



# CMD308P4

## 2-6 GHz Low Noise Amplifier

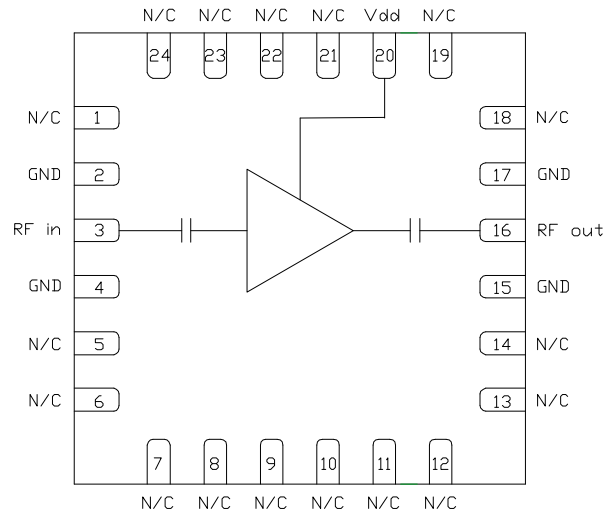
### Features

- ▶ Low noise figure
- ▶ High gain broadband performance
- ▶ Low current consumption
- ▶ Single positive bias
- ▶ Pb-free RoHs compliant 4x4 QFN package

### Description

The CMD308P4 is a broadband MMIC low noise amplifier housed in a leadless 4x4 mm plastic surface mount QFN package. The CMD308P4 is ideally suited for microwave radios and S and C-band applications where high gain, low noise figure and low power consumption are needed. The broadband device delivers 31 dB of gain with a corresponding output 1 dB compression point of +12 dBm and a noise figure of 1.6 dB. The CMD308P4 is a 50 ohm matched design eliminating the need for external DC blocks and RF port matching.

### Functional Block Diagram



### Electrical Performance - $V_{dd} = 4.0 \text{ V}$ , $T_A = 25^\circ\text{C}$ , $F = 4 \text{ GHz}$

| Parameter          | Min   | Typ | Max | Units |
|--------------------|-------|-----|-----|-------|
| Frequency Range    | 2 - 6 |     |     | GHz   |
| Gain               |       | 31  |     | dB    |
| Noise Figure       |       | 1.6 |     | dB    |
| Input Return Loss  |       | 18  |     | dB    |
| Output Return Loss |       | 14  |     | dB    |
| Output P1dB        |       | 12  |     | dBm   |
| Supply Current     |       | 45  |     | mA    |

ver 1.0 0819



# CMD308P4

## 2-6 GHz Low Noise Amplifier

### Specifications

#### Absolute Maximum Ratings

| Parameter                            | Rating        |
|--------------------------------------|---------------|
| Drain Voltage, Vdd                   | 5.5 V         |
| RF Input Power                       | +20 dBm       |
| Channel Temperature, Tch             | 150 °C        |
| Power Dissipation, P <sub>diss</sub> | 494 mW        |
| Thermal Resistance $\Theta_{JC}$     | 131 °C/W      |
| Operating Temperature                | -40 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 |
|-----------|-----|-----|-----|-------|
| Vdd       | 3.0 | 4.0 | 5.0 | V     |
| Idd       |     | 45  |     | mA    |

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

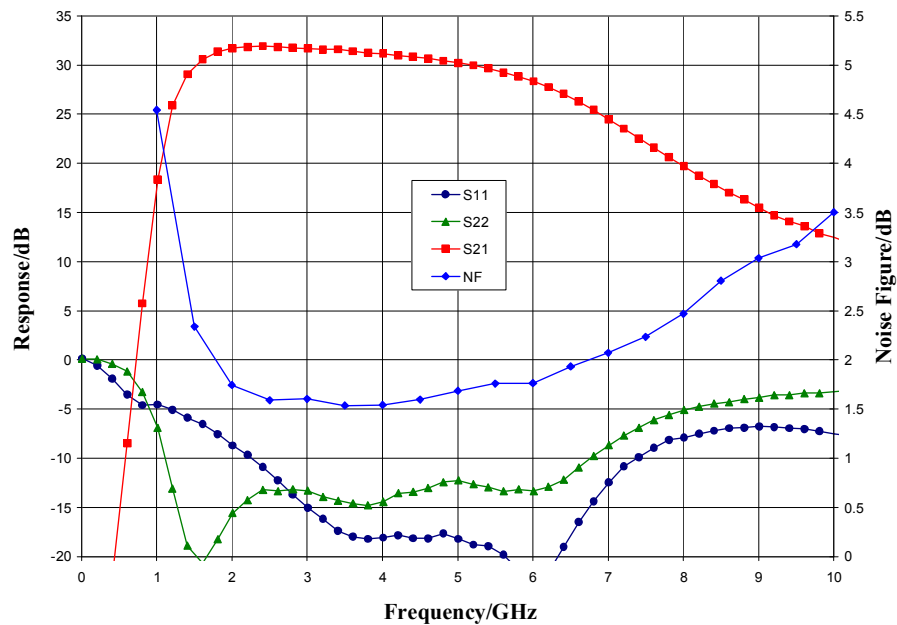
#### Electrical Specifications - V<sub>dd</sub> = 4.0 V, T<sub>A</sub> = 25 °C

