CMD270

4-8 GHz Low Noise Amplifier

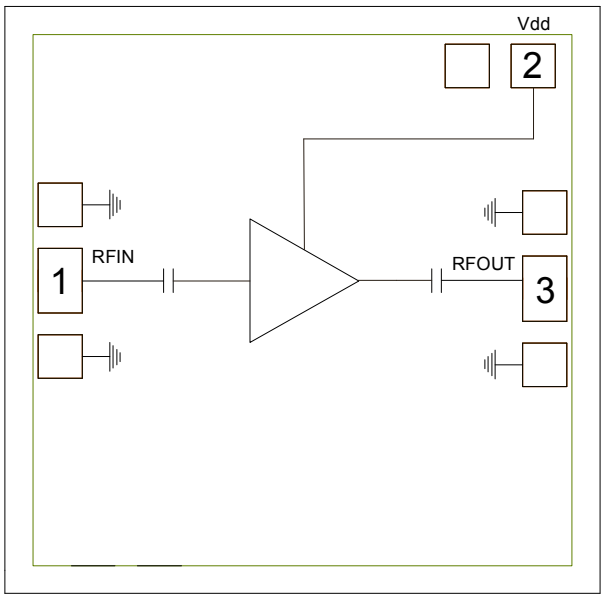
Features

- ► Ultra low noise figure
- ► High gain broadband performance
- ► Single supply voltage: +4.0 V @ 60 mA
- ► Small die size

Description

The CMD270 is a broadband MMIC low noise amplifier ideally suited for EW and communications systems where small size and low power consumption are needed. The broadband device delivers greater than 15 dB of gain with a corresponding output 1 dB compression point of +17 dBm and a noise figure of 1.8 dB. The CMD270 is a 50 ohm matched design eliminating the need for external DC blocks and RF port matching. The CMD270 offers full passivation for increased reliability and moisture protection.

Functional Block Diagram



Electrical Performance - V_{dd} = 4.0 V, T_A = 25 °C, F = 6 GHz

Parameter	Min	Typ	Max	Units
Frequency Range		4 - 8		GHz
Gain		15.5		dB
Noise Figure		1.8		dB
Input Return Loss		16		dB
Output Return Loss		10		dB
Output P1dB		17		dBm
Supply Current		60		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, Pdiss	523 mW
Thermal Resistance, Θ_{JC}	124.3 °C/W
Operating Temperature	-55 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
Vdd	2.0	4.0	5.0	V
Idd		60		mA

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

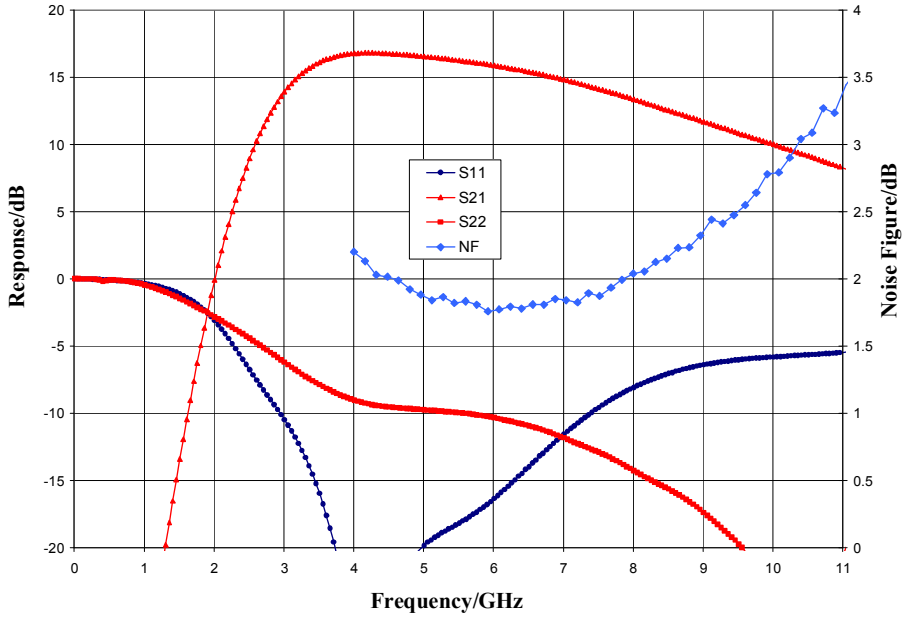
Electrical Specifications - V_{dd} = 4.0 V, T_A = 25 °C

