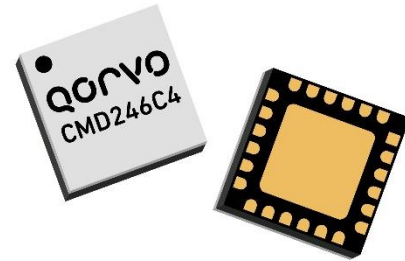
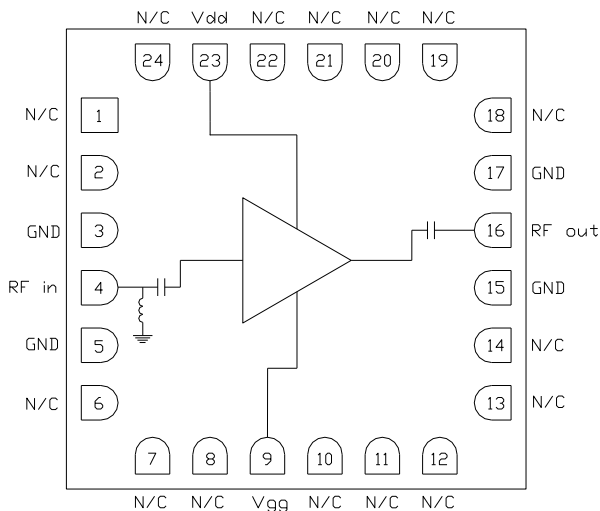


Product Overview

The CMD246C4 is a wideband GaAs MMIC low phase noise amplifier housed in a leadless surface mount package that is ideally suited for military, space and communications systems. At 16 GHz the device delivers 17 dB of gain, a saturated output power of +18 dBm and a noise figure of 5 dB. Also with an input signal of 10 GHz the amplifier provides low phase noise performance of -165 dBc/Hz at 10 kHz offset. The CMD246C4 is a 50 ohm matched design which eliminates the need for RF port matching.



Functional Block Diagram



Key Features

- Wide Bandwidth
- Low Phase Noise
- Low Current Consumption
- Pb-Free RoHS Compliant 4x4 mm SMT Package

Ordering Information

Part No.	Description
CMD246C4	8-22 GHz Low Phase Noise Amplifier, 100 Piece 7" Reel
CMD246C4-EVB	Evaluation Board

Electrical Performance ($V_{dd} = 5.0\text{ V}$, $V_{gg} = 3.0\text{ V}$, $T_A = 25\text{ }^\circ\text{C}$, $F = 16\text{ GHz}$)

Parameter	Min	Typ	Max	Units
Frequency Range		8 - 22		GHz
Gain		17		dB
Input Return Loss		10		dB
Output Return Loss		12		dB
Noise Figure		5		dB
Output P1dB		13		dBm
Saturated Output Power		19		dBm
Phase Noise @ 10 kHz Offset		-165		dBc/Hz
Supply Current		48		mA

Absolute Maximum Ratings

Parameter	Rating
Drain Voltage, V_{dd}	8.0 V
Gate Voltage, V_{gg}	5.0 V
RF Input Power	+15 dBm
Channel Temperature, T_{ch}	150 °C
Power Dissipation, P_{diss}	422 mW
Thermal Resistance, θ_{JC}	154 °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
V_{dd}	3.0	5.0	7.0	V
I_{dd}		48		mA
V_{gg}	0	3.0	4.0	V

