Rancang bangun singleband dan dualband bandpass filter menggunakan kombinasi multi stub = Design of single and dual-band bandpass filter with combination of stub

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Abstrak

Pada penelitian ini dirancang mikrostrip bandpass filter (BPF) singleband dan dualband yang terdiri dari 3 buah singleband BPF (900 MHz, 1800 MHz dan 2400 MHz) dan 2 buah dualband BPF (900 MHz/1800 MHz dan 900 Hz/2400 MHz). Rancangan menggunakan kombinasi stub yang mampu menghasilkan nilai transmission zero (TZ). Dengan nilai TZ yang dihasilkan, maka filter ini memiliki kemampuan menggeser nilai frekuensi tengah & lebar pita yang dinginkan tanpa merubah skematik rangkaian yang baru. