



# CMD157P3

## 6-18 GHz Low Noise Amplifier

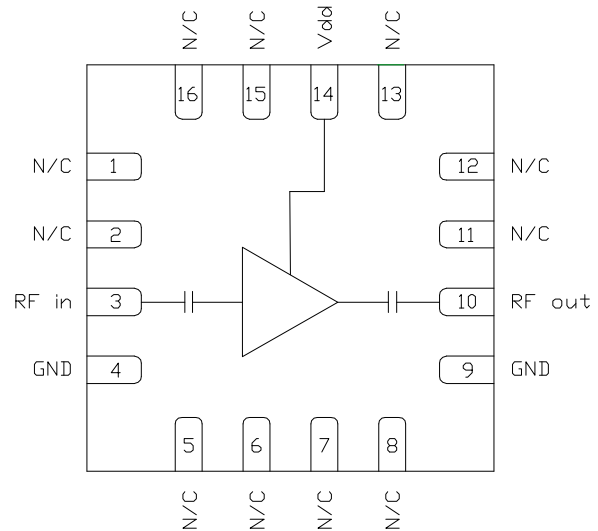
### Features

- ▶ 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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## 6-18 GHz Low Noise Amplifier

### Specifications

#### Absolute Maximum Ratings

Parameter	Rating
Drain Voltage, V <sub>dd</sub>	5.0 V
RF Input Power	+20 dBm
Channel Temperature, T <sub>ch</sub>	150 °C
Power Dissipation, P <sub>diss</sub>	540 mW
Thermal Resistance, $\Theta_{JC}$	120 °C/W
Operating Temperature	-40 to 85 °C
Storage Temperature	-55 to 150 °C
ESD Sensitivity (HBM)	Class 1A

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 <sub>dd</sub>	2.0	3.0	4.5	V
I <sub>dd</sub>		52		mA

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

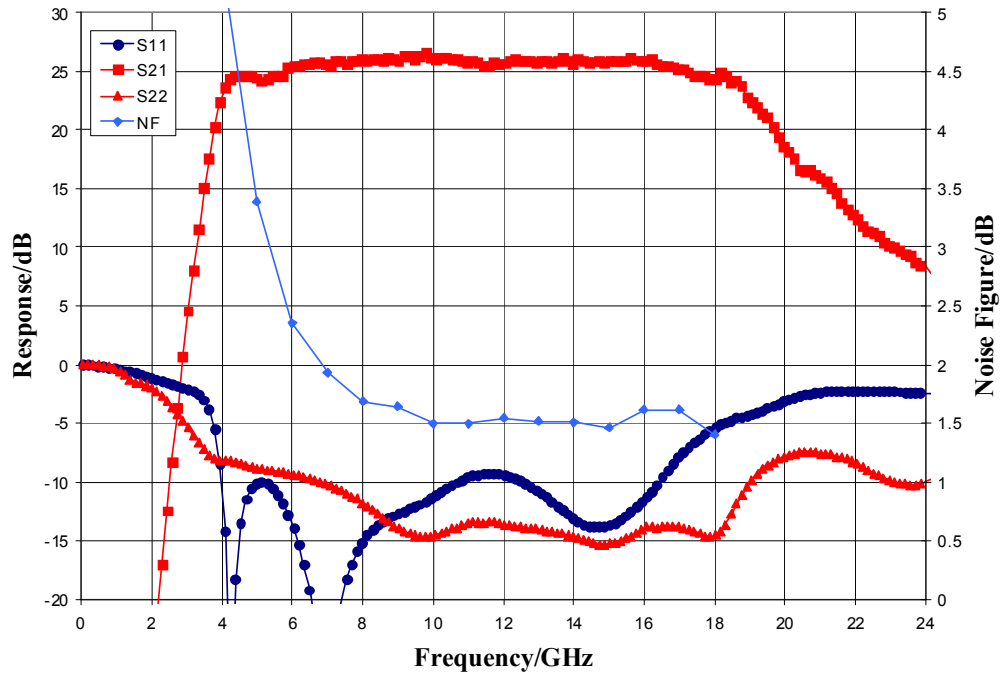
#### Electrical Specifications - V<sub>dd</sub> = 3.0 V, T<sub>A</sub> = 25 °C

