



CMD157P3

6-18 GHz Low Noise Amplifier

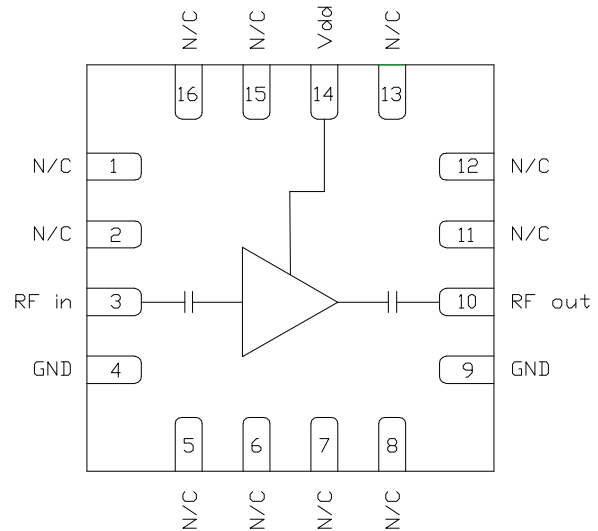
Features

- ▶ Ultra low noise figure
- ▶ High gain broadband performance
- ▶ Single supply voltage: +3.0 V @ 52 mA
- ▶ Pb-free RoHs compliant 3x3 QFN package

Description

The CMD157P3 is a broadband MMIC low noise amplifier housed in a leadless 3x3 mm plastic surface mount package. The CMD157P3 is ideally suited for EW and communications systems where small size and low power consumption are needed. The broadband device delivers greater than 25 dB of gain with a corresponding output 1 dB compression point of +10 dBm and a noise figure of 1.5 dB. The CMD157P3 is a 50 ohm matched design eliminating the need for external DC blocks and RF port matching. The CMD157P3 amplifier is the perfect alternative to costly hybrid amplifiers.

Functional Block Diagram



Electrical Performance - $V_{dd} = 3.0\text{ V}$, $T_A = 25\text{ }^\circ\text{C}$

| Parameter | Min | Typ | Max | Units |
|--------------------|--------|-----|-----|-------|
| Frequency Range | 6 - 18 | | | GHz |
| Gain | | 26 | | dB |
| Noise Figure | | 1.5 | | dB |
| Input Return Loss | | 10 | | dB |
| Output Return Loss | | 14 | | dB |
| Output P1dB | | 11 | | dBm |
| Supply Current | | 52 | | mA |

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Specifications

Absolute Maximum Ratings

| Parameter | Rating |
|--------------------------------------|---------------|
| Drain Voltage, Vdd | 5.0 V |
| RF Input Power | +20 dBm |
| Channel Temperature, Tch | 150 °C |
| Power Dissipation, P _{diss} | 540 mW |
| Thermal Resistance | 120 °C/W |
| Operating Temperature | -40 to 85 °C |
| Storage Temperature | -55 to 150 °C |
| ESD Sensitivity (HBM) | Class 1A |

Operation of this device outside the maximum ratings may cause permanent damage.

Recommended Operating Conditions

| Parameter | Min | Typ | Max | Units |
|-----------------|-----|-----|-----|-------|
| Vdd | 2.0 | 3.0 | 4.5 | V |
| I _{dd} | | 52 | | mA |

