

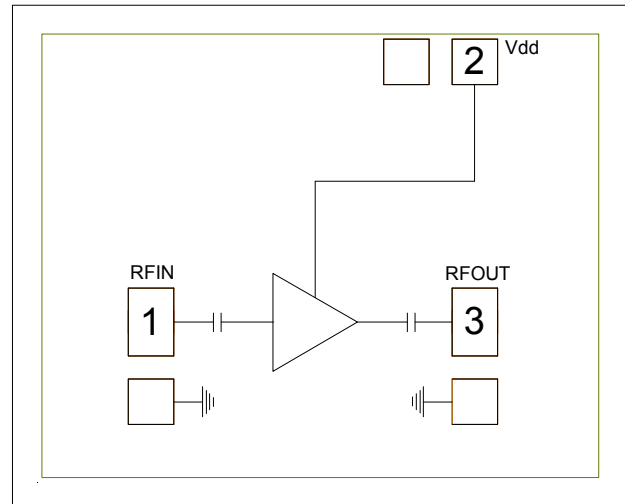
Features

- ▶ Broadband performance
- ▶ High output power
- ▶ Low current consumption
- ▶ Single supply voltage: +5.0 V @ 95 mA
- ▶ Small die size

Description

The CMD158 is a broadband MMIC driver amplifier ideally suited for EW and communications systems where small size and low power consumption are needed. The broadband device delivers 21 dB of gain and +21 dBm saturated output power at 24 % PAE from a single 5 V supply. The CMD158 is a 50 ohm matched design eliminating the need for external DC blocks and RF port matching.

Functional Block Diagram



Electrical Performance - $V_{dd} = 5.0 \text{ V}$, $T_A = 25 \text{ }^\circ\text{C}$, $F = 11 \text{ GHz}$

Parameter	Min	Typ	Max	Units
Frequency Range	6 - 16			GHz
Gain		20		dB
Input Return Loss		12		dB
Output Return Loss		11		dB
Output P1dB		20		dBm
Output Psat		21		dBm
Supply Current		95		mA

Specifications

Absolute Maximum Ratings

Parameter	Rating
Drain Voltage, V _{dd}	6.5 V
RF Input Power	+23 dBm
Channel Temperature, T _{ch}	150 °C
Power Dissipation, P _{diss}	535 mW
Thermal Resistance	122 °C/W
Operating Temperature	-55 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	6.0	V
I _{dd}		95		mA

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

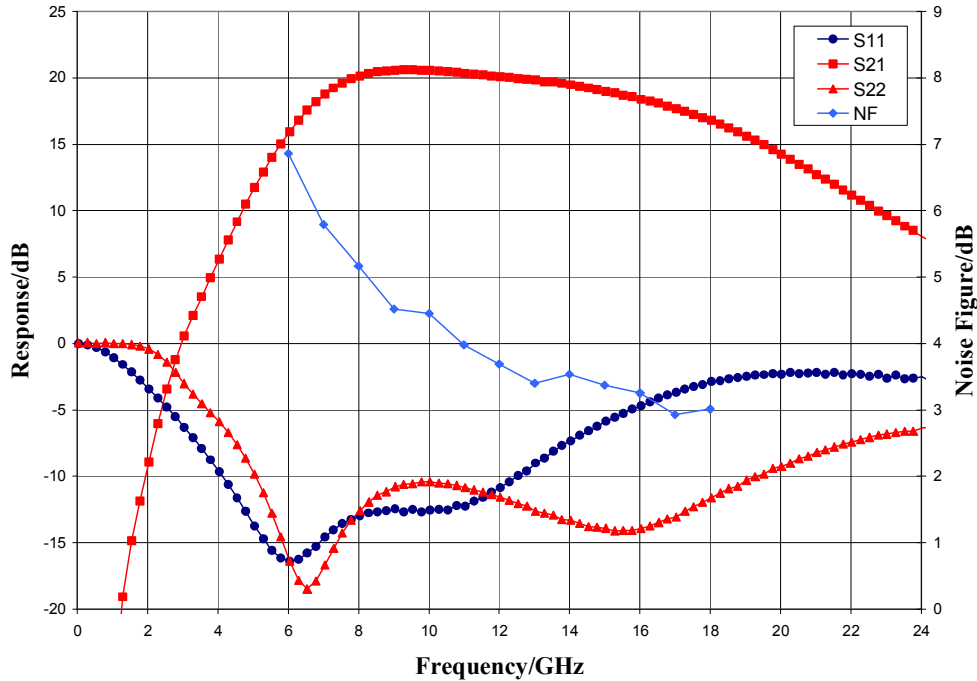
Electrical Specifications - V_{dd} = 5.0 V, T_A = 25 °C

