



Let Performance Drive

CMD186P3

6-11 GHz Low Noise Amplifier



Features

- ▶ Low noise figure
- ▶ High IP3
- ▶ High gain broadband performance
- ▶ Single supply voltage: +5.0 V @ 78 mA
- ▶ Pb-free RoHs compliant 3x3 QFN package

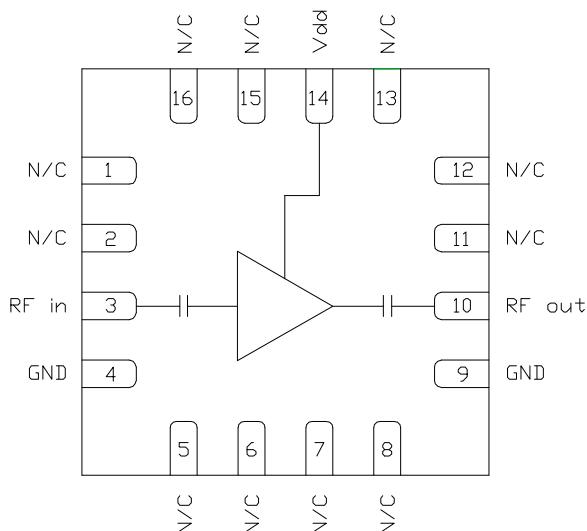
Description

The CMD186P3 is a broadband MMIC low noise amplifier housed in a leadless 3x3 mm plastic surface mount package. The CMD186P3 is ideally suited for EW and communications systems where small size and low power consumption are needed. The broadband device delivers 18.5 dB of gain with a corresponding output IP3 of +28 dBm and a noise figure of 2.1 dB. The CMD186P3 is a 50 ohm matched design eliminating the need for external DC blocks and RF port matching. The CMD186P3 amplifier is the perfect alternative to costly hybrid amplifiers.

Applications

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

Functional Block Diagram



Electrical Performance - $V_{dd} = 5.0$ V, $T_A = 25$ °C, $F = 9$ GHz

Parameter	Min	Typ	Max	Units
Frequency Range	6 - 11			GHz
Gain		18.5		dB
Noise Figure		2.1		dB
Input Return Loss		19		dB
Output Return Loss		16		dB
Output IP3		28		dBm
Supply Current		78		mA

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Specifications

Absolute Maximum Ratings

Parameter	Rating
Drain Voltage, Vdd	5 V
RF Input Power	+20 dBm
Channel Temperature, Tch	150 °C
Power Dissipation, P _{diss}	537 mW
Thermal Resistance	121 °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	5.0	5.5	V
Idd		78		mA

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

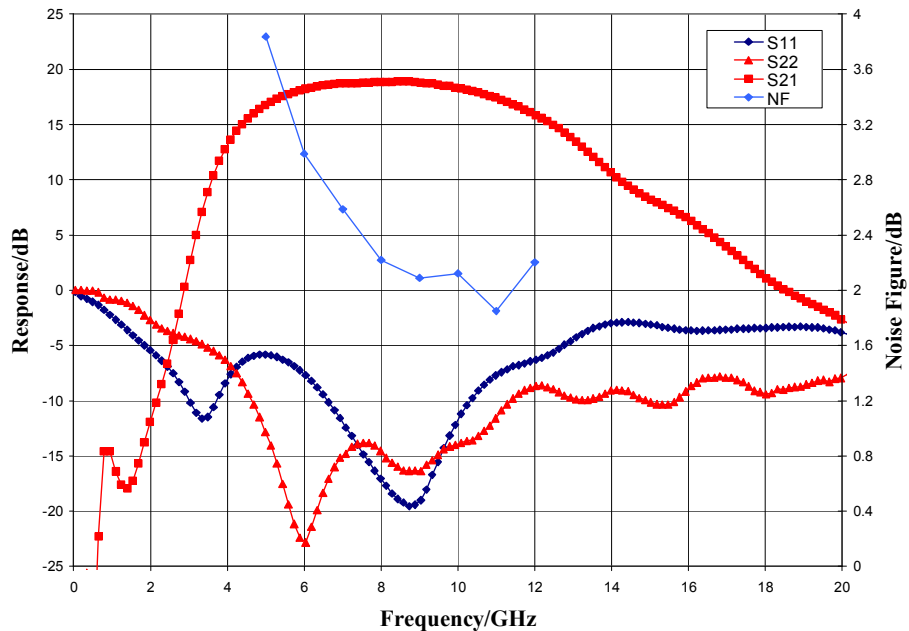
Electrical Specifications - V_{dd} = 5.0 V, T_A = 25 °C

