CMD201P5

DC-20 GHz Distributed Power Amplifier

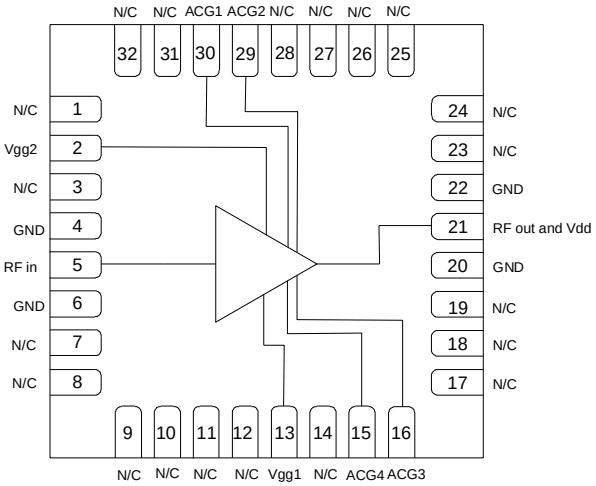
Features

- ► Ultra wideband performance
- ► High linearity
- ► High output power
- ► Excellent return losses

Description

The CMD201P5 is wideband GaAs MMIC distributed power amplifier which operates from DC to 20 GHz. The amplifier delivers 11 dB of gain with a corresponding output 1 dB compression point of +27 dBm and output IP3 of 37 dBm at 10 GHz. The CMD201P5 is a 50 ohm matched design which eliminates the need for RF port matching.

Functional Block Diagram



Electrical Performance – V_{dd} = 10.0 V, V_{gg1} = -0.55 V, V_{gg2} = 5.0 V , T_A = 25 °C, F = 10 GHz

Parameter	Min	Typ	Max	Units
Frequency Range		DC – 20		GHz
Gain		11		dB
Noise Figure		3.4		dB
Input Return Loss		16		dB
Output Return Loss		17		dB
Output P1dB		27		dBm
Supply Current		400		mA

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Specifications

Absolute Maximum Ratings

Parameter	Rating
Drain Voltage, Vdd	12.0 V
Gate1 Voltage, Vgg1	-2.0 to 0 V
Gate2 Voltage, Vgg2	6.0 V
RF Input Power	+30 dBm
Channel Temperature, Tch	150 °C
Power Dissipation, Pdiss	5.43 W
Thermal Resistance, Θ_{JC}	11.9 °C/W
Operating Temperature	-40 to 85 °C
Storage Temperature	-55 to 150 °C

Recommended Operating Conditions

Parameter	Min	Typ	Max	Units
Vdd	8.0	10.0	12.0	V
Idd	350	400	450	mA
Vgg1		-0.55		V
Vgg2		5.0		V

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

Operation of this device outside the maximum ratings may cause permanent damage.

Electrical Specifications – V_{dd} = 10.0 V, V_{gg1} = -0.55 V, V_{gg2} = 5.0 V, T_A = 25 °C

Parameter	Min	Typ	Max	Min	Typ	Max	Units
Frequency Range	DC – 6			6 – 20			GHz
Gain	8	10		7	10		dB
Noise Figure		5			4		dB
Input Return Loss		8			10		dB
Output Return Loss		8			10		dB
Output P1dB	25	28		24	27		dBm
Output IP3		37			36		dBm
Supply Current	300	400	500	300	400	500	mA
Gain Temperature Coefficient		0.009			0.014		dB/°C
Noise Figure Temperature Coefficient		0.01			0.014		dB/°C

