

I. LNA design Project:

The team changed the design from GaAs which could not guarantee the Noise figure specification, to an InP version.

Specifications:

RF frequency: 26-36GHz

Input level: -4 to 0dBm

Linear gain: 20dB min.

Input return loss: 12dB min.

Noise figure: 1.6dB max.

Output return loss: 12dB min.

P1dB 5 dB changed to P1B: > 11dBm

Supply: Self biased design (single supply)

This Ka-band LNA design is complete. However, there were a few small trade offs. Below we are providing the status of the design:

1. The Ka-Band Design is for 26-36 GHz. However, the LNA should perform from 24-38 GHz with no problem.

2. The noise figure spec of 1.6dB is met. Wintek LNA Noise Figure is <1.5dB from 26 to 36 GHz actually we expect the noise figure to be <1.4dB

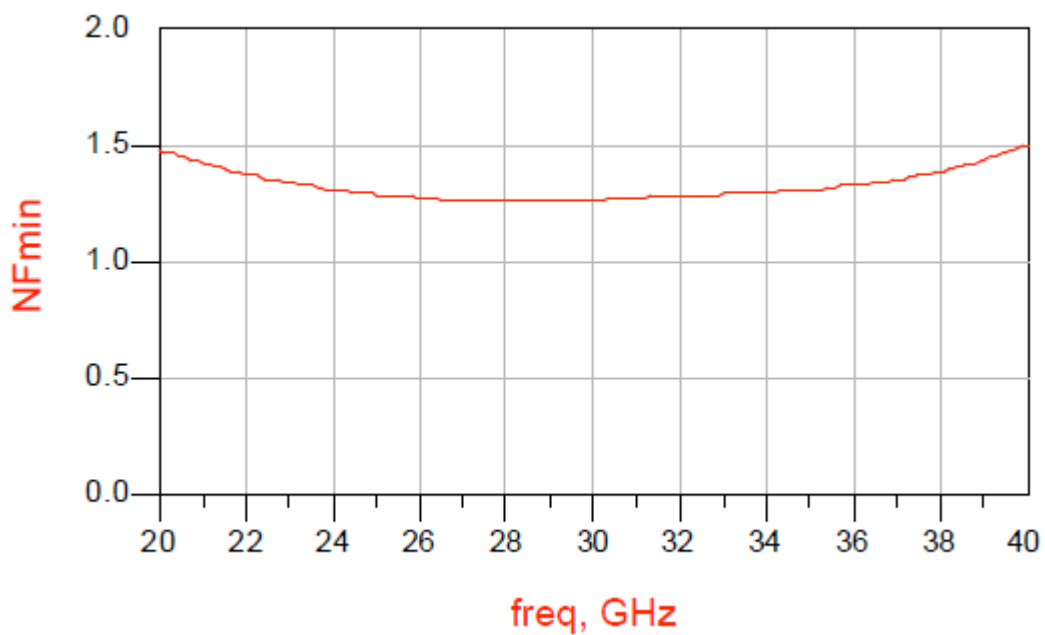
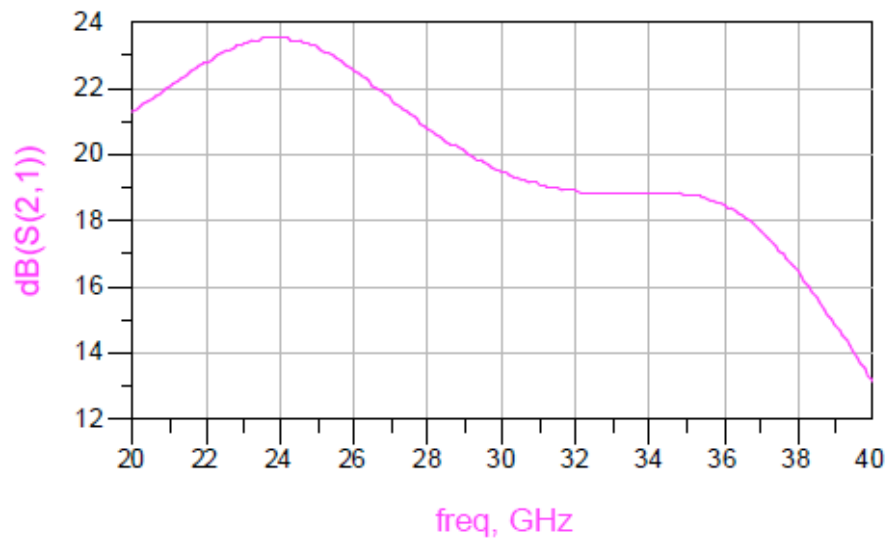
3. Size of the device are 4*25 um gate devices

4. LNA is highly stable and meet the Input and Output return loss spec of 12dB minimum.

The input power level of -4 to 0dBm will not be an issue.

