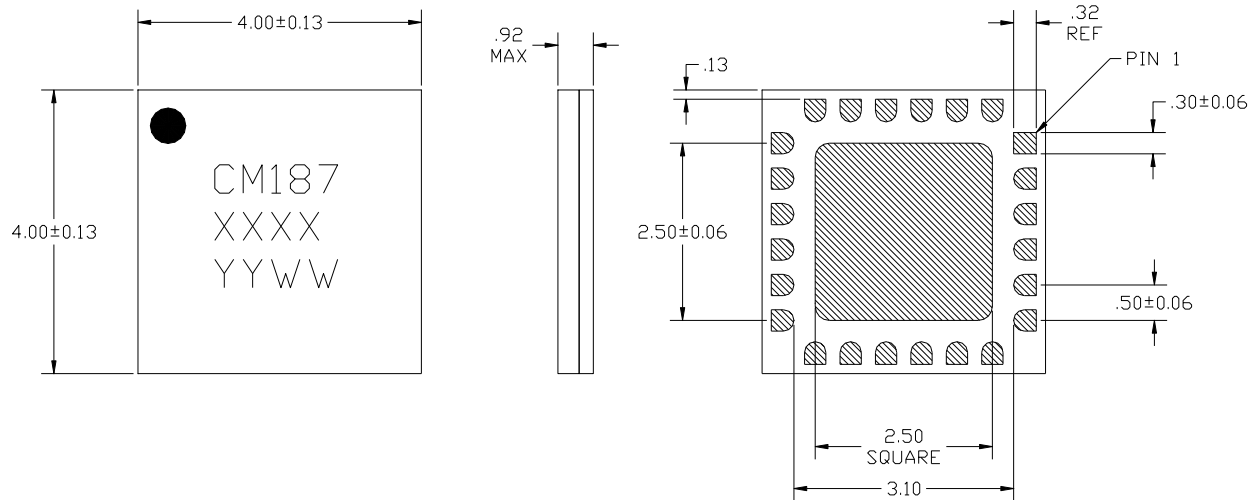
P1dB & Output IP3, $V_{dd}=3\text{V}, 4\text{V}$, $V_{gg} = 2.0\text{ V}$



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Mechanical Information

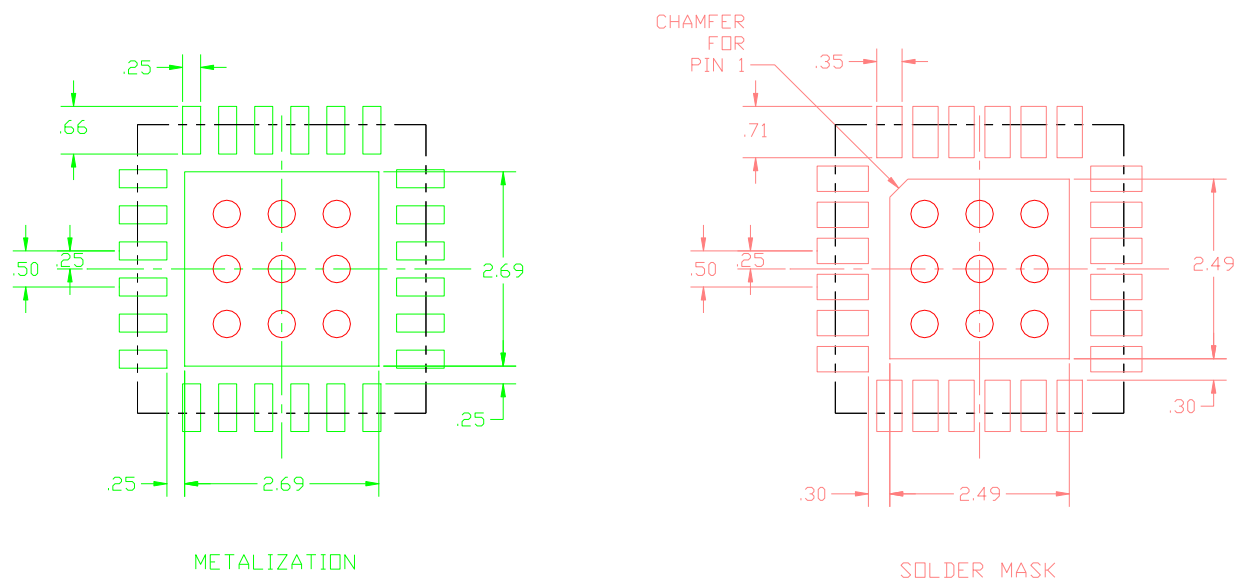
Package Information and Dimensions



NOTES:

1. DIMENSIONS ARE IN MILLIMETERS
2. MATERIAL: BLACK ALUMINA
3. LEAD FINISH: 30-80 MICROINCHES GOLD OVER 50 MICROINCHES NICKEL.
4. ALTERNATE PIN #1 IDENTIFIER IS SINGLE SQUARE PAD.

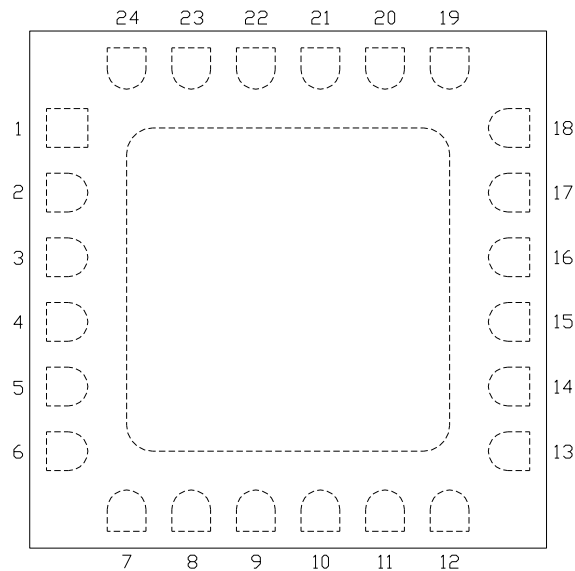
Recommended PCB Land Pattern




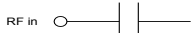
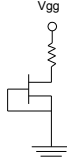

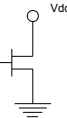
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Pin Description

Pin Diagram



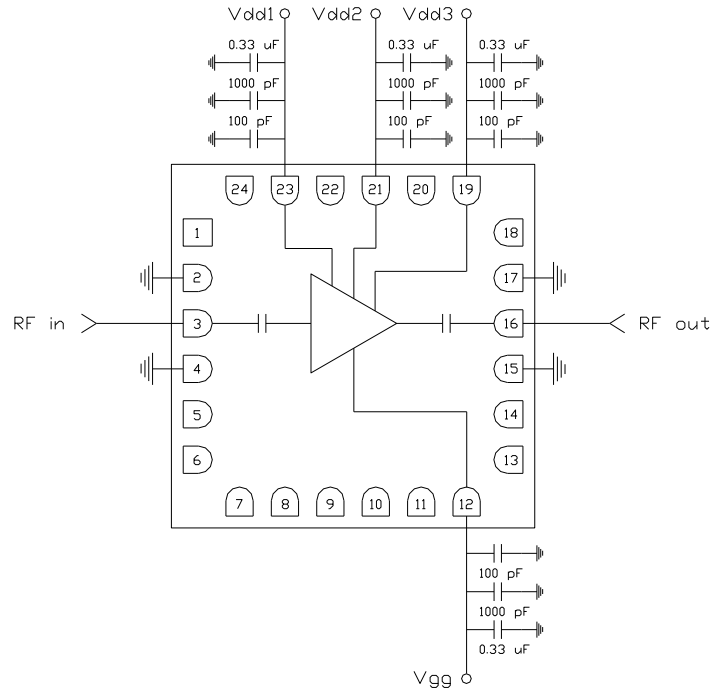
Functional Description

| Pad | Function | Description | Schematic |
|---------------------------------|------------------------|--|---|
| 1, 5-11, 13, 14, 18, 20, 22, 24 | N/C | No connection required. These pins may be connected to RF/DC ground. | |
| 2, 4, 15, 17 and die paddle | Ground | Connect to RF / DC ground |  |
| 3 | RF in | DC blocked and 50 ohm matched |  |
| 12 | V _{gg} | Power supply voltage Decoupling and bypass caps required |  |
| 16 | RF out | DC blocked and 50 ohm matched |  |
| 23, 21, 19 | V _{dd1, 2, 3} | Power supply voltage Decoupling and bypass caps required |  |

ver 1.3 0817

Applications Information

Application Circuit



Biasing and Operation

The CMD187C4 is biased with a positive drain supply and positive gate supply. Performance is optimized when the drain voltage is set to +3.0 V. The recommended gate voltage is +2.0 V.

