

## ABSTRACT

CMOS Front-End Amplifier For Broadband DTV Tuner

(May 2005)

Guang Zhang, B.S., Zhejiang University, Hangzhou, China

Chair of Advisory Committee: Dr. Jose Silva Martinez

In this work, the design of a CMOS broadband low noise amplifier with inherent high performance single-to-differential conversion is presented. These characteristics are driven by the double quadrature single conversion digital television tuner which requires accurately balanced differential signals to perform its function and to improve image rejection.

A three-stage amplifier is designed to satisfy several requirements of front-end circuits at the same time. The resistive shunt-feedback topology is adopted to implement a single-ended broadband low-noise amplifier as the first stage. The second stage is an on-chip single-to-differential converter, which employs a novel method to improve its balancing performance. A fully differential buffer capable of driving heavy loads is used as the third stage to further suppress the phase and magnitude errors of output differential signals.

Fabricated in 0.35 $\mu$ m TSMC standard CMOS technology, the designed broadband front-end amplifier manages to limit the phase error to within  $\pm 1.5^\circ$  and magnitude error  $\pm 0.75$ dB over 50~850 MHz frequency range, with 16dB gain and a noise figure of 4dB.