CMD192C5

DC-20 GHz Distributed Driver Amplifier

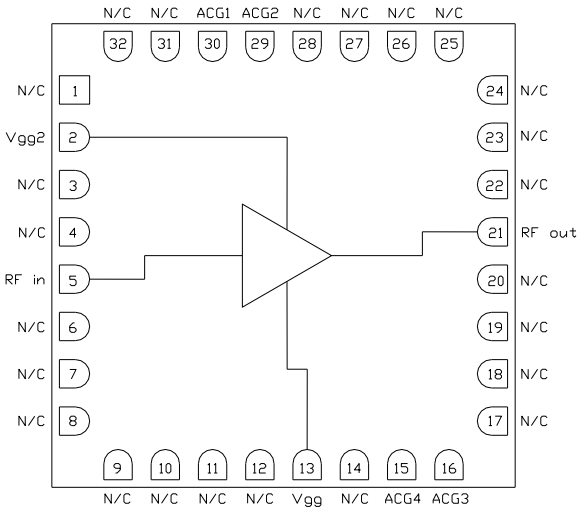
Features

- Ultra wideband performance
- Positive gain slope
- High output power
- Low noise figure
- Pb-free RoHS compliant 5x5 mm SMT package

Description

The CMD192C5 is a wideband GaAs MMIC distributed amplifier which operates from DC to 20 GHz and is housed in a leadless surface mount package. The amplifier delivers greater than 19 dB of gain with a corresponding output 1 dB compression point of +25 dBm and noise figure of 1.9 dB at 10 GHz. The CMD192C5 is a 50 ohm matched design which eliminates the need for RF port matching. This amplifier is the perfect alternative to higher cost hybrid amplifiers.

Functional Block Diagram



Note: Vgg2 is optional for gain control

Electrical Performance – V_{dd} = 8.0 V, V_{gg} = -1.0 V, T_A = 25 °C, F=10 GHz

Parameter	Min	Typ	Max	Units
Frequency Range		DC – 20		GHz
Gain		19.5		dB
Noise Figure		1.9		dB
Input Return Loss		23		dB
Output Return Loss		13		dB
Output P1dB		25		dBm
Supply Current		200		mA

Custom MMIC
300 Apollo Drive Chelmsford, MA 01824 Phone (978) 467-4290 Fax (978) 467-4294
Visit us online at www.custommmic.com

Specifications

Absolute Maximum Ratings

Parameter	Rating
Drain Voltage, Vdd	10 V
Gate Voltage, Vgg	-4 to 0 V
RF Input Power	+23 dBm
Channel Temperature, Tch	150 °C
Power Dissipation, Pdiss	2.8 W
Thermal Resistance	23.2 °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	5.0	8.0	10.0	V
Idd		170		mA
Vgg	-4.0	-1.0	0	V

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

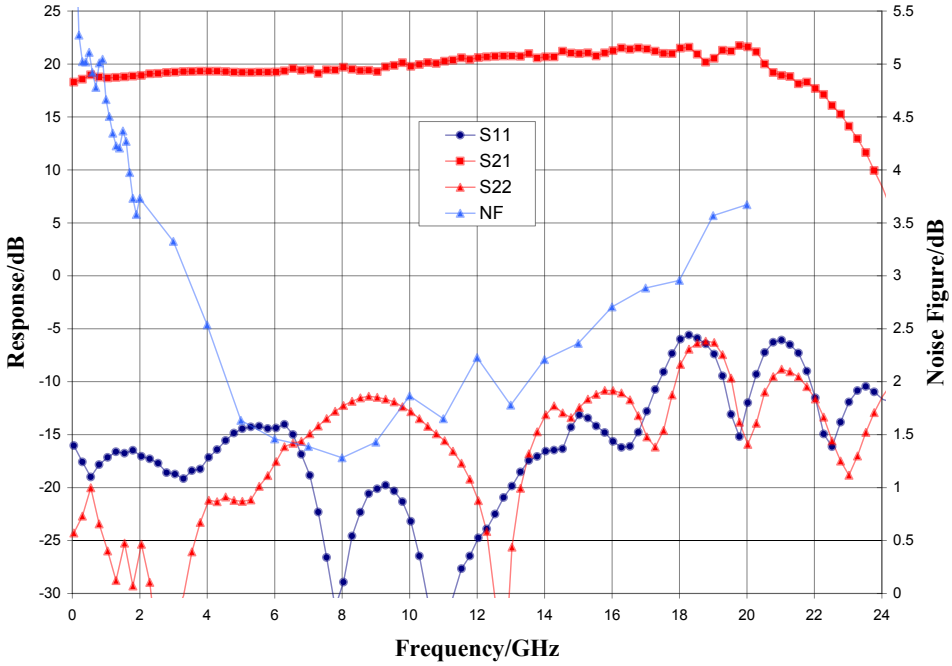
Electrical Specifications – V_{dd} = 8.0 V, V_{gg} = -1.0 V, T_A = 25 °C

