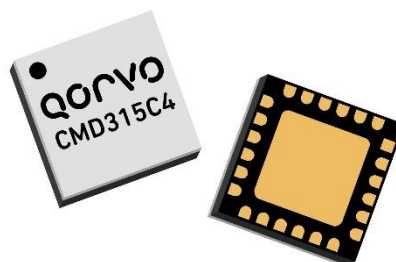
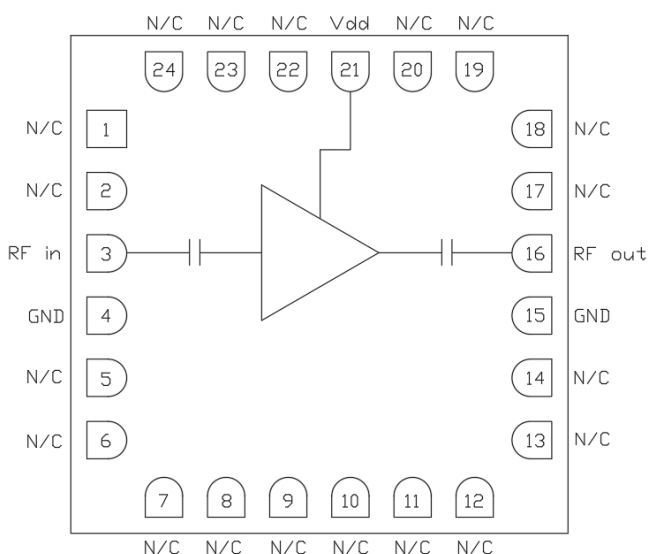


Product Overview

The CMD315C4 is a GaAs MMIC driver amplifier housed in a leadless surface mount package. The CMD315C4 is ideally suited for complex communications systems where small size and high linearity are needed. The device delivers 19.5 dB of gain with a corresponding output 1 dB compression point of 21 dBm and an output IP3 of 33 dBm at 8 GHz. The CMD315C4 is a 50 ohm matched design which eliminates the need for external DC blocks and RF port matching.



Functional Block Diagram



Key Features

- High Output Power
- High Linearity
- Single Positive Bias
- Low Current Consumption
- Pb-Free RoHS Compliant 4x4 Mm SMT Package

Ordering Information

| Part No. | Description |
|--------------|--|
| CMD315C4 | 4-10 GHz Driver Amplifier, 500 Piece 7" Reel |
| CMD315C4-EVB | Evaluation Board |

Electrical Performance ($V_{dd} = 5.0 \text{ V}$, $T_A = 25^\circ \text{C}$, $F = 8 \text{ GHz}$)

| Parameter | Min | Typ | Max | Units |
|--------------------|-----|--------|-----|-------|
| Frequency Range | | 4 - 10 | | GHz |
| Gain | | 19.5 | | dB |
| Noise Figure | | 5.5 | | dB |
| Input Return Loss | | 10 | | dB |
| Output Return Loss | | 15 | | dB |
| Output P1dB | | 21 | | dBm |
| Output IP3 | | 33 | | dBm |
| Supply Current | | 143 | | mA |

Absolute Maximum Ratings

| Parameter | Min Values | Max Values | Units |
|-------------------------------|------------|------------|-------|
| Drain Voltage, V_{dd} | - | 6 | V |
| RF Input Power | - | 20 | dBm |
| Power Dissipation, P_{diss} | - | 802 | mW |
| Storage Temperature | -55 | 150 | °C |

Operation of this device outside the parameter ranges given above may cause permanent damage. These are stress ratings only, and functional operation of the device at these conditions is not implied. Extended application of Absolute Maximum Rating conditions may reduce device reliability.

Thermal and Reliability Information

| Parameter | Test Conditions | Value | Units |
|---|---|--------|-------|
| Thermal Resistance (θ_{JC}) ⁽¹⁾ | $T_{base} = 85^{\circ}\text{C}$, $V_{DD} = 5\text{ V}$, $I_{DQ} = 143\text{ mA}$ Quiescent/Small Signal operation, $P_{DISS} = 0.715\text{ W}$ | 119.59 | °C/W |
| Channel Temperature, T_{CH} (Under RF) | | 170.50 | °C |
| Median Lifetime (T_M) | | 7.0E06 | Hrs |

Notes:

1. Thermal resistance referenced to the bottom of the package.

Recommended Operating Conditions

| Parameter ¹ | Min | Typ | Max | Units |
|---|-----|-----|-----|-------|
| V_{dd} | 3.0 | 5.0 | 5.5 | V |
| $I_{dd} @ V_{dd} = 3\text{ V}$ ² | | 80 | | mA |
| $I_{dd} @ V_{dd} = 5\text{ V}$ ² | | 143 | | mA |
| Operating Temperature Range | -40 | | 85 | °C |

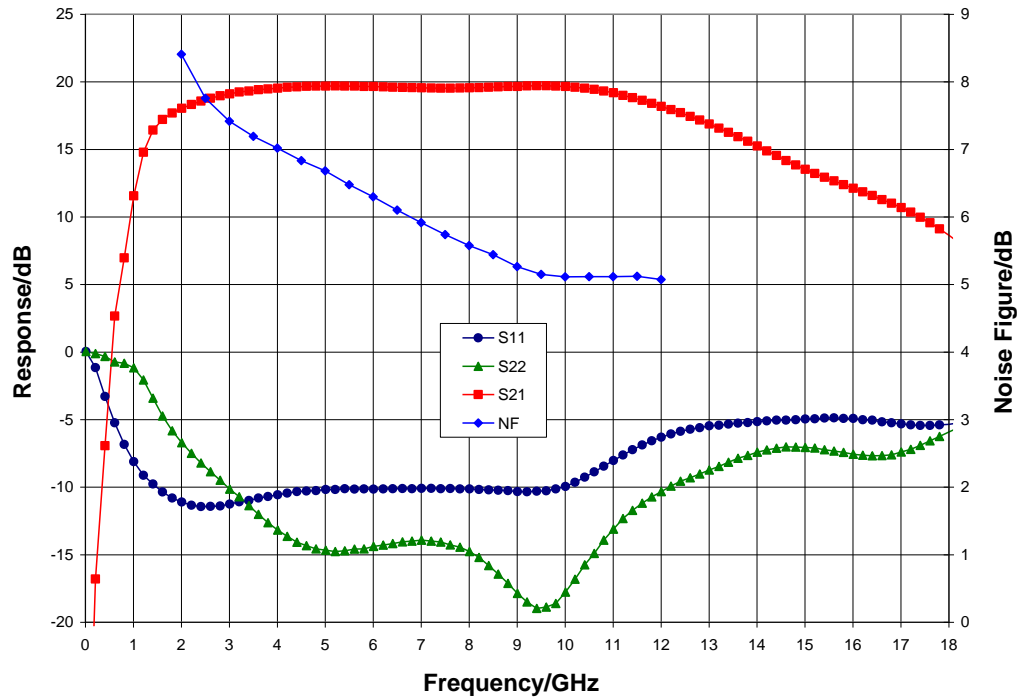
1. Electrical performance is measured at specific test conditions. Electrical specifications are not guaranteed over all recommended operating conditions.
2. Device is self-biased, values shown are typical.

Electrical Specifications ($V_{dd} = 5.0\text{ V}$, $T_A = 25^{\circ}\text{C}$)

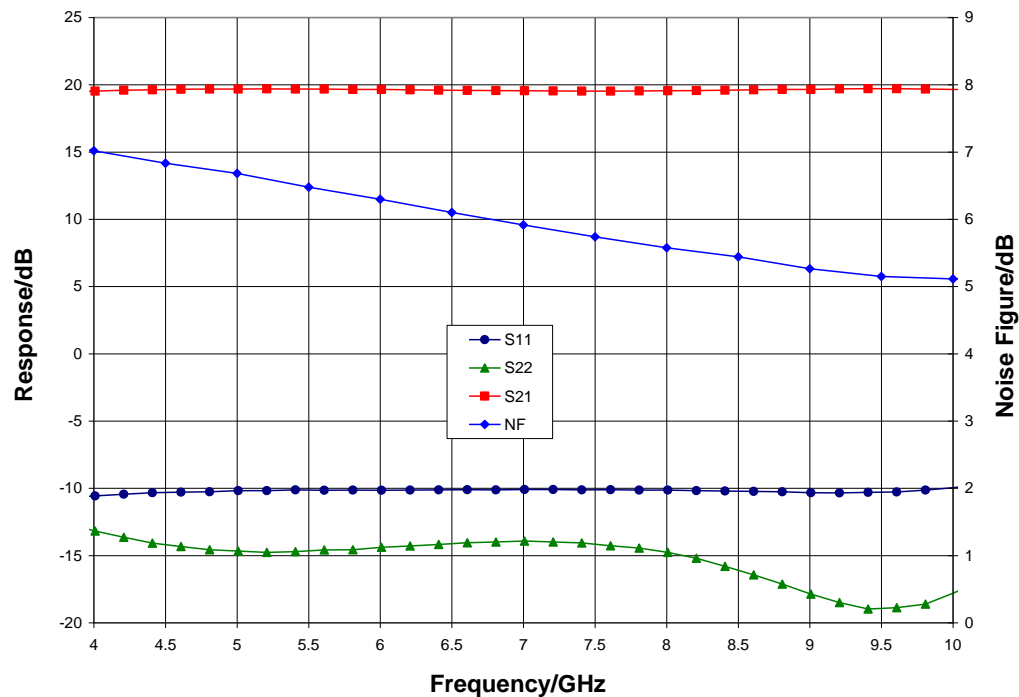
| Parameter | Min | Typ | Max | Min | Typ | Max | Units |
|------------------------------|------|-------|-----|------|--------|-----|-------|
| Frequency Range | | 4 - 7 | | | 7 - 10 | | GHz |
| Gain | 16.5 | 19.5 | | 16.5 | 19.5 | | dB |
| Noise Figure | | 6.5 | | | 5.5 | | dB |
| Input Return Loss | | 10 | | | 10 | | dB |
| Output Return Loss | | 14 | | | 16 | | dB |
| Output P1dB | 18 | 21 | | 18 | 21 | | dBm |
| Output IP3 | | 33.5 | | | 32.5 | | dBm |
| Supply Current | 100 | 143 | 185 | 100 | 143 | 185 | mA |
| Gain Temperature Coefficient | | 0.019 | | | 0.019 | | dB/°C |

