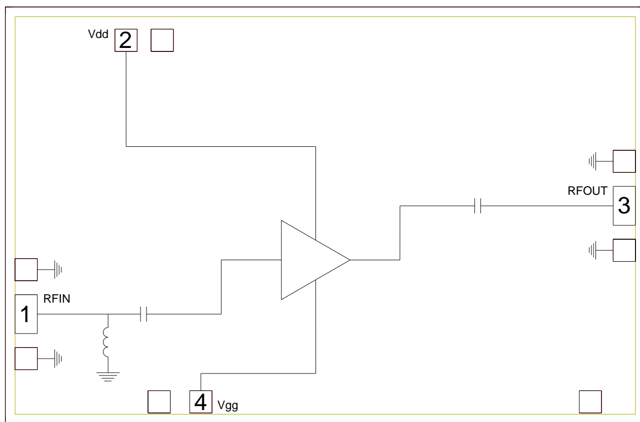
CMD245

6-18 GHz Low Phase Noise Amplifier

Product Overview

The CMD245 is a wideband GaAs MMIC low phase noise amplifier ideally suited for military, space and communications systems. At 10 GHz the device delivers 18 dB of gain, a saturated output power of +21 dBm and a noise figure of 3 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 CMD245 is a 50 ohm matched design which eliminates the need for RF port matching. The CMD245 offers full passivation for increased reliability and moisture protection.

Functional Block Diagram



Key Features

- Wide Bandwidth
- Low Phase Noise
- Low Current Consumption
- Small Die Size: 2.3 x 1.5 mm

Ordering Information

Part No.	Description
CMD245	6-18 GHz Low Phase Noise Amplifier, 100 Piece Gel Pack

Electrical Performance (V_{dd} = 5.0 V, V_{gg} = 3.0 V, T_A = 25 °C, F = 10 GHz)

Parameter	Min	Typ	Max	Units
Frequency Range		5 - 20		GHz
Gain		18		dB
Input Return Loss		10		dB
Output Return Loss		15		dB
Noise Figure		3		dB
Output P_{1dB}		18		dBm
Saturated Output Power		21		dBm
Phase Noise @ 10 kHz Offset		-165		dBc/Hz
Supply Current		76		mA

Absolute Maximum Ratings

Parameter	Rating
Drain Voltage, V_{dd}	8.0 V
Gate Voltage, V_{gg}	5.0 V
RF Input Power	+17 dBm
Channel Temperature, Tch	150 °C
Power Dissipation, Pdiss	602 mW
Thermal Resistance, θ_{JC}	108 °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
V_{dd}	3.0	5.0	7.0	V
I_{dd}		76		mA
V_{gg}	0	3.0	4.0	V

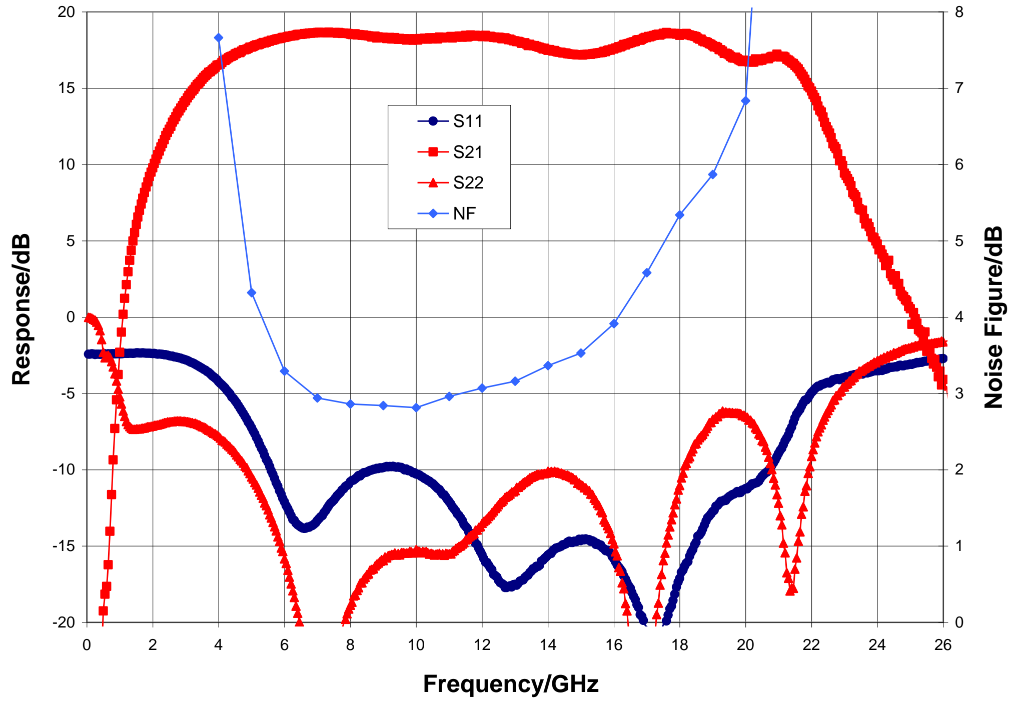
Electrical performance is measured at specific test conditions. Electrical specifications are not guaranteed over all recommended operating conditions.

