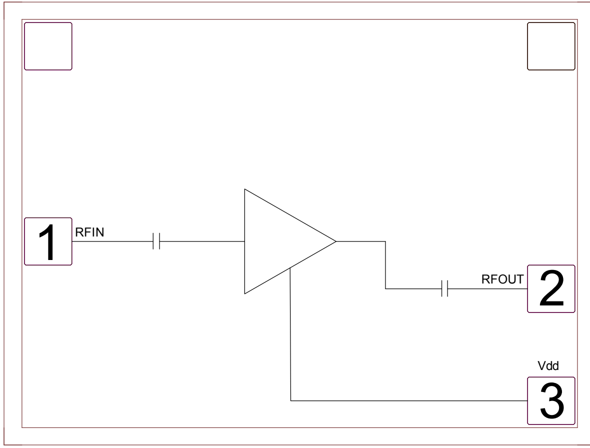
# CMD231

## 2-6 GHz Driver Amplifier

### Features

- ► High gain
- ► Single positive supply voltage
- ► Low current consumption
- ► Small die size
- ► CMM-2 replacement

### Functional Block Diagram




### Description

The CMD231 is a wideband GaAs MMIC driver amplifier ideally suited for military, space and communications systems where small size and high linearity are needed. At 4 GHz the device delivers greater than 14.5 dB of gain with a corresponding output 1 dB compression point of +13.5 dBm and an output IP3 of 23.5 dBm. The CMD231 is a 50 ohm matched design which eliminates the need for external DC blocks and RF port matching. The CMD231 offers full passivation for increased reliability and moisture protection.

### *Electrical Performance* - $V_{dd}$ = 8.0 V, $T_A$ = 25 °C, F = 4 GHz

| Parameter | Min | Typ | Max | Units |
|---|---|---|---|---|
| Frequency Range | | 2 - 6 | | GHz |
| Gain | | 14.5 | | dB |
| Input Return Loss | | 15 | | dB |
| Output Return Loss | | 10 | | dB |
| Output P1dB | | 13.5 | | dBm |
| Output IP3 | | 23.5 | | dBm |
| Supply Current | | 45 | | mA |

ver 1.4 0919

## Specifications

### Absolute Maximum Ratings

| Parameter | Rating |
|---|---|
| Drain Voltage, Vdd | 9 V |
| RF Input Power | +20 dBm |
| Channel Temperature, Tch | 150 °C |
| Power Dissipation, Pdiss | 919 mW |
| Thermal Resistance, $\Theta_{JC}$ | 70.7 °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 |
|---|---|---|---|---|
| Vdd | 3.0 | 8.0 | 8.25 | V |
| Idd | | 45 | | mA |

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

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

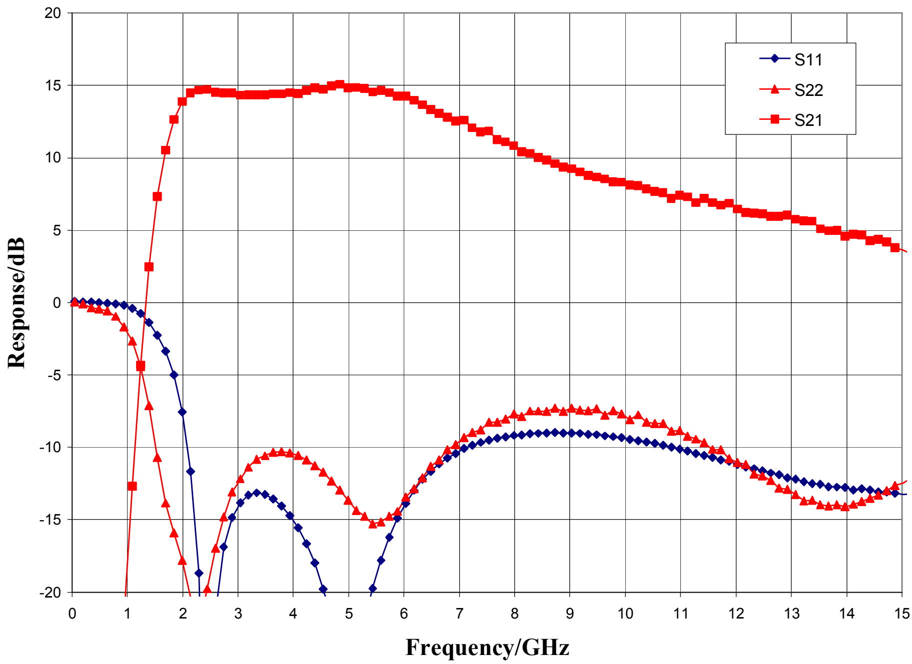
| Parameter | Min | Typ | Max | Units |
|---|---|---|---|---|
| Frequency Range | 2 - 6 | | | GHz |
| Gain | 11.5 | 14.5 | 18 | dB |
| Noise Figure | | 4.5 | | dB |
| Input Return Loss | | 15 | | dB |
| Output Return Loss | | 10 | | dB |
| Output P1dB | 11 | 13.5 | | dBm |
| Output IP3 | | 23.5 | | dBm |
| Supply Current | 30 | 45 | 60 | mA |
| Gain Temperature Coefficient | | 0.015 | | dB/°C |
| Noise Figure Temperature Coefficient | | 0.01 | | dB/°C |



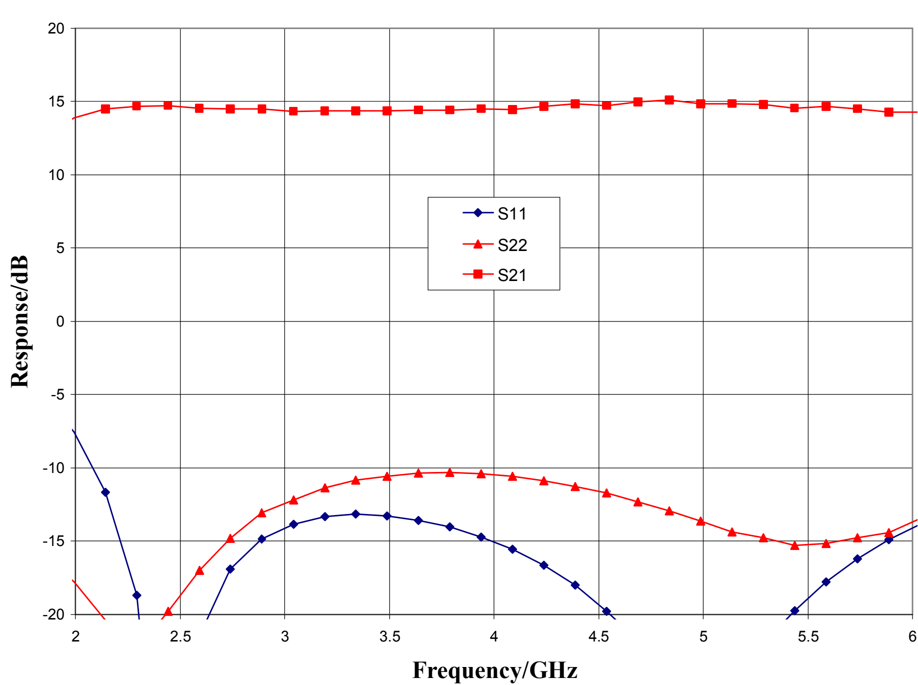
*Custom MMIC*
*300 Apollo Drive Chelmsford, MA 01824 Phone (978) 467-4290 Fax (978) 467-4294*
*Visit us online at www.custommmic.com*