Parameter	Min	Typ	Max	Min	Typ	Max	Units
Frequency Range	6 - 9			9 - 11			GHz
Gain	16.5	18.5	20.5	16	18	20	dB
Noise Figure		2.4	3.4		2.1	2.5	dB
Input Return Loss		15			12		dB
Output Return Loss		15			13		dB
Output P _{1dB}		16.5			17.5		dBm
Output IP ₃		28			28		dBm
Supply Current	55	78	100	55	78	100	mA
Gain Temperature Coefficient		0.01			0.01		dB/°C
Noise Figure Temperature Coefficient		0.009			0.009		dB/°C

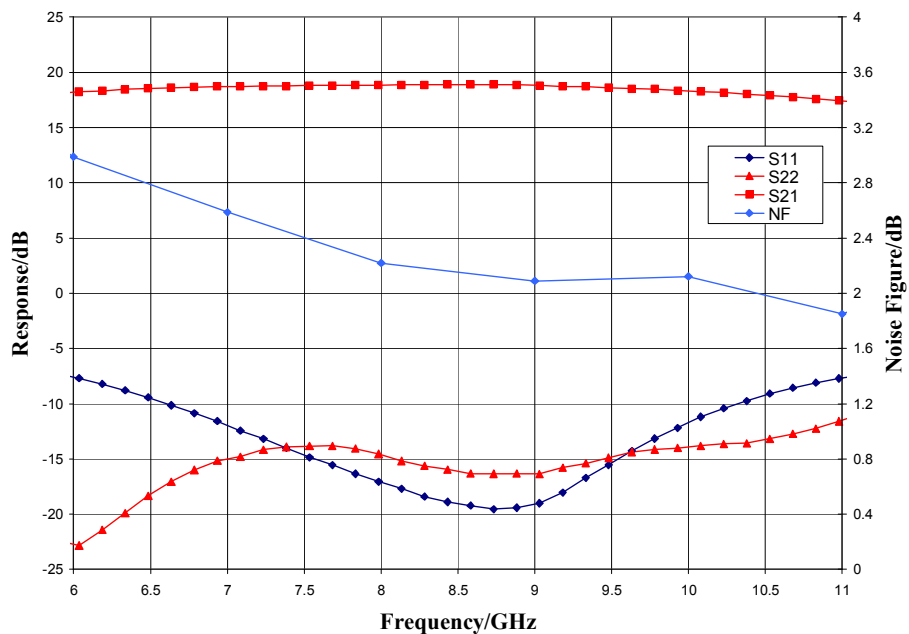
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Typical Performance

