



# CMD232C3

## 2-9 GHz Driver Amplifier

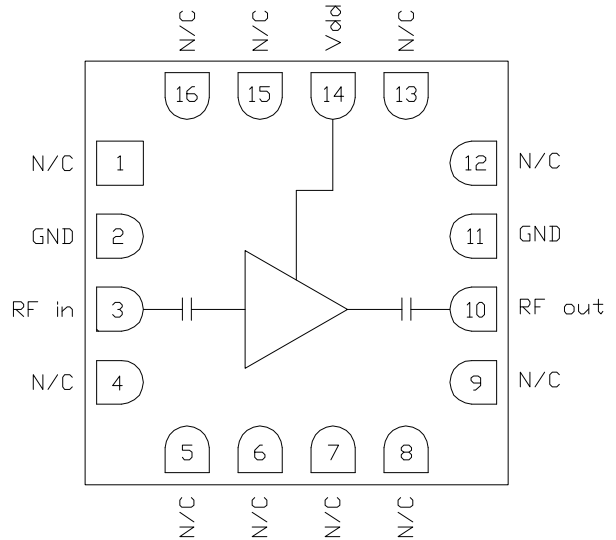
### Features

- ▶ 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

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### Specifications

#### Absolute Maximum Ratings

Parameter	Rating
Drain Voltage, V <sub>dd</sub>	7.5 V
RF Input Power	+15 dBm
Channel Temperature, T <sub>ch</sub>	150 °C
Power Dissipation, P <sub>diss</sub>	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 <sub>dd</sub>	5.0	6.0	7.0	V
I <sub>dd</sub>		90		mA

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

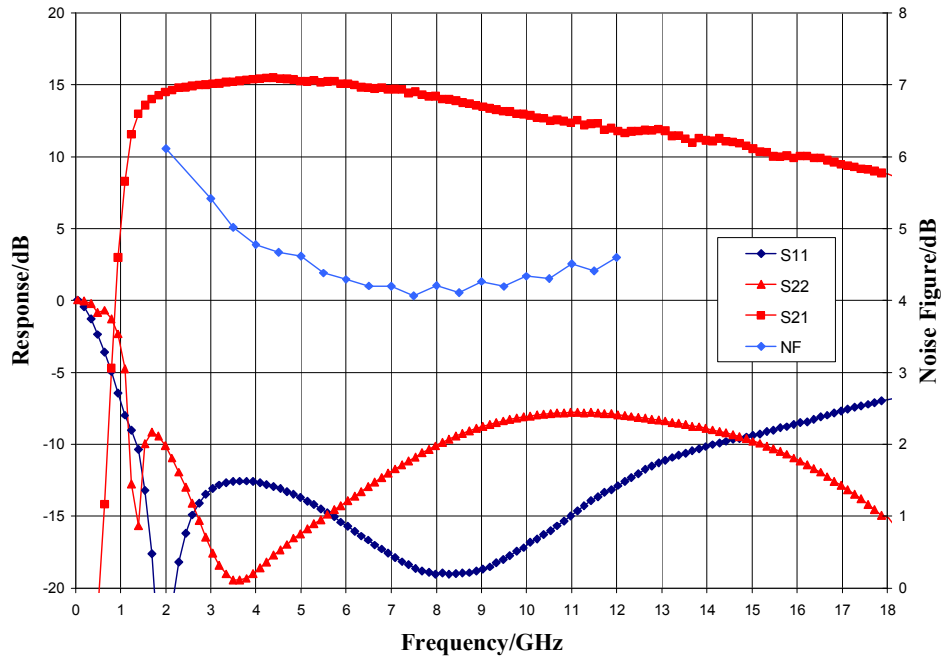
#### Electrical Specifications, V<sub>dd</sub> = 6.0 V, T<sub>A</sub> = 25 °C

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 P <sub>1dB</sub>	15	17		dBm
Output IP <sub>3</sub>		23.5		dBm
Supply Current	60	90	120	mA
Gain Temperature Coefficient		0.014		dB/°C
Noise Figure Temperature Coefficient		0.012		dB/°C