Parameter	Min	Typ	Max	Min	Typ	Max	Units
Frequency Range	DC – 10			10 – 20			GHz
Gain	15.5	19		17	21		dB
Noise Figure		2			2.5		dB
Input Return Loss		17			15		dB
Output Return Loss		15			12		dB
Output P1dB	22	26		19	23		dBm
Output IP3		33			30		dBm
Supply Current	140	200	260	140	200	260	mA
Gain Temperature Coefficient		0.012			0.02		dB/°C
Noise Figure Temperature Coefficient		0.006			0.009		dB/°C

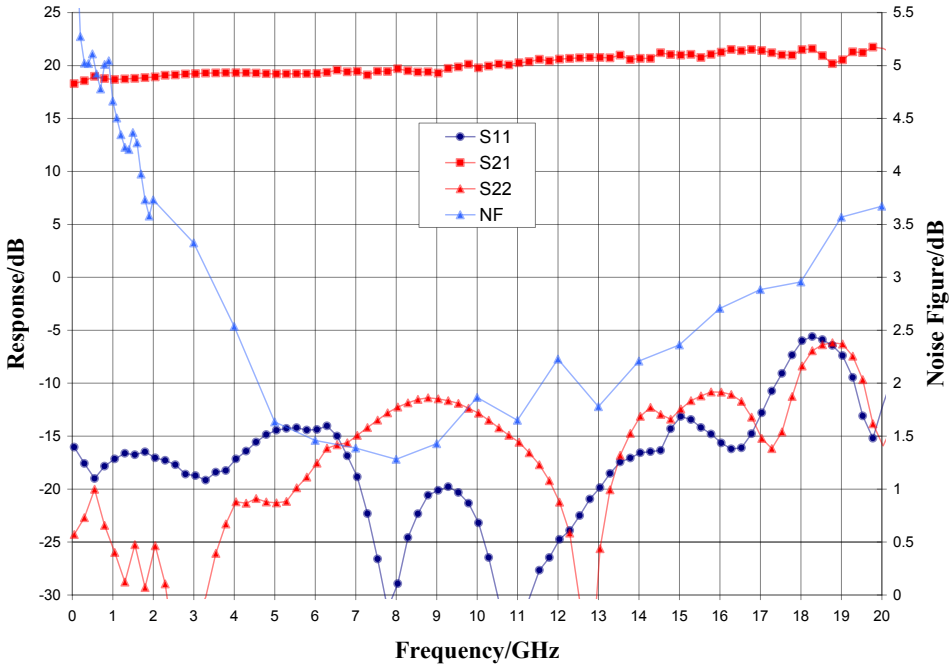
Custom MMIC
300 Apollo Drive Chelmsford, MA 01824 Phone (978) 467-4290 Fax (978) 467-4294
Visit us online at www.custommmic.com

Typical Performance

Broadband Performance, V_{dd} = 8.0 V, V_{gg} = -1.0 V, I_{dd} = 170 mA, T_A = 25 °C



