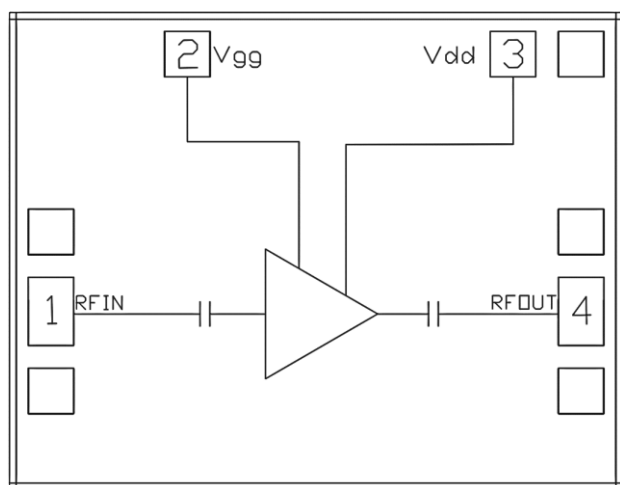


### Product Overview

The CMD319 is a broadband MMIC low noise amplifier that is ideally suited for EW and communications systems where small size and low power consumption are needed. The device is optimized for broadband performance and delivers 20 dB of gain with a corresponding ultra low noise figure. The CMD319 is a 50 ohm matched design which eliminates the need for external DC blocks and RF port matching.



### Functional Block Diagram



### Key Features

- Ultra Low Noise Figure
- High Gain Broadband Performance
- Low Power Dissipation
- Small Die Size: 1350 um x 1050 um

### Ordering Information

Part No.	Description
CMD319	8-12 GHz Ultra Low Noise Amplifier, 50 Piece Gel Pack

### Electrical Performance ( $V_{dd} = 3\text{ V}$ , $V_{gg} = 1.5\text{ V}$ , $T_A = 25\text{ }^{\circ}\text{C}$ , $F = 10\text{ GHz}$ )

Parameter	Min	Typ	Max	Units
Frequency Range		8 - 12		GHz
Gain		20		dB
Noise Figure		0.98		dB
Input Return Loss		19		dB
Output Return Loss		16		dB
Output P1dB		16		dBm
Supply Current		30		mA

## Absolute Maximum Ratings

Parameter	Rating
Drain Voltage, $V_{dd}$	5.5 V
Gate Voltage, $V_{gg}$	3.3 V
RF Input Power	+20 dBm
Channel Temperature, $T_{ch}$	150 °C
Power Dissipation, $P_{diss}$	921 mW
Thermal Resistance, $\theta_{JC}$	70 °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

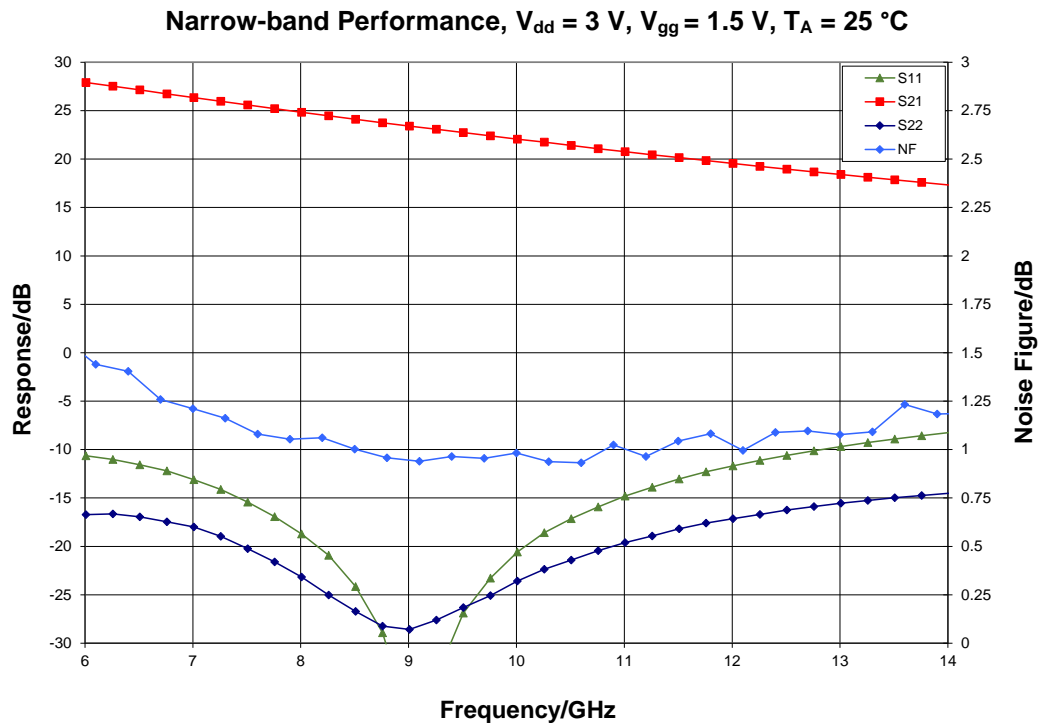
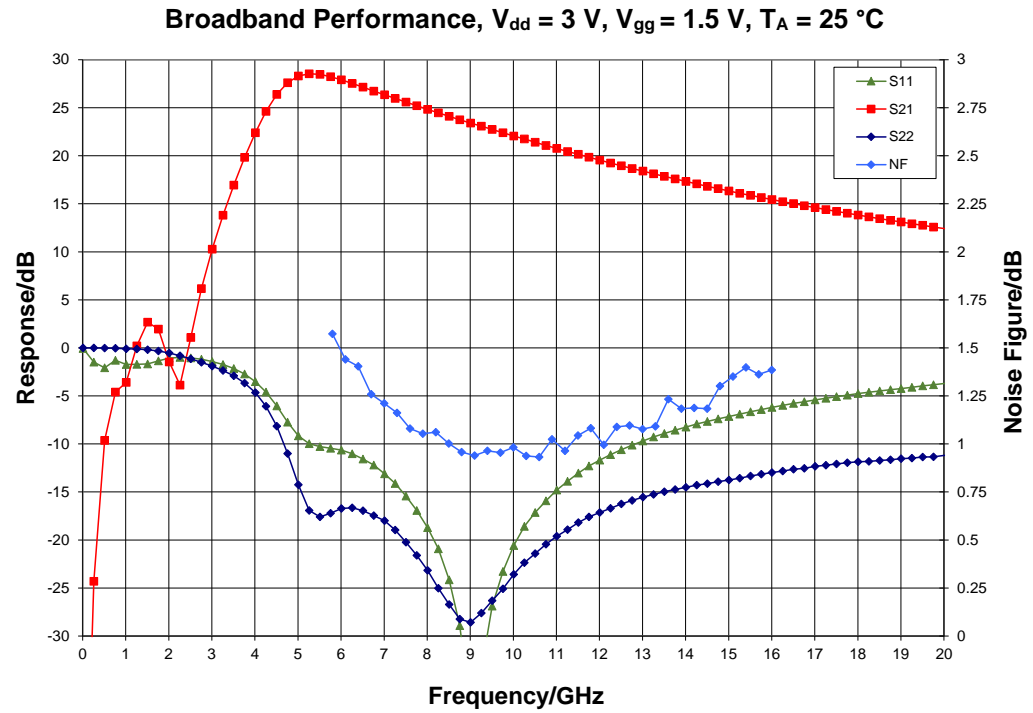
Parameter	Min	Typ	Max	Units
$V_{dd}$	2	3	5	V
$V_{gg}$	0	1.5	3	V
$I_{dd}$		30		mA
$I_{gg}$		2		mA

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

## Electrical Specifications ( $V_{dd} = 3$ V, $V_{gg} = 1.5$ V, $T_A = 25$ °C)

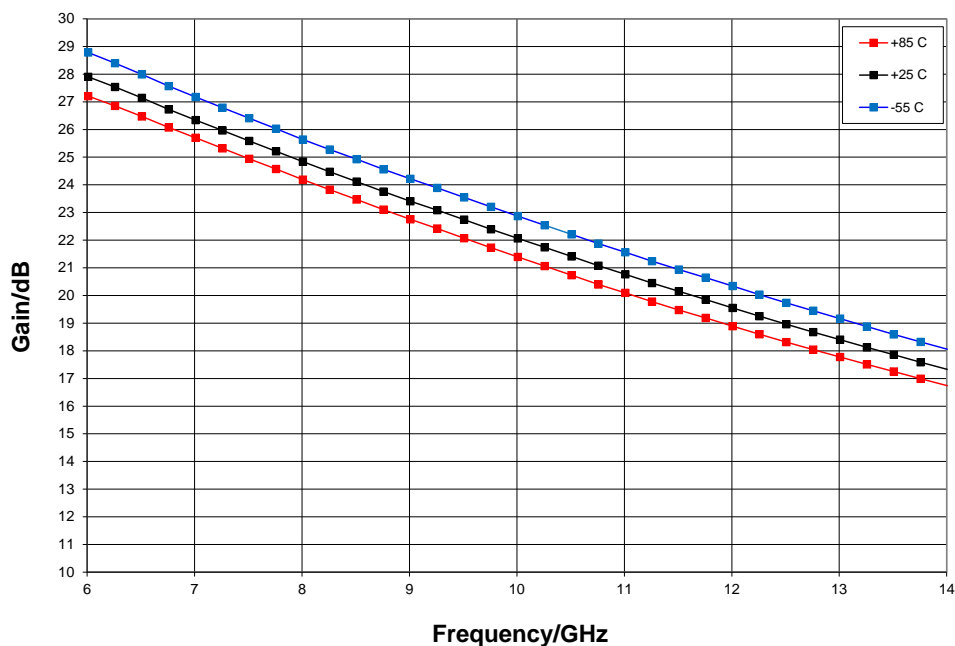
Parameter	Min	Typ	Max	Min	Typ	Max	Units
Frequency Range		8 - 10			10 - 12		GHz
Gain	19	22		16	19		dB
Noise Figure		0.95	1.2		1.05	1.4	dB
Input Return Loss		19			15		dB
Output Return Loss		17			12		dB
Output P1dB		16			16		dBm
Output IP3		25			26		dBm
Supply Current	20	30	40	20	30	40	mA
Gain Temperature Coefficient		0.013			0.013		dB/°C
Noise Figure Temperature Coefficient		0.0066			0.0066		dB/°C