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

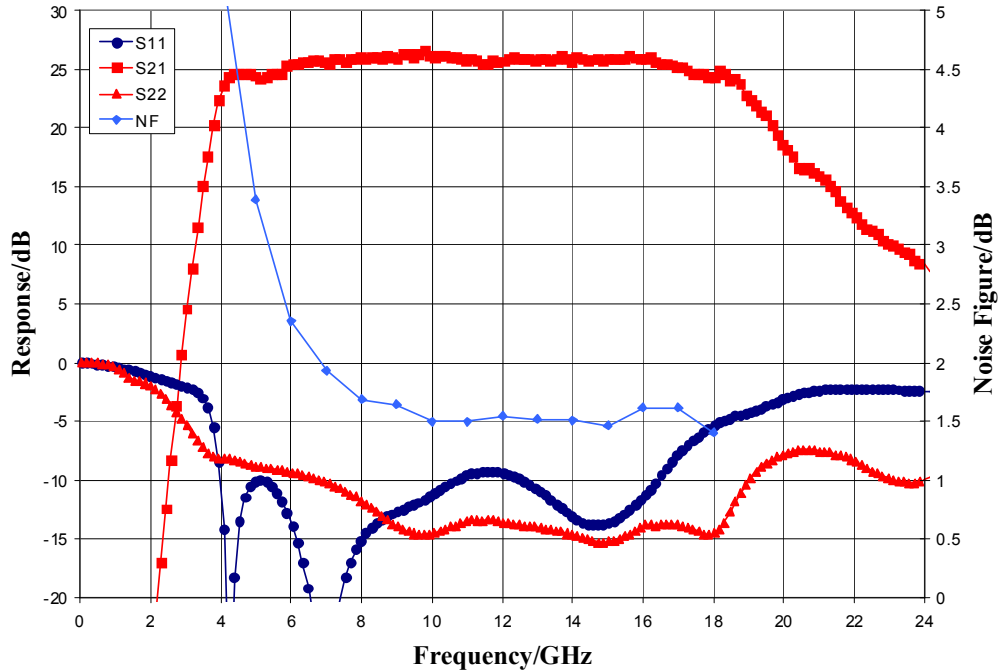
Electrical Specifications - V_{dd} = 3.0 V, T_A = 25 °C

| Parameter | Min | Typ | Max | Min | Typ | Max | Units |
|--------------------------------------|-------|-------|-----|--------|-------|-----|-------|
| Frequency Range | 6 - 9 | | | 9 - 18 | | | GHz |
| Gain | 23 | 26 | 29 | 22 | 26 | 29 | dB |
| Noise Figure | | 1.8 | 2.8 | | 1.5 | 2.0 | dB |
| Input Return Loss | | 15 | | | 10 | | dB |
| Output Return Loss | | 12 | | | 14 | | dB |
| Output P _{1dB} | | 11.5 | | | 10.5 | | dBm |
| Output IP ₃ | | 24 | | | 22 | | dBm |
| Supply Current | 36 | 52 | 68 | 36 | 52 | 68 | mA |
| Gain Temperature Coefficient | | 0.025 | | | 0.025 | | dB/°C |
| Noise Figure Temperature Coefficient | | 0.008 | | | 0.008 | | dB/°C |

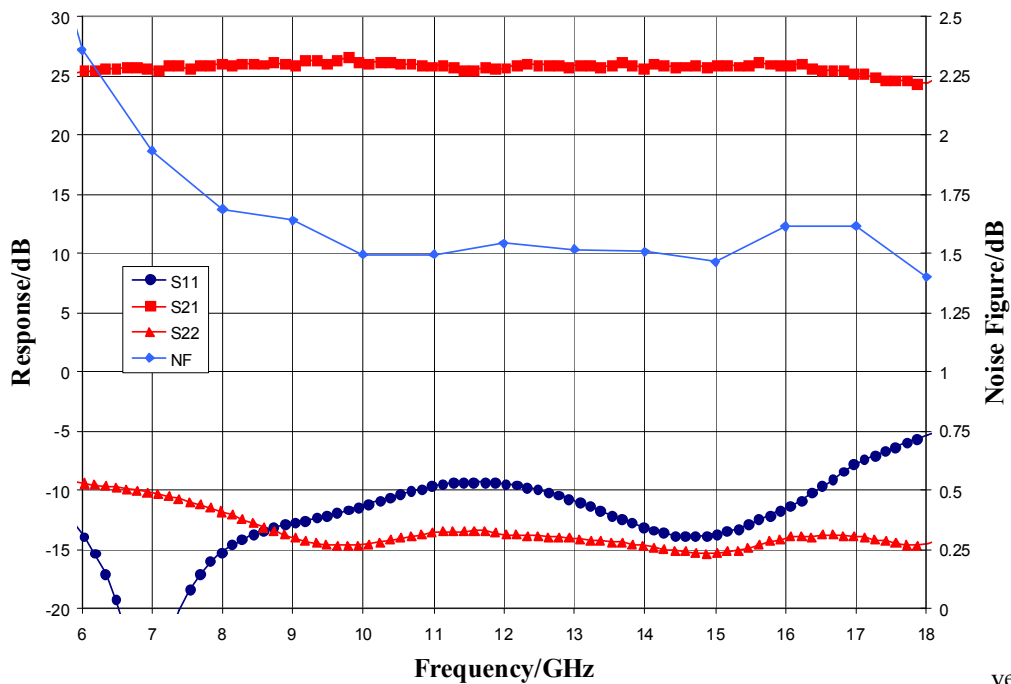
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Typical Performance

