

### Product Overview

The CMD326 is a wideband GaAs MMIC low phase noise amplifier ideally suited for military, space, and communications systems. At 10 GHz, the device delivers 14.4 dB of gain, has a saturated output power of +24.4 dBm, and has a noise figure of 3.5 dB. Also, with an input signal of 6 GHz, the amplifier has a very low additive phase noise of -165 dBc/Hz at 10 kHz offset. The CMD326 is a 50 ohm matched design which eliminates the need for RF port matching. The CMD326 offers full passivation for increased reliability and moisture protection.

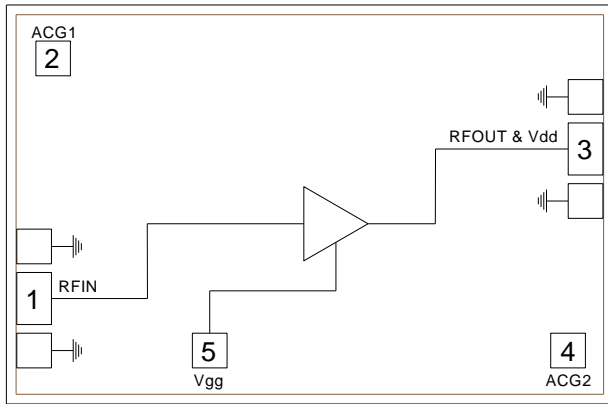
### Key Features

- Wide Bandwidth
- Low Phase Noise
- Positive Gain Slope
- High Power Output
- Small Die Size

### Ordering Information

Part No.	Description
CMD326	Gel Pack Qty=25, MOQ=50

### Functional Block Diagram



### Electrical Performance ( $V_{dd} = 5.0\text{ V}$ , $V_{gg} = 3.0\text{ V}$ , $T_A = 25^\circ\text{ C}$ , $F = 10\text{ GHz}$ )

Parameter	Min	Typ	Max	Units
Frequency Range		DC - 18		GHz
Gain		14.4		dB
Input Return Loss		20		dB
Output Return Loss		18		dB
Noise Figure		3.5		dB
Output P1dB		22.5		dBm
Saturated Output Power		24.4		dBm
Phase Noise @ 10 kHz Offset		-165		dBc/Hz
Supply Current		180		mA

## Absolute Maximum Ratings

Parameter	Rating
Drain Voltage, $V_{dd}$	6.0 V
Gate Voltage, $V_{gg}$	4.0 V
RF Input Power	+20 dBm
Channel Temperature, $T_{ch}$	150° C
Power Dissipation, $P_{diss}$	1.625 W
Thermal Resistance, $Q_{JC}$	40° 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	5.5	V
$I_{dd}$		180		mA
$V_{gg}$	0	3.0	4.0	V
$I_{gg}$		3.3		mA

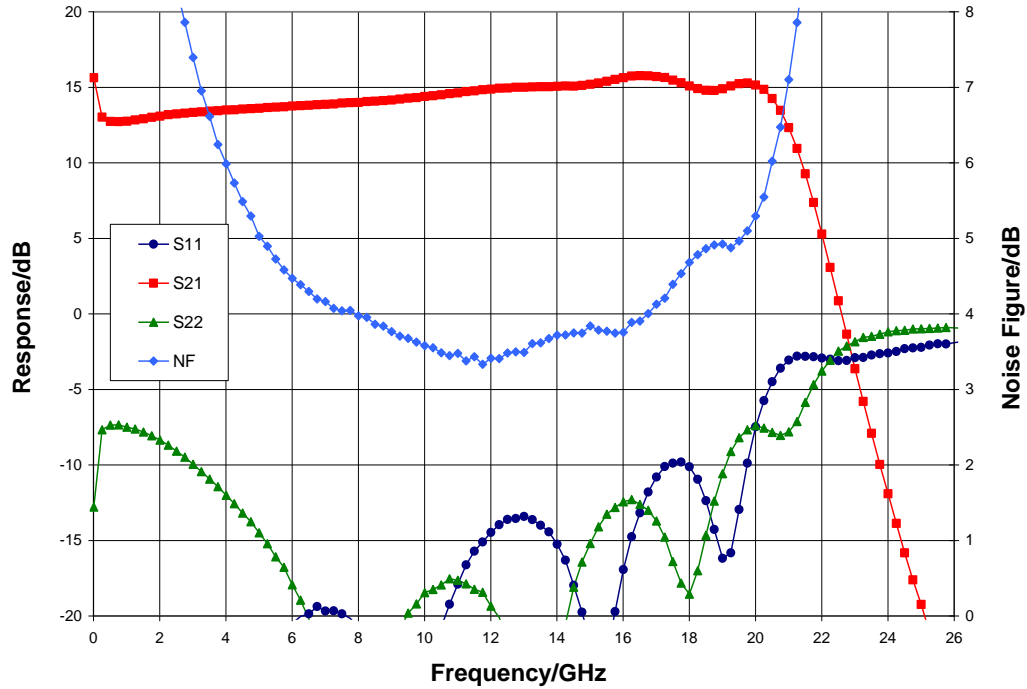
Electrical performance is measured at specific test conditions. Electrical specifications are not guaranteed over all recommended operating conditions.

## Electrical Specifications ( $V_{dd} = 5.0$ V, $V_{gg} = 3.0$ V, $T_A = 25^\circ$ C)

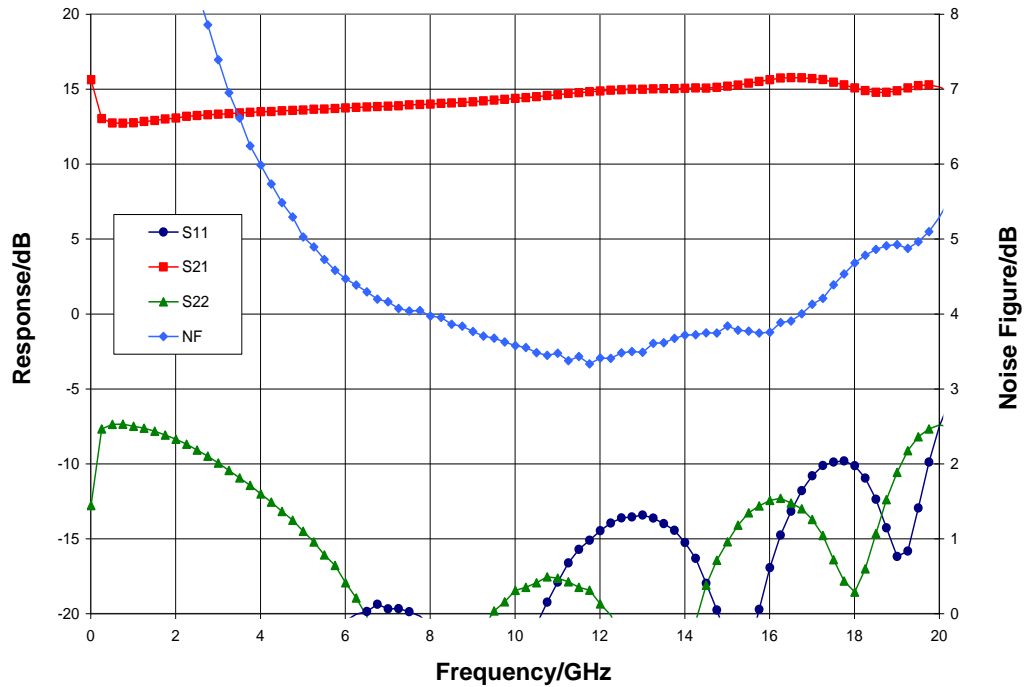
Parameter	Min	Typ	Max	Min	Typ	Max	Units
Frequency Range	DC - 14			14 - 18			GHz
Gain	11.5	14		13	15		dB
Noise Figure		4			3.75		dB
Input Return Loss		14			10		dB
Output Return Loss		8			12		dB
Output P1dB	21	22.5		17.5	19		dBm
Saturated Output Power		24.4			21		dBm
Output IP3		34			30		dBm
Phase Noise @ 10 kHz Offset		-165			-165		dBc/Hz
Supply Current	150	180	210	150	180	210	mA

Typical Performance

Broadband Performance,  $V_{dd} = 5.0\text{ V}$ ,  $V_{gg} = 3.0\text{ V}$ ,  $I_{dd} = 180\text{ mA}$ ,  $T_A = 25^\circ\text{C}$

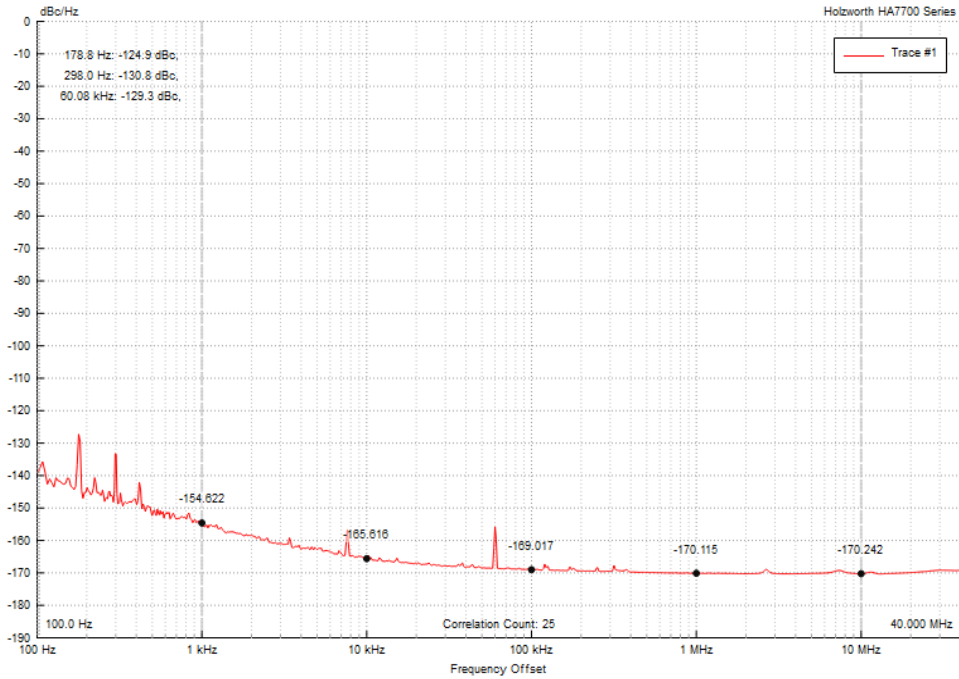


Narrow-band Performance,  $V_{dd} = 5.0\text{ V}$ ,  $V_{gg} = 3.0\text{ V}$ ,  $I_{dd} = 180\text{ mA}$ ,  $T_A = 25^\circ\text{C}$

