

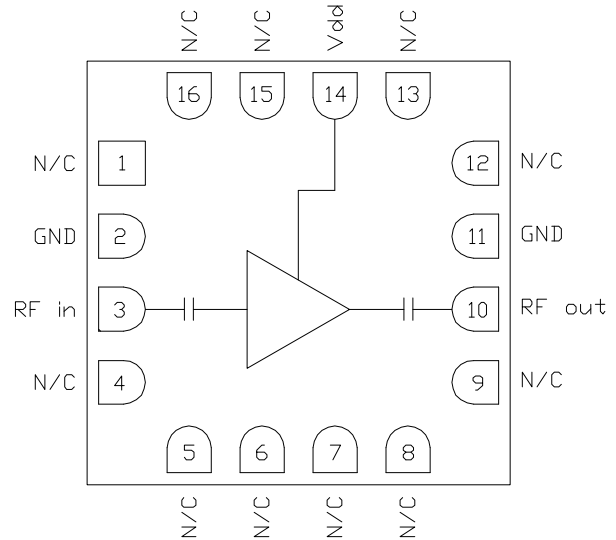
Features

- ▶ High gain
- ▶ Wide bandwidth
- ▶ Single positive supply voltage
- ▶ Pb-free RoHs compliant 3x3 QFN package

Description

The CMD232C3 is a wideband GaAs MMIC driver amplifier housed in a leadless 3x3 mm surface mount package. The CMD232C3 is ideally suited for military, space and communications systems where small size and high linearity are needed. At 6 GHz the device delivers greater than 15 dB of gain with a corresponding output 1 dB compression point of +17 dBm and an output IP3 of 23 dBm. The CMD232C3 is a 50 ohm matched design which eliminates the need for external DC blocks and RF port matching.

Functional Block Diagram



Electrical Performance - $V_{dd} = 6.0\text{ V}$, $T_A = 25\text{ }^\circ\text{C}$, $F=6\text{ GHz}$

| Parameter | Min | Typ | Max | Units |
|--------------------|-------|-----|-----|-------|
| Frequency Range | 2 - 9 | | | GHz |
| Gain | | 15 | | dB |
| Input Return Loss | | 15 | | dB |
| Output Return Loss | | 14 | | dB |
| Output P1dB | | 17 | | dBm |
| Output IP3 | | 23 | | dBm |
| Supply Current | | 90 | | mA |



CMD232C3

2-9 GHz Driver Amplifier

Specifications

Absolute Maximum Ratings

| Parameter | Rating |
|--------------------------------------|---------------|
| Drain Voltage, V _{dd} | 7.5 V |
| RF Input Power | +15 dBm |
| Channel Temperature, T _{ch} | 150 °C |
| Power Dissipation, P _{diss} | 665 mW |
| Thermal Resistance | 97.5 °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 |
|-----------------|-----|-----|-----|-------|
| V _{dd} | 5.0 | 6.0 | 7.0 | V |
| I _{dd} | | 90 | | mA |

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

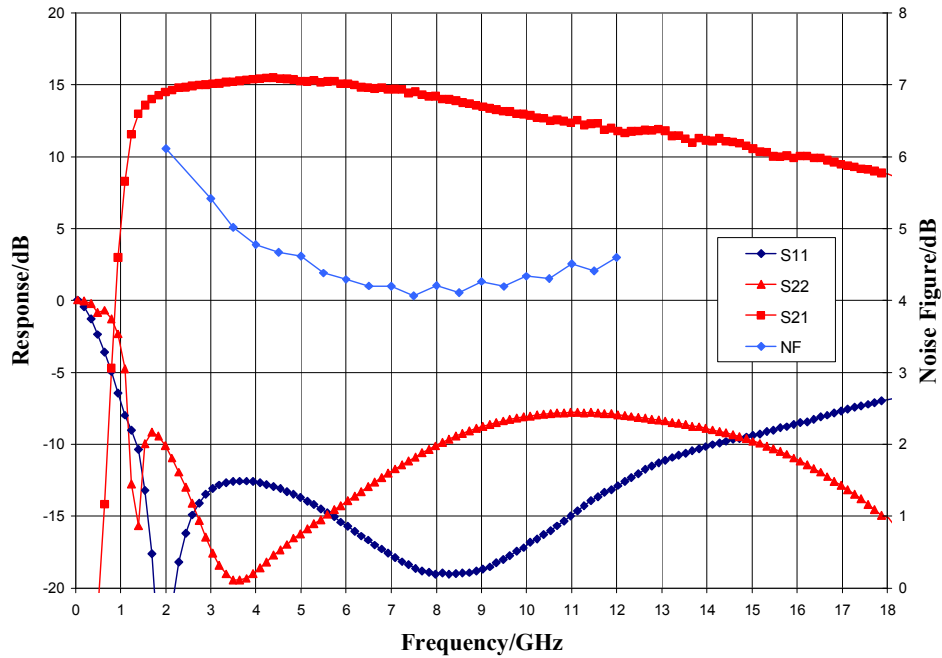
Electrical Specifications, V_{dd} = 6.0 V, T_A = 25 °C