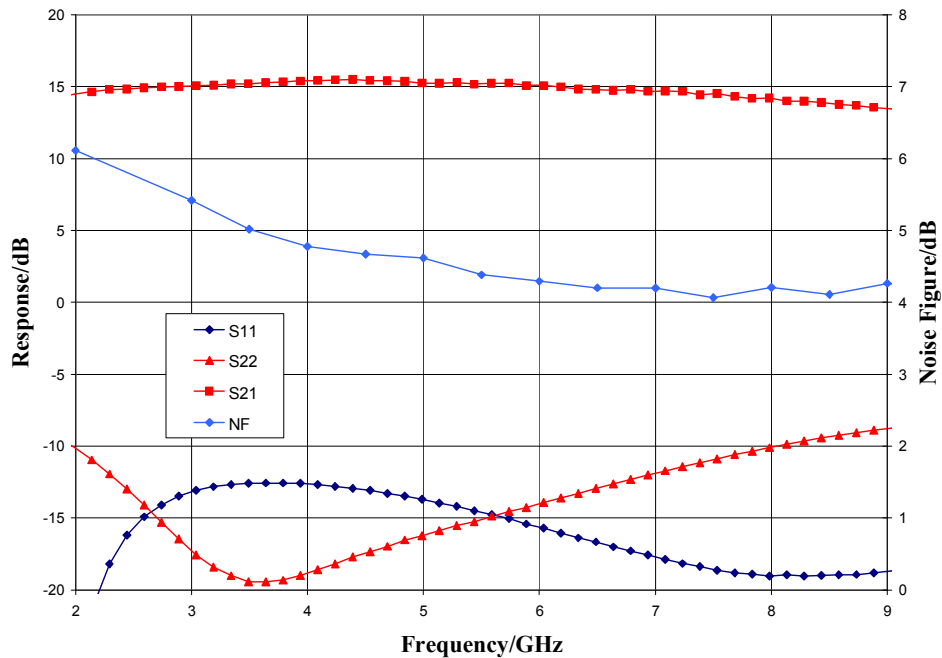
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### Typical Performance

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



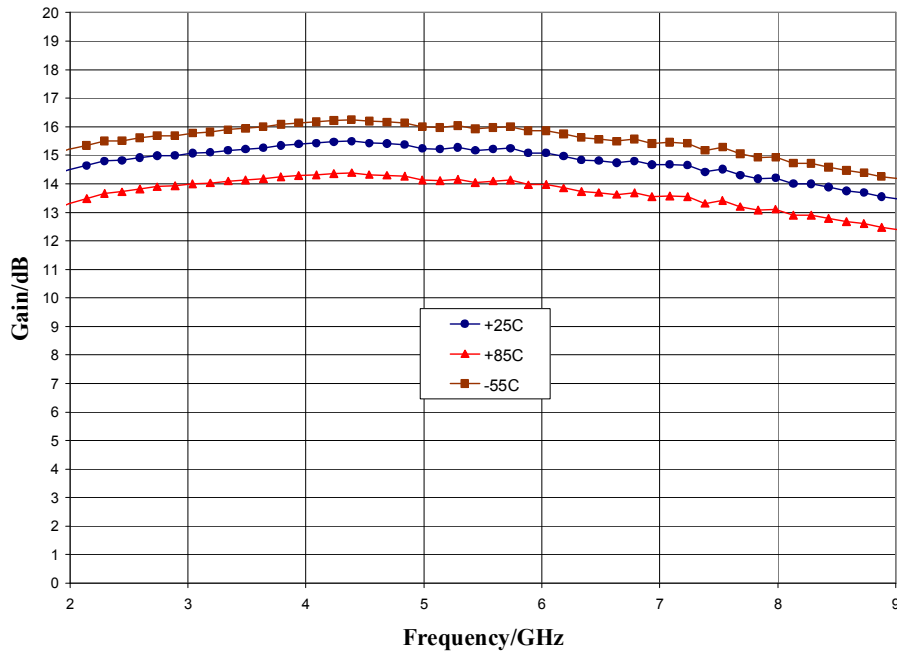
Narrow-band Performance,  $V_{dd} = 6.0\text{ V}$ ,  $I_{dd} = 90\text{ mA}$ ,  $T_A = 25\text{ }^\circ\text{C}$



