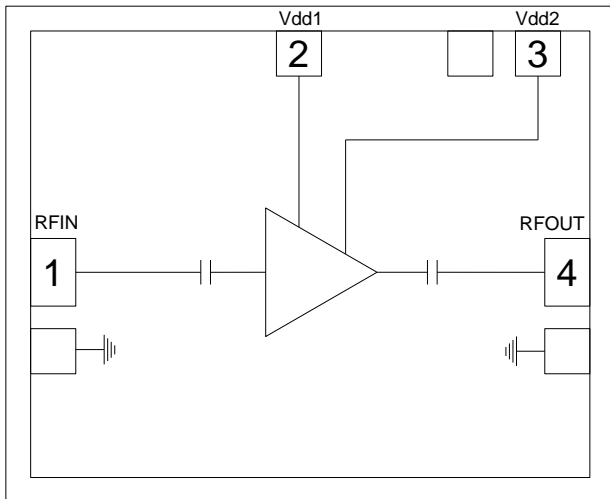


Product Overview

The CMD316 is a broadband MMIC low noise amplifier die that is ideally suited for EW and communications systems where small size and low power consumption are needed. The broadband device delivers greater than 20 dB of gain with a corresponding output 1 dB compression point of +15 dBm and a noise figure of 2 dB. The CMD316 is a 50 ohm matched design eliminating the need for external DC blocks and RF port matching.

Functional Block Diagram



Key Features

- Low Noise Figure
- High Gain Broadband Performance
- Single Supply Voltage
- Small Die Size

Ordering Information

Part No.	Description
CMD316	100 Piece Gel Pack

Electrical Performance ($V_{dd} = 4.0\text{ V}$, $T_A = 25^\circ\text{C}$, $F = 13\text{ GHz}$)

Parameter	Min	Typ	Max	Units
Frequency Range		6 - 20		GHz
Gain		20.5		dB
Noise Figure		2		dB
Input Return Loss		8		dB
Output Return Loss		15		dB
Output P1dB		15		dBm
Output IP3		25		dBm
Supply Current		100		mA

Absolute Maximum Ratings

Parameter	Rating
Drain Voltage, V_{dd}	5.5 V
RF Input Power	+20 dBm
Channel Temperature, T_{ch}	150° C
Power Dissipation, P_{diss}	900 mW
Thermal Resistance, Q_{JC}	72.2° 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
V_{dd}	3.0	4.0	5.0	V
I_{dd}		100		mA

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

Drain Current vs. Drain Voltage

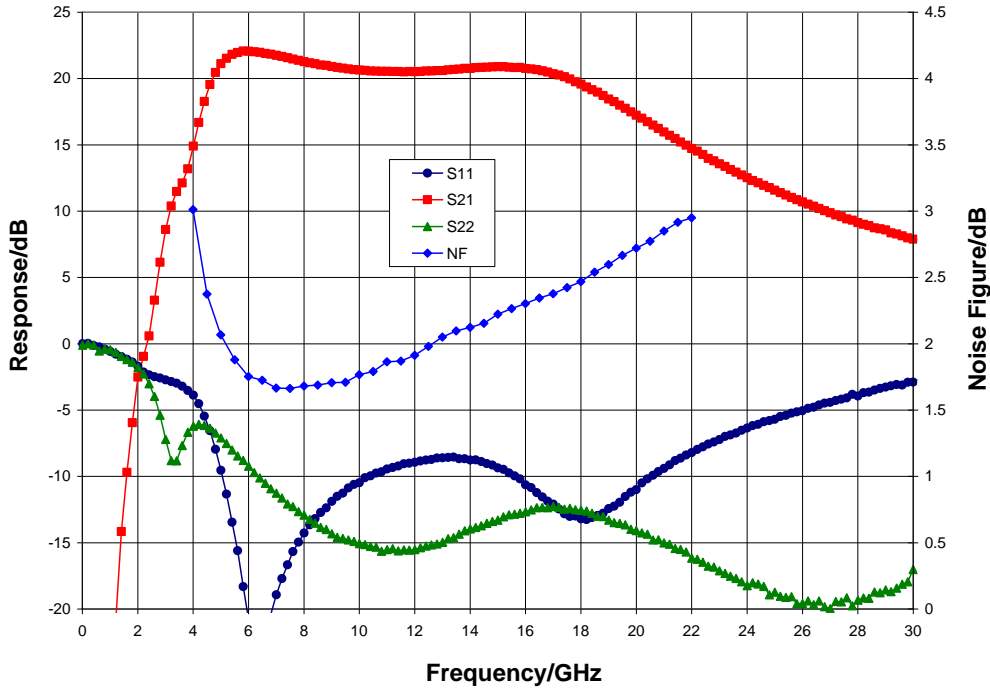
V_{dd} (V)	I_{dd} (mA)
3.0	92
4.0	100
5.0	112

Electrical Specifications ($V_{dd} = 4.0$ V, $T_A = 25^\circ$ C)

