



Let Performance Drive

# 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

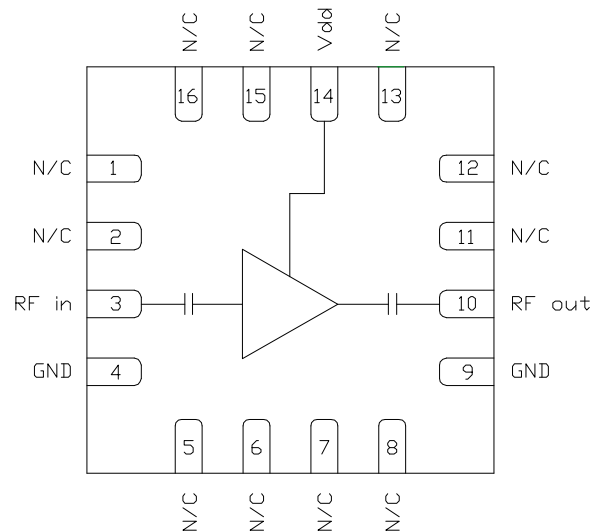
### Applications

- ▶ Point-to-point radios
- ▶ Point-to-multi-point radios
- ▶ Military end-use
- ▶ Test instrumentation

### 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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## 8-16 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>	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
V <sub>dd</sub>	2.0	3.0	4.0	V
I <sub>dd</sub>		50		mA

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

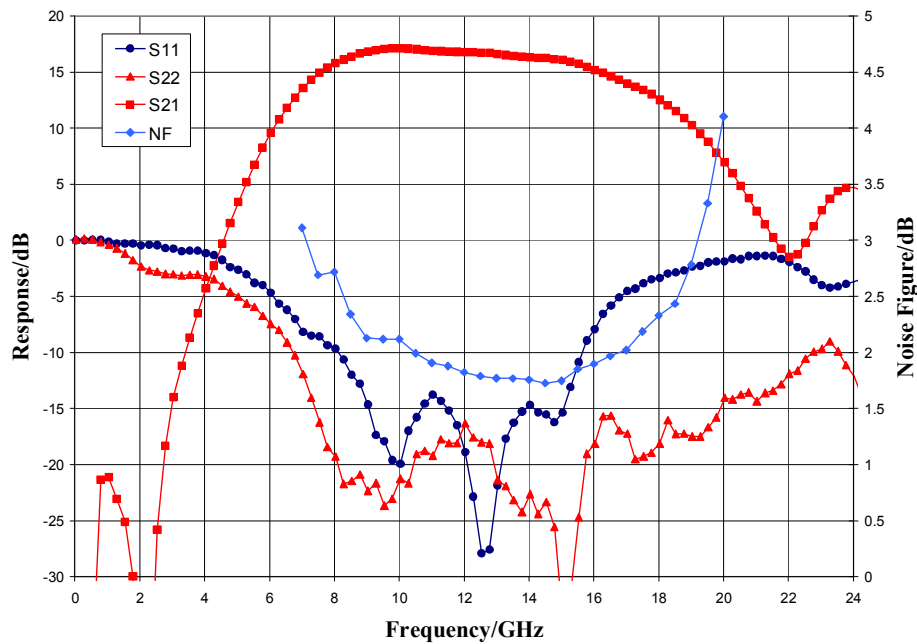
#### Electrical Specifications - V<sub>dd</sub> = 3.0 V, T<sub>A</sub> = 25 °C

Parameter	Min	Typ	Max	Min	Typ	Max	Units
Frequency Range	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 P <sub>1dB</sub>		10.5			11.5		dBm
Output IP <sub>3</sub>		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

