CMD317
1-24 GHz Distributed Driver Amplifier

Product Overview

The CMD317 is a wideband GaAs MMIC driver amplifier ideally suited for military, space and communications systems where small size and high linearity are needed. At 12 GHz the device delivers 16 dB of gain with a corresponding output 1 dB compression point of +23 dBm and an output IP3 of 34 dBm. The CMD317 is a 50 ohm matched design which eliminates the need for RF port matching and includes an on chip bias choke. The CMD317 offers full passivation for increased reliability and moisture protection.

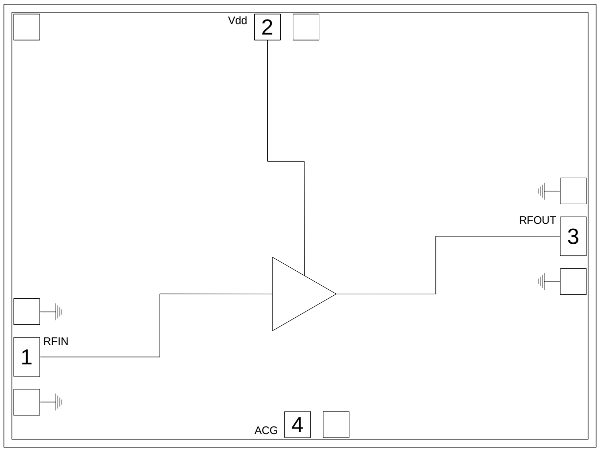
Key Features

- Wide Bandwidth
- High Linearity
- Single Positive Supply Voltage
- On Chip Bias Choke

Ordering Information

Part No.	Description
CMD317	100 Piece Gel Pack

Functional Block Diagram



Electrical Performance (V_{dd} = 8.0 V, T_A = 25° C, F = 12 GHz)

Parameter	Min	Typ	Max	Units
Frequency Range		1 - 24		GHz
Gain		16		dB
Input Return Loss		13		dB
Output Return Loss		16		dB
Output P1dB		23		dBm
Output IP3		34		dBm
Supply Current		225		mA

Absolute Maximum Ratings

Parameter	Rating
Drain Voltage, V_{dd}	9 V
RF Input Power	+20 dBm
Channel Temperature, Tch	150° C
Power Dissipation, Pdiss	2.62 W
Thermal Resistance, Q_{JC}	24.8° 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}	5.0	8.0	8.5	V
I_{dd}		225		mA

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

Drain Current vs. Drain Voltage

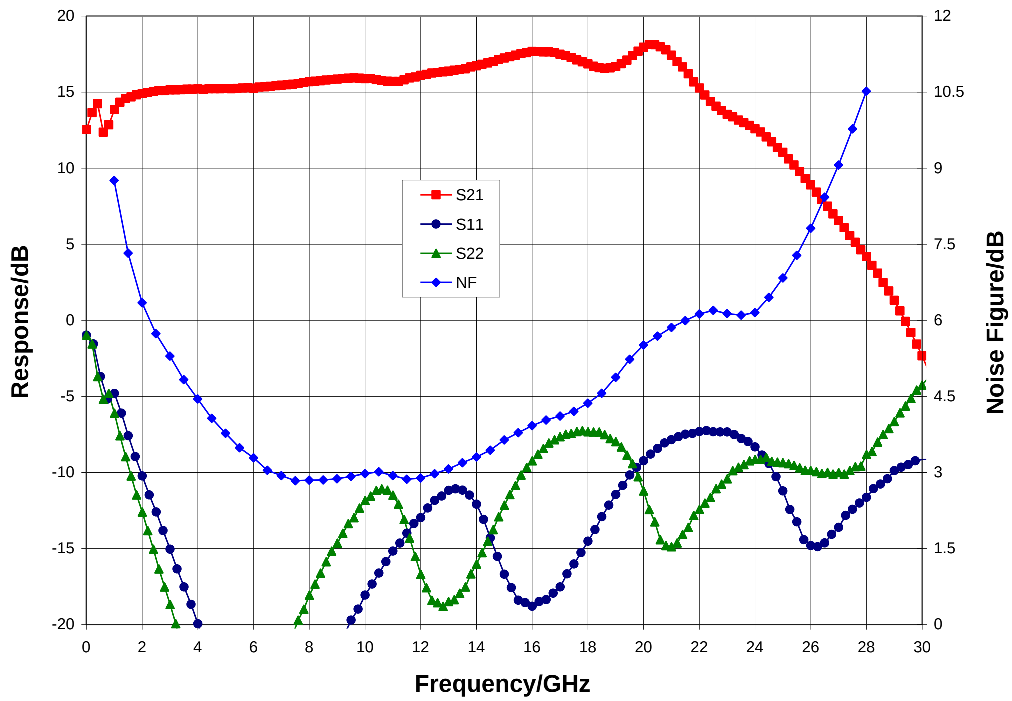
V_{dd} (V)	I_{dd} (mA)
5.0	130
8.0	225

Electrical Specifications (V_{dd} = 8.0 V, T_A = 25° C)