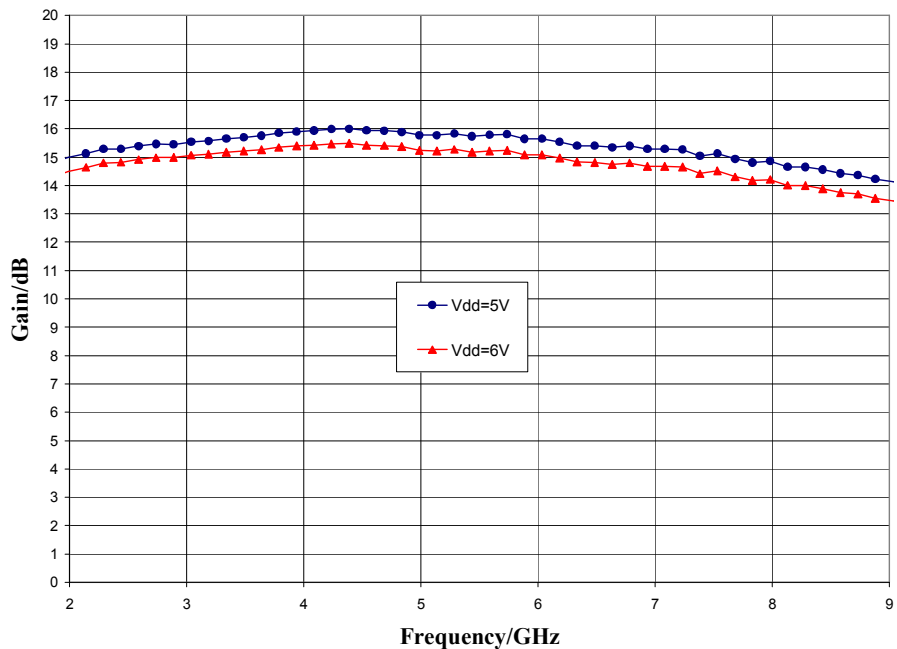
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### Typical Performance

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



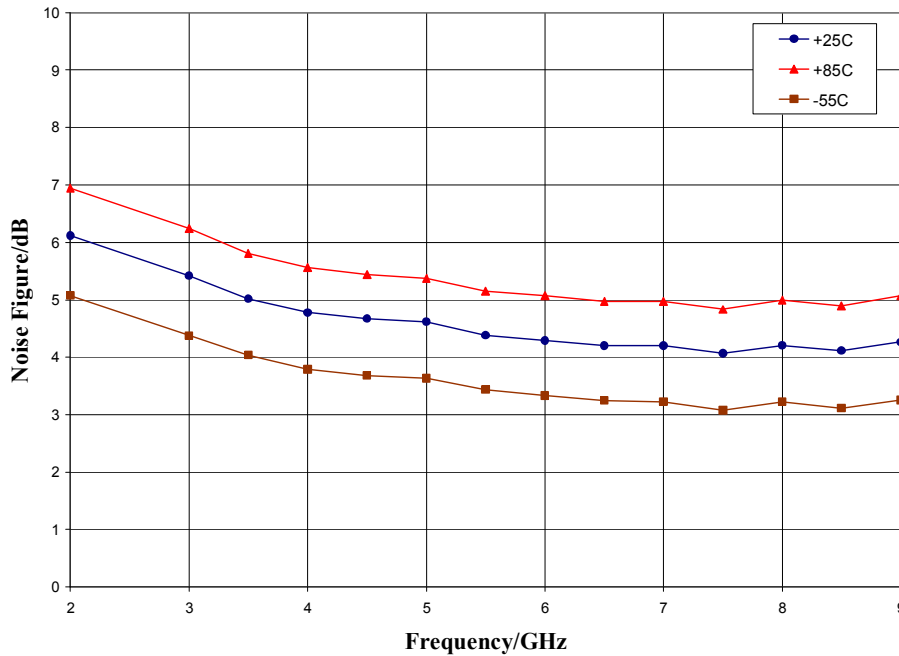
Gain vs. Supply Voltage,  $T_A = 25\text{ }^\circ\text{C}$



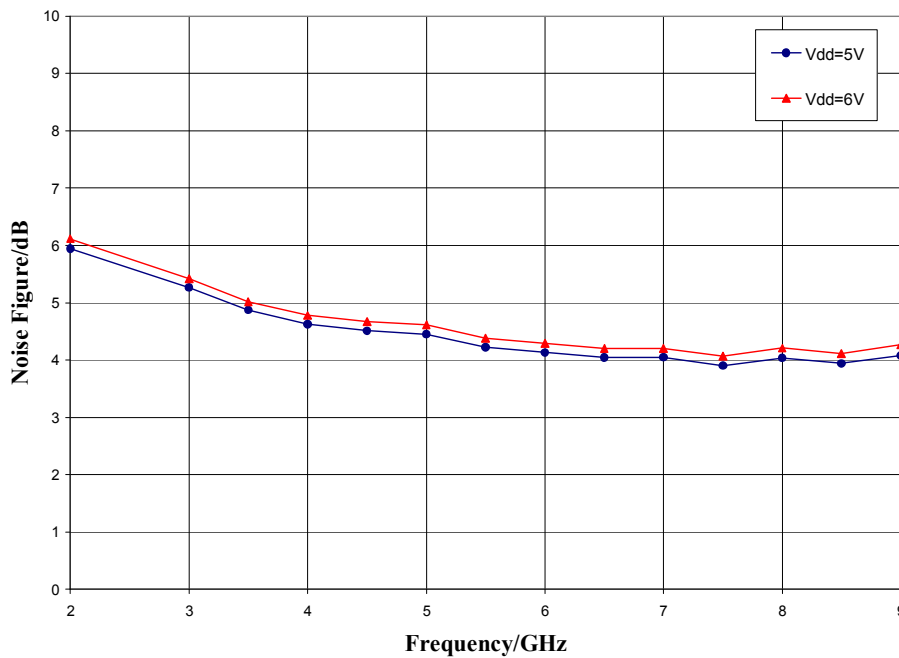
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### Typical Performance

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



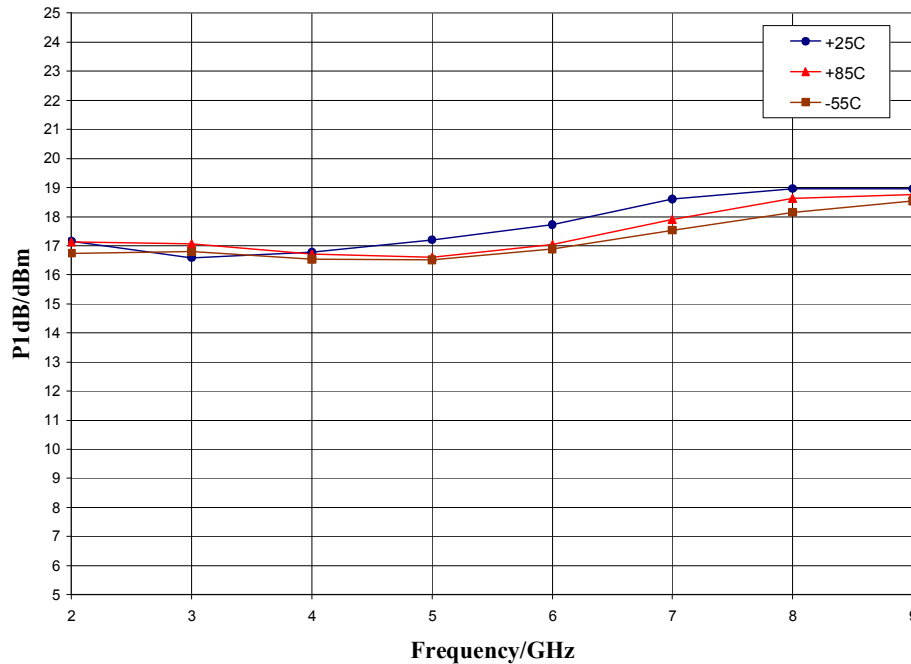
Noise Figure vs. Supply Voltage,  $T_A = 25\text{ }^\circ\text{C}$



