



CMD167P3

8-16 GHz Low Noise Amplifier

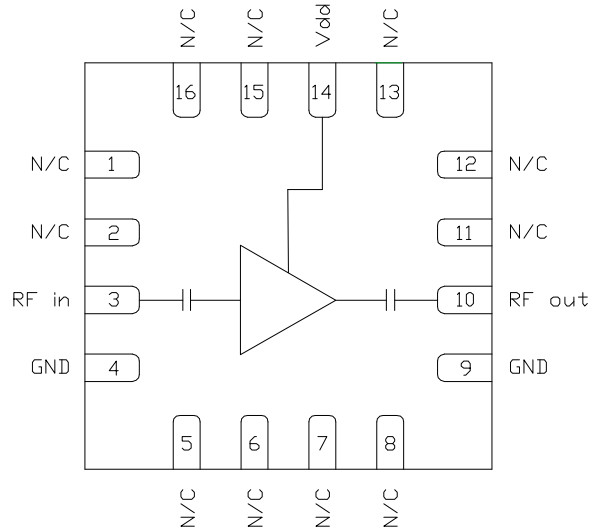
Features

- ▶ Low noise figure
- ▶ Low current consumption
- ▶ Single positive supply voltage
- ▶ Pb-free RoHs compliant 3x3 QFN package

Description

The CMD167P3 is a broadband MMIC low noise amplifier housed in a leadless 3x3 mm plastic surface mount package. The CMD167P3 is ideally suited for EW and communication systems where small size and low power consumption are needed. The device operates from 8 to 16 GHz and delivers greater than 16 dB of gain with a corresponding output 1 dB compression point of +11 dBm and noise figure of 1.8 dB. The CMD167P3 is a 50 ohm matched design which eliminates the need for external DC blocks and RF port matching.

Functional Block Diagram



Electrical Performance - $V_{dd} = 3.0\text{ V}$, $T_A = 25\text{ }^\circ\text{C}$, $F=12\text{ GHz}$

Parameter	Min	Typ	Max	Units
Frequency Range	8 - 16			GHz
Gain		16		dB
Noise Figure		1.8		dB
Input Return Loss		18		dB
Output Return Loss		16		dB
Output P1dB		11		dBm
Supply Current		50		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, Pdiss	416 mW
Thermal Resistance	156 °C/W
Operating Temperature	-40 to 85 °C
Storage Temperature	-55 to 150 °C

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	4.0	V
Idd		50		mA

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

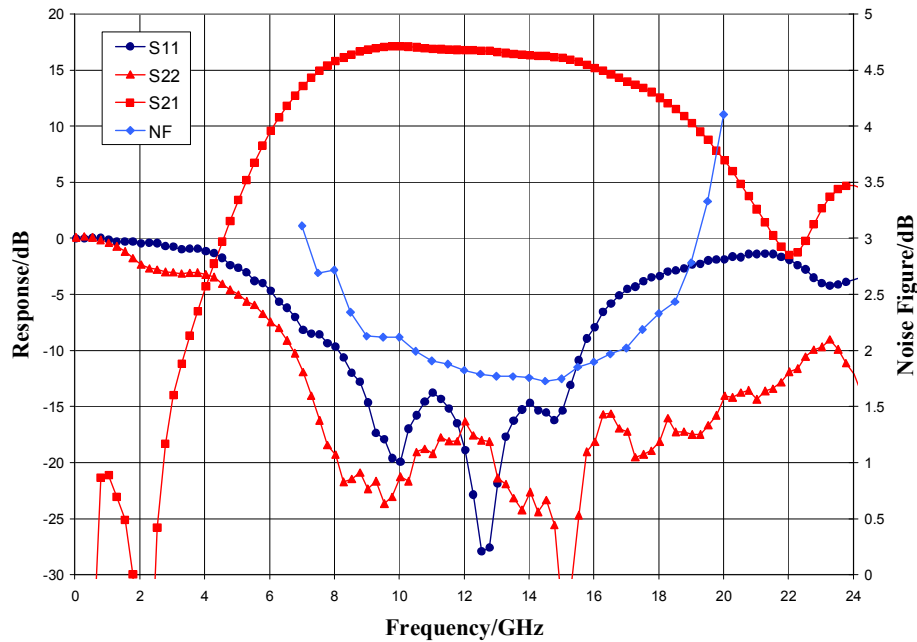
Electrical Specifications - V_{dd} = 3.0 V, T_A = 25 °C

Parameter	Min	Typ	Max	Min	Typ	Max	Units
Frequency Range	8 - 11			11 - 16			GHz
Gain	13	17	20	12.5	16.5	19.5	dB
Noise Figure		2.1	3.1		1.8	2.3	dB
Input Return Loss		13			15		dB
Output Return Loss		20			20		dB
Output P1dB		10.5			11.5		dBm
Output IP3		23			22		dBm
Supply Current	35	50	65	35	50	65	mA
Gain Temperature Coefficient		0.012			0.012		dB/°C
Noise Figure Temperature Coefficient		0.009			0.009		dB/°C

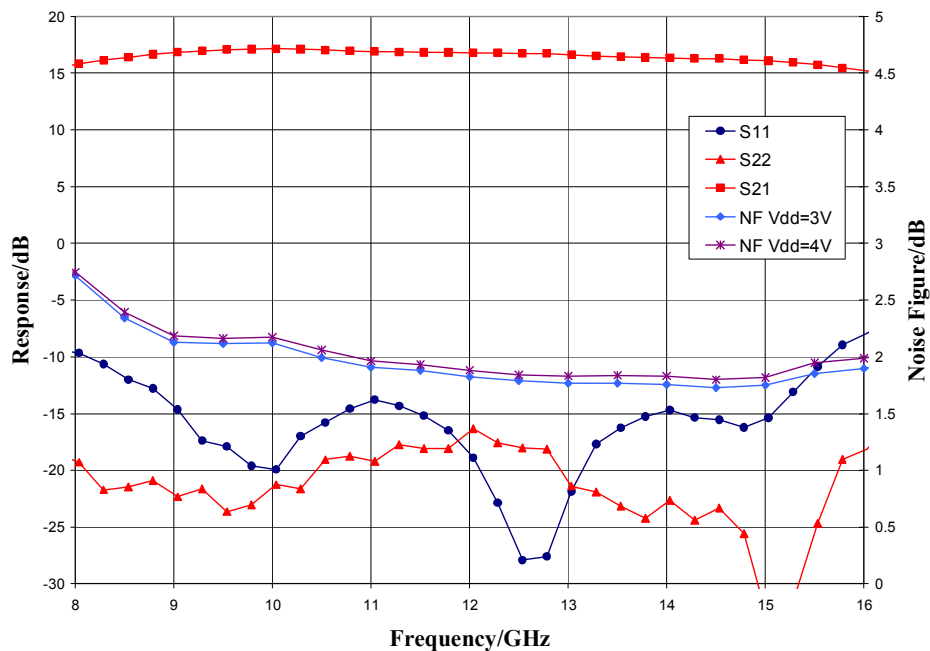
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Typical Performance

Broadband Performance, $V_{dd} = 3.0\text{ V}$, $I_{dd} = 50\text{ mA}$, $T_A = 25\text{ }^\circ\text{C}$



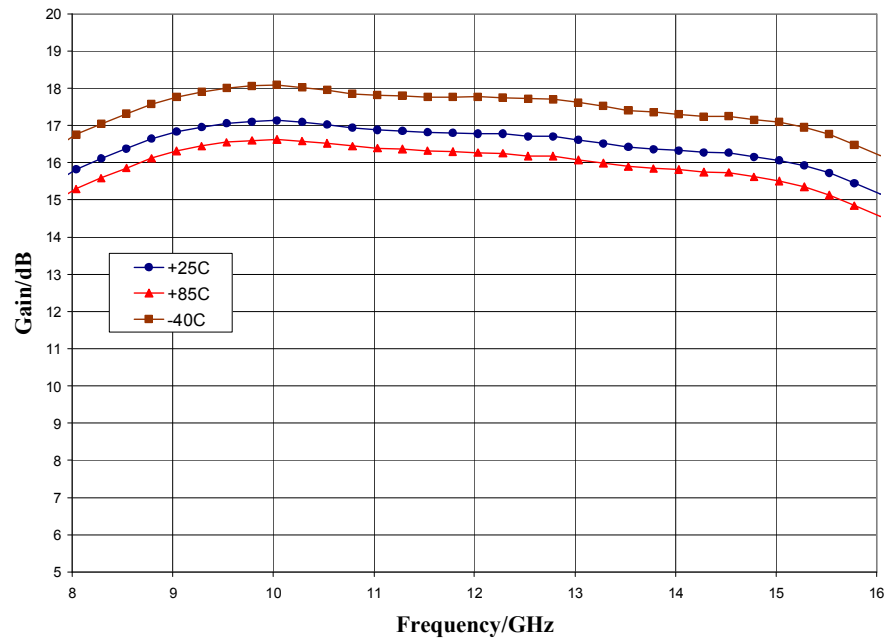
Narrow-band Performance, $V_{dd} = 3.0\text{ V}$, $I_{dd} = 50\text{ mA}$, $T_A = 25\text{ }^\circ\text{C}$



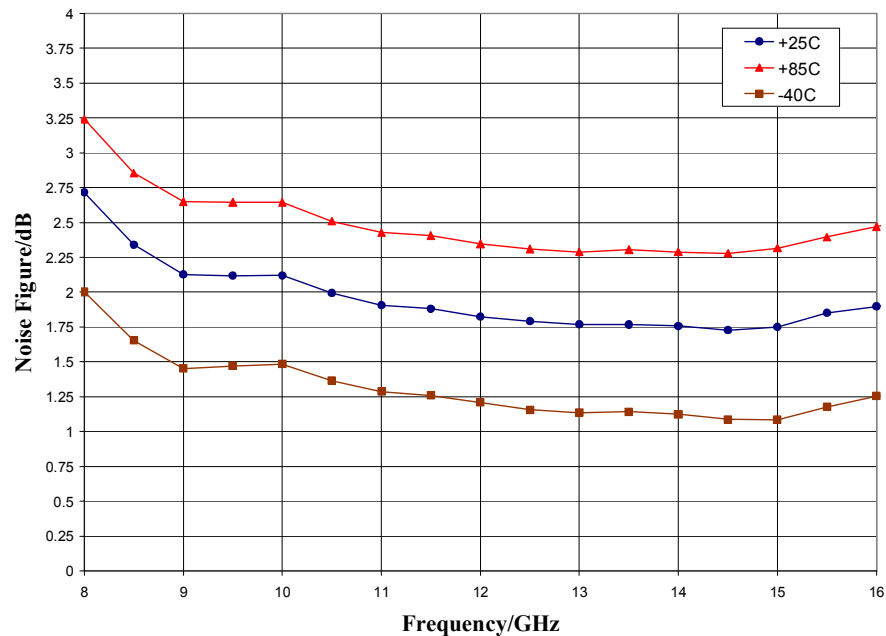
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Typical Performance

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



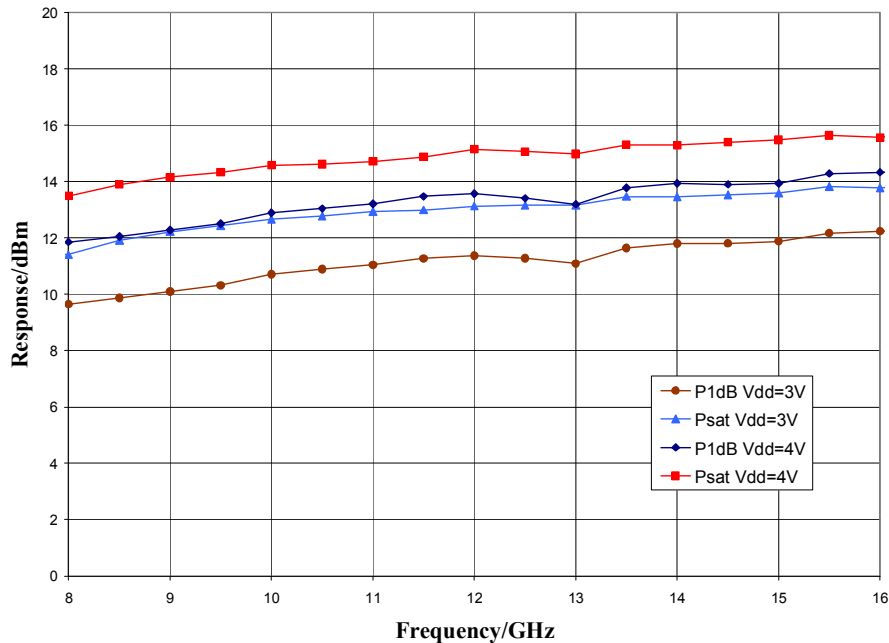
Noise Figure vs. Temperature, $V_{dd} = 3.0\text{ V}$



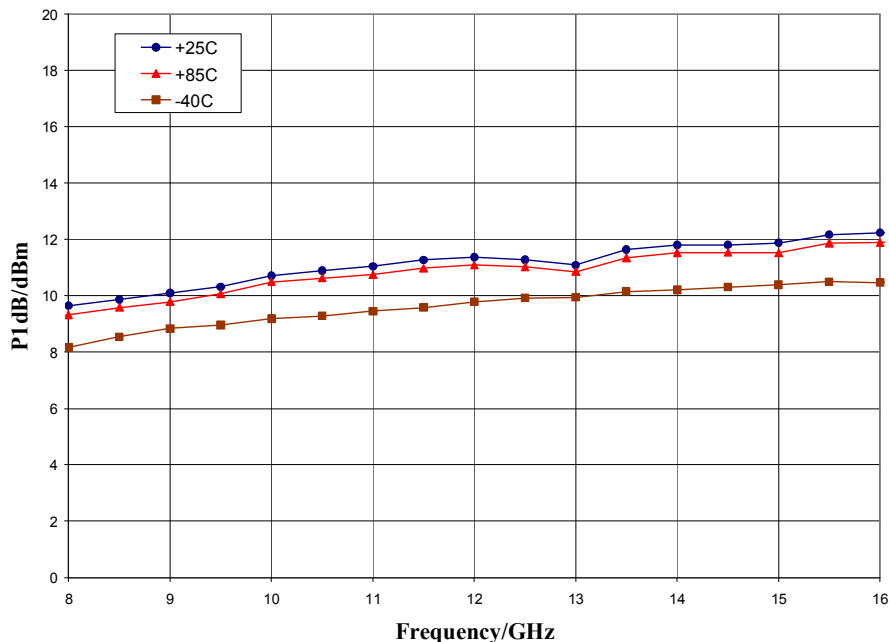
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Typical Performance

Output Power, $V_{dd} = 3.0\text{ V} \ \& \ 4.0\text{ V}$, $T_A = 25\text{ }^\circ\text{C}$



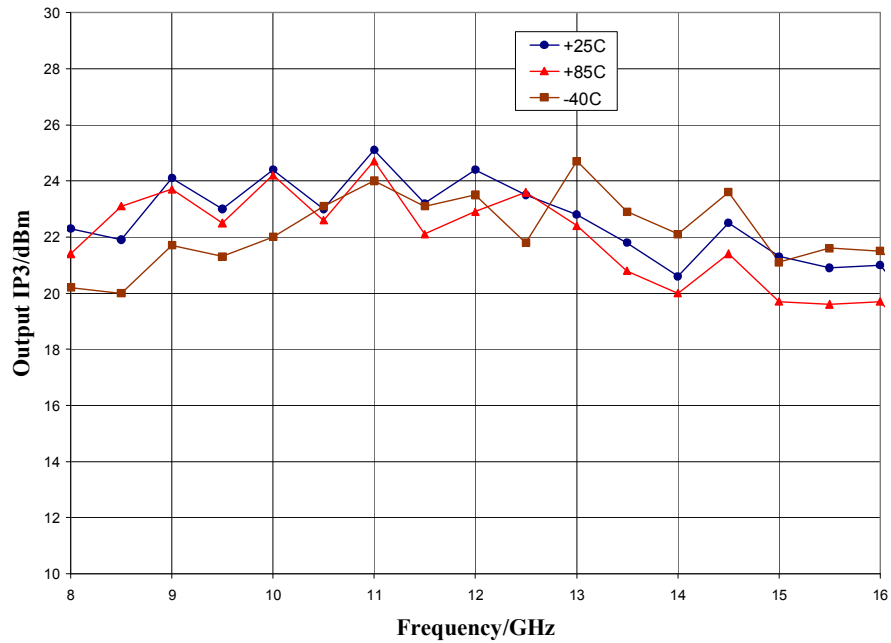
P1dB vs. Temperature, $V_{dd} = 3.0\text{ V}$