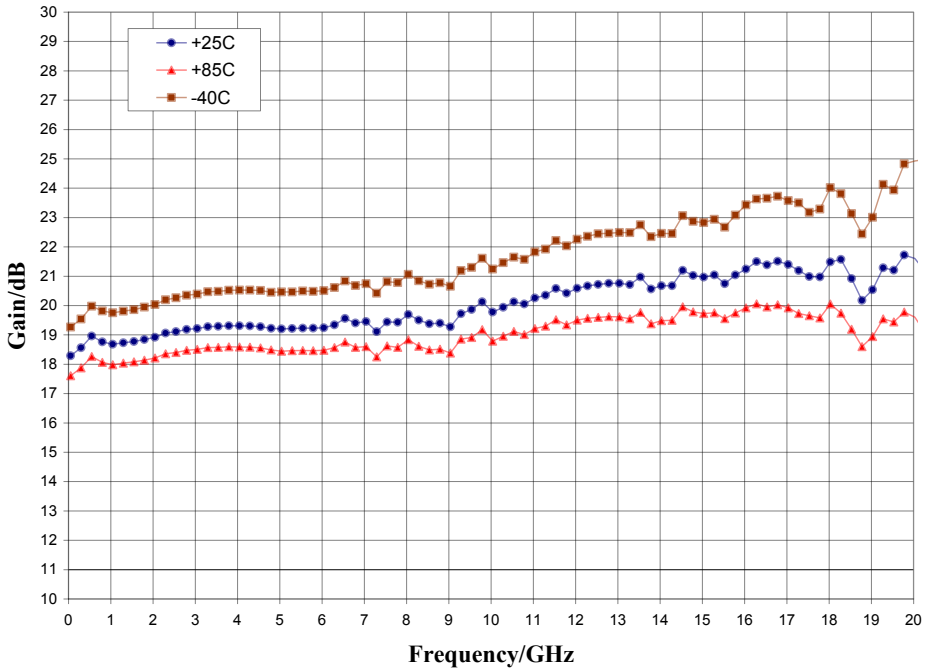
Narrow-band Performance, V_{dd} = 8.0 V, V_{gg} = -1.0 V, I_{dd} = 170 mA, T_A = 25 °C



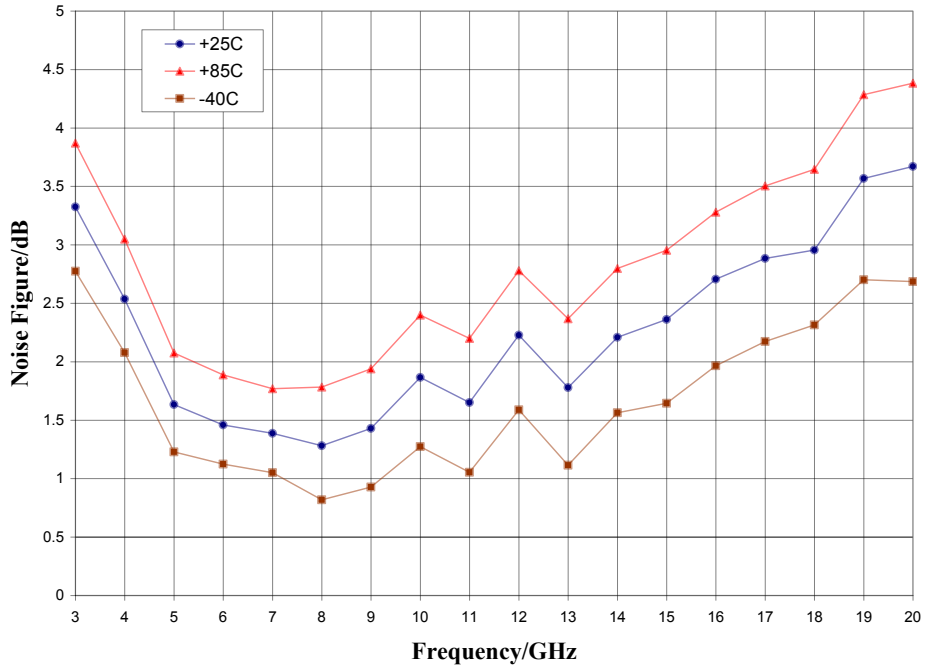
Custom MMIC
300 Apollo Drive Chelmsford, MA 01824 Phone (978) 467-4290 Fax (978) 467-4294
Visit us online at www.custommmic.com

