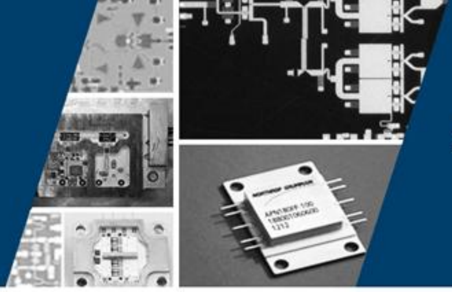
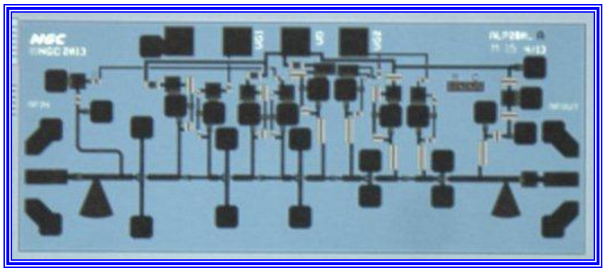
ALP280
80-100 GHz
Low Noise Amplifier



NORTHROP GRUMMAN

Product Datasheet

Revision: April 2014



X = 2.0mm Y = 0.85mm

Product Features

- RF frequency: 80-100 GHz
- Broadband Operation
- Linear gain: 29 dB, typical
- Noise Figure: 2 dB, typical
- P1dB : 3 dBm *
- Microstrip Topology MMIC, In-line Input & Output
- 0.1 um InP HEMT Process
- 3 mil substrate
- DC Power: < 35 mW
- Die Size 1.7 sq. mm

Applications

- W-Band Imaging
- Sensors
- Radar
- Short Haul / High Capacity Links
- W-Band Communication Links

Product Description

The ALP280 W-band InP HEMT Low Noise Amplifier is a 5-Stage, broadband, ultra low noise amplifier MMIC. It can be used in applications such as W-band Imaging, Radar, commercial digital microwave radios and wireless LANs. The small die size allows for extremely compact packaging. To ensure rugged and reliable operation, HEMT devices are fully passivated. Both bond pad and backside metallization are Ti/Au, which is compatible with conventional die attach, thermocompression and thermosonic wire bonding assembly techniques.

Performance Characteristics (Ta = 25°C)

Specification	Min	Typ	Max	Unit
Frequency	80		100	GHz
Linear Gain	25	29		dB
Input Return Loss	4	10		dB
Output Return Loss	5	12		dB
Noise Figure		2	3.5	dB
Noise Figure (Ave.)		2.6	3	dB
P1dB *		3		dBm
Vd		1.3		V
Vg1=Vg2		-0.1		V
Id1		25.5		mA

Absolute Maximum Ratings (Ta = 25°C)

Parameter	Min	Max	Unit
Vd1		1.3	V
Vg1, vg2	-1	0.4	V
Id2		25.5	mA
Input Drive Level *		-24	dBm
Assy. Temperature		150	deg. C

* Estimated

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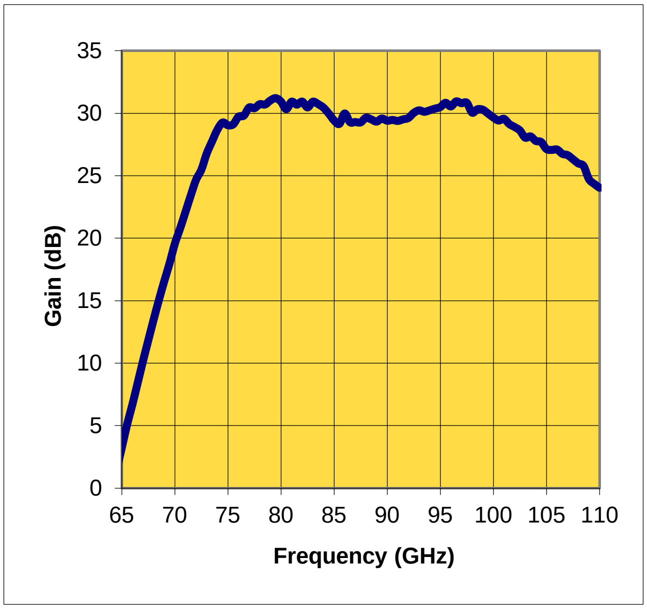
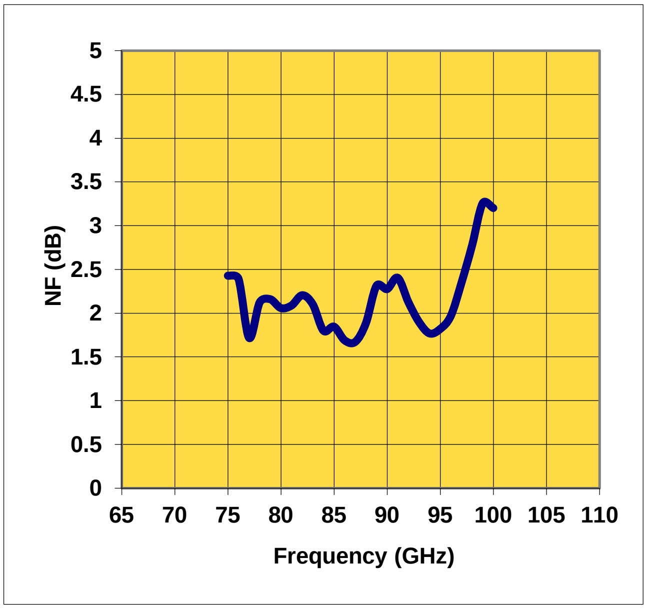
Measured Performance Characteristics (Typical Performance at 25°C)
Vd = 1.3 V, Id = 25.5 mA* - Wideband Performance

