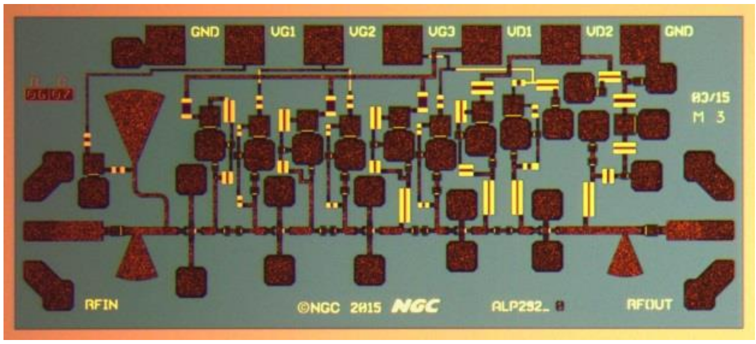
ALP292

90 – 110 GHz
InP Low Noise Amplifier

PRODUCT DESCRIPTION

The ALP292 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 commercial digital microwave Links, radios, wireless LANs, Radar, Sensors and Test Equipment. 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.



X= 1.9 mm; Y= 0.85 mm

APPLICATIONS

- W-Band Communication Links
- Short Haul / High Capacity Links
- Radar
- Sensors
- Test & Measurement Systems

PRODUCT FEATURES

- RF frequency: 90-110 GHz
- Broadband Operation
- Linear gain: 27 dB, typical
- Gain Flatness: 3.5 dB typical
- Noise Figure: 3.1 dB, typical
- P1dB : 3 dBm (Est.)
- Microstrip Topology MMIC, In-line Input & Output
- Die Size 1.62 sq. mm
- 0.1 um InP HEMT Process
- 3 mil substrate
- DC Power: < 35 mW

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NORTHROP GRUMMAN

ABSOLUTE MAXIMUM RATINGS

Parameter	Value	Unit
Drain Voltage	1.3	V
Gate Voltage Range*	-0.7 to 0.4	V
Drain Current	30	mA
Forward Gate Current	0.12	mA
Reverse Gate Current	-0.3	mA
Soldering Temperature	1.3	V

*Vgd max 2C

RECOMMENDED OPERATING CONDITIONS

Parameter	Value	Unit
Drain Voltage Range	1.3	V
Gate Voltage Range	-0.7 to 0.3	V
Vd1 Drain Current	13.5	mA
Vd2 Drain Current	12	mA

ELECTRICAL SPECIFICATIONS

Parameter	Min	Typical	Max	Unit
Operational Frequency	90		110	GHz
Small Signal S-Parameters				
Small Signal Linear Gain	24.5	27.0		dB
Gain Flatness		3.5		dB
Input Return Loss		-12	-3.5	dB
Output Return Loss		-16	-9	dB
Noise Figure				
Operational Frequency*	90		100	GHz
Noise Figure		3.1	3.3	dB