Parameter	Min	Typ	Max	Min	Typ	Max	Units
Frequency Range	4 - 6			6 - 8			GHz
Gain	13	16.5	20	11	15	19	dB
Noise Figure		1.9	2.7		1.8	2.5	dB
Input Return Loss		10			12		dB
Output Return Loss		20			12		dB
Output P1dB		17			17		dBm
Output IP3		31			27		dBm
Supply Current	40	60	80	40	60	80	mA
Gain Temperature Coefficient		0.008			0.008		dB/°C
Noise Figure Temperature Coefficient		0.007			0.007		dB/°C

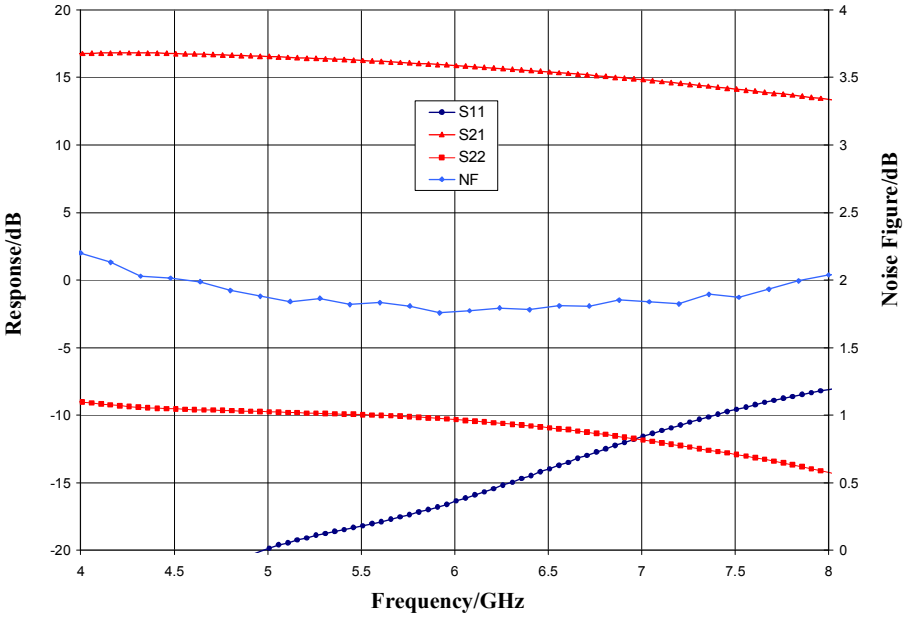
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Typical Performance

Broadband Performance, V_{dd} = 4.0 V, I_{dd} = 60 mA, T_A = 25 °C



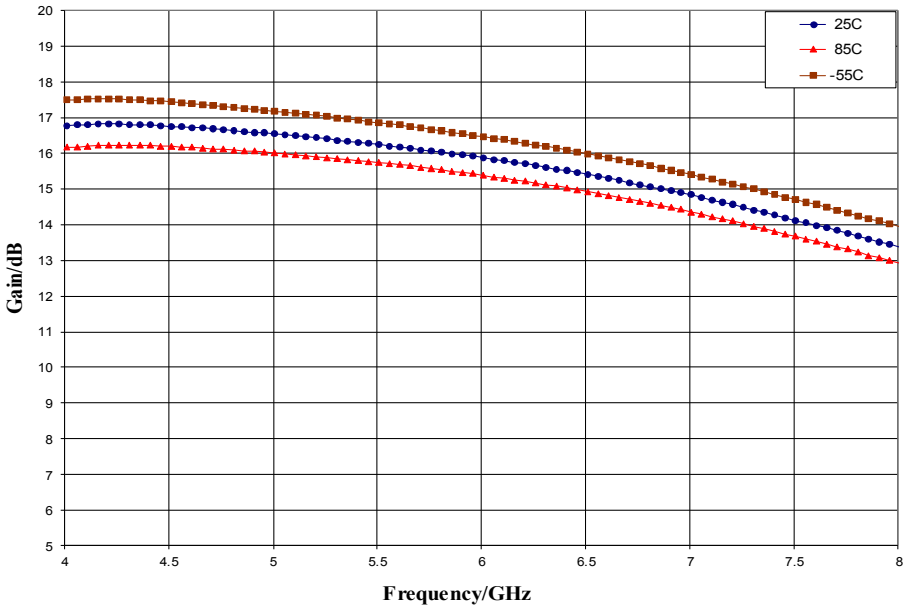
Narrow-band Performance, V_{dd} = 4.0 V, I_{dd} = 60 mA, T_A = 25 °C



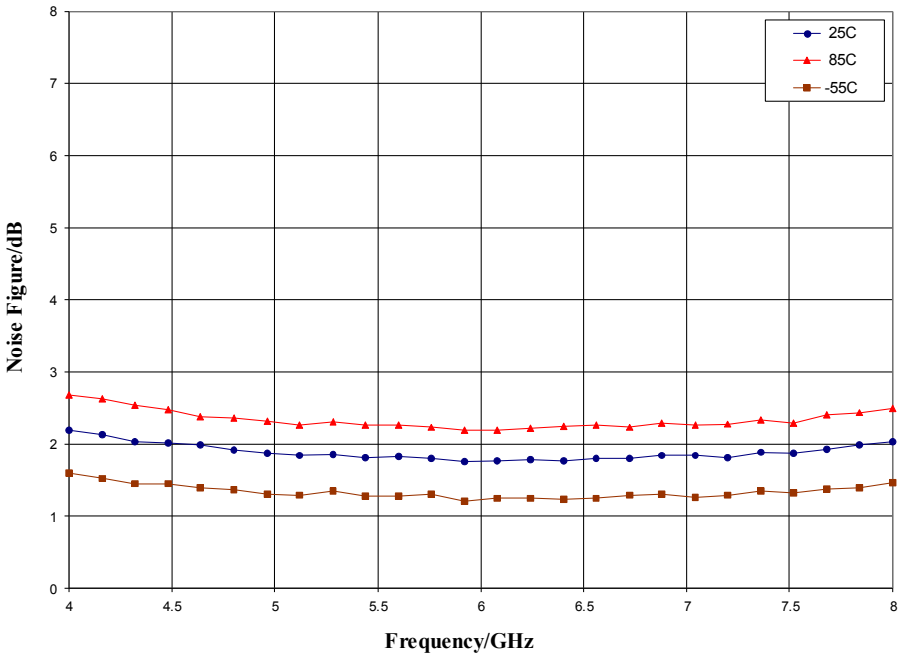
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Typical Performance

Gain vs. Temperature, V_{dd} = 4.0 V



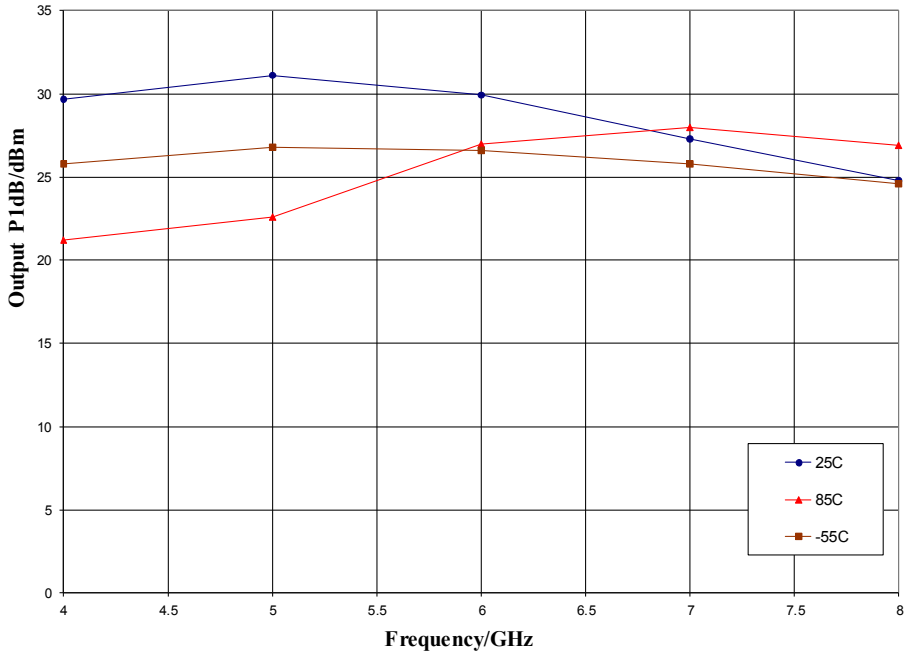
Noise Figure vs. Temperature, V_{dd} = 4.0 V