## Typical Performance

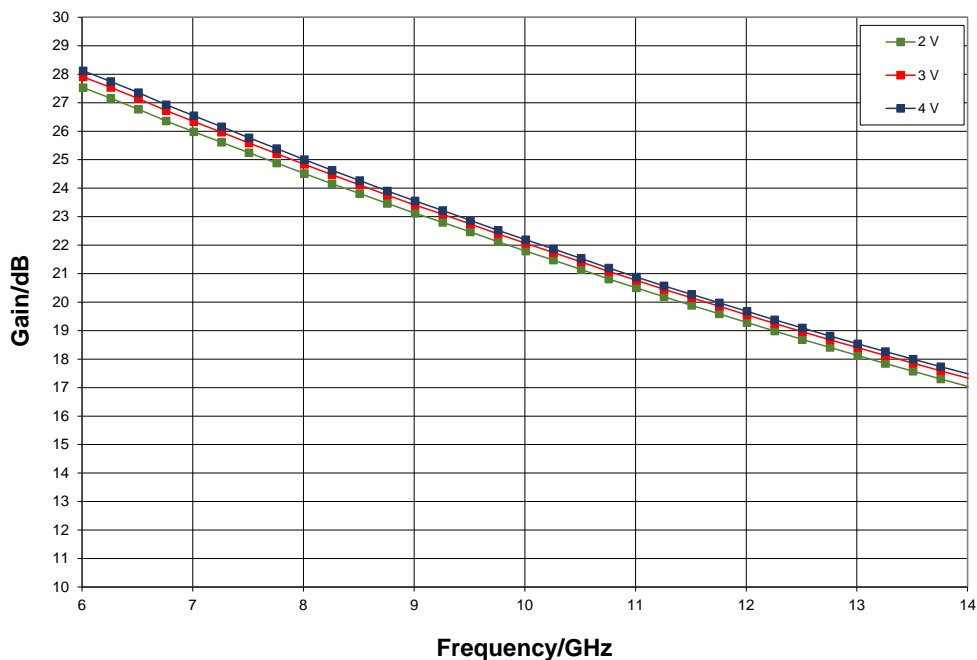


## Typical Performance

Gain vs. Temperature,  $V_{dd} = 3\text{ V}$ ,  $V_{gg} = 1.5\text{ V}$

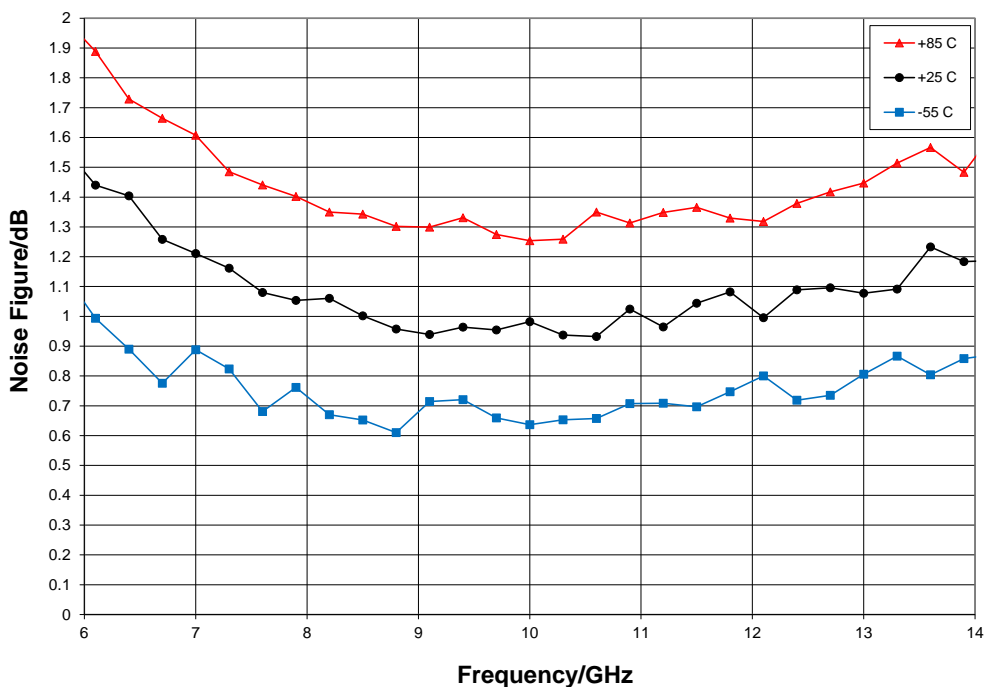


Gain vs.  $V_{dd}$ ,  $V_{gg} = 1.5\text{ V}$ ,  $T_A = 25\text{ °C}$