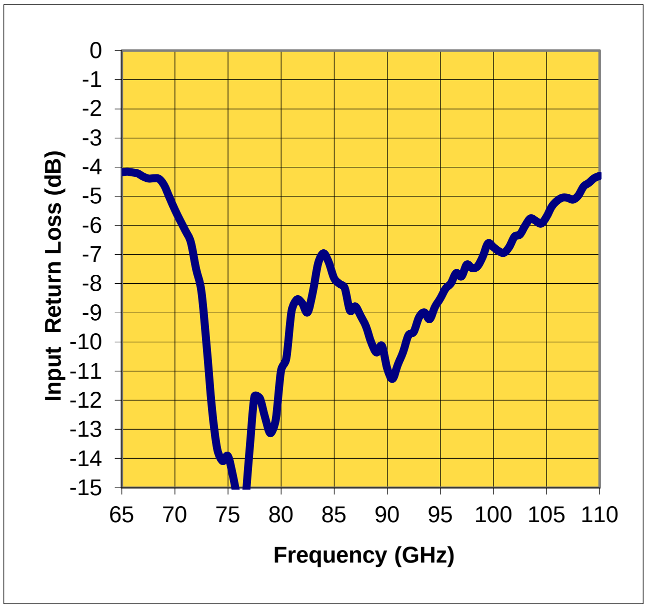
Linear Gain vs. Frequency



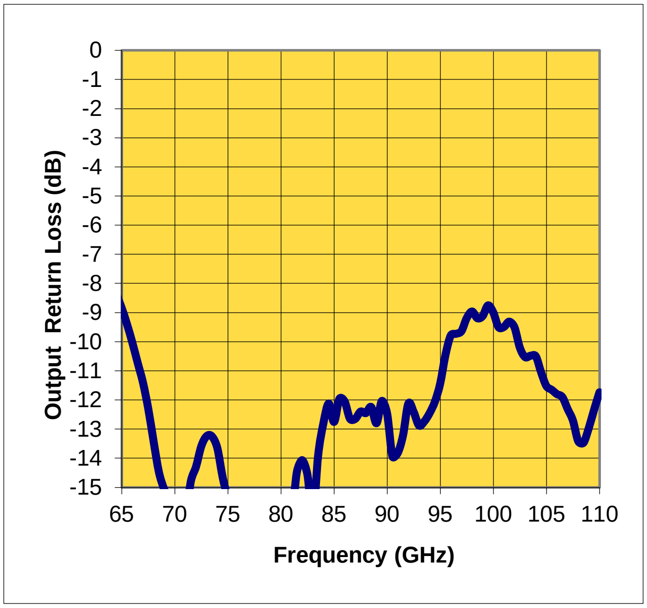
Noise Figure vs. Frequency



Input Return Loss vs. Frequency



Output Return Loss vs. Frequency



* On-Wafer, Vg1=Vg2

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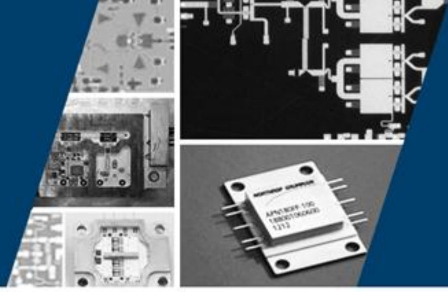
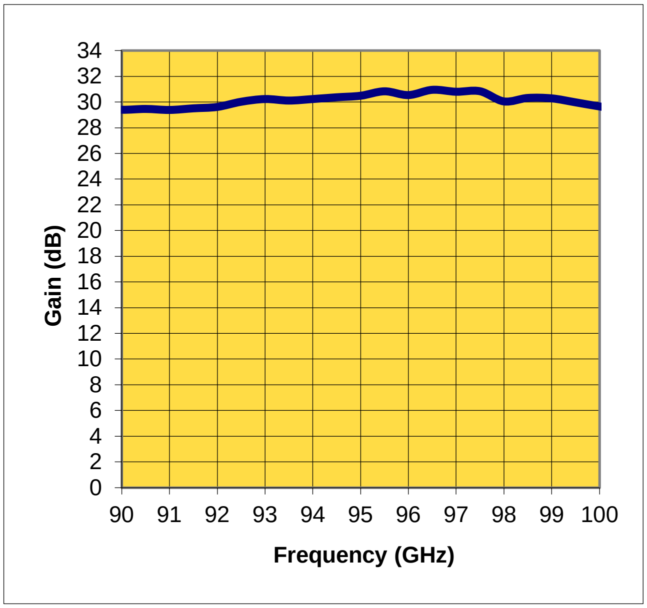


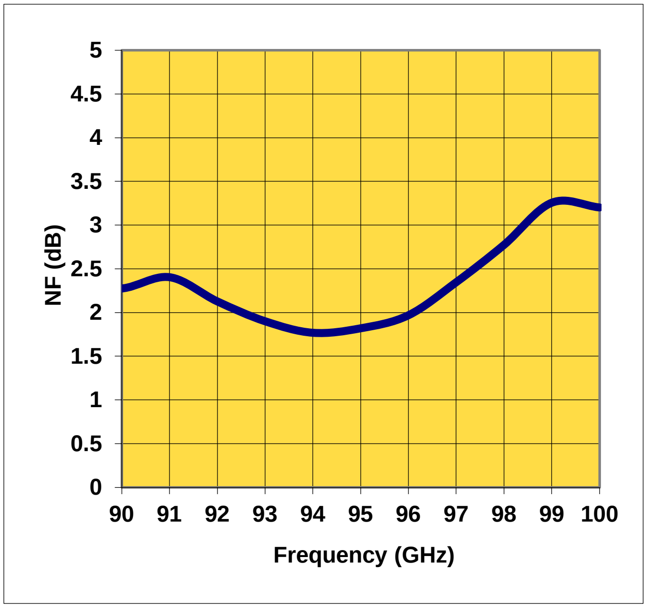
NORTHROP GRUMMAN

Measured Performance Characteristics (Typical Performance at 25°C)
Vd = 1.3 V, Id = 25.5 mA* - Performance from 90 GHz to 100 GHz

