

Low Power LNA/PA

Ali Abuelmaatti

University of Glasgow

Supervision: Prof. Iain Thayne

ali.abuelmaatti@sli-institute.ac.uk

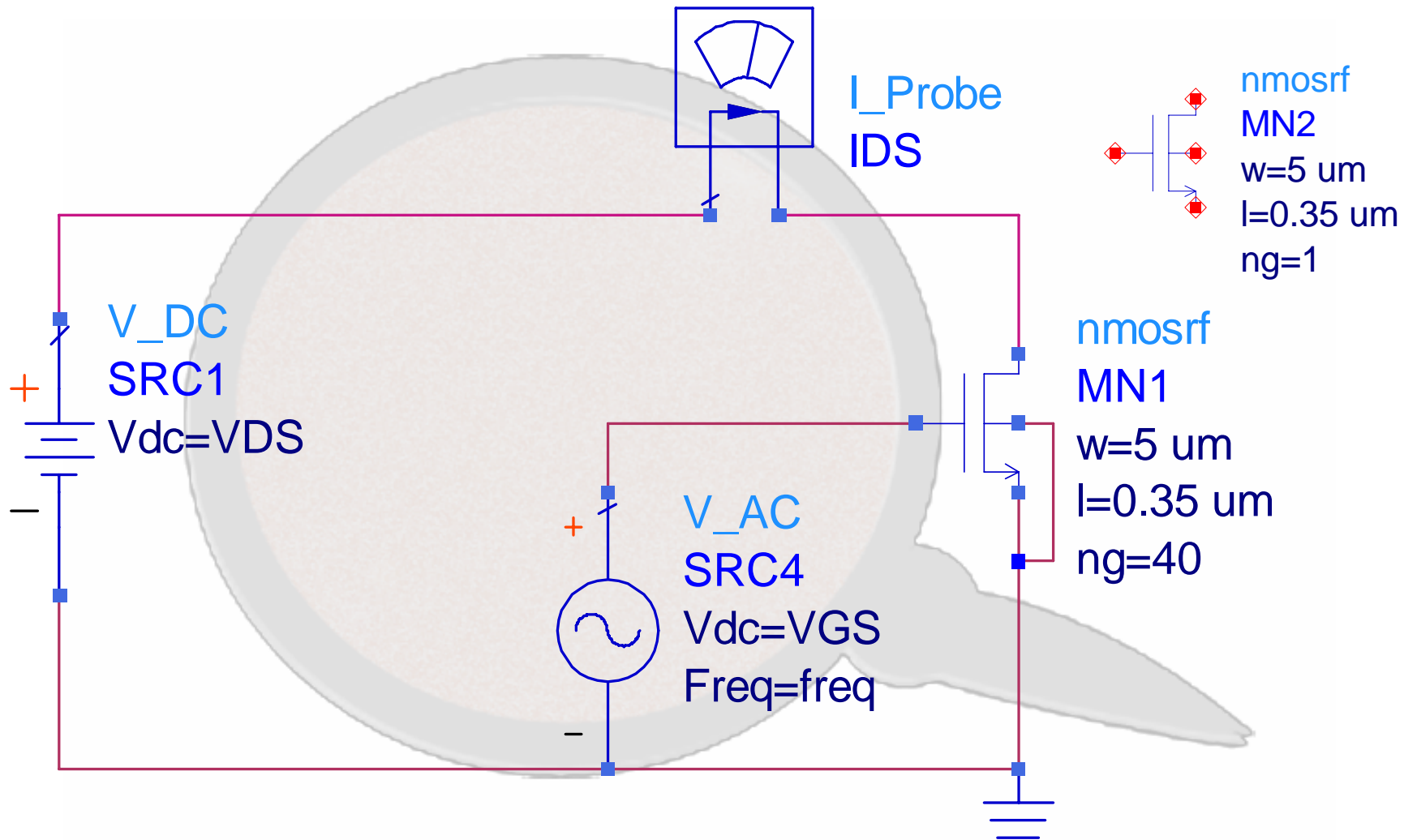


Motivation

➤ Motivation

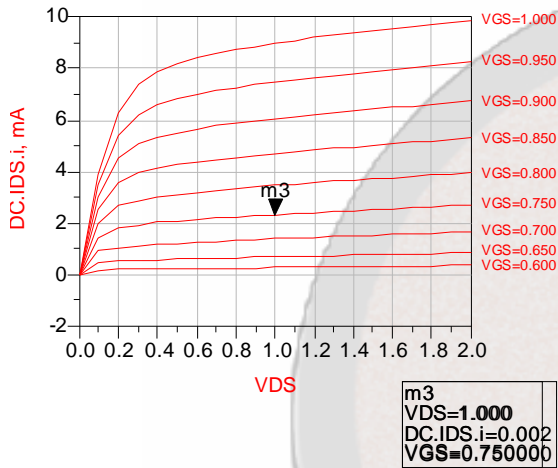
- Very high power consumption of current commercially chips.
- ZigBee is a half duplex standard
 - In a transceiver, one half of the chip is 'dead' at any point of time.
- ✓ Integrate Transmitter/Receiver functions in single circuits where possible.

Characterisation of Components- Transistor

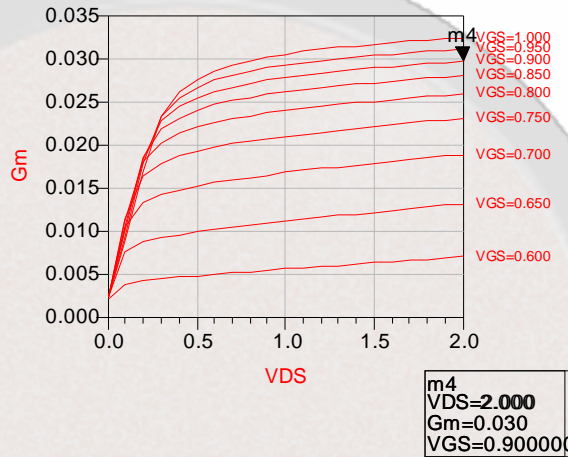


Transistor Characteristics

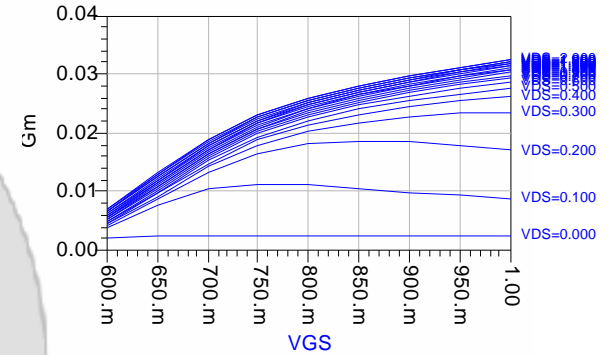