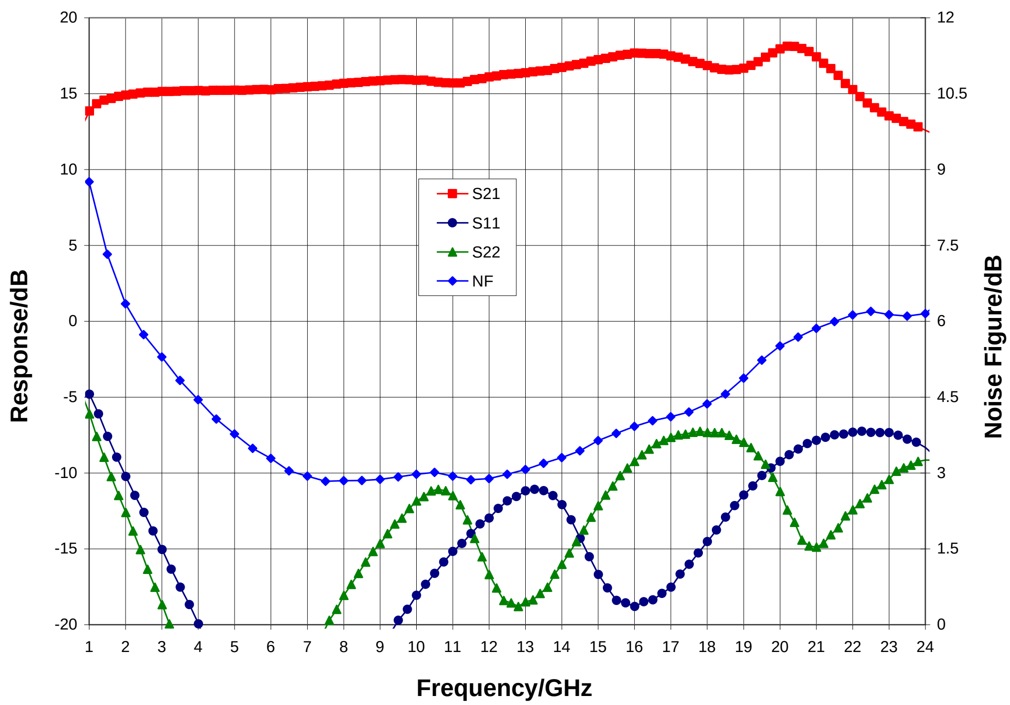
Parameter	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	Units
Frequency Range		1 - 10			10 - 20			20 - 24		GHz
Gain	11	15		13	17		10	15		dB
Noise Figure		4			3.5			6		dB
Input Return Loss		15			13			8		dB
Output Return Loss		15			10			12		dB
Output P1dB	20	23.5		19	22		16	20		dBm
Output IP3		35			33			28		dBm
Supply Current	170	225	280	170	225	280	170	225	280	mA
Gain Temperature Coefficient		0.011			0.012			0.020		dB/°C
Noise Figure Temperature Coefficient		0.009			0.012			0.016		dB/°C

Typical Performance

Broadband Performance, V_{dd} = 8.0 V, T_A = 25° C

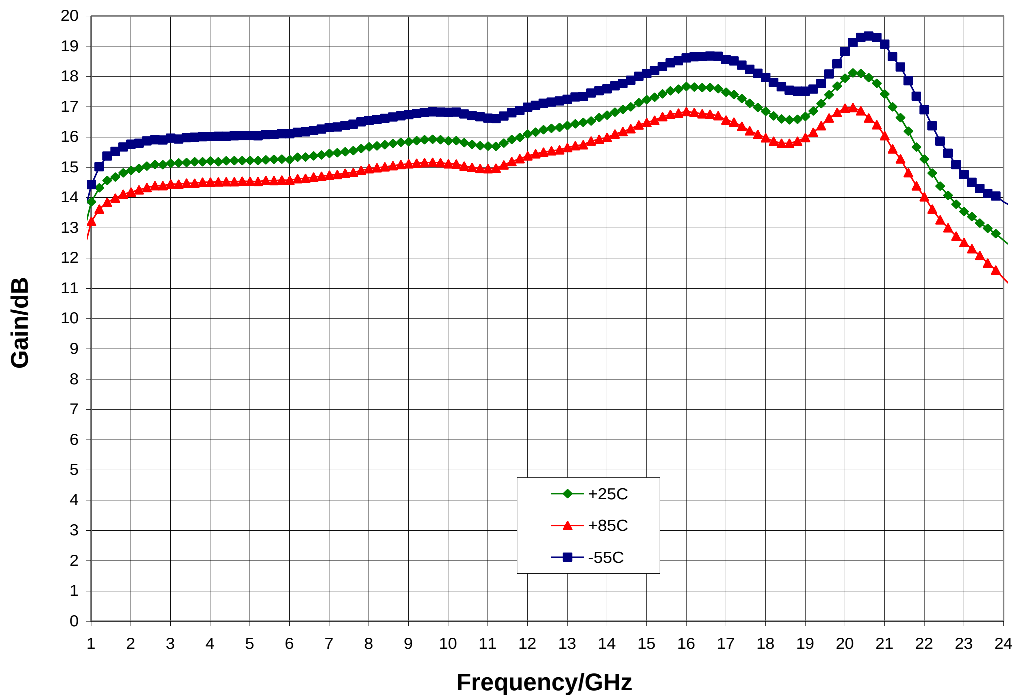


Narrow-band Performance, V_{dd} = 8.0 V, T_A = 25° C

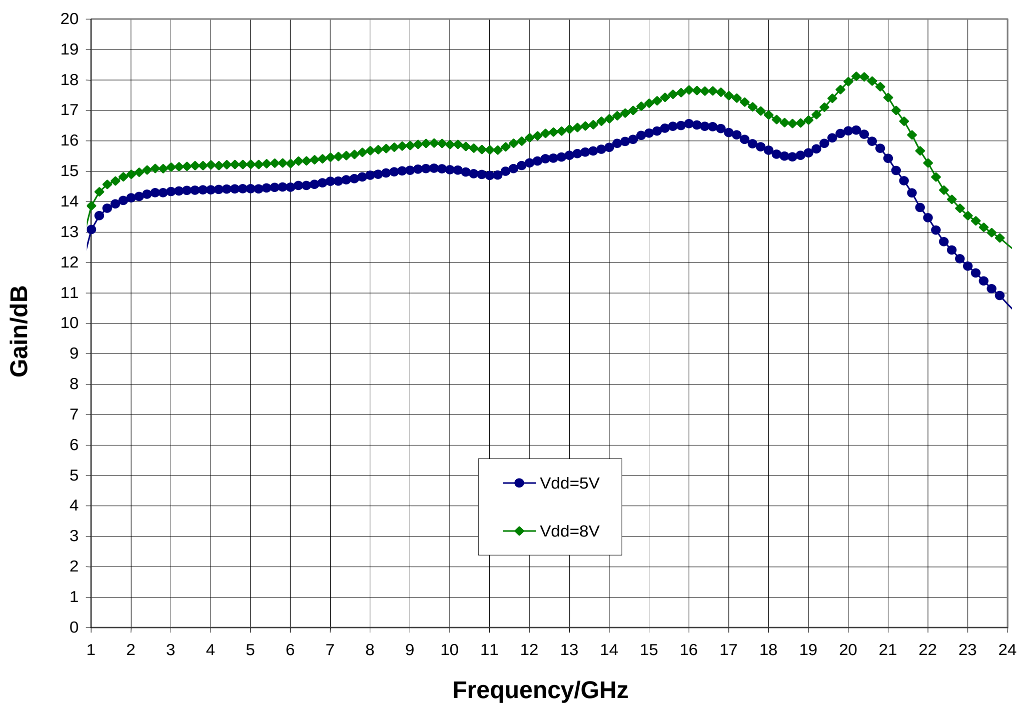


Typical Performance

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