## *Typical Performance*

**Broadband Performance, $V_{dd}$ = 8.0 V, $I_{dd}$ = 45 mA, $T_A$ = 25 °C**




**Narrow-band Performance, $V_{dd}$ = 8.0 V, $I_{dd}$ = 45 mA, $T_A$ = 25 °C**



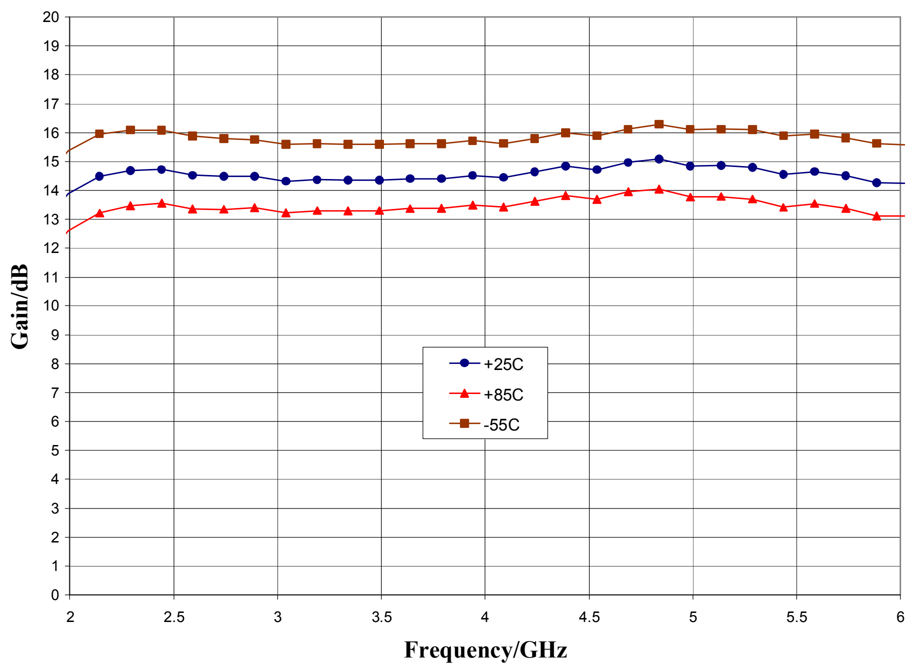




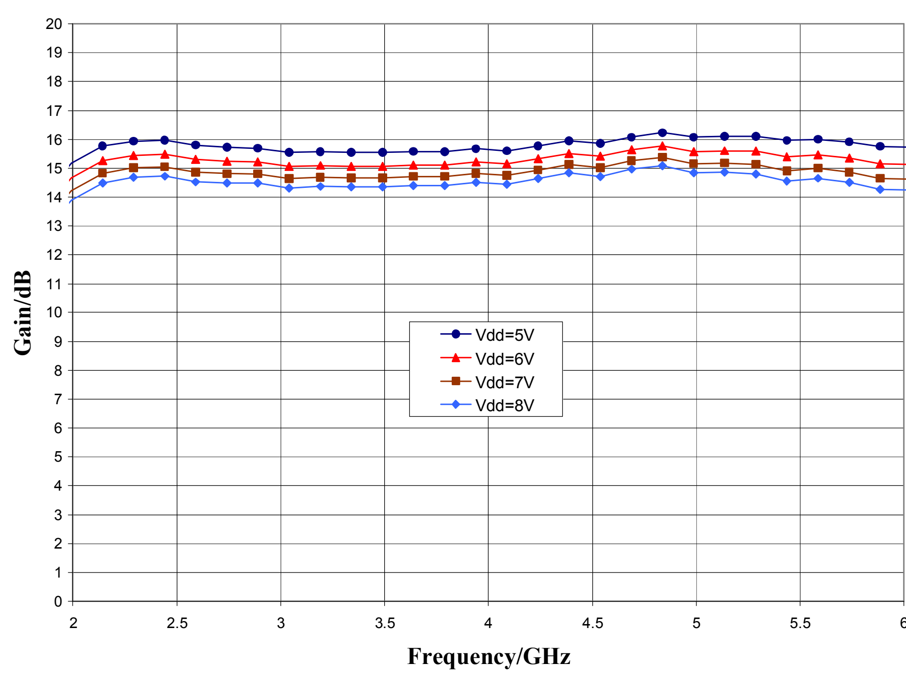
*Custom MMIC*
*300 Apollo Drive Chelmsford, MA 01824 Phone (978) 467-4290 Fax (978) 467-4294*
*Visit us online at www.custommmic.com*