Device I-V Curves



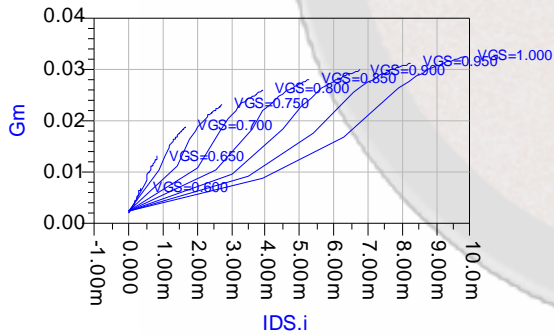
AC Transconductance versus VDS



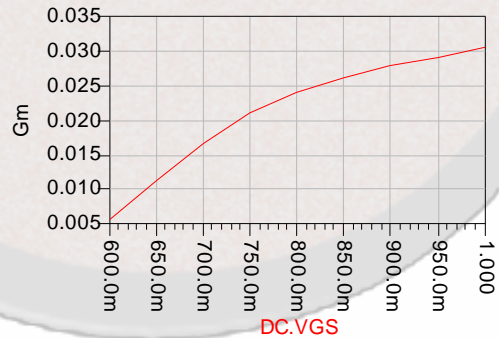
AC Transconductance versus VGS and VDS