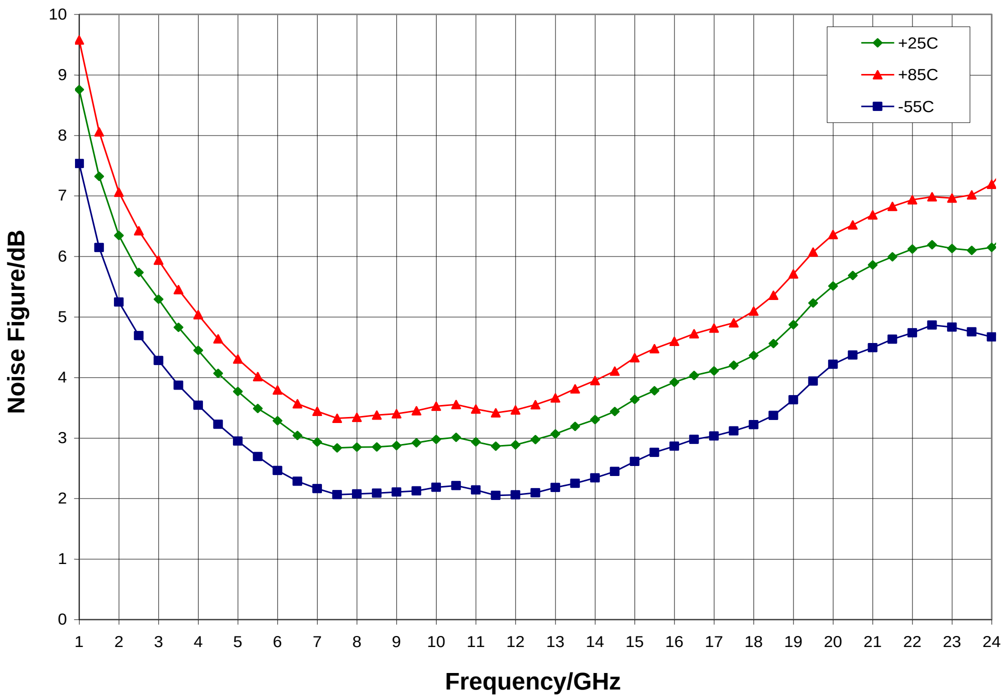


Gain vs. V_{dd}, T_A = 25° C

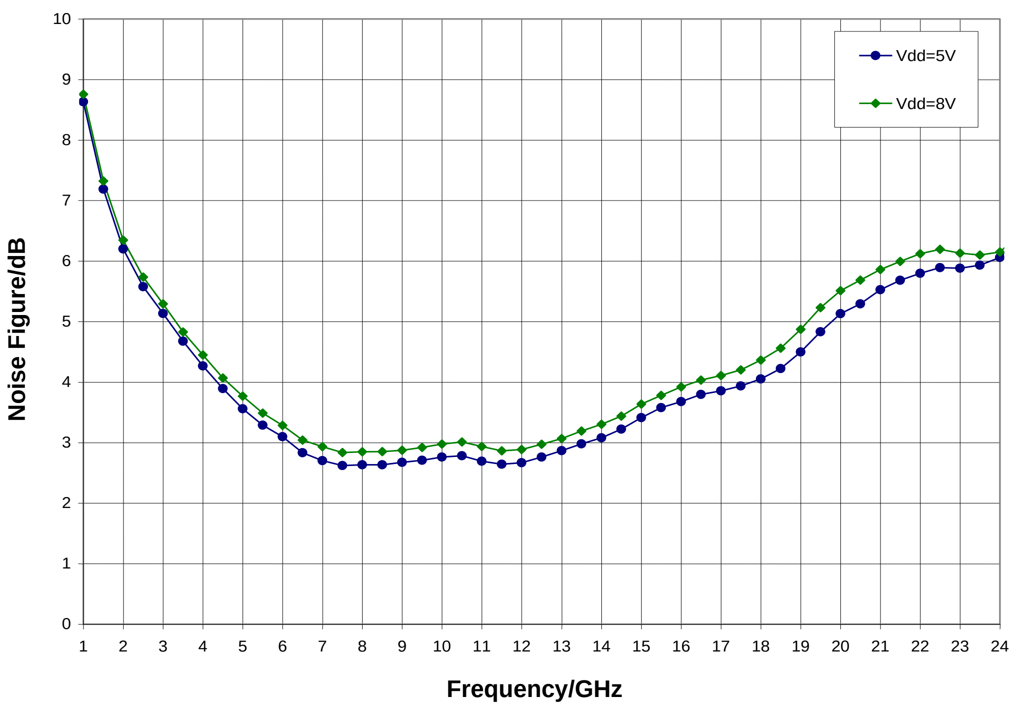


Typical Performance

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

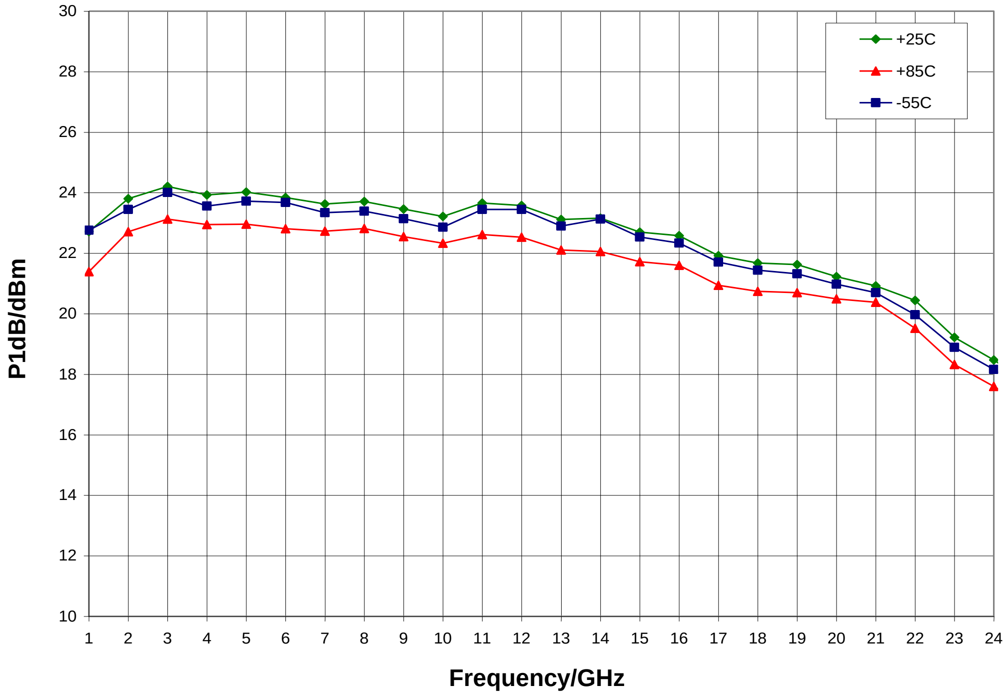


Noise Figure vs. V_{dd}, T_A = 25° C

