CMD217

28-32 GHz GaN Power Amplifier

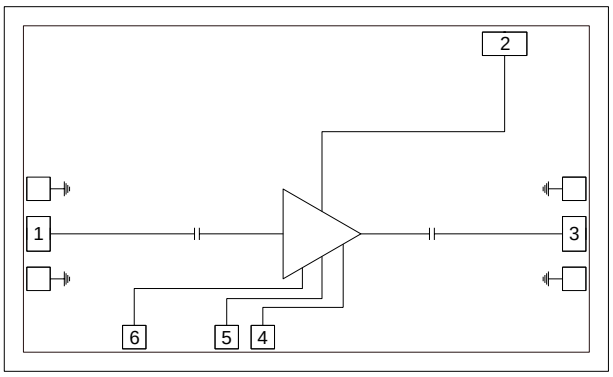
Features

- ► High Power
- ► High linearity
- ► Excellent efficiency
- ► Small die size

Description

The CMD217 is a 8.5 W GaN MMIC power amplifier die ideally suited for Ka-band communications systems where high power and high linearity are needed. The device delivers greater than 20 dB of gain with a corresponding output 1 dB compression point of +36.7 dBm and a saturated output power of +39.3 dBm at 35% power added efficiency. The CMD217 is a 50 ohm matched design eliminating the need for external DC blocks and RF port matching. The CMD217 offers full passivation for increased reliability and moisture protection.

Functional Block Diagram



Electrical Performance - V_{dd} = 28 V, V_{gg1} = V_{gg2} = V_{gg3} = -3.4 V, T_A = 25 °C, F = 30 GHz

Parameter	Min	Typ	Max	Units
Frequency Range		28 - 32		GHz
Gain		20		dB
Output P1dB		36.7		dBm
Output Psat		39.3		dBm
Input Return Loss		13		dB
Output Return Loss		23		dB
Supply Current		580		mA

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Specifications

Absolute Maximum Ratings

Parameter	Rating
Drain Voltage, Vdd	32 V
Gate Voltage, Vgg1, 2, 3	-1.0 V
RF Input Power	+30 dBm
Channel Temperature, Tch	175 ºC
Power Dissipation, Pdiss	25.4 W
Thermal Resistance, Q $_{JC}$	3.55 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
Vdd	20	28	30	V
Idd		580		mA
Vgg1, 2, 3		-3.4		

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

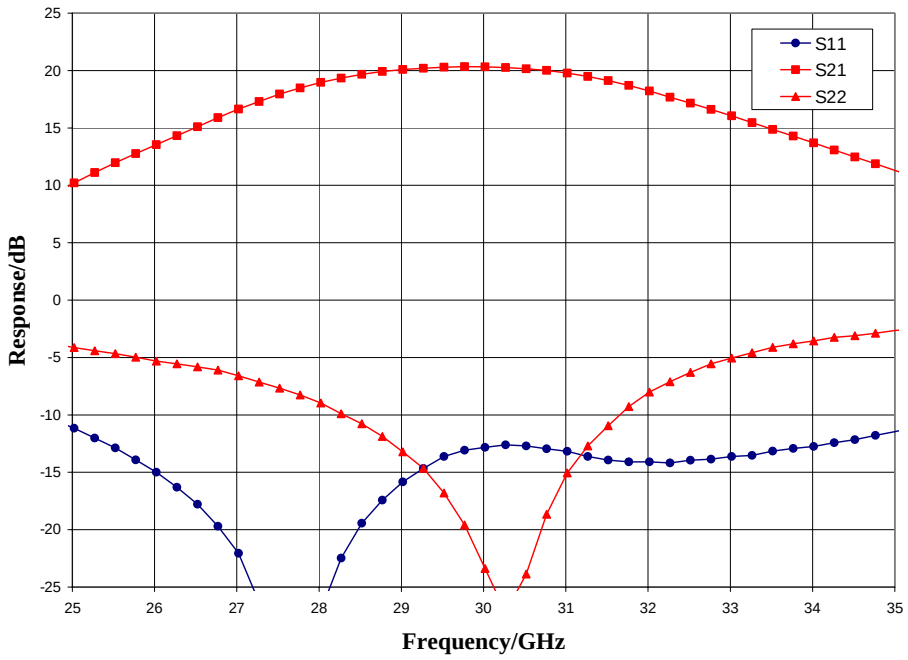
Electrical Specifications - V = 28 V, V_{gg1} = V_{gg2} = V_{gg3} = -3.4 V, T_A = 25 °C

Parameter	Min	Typ	Max	Units
Frequency Range		28 - 32		GHz
Gain		20		dB
Input Return Loss		13		dB
Output Return Loss		15		dB
Output P1dB		36.7		dBm
Psat		39		dBm
Output IP3		41.5		dBm
Power Added Efficiency		32		%
Supply Current		580		mA

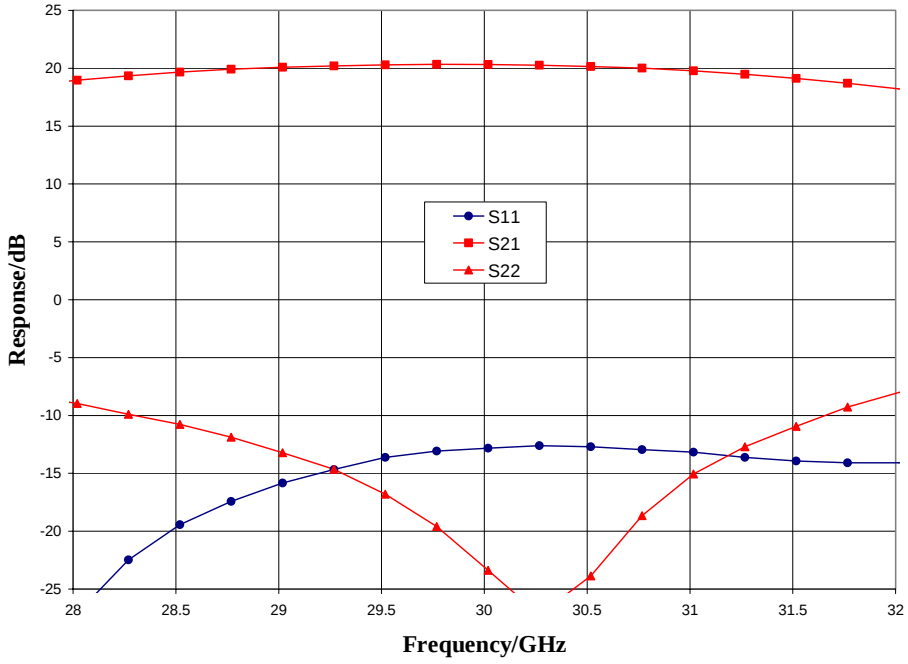
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Typical Performance

Broadband Performance, V_{dd} = 28 V, $V_{gg1, 2, 3}$ = -3.4 V, I_{dd} = 580 mA, T_A = 25 °C



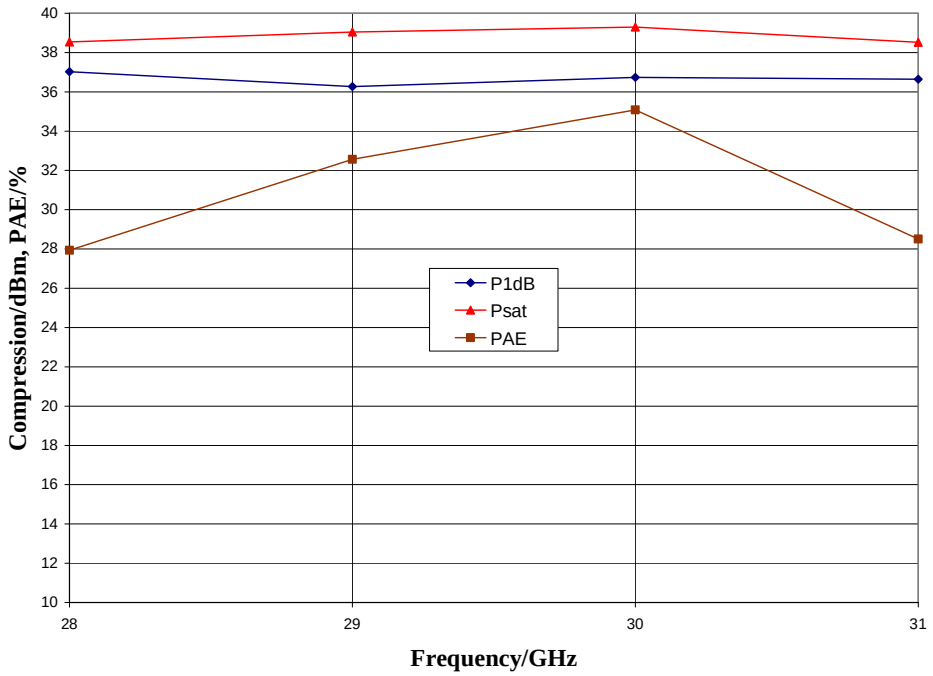
Narrow-band Performance, V_{dd} = 28 V, $V_{gg1, 2, 3}$ = -3.4 V, I_{dd} = 580 mA, T_A = 25 °C