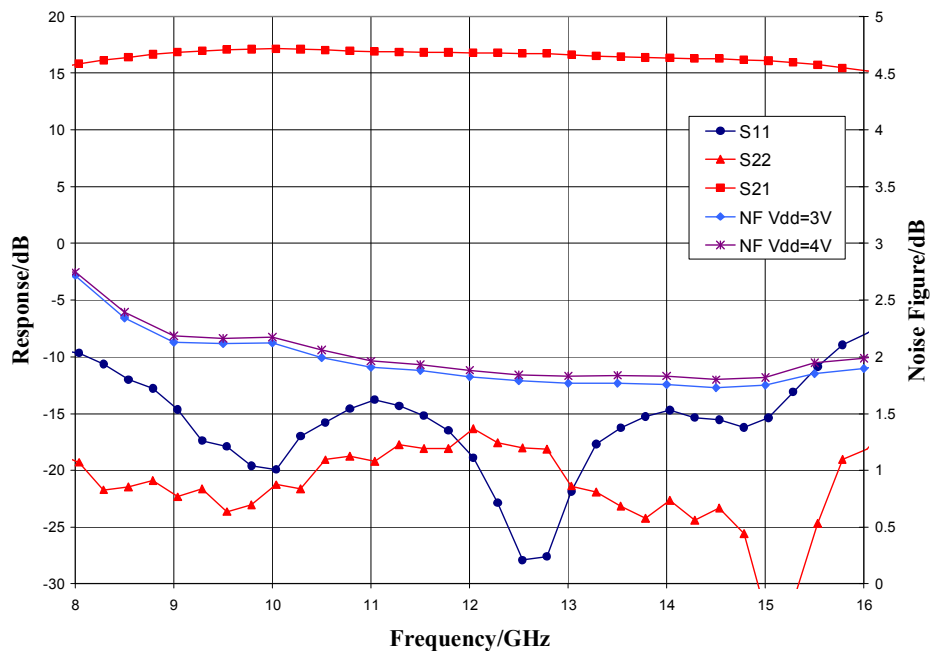
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### Typical Performance

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



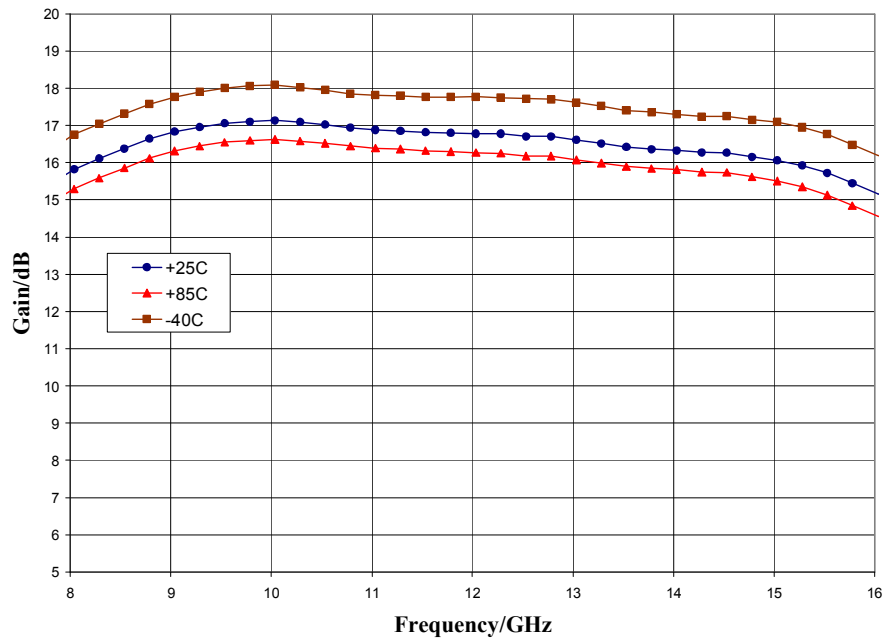
**Narrow-band Performance,  $V_{dd} = 3.0\text{ V}$ ,  $I_{dd} = 50\text{ mA}$ ,  $T_A = 25\text{ }^\circ\text{C}$**