Typical Performance

Broadband Performance, $V_{dd} = 5.0 \text{ V}$, $T_A = 25^\circ\text{C}$

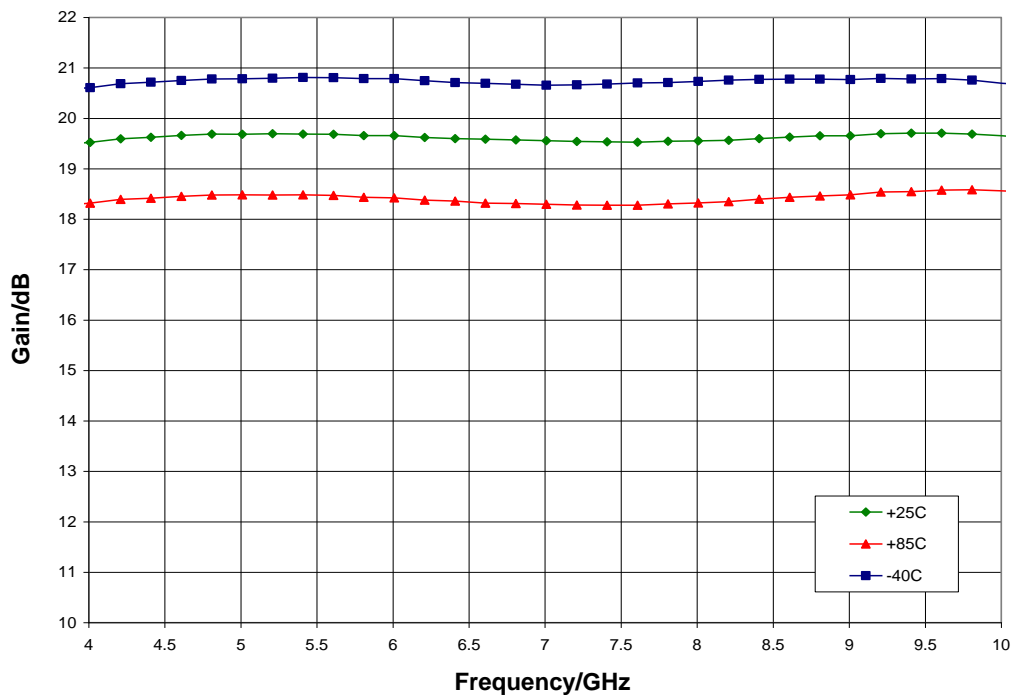


Narrow-band Performance, $V_{dd} = 5.0 \text{ V}$, $T_A = 25^\circ\text{C}$

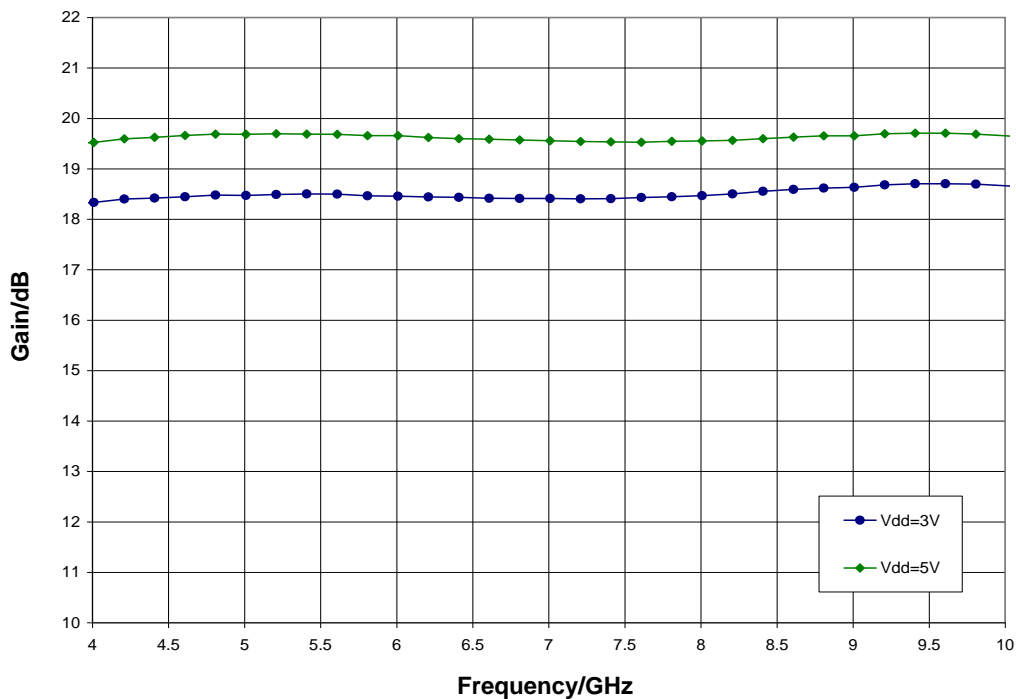


Typical Performance

Gain vs. Temperature, $V_{dd} = 5.0 \text{ V}$

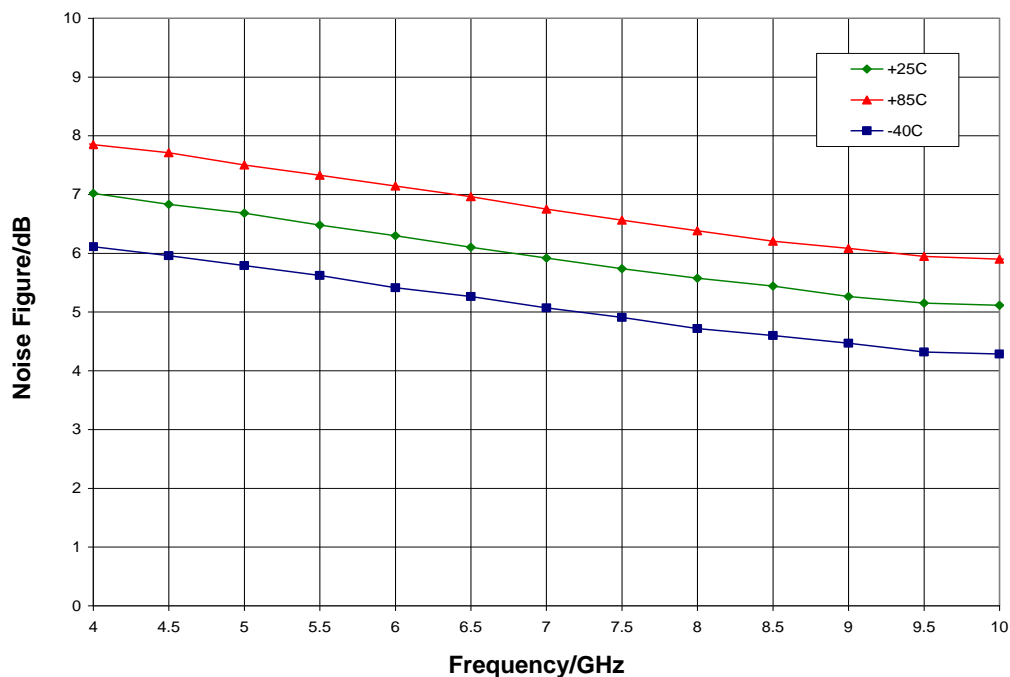


Gain vs. V_{dd} , $T_A = 25^\circ\text{C}$