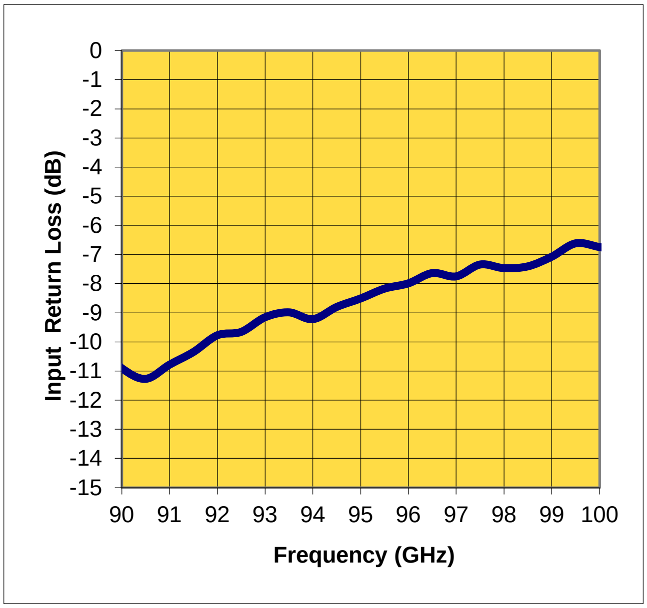
Linear Gain vs. Frequency



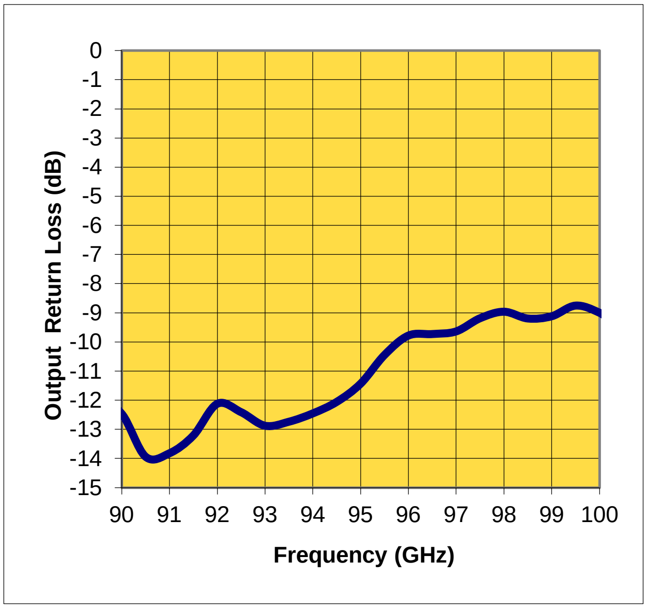
Noise Figure vs. Frequency



Input Return Loss vs. Frequency



Output Return Loss vs. Frequency



* On-Wafer, Vg1=Vg2

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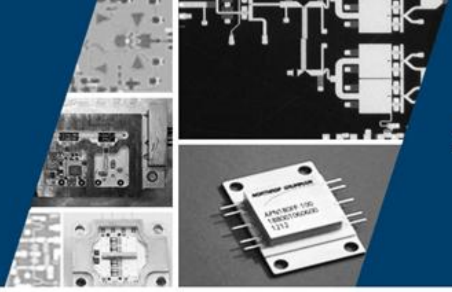
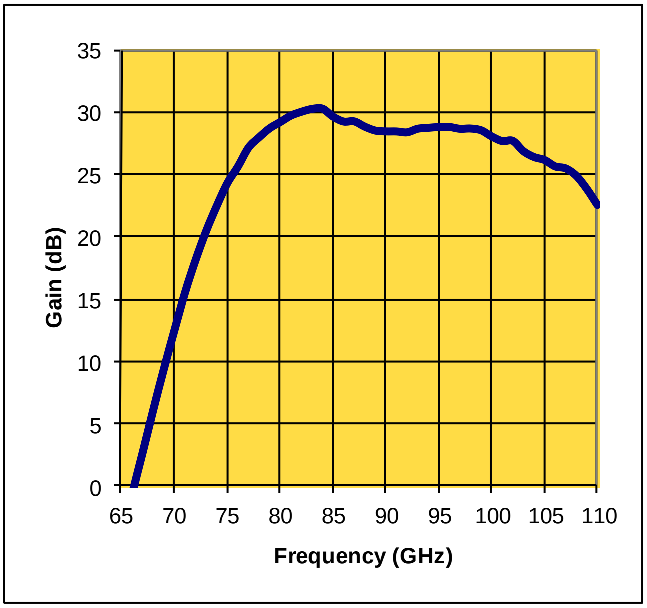


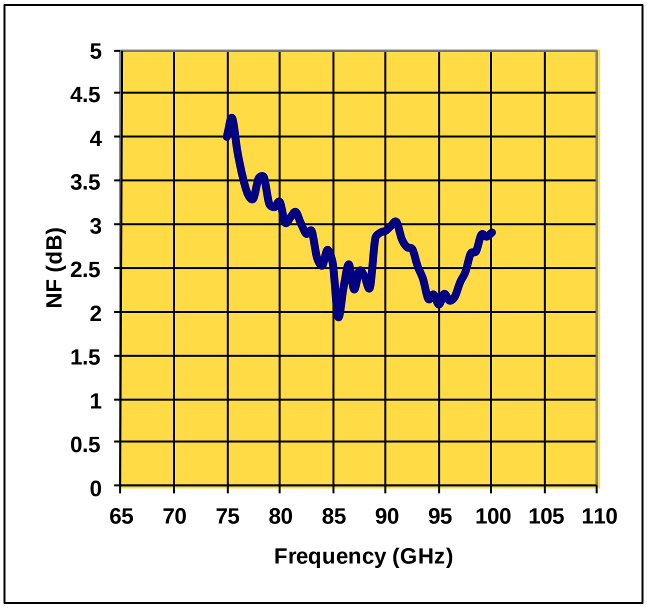
NORTHROP GRUMMAN

Measured Performance Characteristics (Typical Performance at 25°C)
Vd = 1.3 V, Id = 25.5 mA** - Wideband Performance