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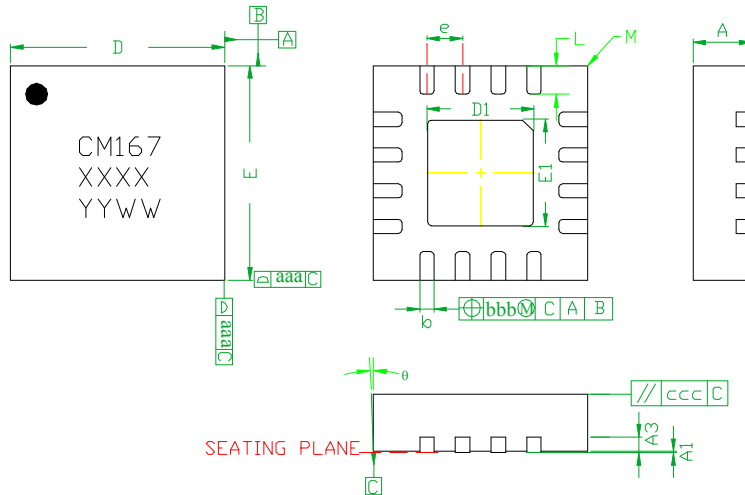
Typical Performance

Output IP3 vs. Temperature, $V_{dd} = 3.0$ V



Mechanical Information

Package Information and Dimensions

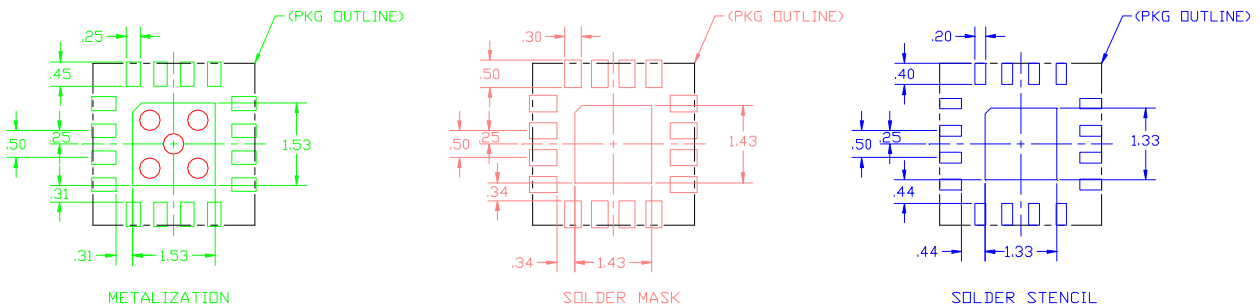


SYMBOLS	DIMENSIONS IN MILLIMETERS		
	MIN	NOM	MAX
A	0.80	0.90	1.00
A1	0	0.02	0.05
A3	---	0.25REF.	---
b	0.17	0.23	0.30
D	2.85	3.00	3.15
D1	1.5	1.6	1.7
E	2.85	3.00	3.15
E1	1.5	1.6	1.7
e	---	0.50BSC	---
L	0.30	0.40	0.50
ø	0	---	12
aaa	---	0.25	---
bbb	---	0.10	---
ccc	---	0.10	---
M	---	---	0.05

NOTES:

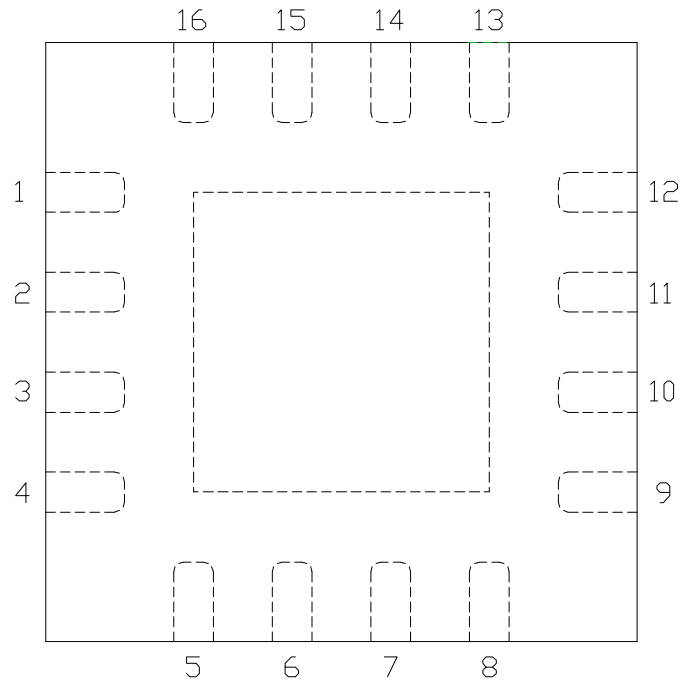
1. DIMENSIONS ARE IN MILLIMETERS
2. RoHS COMPLIANT MOLD COMPOUND
3. LEADFRAME MATERIAL: COPPER ALLOY
4. LEAD FINISH: 100% MATTE Sn
5. INDICATED DIMENSION/TOLERANCE APPLIES TO LEADS AND EXPOSED PAD