Parameter	Min	Typ	Max	Min	Typ	Max	Units
Frequency Range	6 - 9			9 - 16			GHz
Gain	13	20	25	15	20	25	dB
Noise Figure		5.5			3.5		dB
Input Return Loss		13			15		dB
Output Return Loss		17			12		dB
Output P _{1dB}	16.5	19.5		17.5	20		dBm
Output IP ₃		24			26		dBm
Supply Current	70	95	120	70	95	120	mA
Gain Temperature Coefficient		0.012			0.012		dB/°C

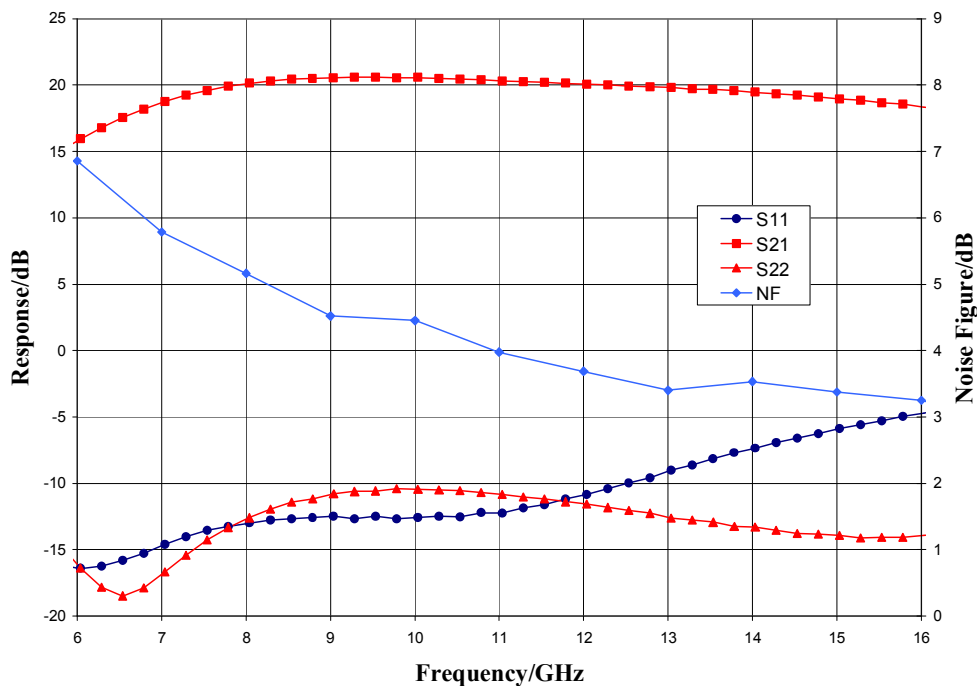
ver 1.1 0516

Typical Performance

Broadband Performance, $V_{dd} = 5.0 \text{ V}$, $I_{dd} = 95 \text{ mA}$, $T_A = 25 \text{ }^\circ\text{C}$



