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High Frequency Gain Block Feasibility for 5G Communications.

ABSTRACT - Masterthesis

5G is the next major step of innovation for the wireless industry. It is attracting many researchers all around the world to investigate the possible technologies that can be implemented. 5G is expected to operate in the centimetre and millimeter-wave bands because these bands promise higher bandwidths and improved performance that will address the increasing capacity demands in mobile communication.

This thesis presents the design of a high frequency gain block, operating in the centimeter and millimeter-wave bands, which could be used for 5G communications. The gain block consists of a driving amplifier, power amplifiers and switches that operate at frequencies up to 40 GHz. The purpose of this gain block is to be able to deliver enough power at the various wave bands that will be required by the 5G use cases. It began with a block diagram of the gain block, followed by a simulation of the RF paths using Microwave Office AWR. In subsequent chapters, each amplifier was observed in details and DC biasing circuits were designed and tested with the 5G air interface candidates. In the end, the amplifiers biasing circuits were optimized to achieve the maximum output power, and large signal analysis of the test paths were performed to investigate the behavior of the components at such high frequencies.