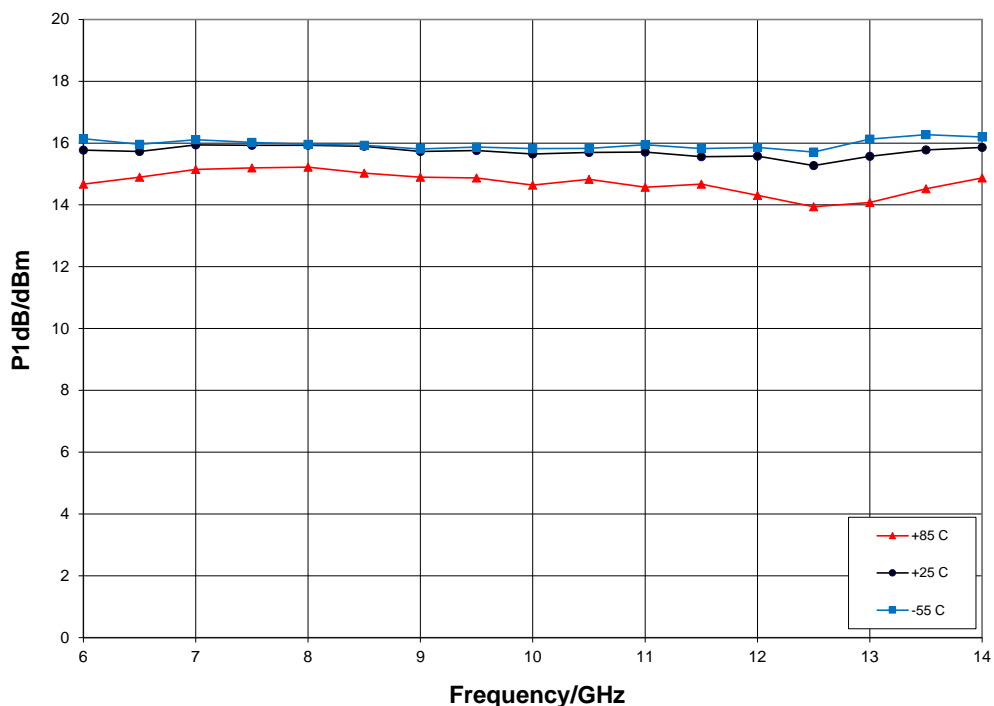


## Typical Performance

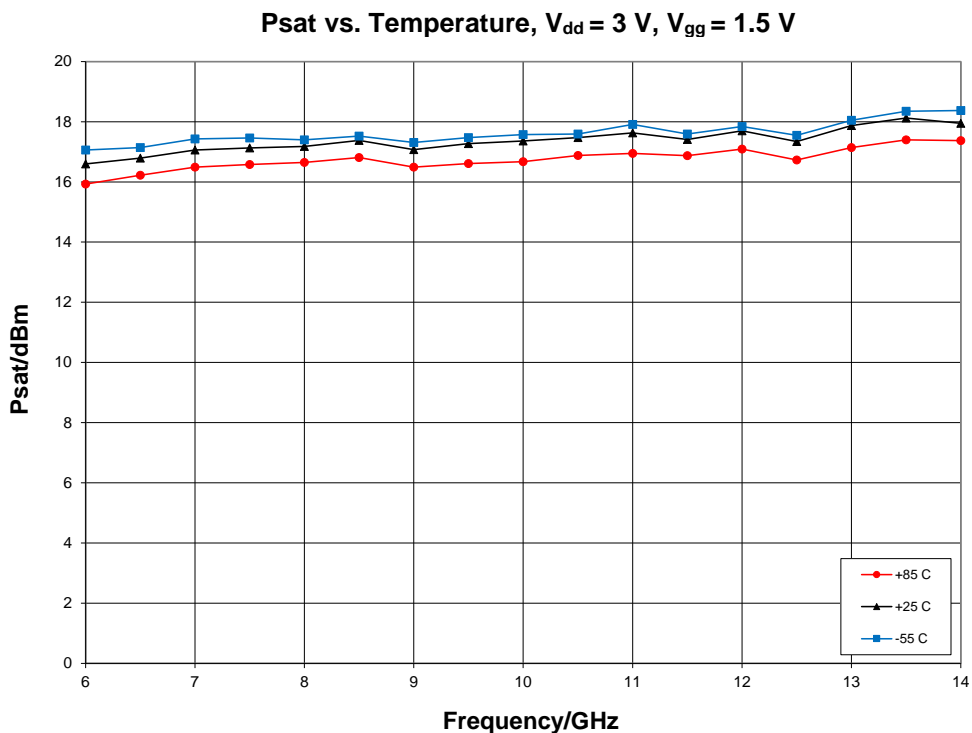
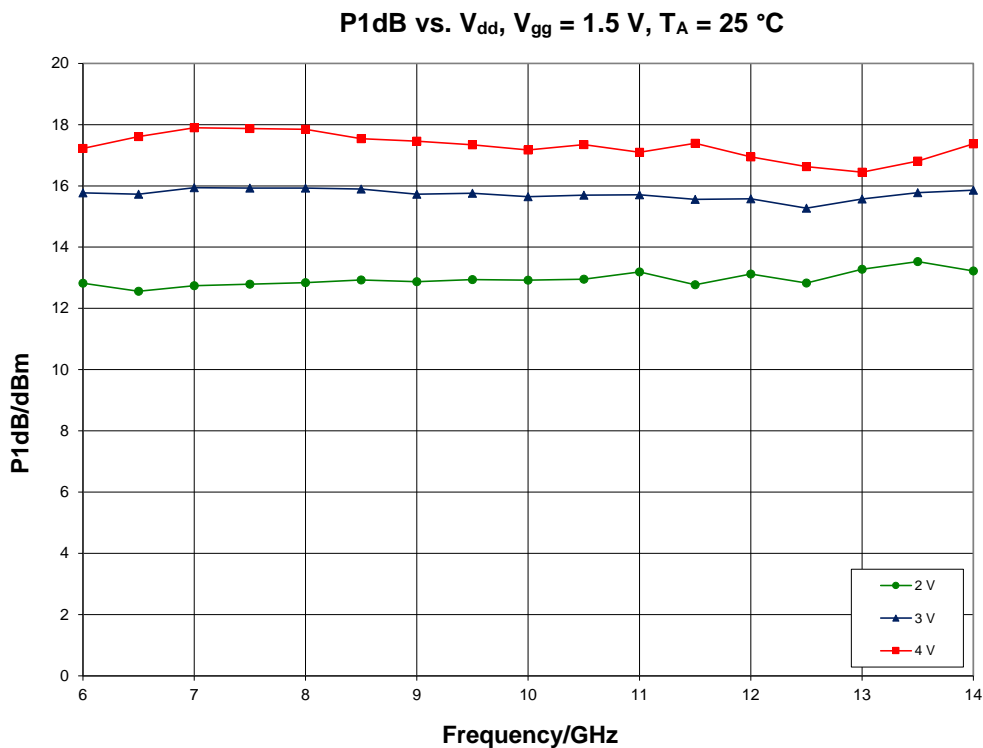
Noise Figure vs. Temperature,  $V_{dd} = 3\text{ V}$ ,  $V_{gg} = 1.5\text{ V}$