5. Gain Flatness at present the Gain is not flat, it ranges from >23dB at 24 GHz to about 18.5dB at 36GHz. The design can be adjusted to a flatness of + 1db but the gain will be ~18Db.

6. Power: The power is presently $P_{sat} \sim 7\text{dBm}$ and in gain. $P_{1dB} > 5\text{dBm}$ with self biases. To get more power another stage would be needed and the noise figure will increase and the matching (Input and return loss will be out of specification).



Conclusion:

We perform the LNA design with the property given to the Noise figure spec and gain. As such, we made a few compromises to gain Flatness and Power Out. We can level the gain to ~18dB. However, to increase the power the stability and noise figure will not be compromised. The Wintek Team is ready to finalize the design and move forward unless there are any changes to further compromises.

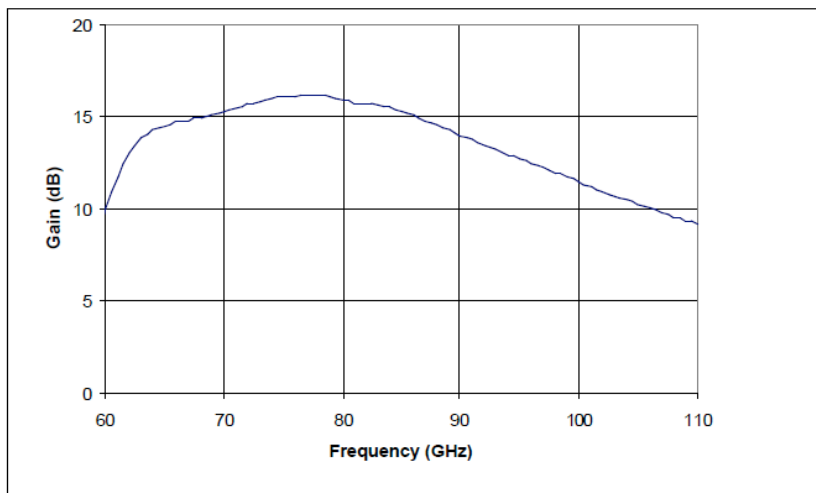
II. The 110 Multiplier Module Project.

The Wintek team focus on 110 Multiplier Module Project and the remaining item is the final stage amplification of the module from 100 to 110 GHz.. Wintek has tried nearly all of the various amplifiers and narrows it down to the present amplifier that has demonstrated the gain and power needed during the application.

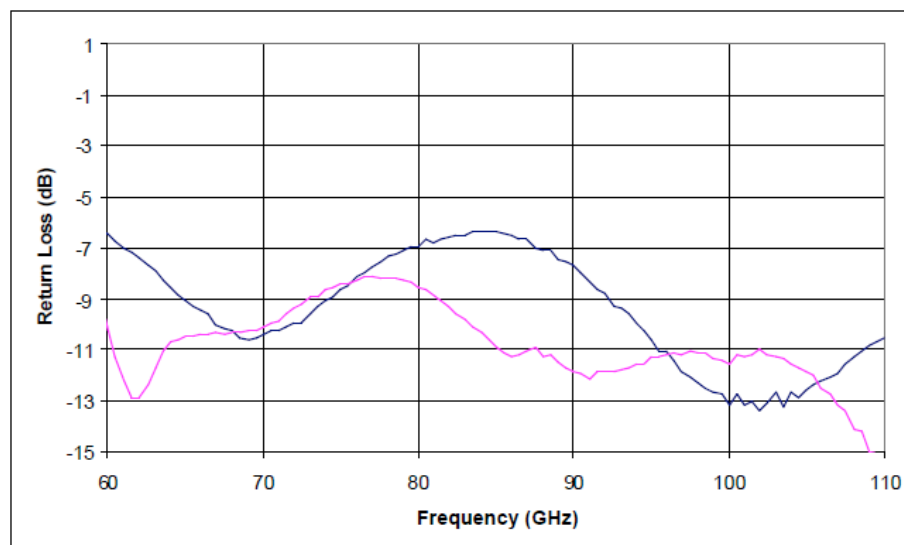
Electrical Specifications, $T_A=25^{\circ}\text{C}$, $V_d=2.0\text{ V}$, $I_d=120\text{ mA}$, $50\ \Omega$ Input and Output