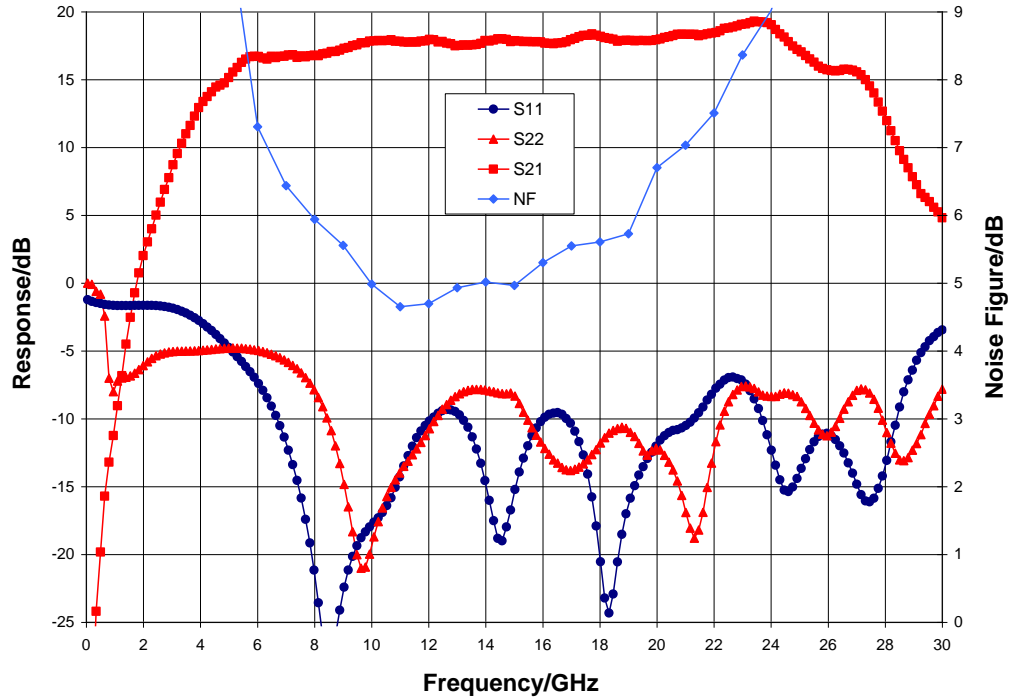
Electrical performance is measured at specific test conditions. Electrical specifications are not guaranteed over all recommended operating conditions.

Electrical Specifications ($V_{dd} = 5.0$ V, $V_{gg} = 3.0$ V, $T_A = 25$ °C)

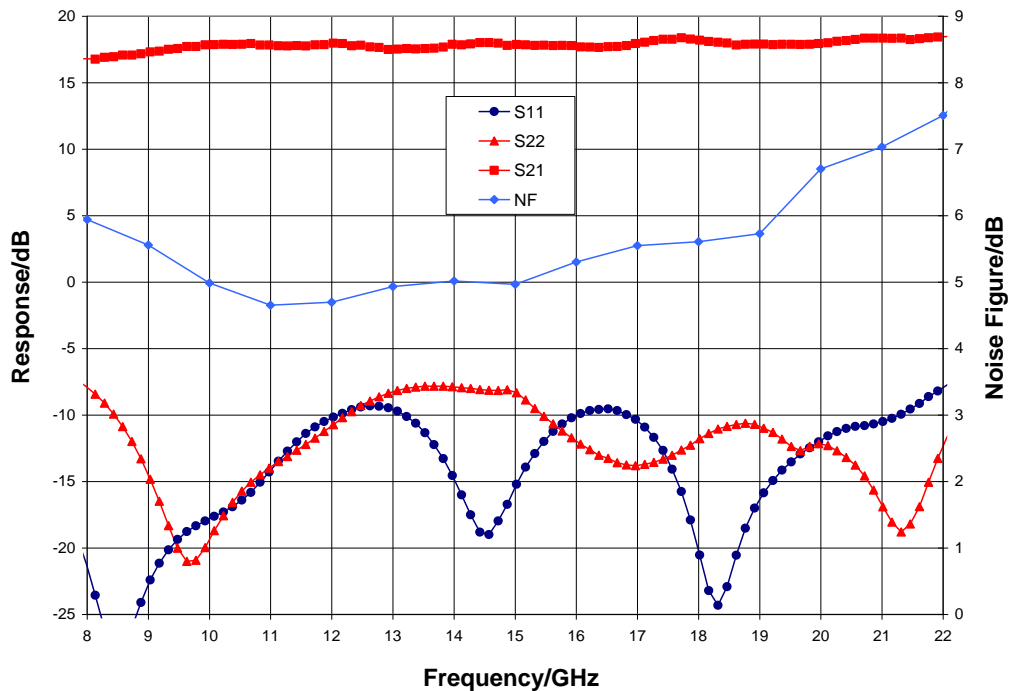
Parameter	Min	Typ	Max	Min	Typ	Max	Units
Frequency Range		8 - 16			16 - 22		GHz
Gain	14	17	21	14	18	21	dB
Noise Figure		5			6		dB
Input Return Loss		10			10		dB
Output Return Loss		8			12		dB
Output P1dB	10	17		6	12		dBm
Saturated Output Power		20			15		dBm
Output IP3		25			24		dBm
Phase Noise @ 10 kHz Offset		-165			-165		dBc/Hz
Supply Current	33	48	63	33	48	63	mA

Typical Performance

Broadband Performance, $V_{dd} = 5.0 \text{ V}$, $V_{gg} = 3.0 \text{ V}$, $I_{dd} = 48 \text{ mA}$, $T_A = 25 \text{ }^\circ\text{C}$

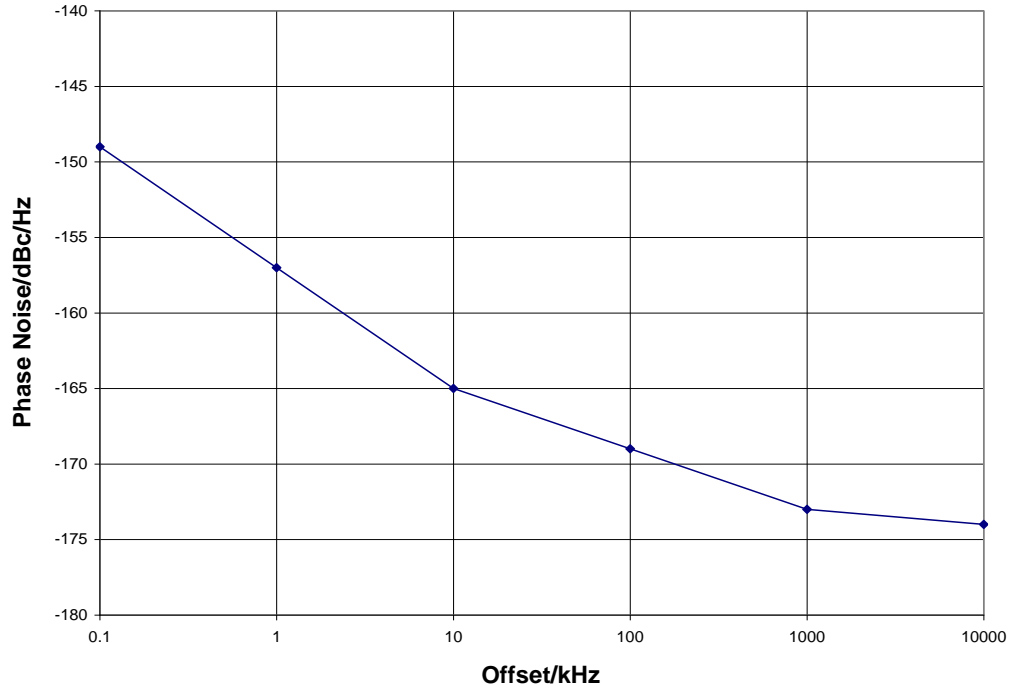


Narrow-band Performance, $V_{dd} = 5.0 \text{ V}$, $V_{gg} = 3.0 \text{ V}$, $I_{dd} = 48 \text{ mA}$, $T_A = 25 \text{ }^\circ\text{C}$