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 <sub>1dB</sub>		11.5			10.5		dBm
Output IP <sub>3</sub>		24			22		dBm
Supply Current	36	52	75	36	52	75	mA
Gain Temperature Coefficient		0.025			0.025		dB/°C
Noise Figure Temperature Coefficient		0.008			0.008		dB/°C

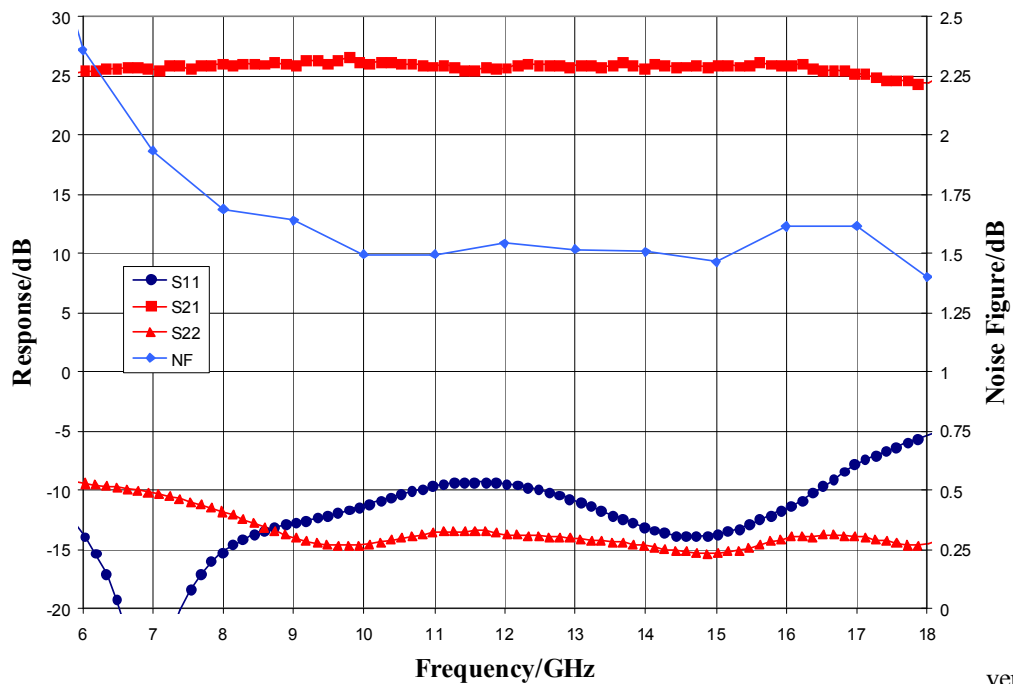
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### Typical Performance

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



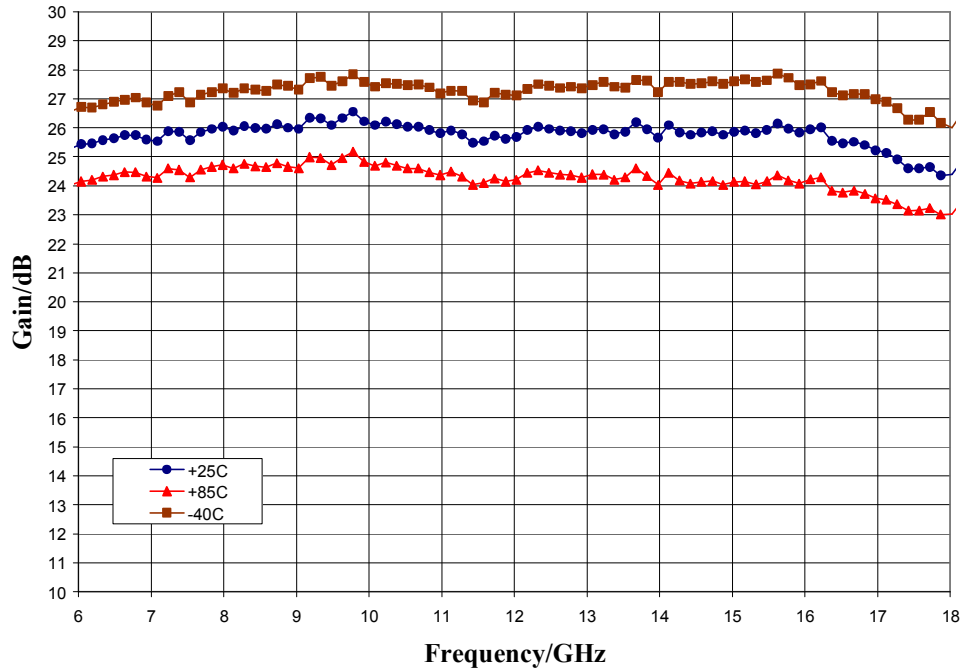
Narrow-band Performance,  $V_{dd} = 3.0\text{ V}$ ,  $I_{dd} = 52\text{ mA}$ ,  $T_A = 25\text{ }^\circ\text{C}$