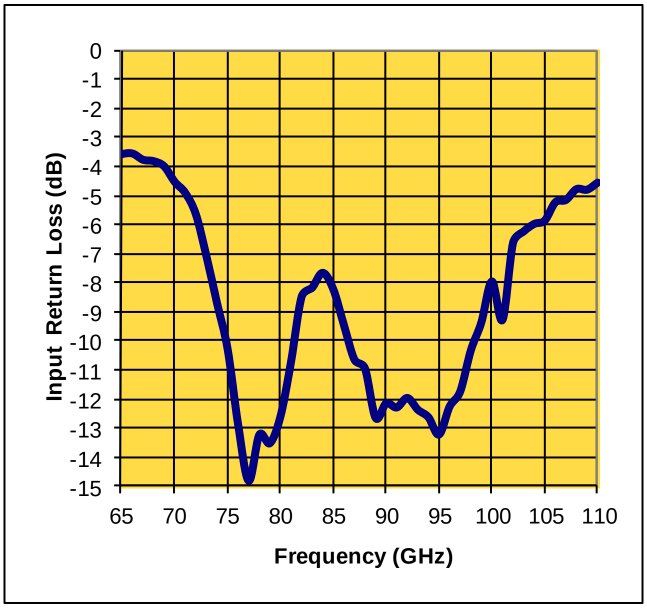
Linear Gain vs. Frequency



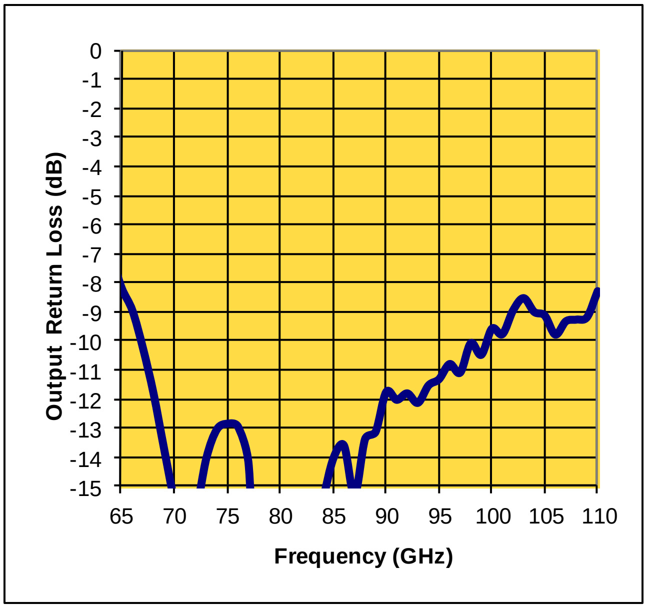
Noise Figure vs. Frequency



Input Return Loss vs. Frequency



Output Return Loss vs. Frequency



* On-Wafer, Vg1 & Vg2 biased Independently

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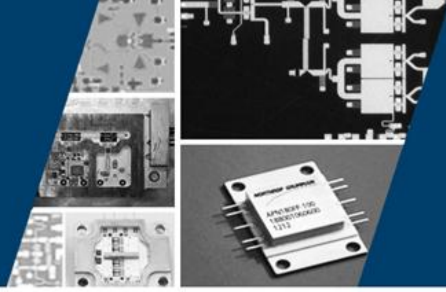
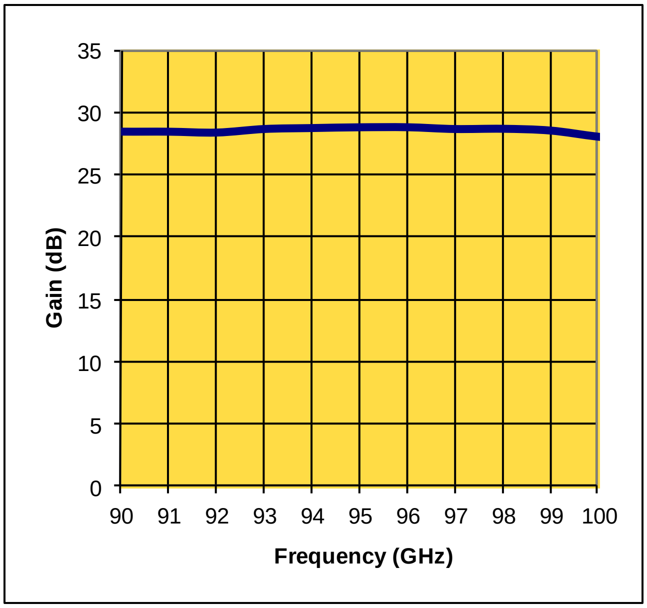
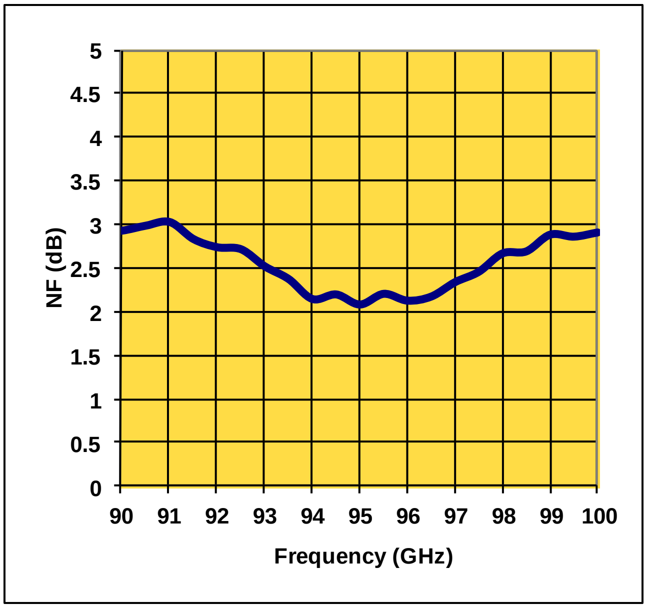


