



CMD158P3

6-14 GHz Driver Amplifier

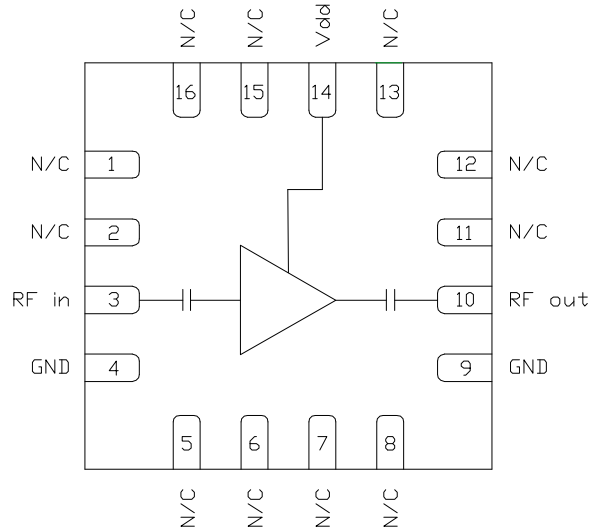
Features

- ▶ Broadband performance
- ▶ High output power
- ▶ Low current consumption
- ▶ Single supply voltage: +5.0 V @ 95 mA
- ▶ Pb-free RoHs compliant 3x3 QFN package

Description

The CMD158P3 is a broadband MMIC driver amplifier housed in a leadless 3x3 mm plastic surface mount package. The CMD158P3 is ideally suited for EW and communications systems where small size and low power consumption are needed. The broadband device delivers 19.5 dB of gain and +20.5 dBm saturated output power at 20 % PAE from a single 5 V supply. The CMD158P3 is a 50 ohm matched design eliminating the need for external DC blocks and RF port matching. The CMD158P3 amplifier is the perfect alternative to costly hybrid amplifiers.

Functional Block Diagram



Electrical Performance - $V_{dd} = 5.0\text{ V}$, $T_A = 25\text{ }^\circ\text{C}$

Parameter	Min	Typ	Max	Units
Frequency Range	6 - 14			GHz
Gain		19.5		dB
Input Return Loss		10		dB
Output Return Loss		10		dB
Output P1dB		19.5		dBm
Output Psat		20.5		dBm
Supply Current		95		mA

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Specifications

Absolute Maximum Ratings

Parameter	Rating
Drain Voltage, V _{dd}	6.5 V
RF Input Power	+23 dBm
Channel Temperature, T _{ch}	150 °C
Power Dissipation, P _{diss}	535 mW
Thermal Resistance, Θ_{JC}	122 °C/W
Operating Temperature	-40 to 85 °C
Storage Temperature	-55 to 150 °C

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 _{dd}	3.0	5.0	6.0	V
I _{dd}		95		mA

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

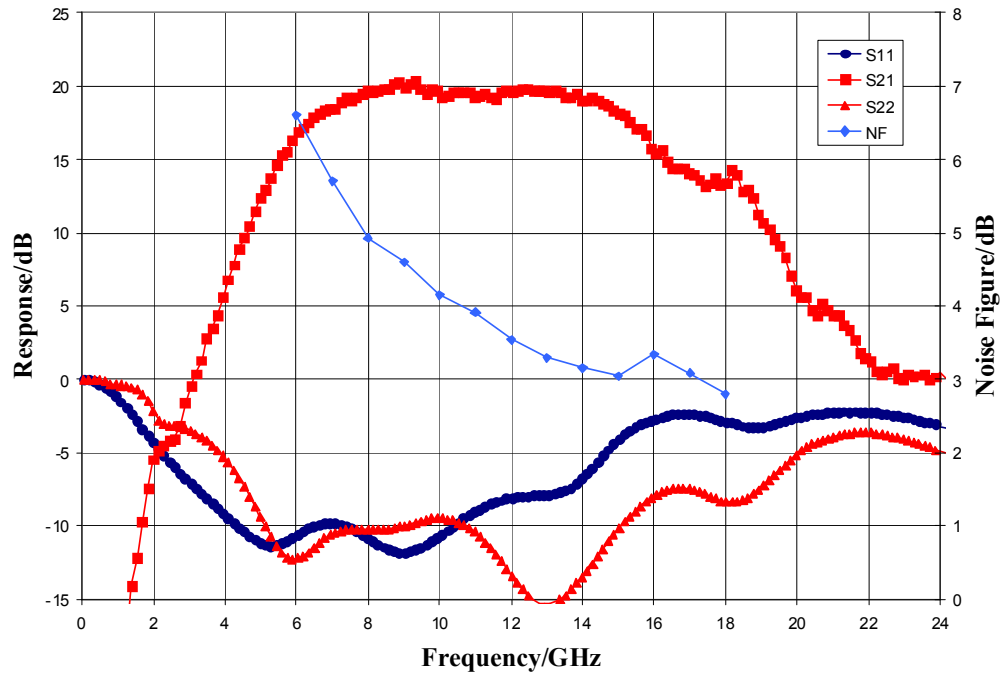
Electrical Specifications - V_{dd} = 5.0 V, T_A = 25 °C