## Typical Performance

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




### Gain vs. Supply Voltage, $T_A$ = 25 °C

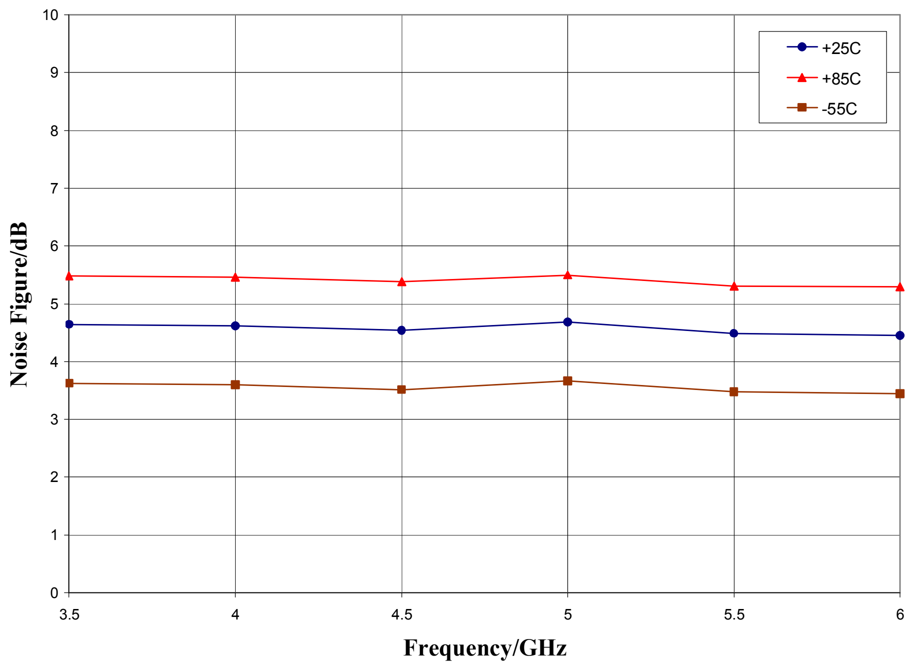




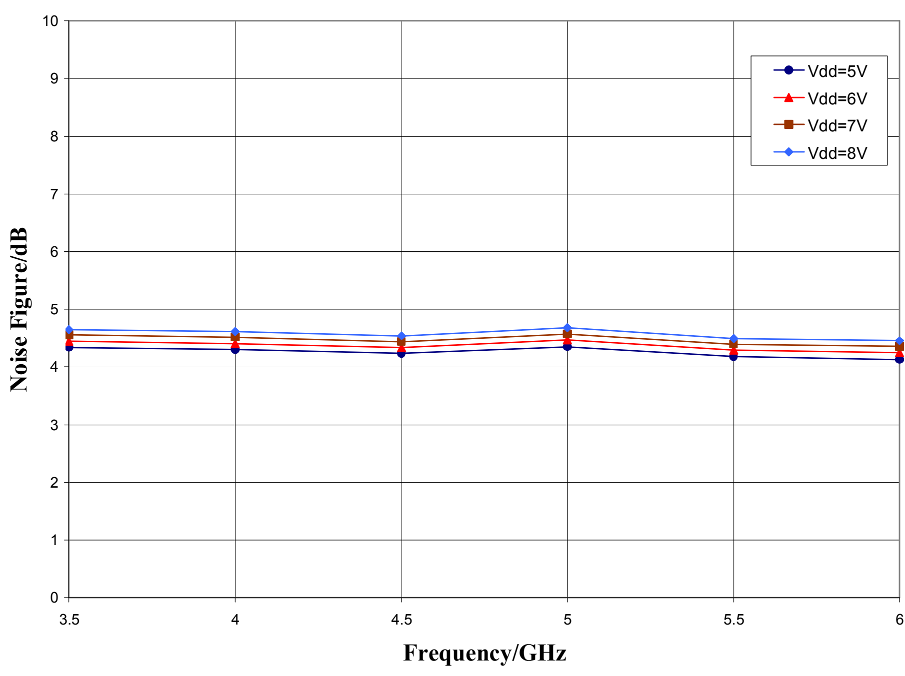

Custom MMIC
300 Apollo Drive Chelmsford, MA 01824 Phone (978) 467-4290 Fax (978) 467-4294
Visit us online at www.custommmic.com