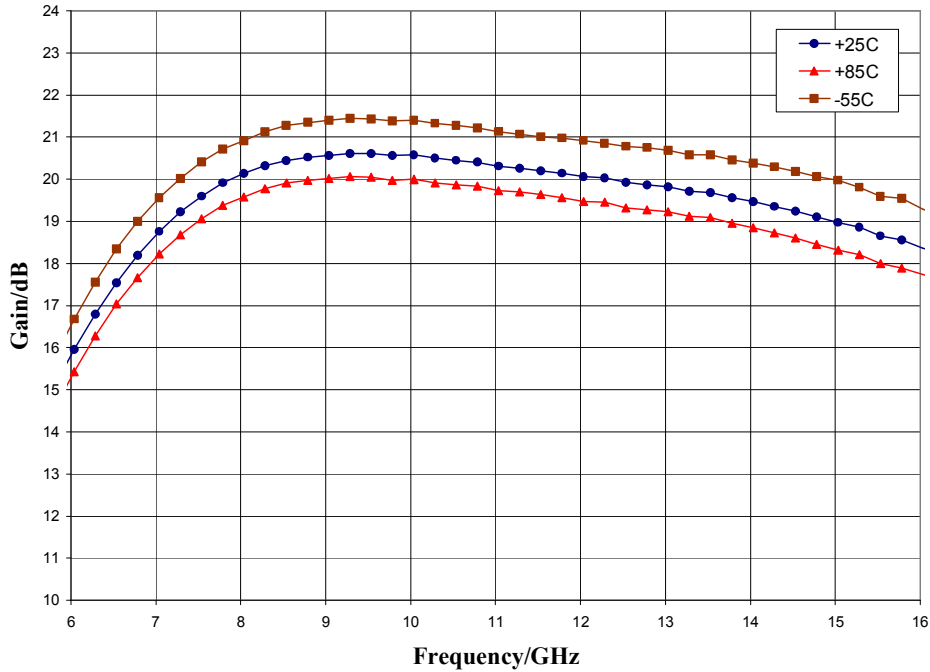
Narrow-band Performance, $V_{dd} = 5.0 \text{ V}$, $I_{dd} = 95 \text{ mA}$, $T_A = 25 \text{ }^\circ\text{C}$



