qorvo®

CMD216

14-18 GHz GaN Power Amplifier

Product Overview

The CMD216 is a 5.6 W GaN MMIC power amplifier die ideally suited for Ku-band communications systems where high power and high linearity are needed. The device delivers greater than 16 dB of gain with a corresponding output 1 dB compression point of +37 dBm and a saturated output power of +38 dBm at 32% power added efficiency. The CMD216 is a 50 ohm matched design eliminating the need for external DC blocks and RF port matching. The CMD216 offers full passivation for increased reliability and moisture protection.

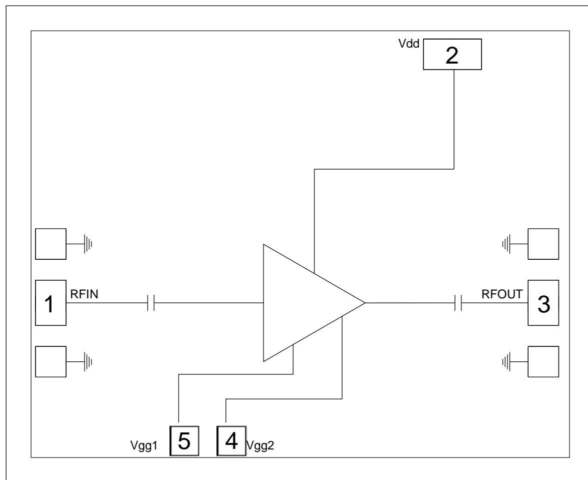
Key Features

- High Power
- High Linearity
- Excellent Efficiency
- Small Die Size: 2000 um x 1620 um

Ordering Information

Part No.	Description
CMD216	14-18 GHz GaN Power Amplifier, 10 Piece Gel Pack

Functional Block Diagram



Electrical Performance (V_{dd} = 28 V, V_{gg1} = V_{gg2} = -3.4 V, T_A = 25 °C, F = 16 GHz)

Parameter	Min	Typ	Max	Units
Frequency Range		14 - 18		GHz
Gain		16		dB
Output P1dB		37		dBm
Output Psat		38		dBm
Input Return Loss		10		dB
Output Return Loss		15		dB
Supply Current		550		mA

Absolute Maximum Ratings

Parameter	Rating
Drain Voltage, V_{dd}	32 V
Gate Voltage, $V_{gg1,2}$	-1.0 V
RF Input Power	+30 dBm
Channel Temperature, Tch	175 ºC
Power Dissipation, Pdiss	19.5 W
Thermal Resistance, θ_{JC}	4.6 ºC/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
V_{dd}	20	28	30	V
I_{dd}		550		mA
$V_{gg1,2}$		-3.4		

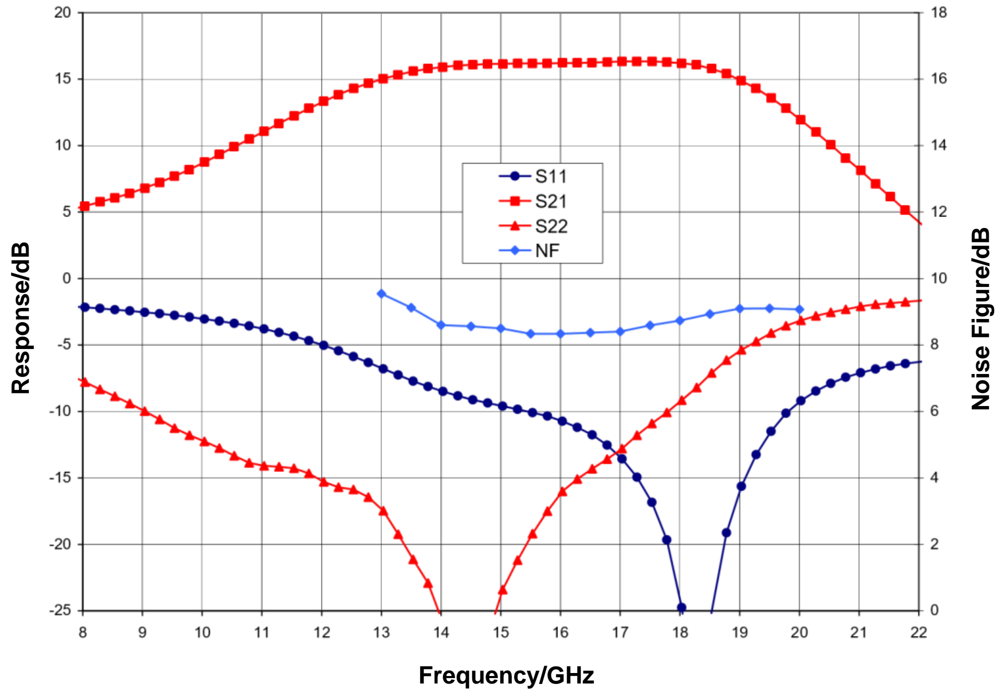
Electrical performance is measured at specific test conditions. Electrical specifications are not guaranteed over all recommended operating conditions.