## *Typical Performance*

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




### Noise Figure vs. Supply Voltage, $T_A$ = 25 °C

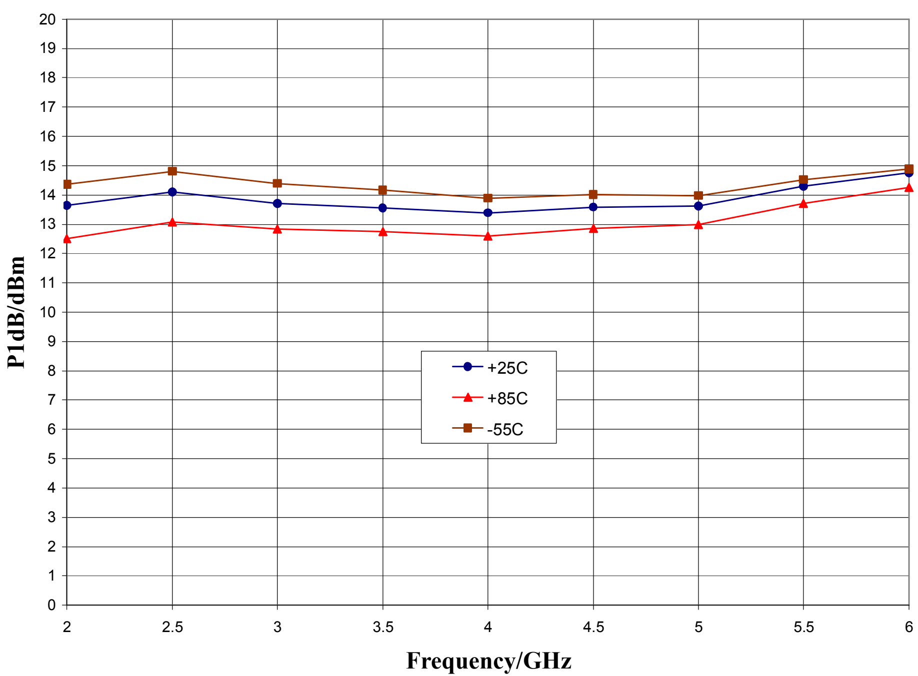




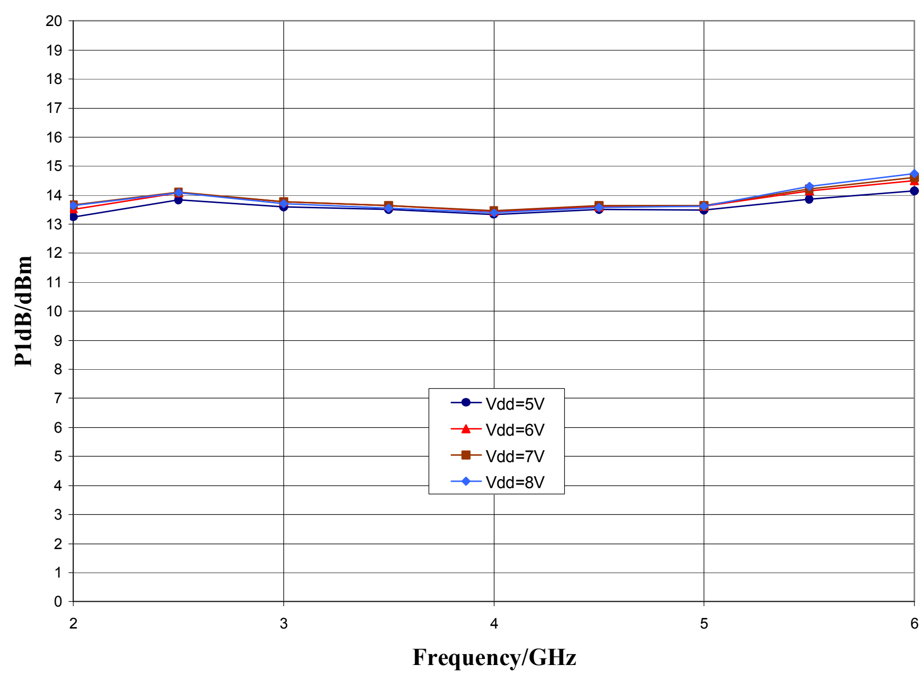

*Custom MMIC*
*300 Apollo Drive Chelmsford, MA 01824 Phone (978) 467-4290 Fax (978) 467-4294*
*Visit us online at www.custommmic.com*