Broadband Performance, $V_{dd} = 5.0$ V, $I_{dd} = 78$ mA, $T_A = 25$ °C



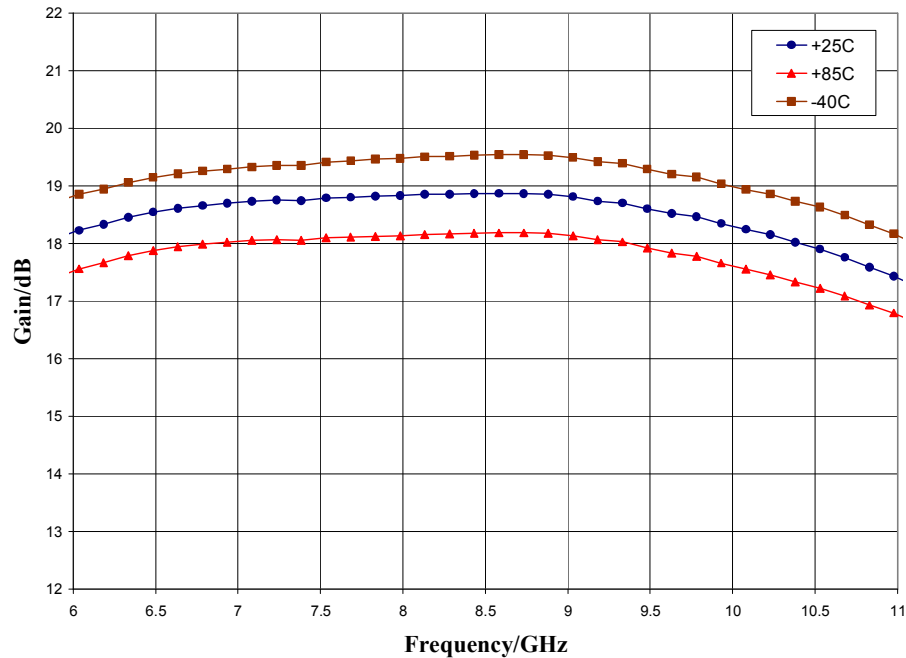
Narrow-band Performance, $V_{dd} = 5.0$ V, $I_{dd} = 78$ mA, $T_A = 25$ °C



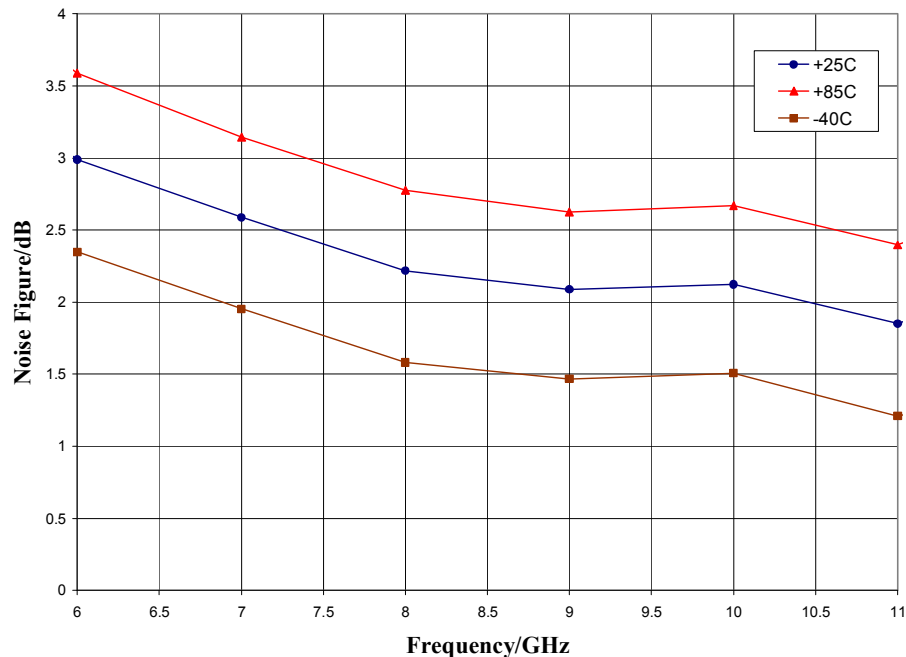
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Typical Performance