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

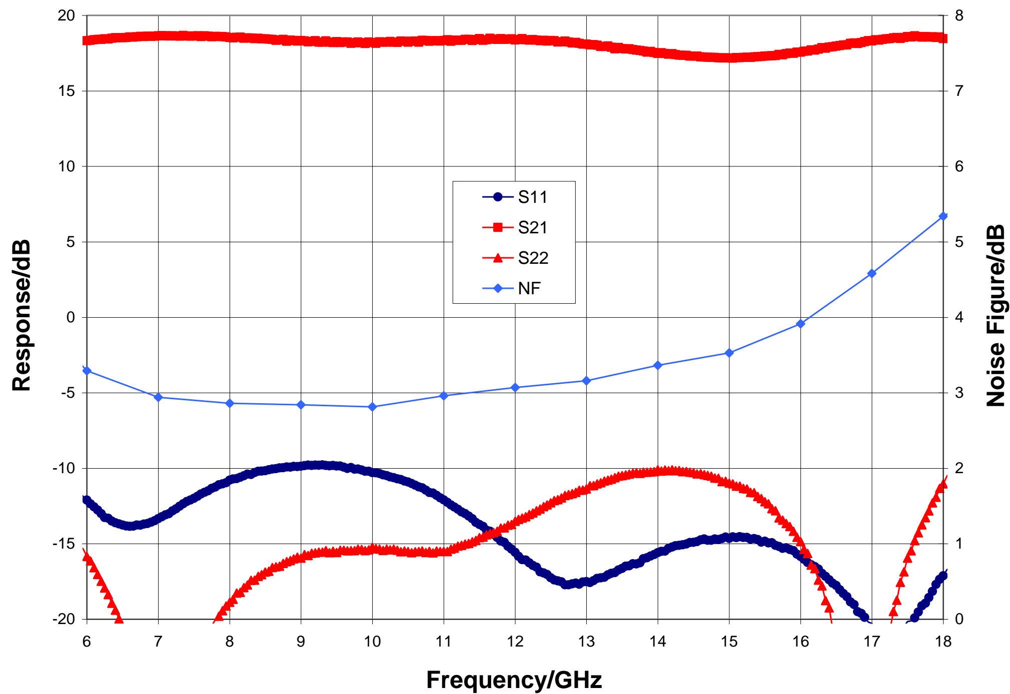
Parameter	Min	Typ	Max	Min	Typ	Max	Units
Frequency Range		6 - 12			12 - 18		GHz
Gain	15	18.5	21.5	14	18	21.5	dB
Noise Figure		3			4		dB
Input Return Loss		10			15		dB
Output Return Loss		15			12		dB
Output P_{1dB}	15	19		11	16		dBm
Saturated Output Power		21			20		dBm
Output IP3		29			29		dBm
Phase Noise @ 10 kHz Offset		-165			-165		dBc/Hz
Supply Current	53	76	100	53	76	100	mA

Typical Performance

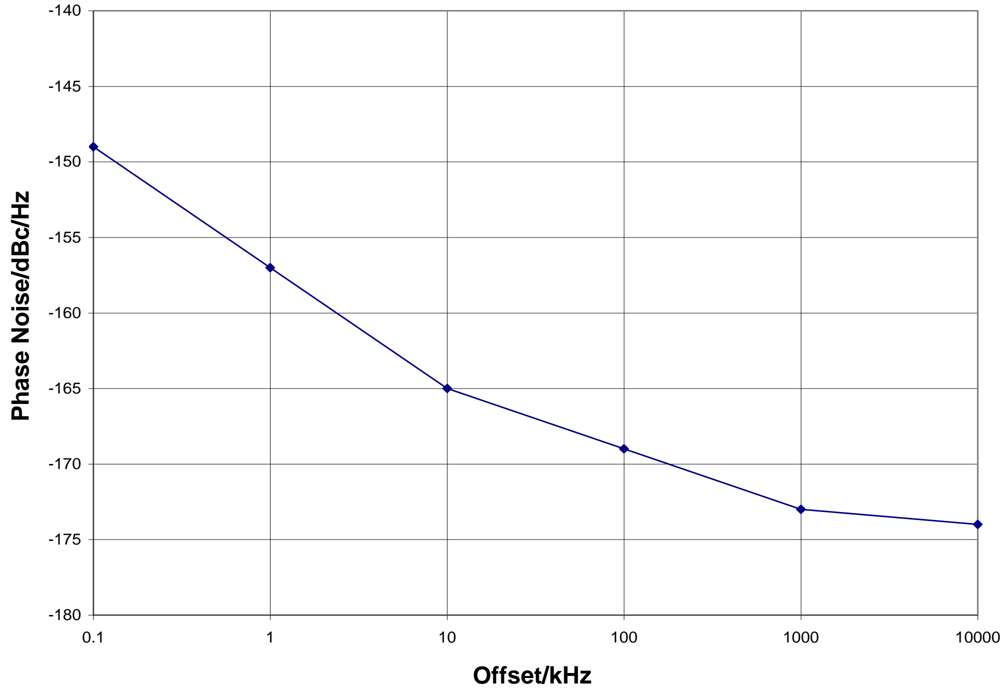
Broadband Performance, V_{dd} = 5.0 V, V_{gg} = 3.0 V, I_{dd} = 76 mA, T_A = 25 °C

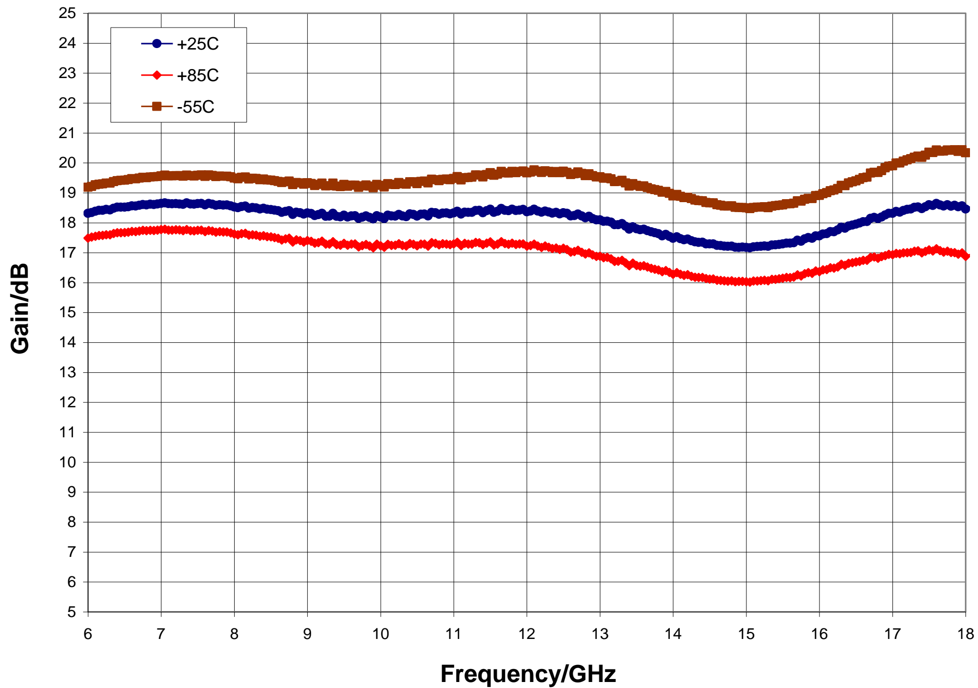


Narrow-band Performance, V_{dd} = 5.0 V, V_{gg} = 3.0 V, I_{dd} = 76 mA, T_A = 25 °C

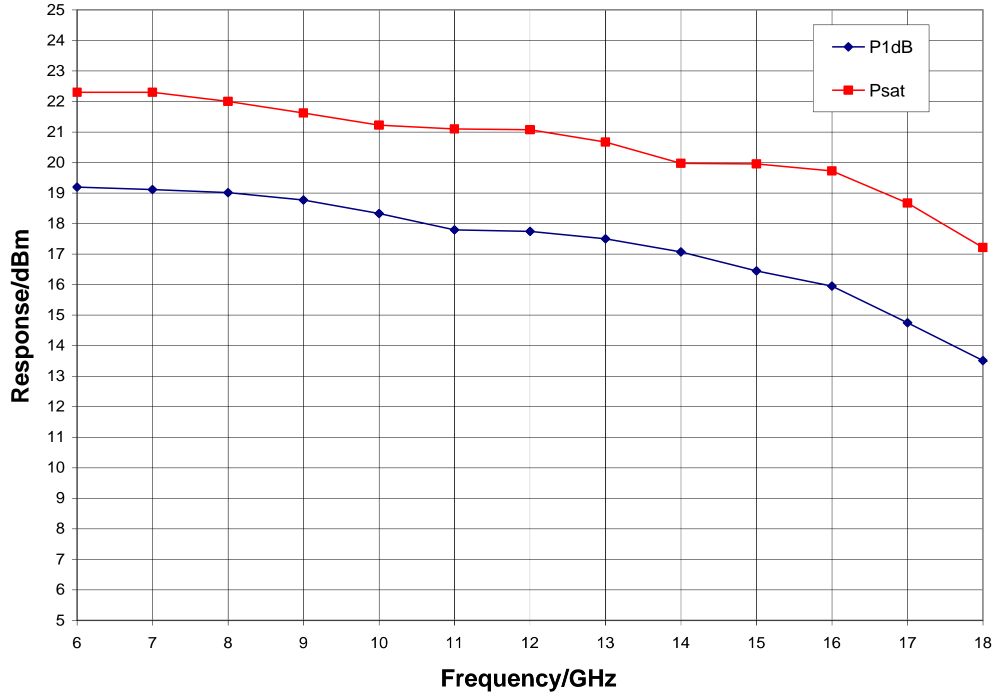


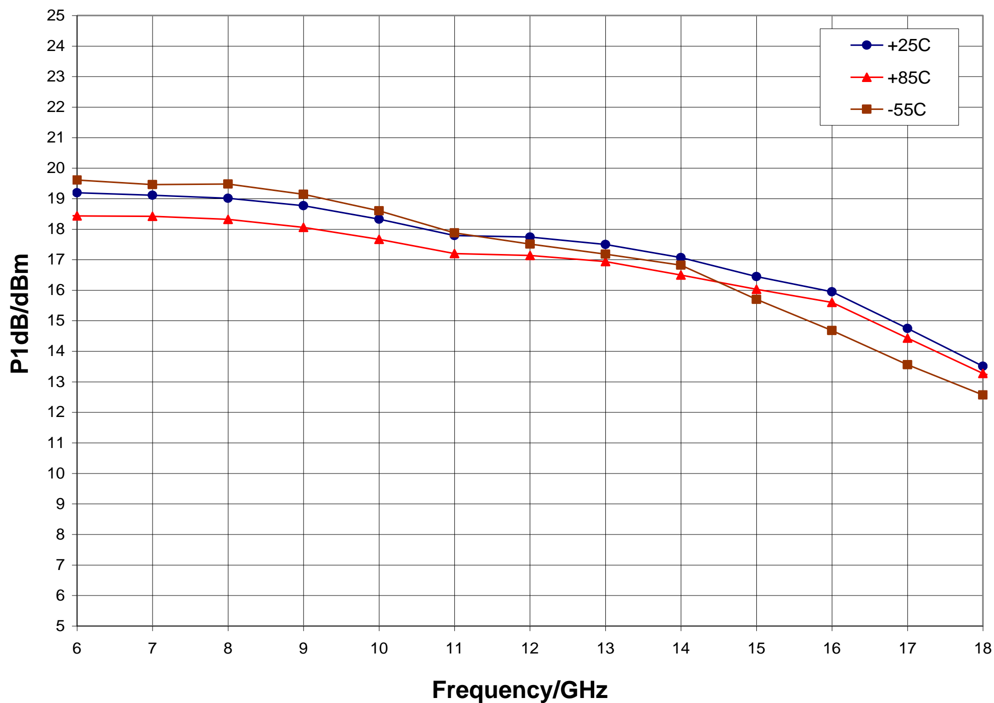
Typical Performance



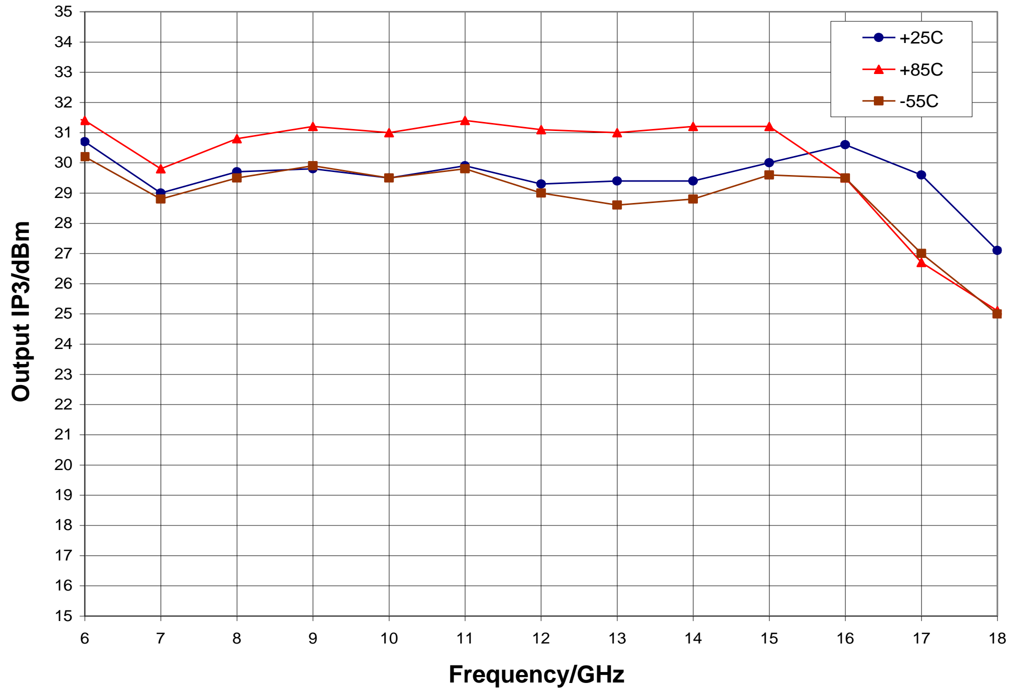


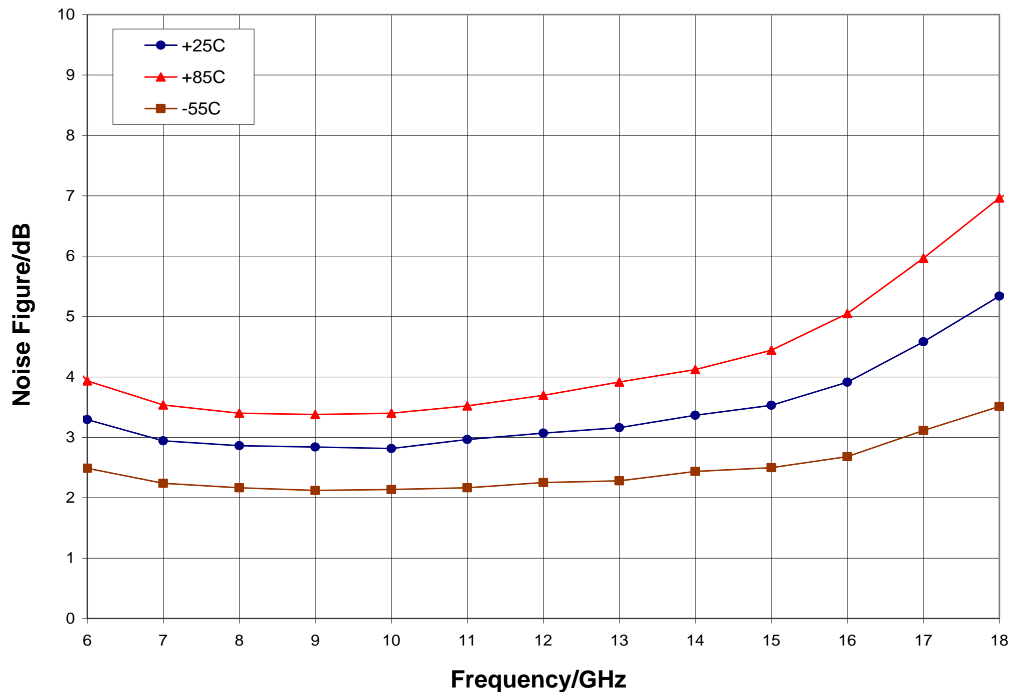
Typical Performance