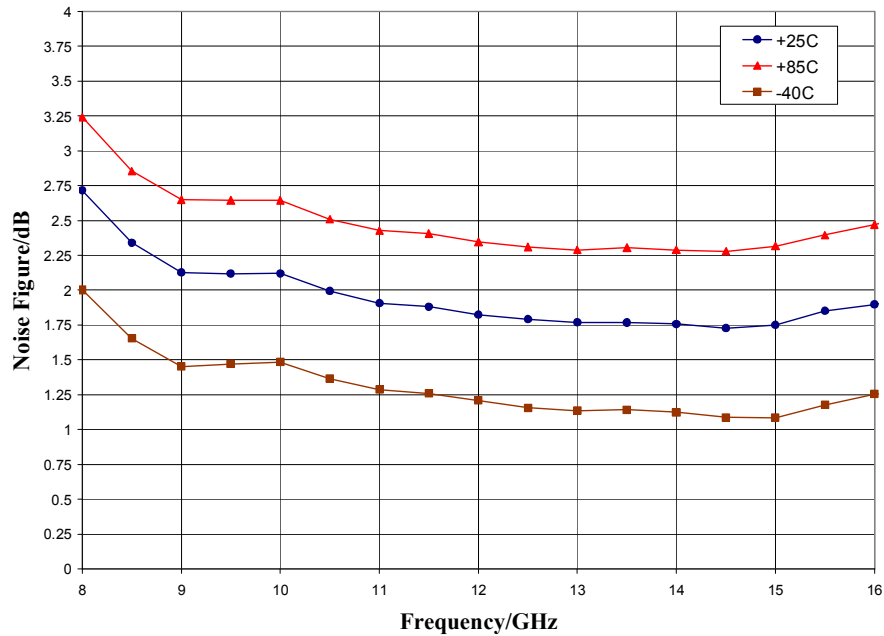
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### Typical Performance

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



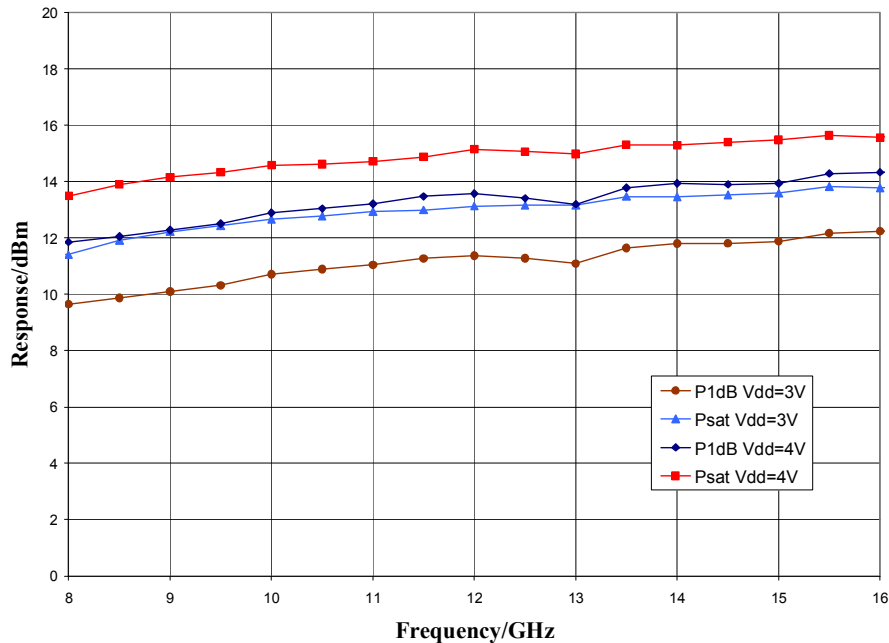
Noise Figure vs. Temperature,  $V_{dd} = 3.0\text{ V}$