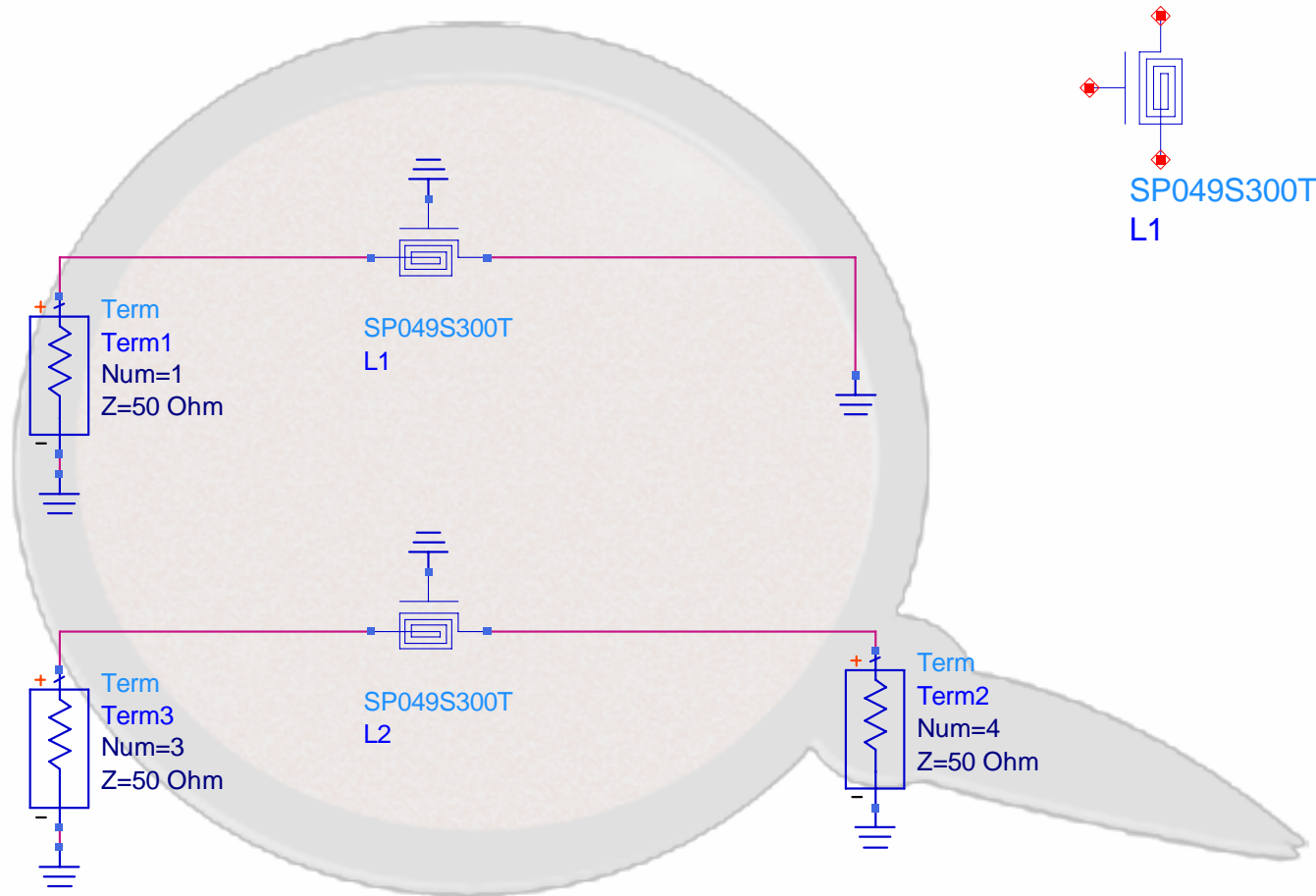
AC Transconductance versus IDS



AC Transconductance versus VGS

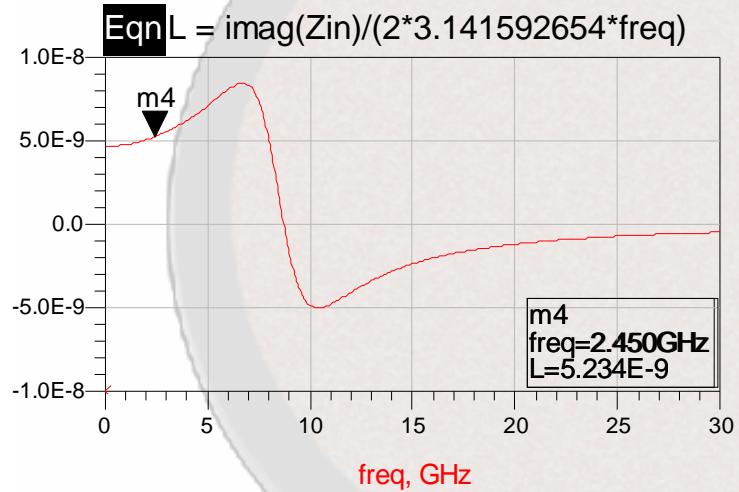