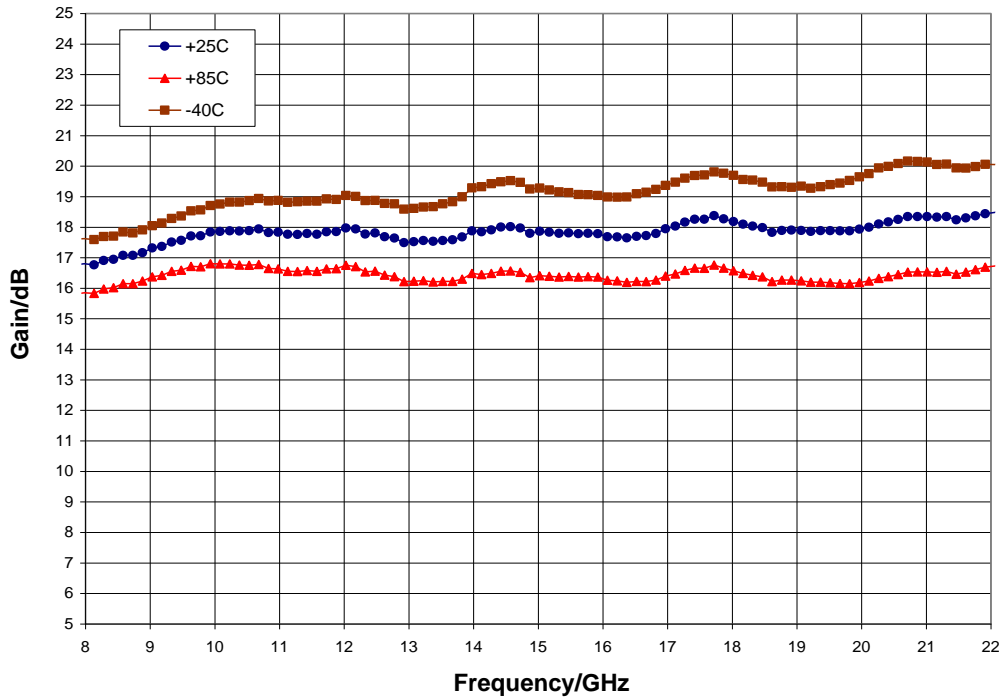


Typical Performance

Additive Phase Noise @ P_{sat}, V_{dd} = 5.0 V, V_{gg} = 3.0 V, T_A = 25 °C

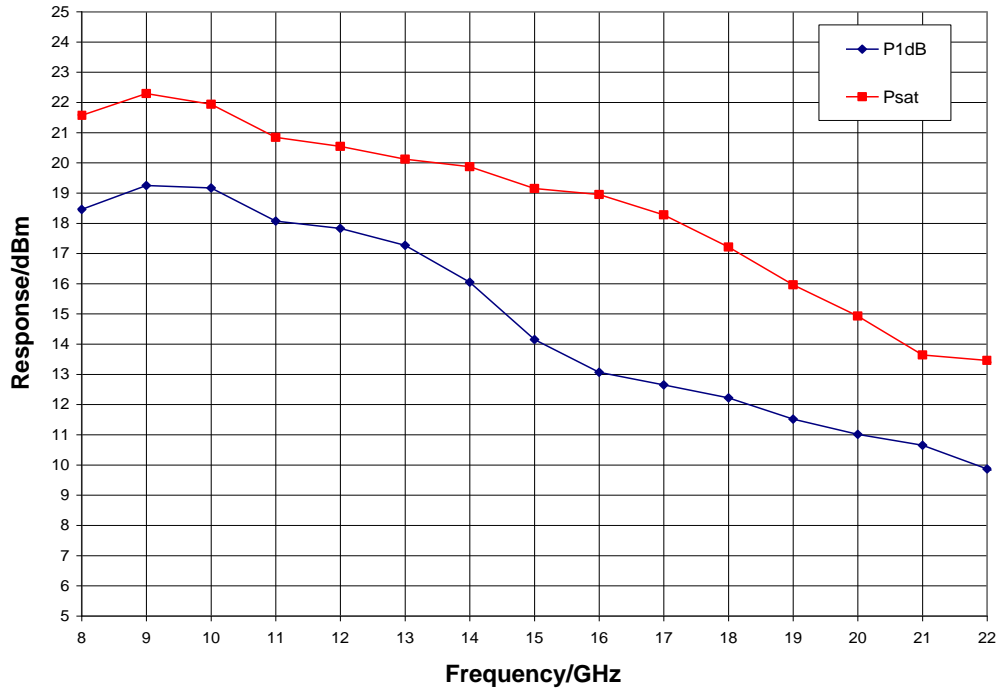


Gain vs. Temperature, V_{dd} = 5.0 V, V_{gg} = 3.0 V

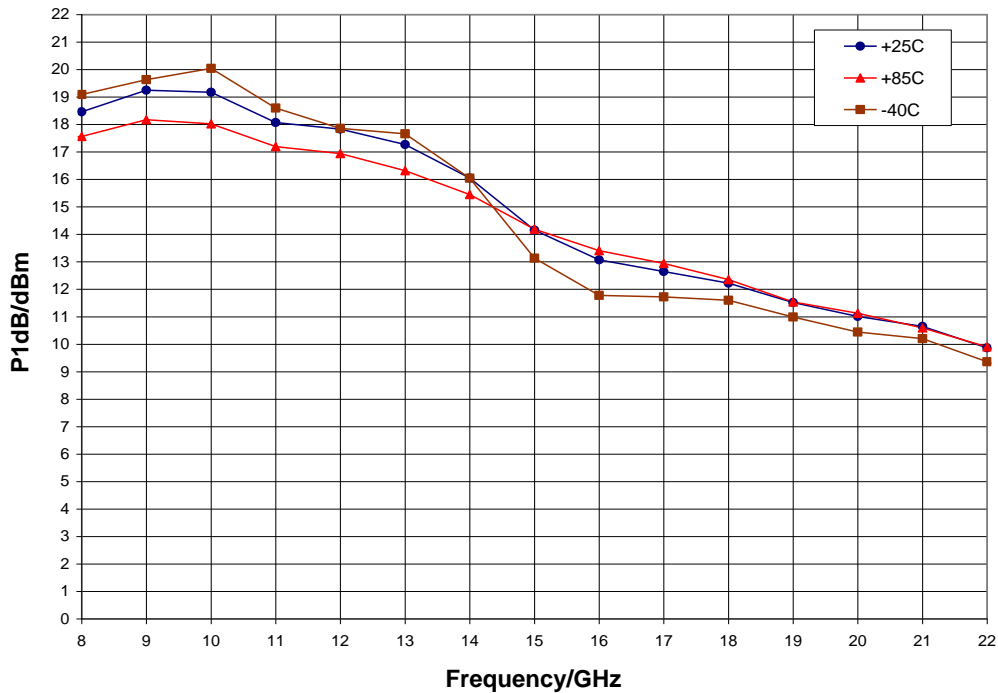


Typical Performance

Output Power, $V_{dd} = 5.0\text{ V}$, $V_{gg} = 3.0\text{ V}$, $T_A = 25\text{ }^\circ\text{C}$