Parameter	Min	Typ	Max	Min	Typ	Max	Units
Frequency Range	6 - 9			9 - 14			GHz
Gain	15	19	22	17	19.5	23	dB
Noise Figure		5			3.5		dB
Input Return Loss		10			8		dB
Output Return Loss		10			12		dB
Output P _{1dB}	16.5	19		17.5	19.5		dBm
Output IP ₃		25.5			26.5		dBm
Supply Current	70	95	120	70	95	120	mA
Gain Temperature Coefficient		0.012			0.012		dB/°C

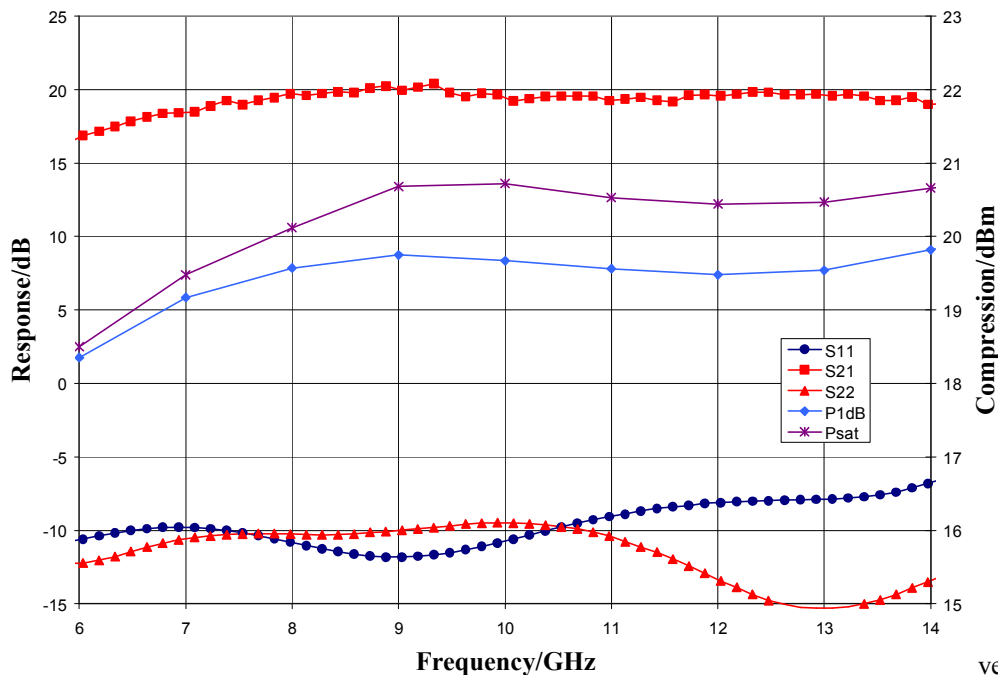
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Typical Performance

Broadband Performance, $V_{dd} = 5.0\text{ V}$, $I_{dd} = 95\text{ mA}$, $T_A = 25\text{ }^\circ\text{C}$