Measured Performance Characteristics (Typical Performance at 25°C)
Vd = 1.3 V, Id = 25.5 mA** - Performance from 90 GHz to 100 GHz

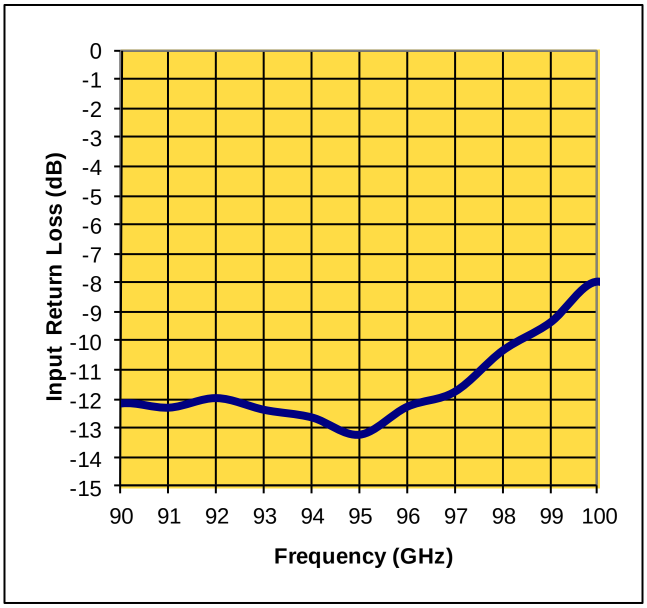
Linear Gain vs. Frequency



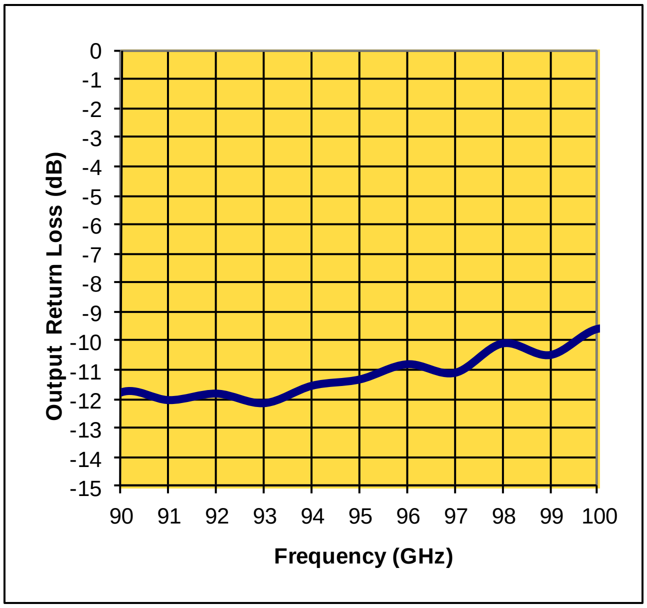
Noise Figure vs. Frequency



Input Return Loss vs. Frequency

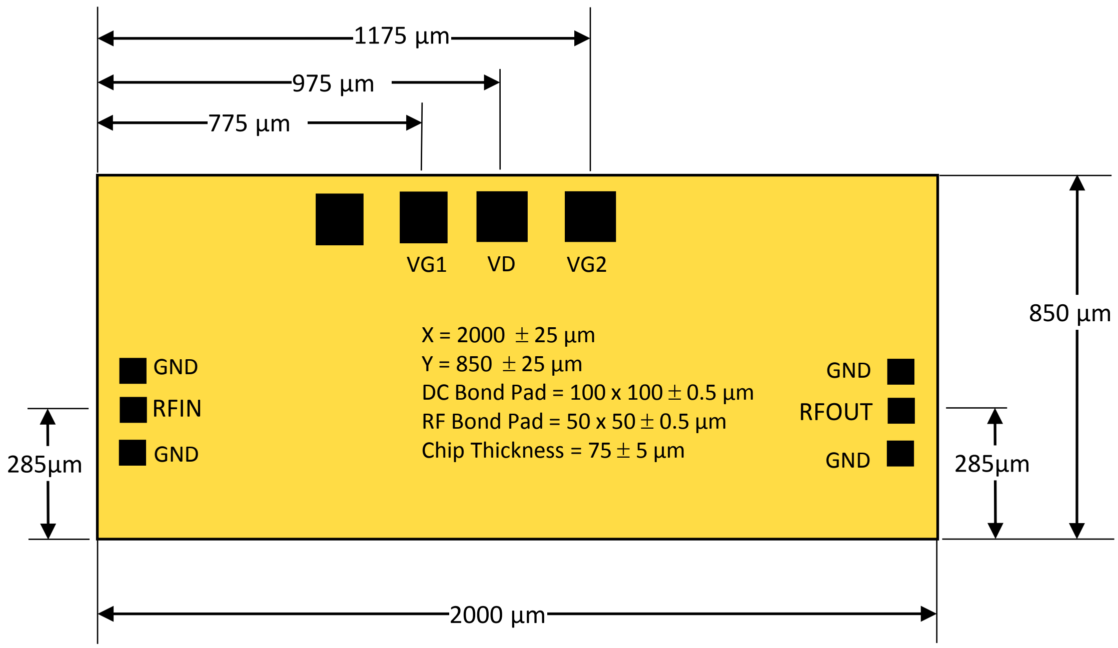


Output Return Loss vs. Frequency



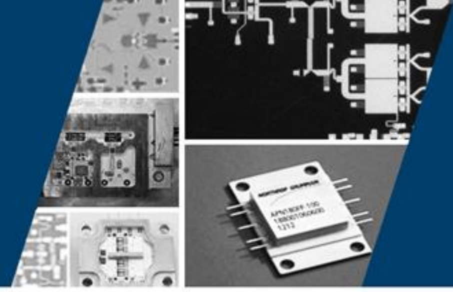