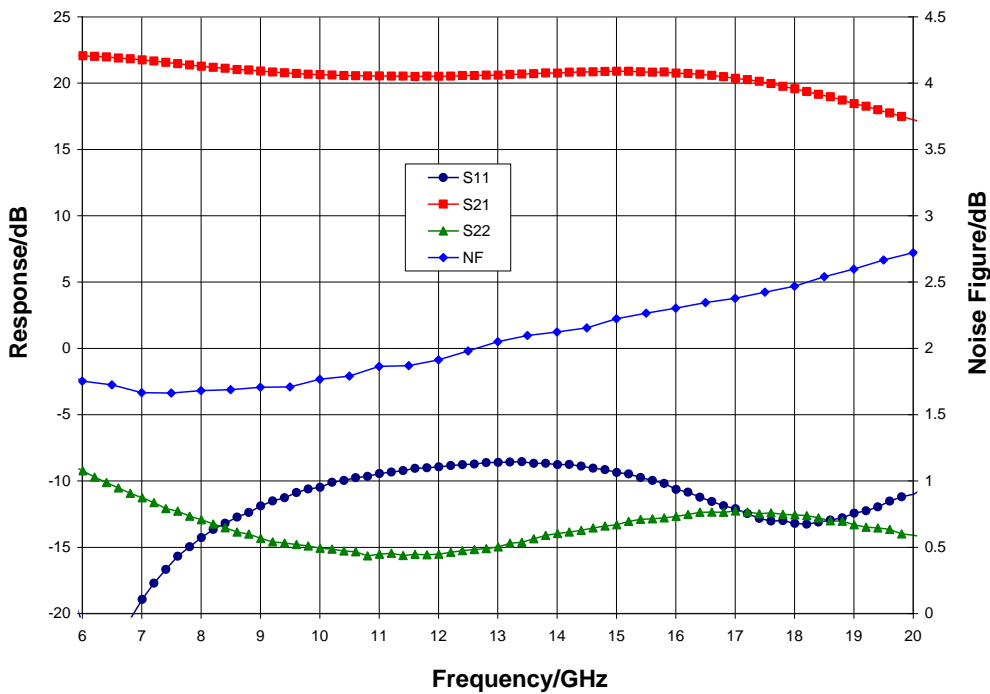
Parameter	Min	Typ	Max	Min	Typ	Max	Units
Frequency Range		6 - 18			18 - 20		GHz
Gain	17	20.5		15	18.5		dB
Noise Figure		2	2.9		2.6	3.2	dB
Input Return Loss		10			12		dB
Output Return Loss		13			13		dB
Output P1dB		15.5			15.5		dBm
Output IP3		25.5			25		dBm
Supply Current	70	100	130	70	100	130	mA
Gain Temperature Coefficient		0.016			0.02		dB/°C
Noise Figure Temperature Coefficient		0.008			0.009		dB/°C

