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**THE DEVELOPMENT OF A PULSE RF HIGH POWER
AMPLIFIER FOR A PORTABLE NMR SPECTROMETER**

TIANYANG TED JIANG

2008

**THE DEVELOPMENT OF A PULSE RF HIGH POWER
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**A thesis presented in partial fulfillment of the
requirement for the degree of Master of Engineering at
Massey University**

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ABSTRACT

The RF high power amplifier is a key module in the NMR spectrometer. Robustness, lower power consumption, and small size are requirements. In this thesis, devices are studied and different design approaches are considered. New ideas are introduced, and simulations are used to show if it these work. A real prototype is developed. Results from the prototype are satisfactory and in good agreement with the simulation results. This allows for the possibility of a real portable NMR spectrometer 'Lapspec'.

Points of note:

- Feedback to stabilize amplifier,
- Hard bias to improve rise time of pulse,
- A rugged device is chosen,
- Power limiter technology is used to avoid overdrive amplifier,
- Lower value attenuator at output of final stage to reduce load VSWR,
- Reason of spike is studied, the solution to reduce spike is given,
- The reason of instability of amplifier with NMR load is analyzed,
- A method is introduced to ensure there is no oscillation while the High Power Amplifier (HPA) is connected with the NMR probe.

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