Characterisation of Components - Inductor

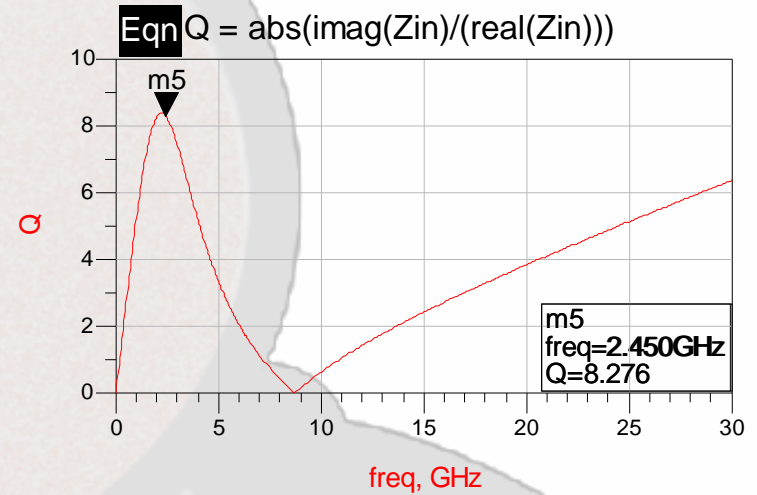


Inductor Characteristics

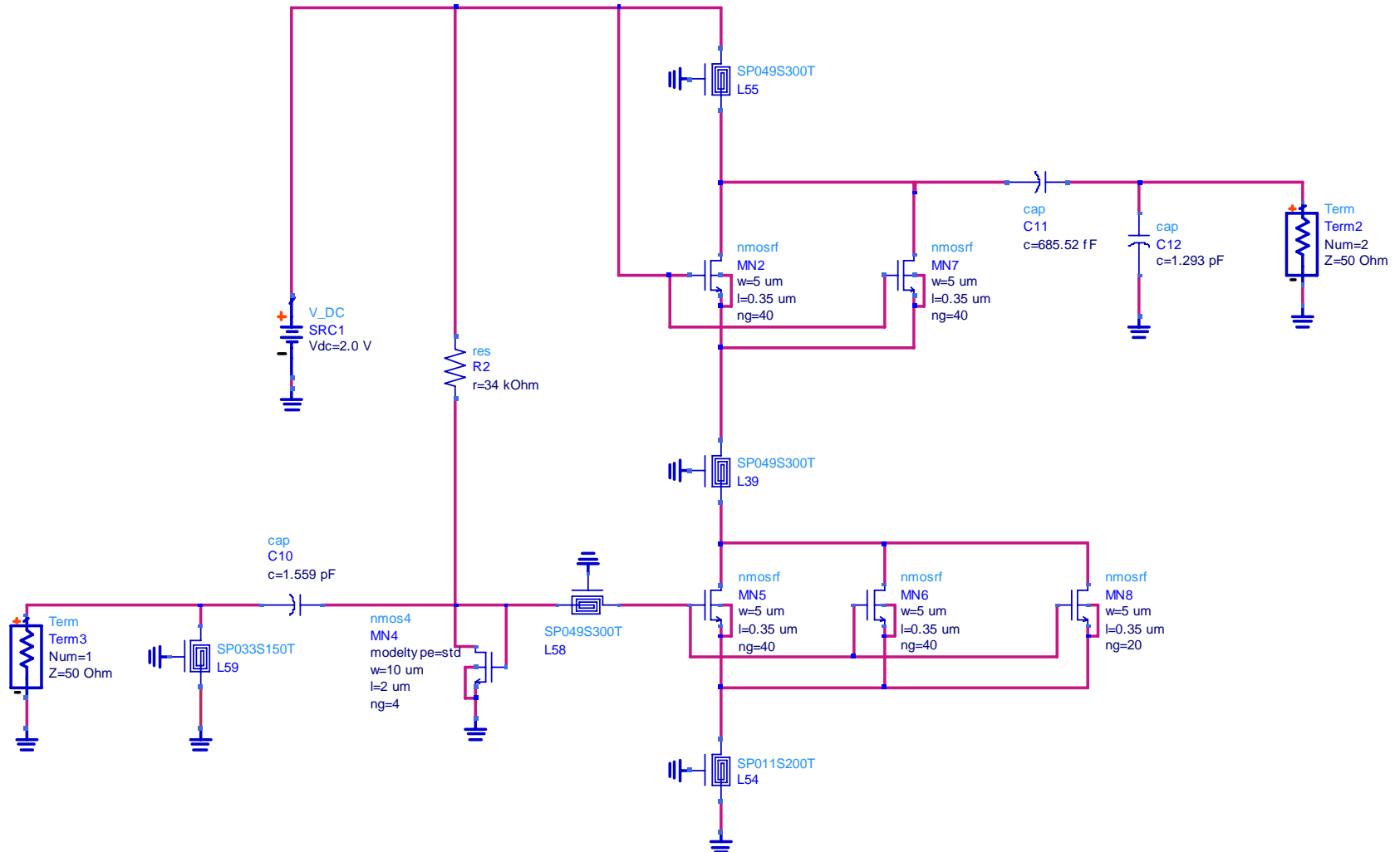