Typical Performance

Broadband Performance, $V_{dd} = 4.0\text{ V}$, $T_A = 25^\circ\text{ C}$

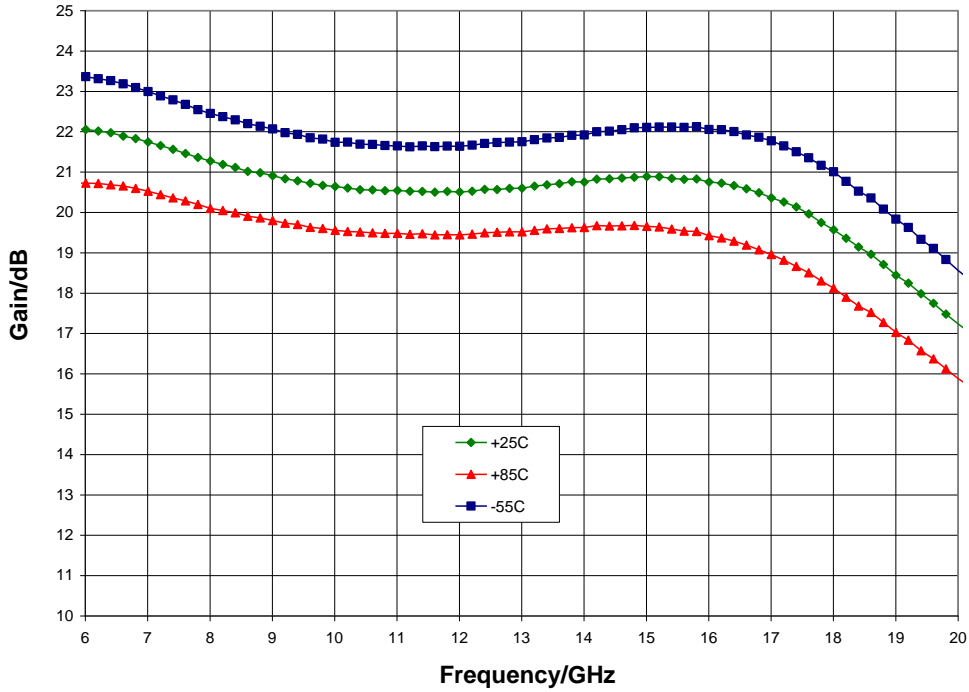


Narrow-band Performance, $V_{dd} = 4.0\text{ V}$, $T_A = 25^\circ\text{ C}$

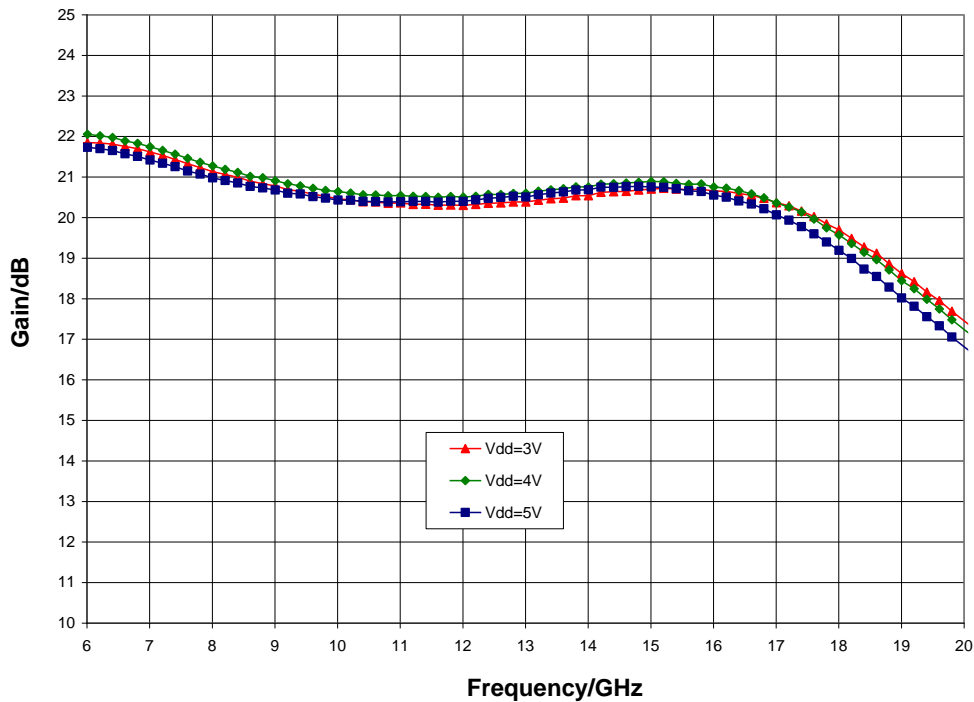


Typical Performance

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

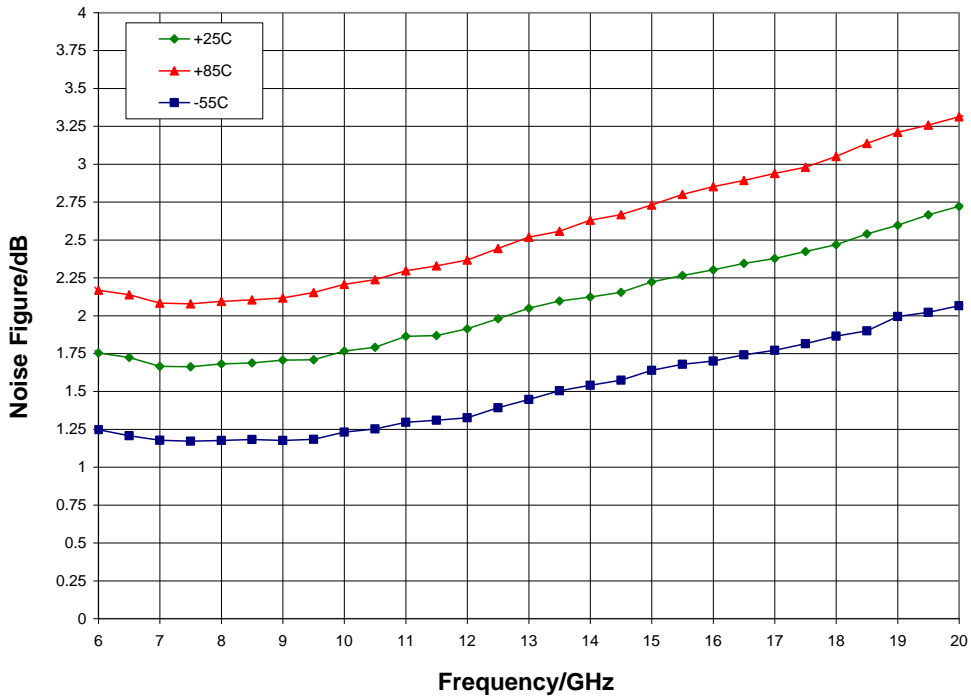


Gain vs. V_{dd} , $T_A = 25^\circ\text{ C}$

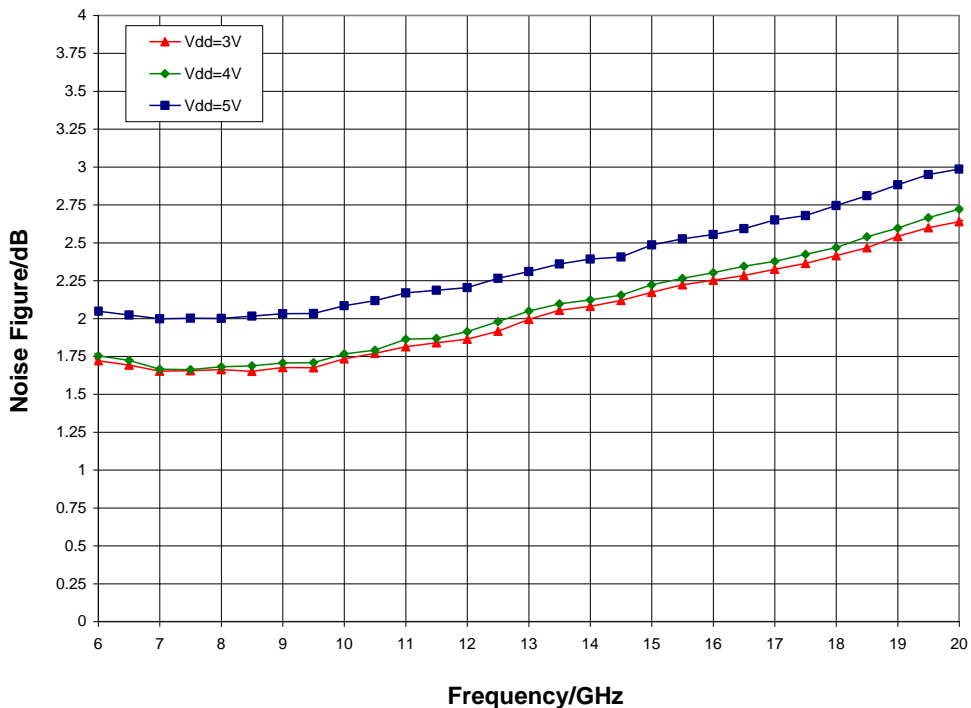


Typical Performance

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