| Parameter                            | Min   | Typ   | Max | Min   | Typ   | Max | Units |
|--------------------------------------|-------|-------|-----|-------|-------|-----|-------|
| Frequency Range                      | 2 - 4 |       |     | 4 - 6 |       |     | GHz   |
| Gain                                 | 28    | 31    |     | 25    | 30    |     | dB    |
| Noise Figure                         |       | 1.6   | 2.2 |       | 1.7   | 2.3 | dB    |
| Input Return Loss                    |       | 15    |     |       | 18    |     | dB    |
| Output Return Loss                   |       | 13    |     |       | 13    |     | dB    |
| Output P <sub>1dB</sub>              |       | 12.5  |     |       | 13    |     | dBm   |
| Output IP <sub>3</sub>               |       | 22.5  |     |       | 23.5  |     | dBm   |
| Supply Current                       | 30    | 45    | 60  | 30    | 45    | 60  | mA    |
| Gain Temperature Coefficient         |       | 0.015 |     |       | 0.015 |     | dB/°C |
| Noise Figure Temperature Coefficient |       | 0.007 |     |       | 0.007 |     | dB/°C |

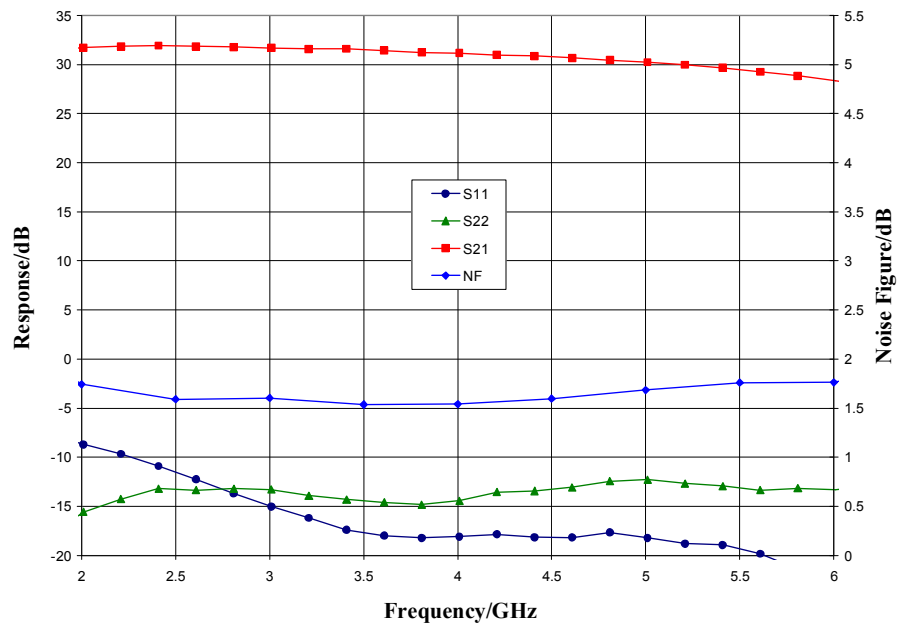
ver 1.0 0819

### Typical Performance

**Broadband Performance,  $V_{dd} = 4.0$  V,  $T_A = 25$  °C**



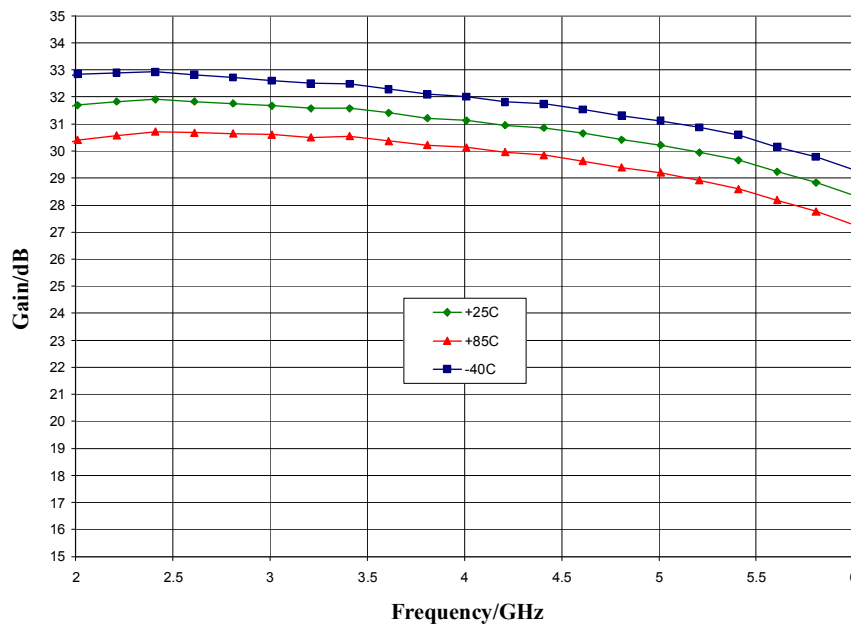
**Narrow-band Performance,  $V_{dd} = 4.0$  V,  $T_A = 25$  °C**