Electrical Specifications (V = 28 V, V_{gg1} = V_{gg2} = -3.4 V, T_A = 25 ºC)

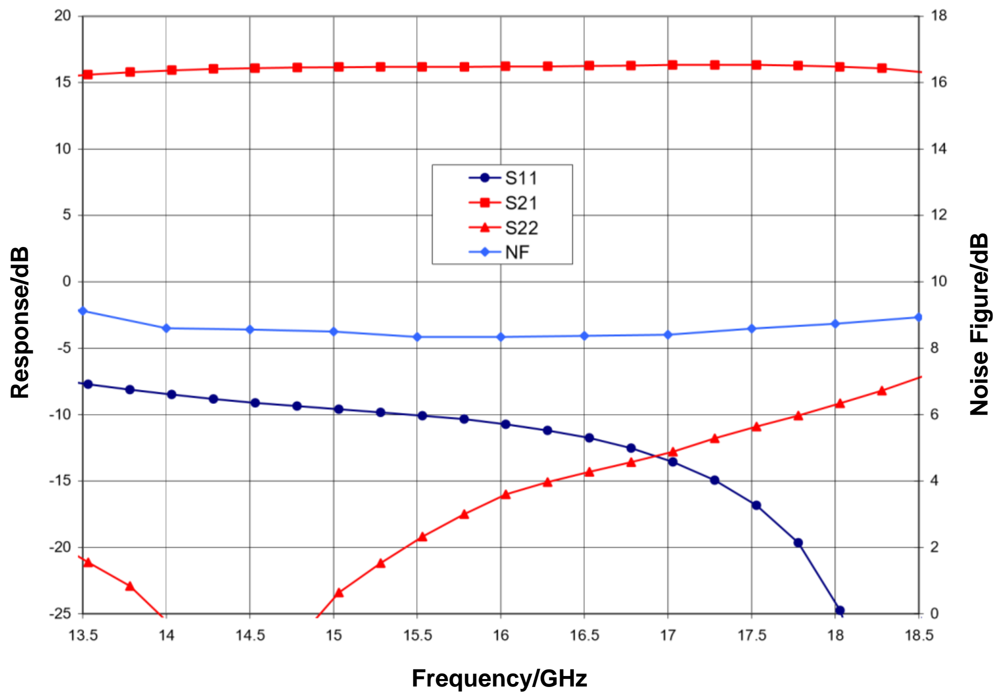
Parameter	Min	Typ	Max	Units
Frequency Range		14 - 18		GHz
Gain		16		dB
Input Return Loss		10		dB
Output Return Loss		15		dB
Output P1dB		36.5		dBm
Psat		37.5		dBm
Output IP3		43		dBm
Power Added Efficiency		28		%
Supply Current		550		mA