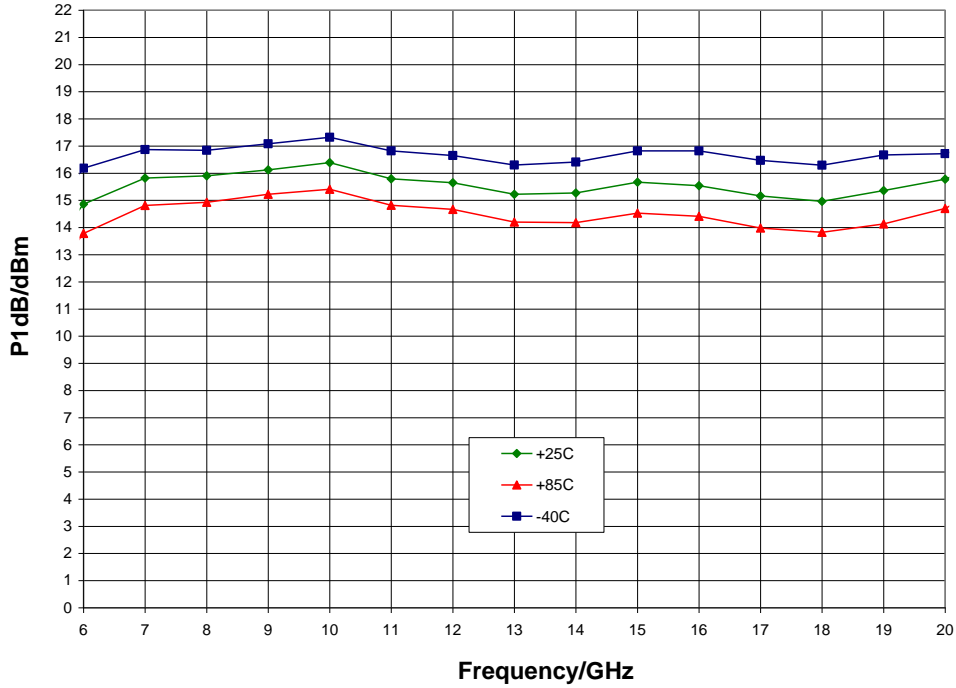


Noise Figure vs. V_{dd} , $T_A = 25^\circ\text{ C}$

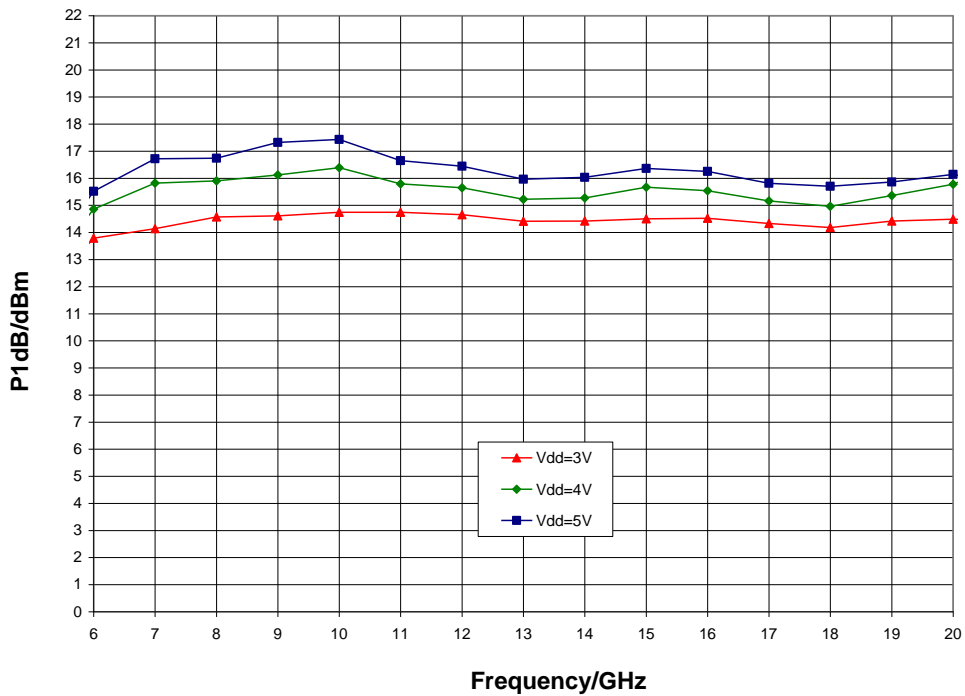


Typical Performance

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

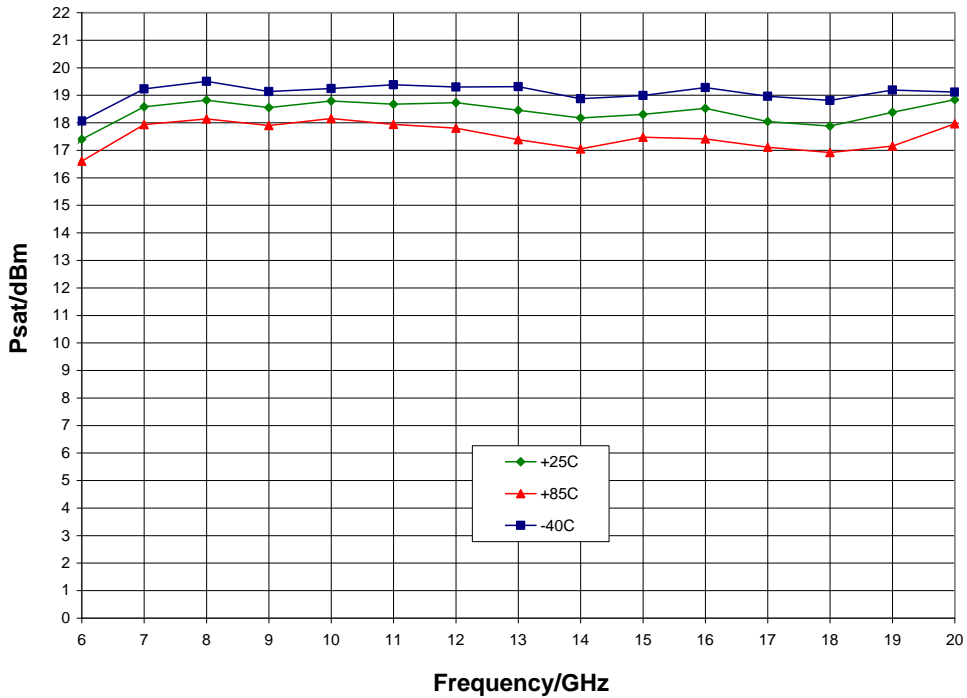