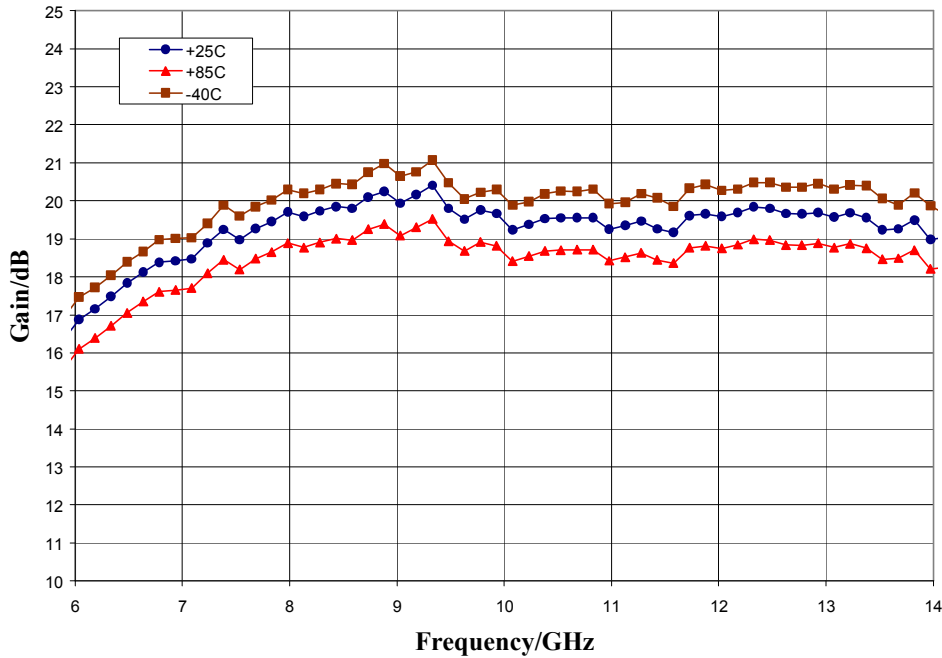
Narrow-band Performance, $V_{dd} = 5.0\text{ V}$, $I_{dd} = 95\text{ mA}$, $T_A = 25\text{ }^\circ\text{C}$



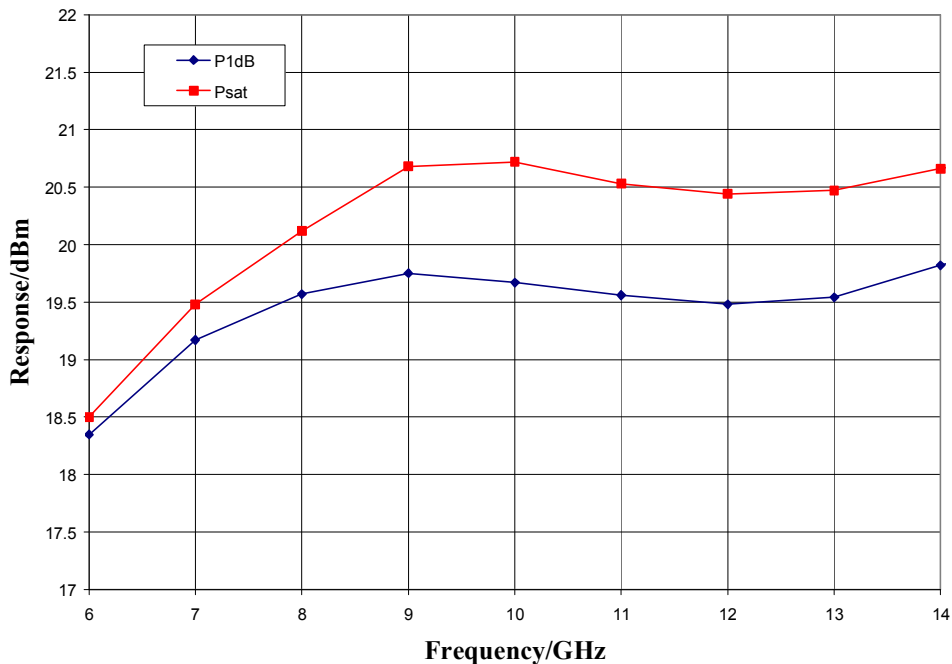
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Typical Performance

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



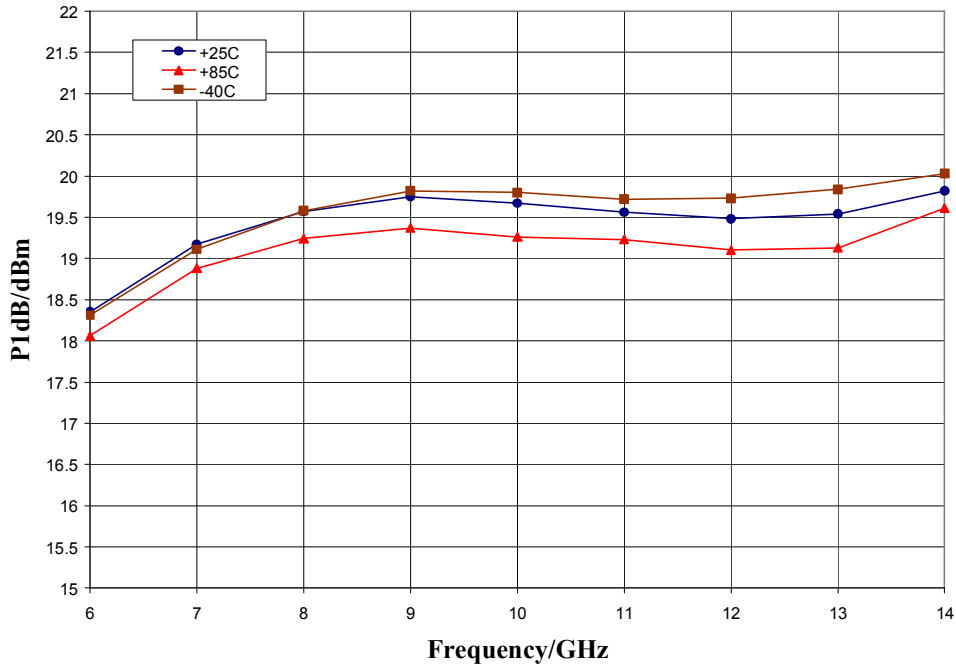
Output Power, $V_{dd} = 5.0\text{ V}$, $I_{dd} = 95\text{ mA}$, $T_A = 25\text{ }^\circ\text{C}$



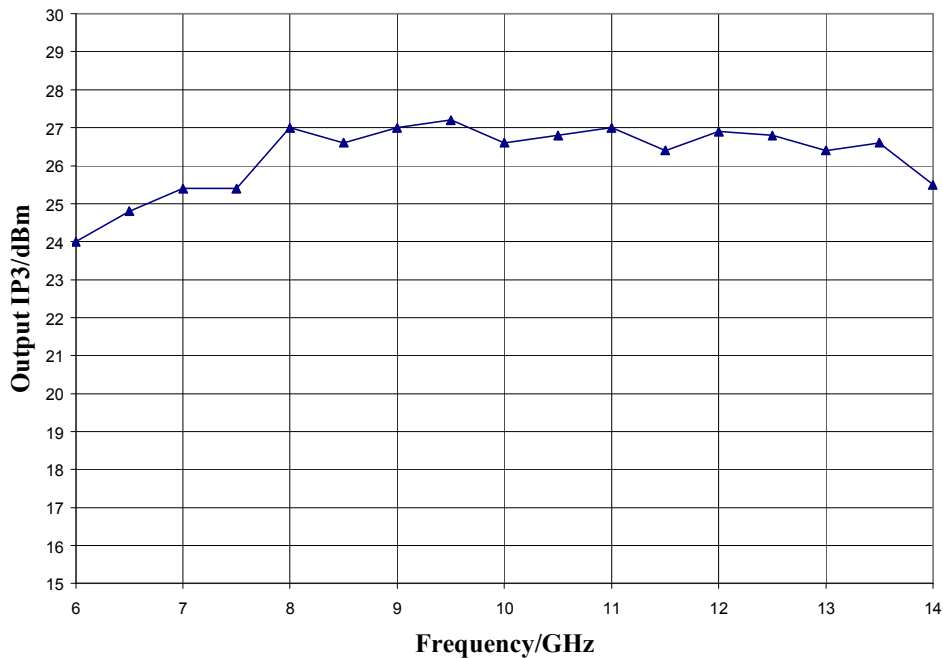
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Typical Performance

