## Title

Bi-Directional Vector Variable Gain Amplifier for an X-Band Phased Array Radar Application

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## Abstract

This thesis presents the design, layout, and measurements of a bi-directional amplifier with variable vector (in-phase / quadrature) gain control that will be part of an electronically steered phased array system. The electronically steered phased array has many advantages over the conventional mechanically steered antennas including rapid scanning of the beam and adaptively creating nulls in desired locations. The 10-bit bi-directional Vector Variable Gain Amplifier (VVGA) is part of the transmit and receive module of each antenna element where transmit and receive functionality is determined through a simple switch. The VVGA performs amplification of the IF IQ pair by an adjustable complex coefficient. At receive, the VVGA functions as a Vector Variable Gain Current Amplifier (VVGCA) and at transmit, the VVGA functions as a Vector Variable Gain Transadmittance Amplifier (VVGTA). Design procedure, layout entry, schematic and parasitic extracted simulation results, and measurements are presented in this thesis.

## First Advisor

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