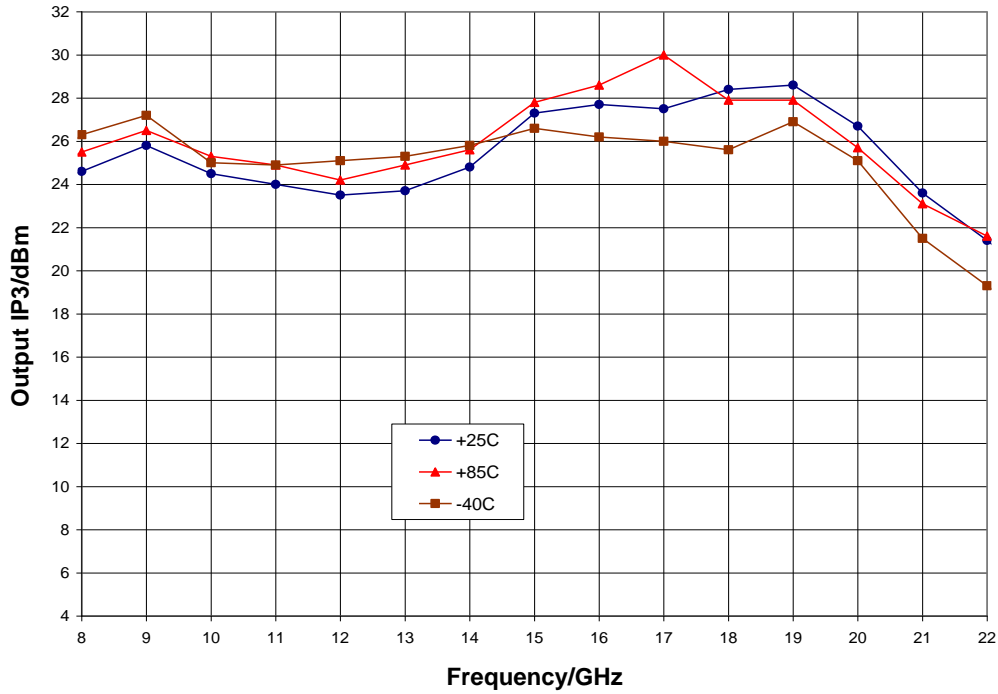


P1dB vs. Temperature, $V_{dd} = 5.0\text{ V}$, $V_{gg} = 3.0\text{ V}$

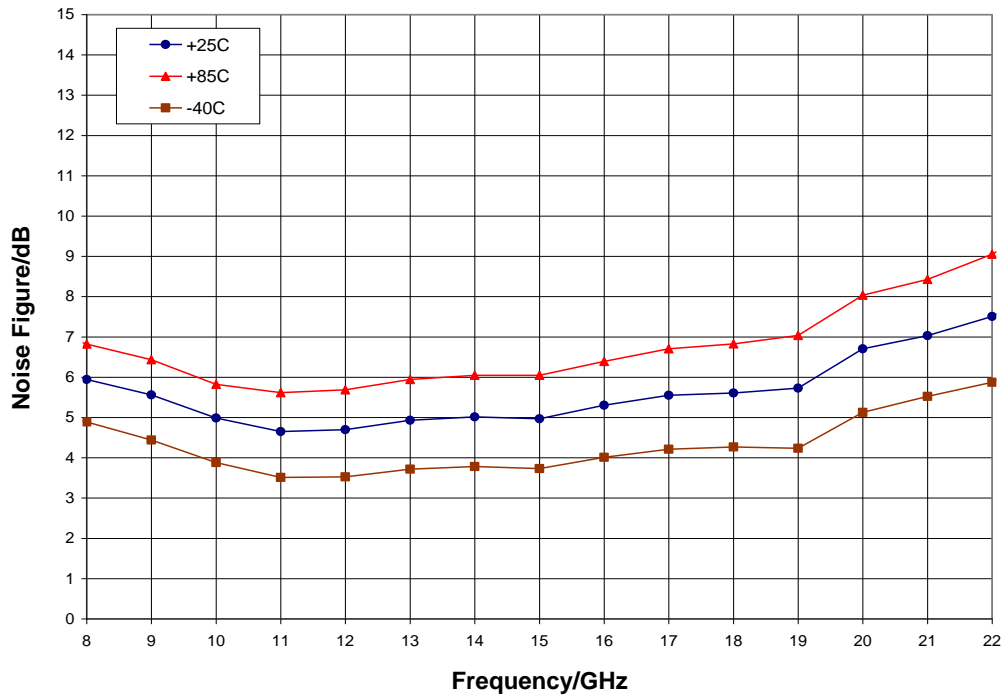


Typical Performance

Output IP3 vs. Temperature, $V_{dd} = 5.0\text{ V}$, $V_{gg} = 3.0\text{ V}$