| Parameter | Min | Typ | Max | Units |
|--------------------------------------|-----|-------|-----|-------|
| Frequency Range | | 2 - 9 | | GHz |
| Gain | 12 | 15 | 19 | dB |
| Noise Figure | | 4.5 | | dB |
| Input Return Loss | | 15 | | dB |
| Output Return Loss | | 13 | | dB |
| Output P1dB | 15 | 17 | | dBm |
| Output IP3 | | 23.5 | | dBm |
| Supply Current | 60 | 90 | 120 | mA |
| Gain Temperature Coefficient | | 0.014 | | dB/°C |
| Noise Figure Temperature Coefficient | | 0.012 | | dB/°C |

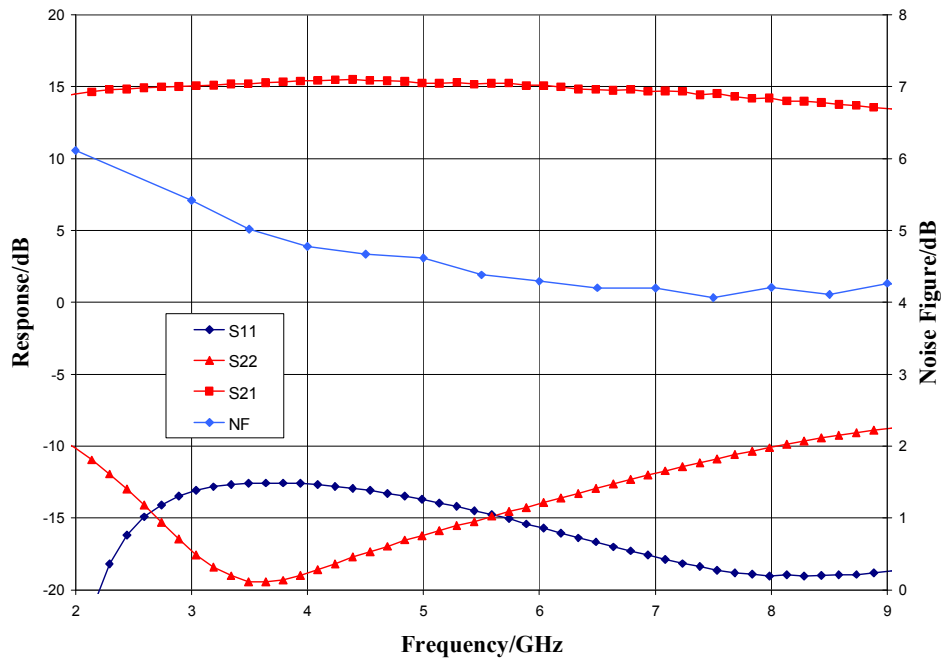
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Typical Performance

Broadband Performance, $V_{dd} = 6.0\text{ V}$, $I_{dd} = 90\text{ mA}$, $T_A = 25\text{ }^\circ\text{C}$



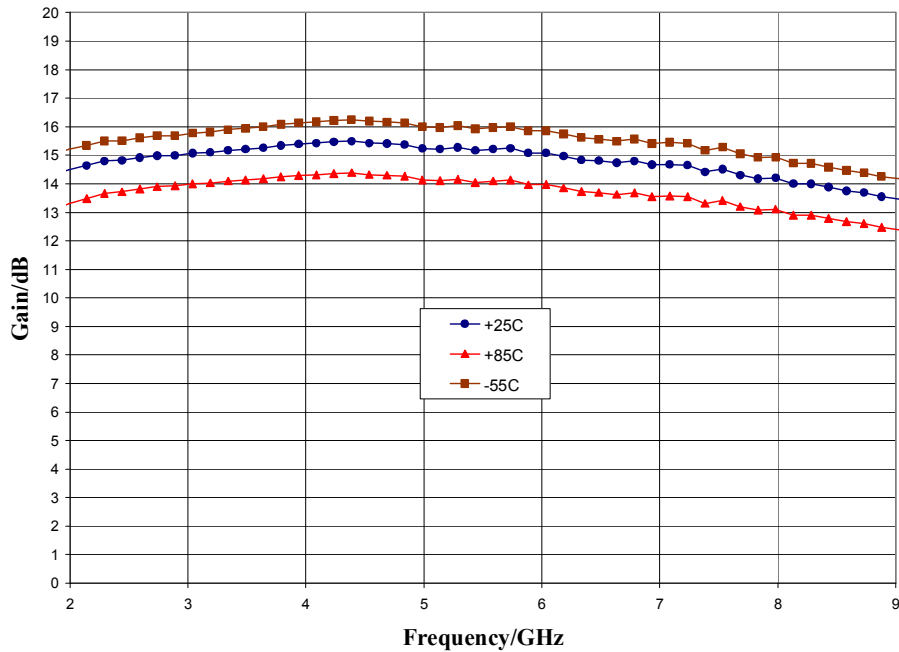
Narrow-band Performance, $V_{dd} = 6.0\text{ V}$, $I_{dd} = 90\text{ mA}$, $T_A = 25\text{ }^\circ\text{C}$