Typical Performance

Gain vs. Temperature, V_{dd} = 8.0 V, V_{gg} = -1.0 V



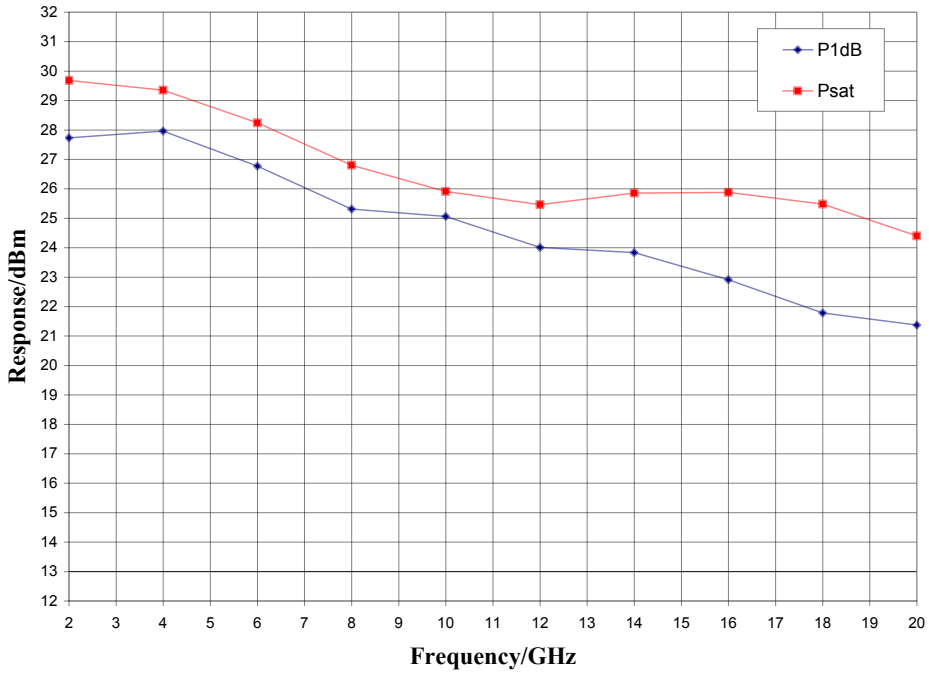
Noise Figure vs. Temperature, V_{dd} = 8.0 V, V_{gg} = -1.0 V



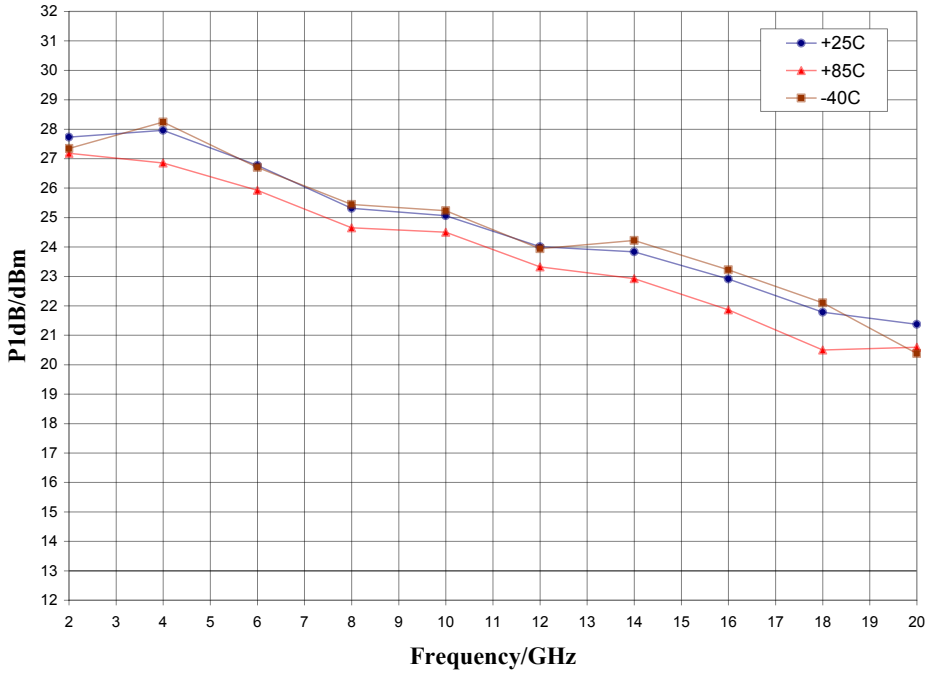
Custom MMIC
300 Apollo Drive Chelmsford, MA 01824 Phone (978) 467-4290 Fax (978) 467-4294
Visit us online at www.custommmic.com