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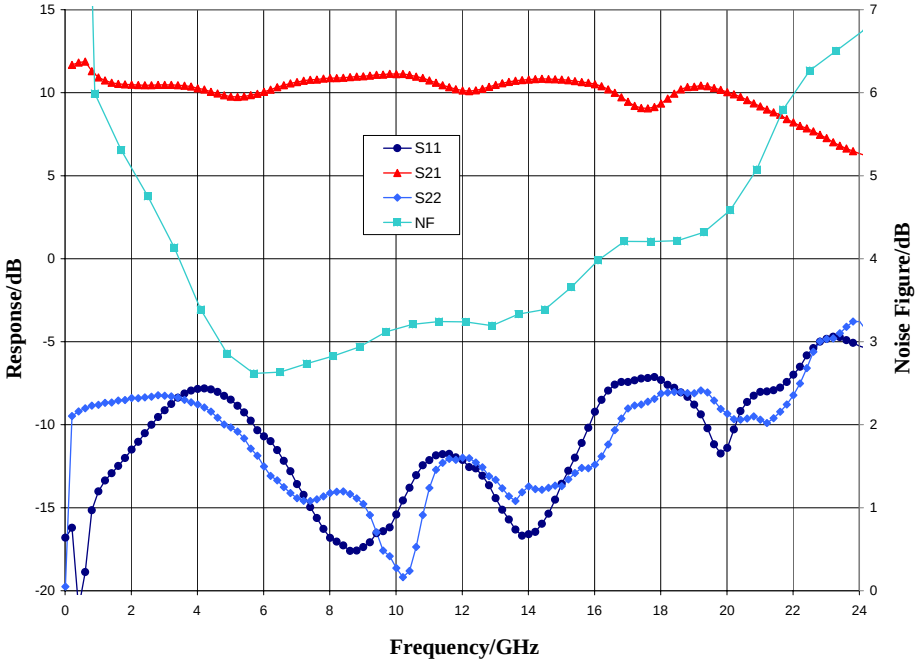
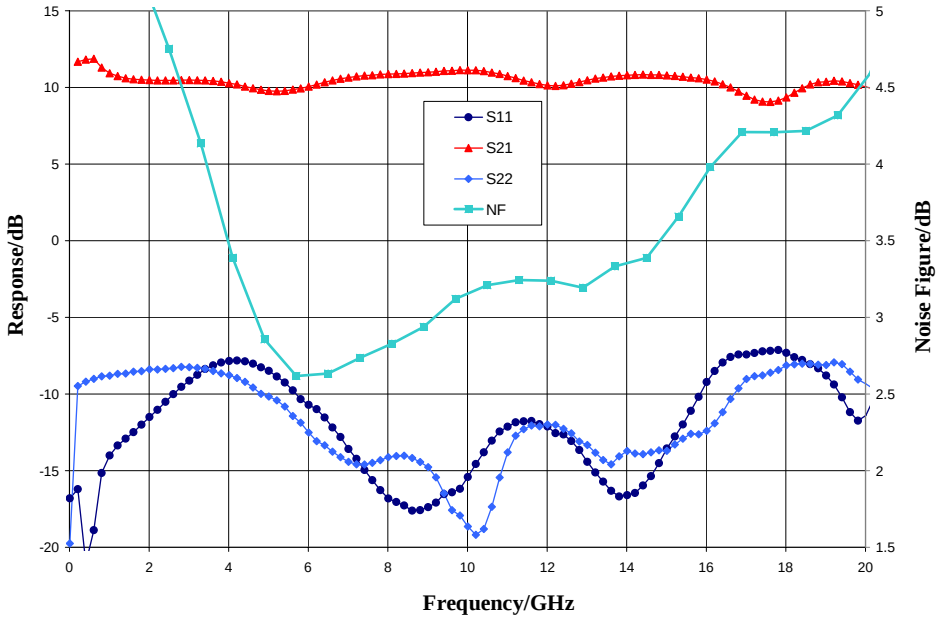
Typical Performance

Broadband Performance, V_{dd} = 10 V, V_{gg1} = -0.55 V, V_{gg2} = 5 V, I_{dd} = 400 mA, T_A = 25 °C



Narrow-band Performance, V_{dd} = 10 V, V_{gg1} = -0.55 V, V_{gg2} = 5 V, I_{dd} = 400 mA, T=25 °C