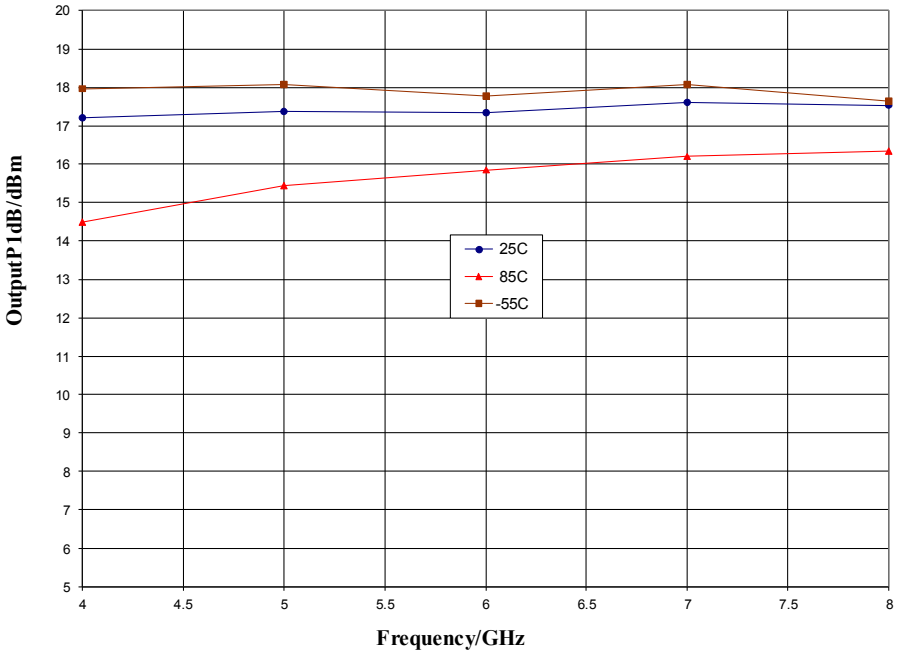
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Typical Performance

Output IP3 vs. Temperature, V_{dd} = 4.0 V



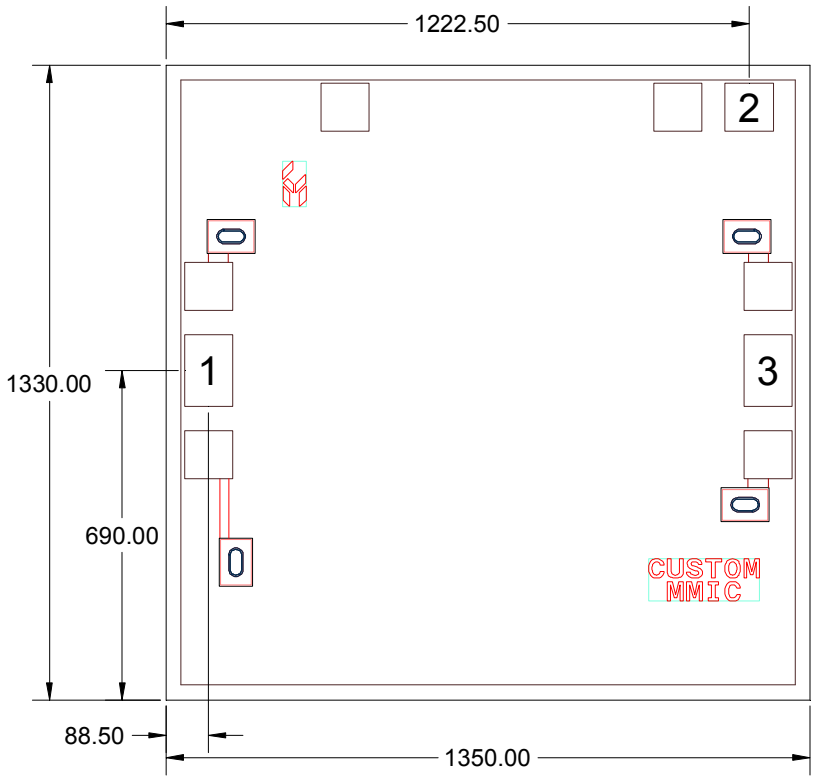
P1dB vs. Temperature, V_{dd} = 4.0 V



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Mechanical Information

Die Outline (all dimensions in microns)