## *Typical Performance*

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




**P1dB vs. Supply Voltage, $T_A$ = 25 $^oC$**

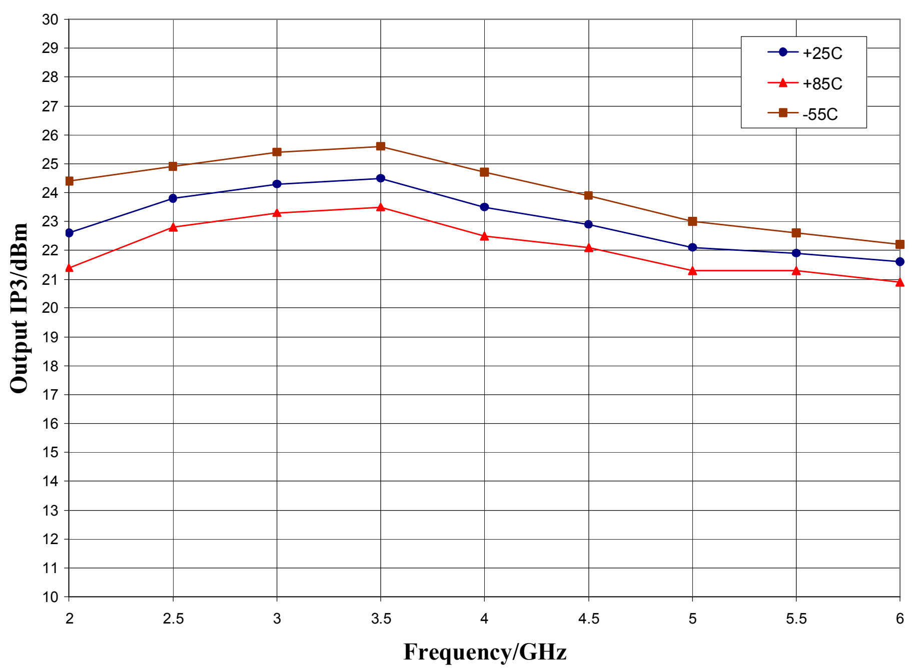




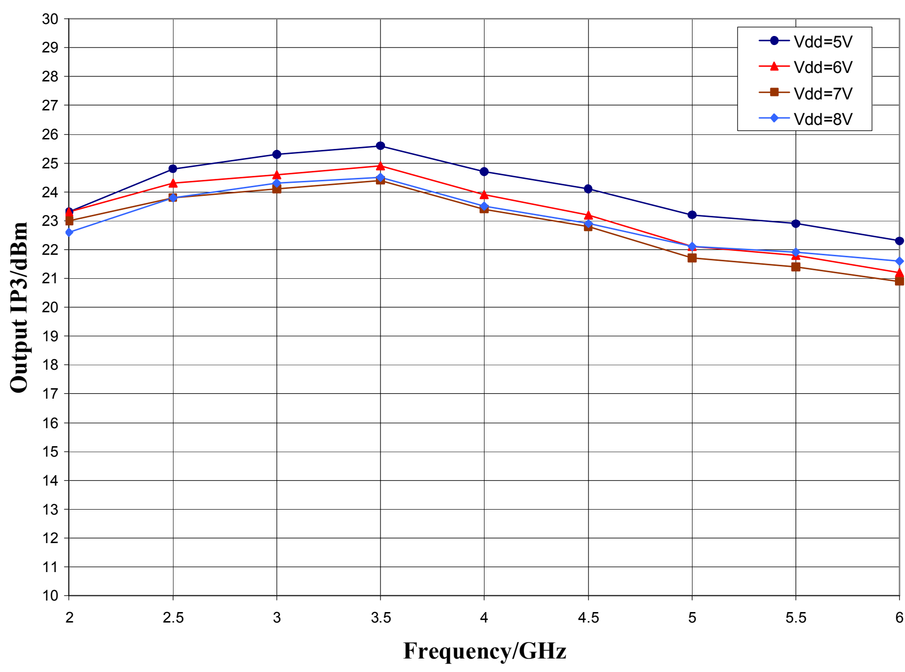

*Custom MMIC*
*300 Apollo Drive Chelmsford, MA 01824 Phone (978) 467-4290 Fax (978) 467-4294*
*Visit us online at www.custommmic.com*