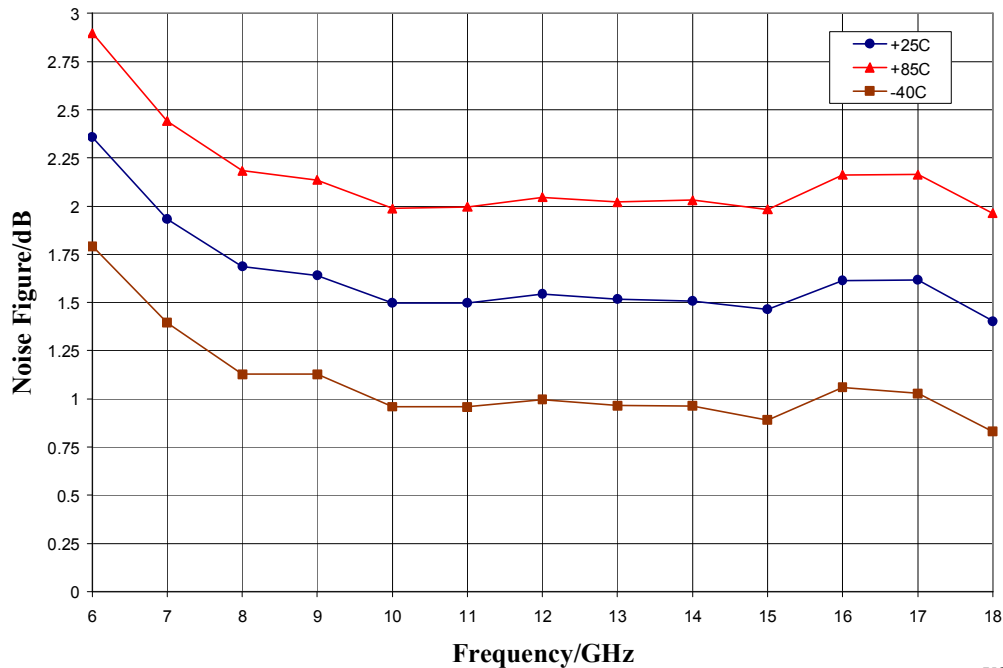
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### Typical Performance