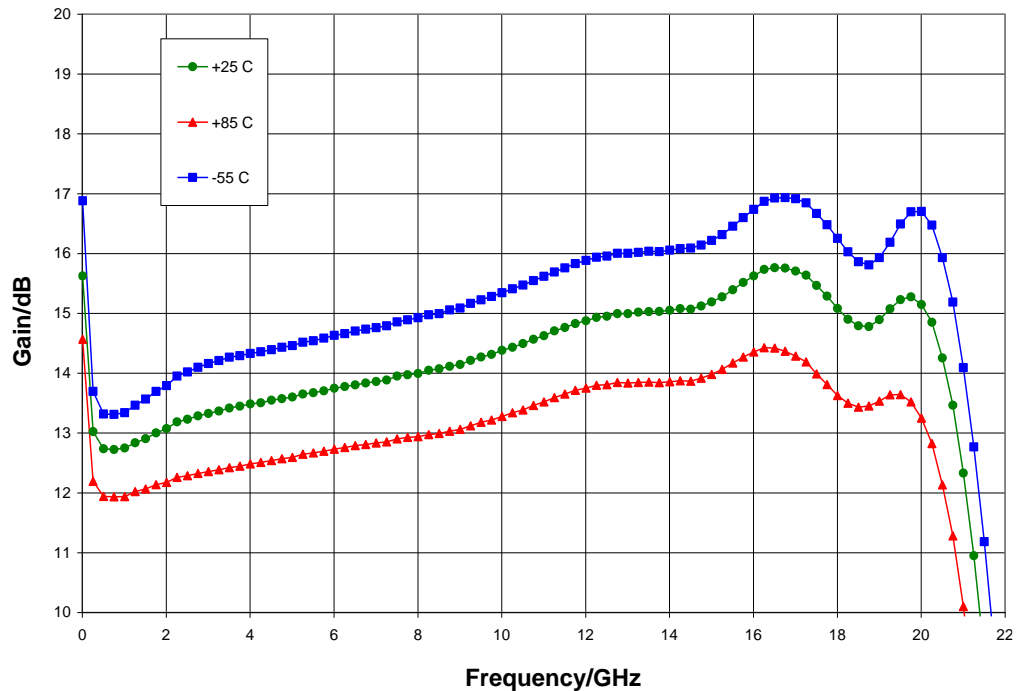


Typical Performance

Additive Phase Noise @ Psat, V<sub>dd</sub> = 5.0 V, V<sub>gg</sub> = 3.0 V, T<sub>A</sub> = 25° C, F = 6 GHz