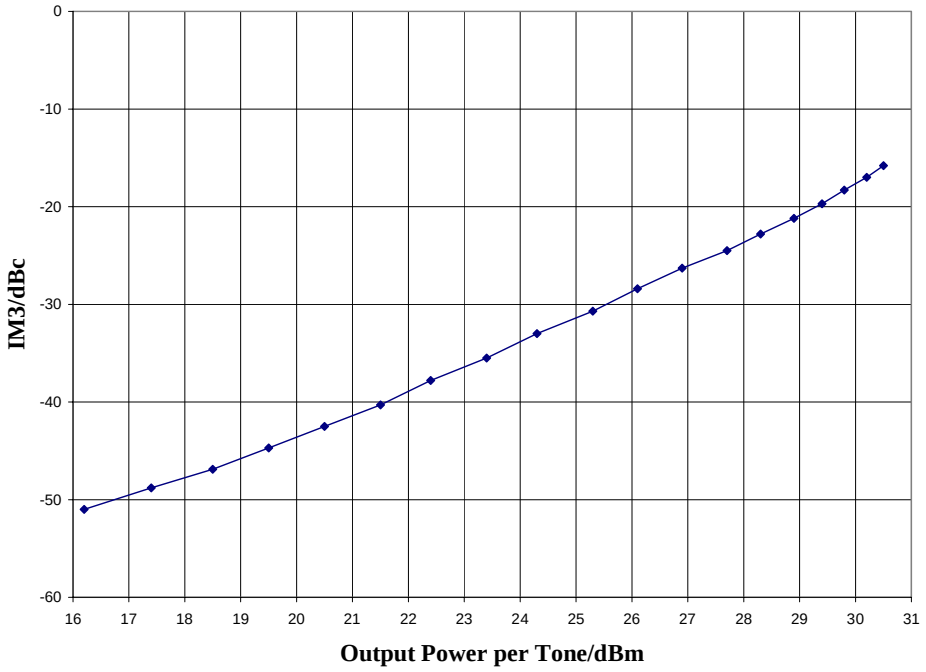
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Typical Performance

Output Power and Power Added Efficiency, V_{dd} = 28 V, $V_{gg1, 2, 3}$ = -3.4 V, T_A = 25 °C