Broadband Performance, $V_{dd} = 3.0$ V, $I_{dd} = 52$ mA, $T_A = 25$ °C



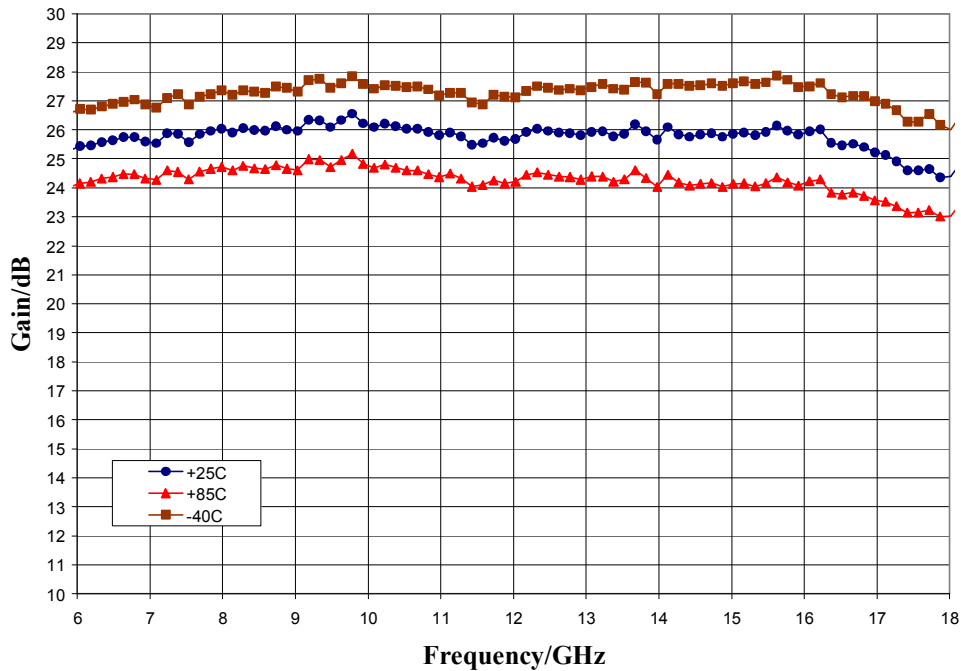
Narrow-band Performance, $V_{dd} = 3.0$ V, $I_{dd} = 52$ mA, $T_A = 25$ °C