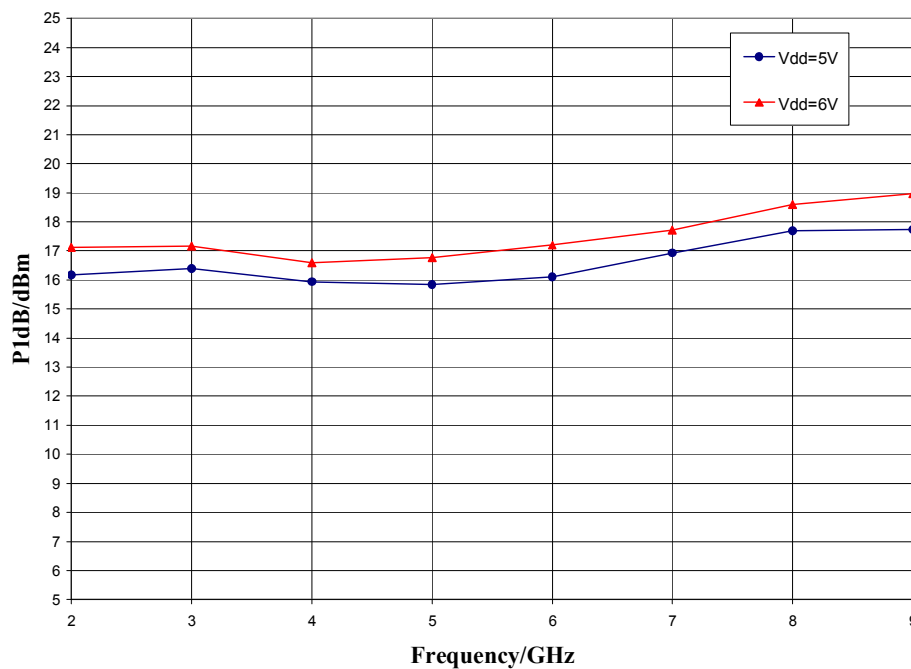
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### Typical Performance

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



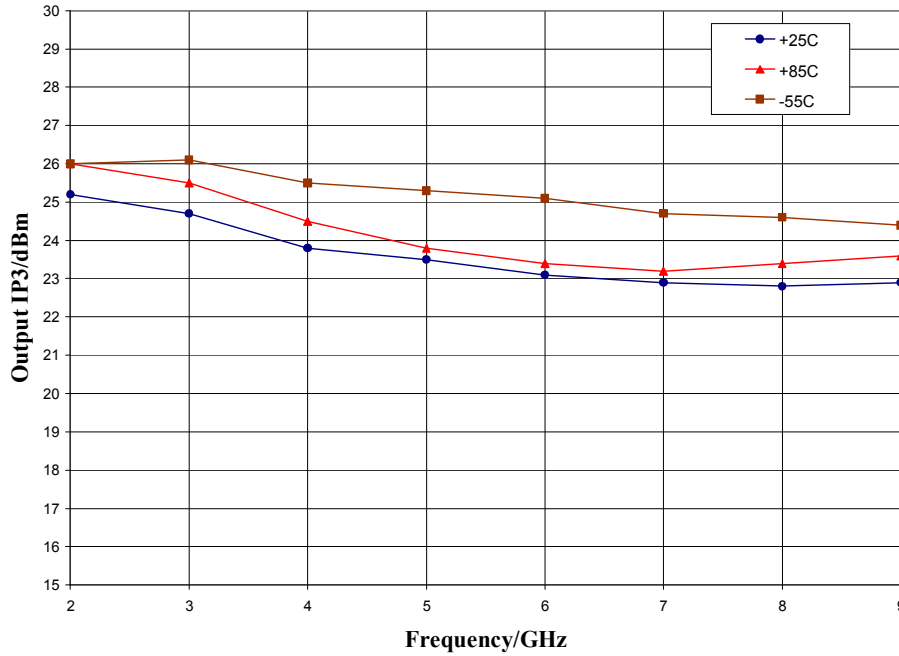
#### P1dB vs. Supply Voltage, $T_A = 25\text{ }^\circ\text{C}$



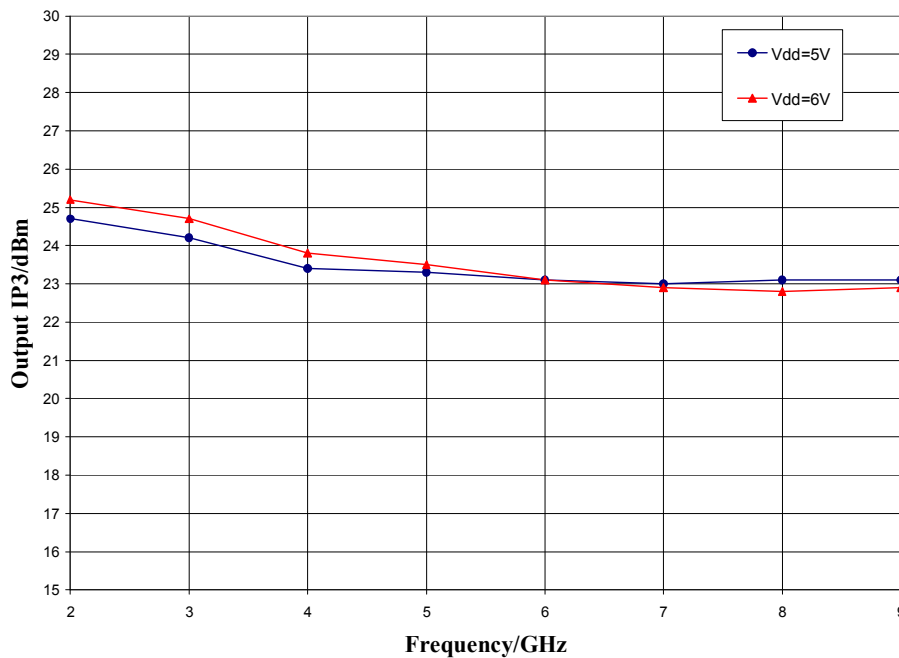
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### Typical Performance