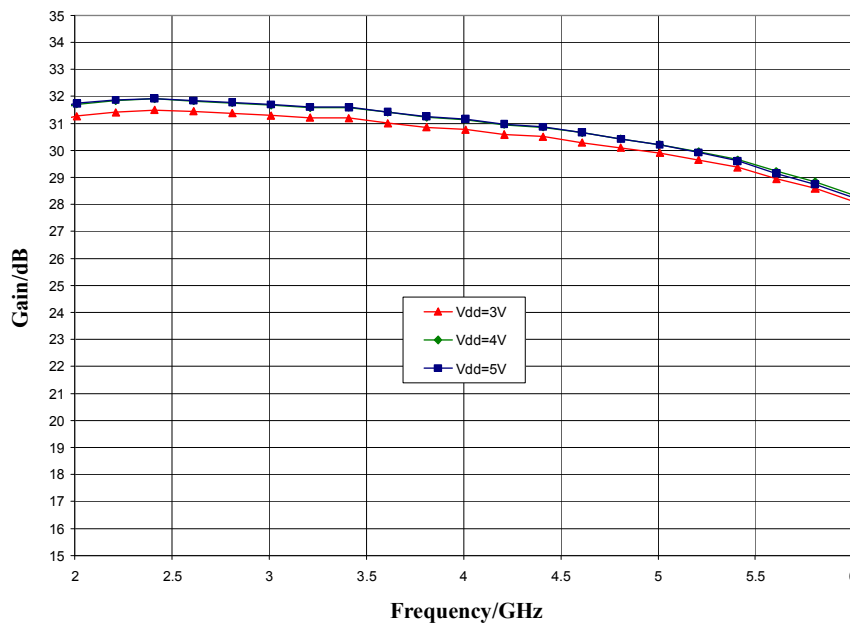
ver 1.0 0819

### Typical Performance

Gain vs. Temperature,  $V_{dd} = 4.0 \text{ V}$



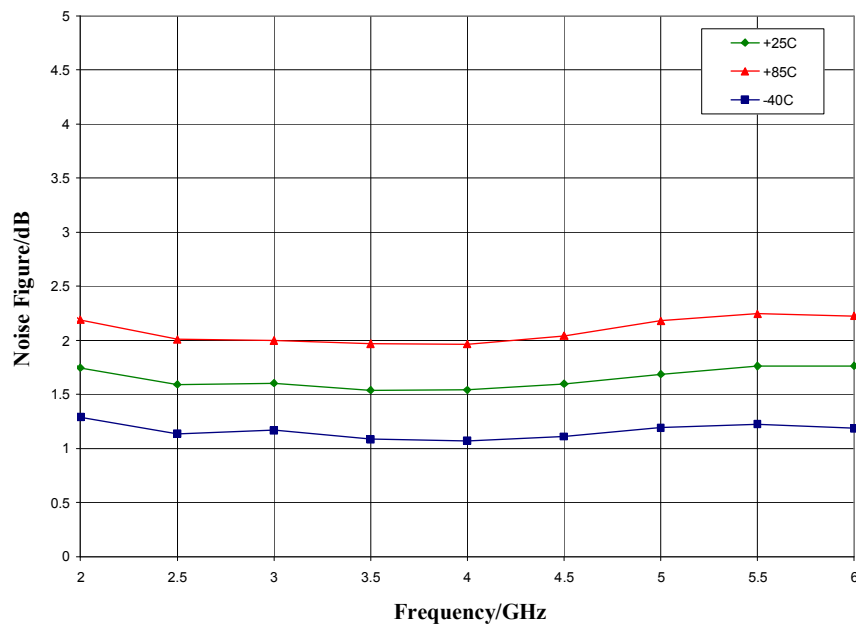
Gain vs.  $V_{dd}$ ,  $T_A = 25^\circ\text{C}$