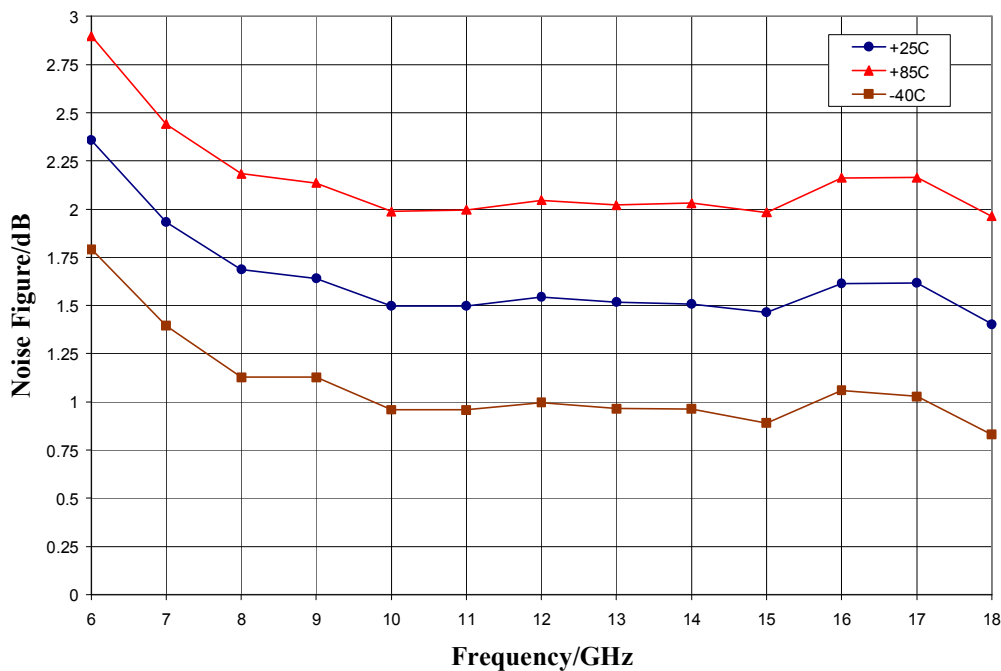
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Typical Performance

Gain vs. Temperature, $V_{dd} = 3.0\text{ V}$



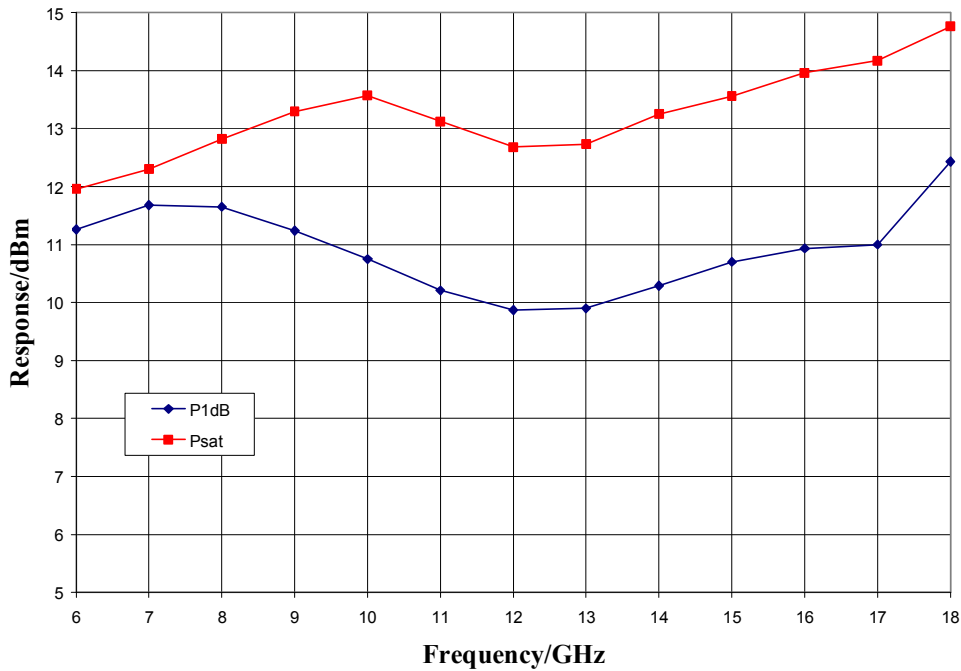
Noise Figure vs. Temperature, $V_{dd} = 3.0\text{ V}$