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



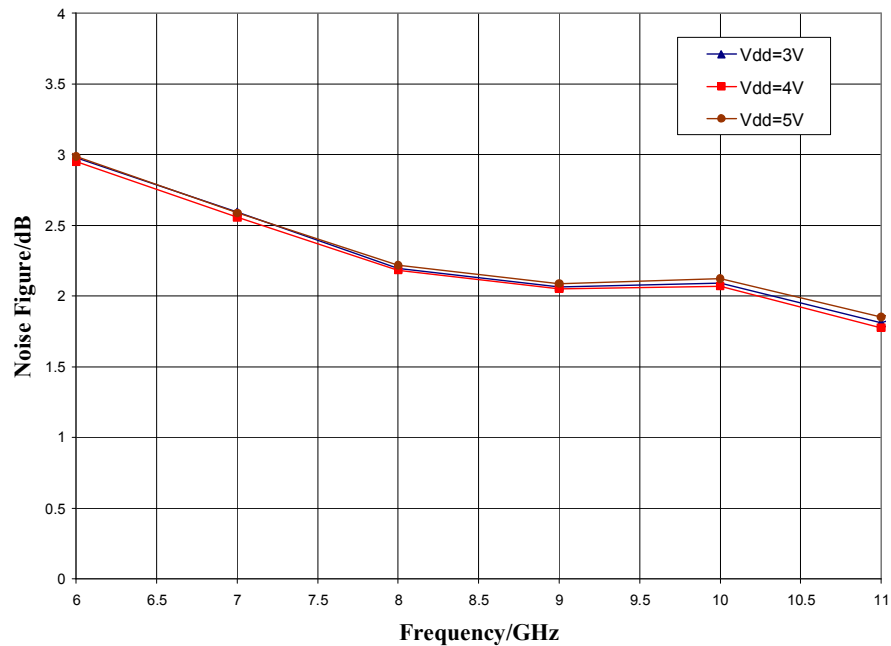
Noise Figure vs. Temperature, $V_{dd} = 5.0$ V



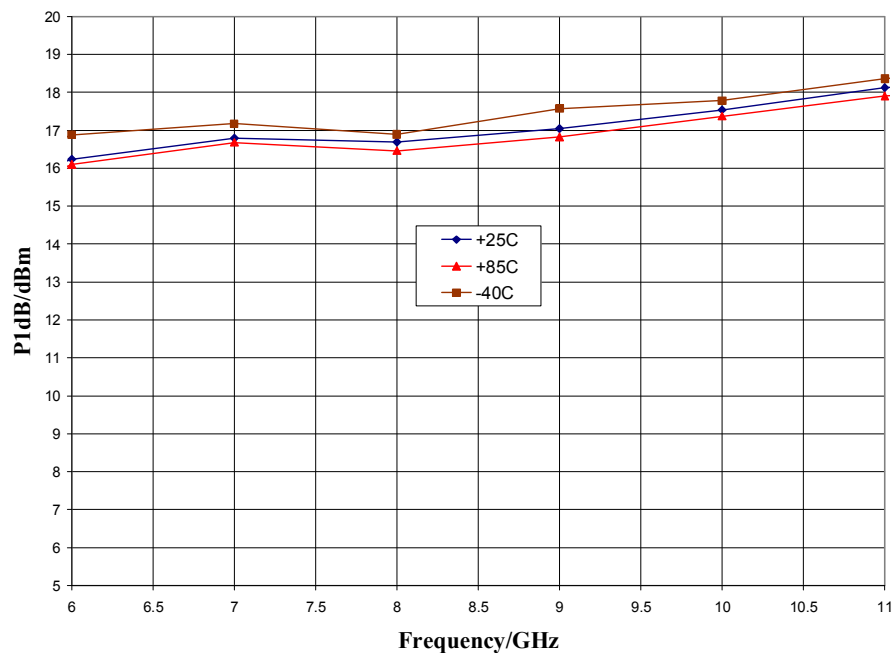
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Typical Performance