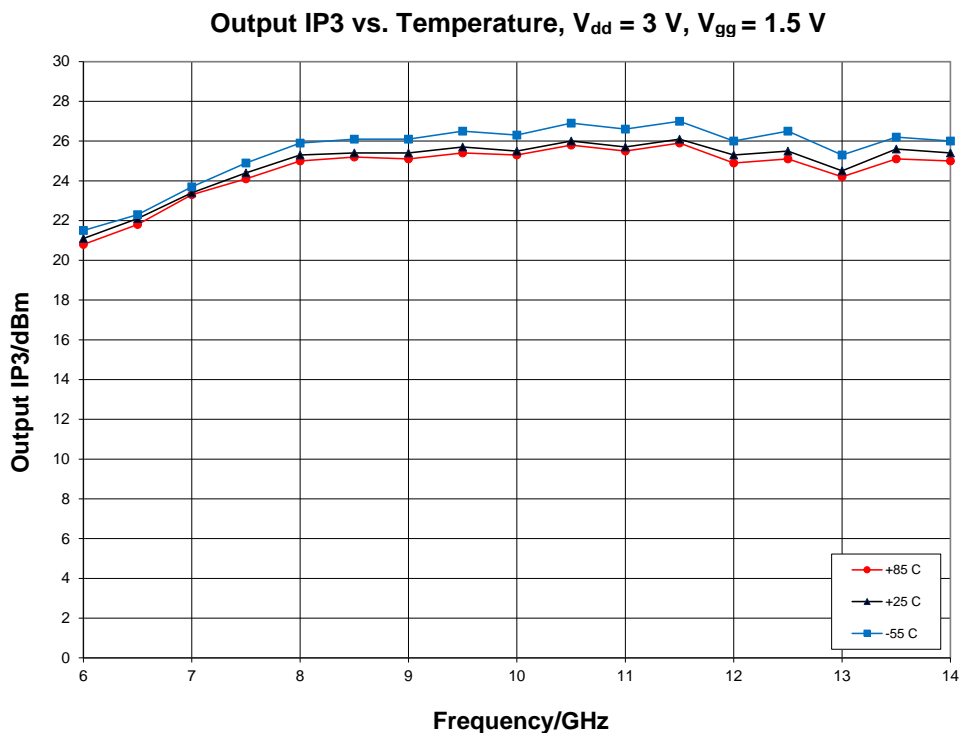
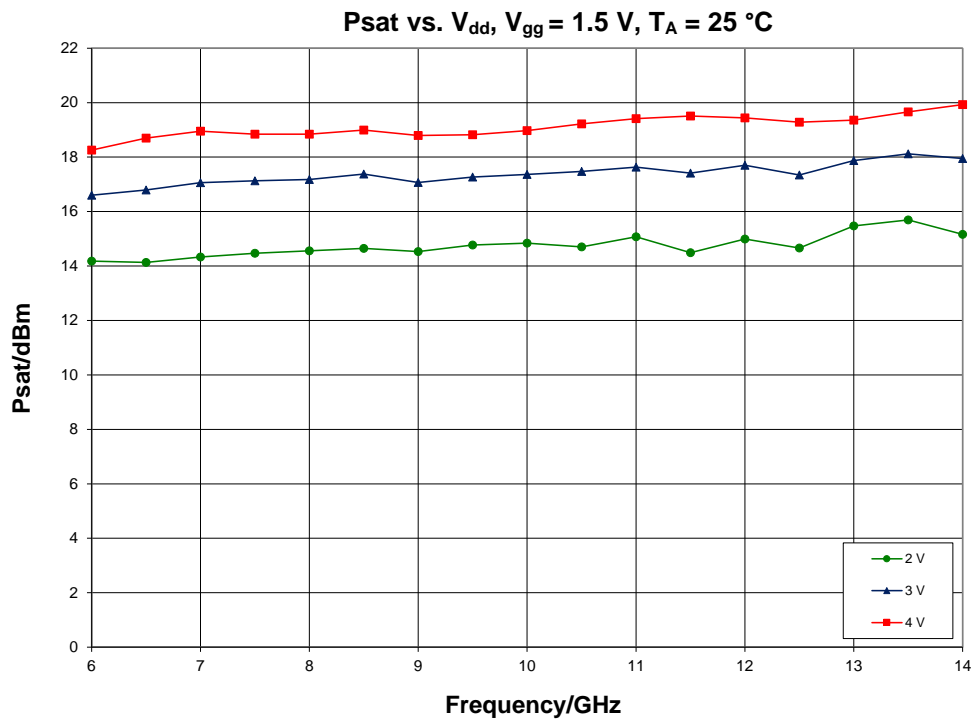
P1dB vs. Temperature,  $V_{dd} = 3\text{ V}$ ,  $V_{gg} = 1.5\text{ V}$