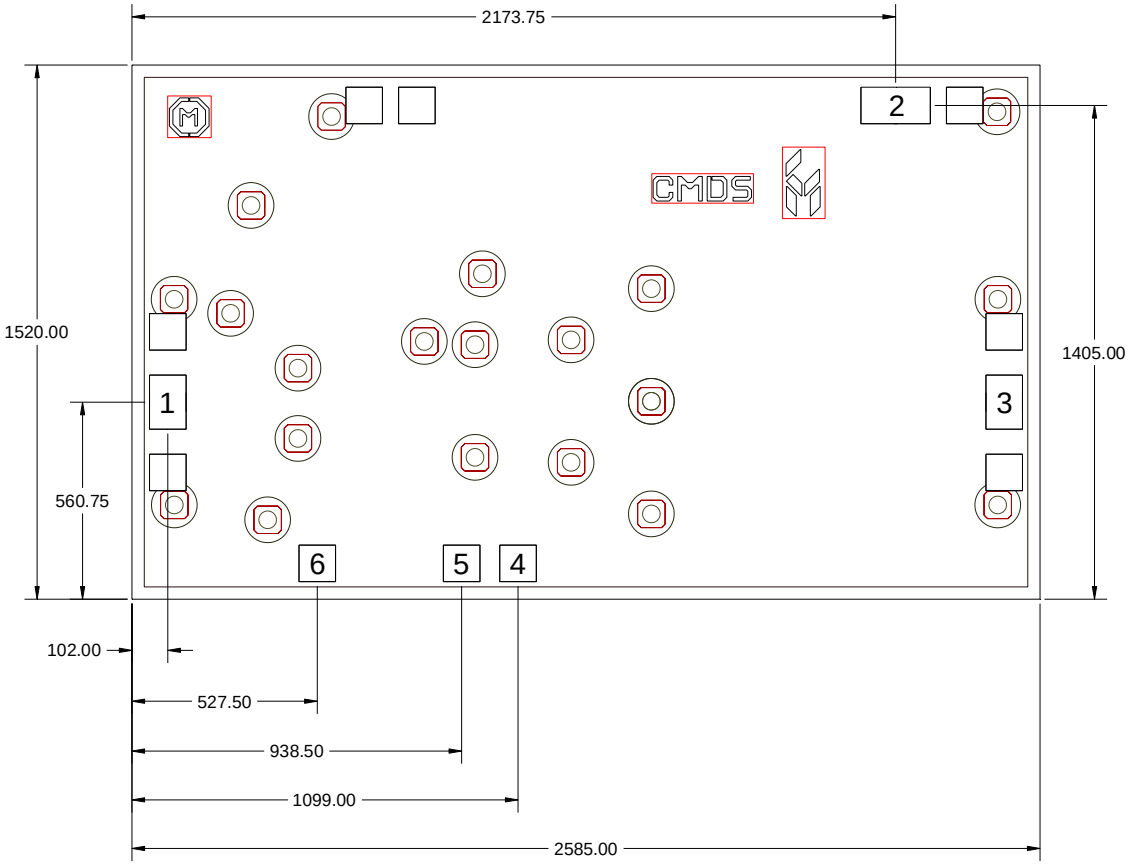
IM3 vs. Output Power, V_{dd} = 28 V, $V_{gg1, 2, 3}$ = -3.4 V, F = 30 GHz, T_A = 25 °C



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Mechanical Information

Die Outline (all dimensions in microns)



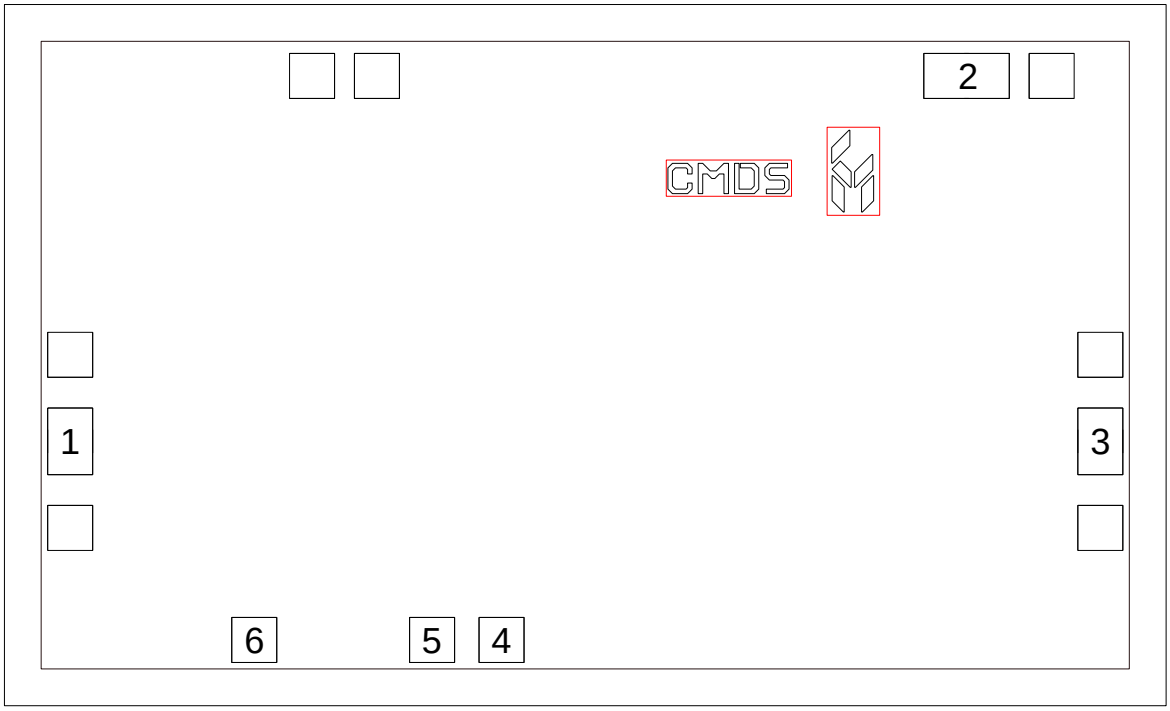
Notes:

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

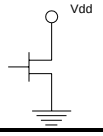
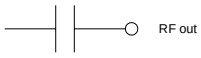
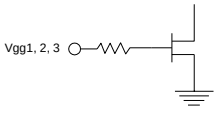
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Pin Description

Pad Diagram



Functional Description

Pad	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	
4, 5, 6	Vgg3, 2, 1	Power supply voltage Decoupling and bypass caps required	
Backside	Ground	Connect to RF / DC ground	

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Applications Information

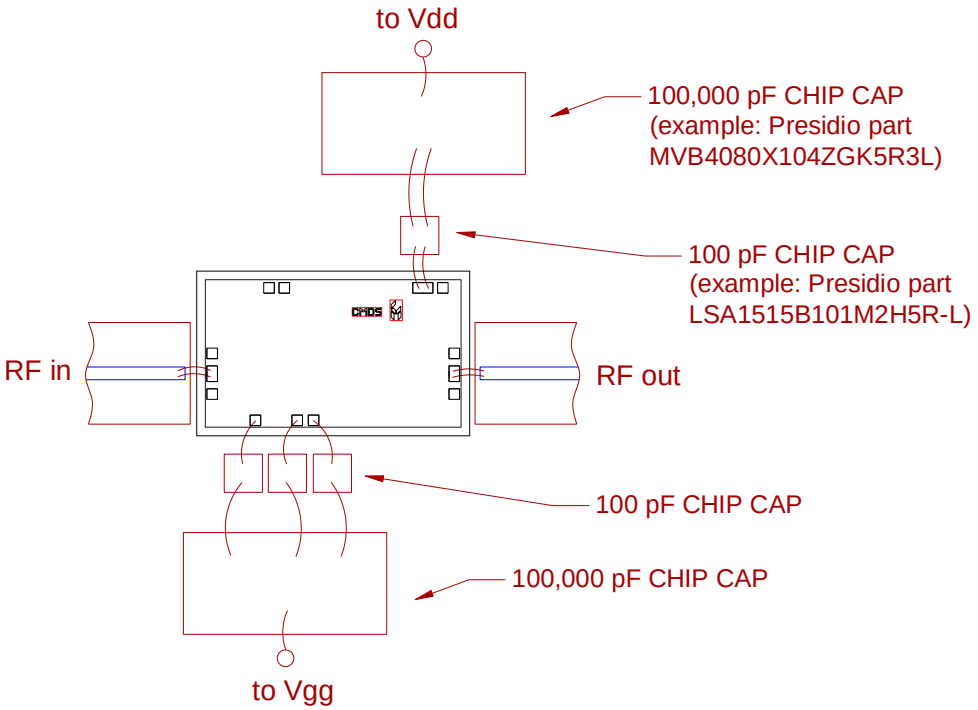
Assembly Guidelines

The backside of the CMD217 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.

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Applications Information

Biasing and Operation

The CMD217 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 $V_{gg1,}$ $V_{gg2,}$ V_{gg3} 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 $V_{gg1,}$ $V_{gg2,}$ V_{gg3}

RF power can be applied at any time.

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