Noise Figure, $V_{dd}=3.0V, 4.0V, 5.0V$, $T_A = 25^\circ C$



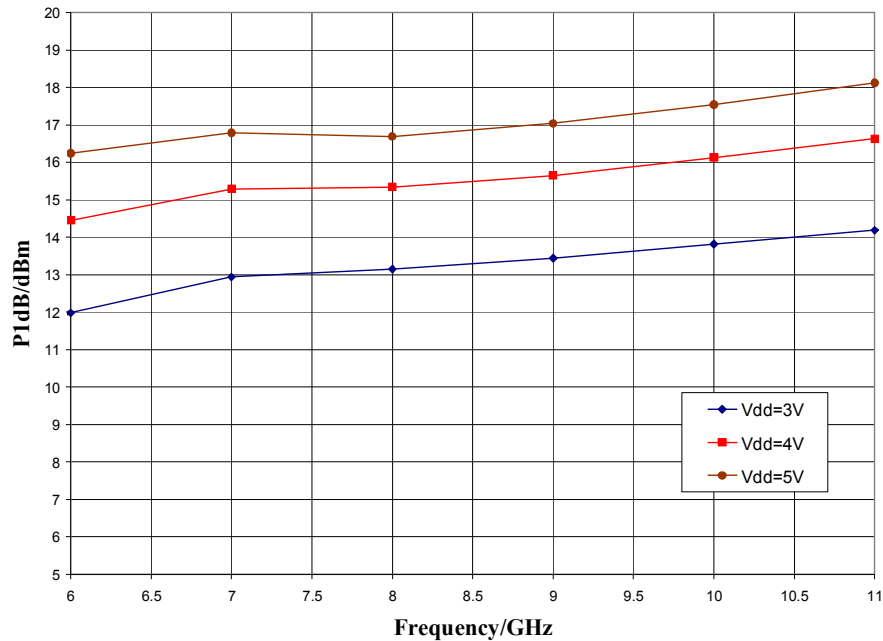
P1dB vs. Temperature, $V_{dd}=5.0V$



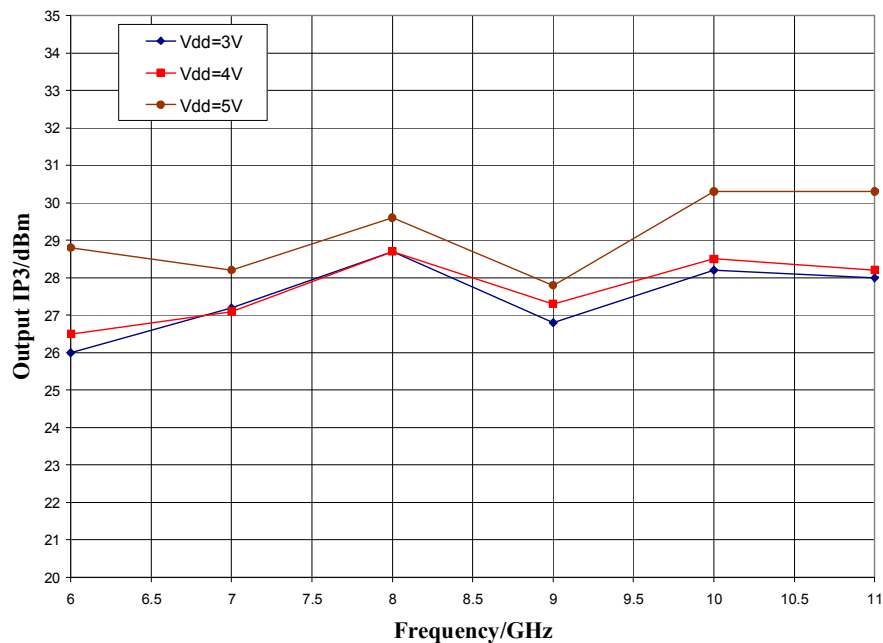
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Typical Performance