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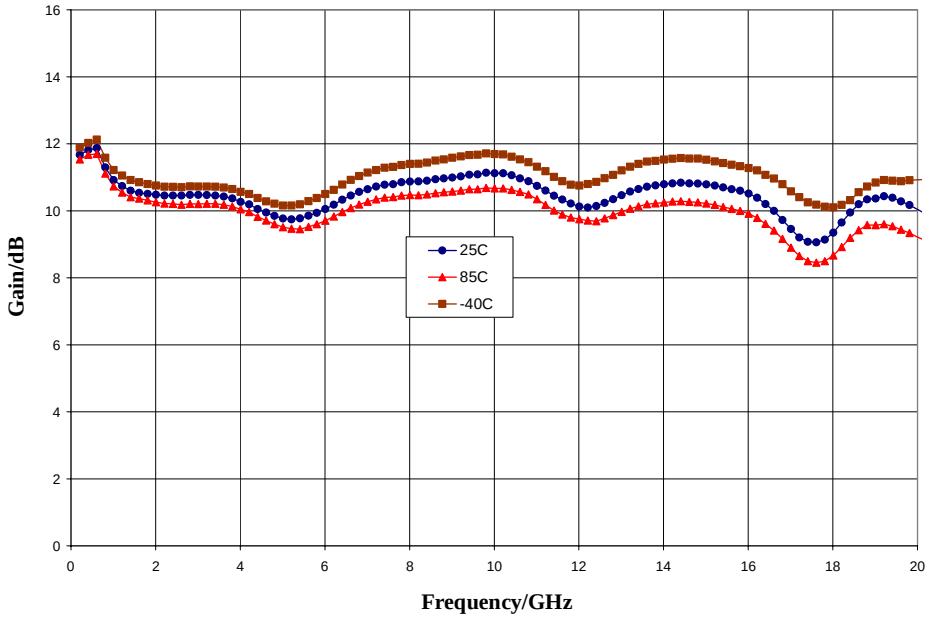
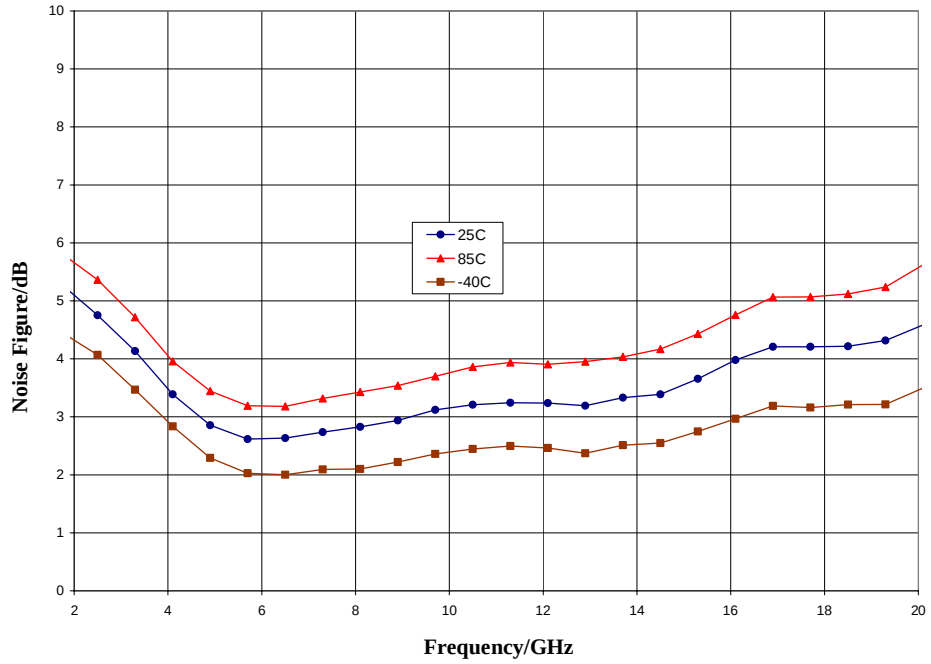
Typical Performance