Typical Performance

Output Power, V_{dd} = 8.0 V, V_{gg} = -1.0 V, T_A = 25 °C



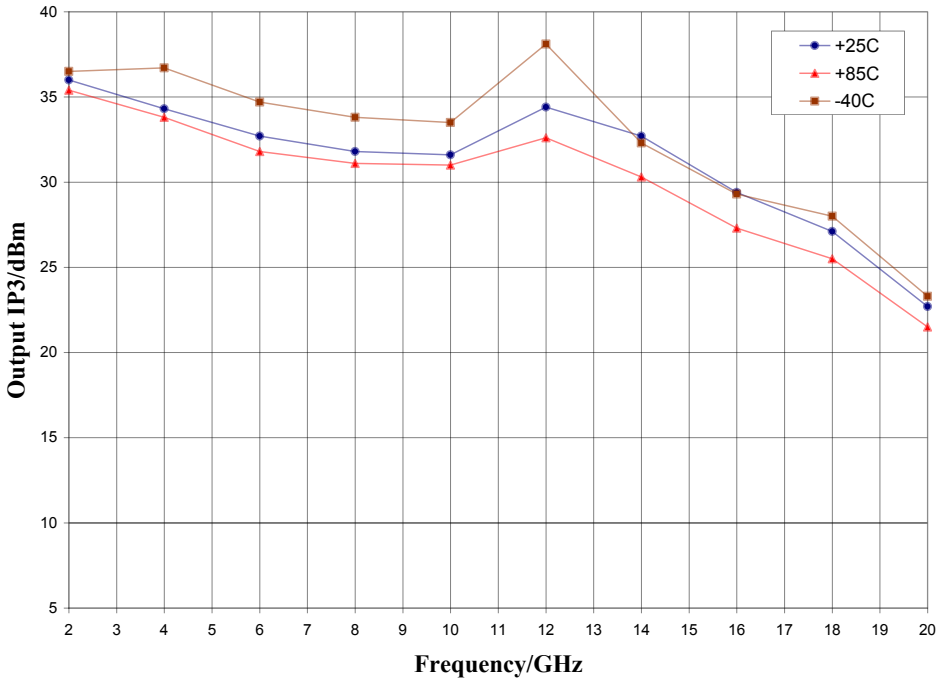
P1dB vs. Temperature, V_{dd} = 8.0 V, V_{gg} = -1.0 V



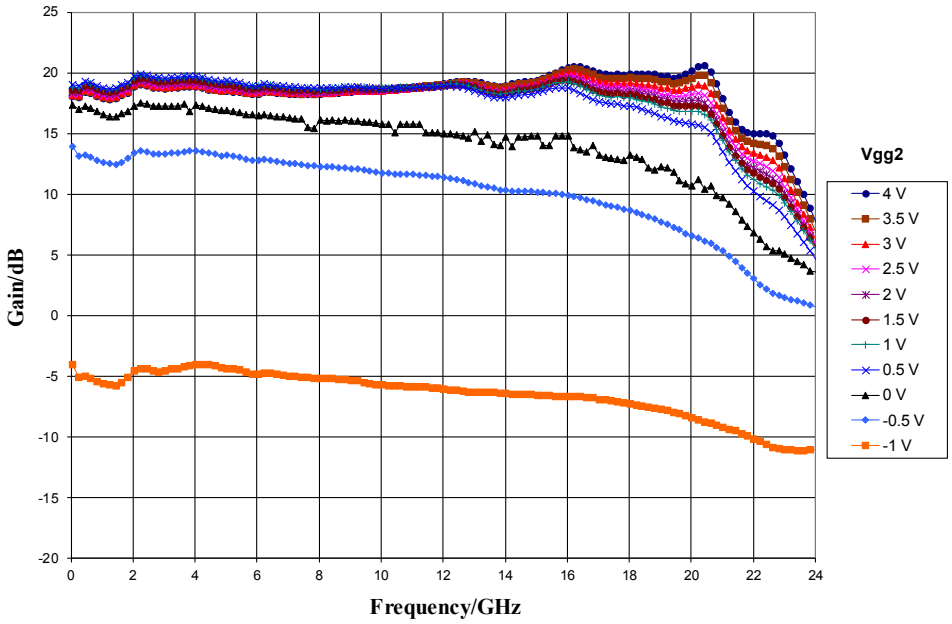
Custom MMIC
300 Apollo Drive Chelmsford, MA 01824 Phone (978) 467-4290 Fax (978) 467-4294
Visit us online at www.custommmic.com