P1dB, $V_{dd}=3.0V, 4.0V, 5.0V, T_A = 25^\circ C$



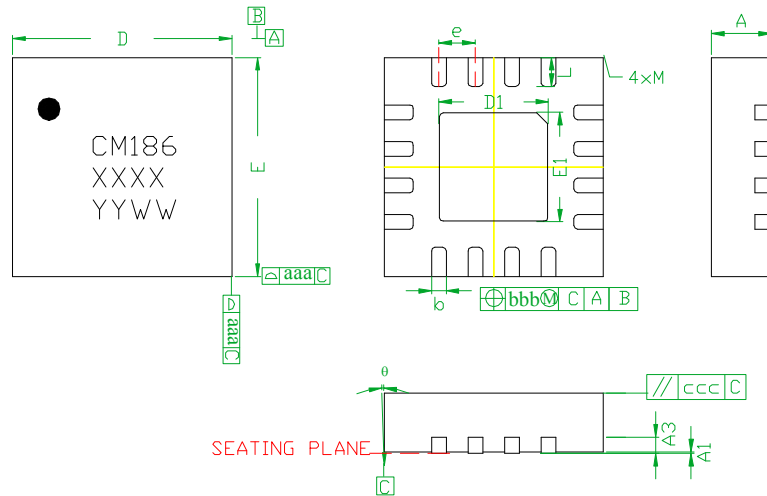
Output IP3, $V_{dd}=3.0V, 4.0V, 5.0V, T_A = 25^\circ C$



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Mechanical Information

Package Information and Dimensions

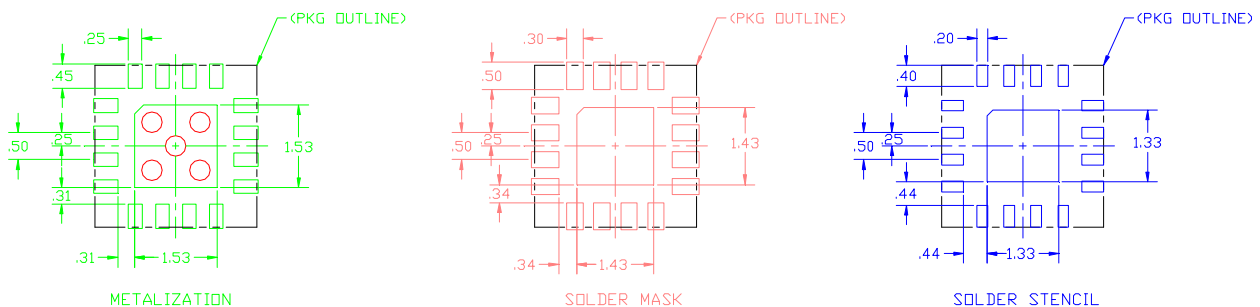


SYMBOLS	DIMENSIONS IN MILLIMETERS		
	MIN	NOM	MAX
A	0.80	0.90	1.00
A1	0	0.02	0.05
A3	—	0.25REF.	—
b	0.18	0.23	0.30
D	2.85	3.00	3.15
D1	—	1.5BSC	—
E	2.85	3.00	3.15
E1	—	1.5BSC	—
e	—	0.50BSC	—
L	0.30	0.40	0.50
theta	0	—	12
aaa	—	0.25	—
bbb	—	0.10	—
ccc	—	0.10	—
M	—	—	0.05

NOTES:

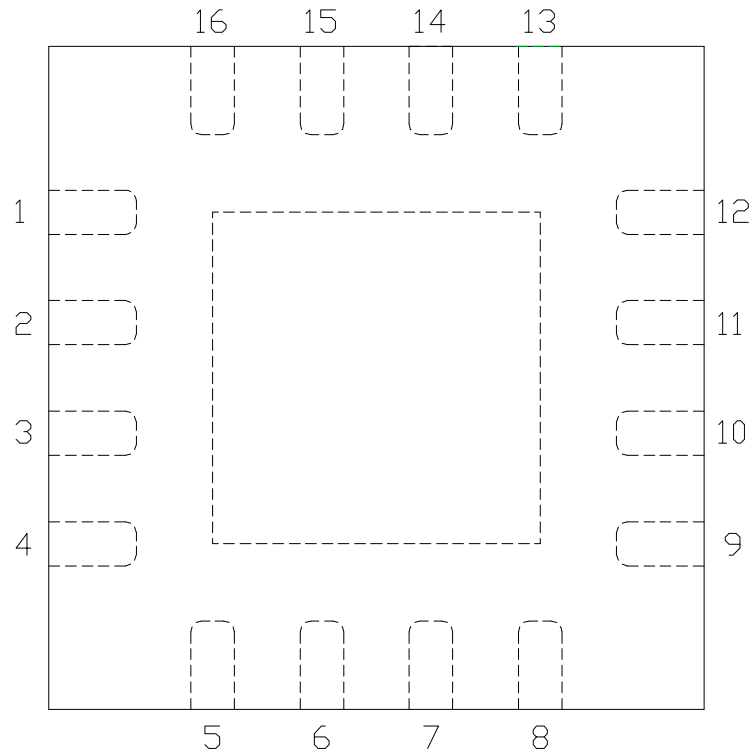
1. DIMENSIONS ARE IN MILLIMETERS
2. RoHS COMPLIANT MOLD COMPOUND
3. LEADFRAME MATERIAL: COPPER ALLOY
4. LEAD FINISH: 100% MATTE Sn
5. INDICATED DIMENSION/TOLERANCE APPLIES TO LEADS AND EXPOSED PAD