## *Typical Performance*

### Output IP3 vs. Temperature, $V_{dd}$ = 8.0 V




### Output IP3 vs. Supply Voltage, $T_A$ = 25 °C

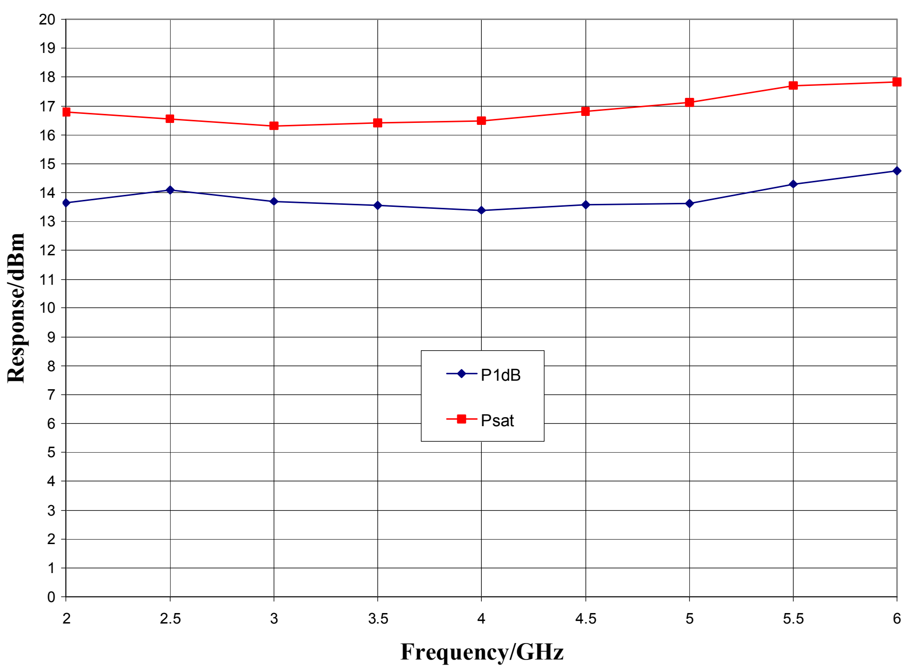





*Custom MMIC*
*300 Apollo Drive Chelmsford, MA 01824 Phone (978) 467-4290 Fax (978) 467-4294*
*Visit us online at www.custommmic.com*

## *Typical Performance*

**Output Power, Vdd = 8.0 V, $T_A$ = 25 °C**

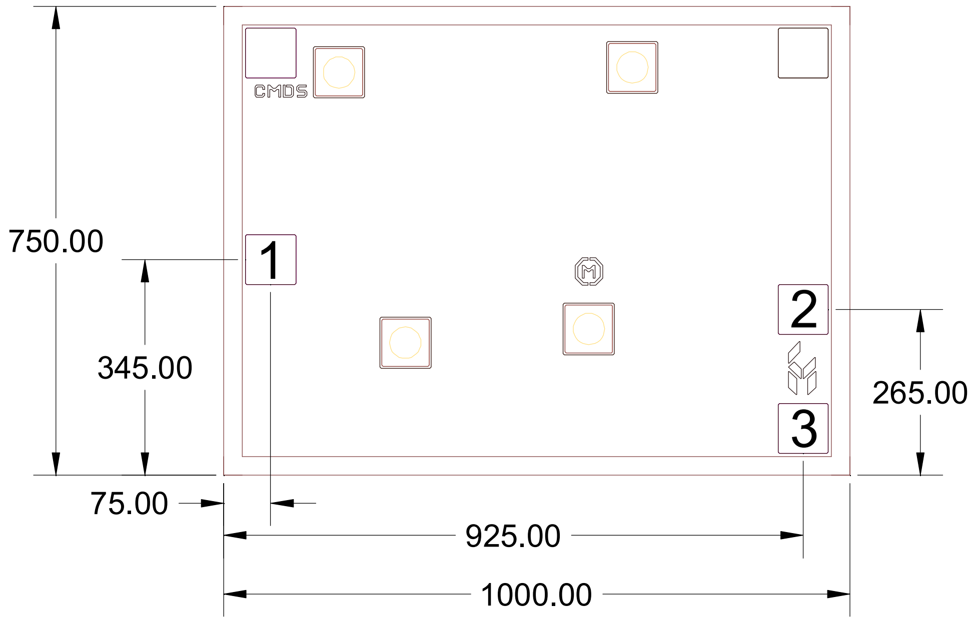





*Custom MMIC*
*300 Apollo Drive Chelmsford, MA 01824 Phone (978) 467-4290 Fax (978) 467-4294*
*Visit us online at www.custommmic.com*