Typical Performance

Output IP3 vs. Temperature, V_{dd} = 8.0 V, V_{gg} = -1.0 V



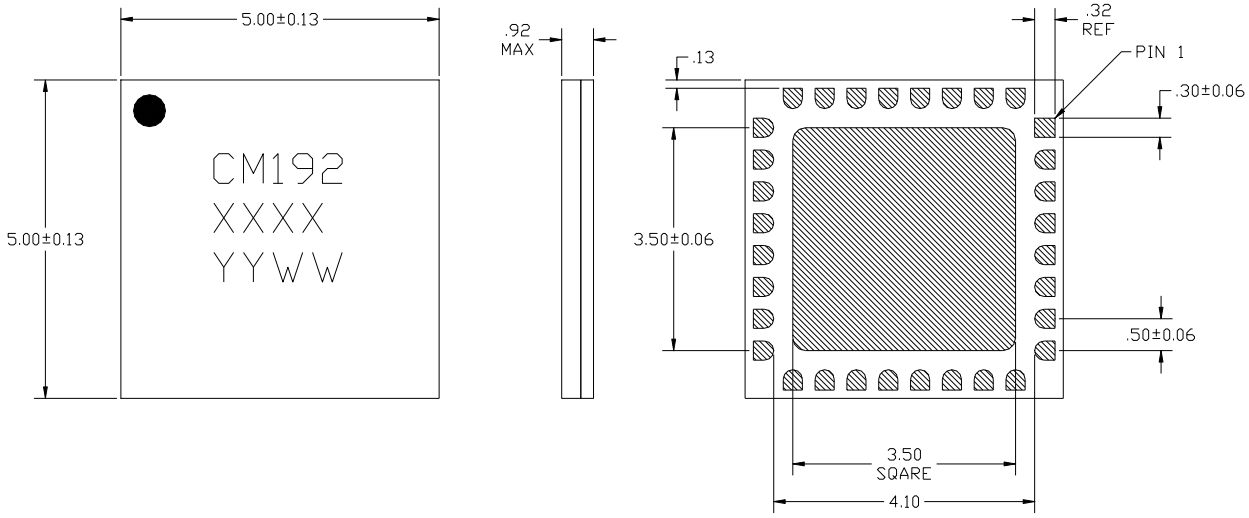
Gain control vs. Vgg2, V_{dd} = 8.0 V, V_{gg} = -1.0 V



Custom MMIC
300 Apollo Drive Chelmsford, MA 01824 Phone (978) 467-4290 Fax (978) 467-4294
Visit us online at www.custommmic.com

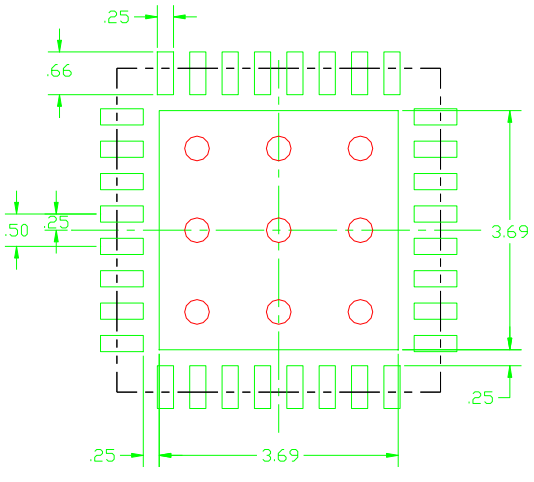
Mechanical Information

Package Information and Dimensions

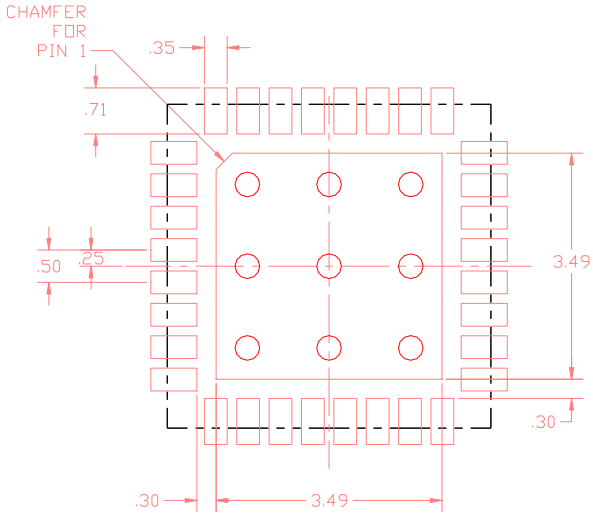


NOTES:
1. DIMENSIONS ARE IN MILLIMETERS
2. MATERIAL: BLACK ALUMINA
3. LEAD FINISH: 30-80 MICROINCHES GOLD OVER 50 MICROINCHES NICKEL.
4. ALTERNATE PIN #1 IDENTIFIER IS SINGLE SQUARE PAD.