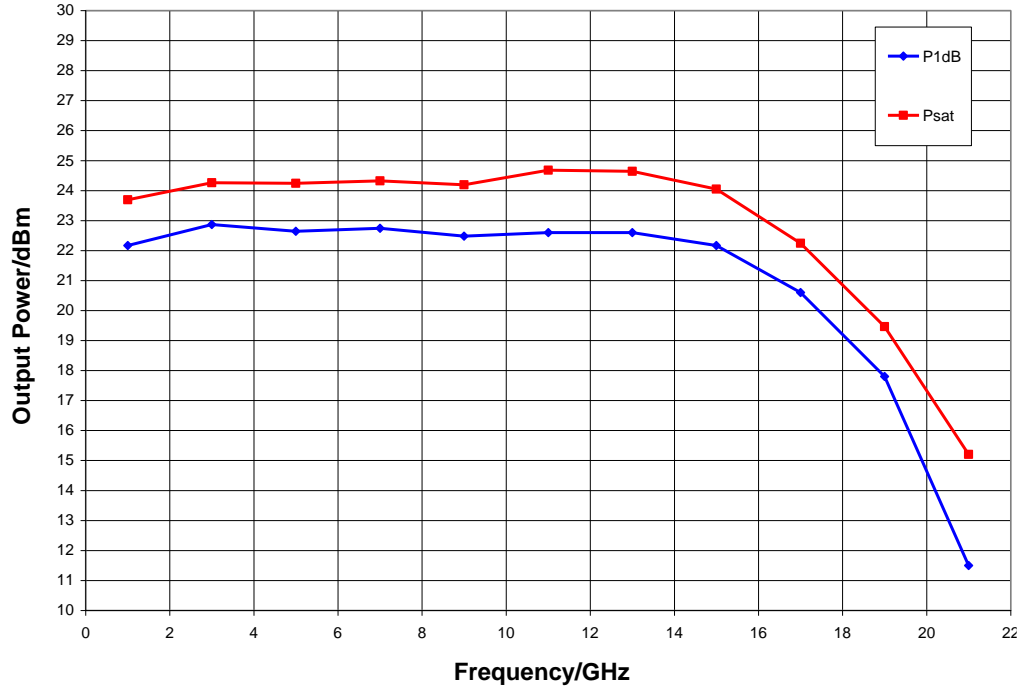


Gain vs. Temperature, V<sub>dd</sub> = 5.0 V, V<sub>gg</sub> = 3.0 V

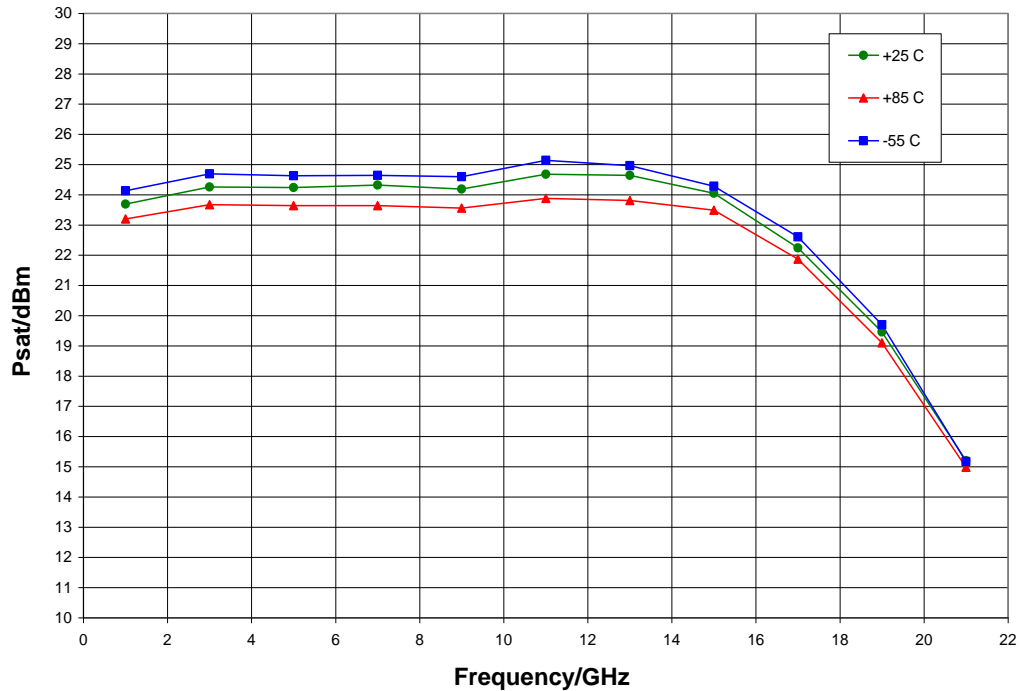


Typical Performance

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

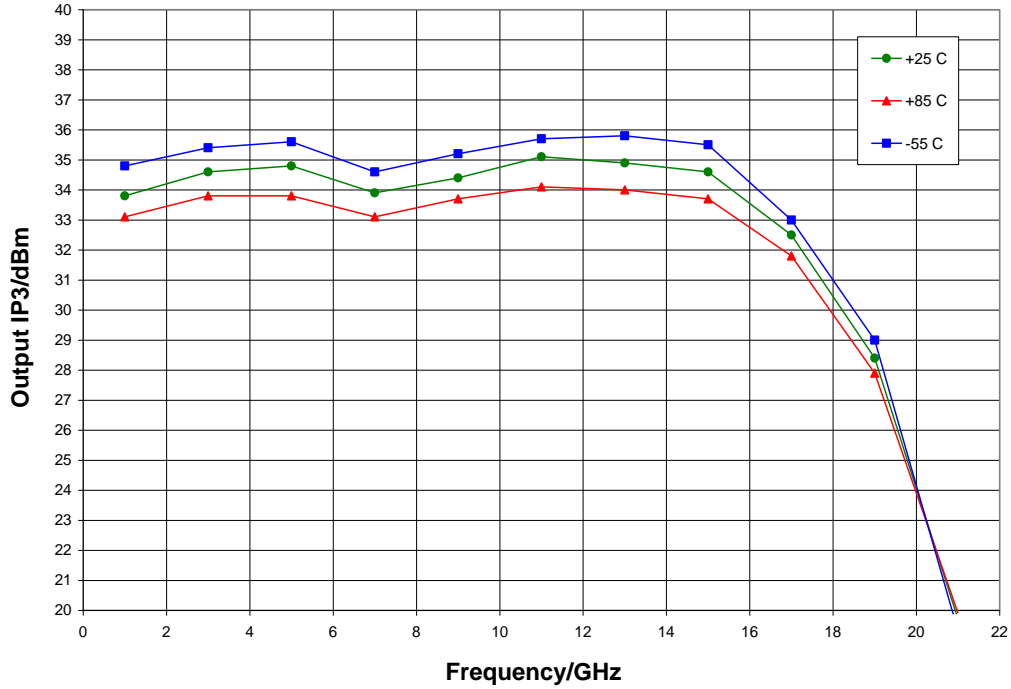