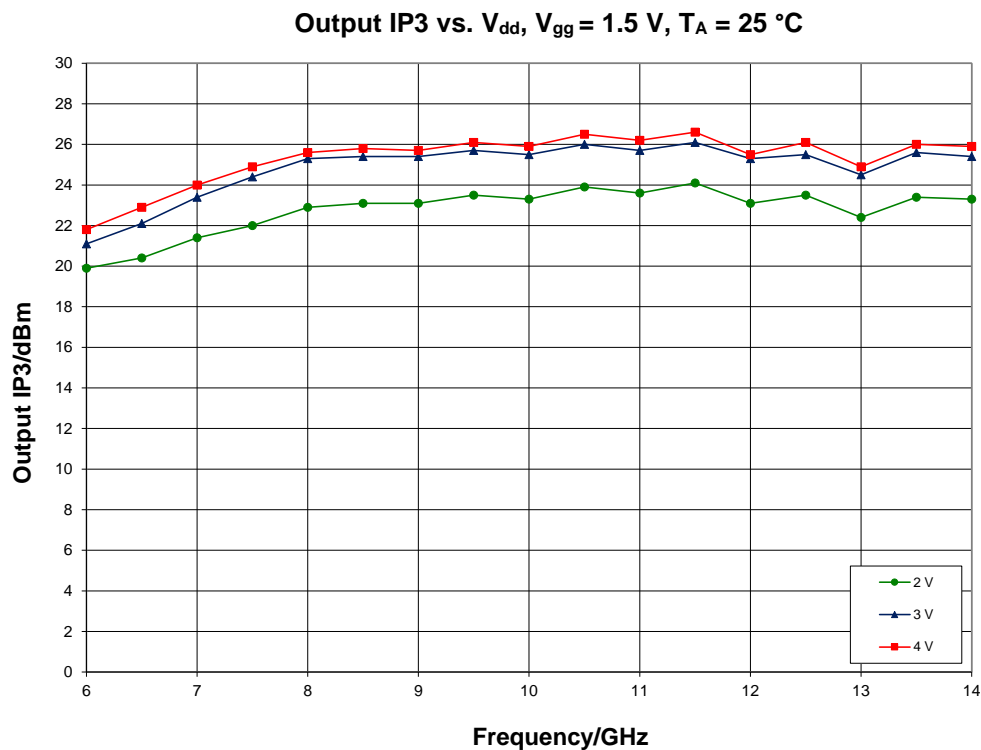
## Typical Performance



## Typical Performance



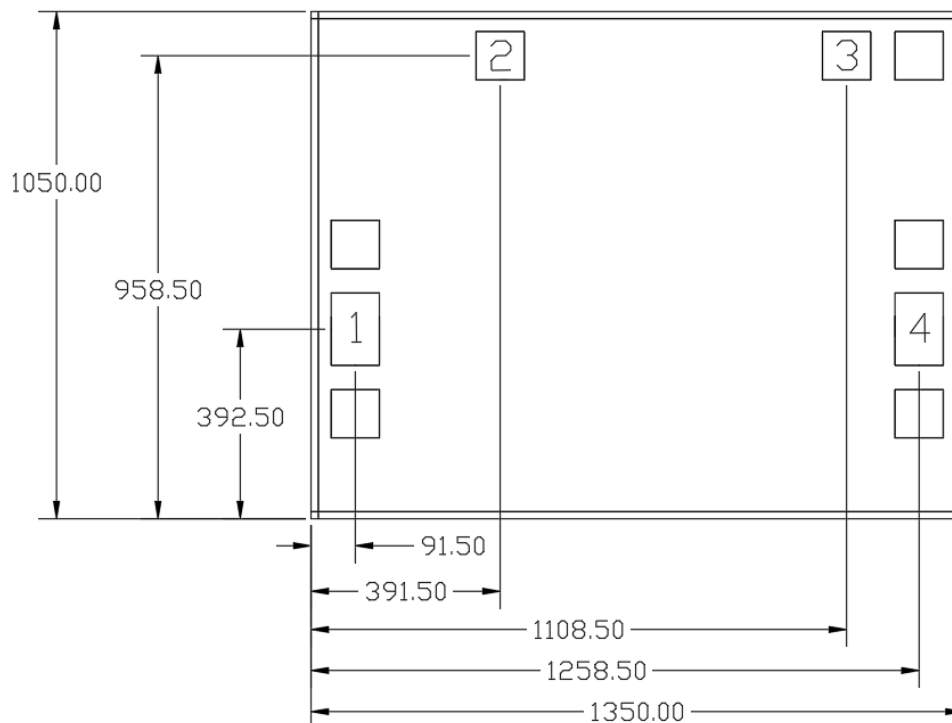
## Typical Performance





## Mechanical Information

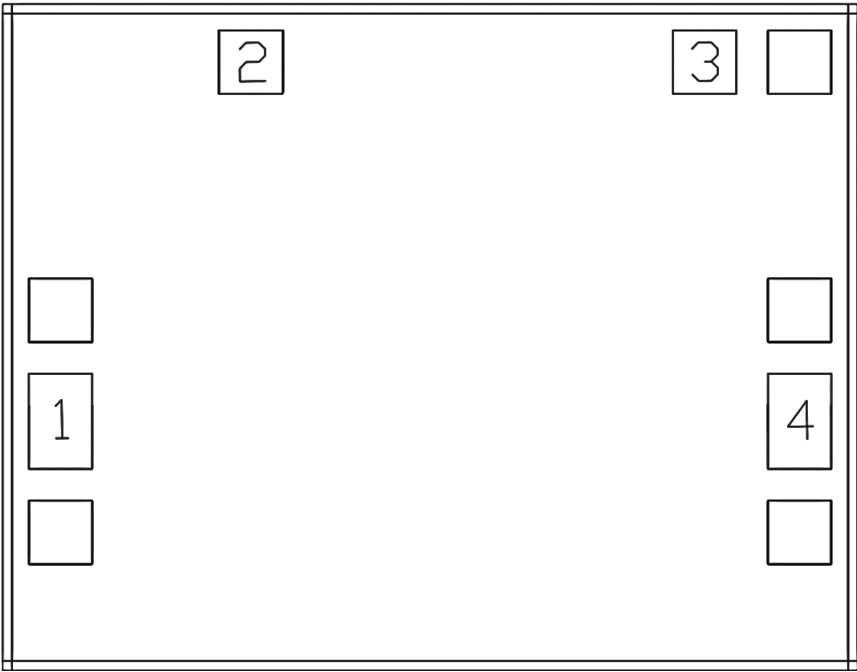
### Package Information and Dimensions



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

Pin Description

Pin Diagram



Functional Description

Pin	Function	Description	Schematic
1	RF in	DC blocked and 50 ohm matched	
2	V <sub>gg</sub>	Power supply voltage Decoupling and bypass caps required	
3	V <sub>dd</sub>	Power supply voltage Decoupling and bypass caps required	
4	RF out	DC blocked and 50 ohm matched	
Backside	Ground	Connect to RF / DC ground	

## Applications Information

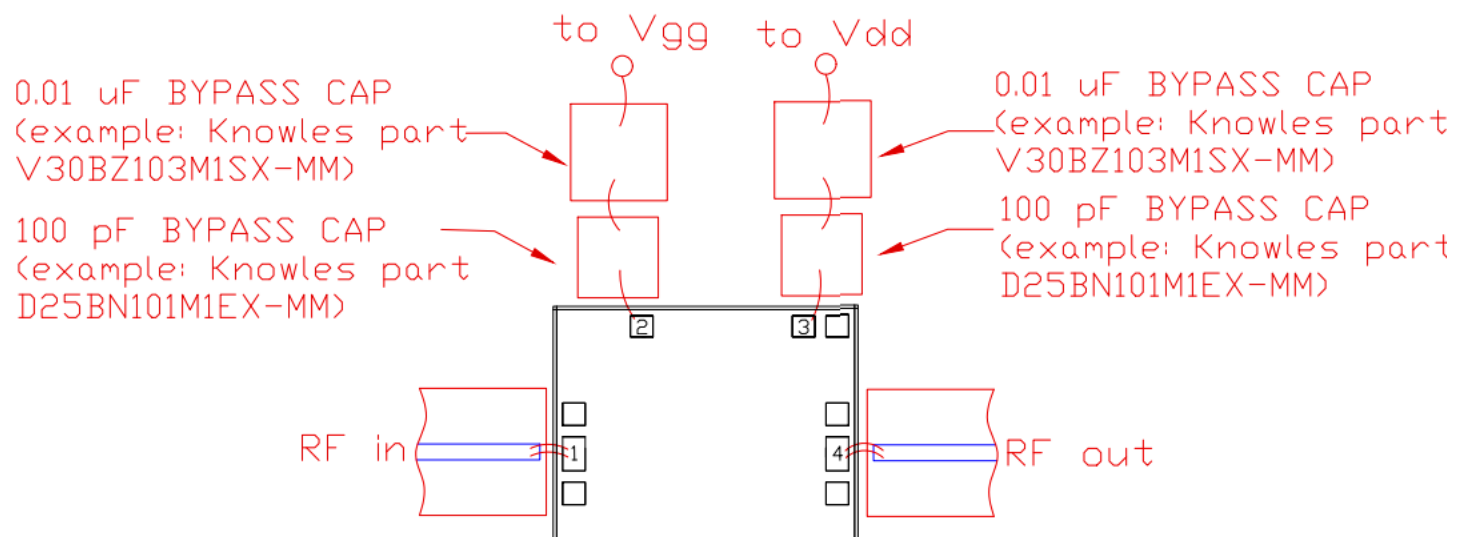
### Assembly Guidelines

The backside of the CMD319 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.**

### Biasing and Operation

The CMD319 is biased with a 3 V positive drain supply and a 1.5 V positive gate supply.

Turn ON procedure:

1. Apply drain voltage  $V_{dd}$  and set to +3 V
2. Apply gate voltage  $V_{gg}$  and set to +1.5 V

Turn OFF procedure:

1. Turn off gate voltage  $V_{gg}$
2. Turn off drain voltage  $V_{dd}$

Refer to Application Note 103: Amplifier Biasing Techniques for instructions on how to implement a single supply biasing scheme.

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<sub>15</sub>H<sub>12</sub>Br<sub>4</sub>O<sub>2</sub>) Free
- SVHC Free
- PFOS Free
- Halogen Free

## Contact Information

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

**Web:** [www.qorvo.com](http://www.qorvo.com)

**Tel:** 1-844-890-8163

**Email:** [customer.support@qorvo.com](mailto:customer.support@qorvo.com)

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