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



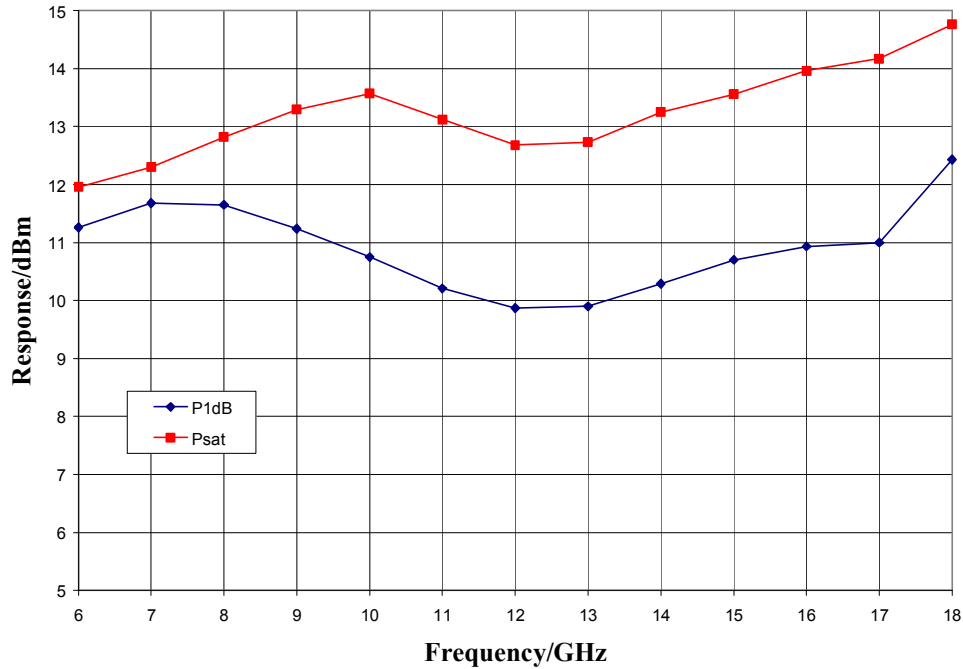
Noise Figure vs. Temperature,  $V_{dd} = 3.0\text{ V}$



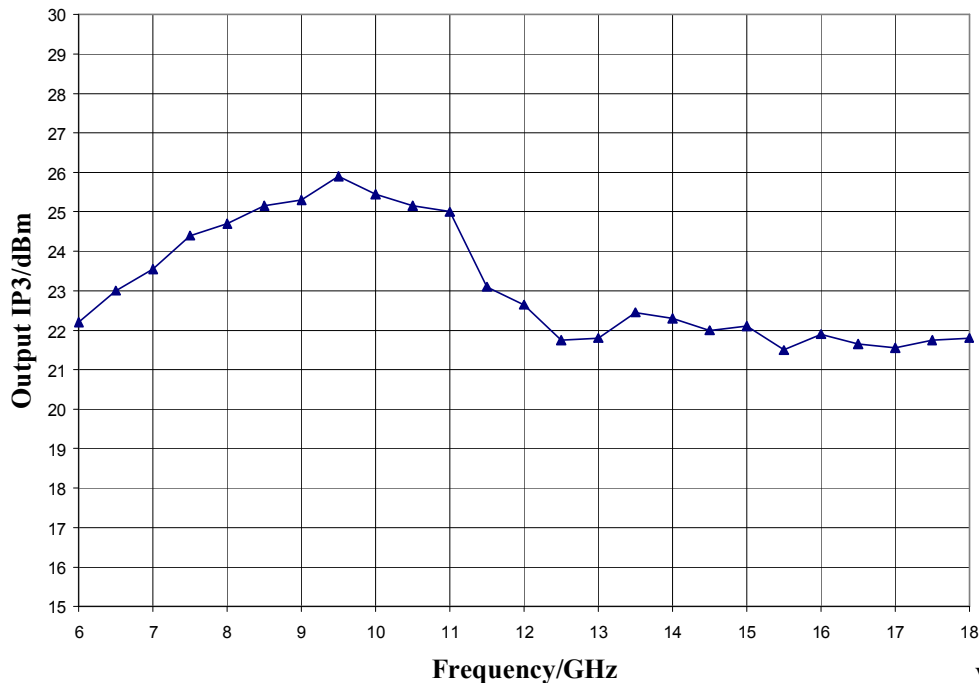
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### Typical Performance