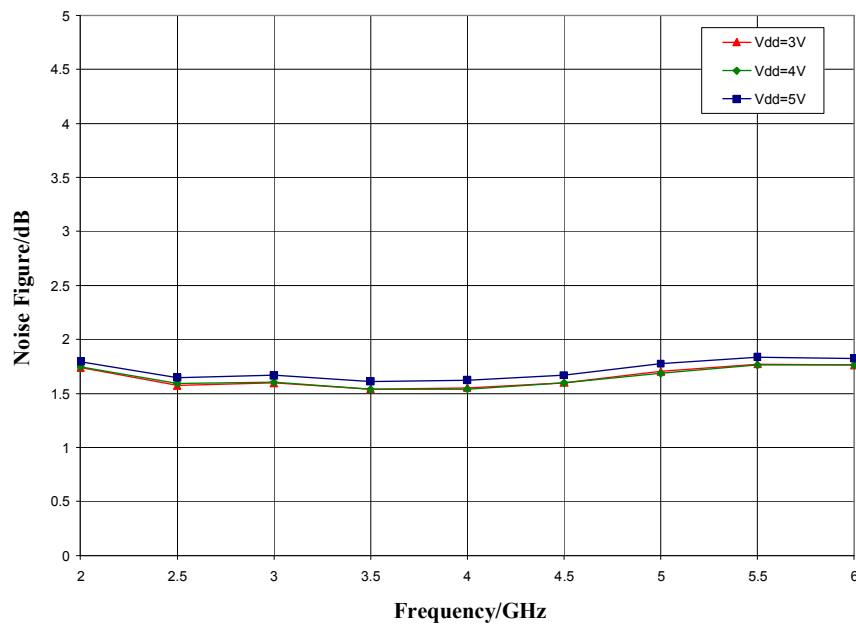
ver 1.0 0819

### Typical Performance

Noise Figure vs. Temperature,  $V_{dd} = 4.0 \text{ V}$

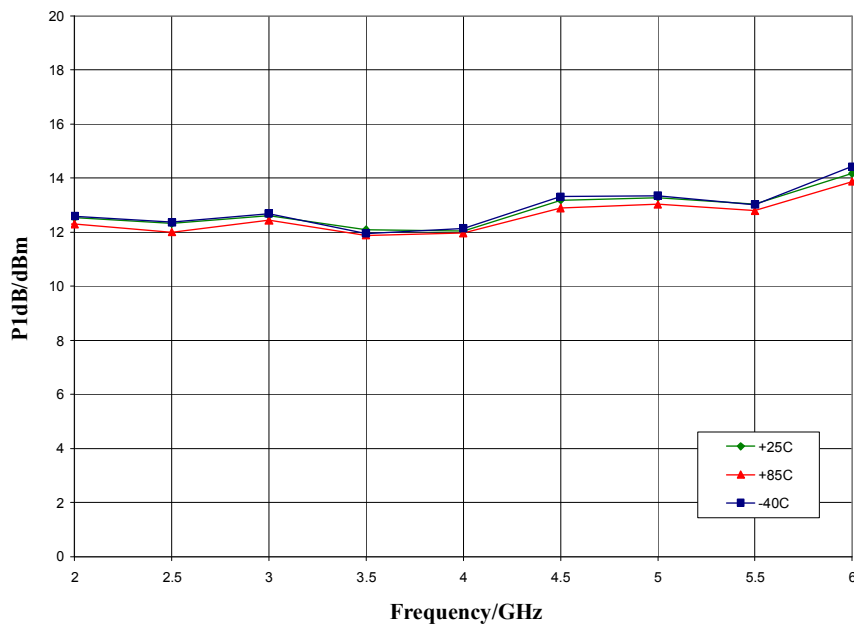


Noise Figure vs.  $V_{dd}$ ,  $T_A = 25^\circ\text{C}$

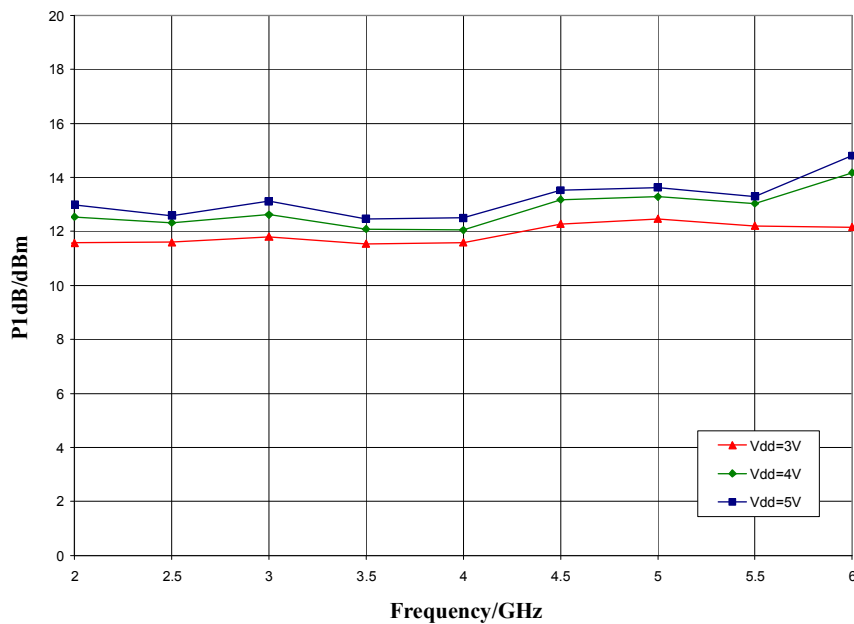


### Typical Performance

**P1dB vs. Temperature,  $V_{dd} = 4.0$  V**



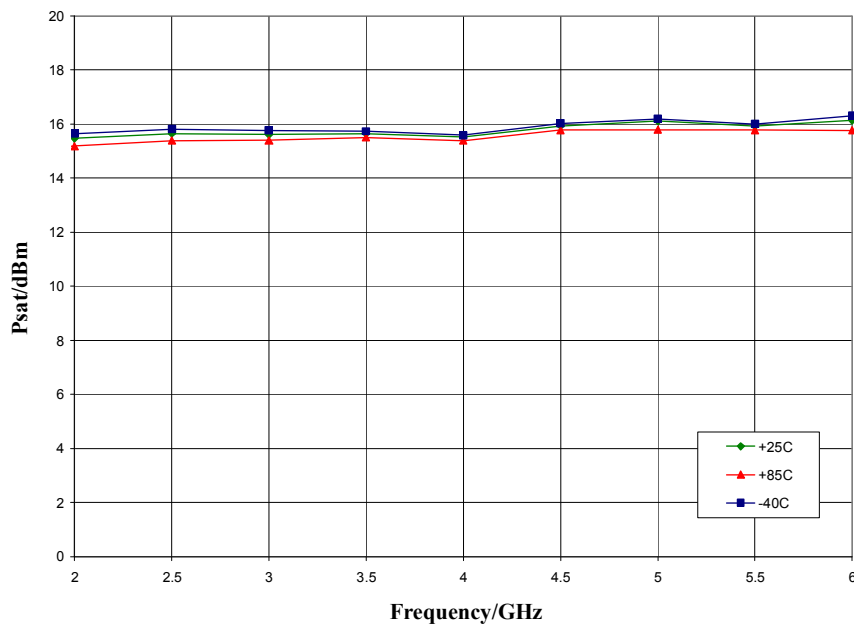
**P1dB vs.  $V_{dd}$ ,  $T_A = 25$  °C**