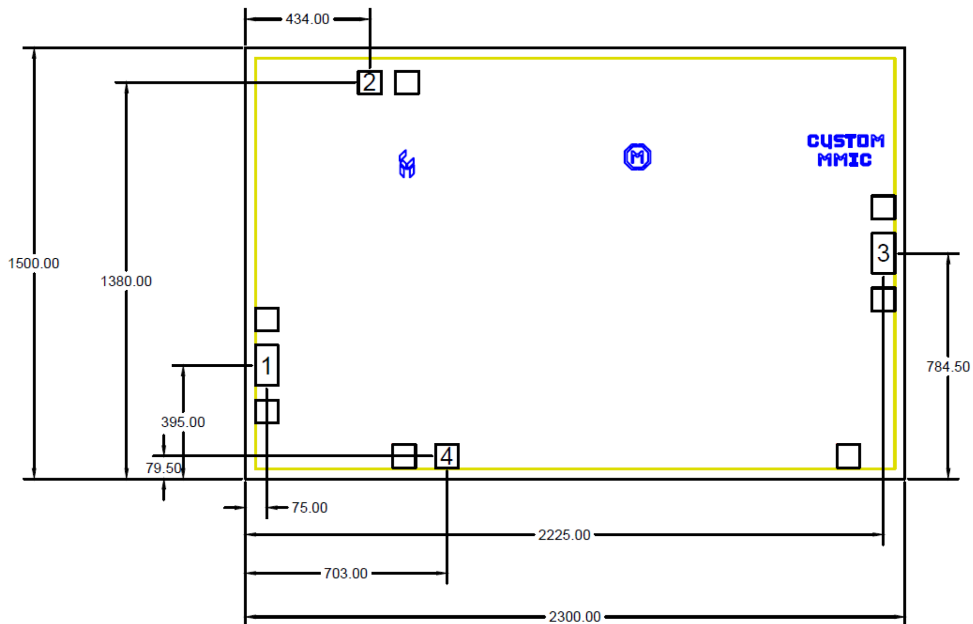
Typical Performance





Mechanical Information

Die Outline (all dimensions in microns)

