

ABSTRAK

RANCANG BANGUN ANTENA MIKROSTRIP *RECTANGULAR DUAL BAND* 900 MHZ – 1.8 GHZ UNTUK KEBUTUHAN AKSES KOMUNIKASI SELULER PADA DAERAH LEMAH SINYAL (2026:XV + 106 Halaman + 24 Gambar + 20 Tabel + 12 Lampiran)

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Abstrak – Perancangan dan realisasi antenna mikrostrip *rectangular dual band* 900 Mhz – 1,8 Ghz dilakukan untuk meningkatkan kualitas penerimaan sinyal seluler pada daerah dengan kondisi sinyal lemah. Antena dirancang menggunakan substrat FR4 dengan teknik pencatutan *microstrip line* dan disimulasikan menggunakan CST Studio Suite. Setelah fabrikasi, pengujian dilakukan menggunakan NanoVNA dan *Spectrum Analyzer* untuk mengetahui parameter kinerja antenna seperti VSWR, *return loss*, impedansi, dan level daya penerimaan sinyal. Hasil pengujian menunjukkan nilai VSWR terbaik sebesar 1,079 dan *return loss* -28,39 dB dengan pencocokan impedansi yang baik terhadap saluran transmisi 50 Ω . Pada kondisi awal, level daya berada pada rentang -44,3 dBm hingga -74,1 dBm, sedangkan setelah penggunaan antenna mikrostrip terjadi peningkatan dengan nilai terbaik mencapai -13,5 dBm. Pengujian pada jarak 10 meter, 20 meter, dan 30 meter menunjukkan antenna masih mampu bekerja dengan baik meskipun terjadi penurunan daya seiring bertambahnya jarak. Secara keseluruhan, antenna yang dirancang mampu bekerja pada rentang frekuensi tersebut dan meningkatkan kualitas sinyal seluler.

Kata Kunci : Antena Mikrostrip, *Dual Band*, 900 Mhz – 1.8 Ghz, VSWR, *Return Loss*, *Spectrum Analyzer*, NanoVNA

ABSTRACT

DESIGN AND DEVELOPMENT OF A DUAL BAND RECTANGULAR MICROSTRIP ANTENNA 900 MHZ – 1.8 GHZ FOR CELLULAR COMMUNICATION ACCESS IN WEAK SIGNAL AREAS

(2026 : XV + 106 Pages + 24 Pictures + 20 Tables + 12 Attachments)

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Abstract – The design and realization of a rectangular dual-band microstrip antenna operating at 900 Mhz – 1.8 Ghz was carried out to improve the quality of cellular signal reception in weak signal areas. The antenna was designed using an FR-4 substrate with a microstrip line feeding technique and simulated using CST Studio Suite. After fabrication, measurements were conducted using a NanoVNA and Spectrum Analyzer to evaluate antenna performance parameters such as VSWR, return loss, impedance, and received signal power level. The measurement results show a best VSWR value of 1.079 and a return loss of -28.39 dB, indicating good impedance matching to a 50 Ω transmission line. At the initial condition, the received power level ranged from -44.3 dBm to -74.1 dBm, while after using the microstrip antenna it improved significantly, reaching a best value of -13.5 dBm. Measurements at distances of 10, 20, and 30 meters show stable antenna performance despite a decrease in received power as distance increases. Overall, the designed antenna operates effectively within the intended frequency range and improves signal quality.

Keywords : *Microstrip Antenna, Dual Band, 900 Mhz – 1.8 Ghz, VSWR, Return Loss, Spectrum Analyzer, NanoVNA*