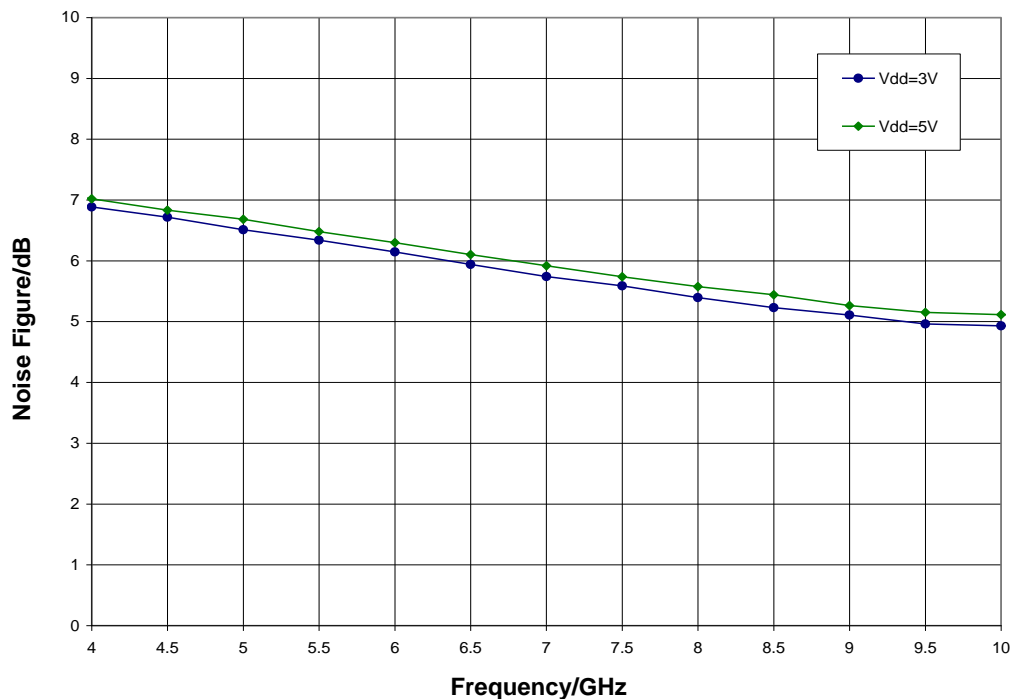


Typical Performance

Noise Figure vs. Temperature, $V_{dd} = 5.0 \text{ V}$

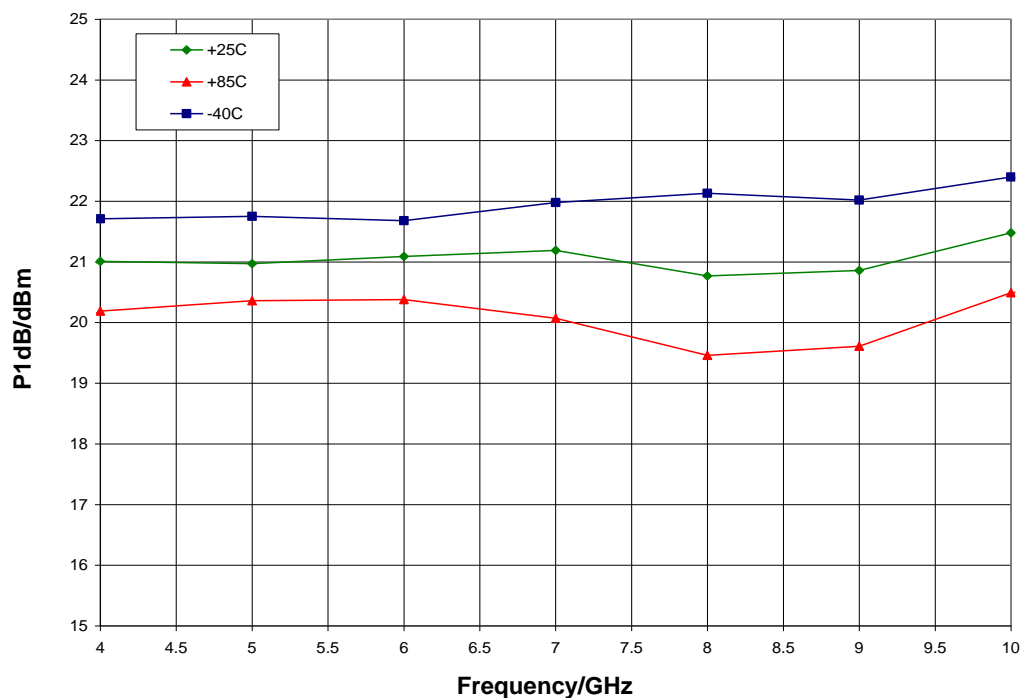


Noise Figure vs. V_{dd} , $T_A = 25^\circ\text{C}$

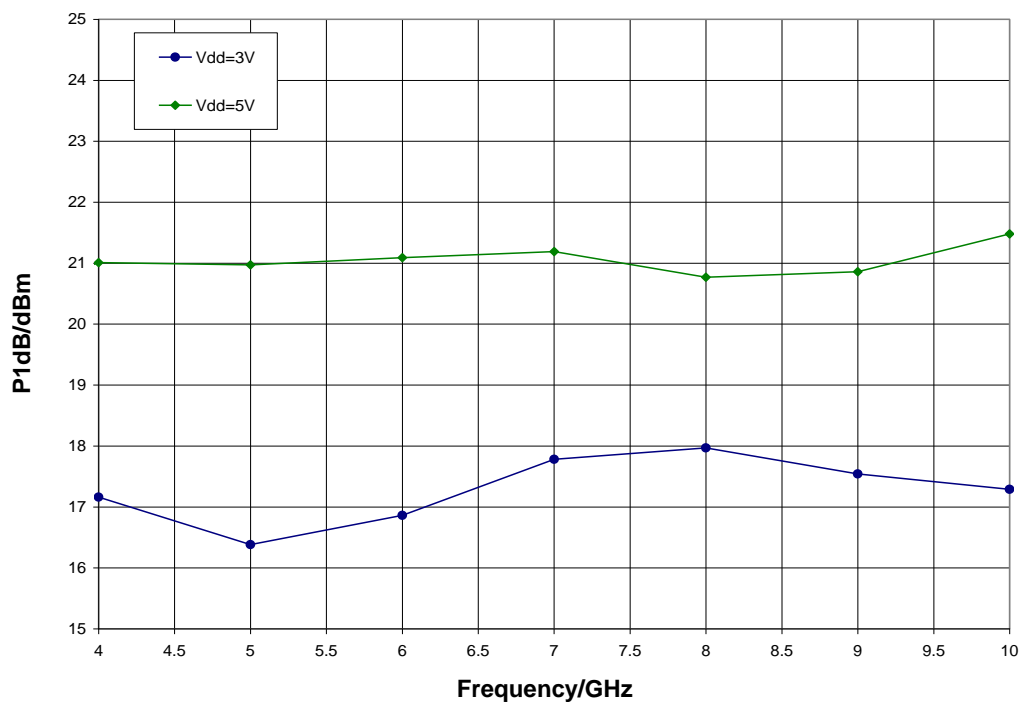


Typical Performance

P1dB vs. Temperature, $V_{dd} = 5.0 \text{ V}$

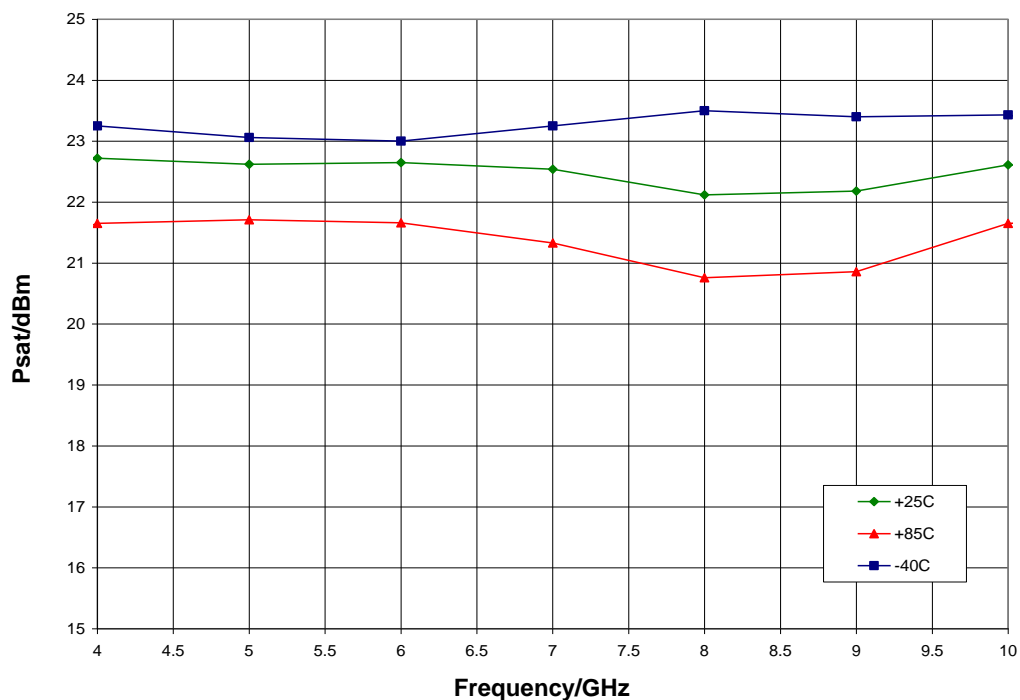


P1dB vs. V_{dd} , $T_A = 25^\circ\text{C}$

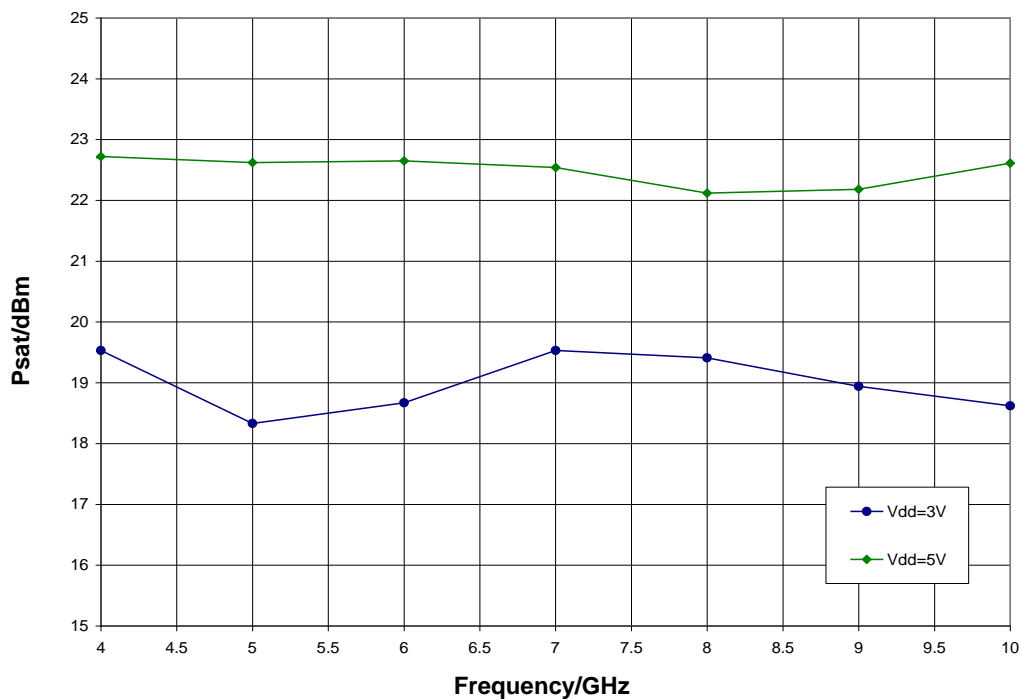


Typical Performance

Psat vs. Temperature, $V_{dd} = 5.0\text{ V}$

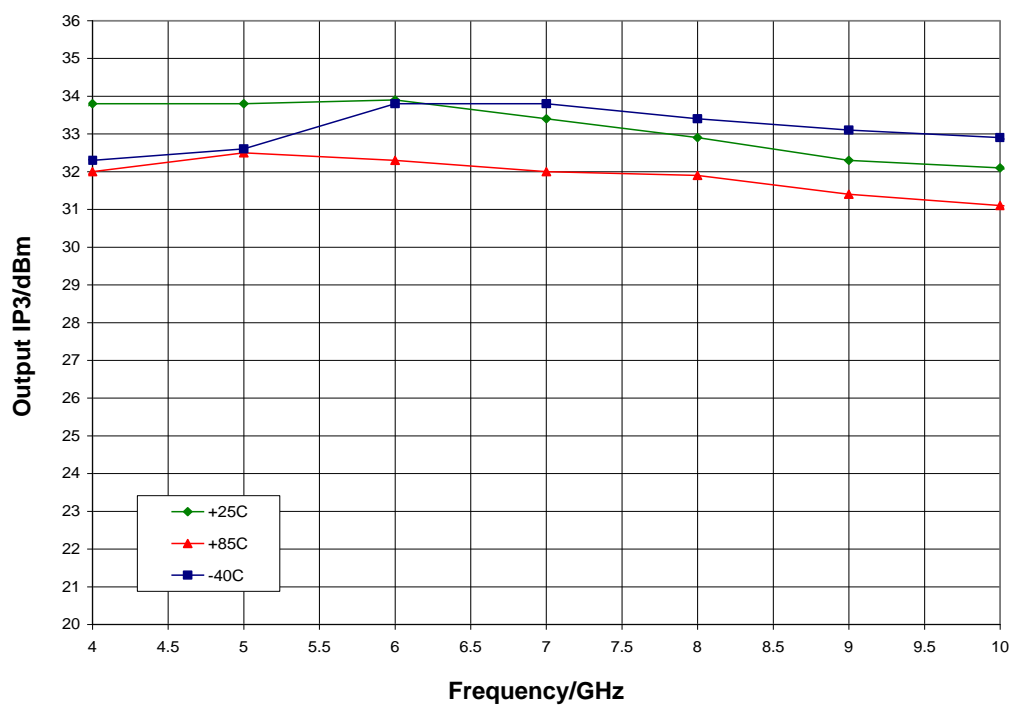


Psat vs. V_{dd} , $T_A = 25\text{ °C}$

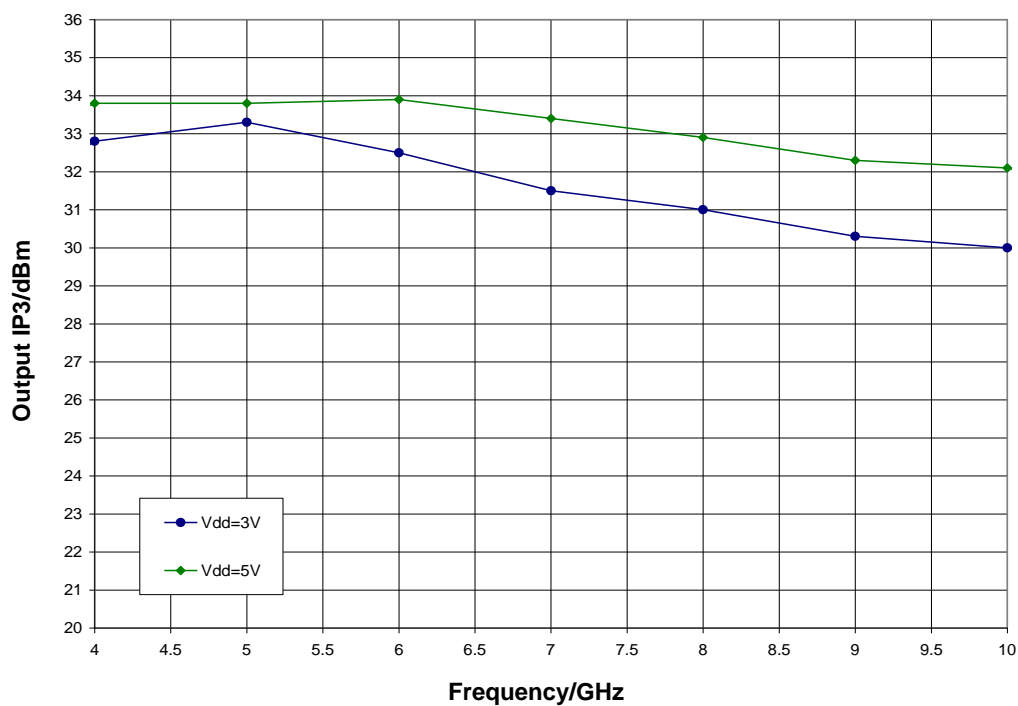


Typical Performance

Output IP3 vs. Temperature, $V_{dd} = 5.0\text{ V}$

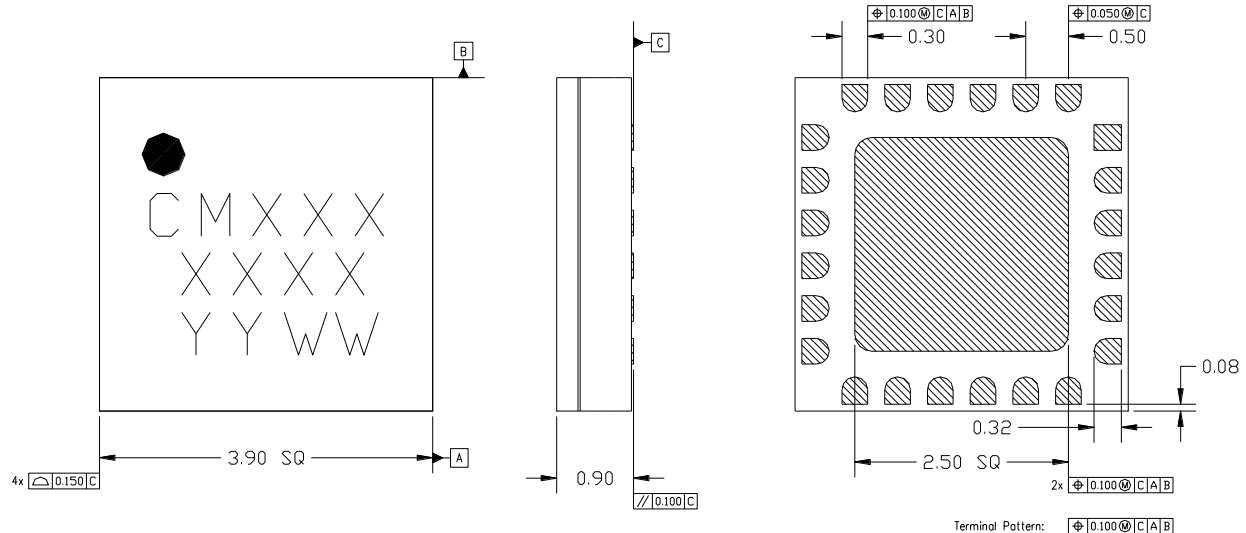


Output IP3 vs. V_{dd} , $T_A = 25\text{ °C}$



Mechanical Information