Inductance



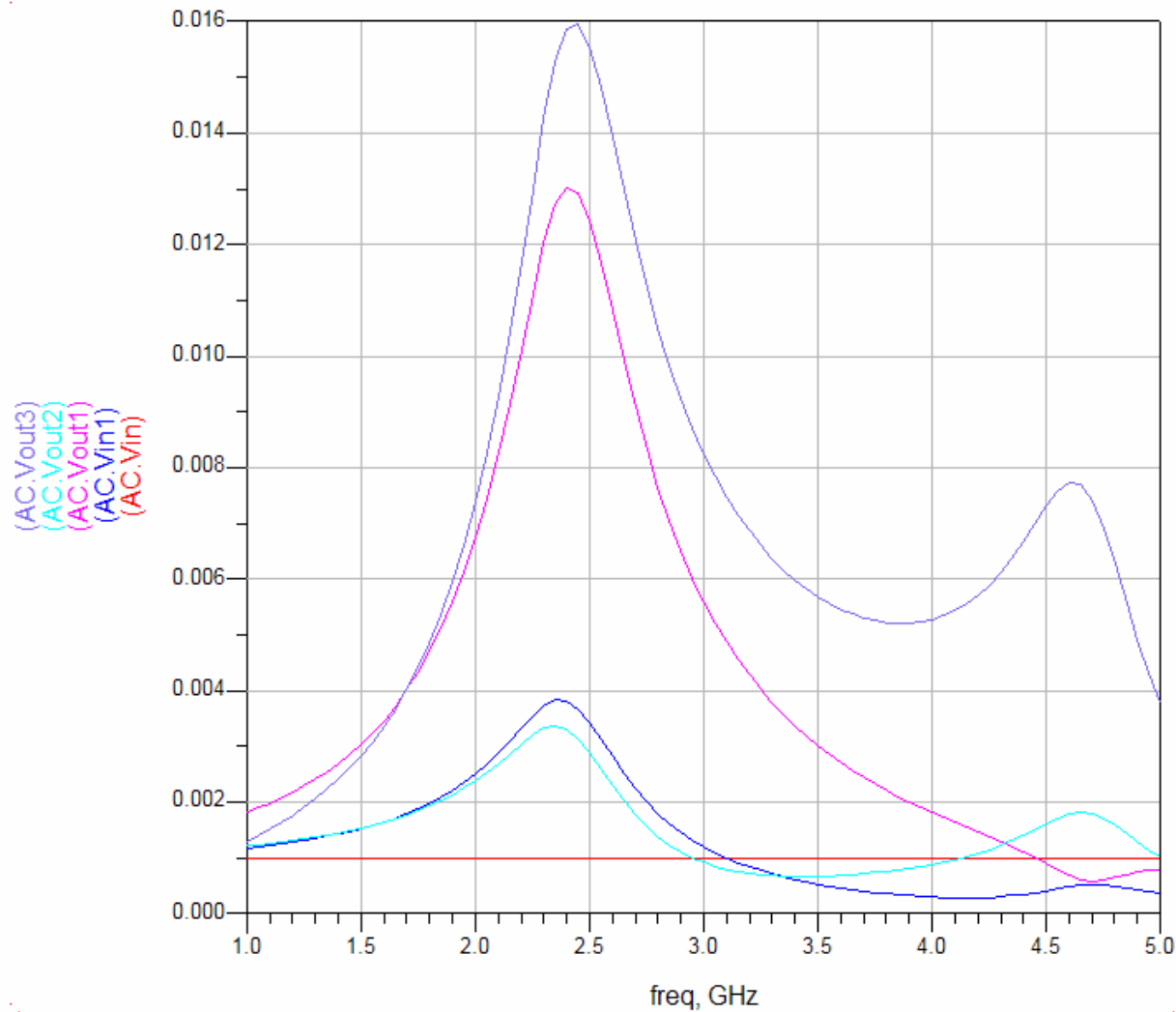
Q



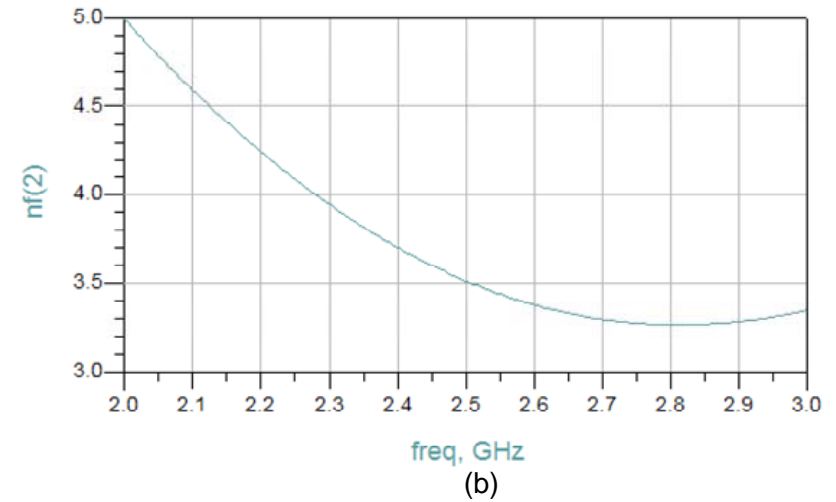
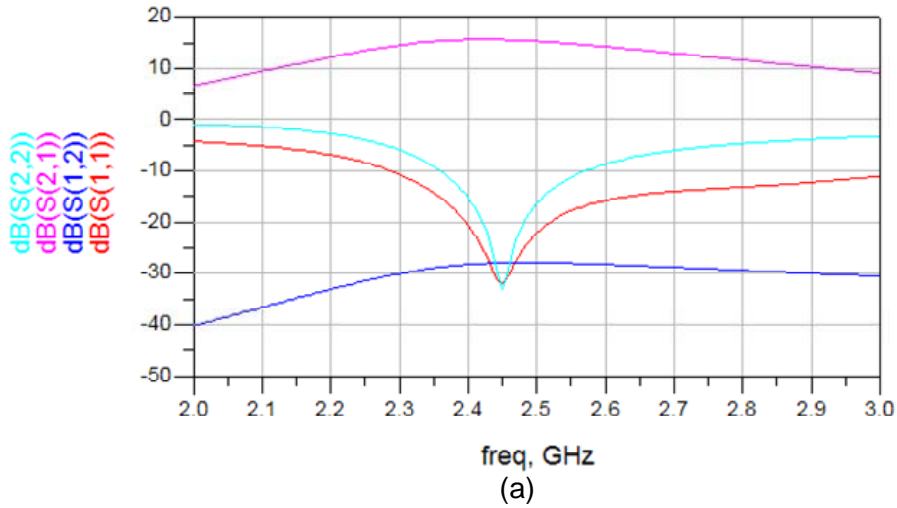
Full circuit schematic