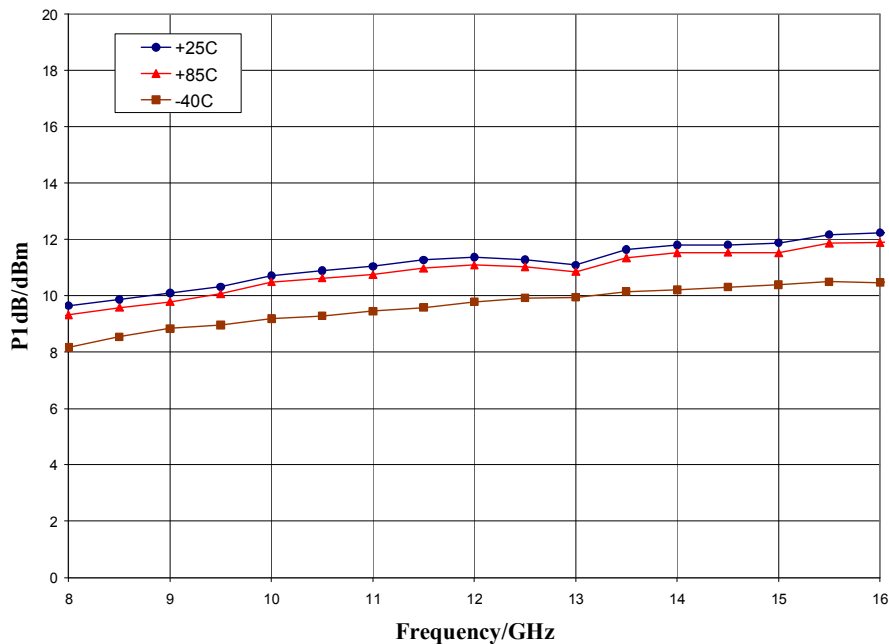
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### Typical Performance

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



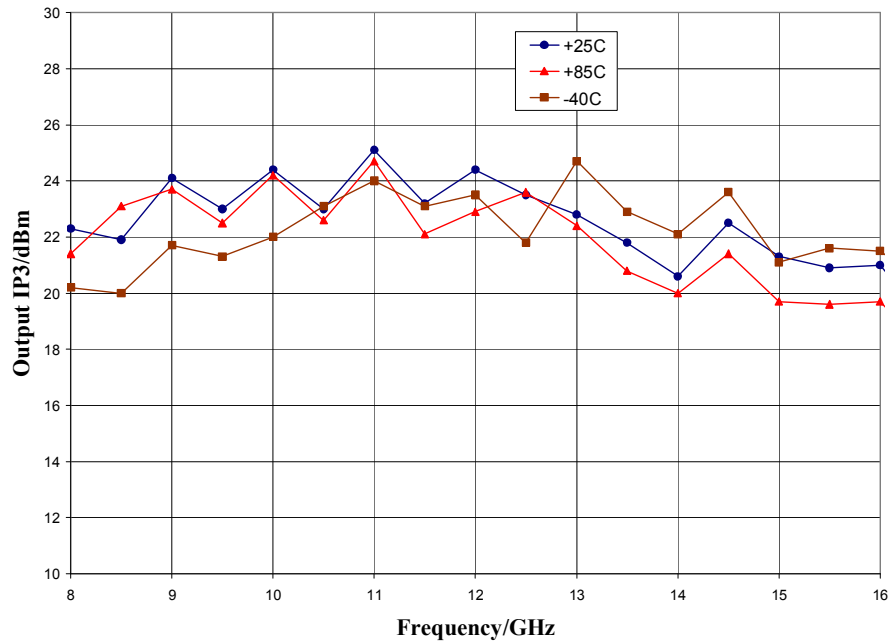
P1dB vs. Temperature,  $V_{dd} = 3.0\text{ V}$