Package Information and Dimensions



Notes:

- All dimensions shown in mm.
- Material: Black alumina
- Lead finish
 - Ni: 8.89um max, 1.27um min
 - Pd: 0.17um max, 0.07um min
 - Au: 0.254um max, 0.03um min
- Marking
 - Line 1: Part number
 - Example: CMD315C4 shall be marked as CM315
 - Line 2: Lot number
 - Line 3: Date code - Last 2 digits of the year of manufacture followed by a 2 digit week code
- Alternate pin #1 identifier is a single square pad
- Alternate die paddle may have chamfered corners

Recommended PCB Land Pattern

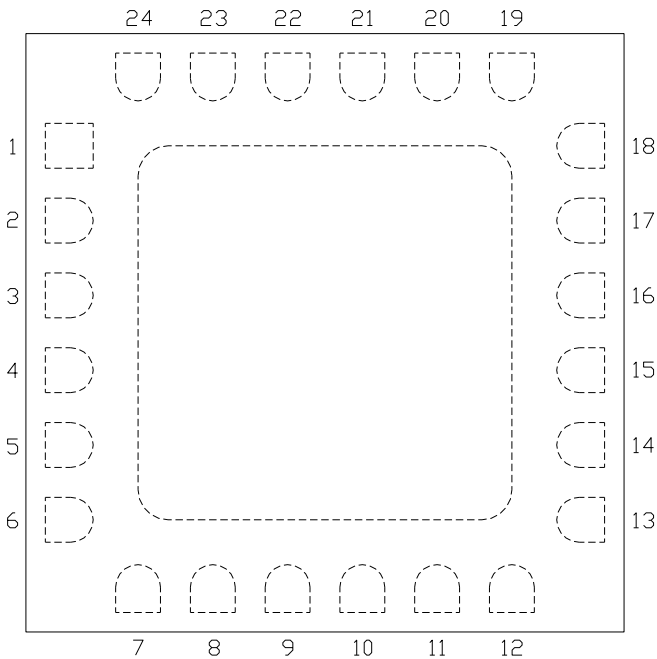
Qorvo recommends that the user develop the land pattern that will provide the best design for proper solder reflow and device attach for their specific application. Please review Qorvo Application Note AN 105 for a recommended land pattern approach.