Recommended PCB Land Pattern

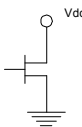


Pin Description

Pin Diagram



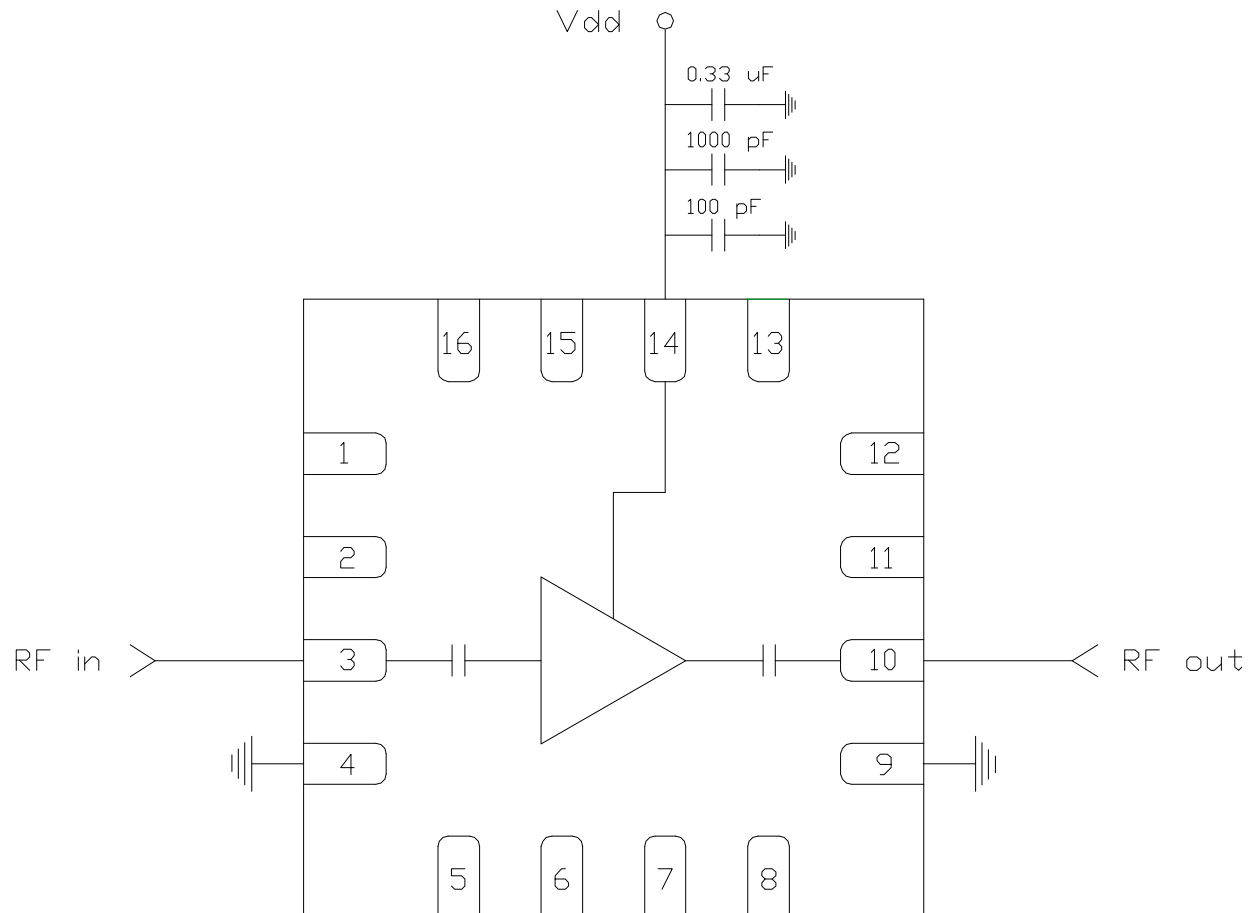
Functional Description

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 CMD186P3 is biased with a single 5.0 V positive drain supply.

RF power can be applied at any time.

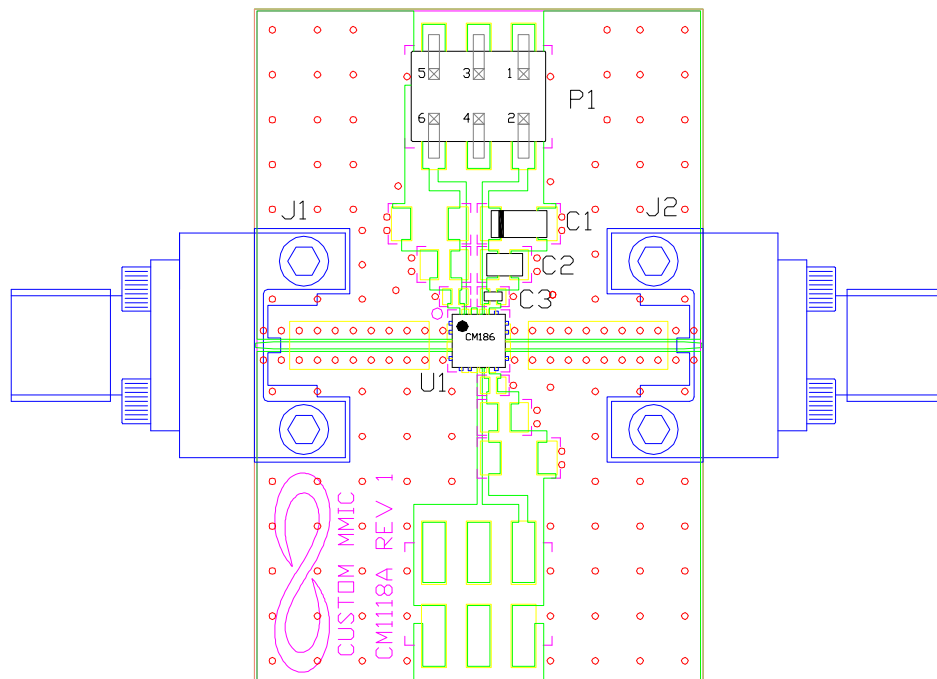
GaAs MMIC devices are susceptible to damage from Electrostatic Discharge. Proper precautions should be observed during handling, assembly and test.

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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		2.4 mm End Launch Connector
P1		10 Pin Header
C1	0.33 μ F	Capacitor, Tantalum
C2	1000 pF	Capacitor, 0603
C3	100 pF	Capacitor, 0402
U1		CMD186P3 Low Noise Amplifier
PCB		CM1118A Evaluation PCB

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