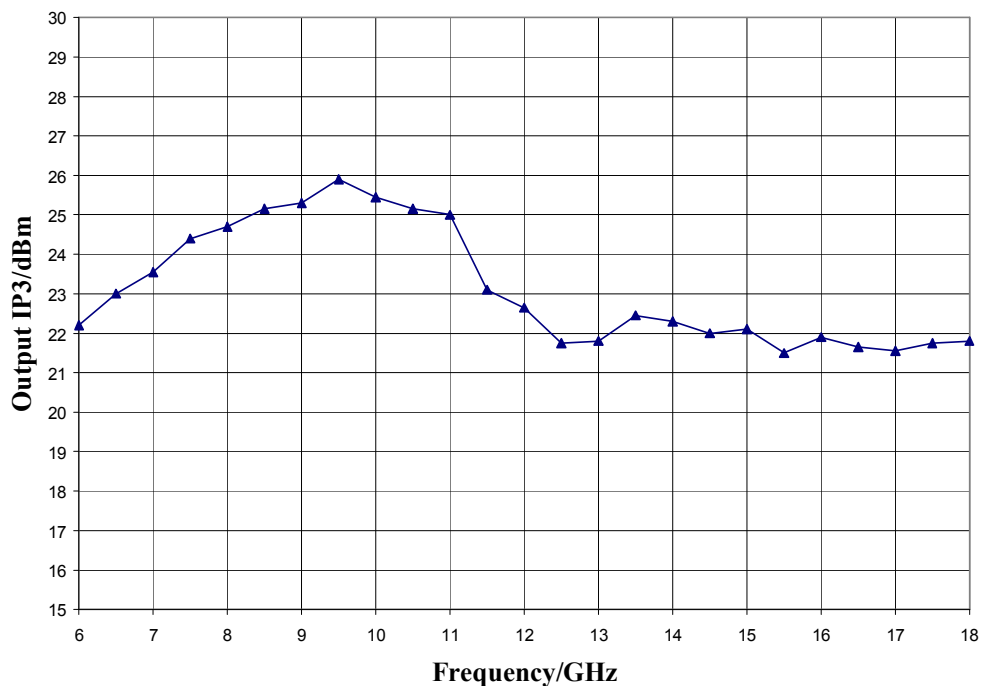
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Typical Performance

Output Power, $V_{dd} = 3.0\text{ V}$, $I_{dd} = 52\text{ mA}$, $T_A = 25\text{ }^\circ\text{C}$



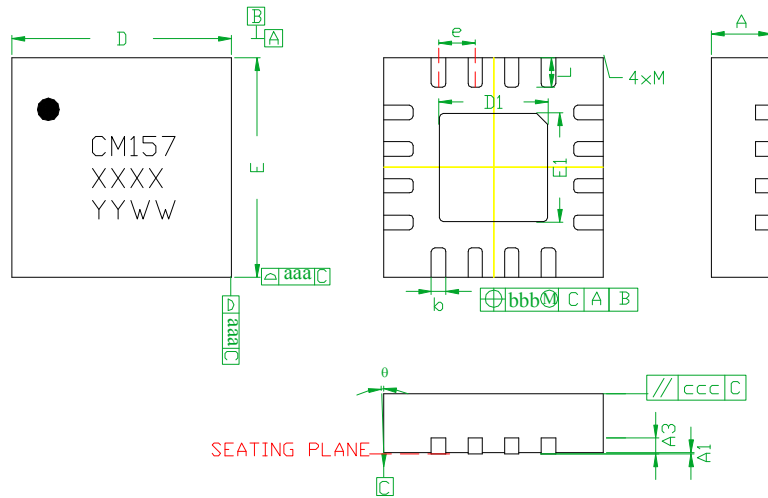
Output IP3, $V_{dd} = 3.0\text{ V}$, $I_{dd} = 52\text{ mA}$, $T_A = 25\text{ }^\circ\text{C}$



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Mechanical Information

Package Information and Dimensions

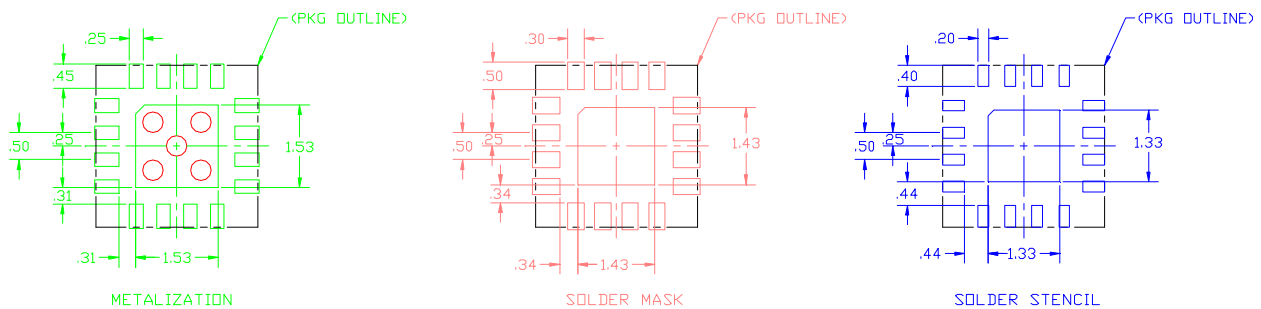


| SYMBOLS | DIMENSIONS IN MILLIMETERS | | |
|---------|---------------------------|----------|------|
| | MIN | NOM | MAX |
| A | 0.80 | 0.90 | 1.00 |
| A1 | 0 | 0.02 | 0.05 |
| A3 | --- | 0.25REF. | --- |
| b | 0.18 | 0.23 | 0.30 |
| D | 2.85 | 3.00 | 3.15 |
| D1 | --- | 1.5BSC | --- |
| E | 2.85 | 3.00 | 3.15 |
| E1 | --- | 1.5BSC | --- |
| e | --- | 0.50BSC | --- |
| L | 0.30 | 0.40 | 0.50 |
| θ | 0 | --- | 12 |
| aaa | --- | 0.25 | --- |
| bbb | --- | 0.10 | --- |
| ccc | --- | 0.10 | --- |
| M | --- | --- | 0.05 |

NOTES:

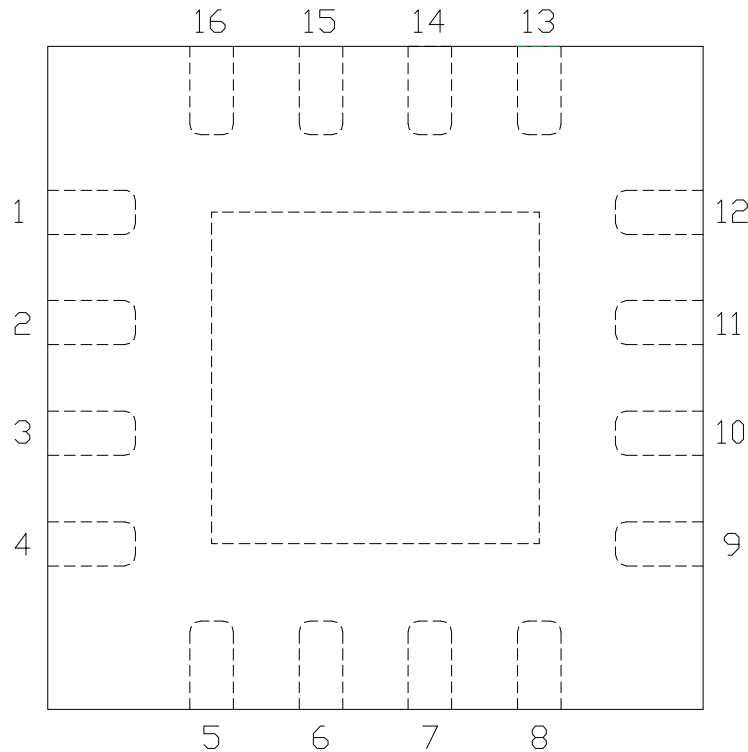
1. DIMENSIONS ARE IN MILLIMETERS
2. RoHS COMPLIANT MOLD COMPOUND
3. LEADFRAME MATERIAL: COPPER ALLOY
4. LEAD FINISH: 100% MATTE Sn
5. INDICATED DIMENSION/TOLERANCE APPLIES TO LEADS AND EXPOSED PAD

Recommended PCB Land Pattern


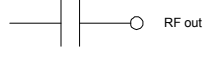
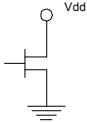



Pin Description

Pin Diagram



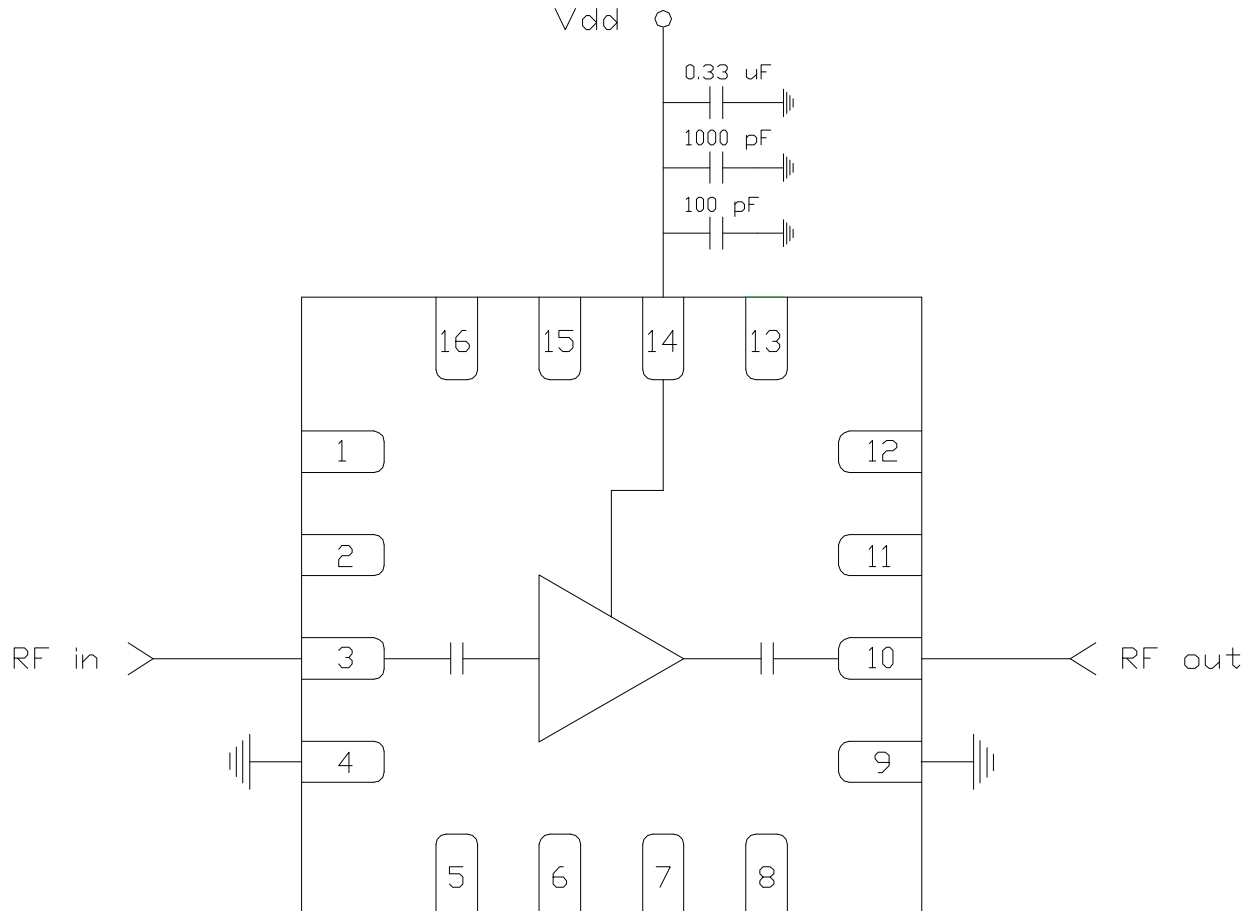
Functional Description

| Pin | Function | Description | Schematic |
|--------------------|----------|---|---|
| 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 |  |
| 4,9 and die paddle | Ground | Connect to RF / DC ground |  |

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Applications Information

Application Circuit



Biasing and Operation

The CMD157P3 is biased with a single 3.0 V positive drain supply.