Recommended Solder Reflow Profile

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

Pin Description

Pin Diagram

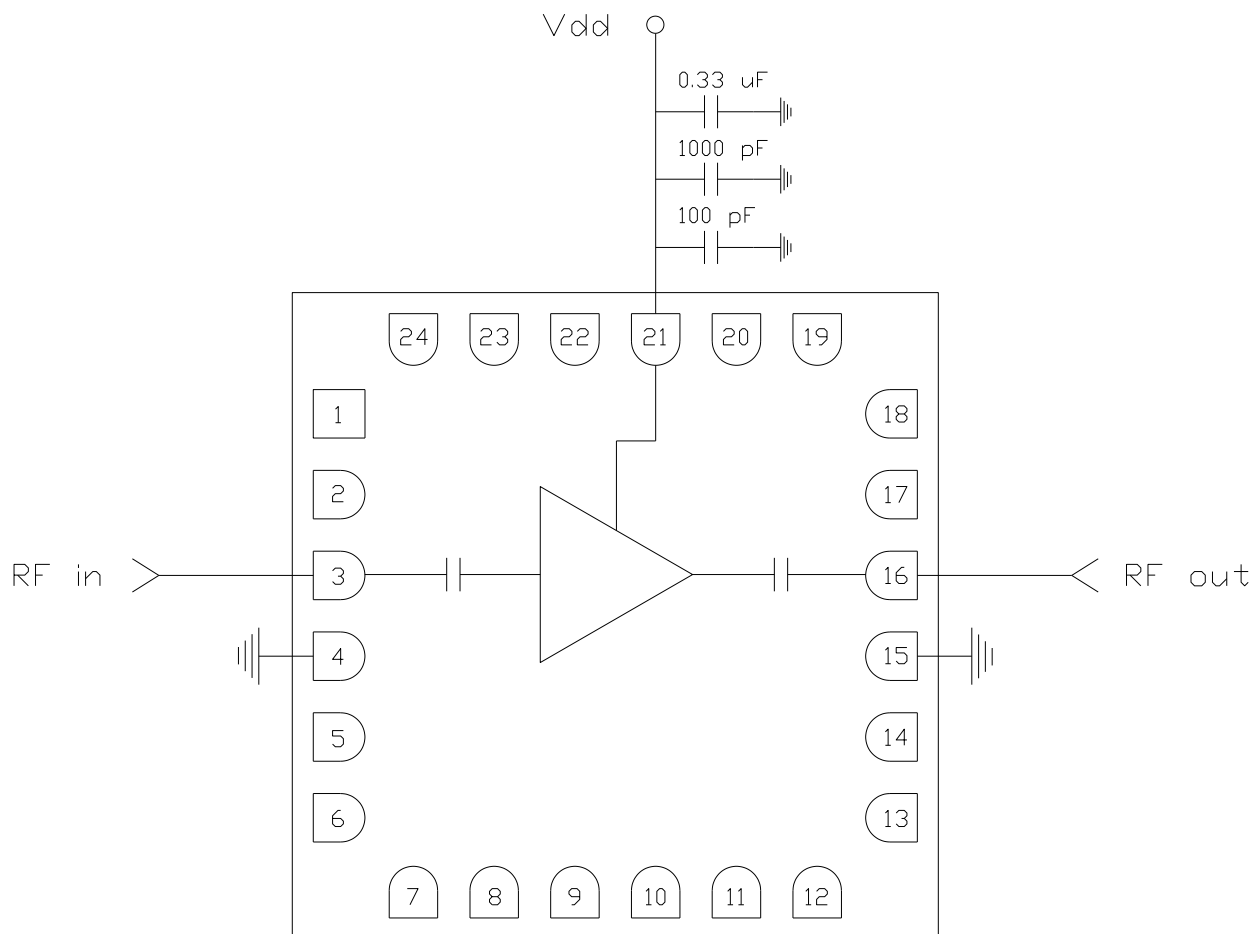


Functional Description

| Pad | Function | Description | Schematic |
|--------------------------------|-----------------|---|-----------|
| 1, 2, 5 - 14, 17 - 20, 22 - 24 | N/C | No connection required These pins may be connected to RF / DC ground | |
| 4,15 and die paddle | Ground | Connect to RF / DC ground | |
| 3 | RF in | DC blocked and 50 ohm matched | |
| 16 | RF out | DC blocked and 50 ohm matched | |
| 21 | V _{dd} | Power supply voltage Decoupling and bypass caps required | |

Applications Information

Application Circuit



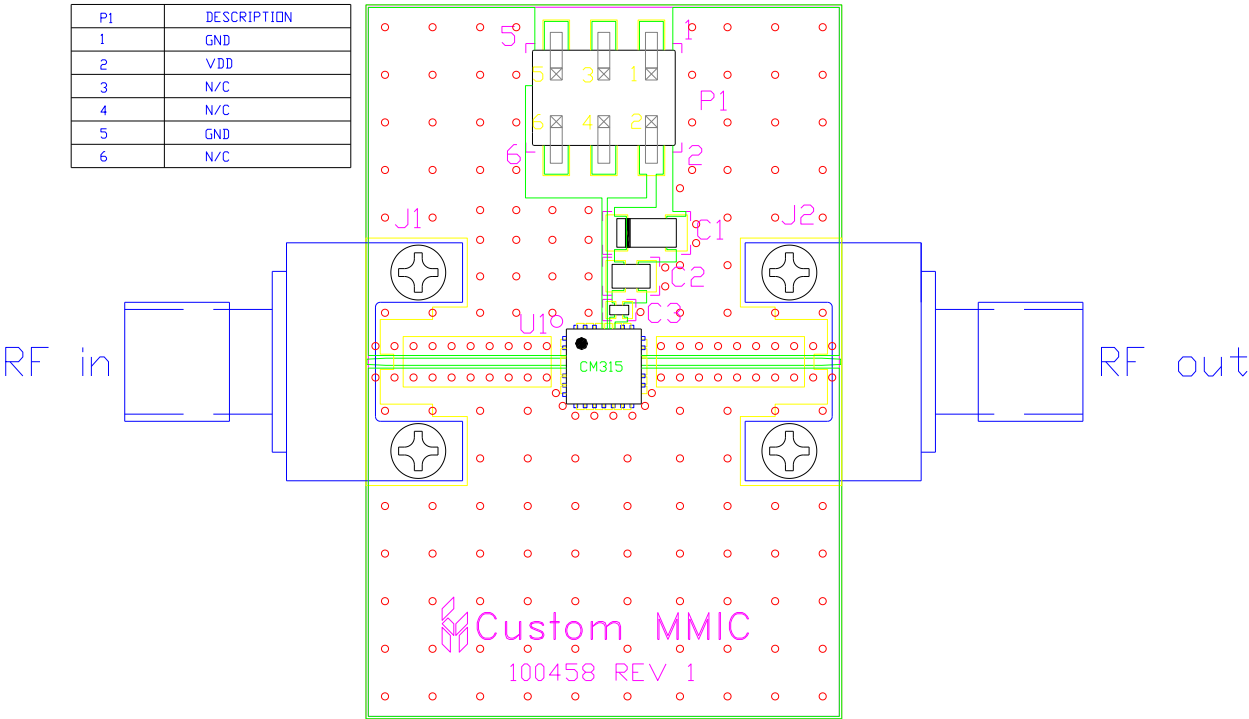
Biasing and Operation

The CMD315C4 is biased with a single 5.0 V positive drain supply. No bias procedure required, RF power can be applied at any time.

Applications Information

Evaluation Board

The circuit board shown has been developed for optimized assembly at Qorvo. 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 μ F | Capacitor, Tantalum |
| C2 | 1000 pF | Capacitor, 0603 |
| C3 | 100 pF | Capacitor, 0402 |
| U1 | | CMD315C4 Driver Amplifier |
| PCB | | 100458 Evaluation PCB |

Handling Precautions

| Parameter | Rating | Standard |
|----------------------------------|----------|------------------------------------|
| ESD – Human Body Model (HBM) | Class 1A | ESDA / JEDEC JS-001-2012 |
| MSL – Moisture Sensitivity Level | Level 1 | JEDEC standard IPC/JEDEC J-STD-020 |



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 (C₁₅H₁₂Br₄O₂) 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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