Gain vs. Temperature, V_{dd} = 10 V, V_{gg1} = -0.55 V, V_{gg2} = 5 V



Noise Figure vs. Temperature, V_{dd} = 10 V, V_{gg1} = -0.55 V, V_{gg2} = 5 V



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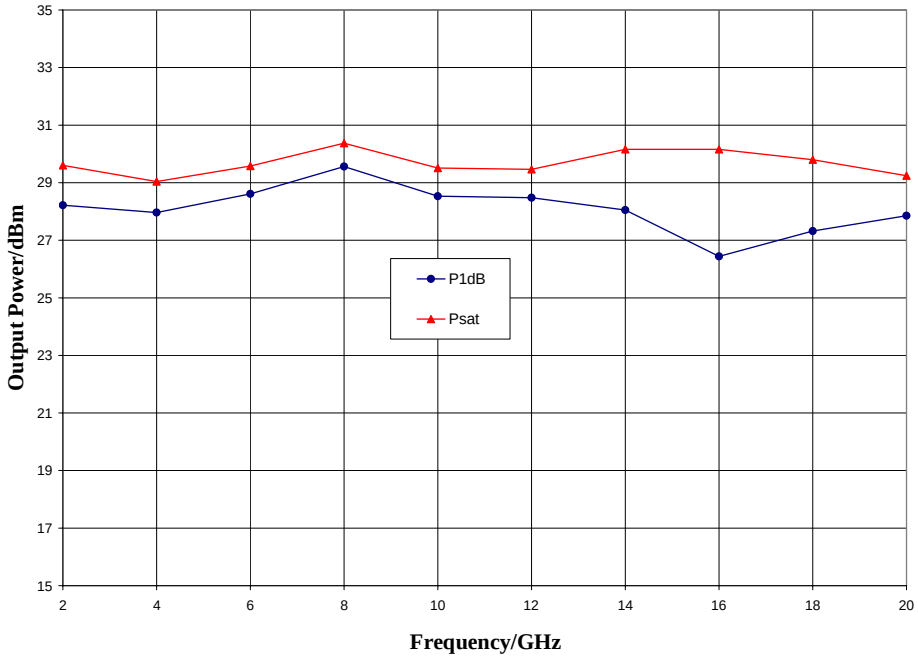
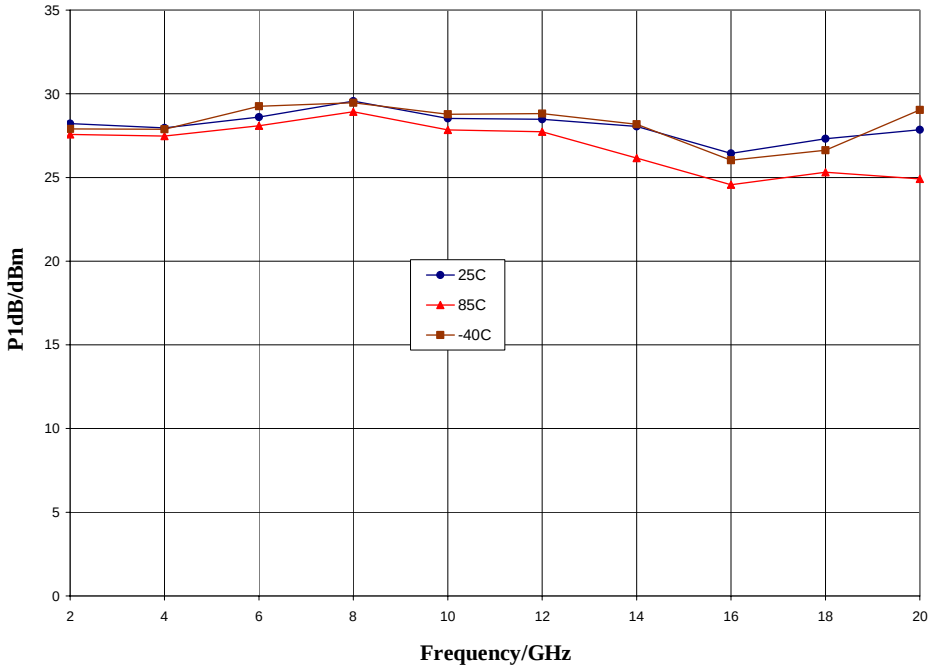
Typical Performance