Recommended PCB Land Pattern



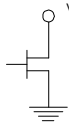



Pin Description

Pin Diagram



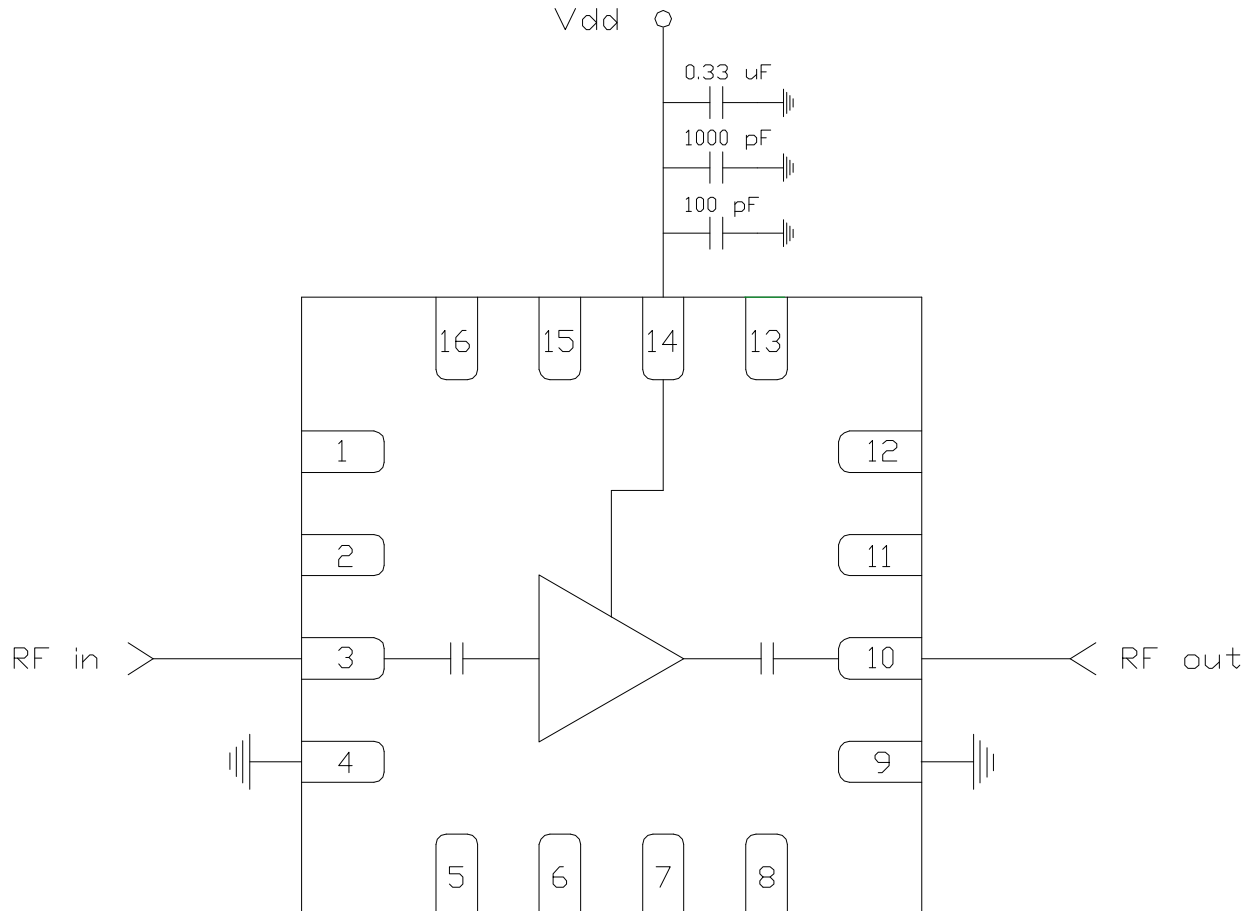
Functional Description

Pin	Function	Description	Schematic
1, 2, 5-8, 11-13, 15, 16	N/C	No connection required. These pins may be connected to RF/DC ground.	
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 CMD167P3 is biased with a single 3.0 V positive drain supply.

RF power can be applied at any time.

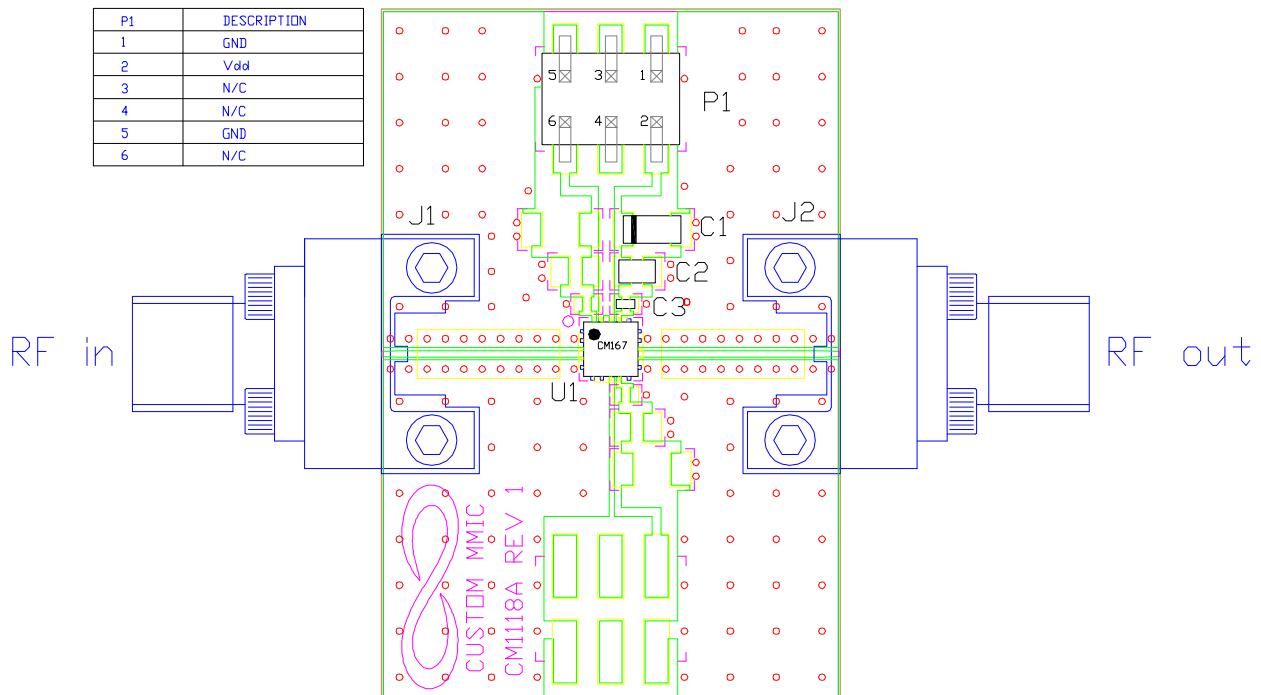
GaAs MMIC devices are susceptible to damage from Electrostatic Discharge. Proper precautions should be observed during handling, assembly and test.

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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		CMD167P3 Low Noise Amplifier
PCB		CM1118A Evaluation PCB

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