Typical Performance

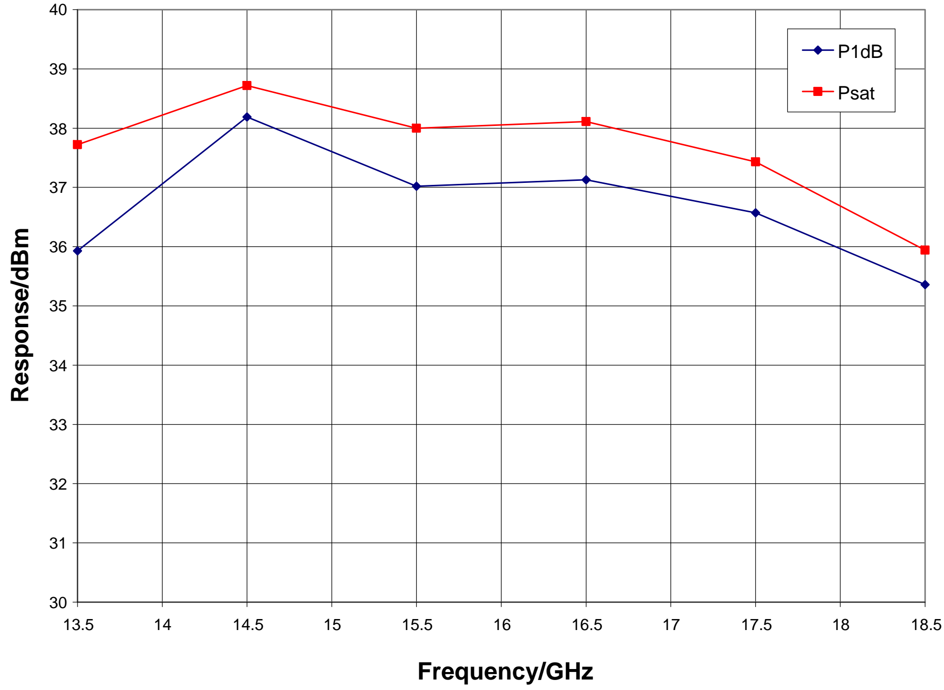
Broadband Performance, V_{dd} = 28 V, V_{gg1} = V_{gg2} = -3.4 V, I_{dd} = 550 mA, T_A = 25 °C

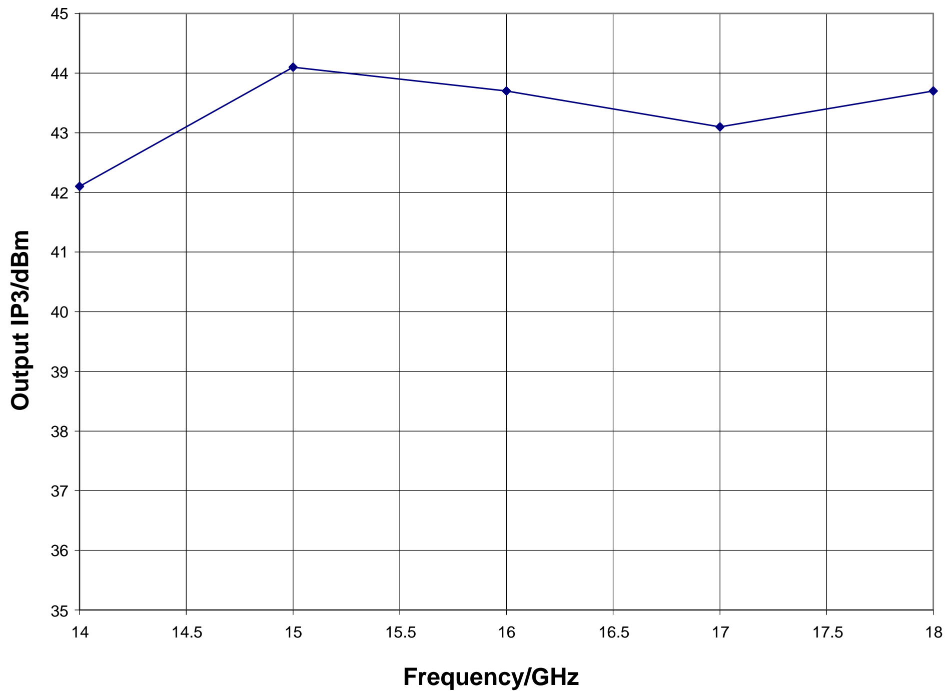


Narrow-band Performance, V_{dd} = 28 V, V_{gg1} = V_{gg2} = -3.4 V, I_{dd} = 550 mA, T_A = 25 °C