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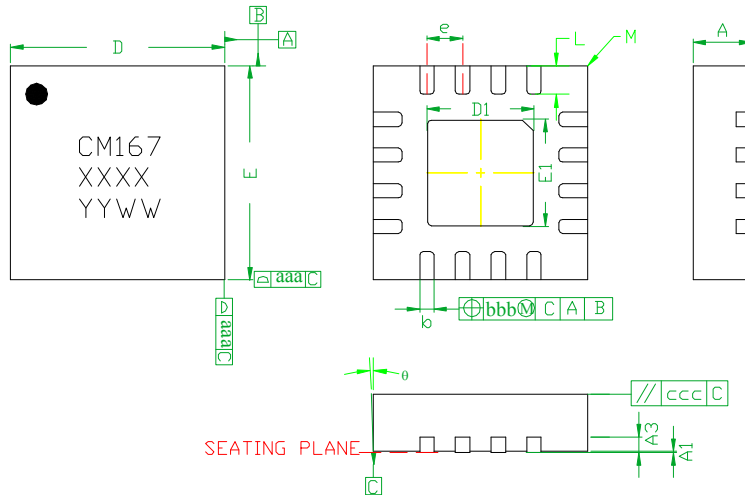
### Typical Performance

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



### Mechanical Information

### Package Information and Dimensions

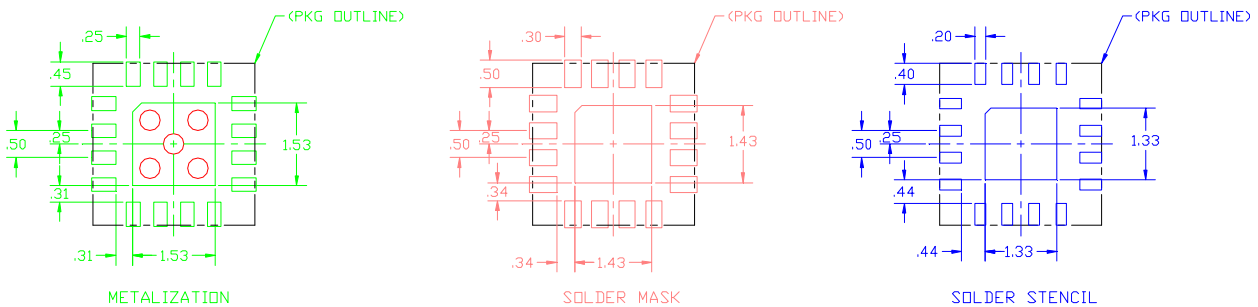


SYMBOLS	DIMENSIONS IN MILLIMETERS		
	MIN	NOM	MAX
A	0.80	0.90	1.00
A1	0	0.02	0.05
A3	---	0.25REF.	---
b	0.17	0.23	0.30
D	2.85	3.00	3.15
D1	1.5	1.6	1.7
E	2.85	3.00	3.15
E1	1.5	1.6	1.7
e	---	0.50BSC	---
L	0.30	0.40	0.50
ø	0	---	12
aaa	---	0.25	---
bbb	---	0.10	---
ccc	---	0.10	---
M	---	---	0.05