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



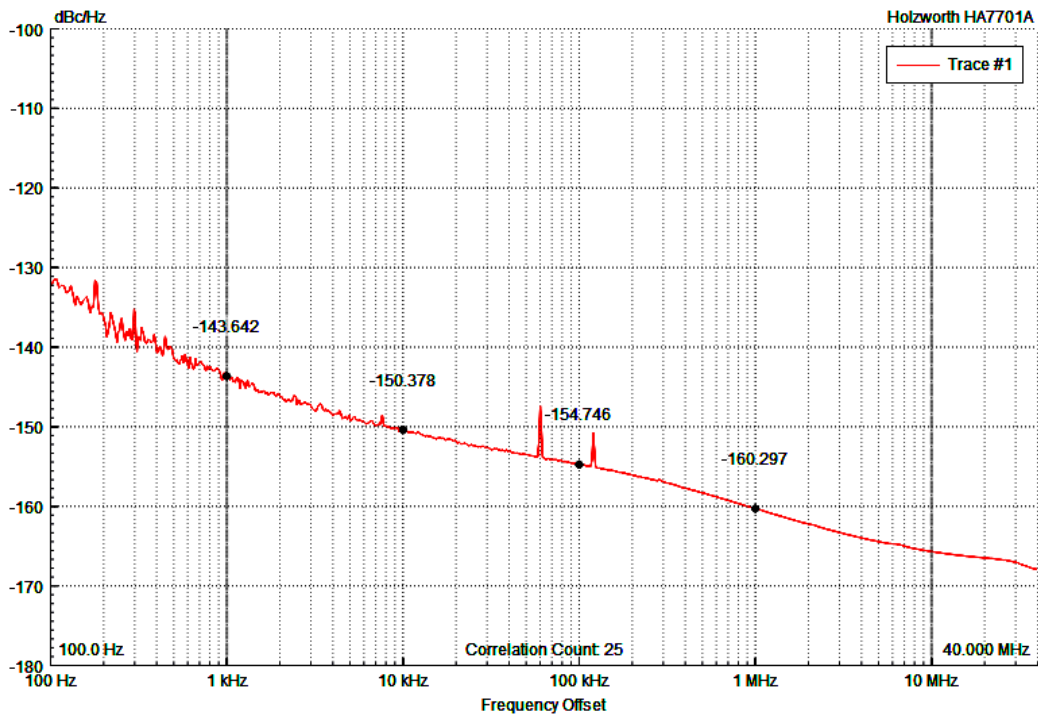
Output IP3, $V_{dd} = 5.0\text{ V}$, $I_{dd} = 95\text{ mA}$, $T_A = 25\text{ }^\circ\text{C}$



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Typical Performance

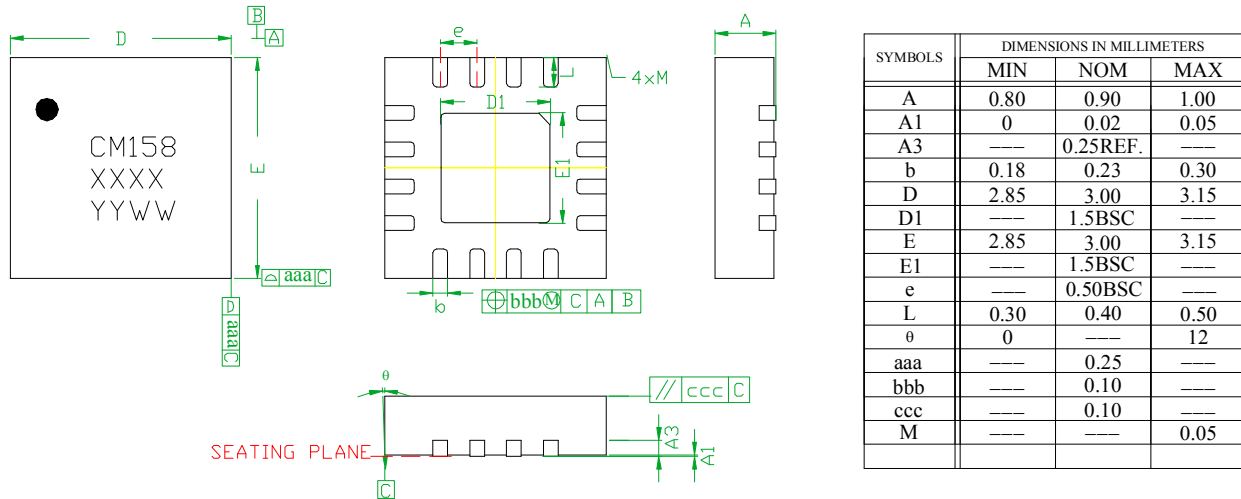
Additive Phase Noise @ P_{sat} , $F = 12\text{ GHz}$, $V_{dd} = 5.0\text{ V}$, $I_{dd} = 95\text{ mA}$, $T_A = 25\text{ }^\circ\text{C}$



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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