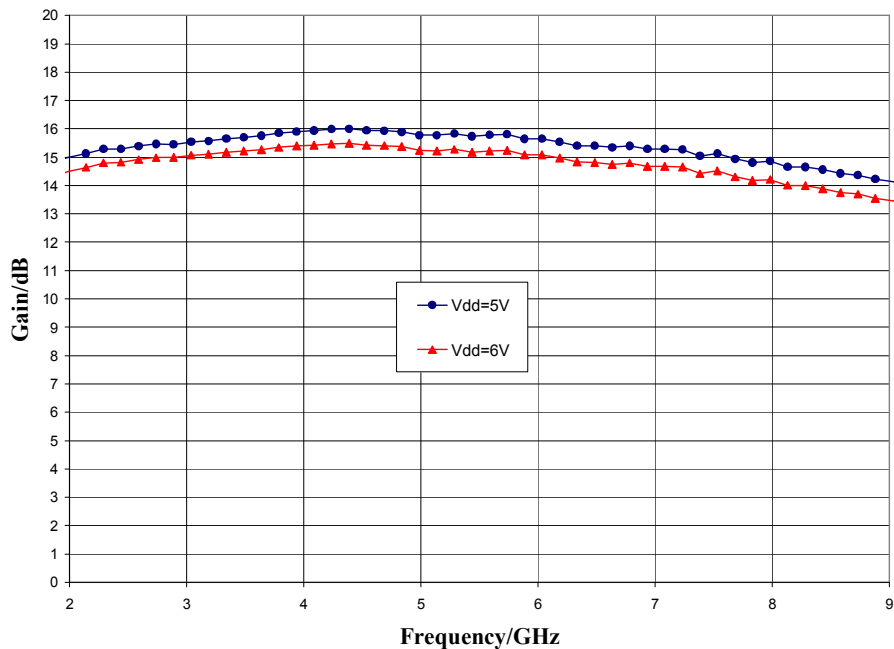
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Typical Performance

Gain vs. Temperature, $V_{dd} = 6.0\text{ V}$



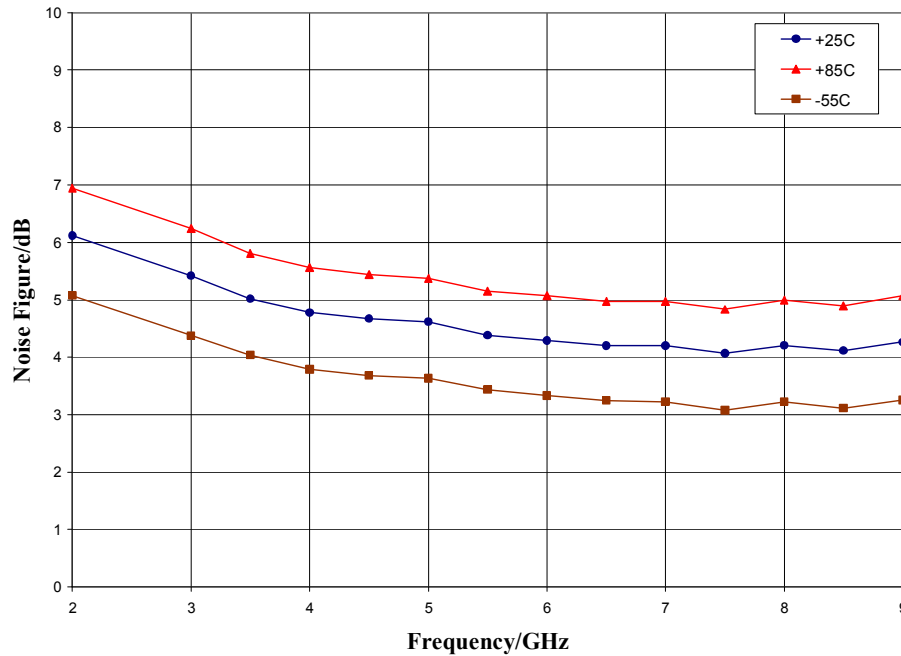
Gain vs. Supply Voltage, $T_A = 25\text{ }^\circ\text{C}$



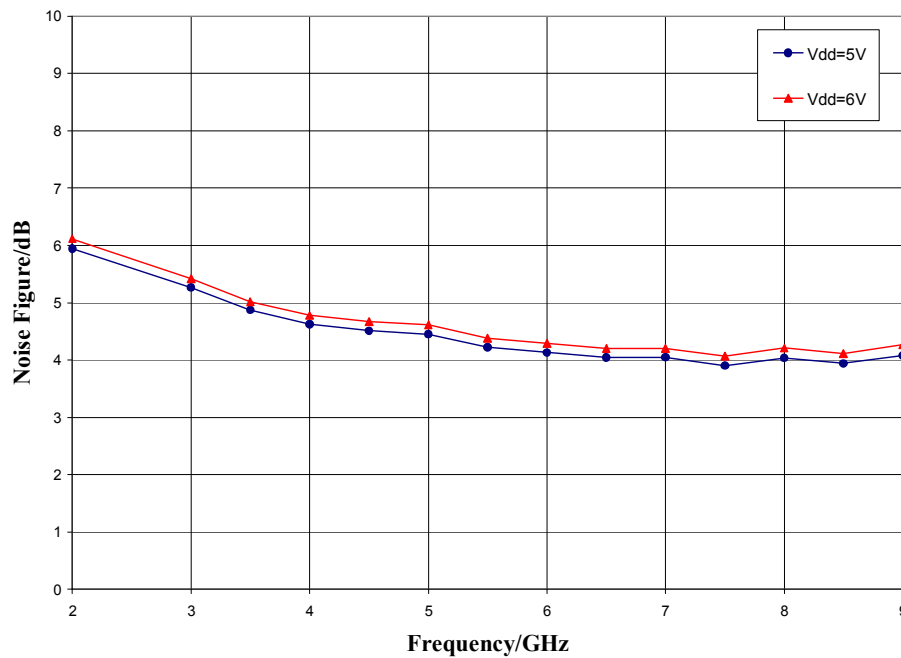
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Typical Performance

Noise Figure vs. Temperature, $V_{dd} = 6.0\text{ V}$



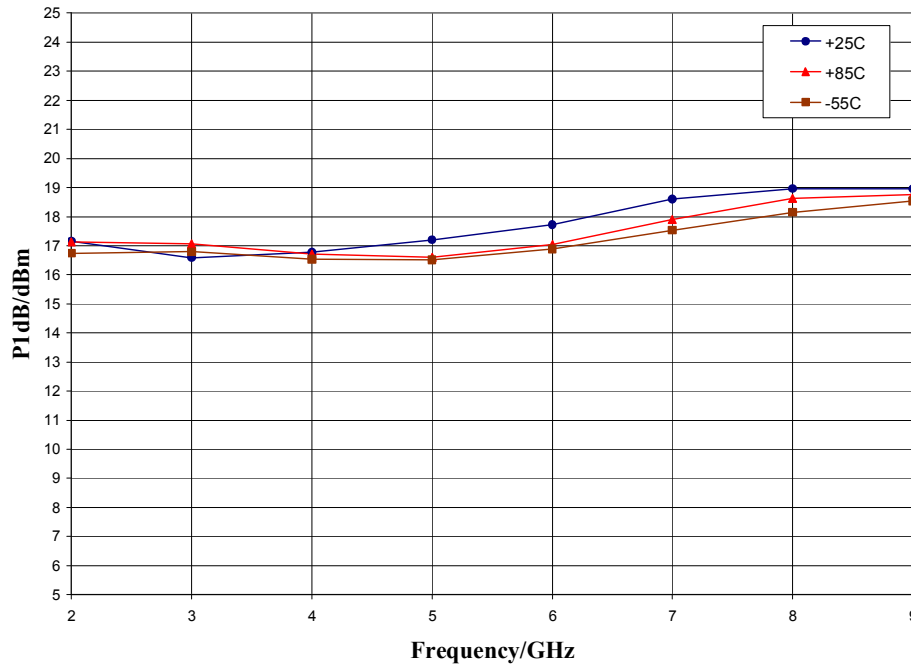
Noise Figure vs. Supply Voltage, $T_A = 25\text{ }^\circ\text{C}$



