

High Efficiency RF Amplifiers

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Project Summary:

The overall objective is to demonstrate an amplifier with 70% power added efficiency (PAE) up to 10 Watts output operating at 915 MHz. The work is performed in two stages. Stage 1: 5 Watts; Stage 2: hybrid module to include the high efficiency power amplifier and a 915 MHz oscillator. The first step involves literature search on current technologies and designs that use Class E, F and inverse F high efficiency amplifiers. Once several target technologies have been identified, a choice of power transistor will be selected. Once possible circuit topologies and active components have been identified, an ideal simulation analysis using Ansoft microwave CAD software will be performed to determine the "best case" specifications. We will investigate through simulation physical implementations of the ideal high efficiency power amplifier and simulate the performance of the physical circuit and representative active devices. Prototype versions of the high efficiency amplifiers will then be built and tested for gain and PAE. Once the amplifier has been successfully built and tested (Stage 1), a 915 MHz oscillator (with a possible driver amplifier stage) will be selected to interface with the high efficiency power amplifier, creating a self-contained module (Stage 2). The investigation will use the facilities of the Villanova University Microwave Laboratory. The laboratory has several high performance computers running Ansoft microwave CAD software that will be used in the project.