P1dB vs. V_{dd} , $T_A = 25^\circ\text{C}$

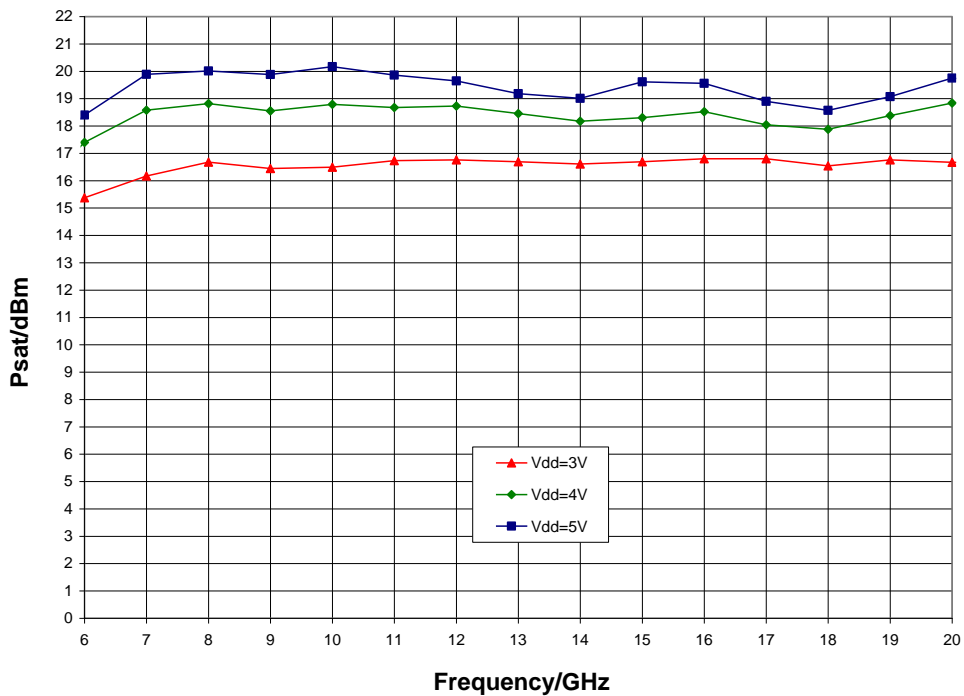


Typical Performance

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

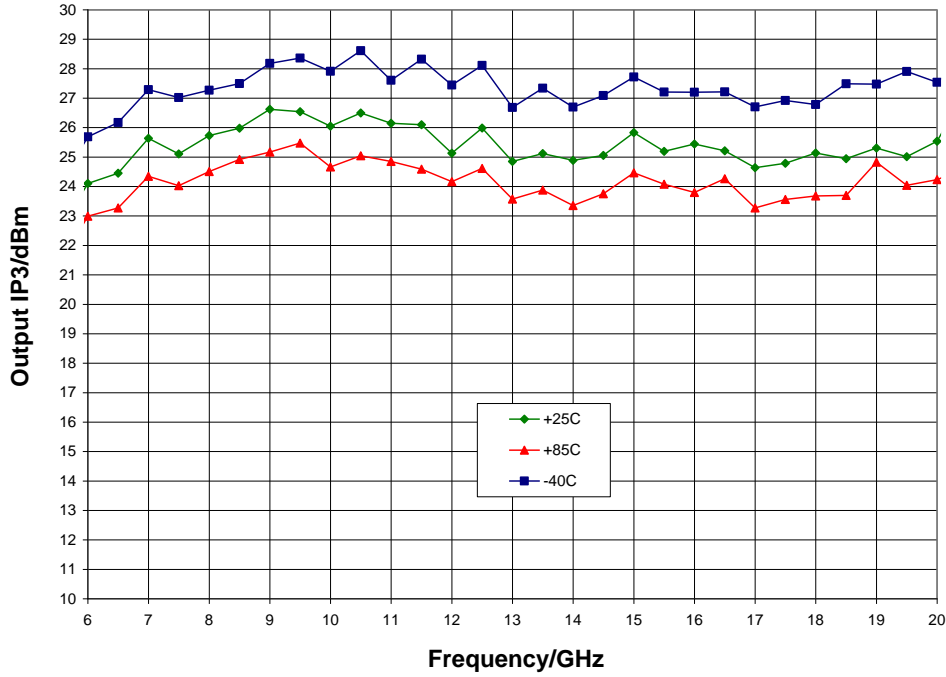


Psat vs. V_{dd} , $T_A = 25^\circ\text{C}$