Psat vs. Temperature,  $V_{dd} = 5.0\text{ V}$ ,  $V_{gg} = 3.0\text{ V}$

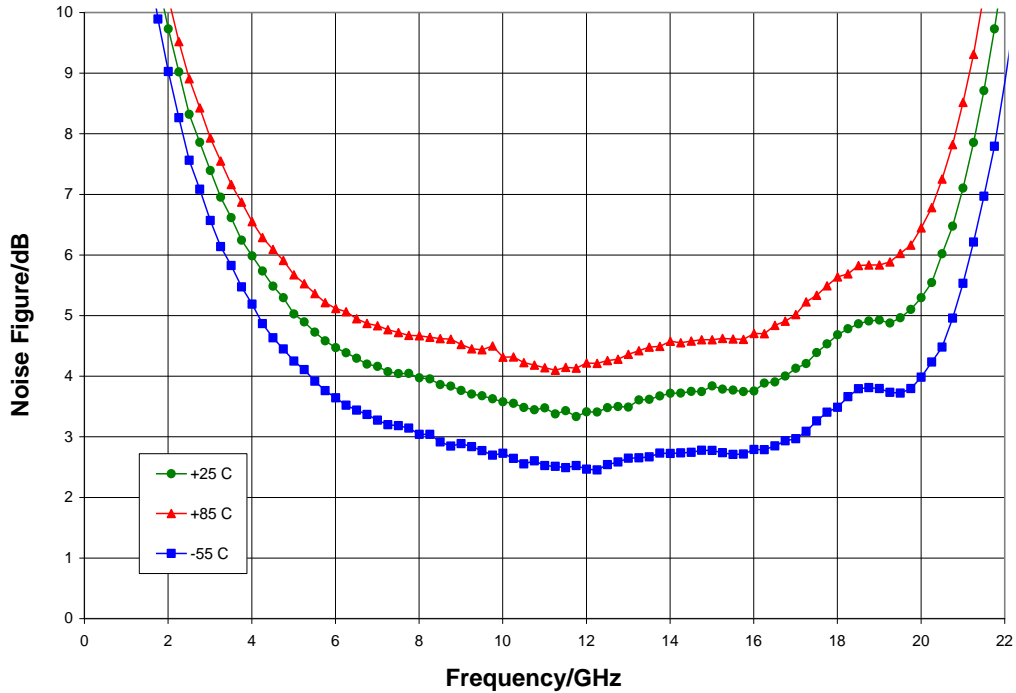


Typical Performance

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



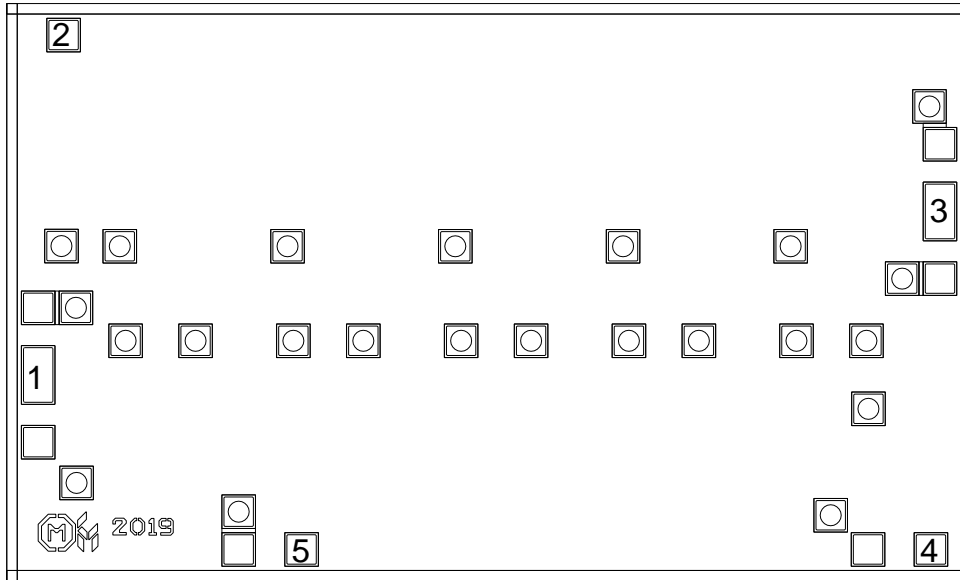
Noise Figure vs. Temperature,  $V_{dd} = 5.0\text{ V}$ ,  $V_{gg} = 3.0\text{ V}$