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



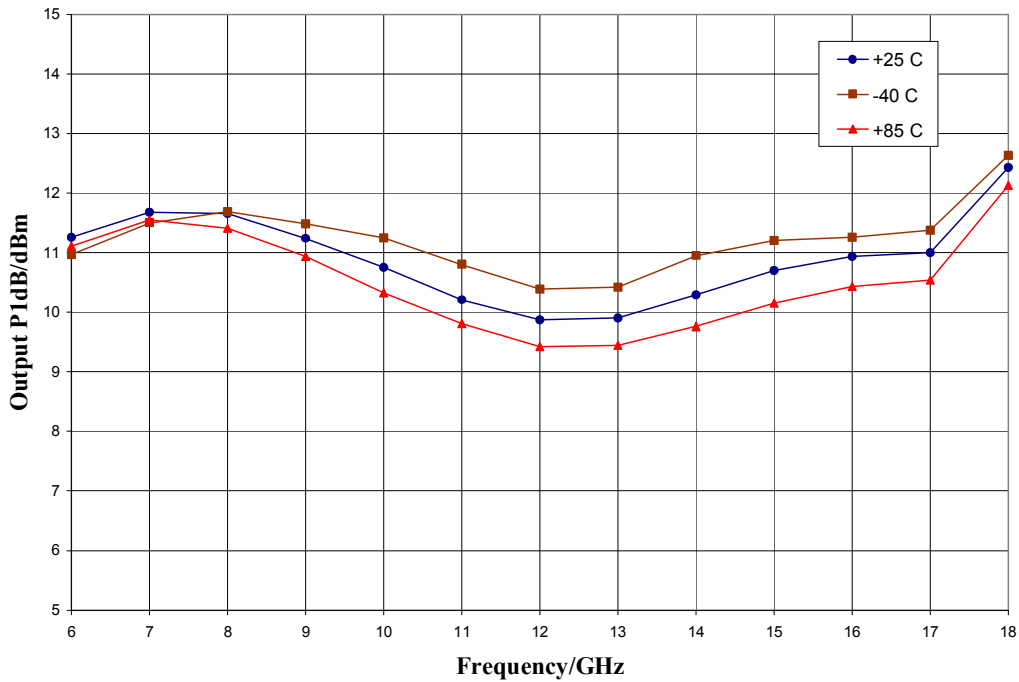
Output IP3,  $V_{dd} = 3.0\text{ V}$ ,  $I_{dd} = 52\text{ mA}$ ,  $T_A = 25\text{ }^\circ\text{C}$



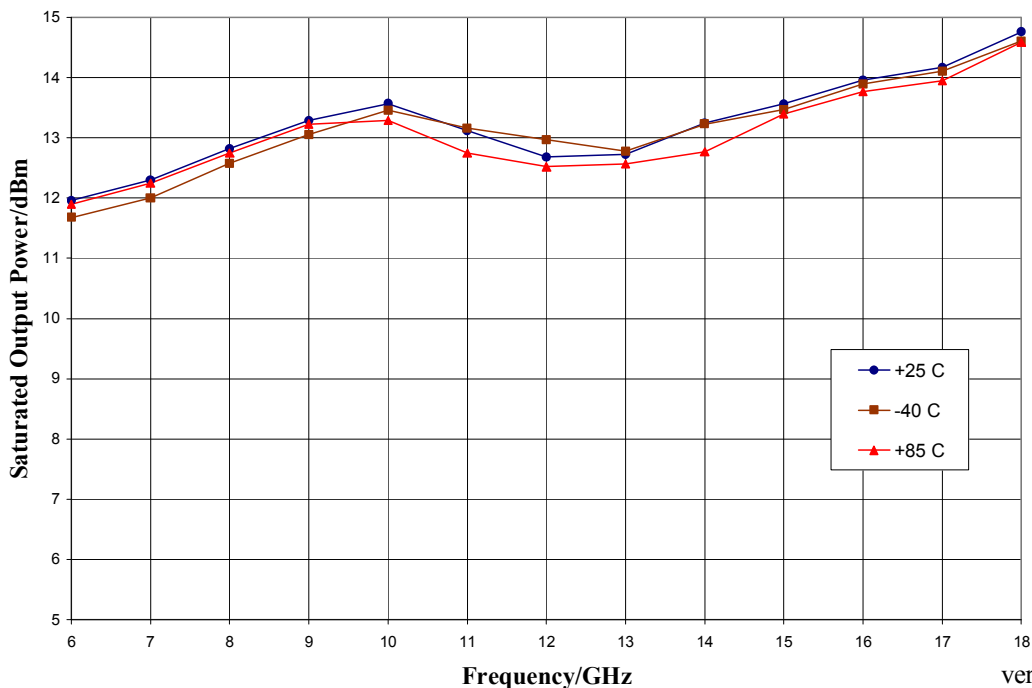
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### Typical Performance

