

MULTI-BAND RF CIRCUITS AND THEIR APPLICATIONS

by

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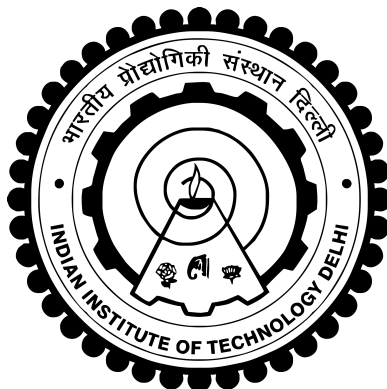
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Certificate

This is to certify that the thesis entitled “*Multi-band RF circuits and their applications*”, being submitted by **Mr. Nagarjuna Nallam** to the Indian Institute of Technology Delhi, is worthy of consideration for the award of the degree of **Doctor of Philosophy** and is a record of the original bonafide research work carried out by him under my guidance and supervision. The results contained in the thesis have not been submitted in part or full, to any other University or Institute for the award of any degree or diploma.

I certify that he has pursued the prescribed course of research.

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– Nagarjuna Nallam

Abstract

With advances in tablets and mobile phones, the need for high speed wireless communication is rapidly increasing. Unlike wired communication, one can't use the entire radio-frequency (RF) spectrum in a wireless communication system as the channel is a shared resource. Multi-band RF systems provide an opportunity to use multiple bands placed around different center frequencies to increase the overall throughput of a wireless system. Out of the many possible implementations of a multi-band communication system, a concurrent multi-band approach results in a system that is optimum in terms of hardware sharing and power consumption. The core building block of any concurrent multi-band RF circuit is a multi-band matching network. This thesis gives techniques to synthesize concurrent multi-band matching networks, concurrent multi-band low noise amplifiers (LNAs) and concurrent multi-band power amplifiers (PAs). The proposed techniques have been verified by implementing an LNA in a 0.13 μm CMOS technology and a PA in a 0.18 μm technology. Measured results of both the integrated circuits are included in this thesis. Other applications of concurrent multi-band matching networks, such as in RF energy harvesting systems, are also illustrated and verified through simulations.

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