Output Power, V_{dd} = 10 V, V_{gg1} = -0.55 V, V_{gg2} = 5 V, T_A = 25 °C



Output P1dB vs. Temperature, V_{dd} = 10 V, V_{gg1} = -0.55 V, V_{gg2} = 5 V



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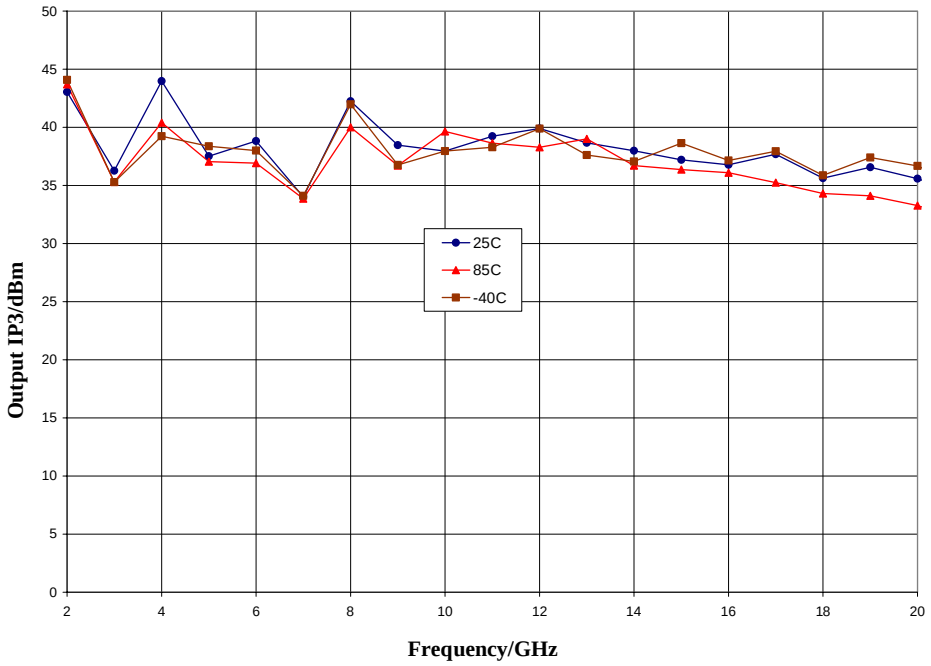
Typical Performance

Output IP3 vs. Temperature, V_{dd} = 10 V, V_{gg1} = -0.55 V, V_{gg2} = 5 V



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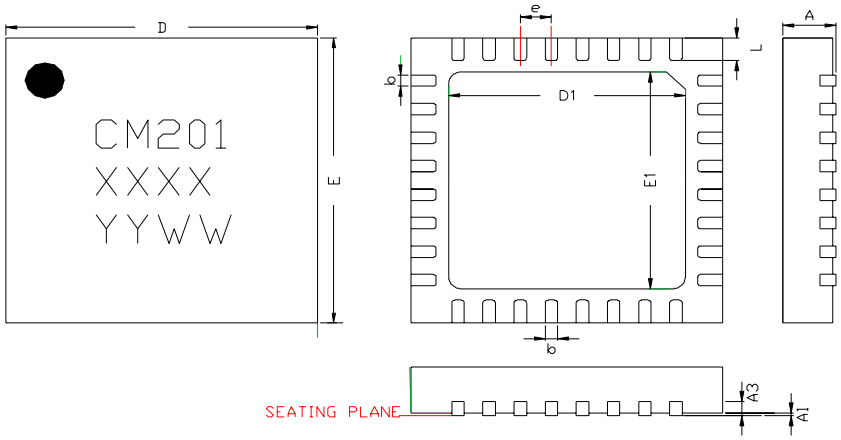
Mechanical Information

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	4.85	5.00	5.15
D1	---	3.8BSC	---
E	4.85	5.00	5.15
E1	---	3.8BSC	---
e	---	0.50BSC	---
L	0.30	0.40	0.50

Notes:

1. Dimensions are in Millimeters
2. RoHs Compliant Mold Compound
3. Leadframe Material - Copper Alloy
4. Leadframe Finish 100% Matte Sn
5. Indicated Dimension/Tolerance Applies to Leads and Exposed Pad