Pad Description

Pad Diagram



Functional Description

Pin	Function	Description	Schematic
1	RF in	50 ohm matched input	
2	ACG1	Low frequency termination Attach bypass capacitors per application circuit	
3	RF out & V <sub>dd</sub>	Power supply voltage and 50 ohm matched output	
4	ACG2	Low frequency termination Attach bypass capacitors per application circuit	
5	V <sub>gg</sub>	Power supply voltage Decoupling and bypass caps required	
Backside	Ground	Connect to RF / DC ground	



## Applications Information

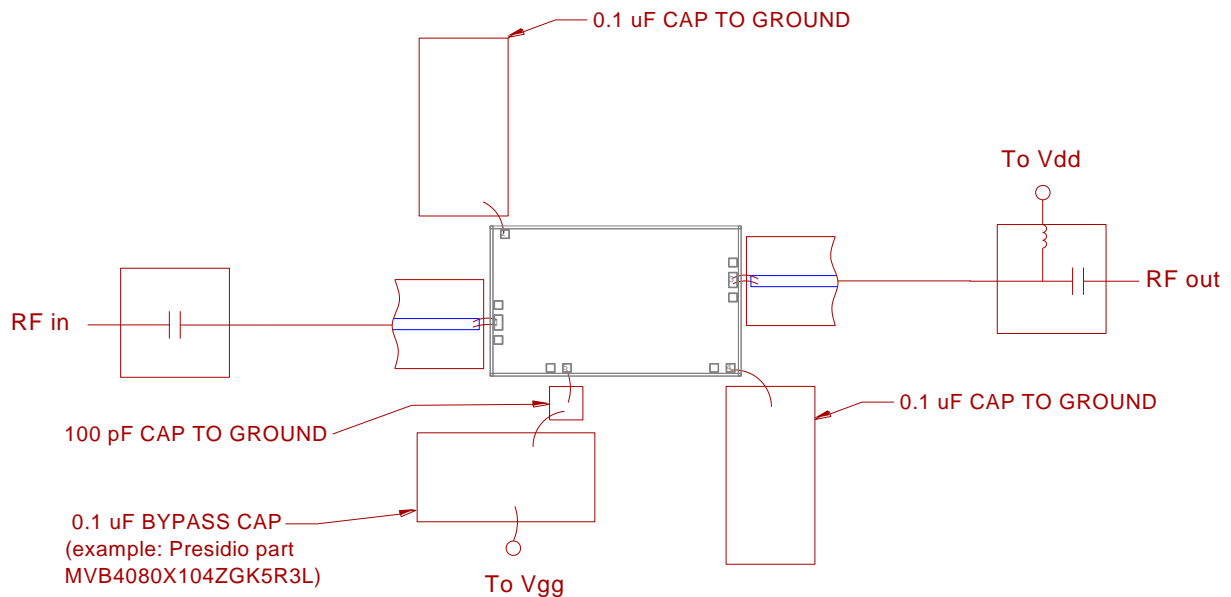
### Assembly Guidelines

The backside of the CMD326 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  $\mu\text{m}$  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 CMD326 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. Note that the turn ON and turn OFF sequence as described below is recommended but not required.

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  $V_{dd}$

Refer to Application Note 103: Amplifier Biasing Techniques for instructions on how to implement a single supply biasing scheme.

RF power can be applied at any time.

## 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 ( $C_{15}H_{12}Br_4O_2$ ) Free
- SVHC Free
- PFOS Free
- Halogen Free



## Contact Information

---

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

**Web:** [www.qorvo.com](http://www.qorvo.com)

**Tel:** 1-844-890-8163

**Email:** [customer.support@qorvo.com](mailto:customer.support@qorvo.com)