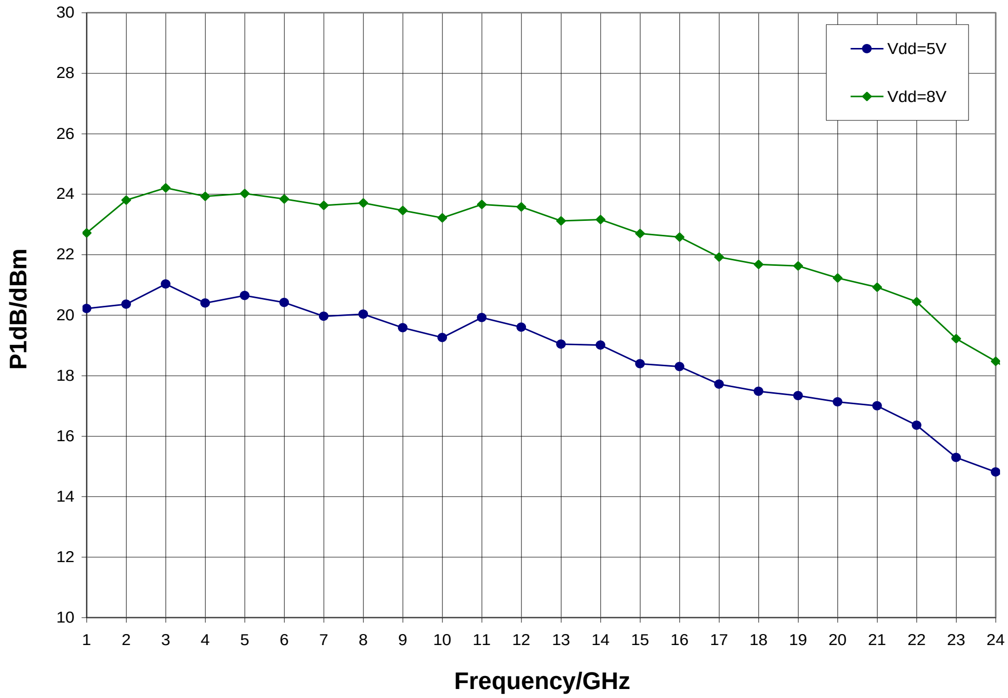


Typical Performance

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

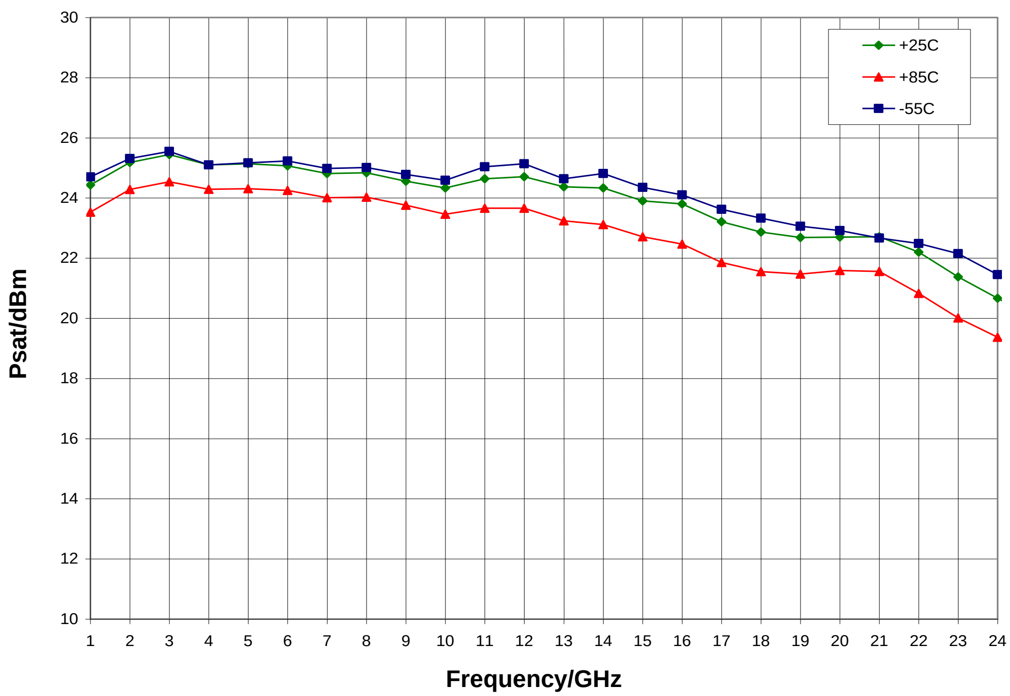


P1dB vs. V_{dd}, T_A = 25^o C

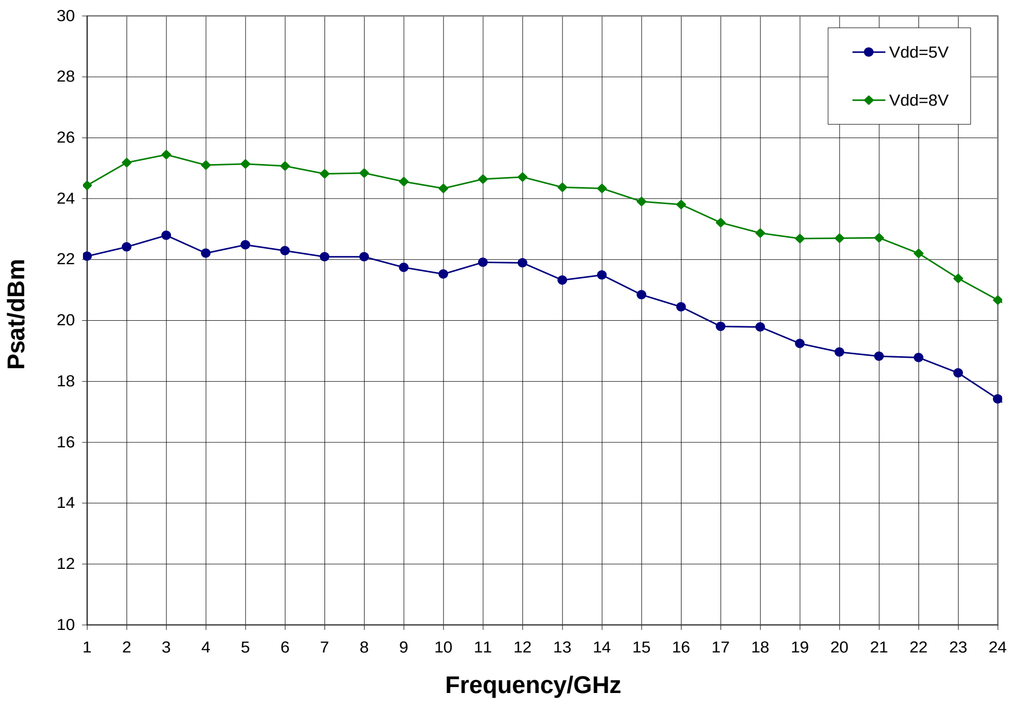


Typical Performance

Psat vs. Temperature, V_{dd} = 8.0 V