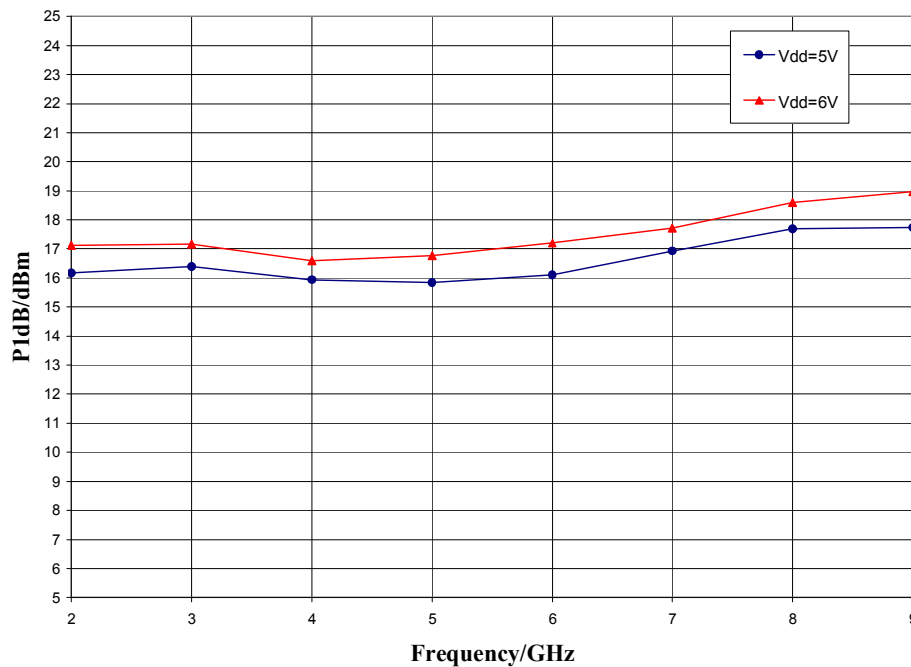
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Typical Performance

P1dB vs. Temperature, $V_{dd} = 6.0\text{ V}$



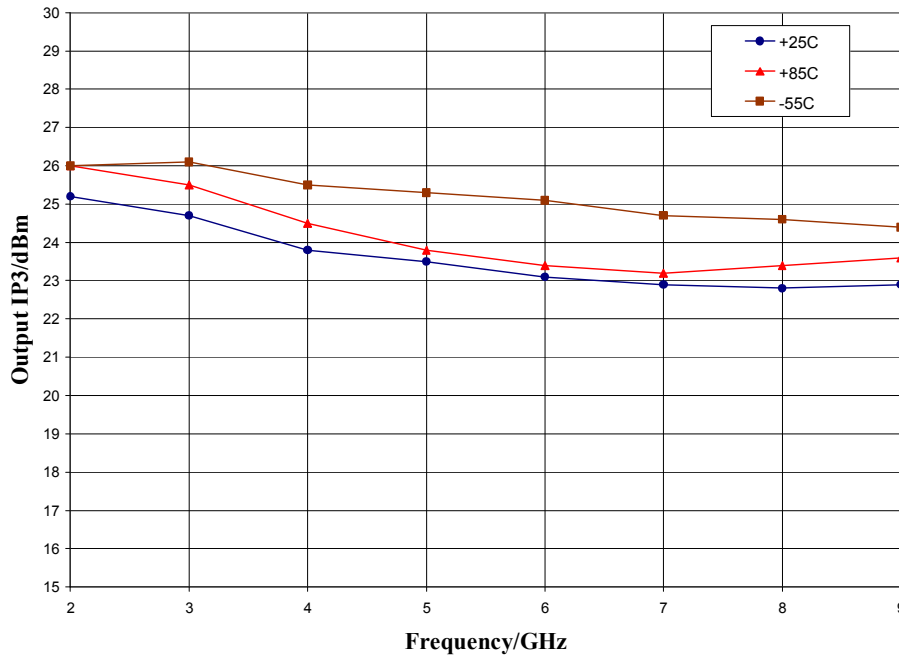
P1dB vs. Supply Voltage, $T_A = 25\text{ }^\circ\text{C}$



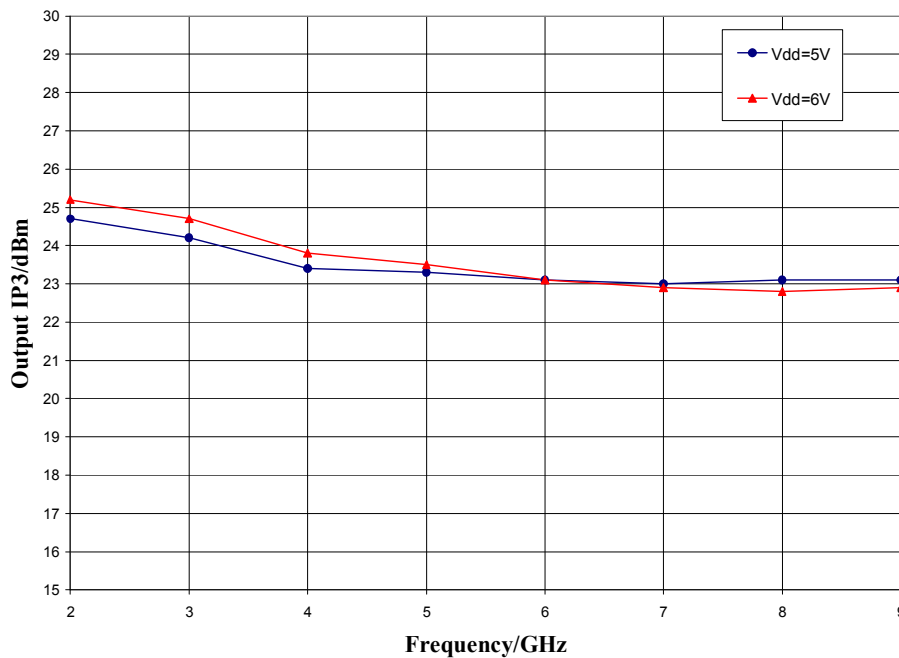
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Typical Performance