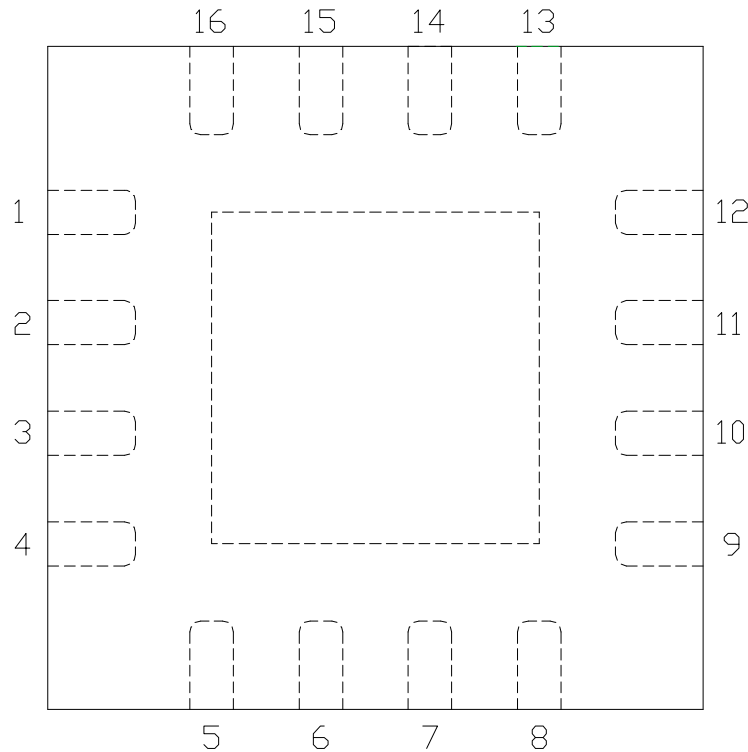
Custom MMIC Design Services recommends that the user develop the land pattern that will provide the best design for proper solder reflow and device attach for their specific application. Please review CMDS Application Note AN 105 for a recommended land pattern approach.

Recommended Solder Reflow Profile


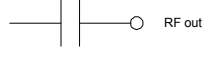
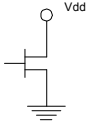

Custom MMIC Design Services recommends screen printing with belt furnace reflow to ensure proper solder reflow and device attach. Please review CMDS Application Note AN 102 for a recommended solder reflow profile.