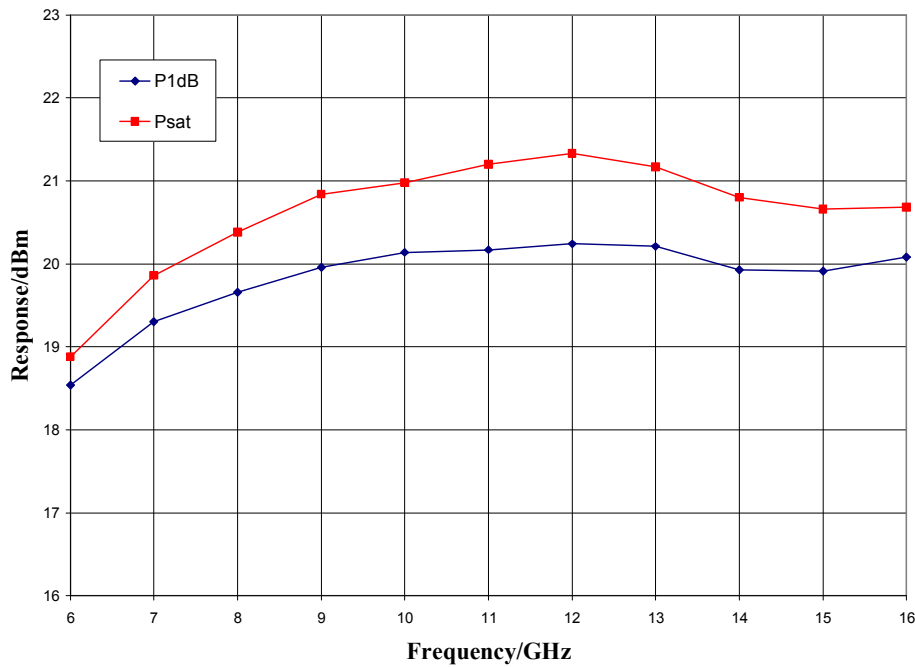
ver 1.1 0516

Typical Performance

Gain vs. Temperature, $V_{dd} = 5.0\text{ V}$



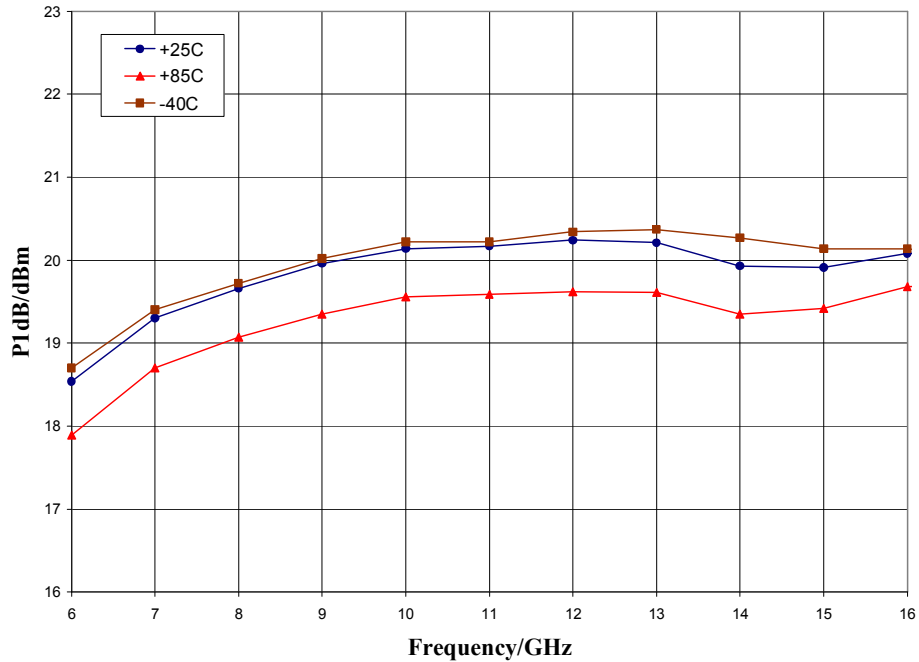
Output Power, $V_{dd} = 5.0\text{ V}$, $I_{dd} = 95\text{ mA}$, $T_A = 25\text{ }^\circ\text{C}$



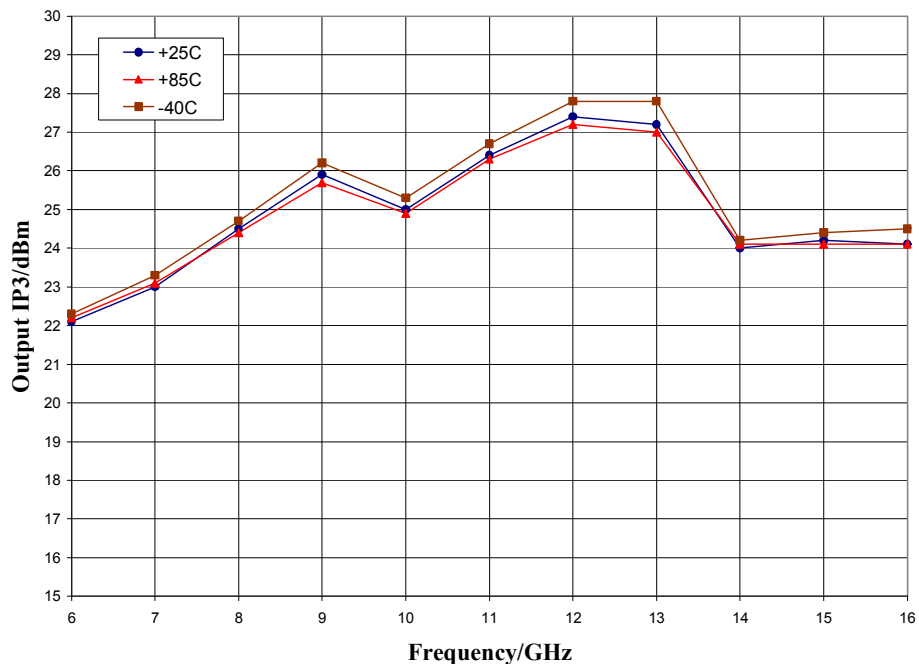
ver 1.1 0516

Typical Performance

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



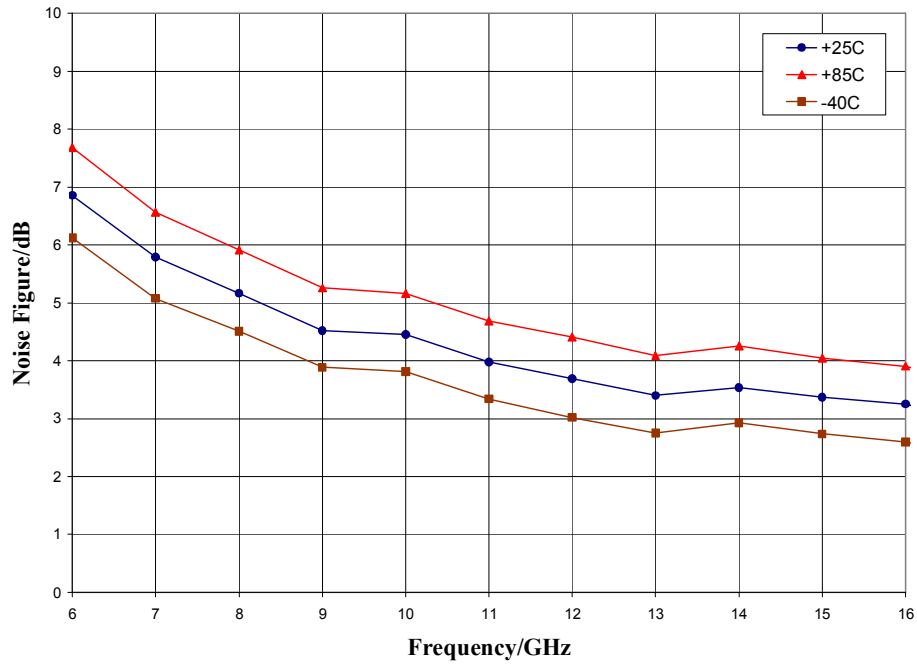
Output IP3, $V_{dd} = 5.0\text{ V}$, $I_{dd} = 95\text{ mA}$, $T_A = 25\text{ }^\circ\text{C}$



ver 1.1 0516

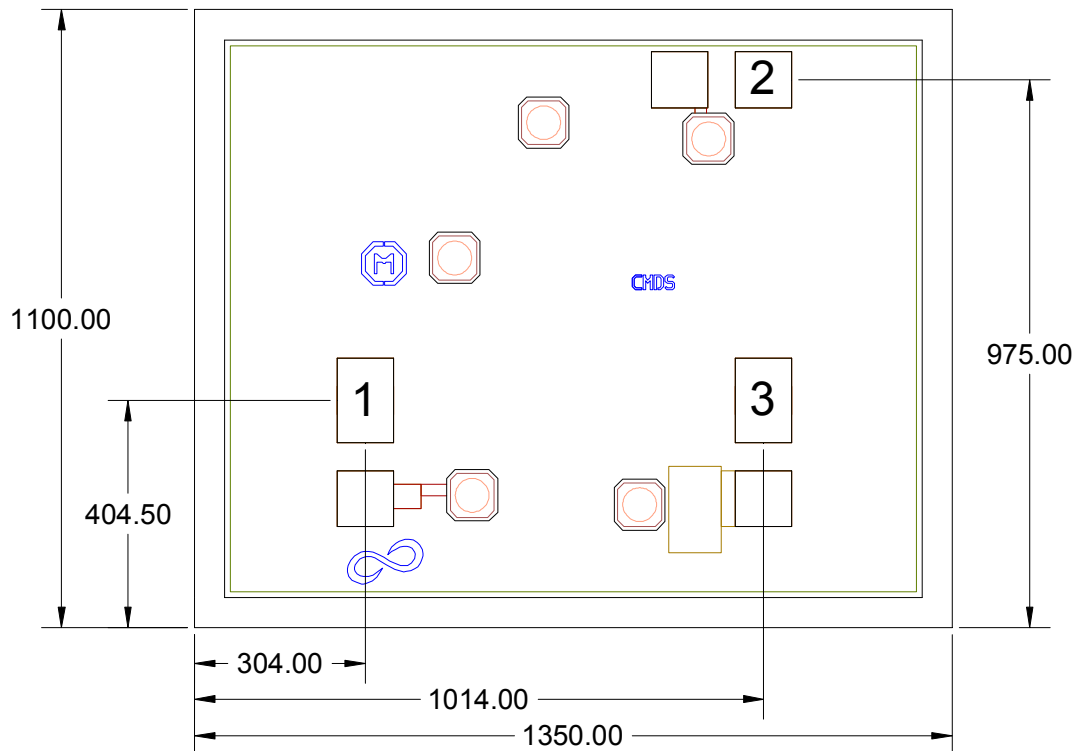
Typical Performance

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



Mechanical Information

Die Outline (all dimensions in microns)