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



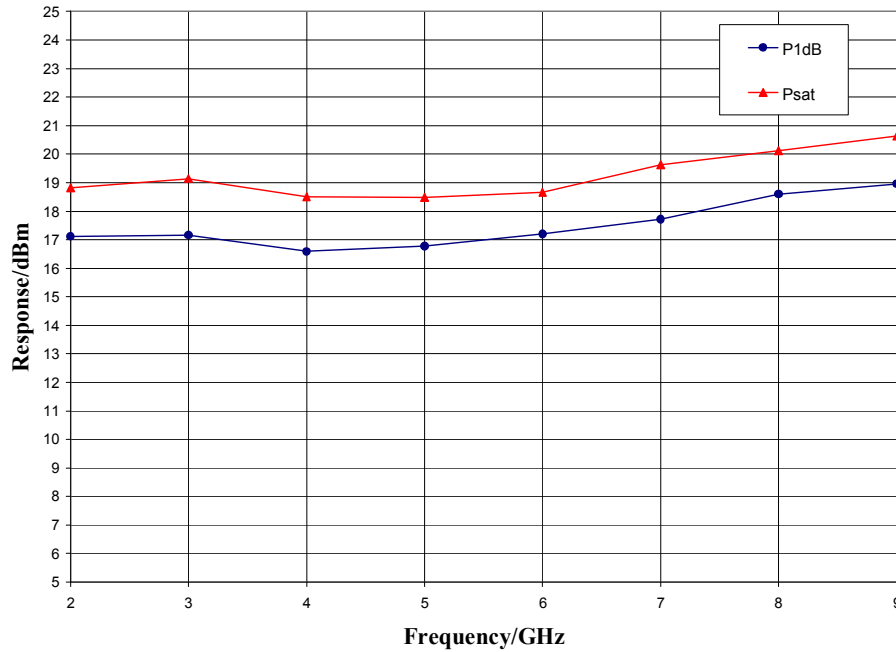
Output IP3 vs. Supply Voltage,  $T_A = 25\text{ }^\circ\text{C}$



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### Typical Performance

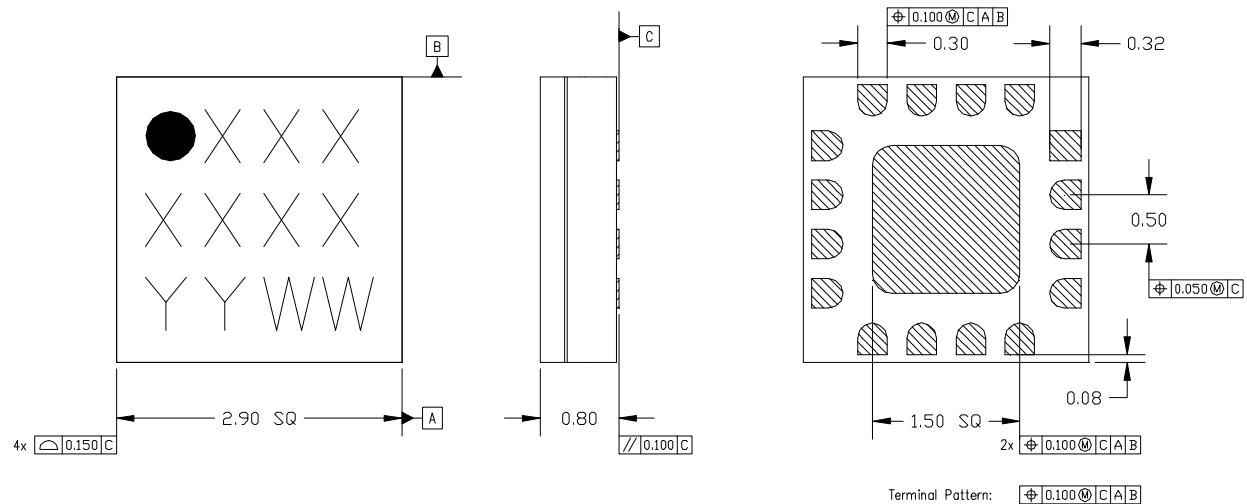
Output Power,  $V_{dd} = 6.0\text{ V}$ ,  $T_A = 25\text{ }^\circ\text{C}$