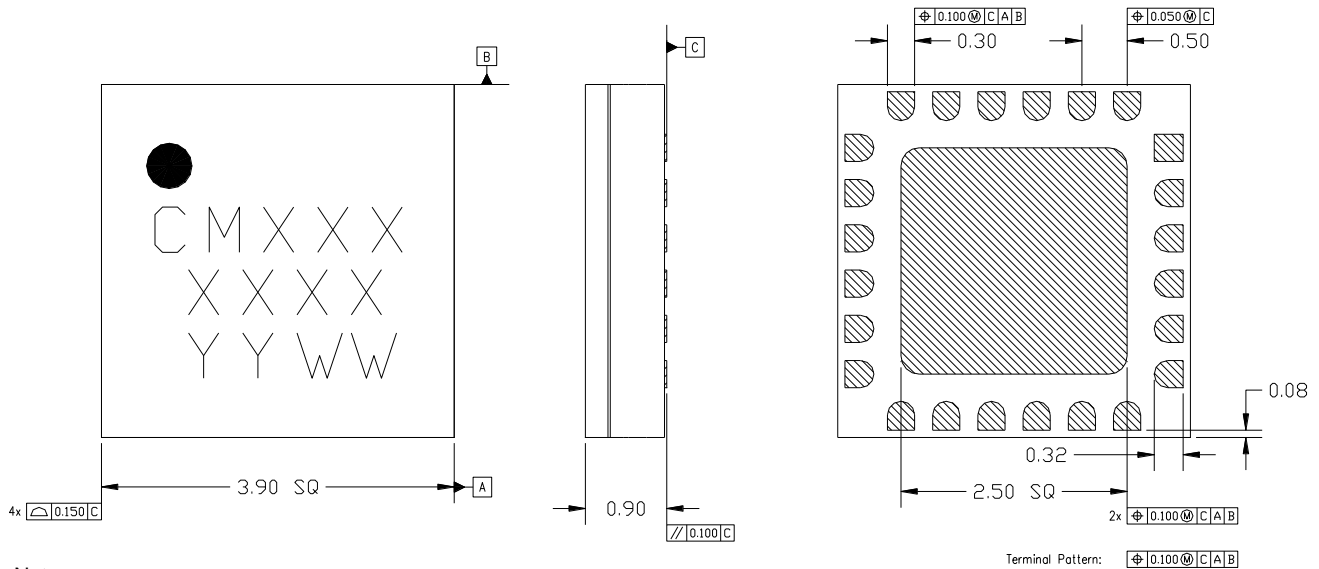


Noise Figure vs. Temperature, $V_{dd} = 5.0\text{ V}$, $V_{gg} = 3.0\text{ V}$



Mechanical Information

Package Information and Dimensions



Notes:

1. All dimensions shown in mm.
2. Material: Black alumina
3. Lead finish
 - 3.1. Ni: 8.89um max, 1.27um min
 - 3.2. Pd: 0.17um max, 0.07um min
 - 3.3. Au: 0.254um max, 0.03um min
4. Marking
 - 4.1. Line 1: Part number
 - 4.1.1. Example: CMD246C4 shall be marked as CM246
 - 4.2. Line 2: Lot number
 - 4.3. Line 3: Date code – Last 2 digits of the year of manufacture followed by a 2 digit week code
5. Alternate pin #1 identifier is a single square pad
6. Alternate die paddle may have chamfered corners

Recommended PCB Land Pattern

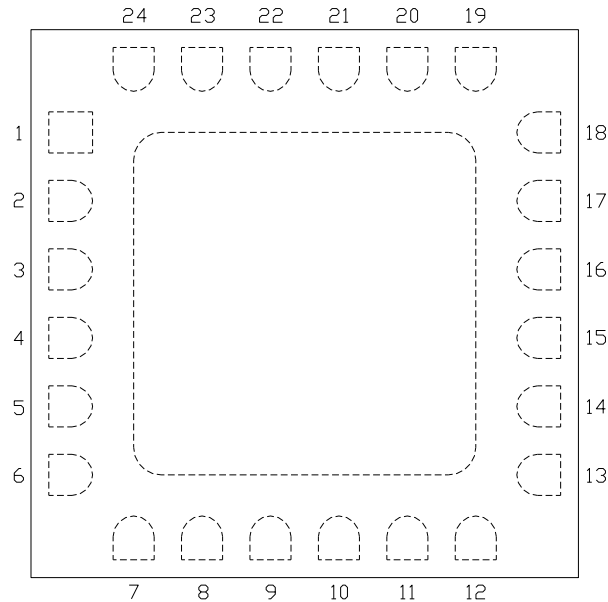
Qorvo recommends that the user develop the land pattern that will provide the best design for proper solder reflow and device attach for their specific application. Please review Qorvo Application Note AN 105 for a recommended land pattern approach.

Recommended Solder Reflow Profile

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

Pin Description

Pin Diagram

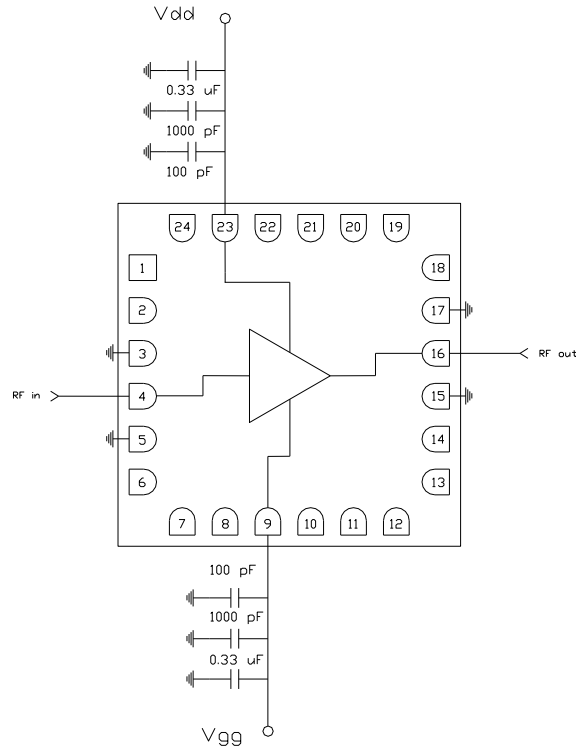


Functional Description

Pad	Function	Description	Schematic
1, 2, 6 - 8, 10 - 14, 18 - 22, 24	N/C	No connection required These pins may be connected to RF / DC ground	
3, 5, 15, 17 and die paddle	Ground	Connect to RF / DC ground	
4	RF in	DC coupled and 50 ohm matched	
23	V _{dd}	Power supply voltage Decoupling and bypass caps required	
16	RF out	DC blocked and 50 ohm matched	
9	V _{gg}	Power supply voltage Decoupling and bypass caps required	

Applications Information

Application Circuit



Biasing and Operation

The CMD246C4 is biased with a positive drain supply and positive gate supply. Performance is optimized when the drain voltage is set to +5.0 V. The recommended gate voltage is +3.0 V.