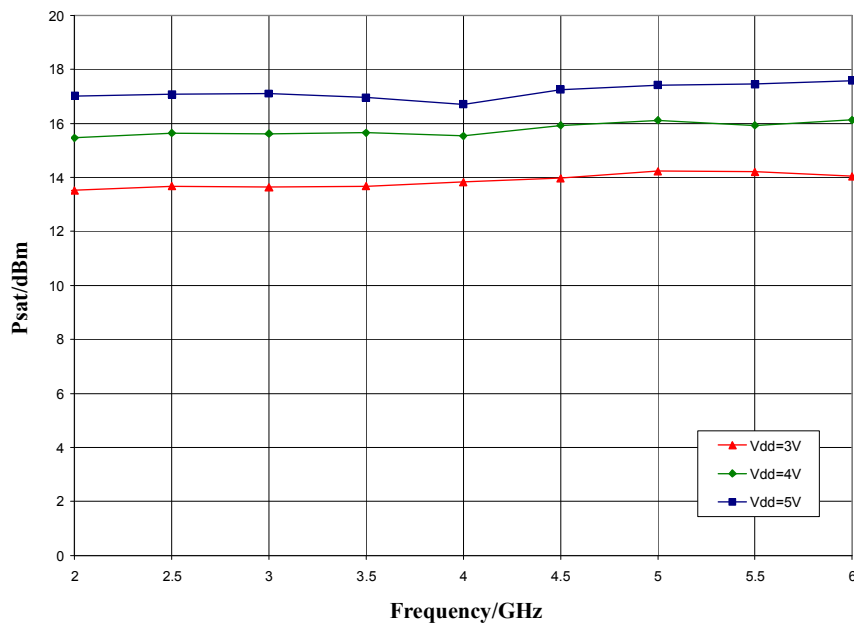
ver 1.0 0819

### Typical Performance

**Psat vs. Temperature,  $V_{dd} = 4.0$  V**



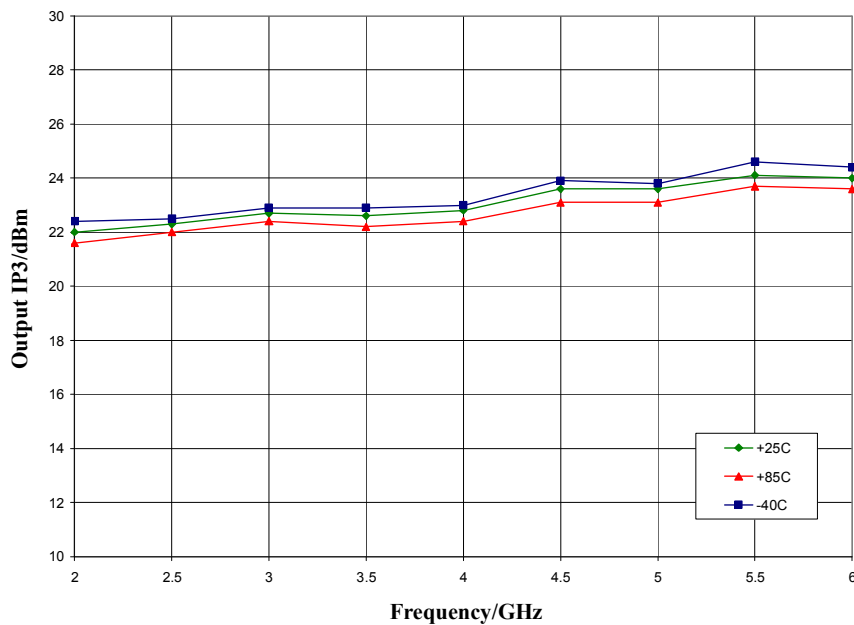
**Psat vs.  $V_{dd}$ ,  $T_A = 25$  °C**



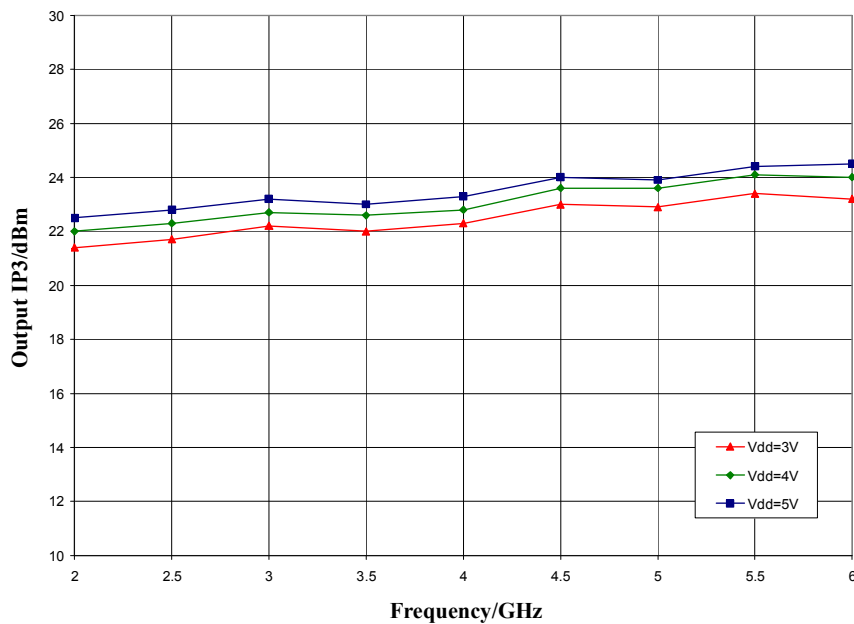
ver 1.0 0819

### Typical Performance

**Output IP3 vs. Temperature,  $V_{dd} = 4.0$  V**



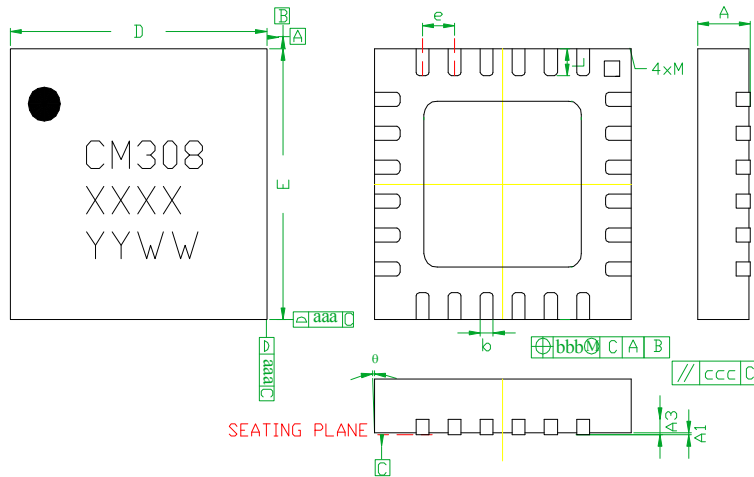
**Output IP3 vs.  $V_{dd}$ ,  $T_A = 25$  °C**



ver 1.0 0819

### Mechanical Information

#### Package Information and Dimensions



| SYMBOLS | DIMENSIONS IN MILLIMETERS |          |      |
|---------|---------------------------|----------|------|
|         | MIN                       | NOM      | MAX  |
| A       | 0.80                      | 0.90     | 1.00 |
| A1      | 0                         | 0.02     | 0.05 |
| A3      | —                         | 0.25REF. | —    |
| b       | 0.18                      | 0.23     | 0.30 |
| D       | 3.85                      | 4.00     | 4.15 |
| D1      | —                         | 2.45BSC  | —    |
| E       | 3.85                      | 4.00     | 4.15 |
| E1      | —                         | 2.45BSC  | —    |
| e       | —                         | 0.50BSC  | —    |
| L       | 0.30                      | 0.40     | 0.50 |
| theta   | 0                         | —        | 12   |
| aaa     | —                         | 0.25     | —    |
| bbb     | —                         | 0.10     | —    |
| ccc     | —                         | 0.10     | —    |
| M       | —                         | —        | 0.05 |