Pin Description

Pin Diagram



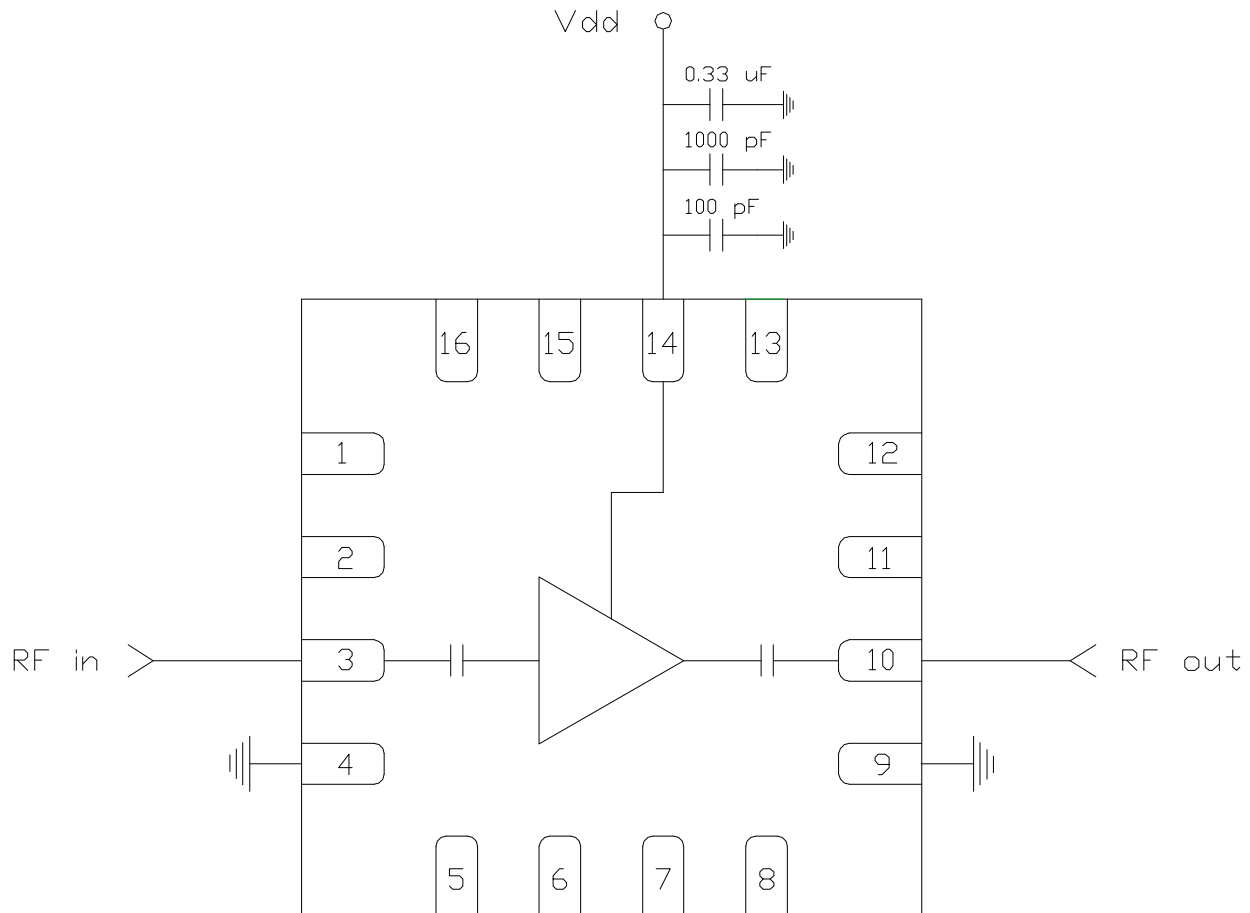
Functional Description

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 CMD158P3 is biased with a single 5.0 V positive drain supply.

RF power can be applied at any time.

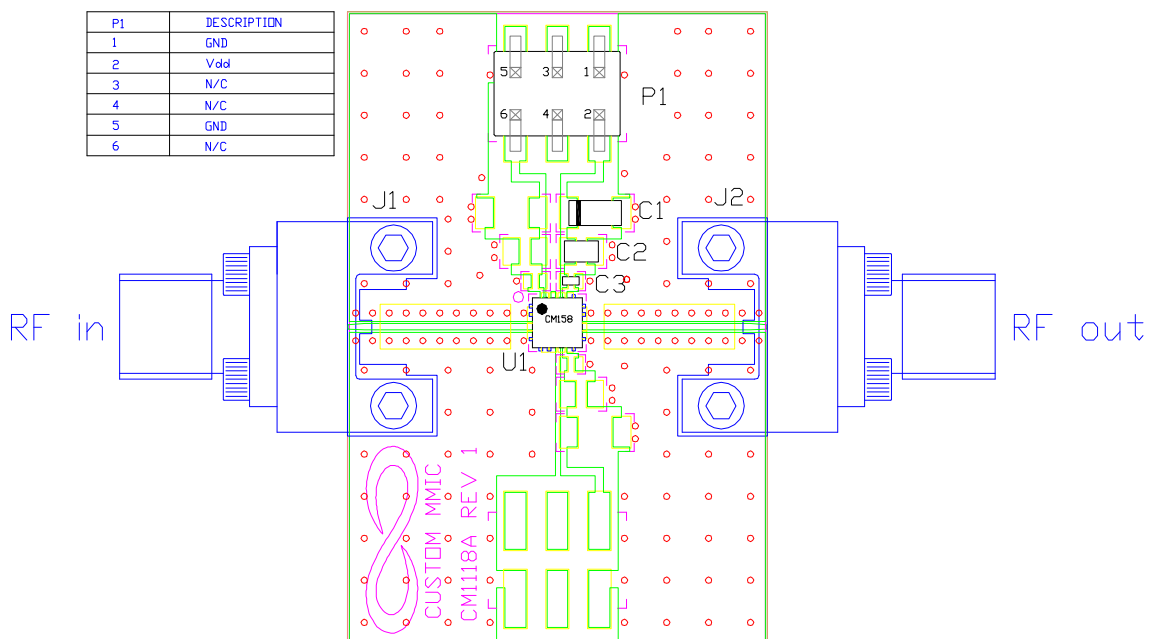
GaAs MMIC devices are susceptible to damage from Electrostatic Discharge. Proper precautions should be observed during handling, assembly and test.

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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		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		CMD158P3 Low Noise Amplifier
PCB		CM11118A Evaluation PCB

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

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