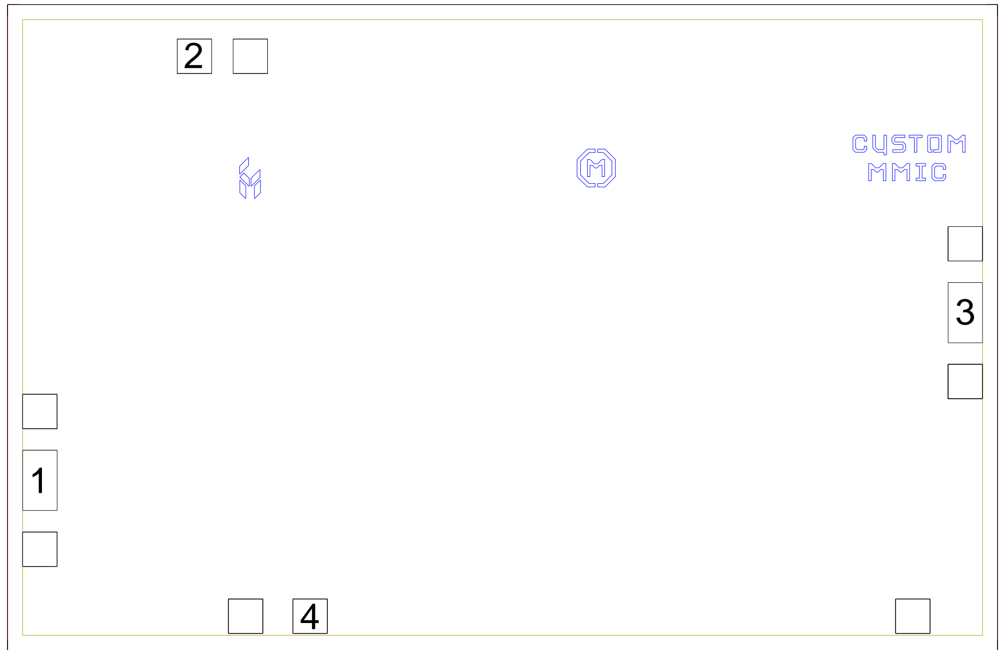


Notes:

1. No connection required for unlabeled pads
2. Backside is RF and DC ground
3. Backside and bond pad metal: Gold
4. Die is 100 microns thick
5. DC bond pads (2, 4) are 80 x 80 microns
6. RF bond pads (1, 3) are 80 x 140 microns

Pad Description

Pad Diagram



Functional Description

Pad	Function	Description	Schematic
1	RF in	DC coupled 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	V_{gg}	Power supply voltage Decoupling and bypass caps required	Vgg
Backside	Ground	Connect to RF / DC ground	GND

Applications Information

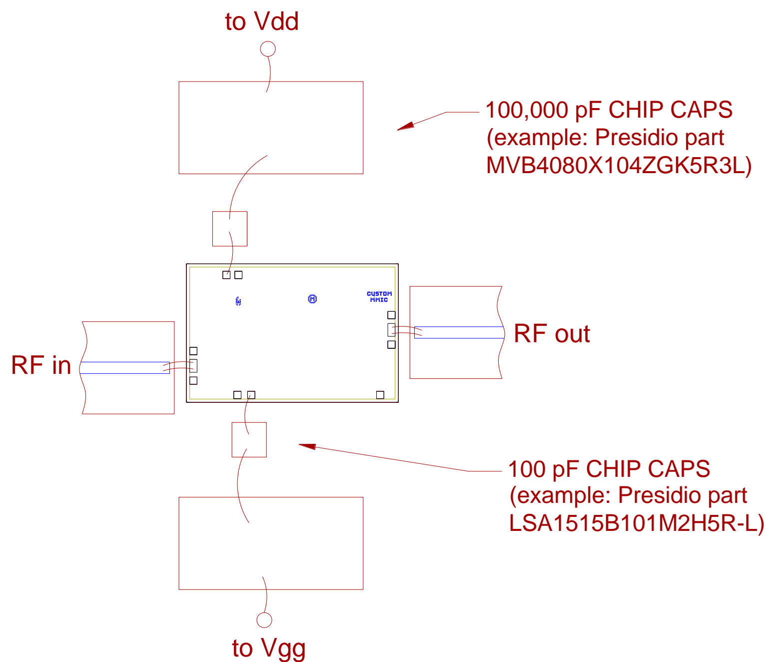
Assembly Guidelines

The backside of the CMD245 is RF ground. Die attach should be accomplished with electrically and thermally conductive epoxy only. Eutectic attach is not recommended. 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 100 µm 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 CMD245 is biased with a positive drain supply and a 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}

RF power can be applied at any time.