Output IP3 vs. Temperature, $V_{dd} = 6.0\text{ V}$



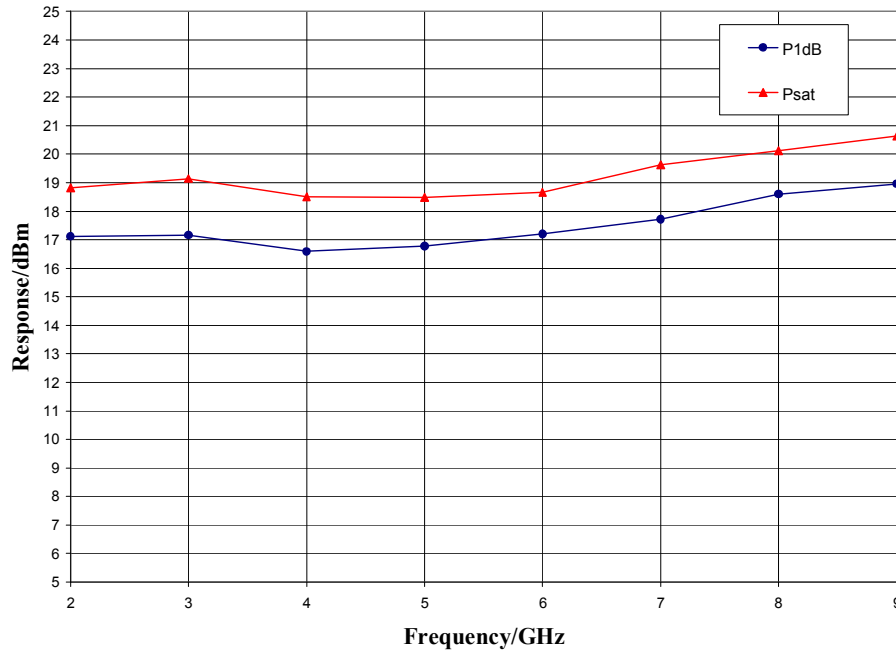
Output IP3 vs. Supply Voltage, $T_A = 25\text{ }^\circ\text{C}$



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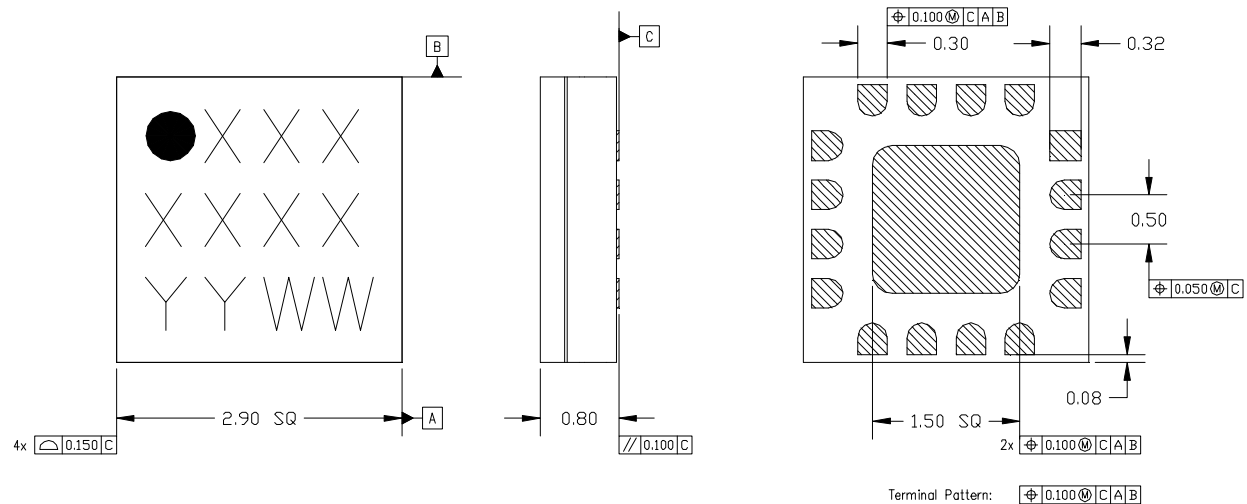
Typical Performance

Output Power, $V_{dd} = 6.0\text{ V}$, $T_A = 25\text{ }^\circ\text{C}$



Mechanical Information

Package Information and Dimensions



NOTES:

1. ALL DIMENSIONS SHOWN IN mm.
2. MATERIAL: BLACK ALUMINA
3. LEAD FINISH:
 - 3.1. Ni: 8.89 μ m MAX, 1.27 μ m MIN
 - 3.2. Pd: 0.17 μ m MAX, 0.07 μ m MIN
 - 3.3. Au: 0.254 μ m MAX, 0.03 μ m MIN
4. MARKING
 - 4.1. LINE 1: PART NUMBER
 - 4.1.1. EXAMPLE: CMD196C3 SHALL BE MARKED AS 196
 - 4.2. LINE 2: LOT NUMBER
 - 4.3. LINE 3: DATE CODE - LAST 2 DIGITS OF THE YEAR OF MANUFACTURE FOLLOWED BY A 2 DIGIT WEEK CODE
5. ALTERNATE PIN #1 IDENTIFIER IS A SINGLE SQUARE PAD
6. ALTERNATE DIE PADDLE MAY HAVE CHAMFERED CORNERS

Recommended PCB Land Pattern

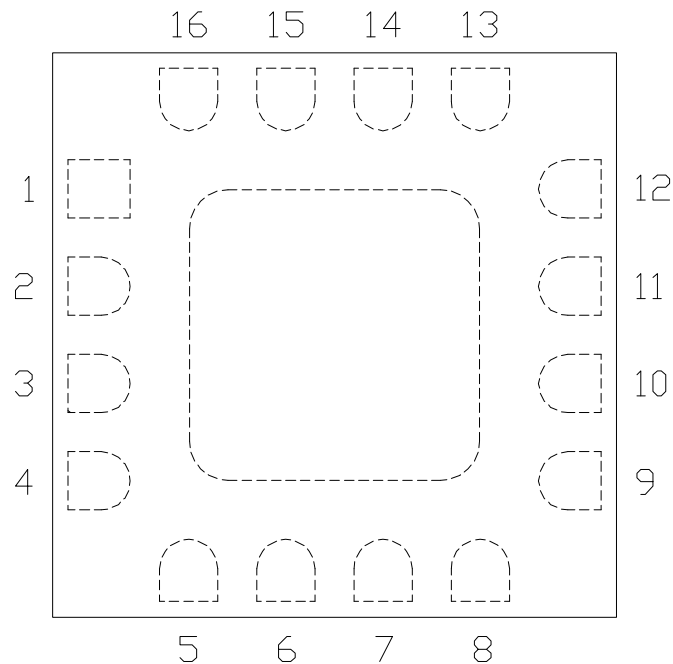
Custom MMIC Design Services recommends that the user develop the land pattern that will provide the best design for proper solder reflow and device attach for their specific application. Please review Custom MMIC Application Note AN 105 for a recommended land pattern approach.

Recommended Solder Reflow Profile

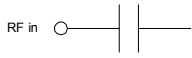
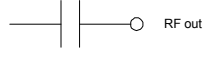
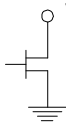

Custom MMIC Design Services recommends screen printing with belt furnace reflow to ensure proper solder reflow and device attach. Please review Custom MMIC Application Note AN 102 for a recommended solder reflow profile.