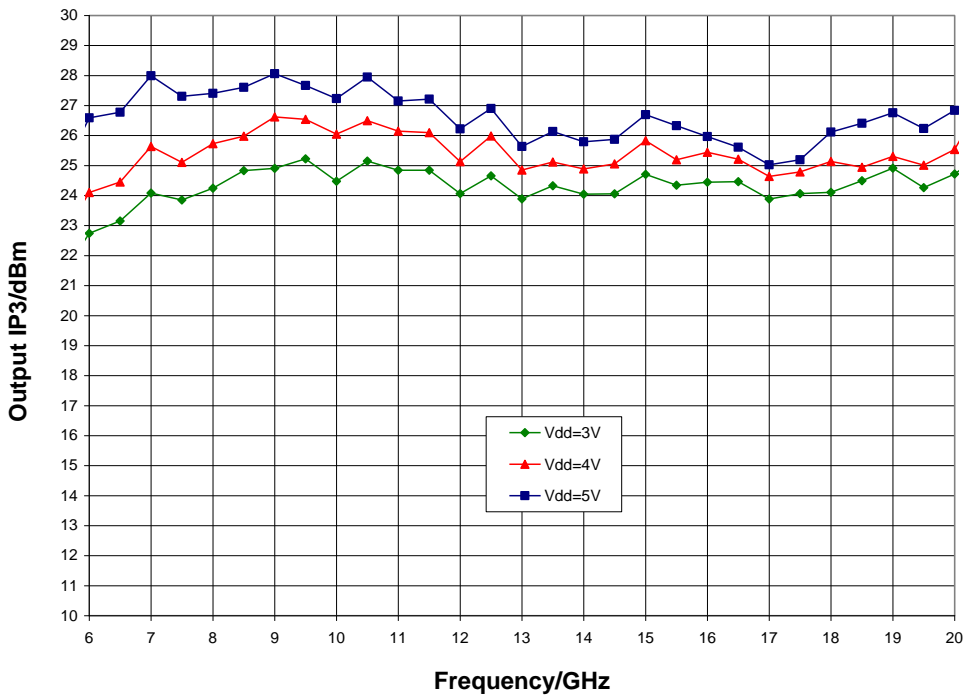


Typical Performance

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

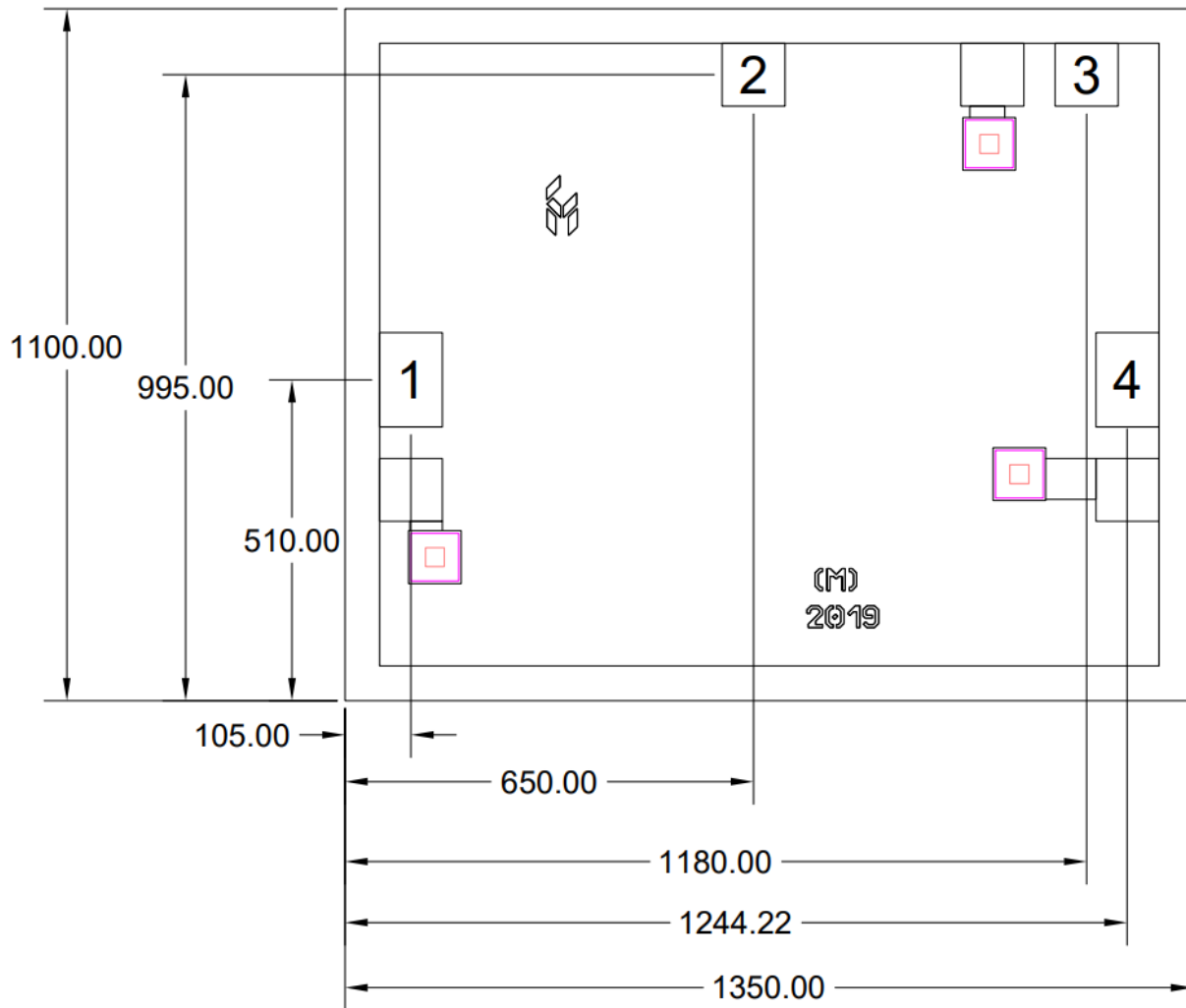


Output IP3 vs. V_{dd} , $T_A = 25^\circ\text{C}$



Mechanical Information

Die Outline (all dimensions in microns)