Turn ON procedure:

1. Apply drain voltages $V_{dd1,2,3}$ and set to +3 V
2. Apply gate voltage V_{gg} and set to +2 V

Turn OFF procedure:

1. Turn off gate voltage V_{gg}
2. Turn off drain voltages $V_{dd1,2,3}$

RF power can be applied at any time.

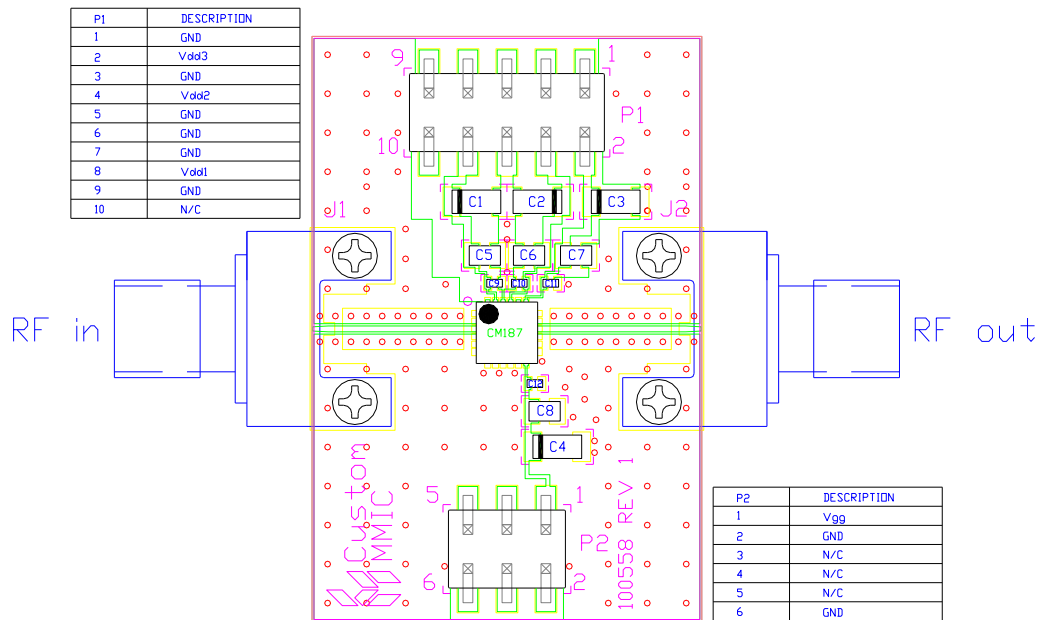
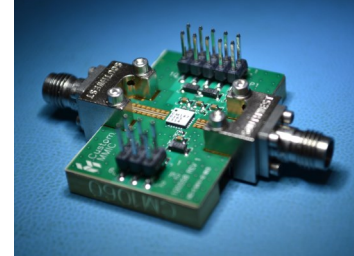
GaAs MMIC devices are susceptible to damage from Electrostatic Discharge. Proper precautions should be observed during handling, assembly and test.

ver 1.3 0817

Applications Information

Evaluation Board

The circuit board shown has been developed for optimized assembly at CMDS. A sufficient number of via holes should be used to connect the top and bottom ground planes. As surface mount processes vary, careful process development is recommended.



Bill of Material

| Designator | Value | Description |
|------------|--------------|---------------------------|
| J1, J2 | | SMA End Launch Connector |
| P1 | | 10 Pin Header |
| P2 | | 6 Pin Header |
| C1 - C4 | 0.33 μ F | Capacitor, Tantalum |
| C5 - C8 | 1000 pF | Capacitor, 0603 |
| C9 - C12 | 100 pF | Capacitor, 0402 |
| U1 | | CMD187C4 Driver Amplifier |
| PCB | | 100558 Evaluation PCB |

Please note, All information contained in this data sheet is subject to change without notice.

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