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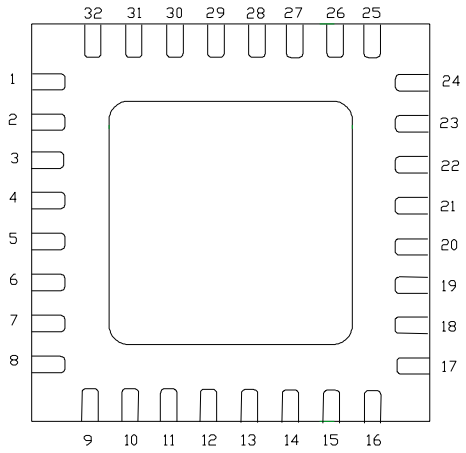
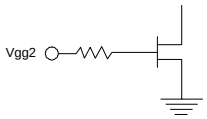
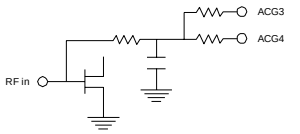
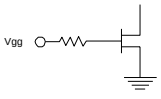
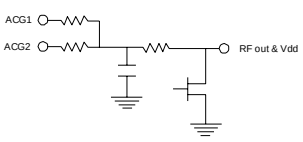
Pin Description

Pin Diagram



Functional Description

Pin	Function	Description	Schematic
1,3, 7-12, 14, 16-18, 23-28, 30-31	N/C	No connection required. These pins may be connected to RF/DC ground	
4,6,20,21 Paddle	Ground	Connect to RF / DC ground	
2	Vgg2	Power supply voltage Decoupling and bypass caps required	
5	RF in	50 ohm matched input	
16, 15	ACG3, 4	Low frequency termination. Attach bypass capacitor per application circuit	
13	Vgg1	Power supply voltage Decoupling and bypass caps required	
21	RF out & Vdd	Power supply voltage and 50 ohm matched output	
29, 30	ACG2, 1	Low frequency termination. Attach bypass capacitor per application circuit	

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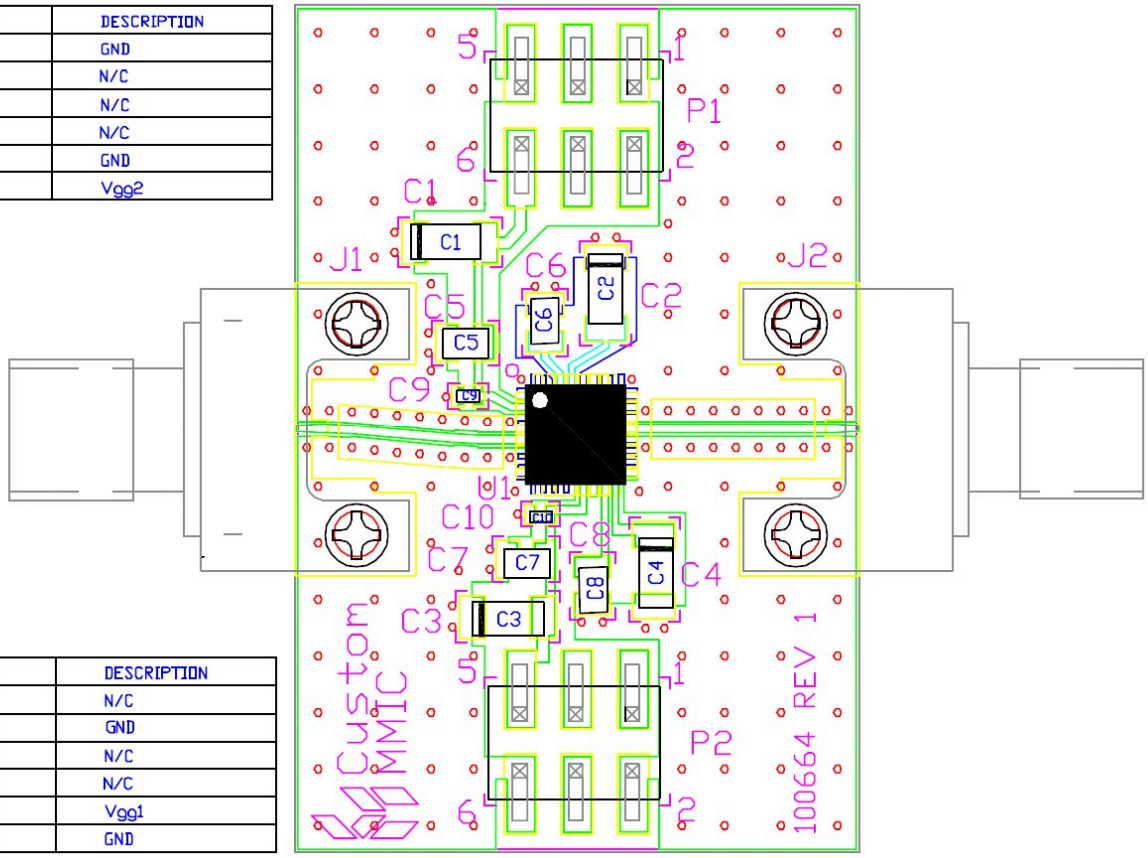
Applications Information