Pin Description

Pin Diagram



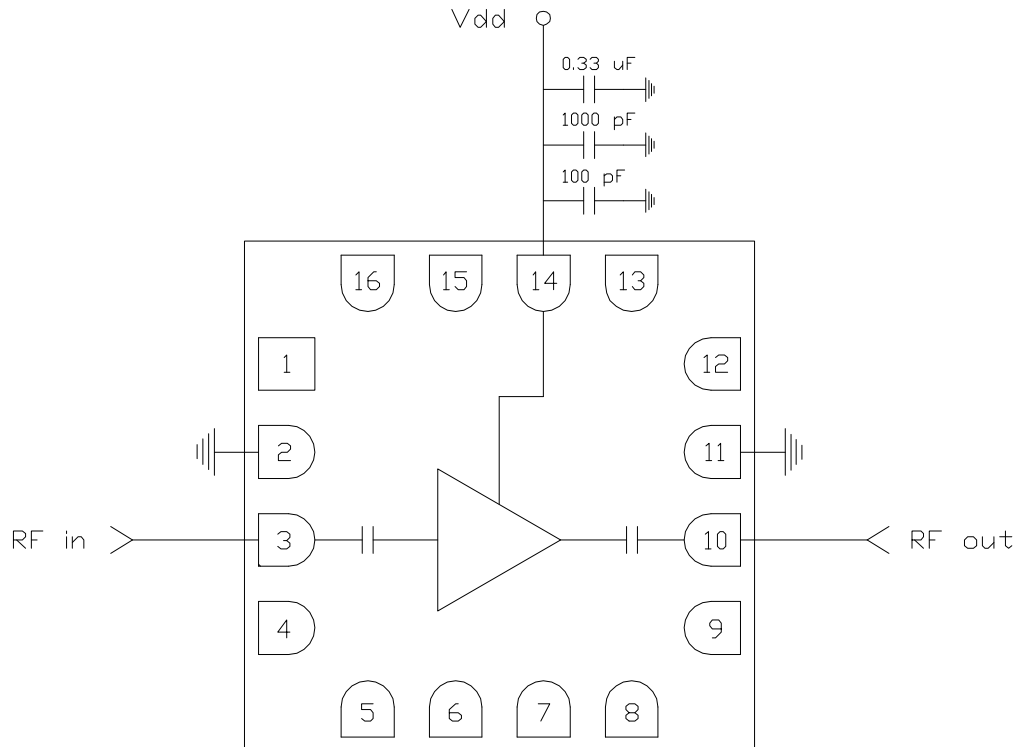
Functional Description

| Pin | Function | Description | Schematic |
|------------------------|----------|--|---|
| 1, 4-9, 12, 13, 15, 16 | N/C | No connection required. These pins may be connected to RF/DC ground. | |
| 3 | RF in | DC blocked and 50 ohm matched |  |
| 10 | RF out | DC blocked and 50 ohm matched |  |
| 14 | Vdd | Power supply voltage Decoupling and bypass caps required |  |
| 2, 11 and die paddle | Ground | Connect to RF / DC ground |  |

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Applications Information

Application Circuit



Biasing and Operation

The CMD232C3 is biased with a single positive drain supply. Performance is optimized when the drain voltage is set between +5.0 V and +6.0 V.

Turn ON procedure:

1. Apply drain voltage V_{dd} and set to +6 V

Turn OFF procedure:

1. Turn off drain voltage V_{dd}

RF power can be applied at any time.

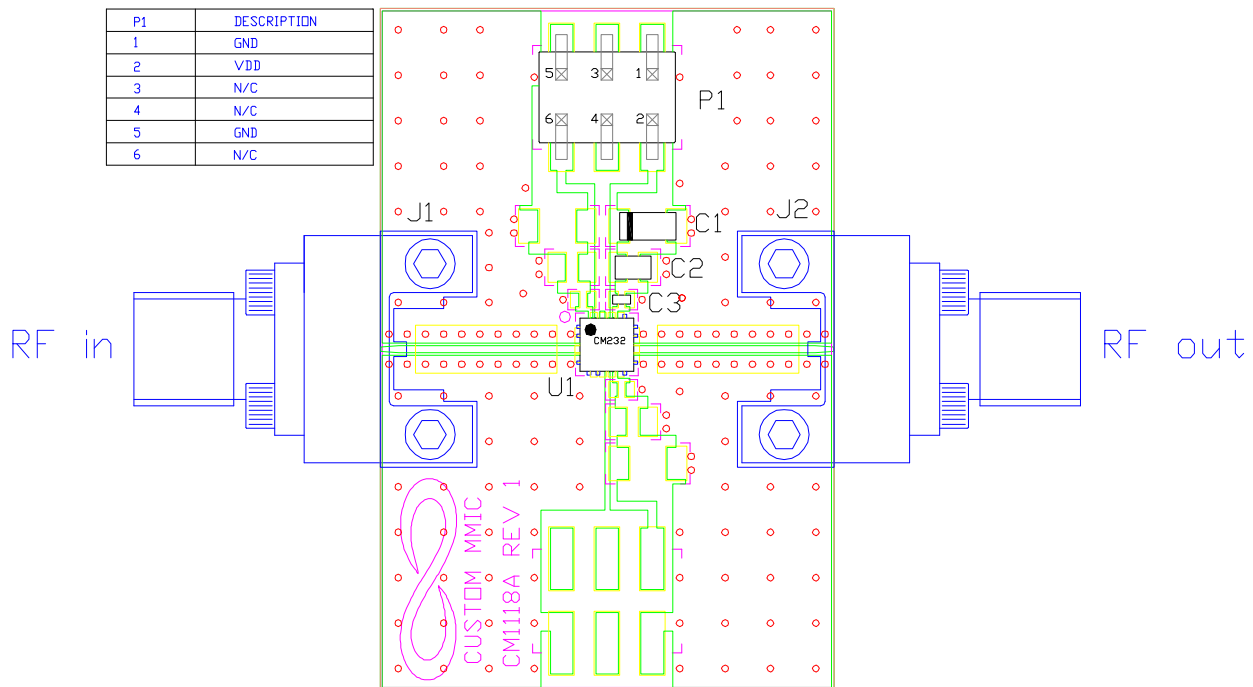
GaAs MMIC devices are susceptible to damage from Electrostatic Discharge. Proper precautions should be observed during handling, assembly and test.

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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 | | 6 Pin Header |
| C1 | 0.33 μ F | Capacitor, Tantalum |
| C2 | 1000 pF | Capacitor, 0603 |
| C3 | 100 pF | Capacitor, 0402 |
| U1 | | CMD232C3 Low Noise Amplifier |
| PCB | | CM1118A Evaluation PCB |

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