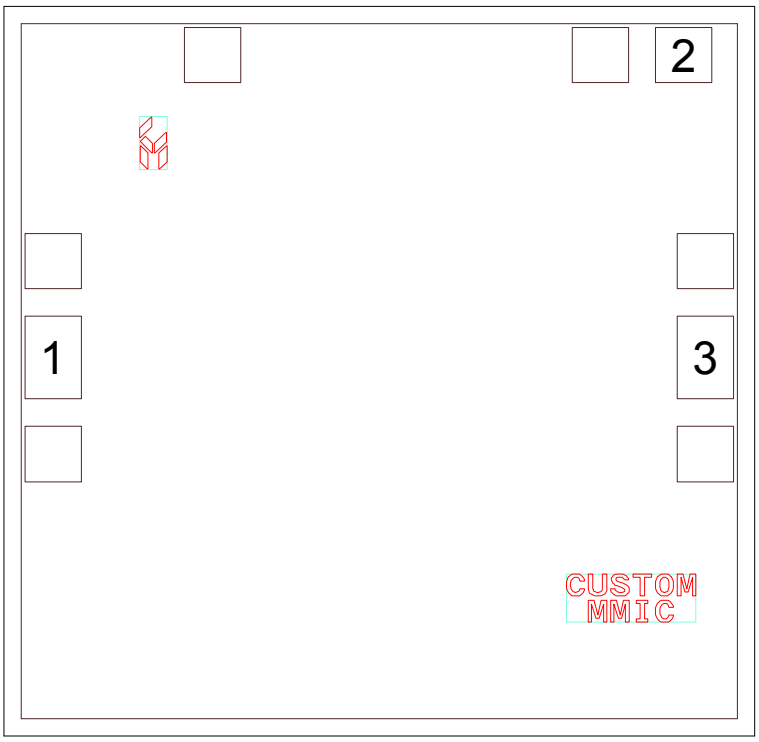
Notes:

1. No connection required for unlabeled pads
2. Backside is RF and DC ground
3. Backside and bond pad metal: Gold
4. Die is 100 microns thick
5. DC bond pads are 100 microns square
6. RF bond pads are 100 microns x 150 microns

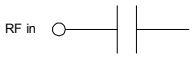
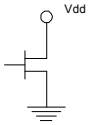
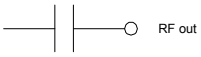
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Pad Description

Pad Diagram



Functional Description

Pin	Function	Description	Schematic
1	RF in	DC blocked and 50 ohm matched	
2	Vdd	Power supply voltage Decoupling and bypass caps required	
3	RF out	DC blocked and 50 ohm matched	
Backside	Ground	Connect to RF / DC ground	

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Applications Information

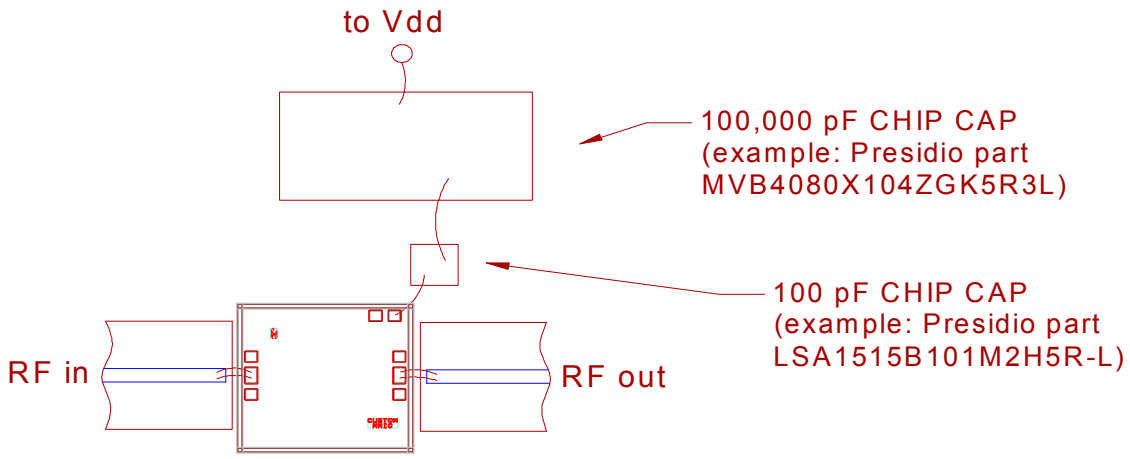
Assembly Guidelines

The backside of the CMD270 is RF ground. Die attach may be accomplished with either electrically and thermally conductive epoxy or eutectic attach. Standard assembly procedures should be followed for high frequency devices. The top surface of the semiconductor should be made planar to the adjacent RF transmission lines, and the RF decoupling capacitors placed in close proximity to the DC connections on chip.

RF connections should be made as short as possible to reduce the inductive effect of the bond wire. Use of a 0.8 mil thermosonic wedge bonding is highly recommended as the loop height will be minimized. The RF input and output require a single bond wire as shown.

The semiconductor is 100 um thick and should be handled by the sides of the die or with a custom collet. Do not make contact directly with the die surface as this will damage the monolithic circuitry. Handle with care.

Assembly Diagram



Biasing and Operation

The CMD270 is biased with a single 4.0 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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