Recommended PCB Land Pattern



METALIZATION

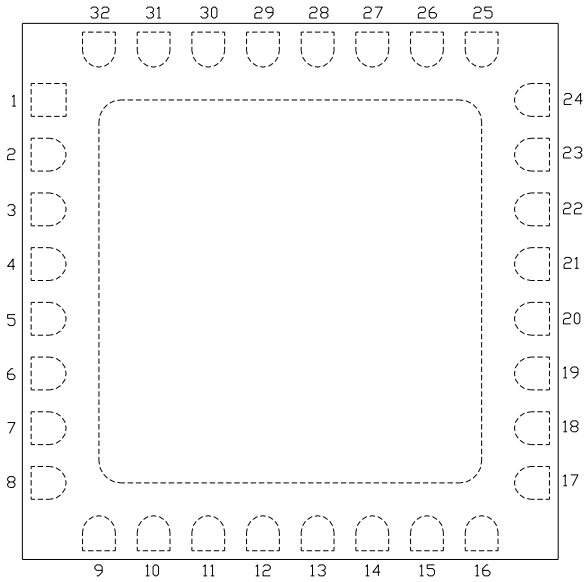


SOLDER MASK

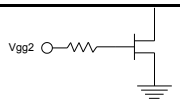
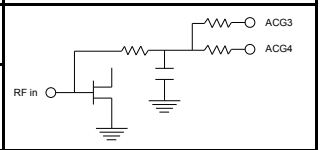
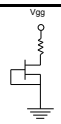
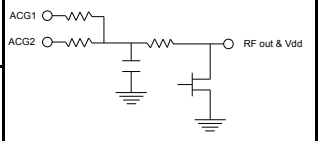
Custom MMIC
300 Apollo Drive Chelmsford, MA 01824 Phone (978) 467-4290 Fax (978) 467-4294
Visit us online at www.custommmic.com

Pad Description

Pin Diagram



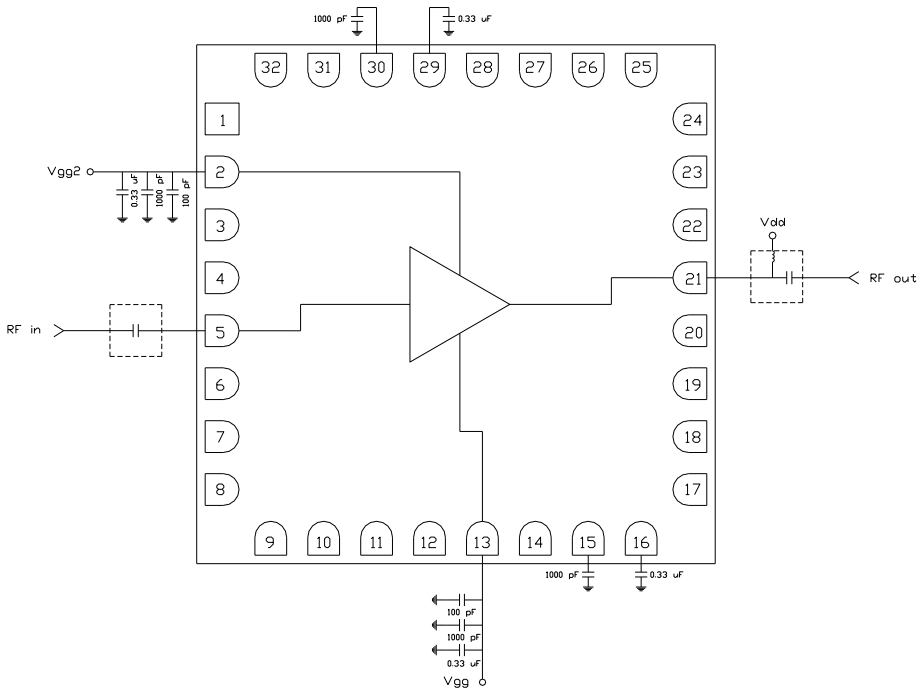
Functional Description

Pin	Function	Description	Schematic
1,3,4,6-12,14,17-20,22-28,31,32	N/C	No connection required. These pins may be connected to RF/DC ground.	
2	Vgg2	Optional supply voltage for gain control Decoupling and bypass caps required	
5	RF in	50 ohm matched input	
15, 16	ACG4, 3	Low frequency termination. Attach bypass capacitor per application circuit	
13	Vgg	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	
Die paddle	Ground	Connect to RF / DC ground	