### Mechanical Information

#### Package Information and Dimensions



#### NOTES:

1. ALL DIMENSIONS SHOWN IN mm.
2. MATERIAL: BLACK ALUMINA
3. LEAD FINISH:
  - 3.1. Ni: 8.89um MAX, 1.27um MIN
  - 3.2. Pd: 0.17um MAX, 0.07um MIN
  - 3.3. Au: 0.254um MAX, 0.03um 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

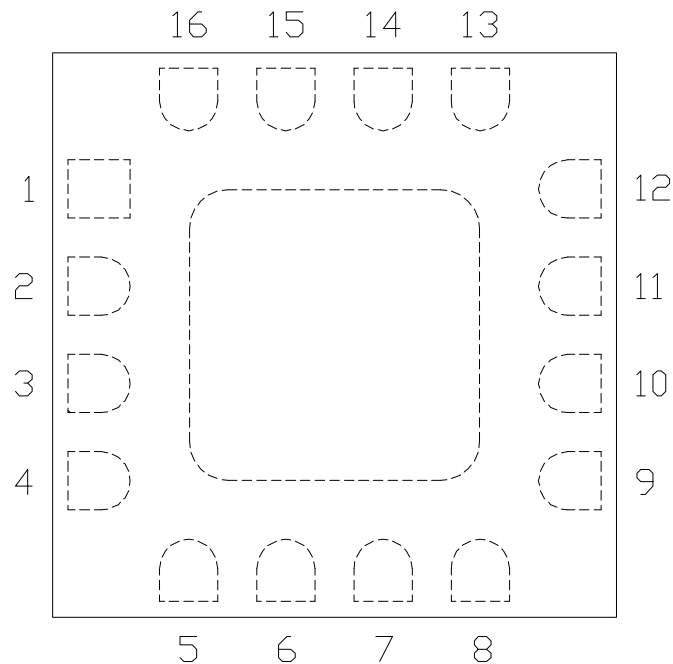
Custom MMIC Design Services recommends that the user develop the land pattern that will provide the best design for proper solder reflow and device attach for their specific application. Please review Custom MMIC Application Note AN 105 for a recommended land pattern approach.

#### Recommended Solder Reflow Profile

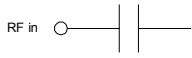
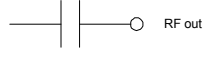
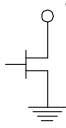

Custom MMIC Design Services recommends screen printing with belt furnace reflow to ensure proper solder reflow and device attach. Please review Custom MMIC Application Note AN 102 for a recommended solder reflow profile.