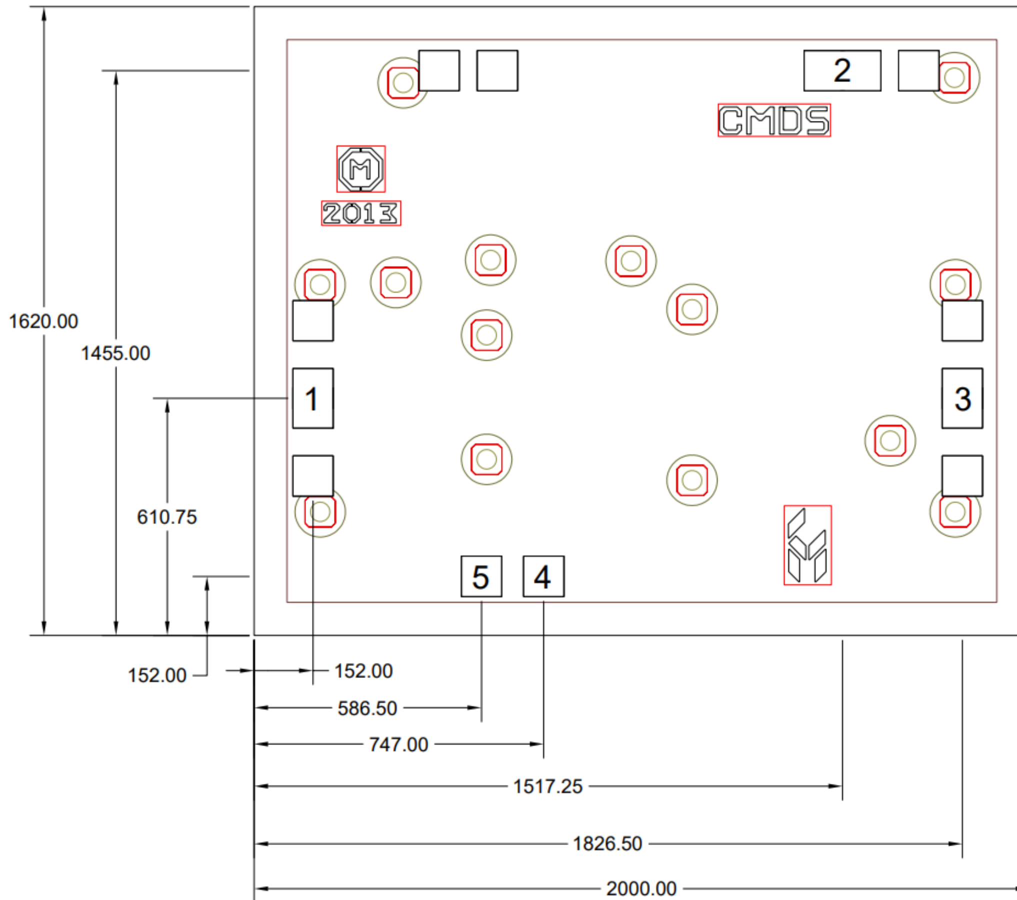
Typical Performance





Mechanical Information

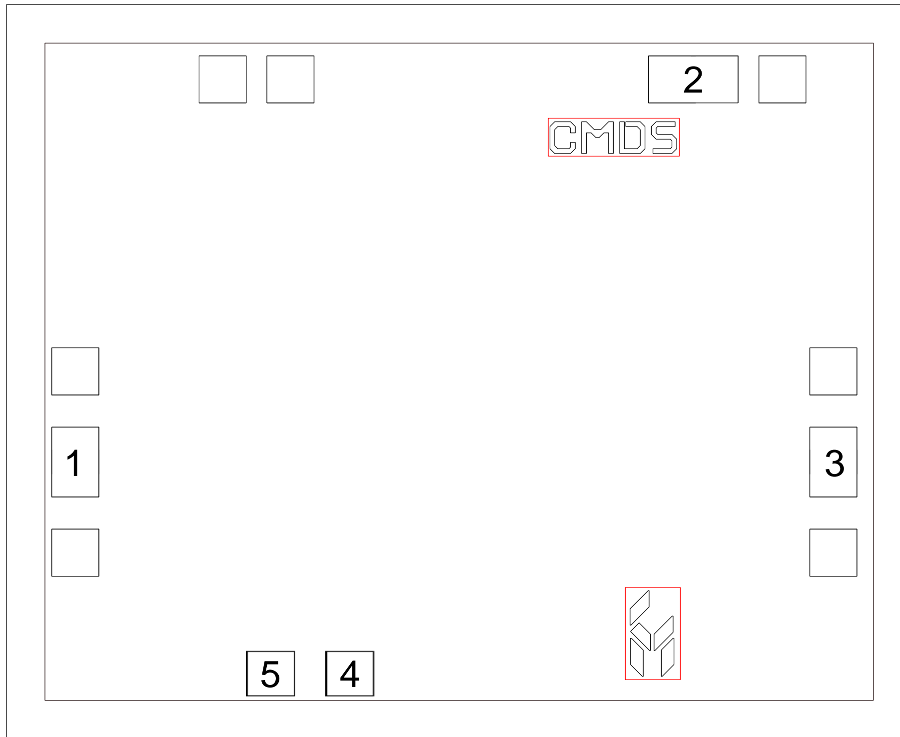
Die Outline (all dimensions in microns)



