

# Analytical Study of a Rectangular Microstrip Patch Antenna

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**Abstract:** *This work presents the analytical study of a rectangular microstrip patch antenna design which is developed on FR4 type substrate material. The resonant frequency of this rectangular microstrip patch antenna is first estimated using Transmission Line Model (TLM) and Cavity Model (CM) based Computer Aided Design (CAD) procedure. The dielectric constant of the FR4 type substrate is assumed to be 4.4 for these calculations. The estimated value of resonant frequency is 2472 MHz. The Return Loss (RL) and Voltage Standing Wave Ratio (VSWR) of the antenna are then measured around the estimated Resonant Frequency of antenna, using a Scalar Network Analyzer setup. The actual resonant frequency of the antenna is found to be 2380 MHz from Return Loss measurements of the antenna. The dielectric constant of substrate is then estimated from the geometry and Resonant Frequency of the antenna. The estimated value of the dielectric constant of substrate comes out to be 4.7545. The probe feed location is also calculated. The radiation pattern of the antenna is measured at the Resonant Frequency 2380 MHz.*

**Keywords:** Microstrip Patch Antenna, Maxwell's Equations, Finite Difference Time Domain algorithm, Cavity Model, Transmission Line Model

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