RF power can be applied at any time.

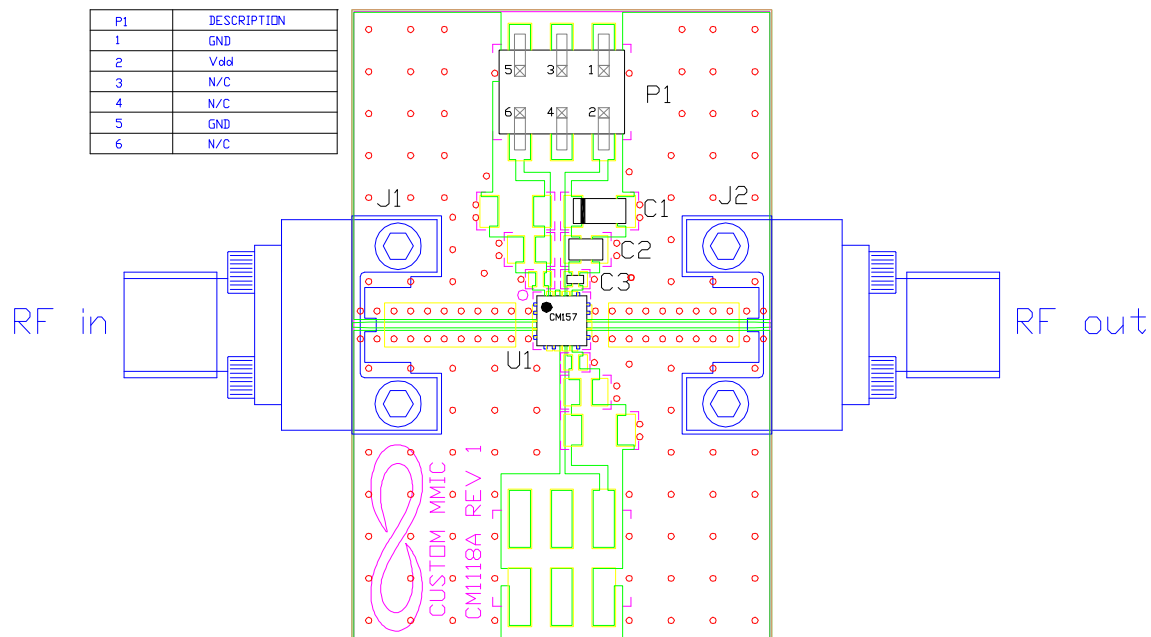
GaAs MMIC devices are susceptible to damage from Electrostatic Discharge. Proper precautions should be observed during handling, assembly and test.

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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 μ F | Capacitor, Tantalum |
| C2 | 1000 pF | Capacitor, 0603 |
| C3 | 100 pF | Capacitor, 0402 |
| U1 | | CMD157P3 Low Noise Amplifier |
| PCB | | CM1118A Evaluation PCB |

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