### Pin Description

#### Pin Diagram



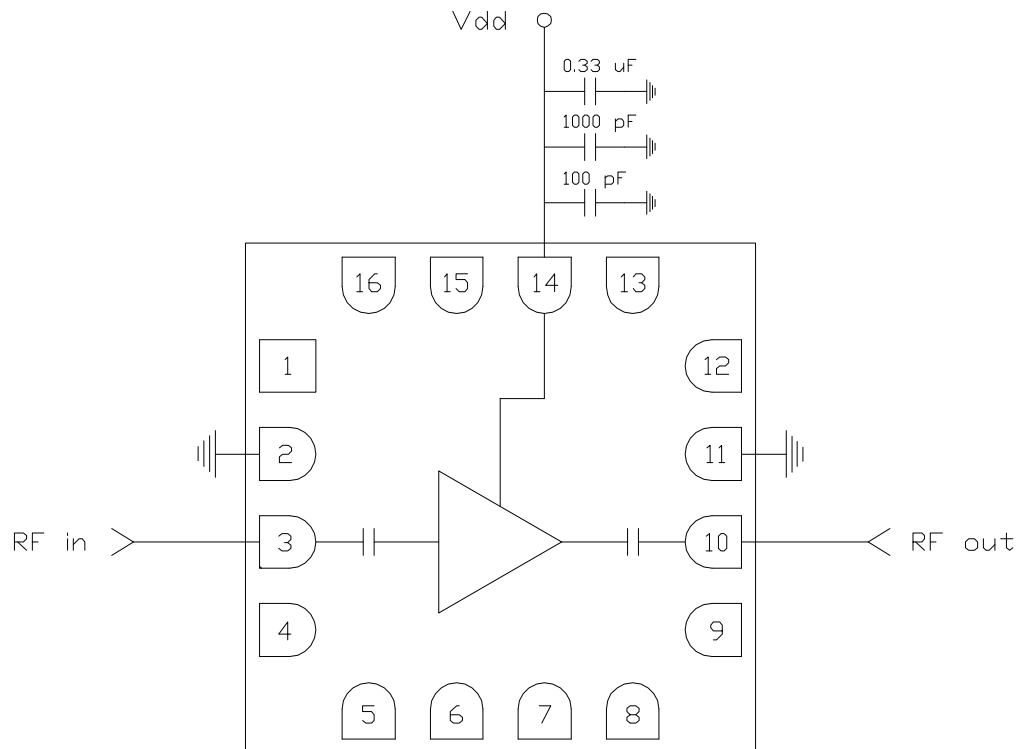
#### Functional Description

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.

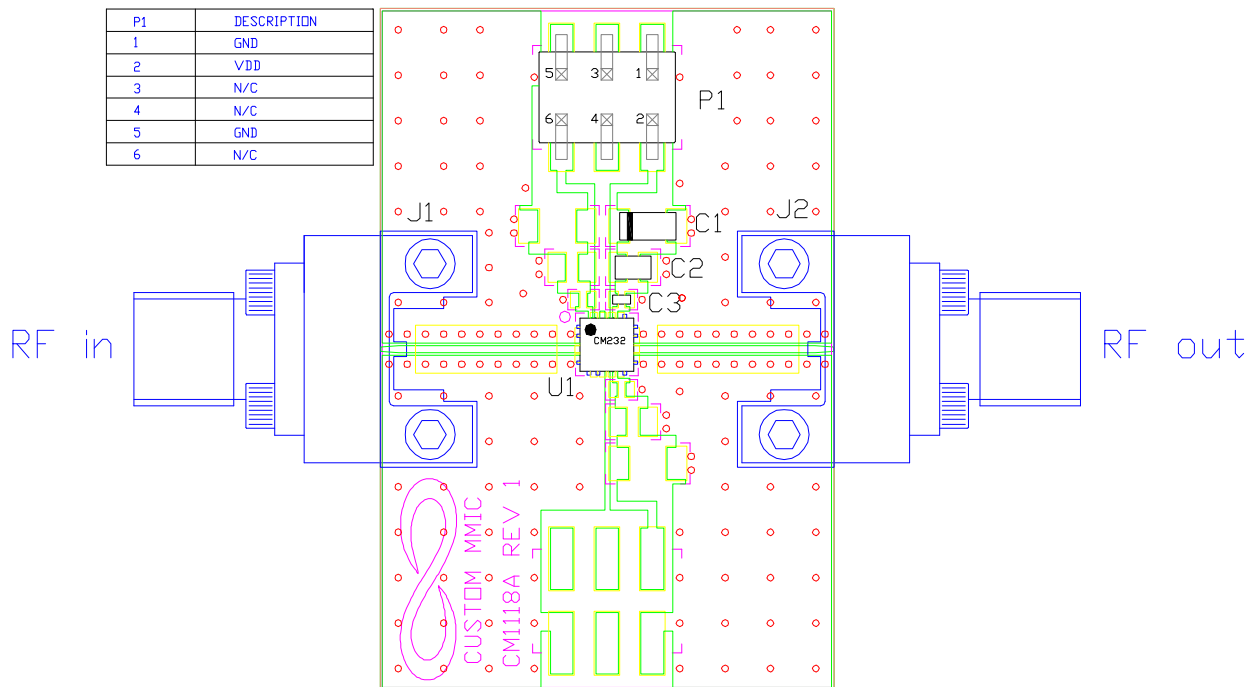
**GaAs MMIC devices are susceptible to damage from Electrostatic Discharge. Proper precautions should be observed during handling, assembly and test.**

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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 $\mu$ 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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