#### NOTES:

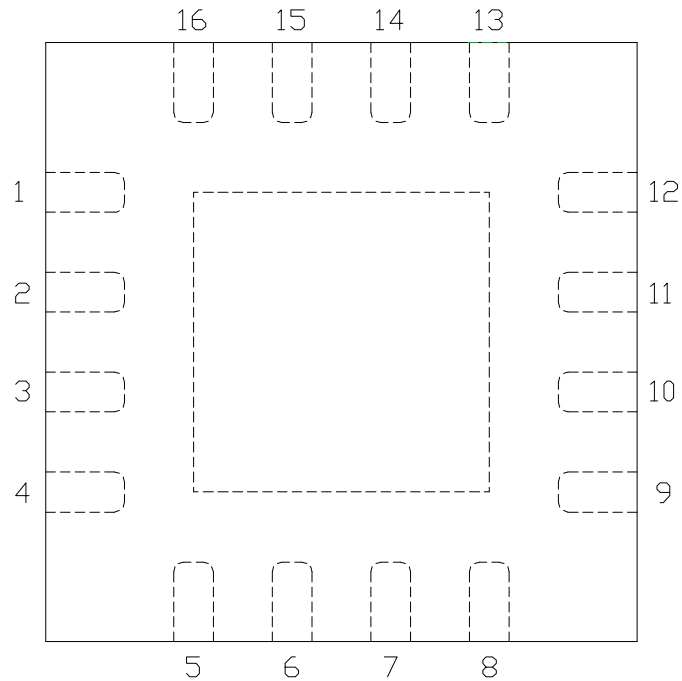
1. DIMENSIONS ARE IN MILLIMETERS
2. RoHS COMPLIANT MOLD COMPOUND
3. LEADFRAME MATERIAL: COPPER ALLOY
4. LEAD FINISH: 100% MATTE Sn
5. INDICATED DIMENSION/TOLERANCE APPLIES TO LEADS AND EXPOSED PAD

### Recommended PCB Land Pattern

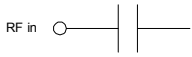
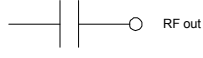
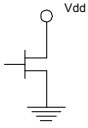



### Pin Description

#### Pin Diagram



#### Functional Description

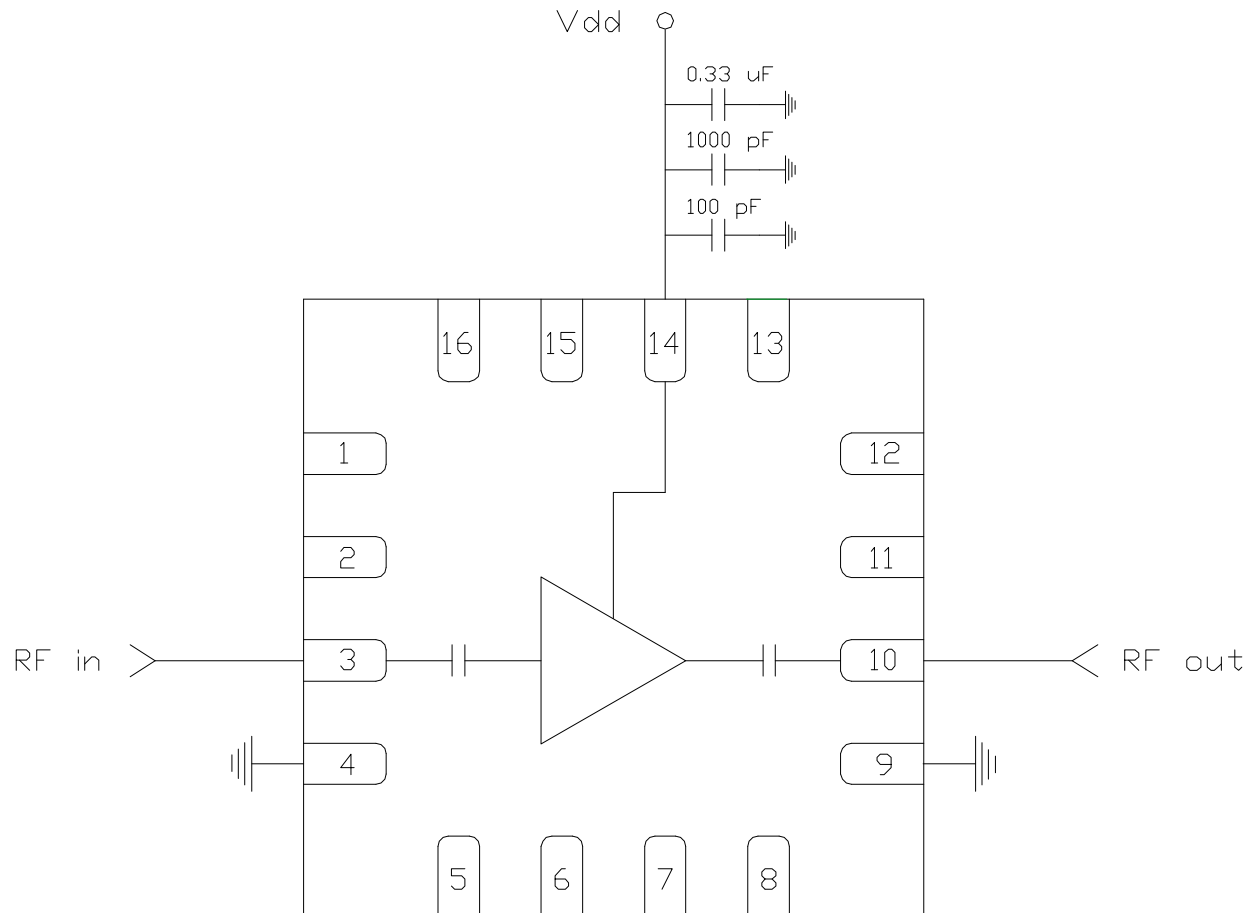
Pin	Function	Description	Schematic
1, 2, 5-8, 11-13, 15, 16	N/C	No connection required. These pins may be connected to RF/DC ground.	
3	RF in	DC blocked and 50 ohm matched	
10	RF out	DC blocked and 50 ohm matched	
14	Vdd	Power supply voltage Decoupling and bypass caps required	
4, 9 and die paddle	Ground	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.