*Noise has been measured only up to 100 GHz

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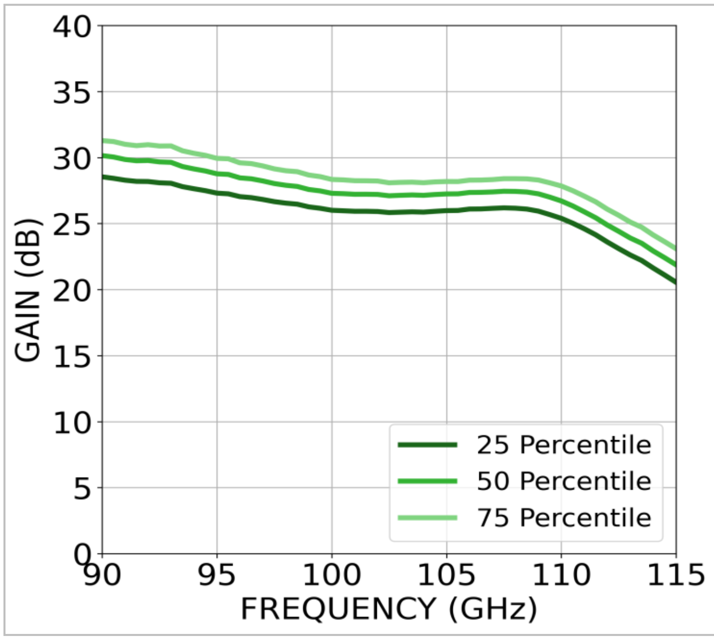
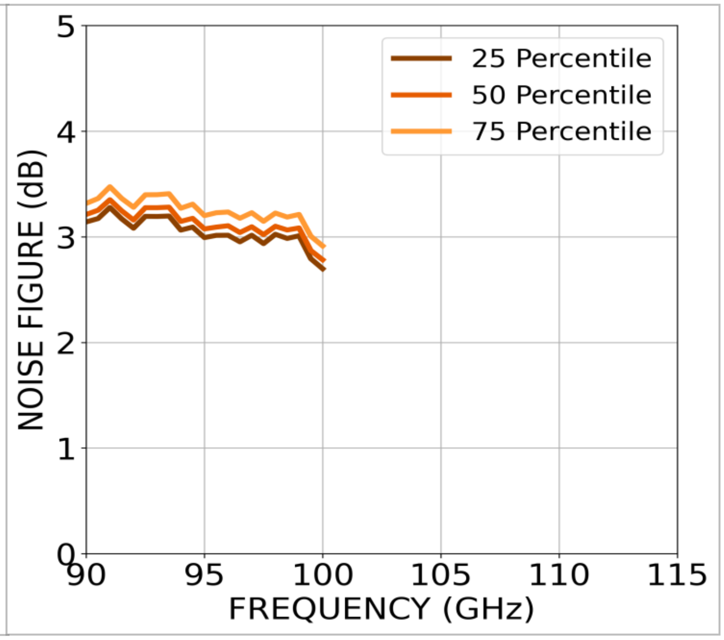
Pulsed On wafer measured Performance Characteristics (Typical Performance at 25°C)