**Output P1dB vs. Temperature,  $V_{dd} = 3.0$  V**



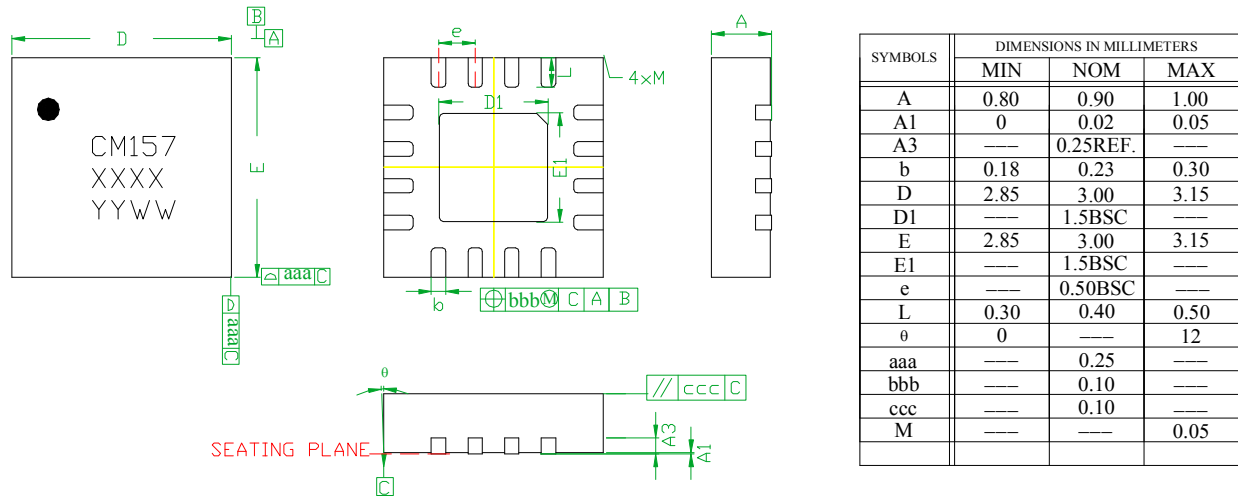
**Output Psat vs. Temperature,  $V_{dd} = 3.0$  V**



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### Mechanical Information

#### Package Information and Dimensions



- 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

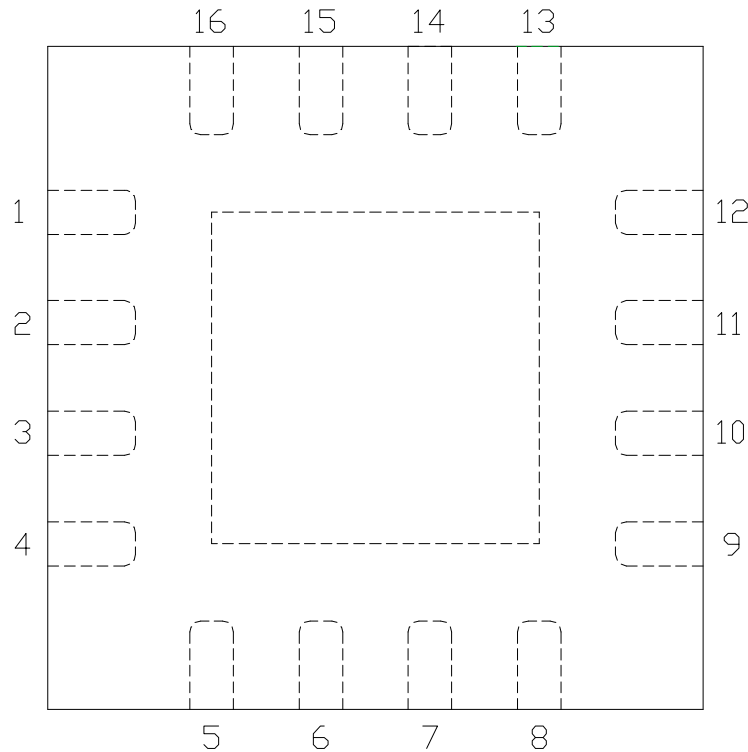
Custom MMIC Design Services recommends that the user develop the land pattern that will provide the best design for proper solder reflow and device attach for their specific application. Please review CMDS Application Note AN 105 for a recommended land pattern approach.