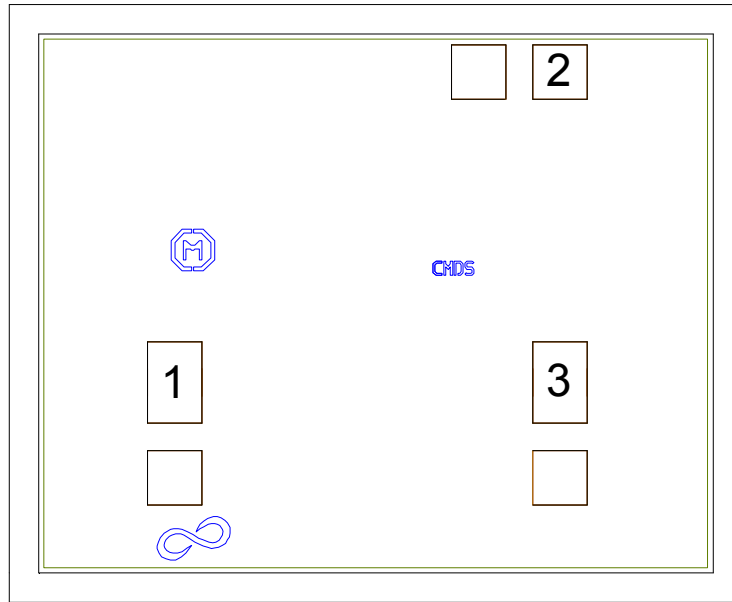


Notes:


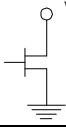
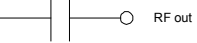

1. No connection required for unlabeled pads
2. Backside is RF and DC ground
3. Backside and bond pad metal: Gold
4. Die is 85 microns thick
5. DC bond pads are 100 microns square

Pad 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	
Backside	Ground	Connect to RF / DC ground	

Applications Information

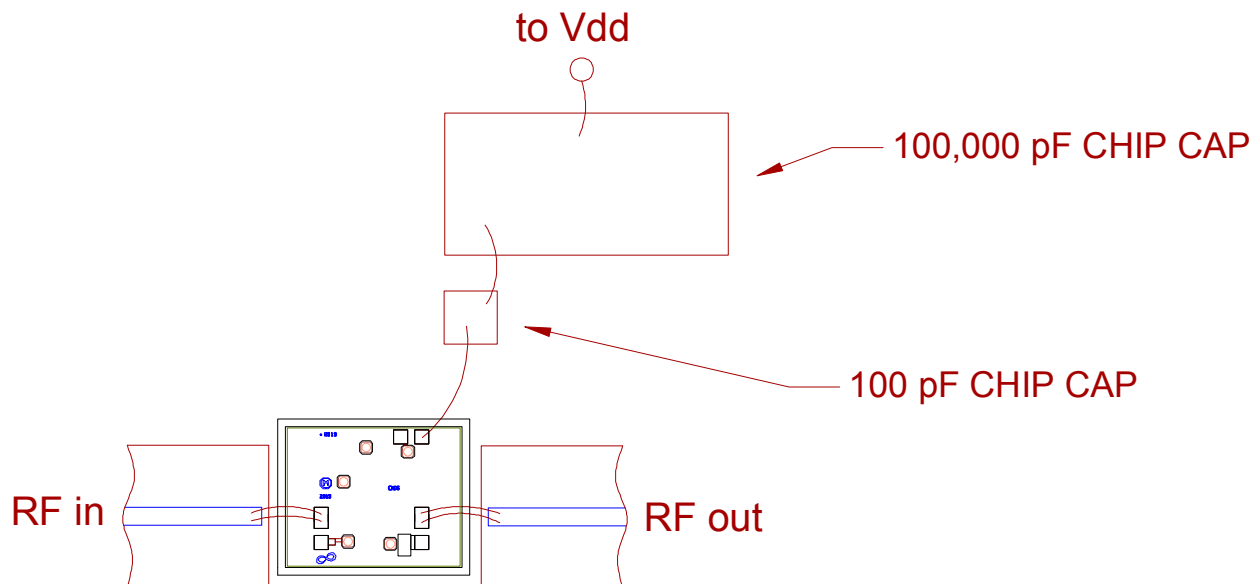
Assembly Guidelines

The backside of the CMD158 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 85 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.

ver 1.1 0516

*Applications Information***Biasing and Operation**

The CMD158 is biased with a positive drain supply. Performance is optimized when the drain voltage is set to +5.0 V, though it may be set to a minimum of +3.0 V and a maximum of +6.0 V.

Turn ON procedure:

1. Apply drain voltage V_{dd} and set to +5 V

Turn OFF procedure:

1. Turn off drain voltage V_{dd}

RF power can be applied at any time.