* On-Wafer, Vg1 & Vg2 biased Independently

Die Size and Bond Pad Locations (Not to Scale)

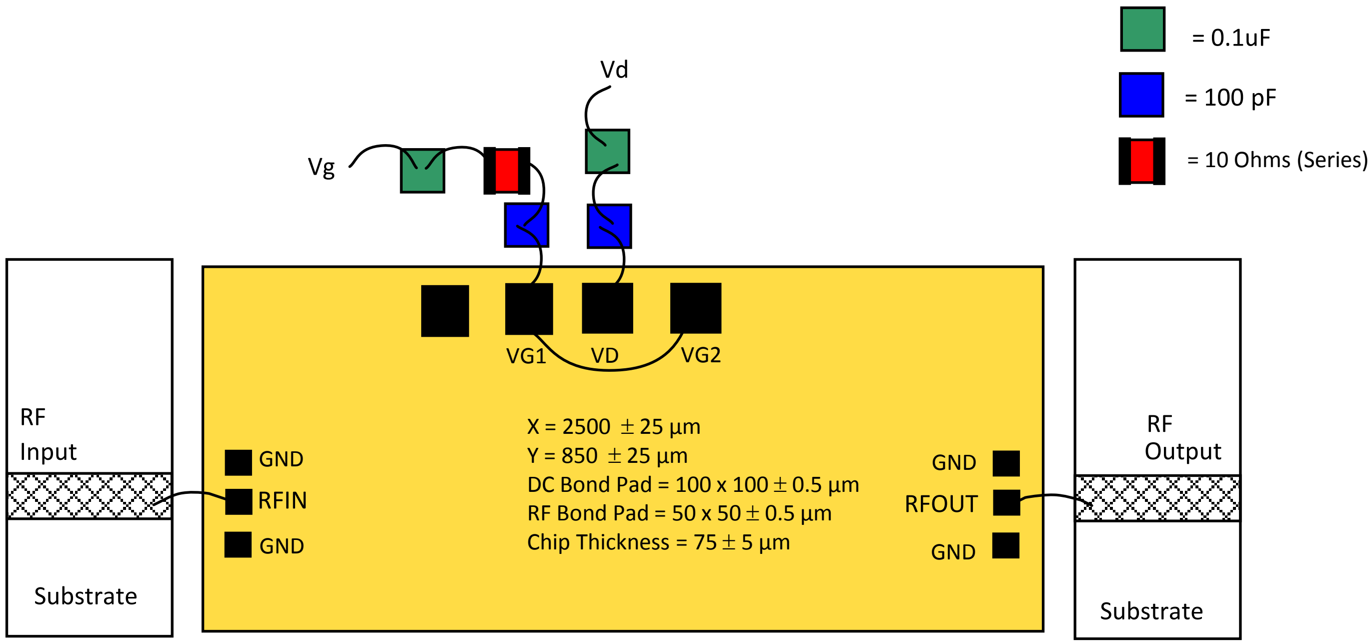


Recommended Assembly Notes

1. Bypass caps should be 100 pF (approximately) ceramic (single-layer) placed no farther than 30 mils from the amplifier.
2. Best performance obtained from use of < 6 mil (long) by 1.5 by 0.5 mil ribbons on input and output.