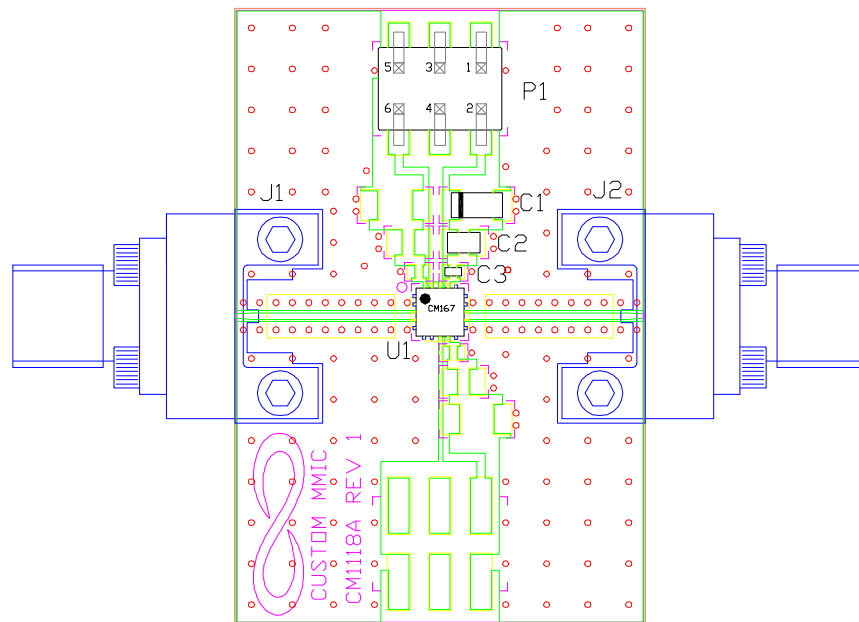
**GaAs MMIC devices are susceptible to damage from Electrostatic Discharge. Proper precautions should be observed during handling, assembly and test.**

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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 $\mu$ F	Capacitor, Tantalum
C2	1000 pF	Capacitor, 0603
C3	100 pF	Capacitor, 0402
U1		CMD167P3 Low Noise Amplifier
PCB		CM11118A Evaluation PCB

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