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 85 microns thick
5. DC bond pads (4, 5) are 100 x 100 microns
6. RF bond pads (1, 3) are 100 x 150 microns
7. DC bond pad (2) is 100 x 150 microns

Pin Description

Pad Diagram



Functional Description

Pad	Function	Description	Schematic
1	RF in	DC blocked and 50 ohm matched	RF in
2	V_{dd}	Power supply voltage Decoupling and bypass caps required	Vdd
3	RF out	DC blocked and 50 ohm matched	RF out
4, 5	$V_{gg2, 1}$	Power supply voltage Decoupling and bypass caps required	Vgg1, 2
Backside	Ground	Connect to RF / DC ground	GND

Applications Information

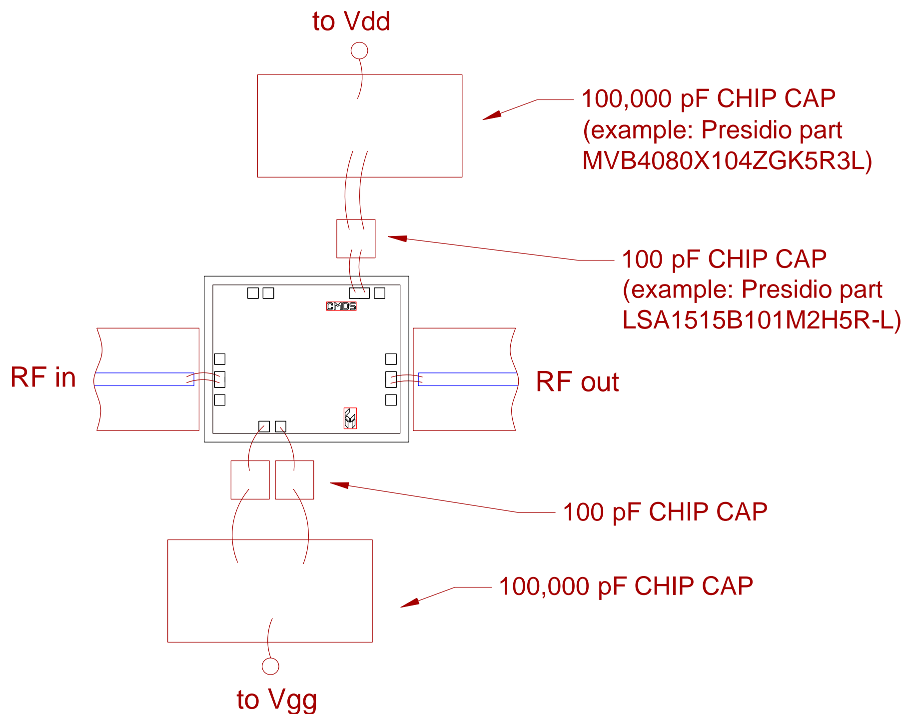
Assembly Guidelines

The backside of the CMD216 is RF ground. Die attach should be accomplished with 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 double bond wire as shown.

The semiconductor is 85 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



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

Applications Information

Biasing and Operation

The CMD216 is biased with a positive drain supply and a negative gate supply. Performance is optimized when the drain voltage is set to +28.0 V and the gate voltage is set to -3.4 V.

Turn ON procedure:

1. Apply gate voltage V_{gg1}, V_{gg2} and set to -3.4 V
2. Apply drain voltage V_{dd} and set to +28 V

Turn OFF procedure:

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

RF power can be applied anytime.

Handling Precautions

Parameter	Rating	Standard
ESD – Human Body Model (HBM)	Class 1A	ESDA / JEDEC JS-001-2012

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 ($C_{15}H_{12}Br_{4}0_{2}$) Free
- SVHC Free
- Halogen Free
- PFOS Free

Contact Information

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

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