Department of Electrical and Electronic Engineering, HKUST

Final Year Project (2001-2002)

Poster

Project Title: A 2.4GHz Power Amplifier Module for Bluetooth Wireless Applications

Project ID number: CKJ1-01

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In the project, we need to build an ISM band power amplifier module for the Bluetooth wireless applications. The power amplifier module consists of a power amplifier integrated circuit, a switch for selecting transmit and receive path and terminated with a monopole antenna. The main technical problem we faced is to design a layout for the power amplifier integrated circuit applications.

The operation frequency of the power amplifier is at about 2.45GHz. Matching at input and output ports of devices are needed to minimize power loss during transmission. The matching network is designed with the aid of the Advanced Design System simulation software and evaluated by high frequency instruments.

**System Block Diagram**

- **Measurement and gain optimization for the amplifier**
  - Test board production (PA)
  - Evaluation on the test board
  - Verification of output impedance
  - Simulation and Redesign for better gain
  - Modification for other issue
  - Combine power amplifier, switch and antenna
    Measurement of the final product

- **Measurement and testing for the switch**
  - Test board production (switch)
  - Measurement on the test board
  - Antenna design
    - Design and measurement of different monopole antennas
    - Design and measurement of top hat antennas
    - Compare performance with standard horn antenna
Final Product

Layout of circuit
Separated PCB boards implemented with power amplifier RF2172, switch RF2436 as well as different types of monopole antenna are connected together using RF adapter to undergo measurements. The measured results are reasonably good and satisfy with our final goal.

After having a satisfactory result, a final product was implemented with both switch and the power amplifier onto one single board as a complete product to the power amplifier module. The final result is shown to have more than 20dB output gain as expected.