#### Recommended Solder Reflow Profile


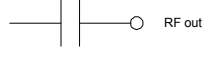
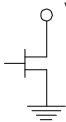

Custom MMIC Design Services recommends screen printing with belt furnace reflow to ensure proper solder reflow and device attach. Please review CMDS Application Note AN 102 for a recommended solder reflow profile.

### Pin Description

#### Pin Diagram



#### Functional Description

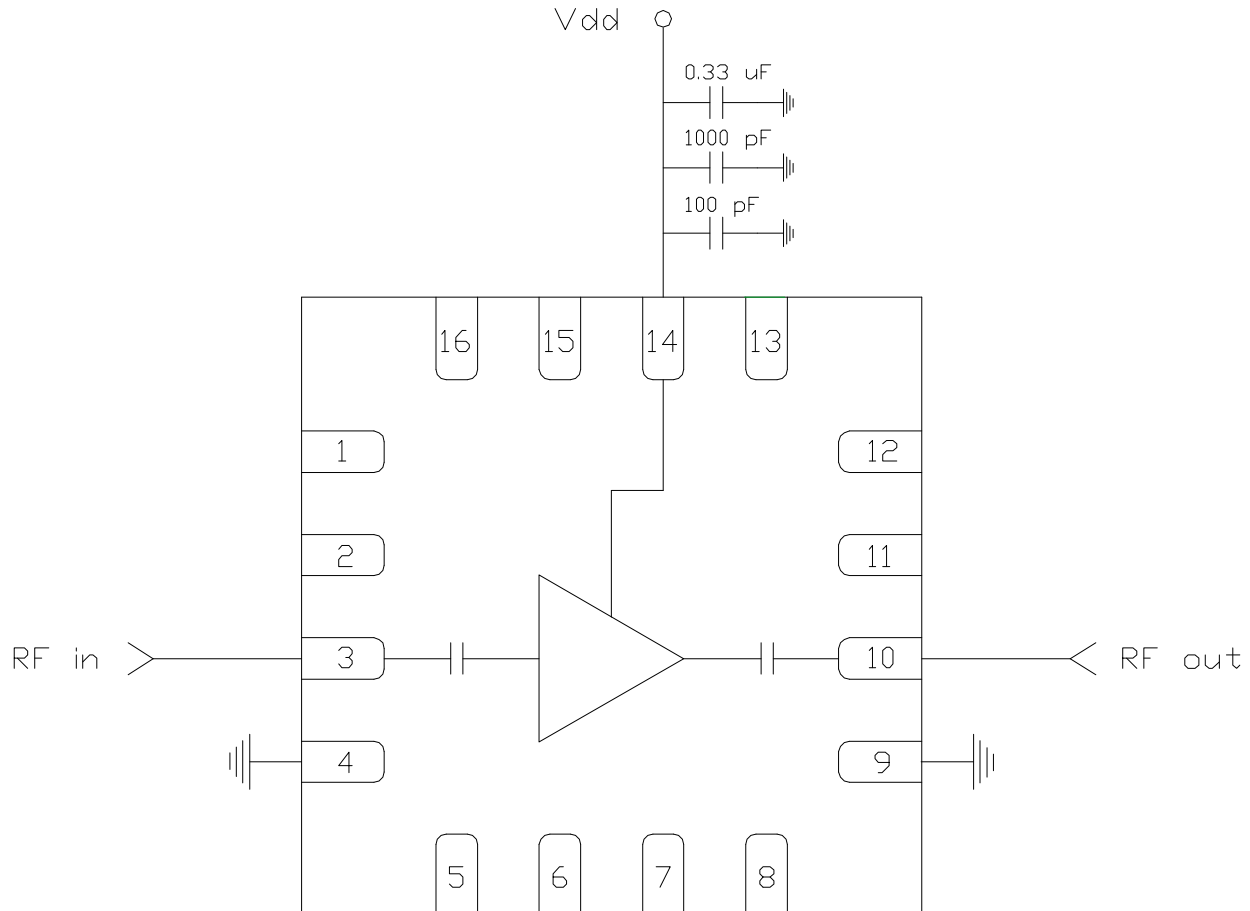
Pin	Function	Description	Schematic
3	RF in	DC blocked and 50 ohm matched	
10	RF out	DC blocked and 50 ohm matched	
14	Vdd	Power supply voltage Decoupling and bypass caps required	
4,9 and die paddle	Ground	Connect to RF / DC ground	