#### NOTES:

1. DIMENSIONS ARE IN MILLIMETERS
2. RoHS COMPLIANT MOLD COMPOUND
3. LEADFRAME MATERIAL: COPPER ALLOY
4. LEAD FINISH: 100% MATTE Sn
5. INDICATED DIMENSION/TOLERANCE APPLIES TO LEADS AND EXPOSED PAD

#### Recommended PCB Land Pattern

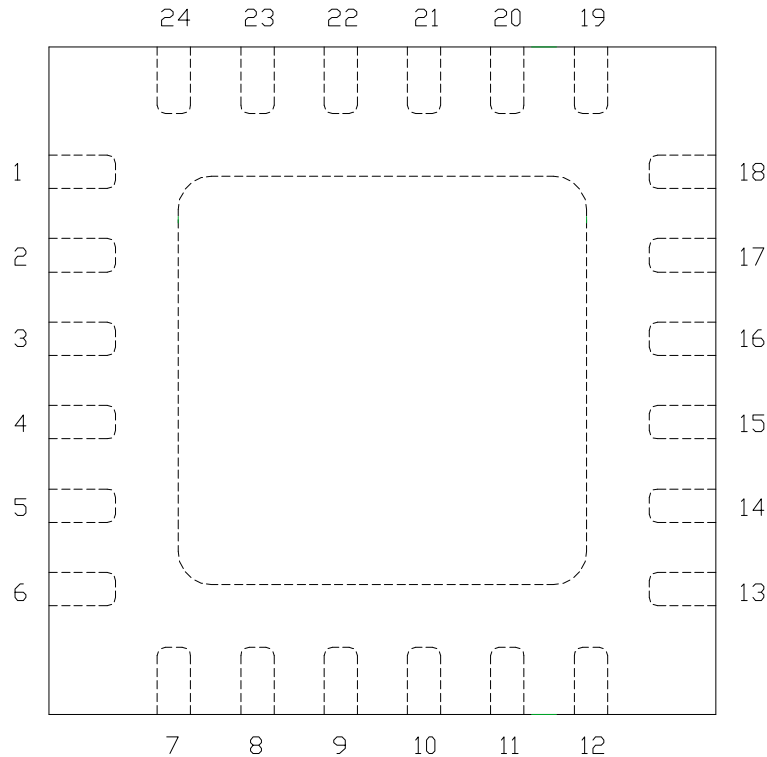
Custom MMIC recommends that the user develop the land pattern that will provide the best design for proper solder reflow and device attach for their specific application. Please review Custom MMIC Application Note AN 105 for a recommended land pattern approach.

#### Recommended Solder Reflow Profile

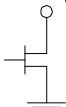
Custom MMIC recommends screen printing with belt furnace reflow to ensure proper solder reflow and device attach. Please review Custom MMIC Application Note AN 102 for a recommended solder reflow profile.