Custom MMIC
300 Apollo Drive Chelmsford, MA 01824 Phone (978) 467-4290 Fax (978) 467-4294
Visit us online at www.custommmic.com

Applications Information

Application Circuit



Biasing and Operation

The CMD192C5 is biased with a positive drain supply and negative gate supply. Performance is optimized when the drain voltage is set to +8.0 V. The recommended gate voltage is -1.0 V.

Turn ON procedure:

1.Apply gate voltage V_{gg} and set to -1 V
2.Apply drain voltage V_{dd} and set to +8 V

Turn OFF procedure:

1.Turn off drain voltage V_{dd}
2.Turn off gate voltage V_{gg}

RF power can be applied at any time.

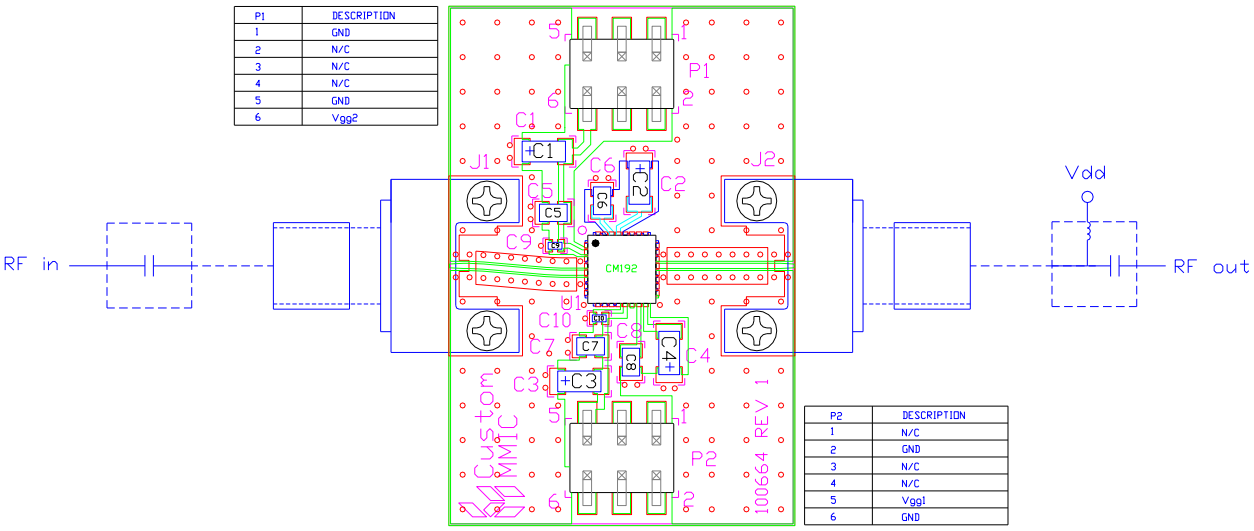
GaAs MMIC devices are susceptible to damage from Electrostatic Discharge. Proper precautions should be observed during handling, assembly and test.

Custom MMIC
300 Apollo Drive Chelmsford, MA 01824 Phone (978) 467-4290 Fax (978) 467-4294
Visit us online at www.custommmic.com

Applications Information

Evaluation Board

The circuit board shown has been developed for optimized assembly at Custom MMIC. 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.



Designator	Value	Description
J1, J2		SMA End Launch Connector
P1, P2		6 Pin Header
C1 - C4	0.33 µF	Capacitor, Tantalum
C5 - C8	1000 pF	Capacitor, 0603
C9, C10	100 pF	Capacitor, 0402
U1		CMD192C5 Driver Amplifier
PCB		100664 Evaluation PCB

Custom MMIC
300 Apollo Drive Chelmsford, MA 01824 Phone (978) 467-4290 Fax (978) 467-4294
Visit us online at www.custommmic.com