AC Simulation – Gains and Losses



S-Parameter Simulation (Noise, stab, match)



freq	Zin1	Zin2
2.450 GHz	51.233 + j2.260	51.186 + j1.919

(c)

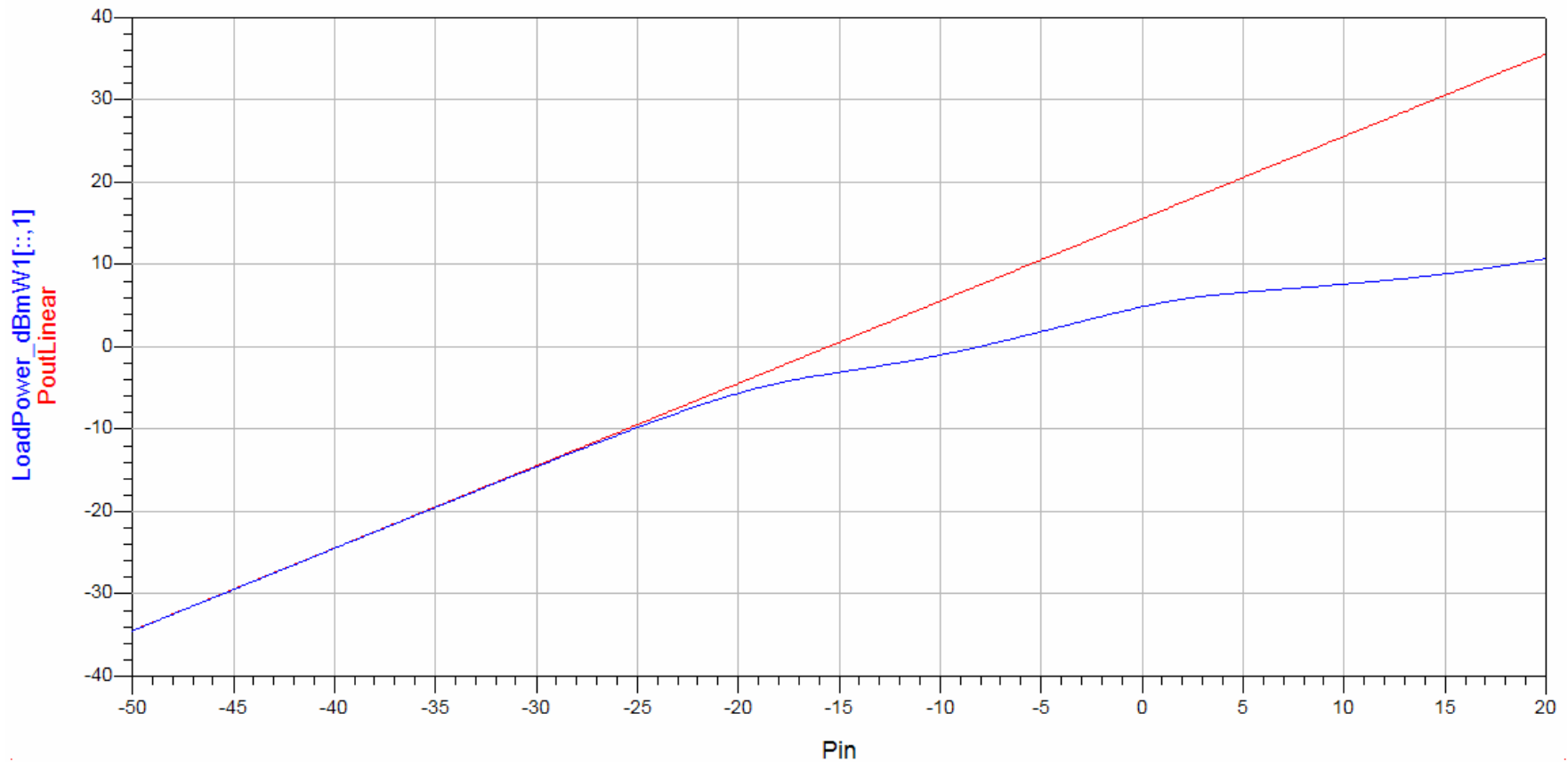
freq	VSWR1	VSWR2
2.450 GHz	1.052	1.046

(d)