### Pin Description

#### Pin Diagram



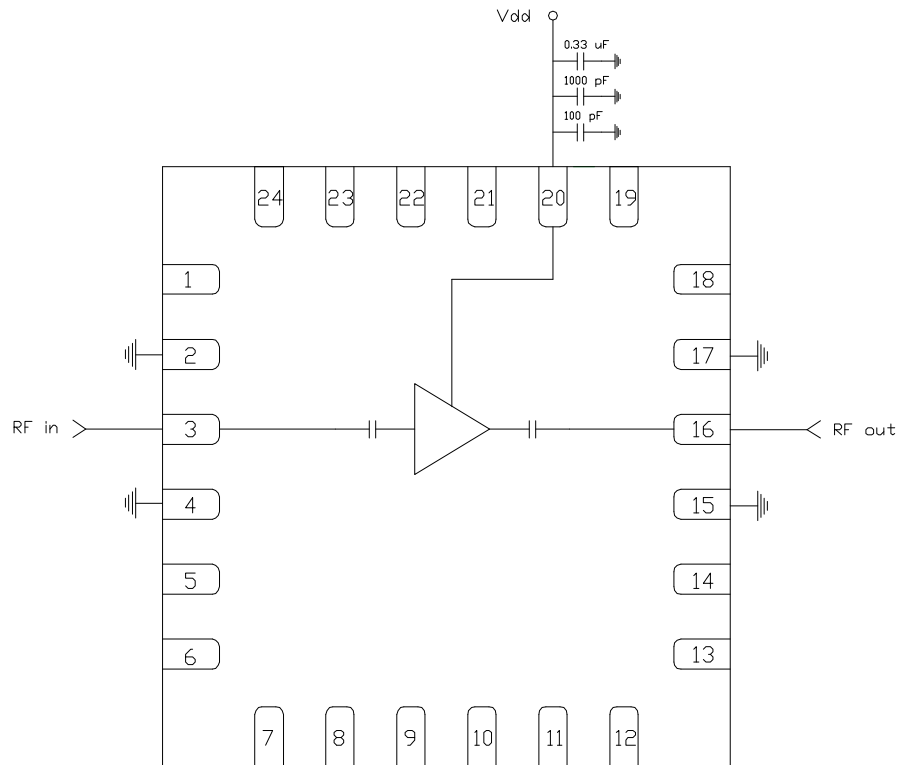
#### Functional Description

| Pad                         | Function | Description                                                         | Schematic                                                                             |
|-----------------------------|----------|---------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| 1, 5-14, 18, 19, 21-24      | 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                                       |  |
| 16                          | RF out   | DC blocked and 50 ohm matched                                       |  |
| 20                          | Vdd      | Power supply voltage<br>Decoupling and bypass caps required         |  |

ver 1.0 0819

### Applications Information

#### Application Circuit



#### Biasing and Operation

The CMD308P4 is biased with a single positive drain supply.

Turn ON procedure:

1. Apply drain voltage  $V_{dd}$  and set to +4 V

Turn OFF procedure:

1. Turn off drain voltage  $V_{dd}$

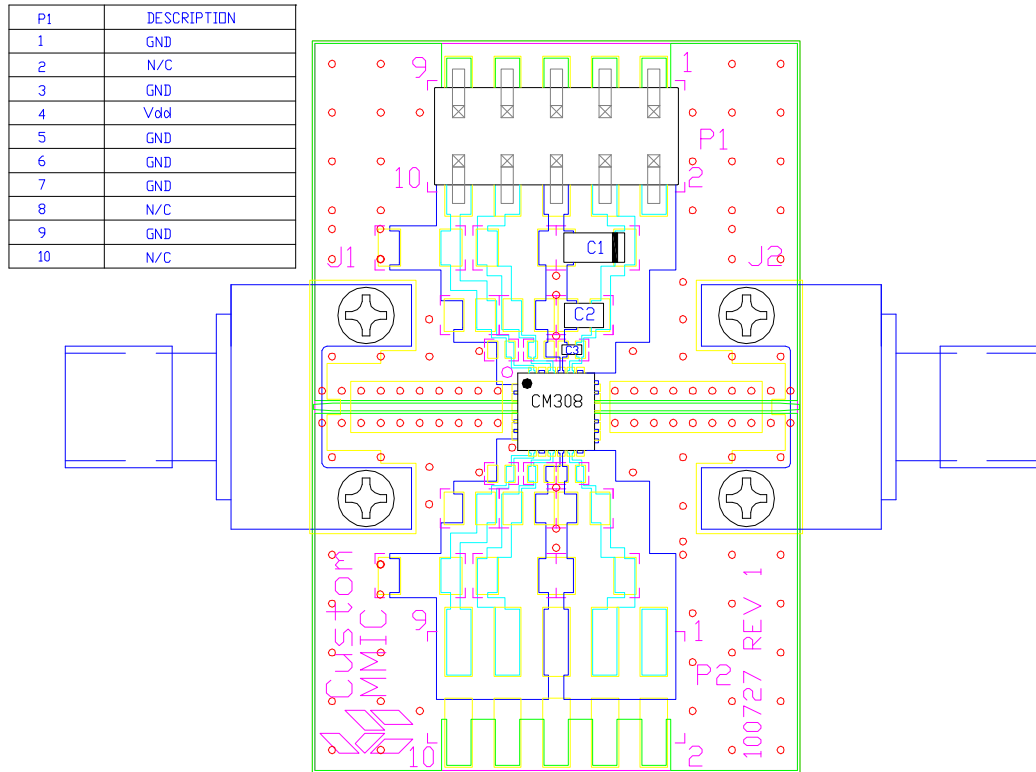
RF power can be applied at any time.

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

ver 1.0 0819

### Applications Information

#### Evaluation Board



#### Bill of Material

| Designator | Value        | Description                  |
|------------|--------------|------------------------------|
| J1, J2     |              | SMA End Launch Connector     |
| P1         |              | 10 Pin DC Header             |
| C1         | 0.33 $\mu$ F | Capacitor, Tantalum          |
| C2         | 1000 pF      | Capacitor, 0603              |
| C3         | 100 pF       | Capacitor, 0402              |
| U1         |              | CMD308P4 Low Noise Amplifier |
| PCB        |              | 100727 Evaluation PCB        |

# Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

[Qorvo:](#)

[CMD308P4-EVB](#) [CMD308P4](#)