Specification	Units	Min	Typ	Max
Frequency	GHz	70		100
Gain	dB	10	13	
Input Return Loss	dB		-7	-5
Output Return Loss	dB		-7	-5
Saturated Output Power	dBm		13	

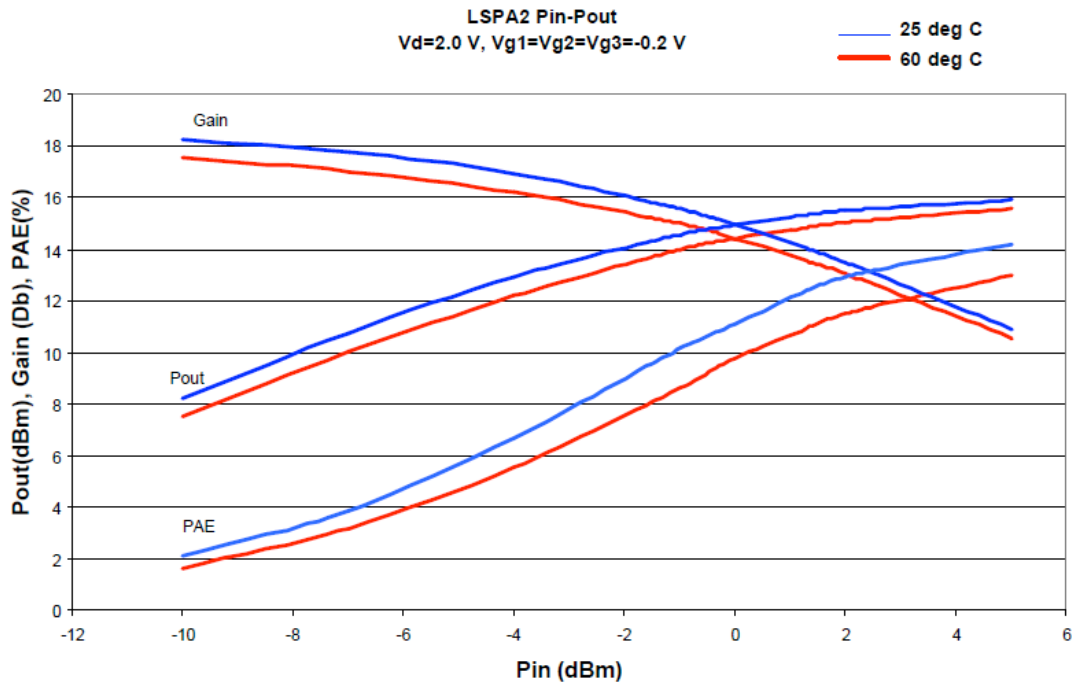
Typical Gain Performance



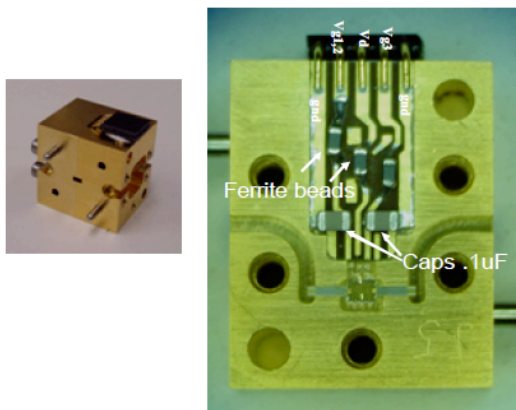
Typical Return Loss Performance



Typical Output Power Performance over Temperature



Power Amplifier Module 90-140 GHz



Waveguide Power Amplifier Module from 90-150 GHz

Closeup of WR8 Module with PA chip