Turn ON procedure:

1. Apply drain voltage V_{dd} and set to +5 V
2. Apply gate voltage V_{gg} and set to +3 V

Turn OFF procedure:

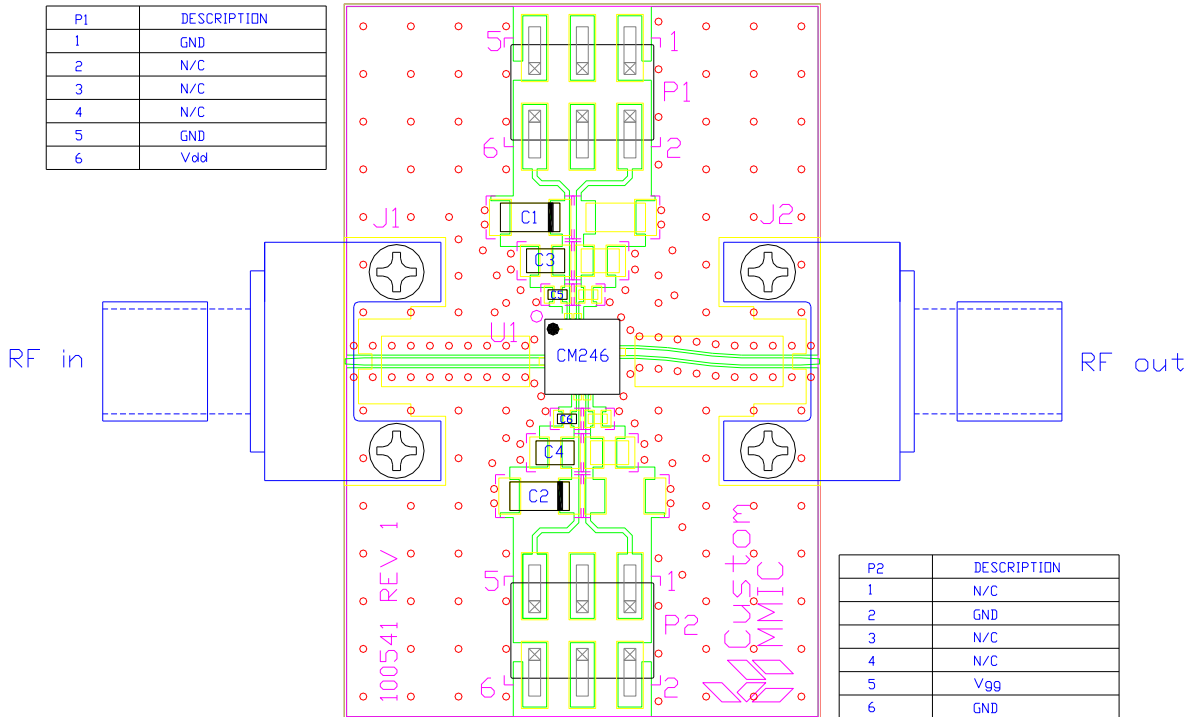
1. Turn off gate voltage V_{gg}
2. Turn off drain voltage V_{dd}

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

Applications Information

Evaluation Board

The circuit board shown has been developed for optimized assembly at Qorvo. 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, P2		6 Pin Header
C1, C2	0.33 μ F	Capacitor, Tantalum
C3, C4	1000 pF	Capacitor, 0603
C5, C6	100 pF	Capacitor, 0402
U1		CMD246C4 Driver Amplifier
PCB		100541 Evaluation PCB

Handling Precautions

Parameter	Rating	Standard
ESD – Human Body Model (HBM)	Class 1A	ESDA / JEDEC JS-001-2012
MSL – Moisture Sensitivity Level	Level 1	JEDEC standard IPC/JEDEC J-STD-020



Caution!
 ESD-Sensitive Device

RoHS Compliance

This part is compliant with 2011/65/EU RoHS directive (Restrictions on the Use of Certain Hazardous Substances in Electrical and Electronic Equipment) as amended by Directive 2015/863/EU.

This product also has the following attributes:

- Lead Free
- Antimony Free
- TBBP-A (C₁₅H₁₂Br₄O₂) Free
- SVHC Free
- Halogen Free
- PFOS Free

Contact Information

For the latest specifications, additional product information, worldwide sales and distribution locations:

Web: www.qorvo.com

Tel: 1-844-890-8163

Email: customer.support@qorvo.com

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