## *Mechanical Information*

**Die Outline (all dimensions in microns)**



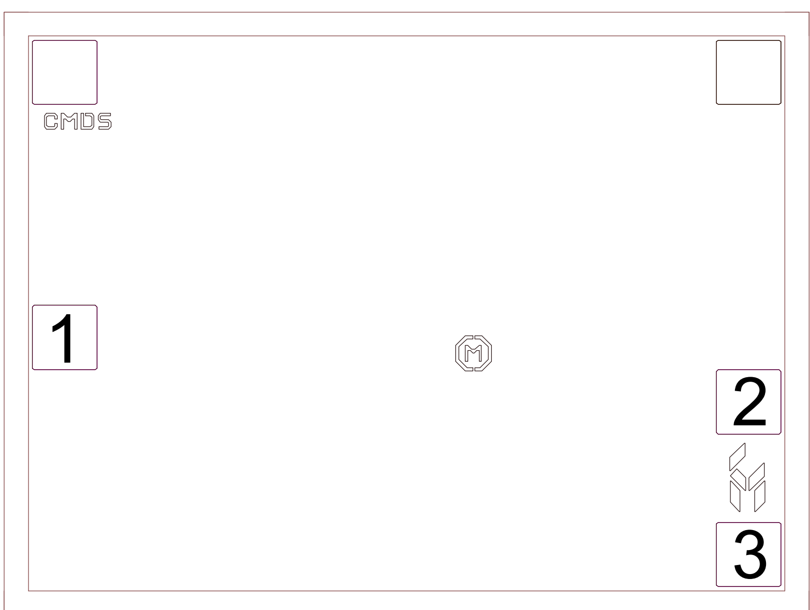

Notes:
1. No connection required for unlabeled pads
2. Backside is RF and DC ground
3. Backside and bond pad metal: Gold
4. Die is 100 microns thick
5. Bond pads (1, 2, 3) are 80 x 80 microns



*Custom MMIC*
*300 Apollo Drive Chelmsford, MA 01824 Phone (978) 467-4290 Fax (978) 467-4294*
*Visit us online at www.custommmic.com*

## Pad Description

### Pad Diagram




### Functional Description

| Pad | Function | Description | Schematic |
|---|---|---|---|
| 1 | RF in | DC blocked and 50 ohm matched | RF in |
| 2 | RF out | DC blocked and 50 ohm matched | RF out |
| 3 | Vdd | Power supply voltage<br>Decoupling and bypass caps required | Vdd |
| Backside | Ground | Connect to RF / DC ground | GND |



*Custom MMIC*
*300 Apollo Drive Chelmsford, MA 01824 Phone (978) 467-4290 Fax (978) 467-4294*
*Visit us online at www.custommmic.com*

*Applications Information*

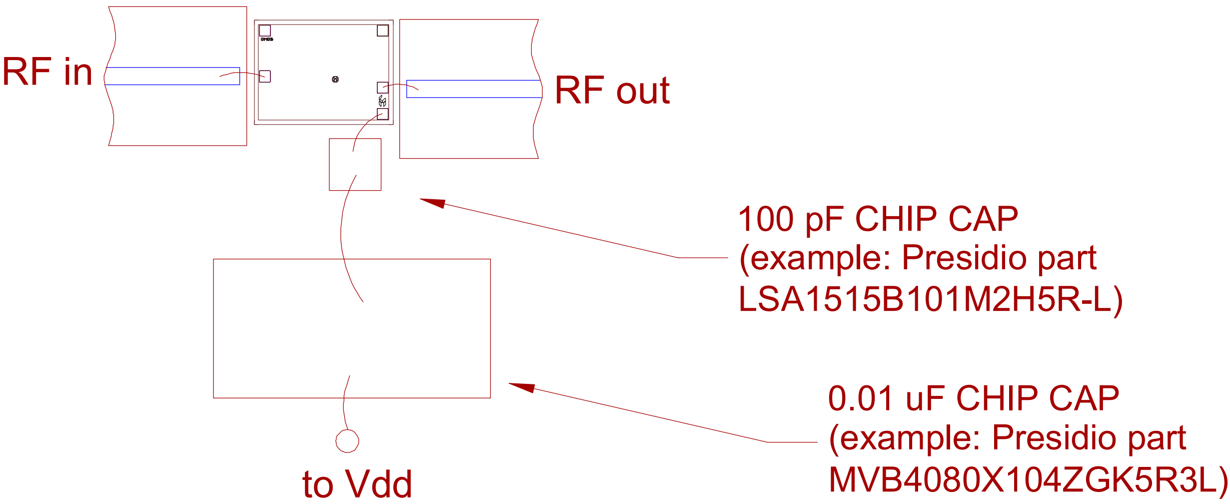
**Assembly Guidelines**

The backside of the CMD231 is RF ground. Die attach may be accomplished with either electrically and thermally conductive epoxy or eutectic attach. 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 single bond wire as shown.

The semiconductor is 100 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.**

ver 1.4 0919