Vd = 1.3 V, Id1 = 13.5 mA, Id2 =12 mA. *

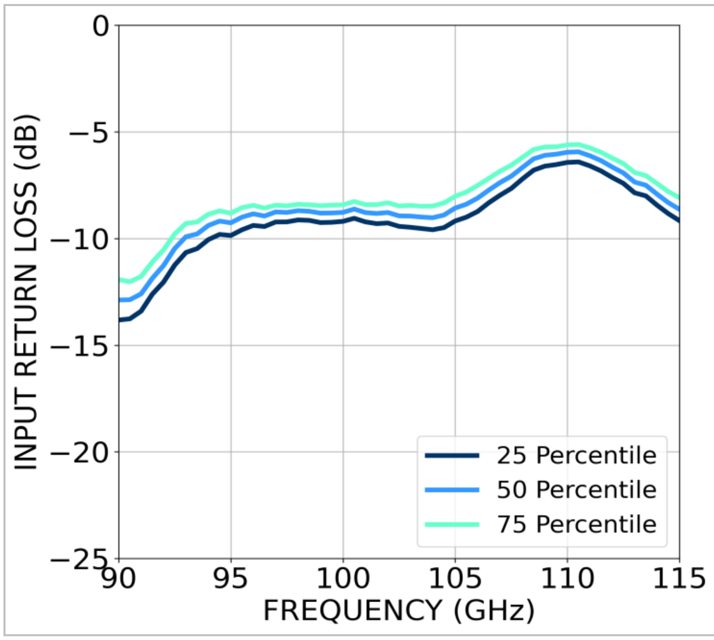
Gain vs. Frequency



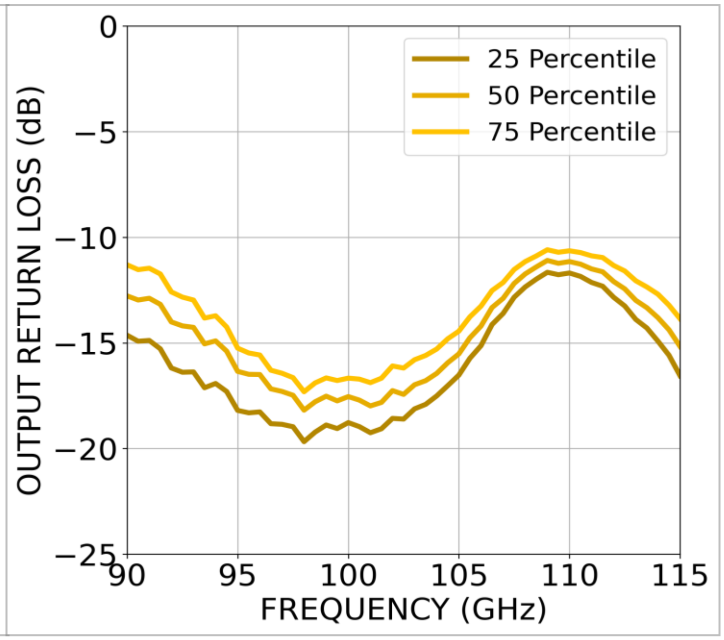
Noise vs. Frequency



Input Return Loss vs. Frequency



Output Return Loss vs. Frequency



* Pulsed-power on-wafer

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DIE SIZE AND BOND PAD LOCATIONS

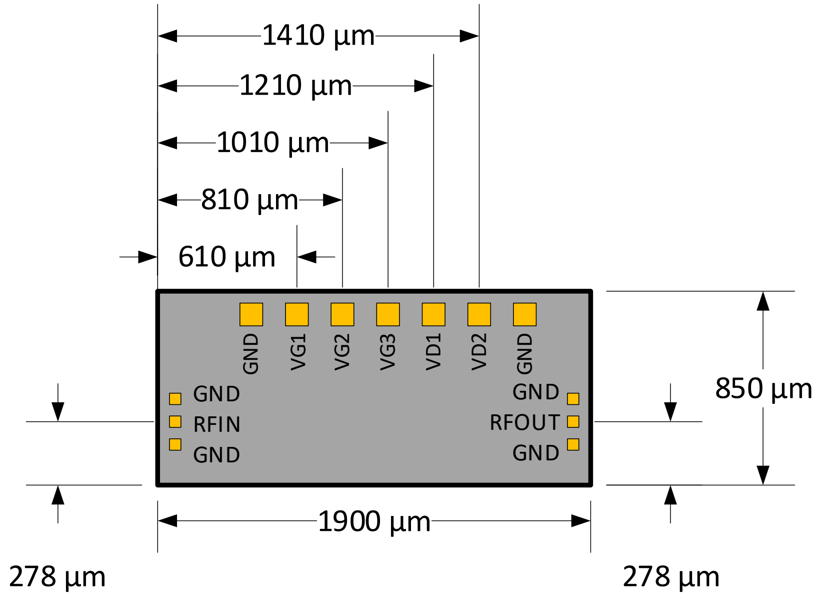
X = 1900 µm ± 25 µm

Y = 850 ± 25 µm

DC Bond Pad = 100 x 100 ± 0.5 µm

RF Bond Pad = 50 x 50 ± 0.5 µm

Chip Thickness = 75 ± 5 µm



BIASING/DE-BIASING DETAILS:

Bias up sequence:

- Set all drain and gate voltages to 0V
- Set Vg1 = Vg2 = Vg3 to -0.7V and check to make sure there is no gate current. High gate current indicates leaky devices.
- Increase Vd1 and Vd2 to +0.4V and check to make sure there are no oscillations.
- If no oscillations are evident, increase Vd1 and Vd2 voltage to recommended value (1.3V).
- Adjust Vg1 to realize the desired Id1 (4.5mA)
- Adjust Vg2 to realize the desired Id1 (13.5mA)
- Adjust Vg3 to realize the desired Id2 (12mA)