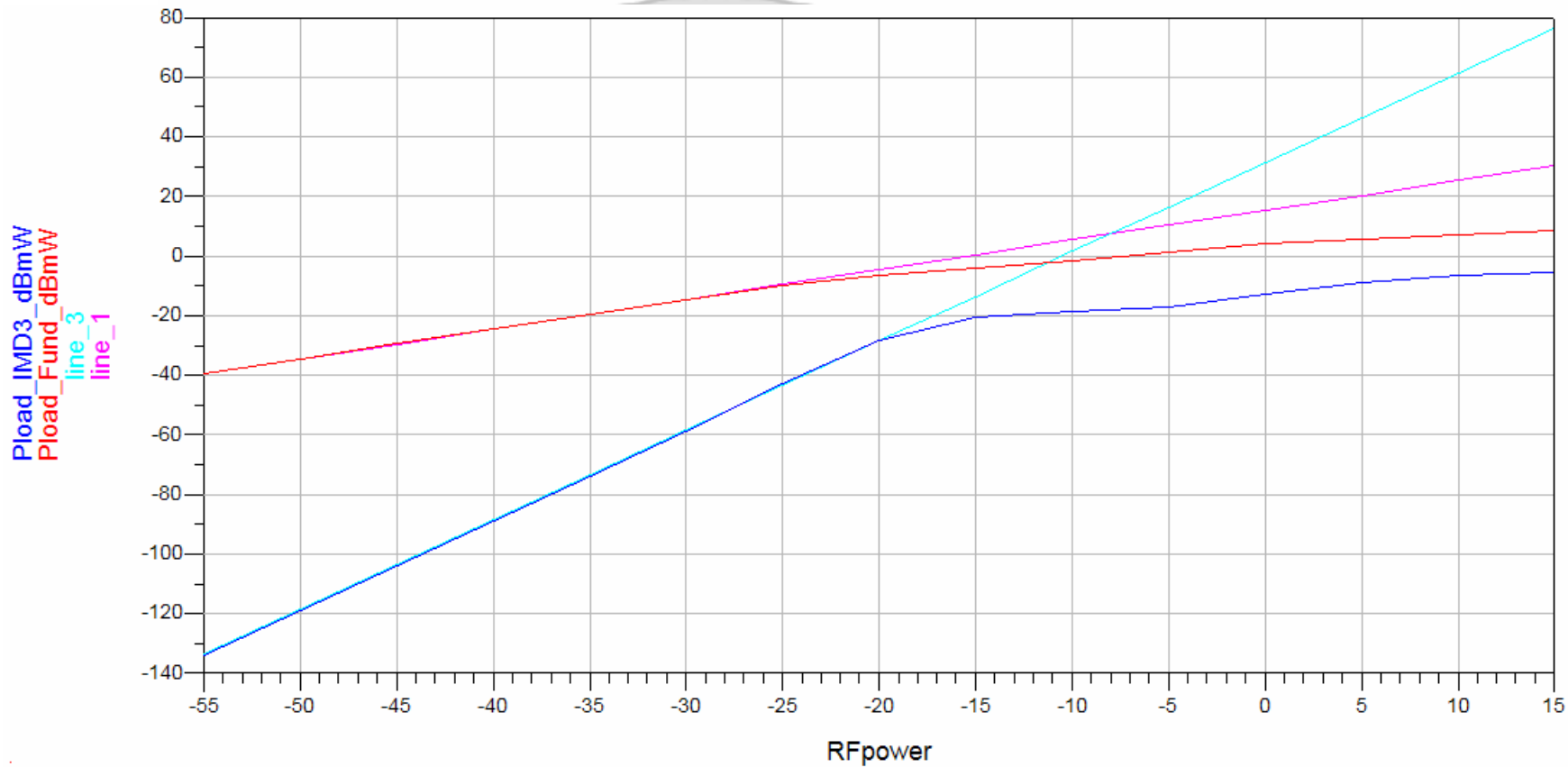
freq	MuPrime	Mu
2.450 GHz	3.785	3.836

(e)

1-Tone Test



2-Tone Test



Future Work

➤ Noise Reduction

- Using bond wires where possible
- Technology, circuit optimisation techniques

➤ Linearity Improvement

- Low power techniques

Thank You!



Questions, comments....etc?