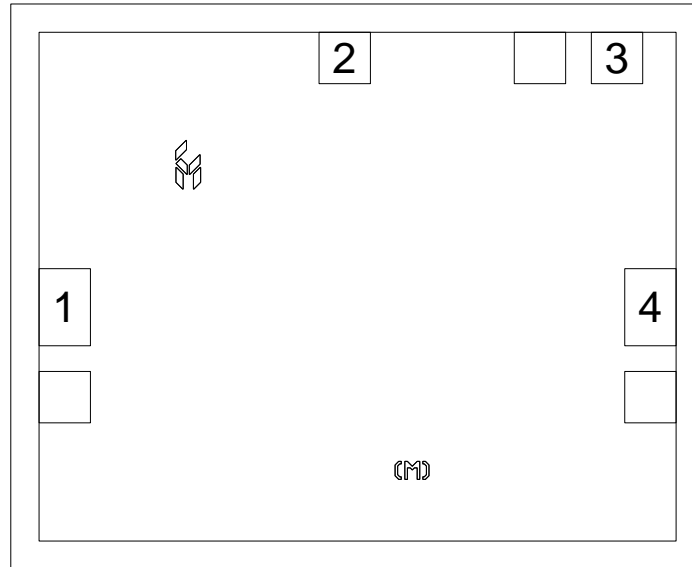


Notes:

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. DC bond pads (2, 3) are 100 x 100 microns
6. RF bond pads (1, 4) are 100 x 150 microns

Pad Description

Pad Diagram



Functional Description

Pad	Function	Description	Schematic
1	RF in	DC blocked and 50 ohm matched input	
2, 3	$V_{dd1, 2}$	Power supply voltage Decoupling and bypass caps required	
4	RF out	DC blocked and 50 ohm matched input	
Backside	Ground	Connect to RF / DC ground	

Applications Information

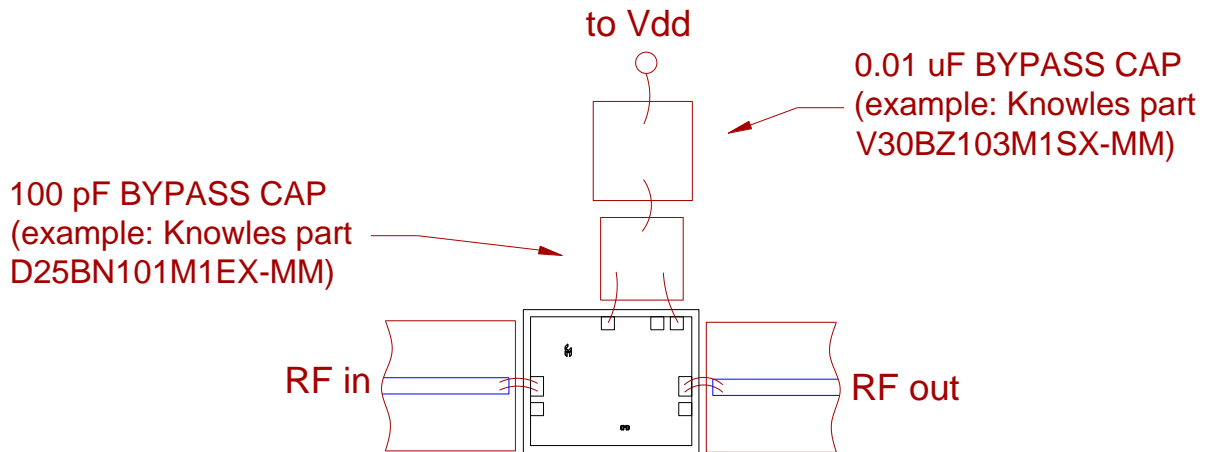
Assembly Guidelines

The backside of the CMD316 is RF ground. Die attach with electrically and thermally conductive epoxy is recommended although eutectic attach is also possible. 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 double bond wire as shown.

The semiconductor is 100um 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.

Applications Information

Biasing and Operation

The CMD316 is biased with a single positive drain supply. Performance is optimized when the drain voltage is set to +4.0 V, though it may be set to a minimum of +3.0 V and a maximum of +5.0 V.

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.

Handling Precautions

Parameter	Rating	Standard
ESD – Human Body Model (HBM)	Class 1A	ESDA / JEDEC JS-001-2012



Caution!
ESD-Sensitive Device

RoHS Compliance

This part is compliant with 2011/65/EU RoHS directive (Restrictions on the Use of Certain Hazardous Substances in Electrical and Electronic Equipment) as amended by Directive 2015/863/EU.

This product also has the following attributes:

- Lead Free
- Antimony Free
- TBBP-A ($C_{15}H_{12}Br_4O_2$) Free
- SVHC Free
- Halogen Free
- PFOS Free

Contact Information

For the latest specifications, additional product information, worldwide sales and distribution locations:

Web: www.qorvo.com

Tel: 1-844-890-8163

Email: customer.support@qorvo.com

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