Bias down sequence:

- Set Vg1 = Vg2 = Vg3 to -0.7V
- Set Vd1 = Vd2 to 0V
- Set Vg1 = Vg2 = Vg3 to 0V

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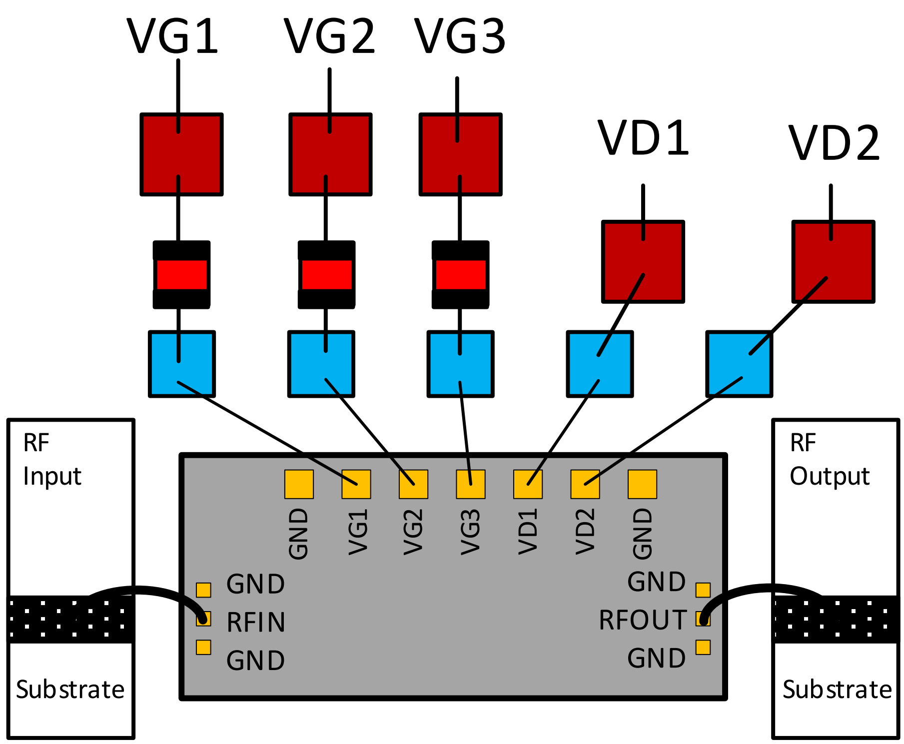
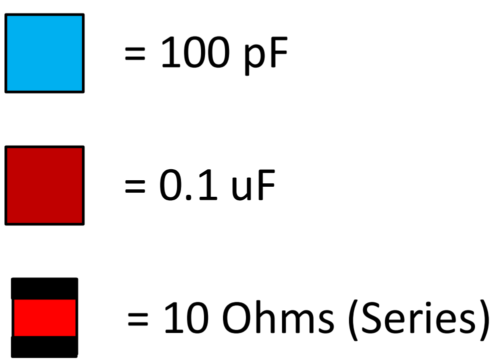
RECOMMENDED ASSEMBLY NOTES

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



GENERAL DIAGRAM SYMBOLS



MOUNTING PROCESSES

Most NG InP IC chips have a gold backing and can be mounted successfully using either a conductive epoxy or AuSn attachment. NG recommends the use of conductive epoxy due to the reduced mechanical strain placed on the chip. The two most important factors when mounting these MMICs are to provide a good thermal path and a good RF path to ground. This should be considered when determining the method for attachment.

Note: Many of the NG parts do incorporate airbridges, so caution should be used when determining the pick up tool.

CAUTION: THE IMPROPER USE OF AuSn ATTACHMENT CAN CATASTROPHICALLY DAMAGE InP CHIPS.

PLEASE ALSO REFER TO OUR "GaAs & InP Chip Handling Application Note" BEFORE HANDLING, ASSEMBLING OR BIASING THESE MMICS!

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