Suggested Bonding Arrangement



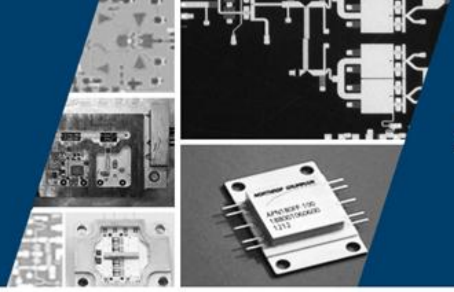
Biasing/De-Biasing Details:

Bias up sequence:

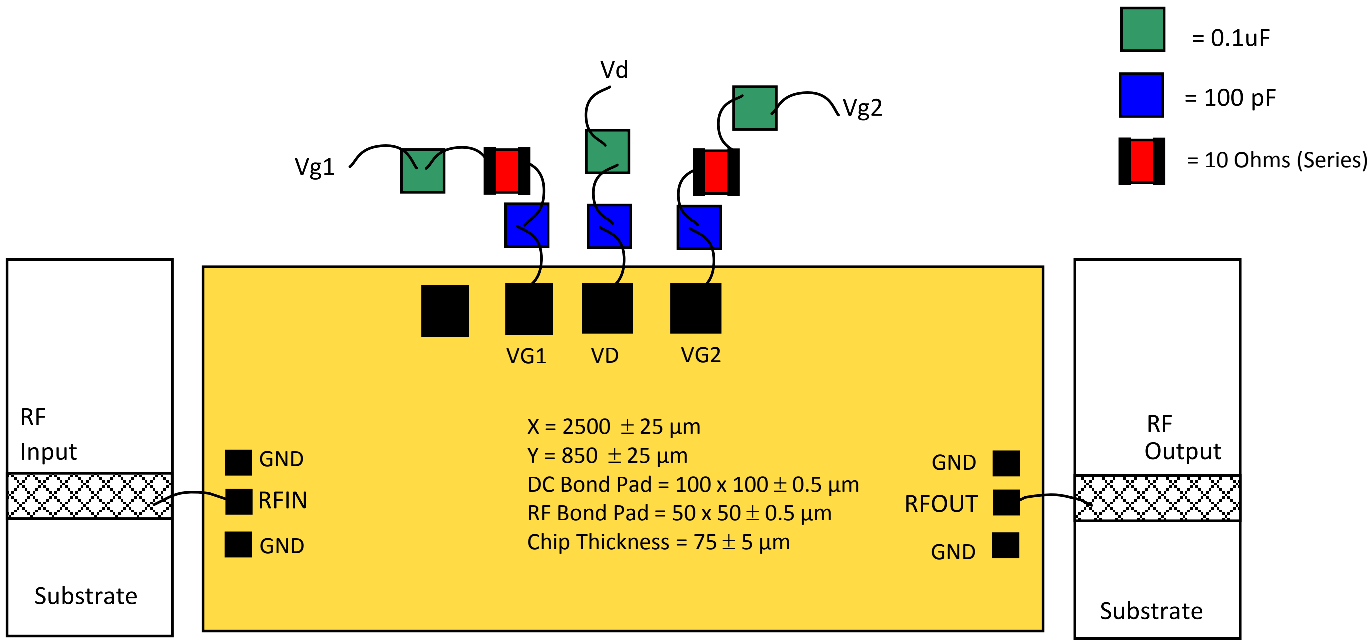
Pinch-off the device by setting Vg1 = Vg2= -0.6 and Vd = 0V
Increase Vd to the desired value
Adjust Vg1=Vg2 to realize the desired Id (Nominal Current for Id for Vg1 = Vg2 biased on is 25.5 mA)

Bias down sequence:

Reduce Vg1=Vg2 down to -0.6V
Lower Vd to 0V
Lower Vg1=Vg2 to 0V



Suggested Bonding Arrangement (Alternate Bias)



Biasing/De-Biasing Details:

Bias up sequence:

Pinch-off the device by setting Vg1 = Vg2= -0.6 and Vd = 0V
Increase Vd to the desired value
Adjust Vg1 to realize the desired Id (Nominal Current for Id for Vg1 biased on is 13.5 mA)
Adjust Vg2 to realize the desired Id (Nominal Current for Id for both Vg1 and Vg2 biased on is 25.5 mA)

Bias down sequence:

Reduce Vg2 down to -0.6V
Reduce Vg1 down to -0.6V
Lower Vd to 0V
Lower Vg1 and Vg2 to 0V

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