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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.

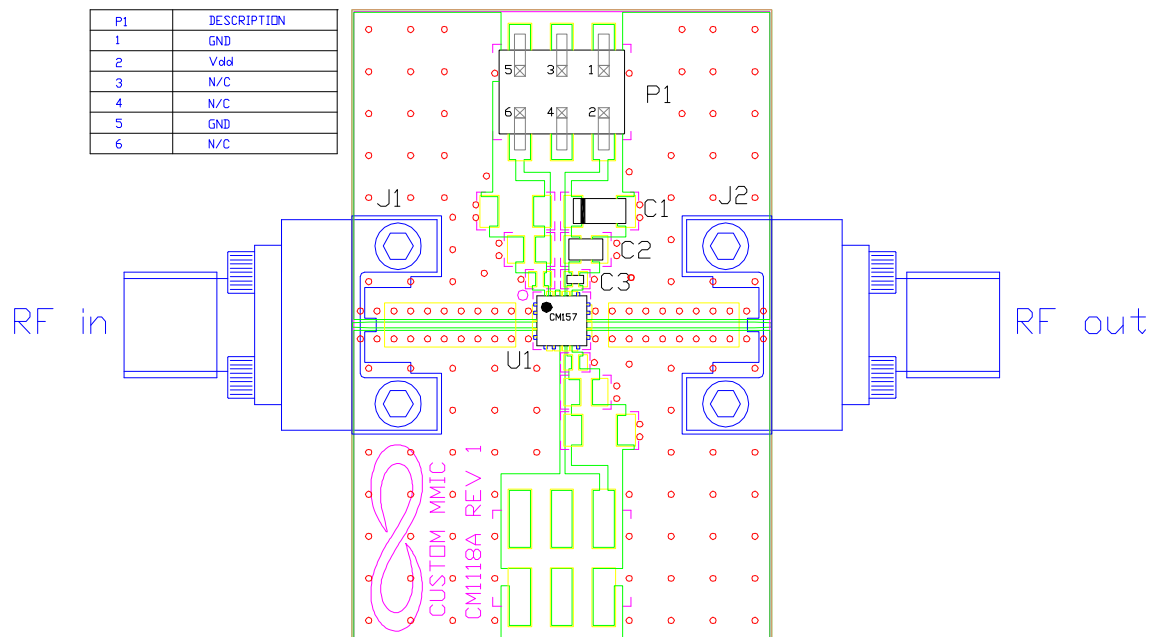
**GaAs MMIC devices are susceptible to damage from Electrostatic Discharge. Proper precautions should be observed during handling, assembly and test.**

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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 $\mu$ F	Capacitor, Tantalum
C2	1000 pF	Capacitor, 0603
C3	100 pF	Capacitor, 0402
U1		CMD157P3 Low Noise Amplifier
PCB		CM1118A Evaluation PCB

Please note, all information contained in this data sheet is subject to change without notice.

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