Evaluation Board

P1	DESCRIPTION
1	GND
2	N/C
3	N/C
4	N/C
5	GND
6	Vgg2



P2	DESCRIPTION
1	N/C
2	GND
3	N/C
4	N/C
5	Vgg1
6	GND

Bill of Material

Designator	Value	Description
J1, J2		SMA END LAUNCH CONNECTOR
P1, P2		6 PIN DC HEADER
C1-C4	0.33uF	CAPACITOR, TANTALUM
C3-C8	1000pF	CAPACITOR, 0603,
C9,C10	100pF	CAPACITOR, 0402
A1		PCB, AMPLIFIER CMD201P5, EVALUATION BOARD
U1		CMD201P5

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

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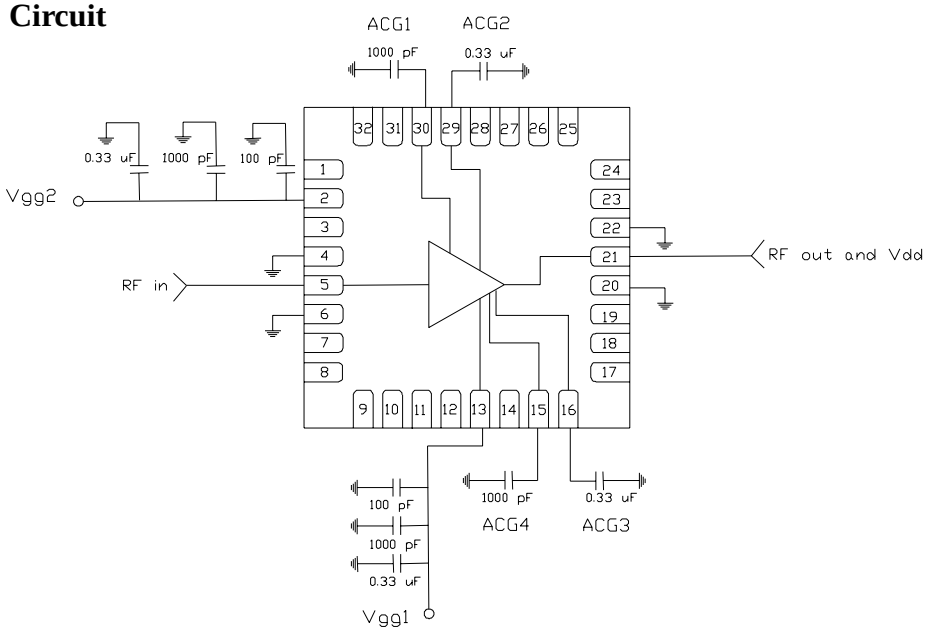
Applications Information

Application Circuit



Note: Drain voltage (Vdd) must be applied through a broadband bias tee or external bias network. External DC block is required on RF input.

Biasing and Operation

The CMD201P5 is biased with a positive drain supply, a negative gate1 supply and a positive gate2 supply. Performance is optimized when the drain voltage is set to +10 V. The recommended gate1 and gate2 voltages are -0.55 V and +5 V respectively.

Turn ON procedure:

1.Apply gate voltage V_{gg1} and set to -0.55 V
2.Apply drain voltage V_{dd} and set to +10 V
3.Apply gate voltage V_{gg2} and set to +5V

Turn OFF procedure:

1.Turn off gate voltage V_{gg2}
2.Turn off drain voltage V_{dd}
3.Turn off gate voltage V_{gg1}

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