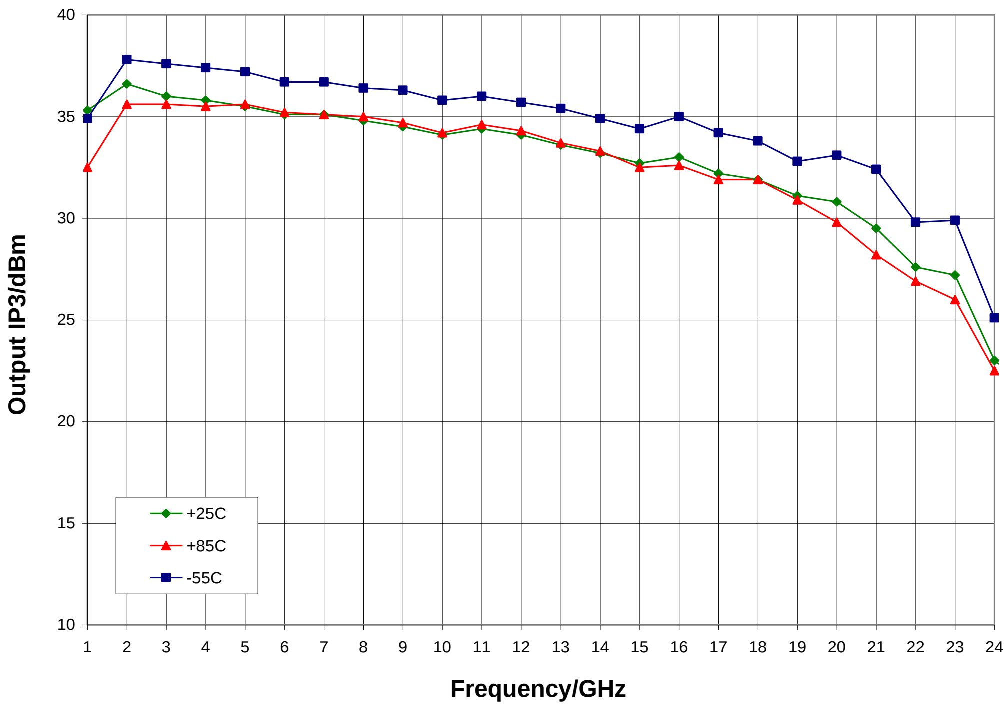


Psat vs. V_{dd}, T_A = 25° C

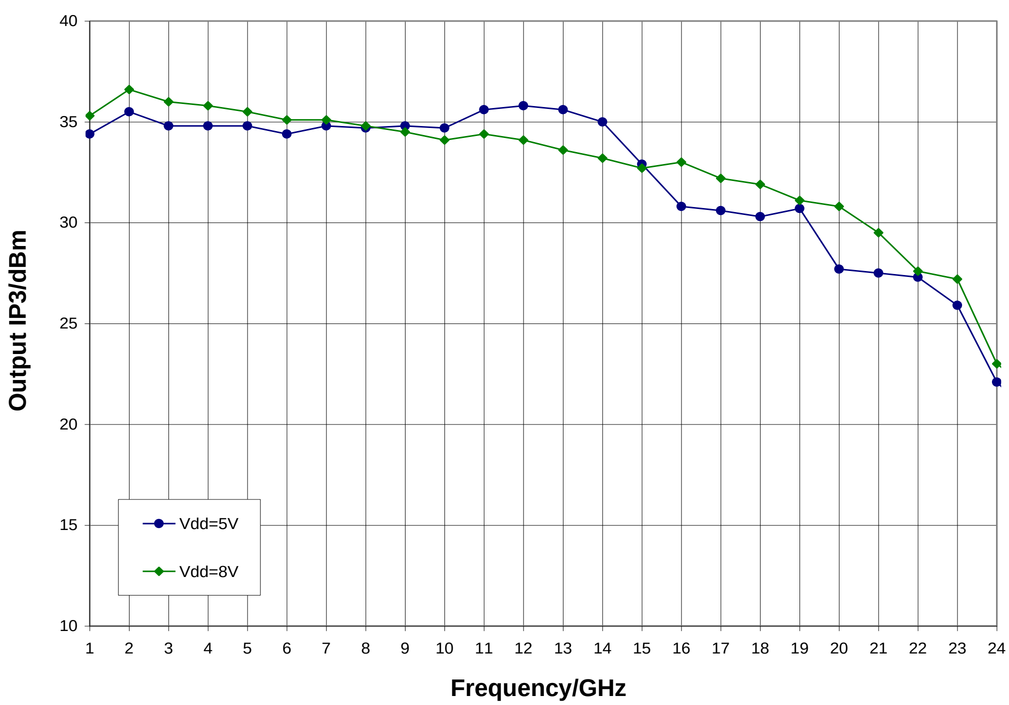


Typical Performance

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

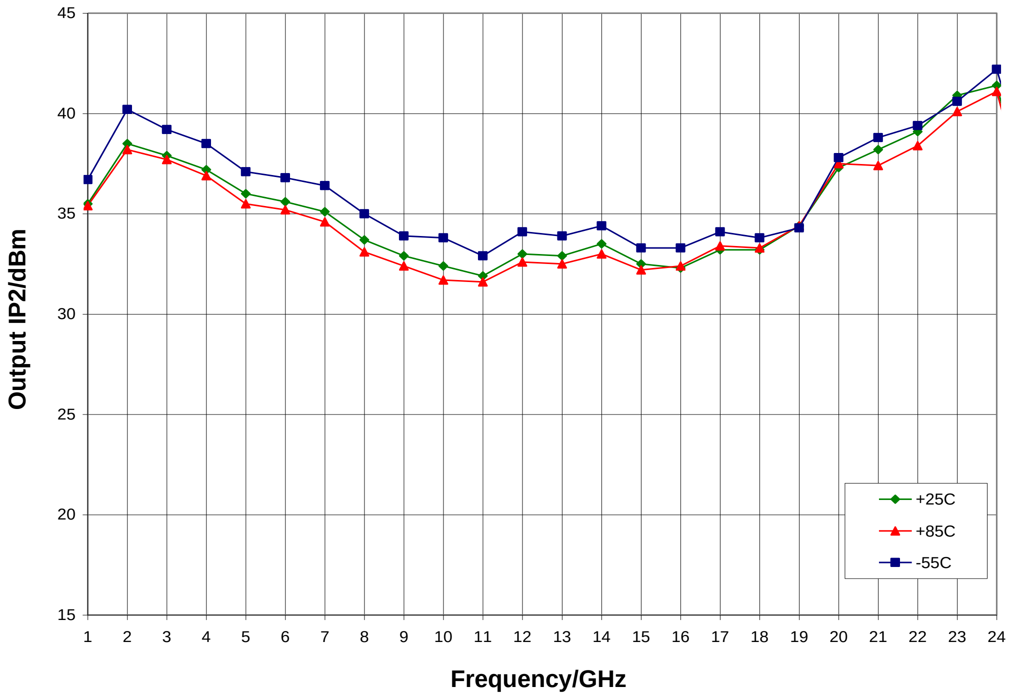


Output IP3 vs. V_{dd}, T_A = 25° C

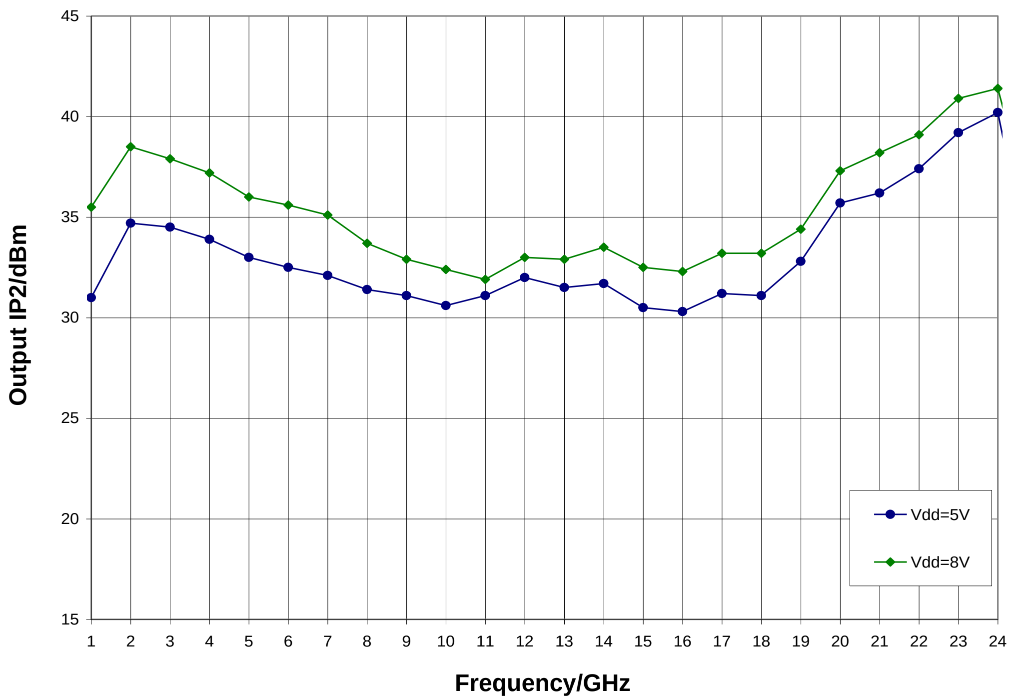


Typical Performance

Output IP2 vs. Temperature, V_{dd} = 8.0 V

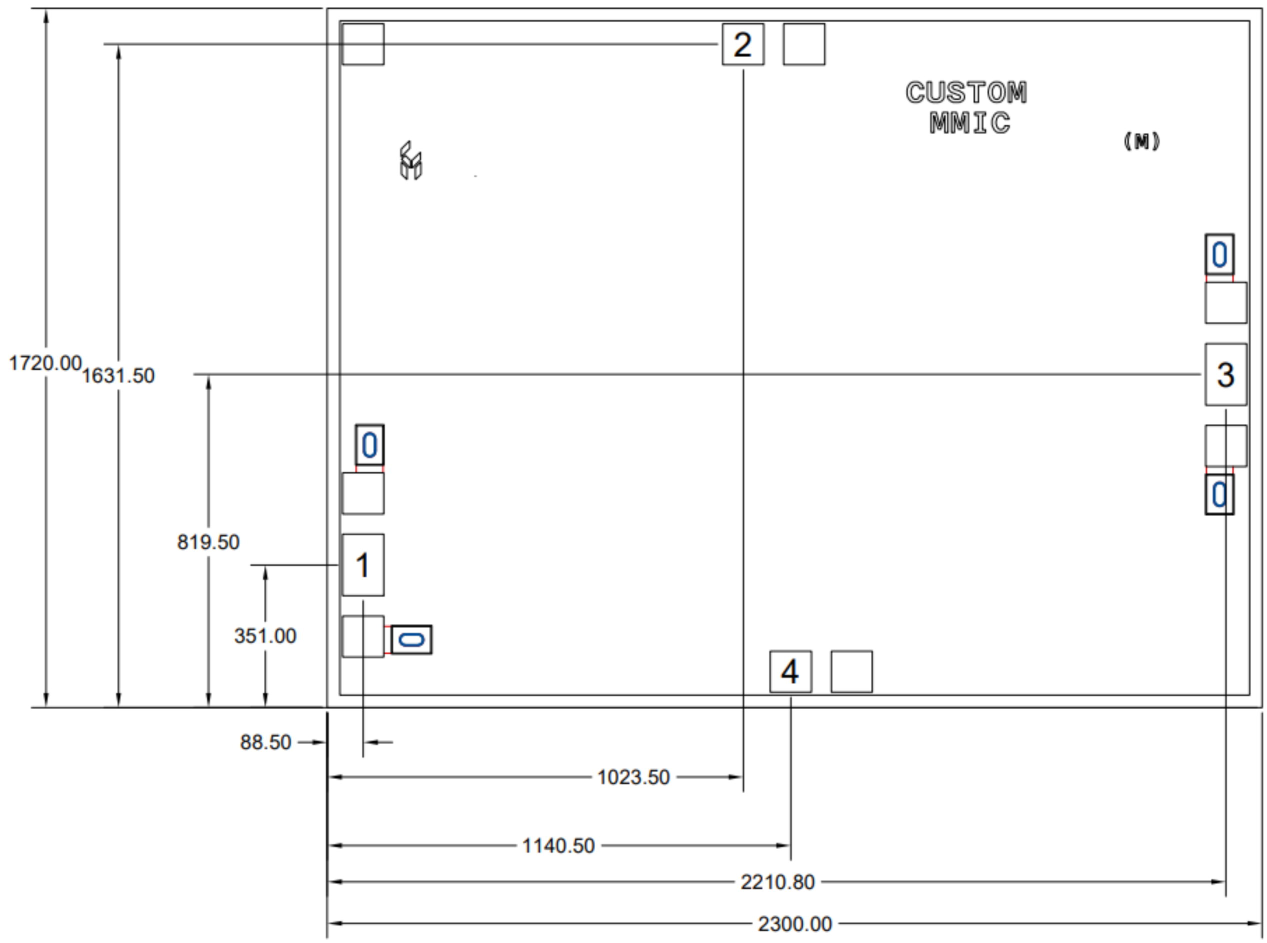


Output IP2 vs. V_{dd}, T_A = 25° C



Mechanical Information

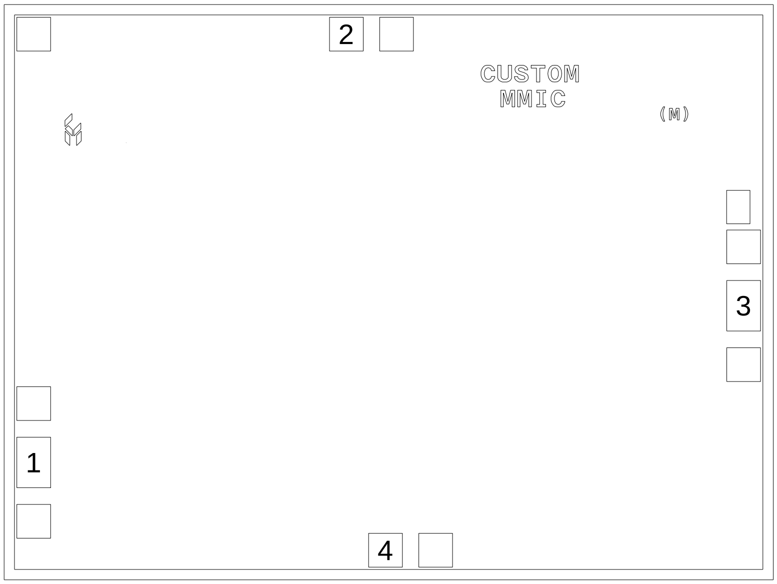
Die Outline (all dimensions in microns)



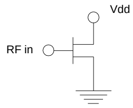
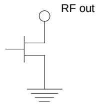
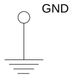
Notes:
1. No connection required for unlabeled pads
2. Backside is RF and DC ground
3. Backside and bond pad metal: Gold
4. Die is 100 microns thick
5. DC bond pads (2, 4) are 100 x 100 microns
6. RF bond pads (1, 3) are 100 x 150 microns

Pad Description

Pad Diagram



Functional Description

Pad	Function	Description	Schematic
1	RF in	50 ohm matched input External DC block required	
2	V_{dd}	Power supply voltage Decoupling and bypass caps required	
3	RF out	50 ohm matched output External DC block required	
4	ACG	Low frequency termination Attach bypass capacitor per application circuit	
Backside	Ground	Connect to RF / DC ground	

Applications Information

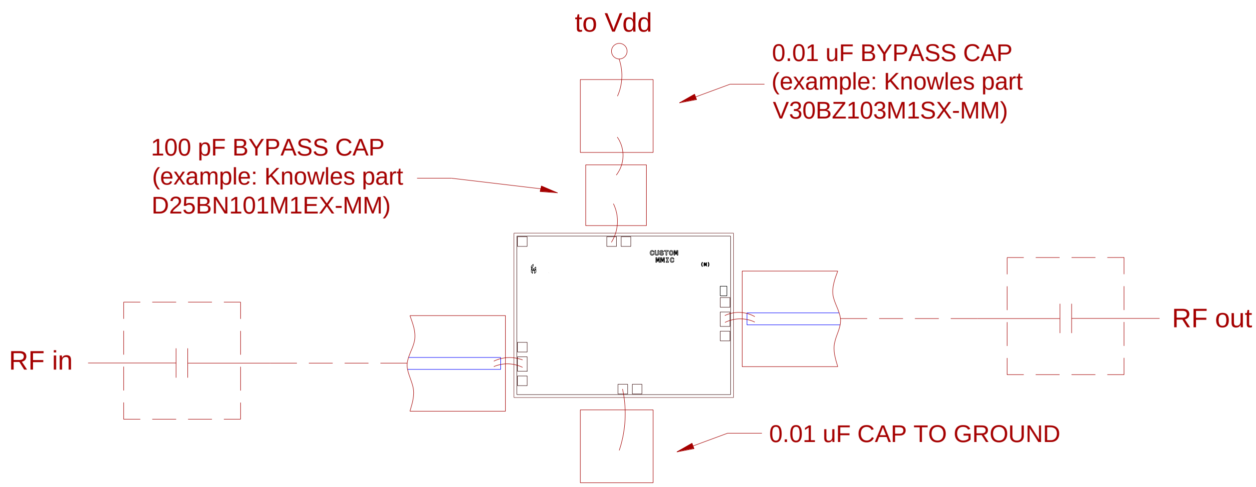
Assembly Guidelines

The backside of the CMD317 is RF ground. Die attach should be accomplished with electrically and thermally conductive epoxy only. Eutectic attach is not recommended. 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 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.

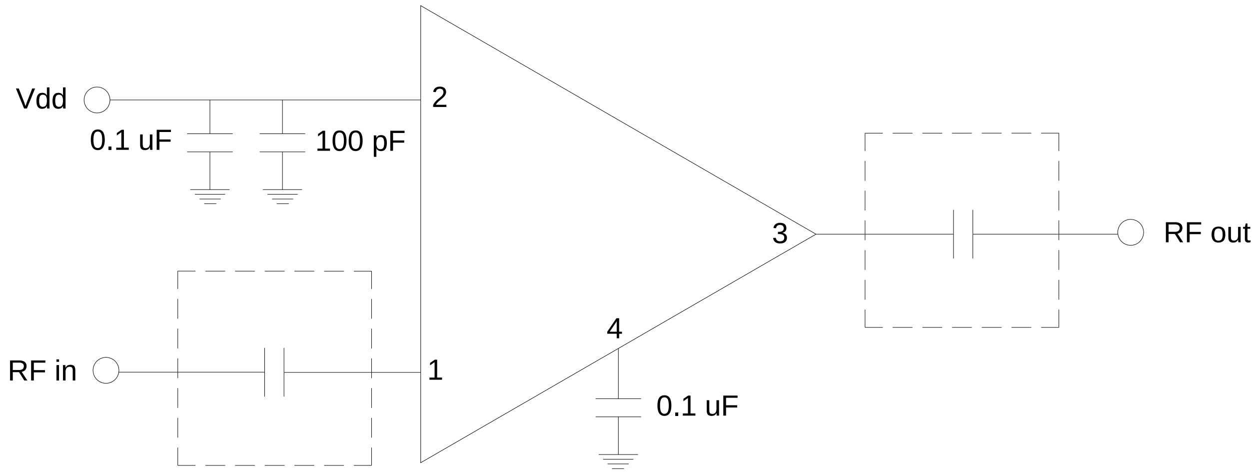
Assembly Diagram



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

Applications Information

Application Circuit



Biasing and Operation

The CMD317 is biased with a single positive drain supply. Performance is optimized when the drain voltage is set to +8.0 V.

Turn ON procedure:

1. Apply drain voltage V_{dd} and set to +8 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 ($C_{15}H_{12}Br_{4}0_{2}$) Free
- SVHC Free
- Halogen Free
- PFOS Free

Contact Information

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

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

Email: **customer.support@qorvo.com**

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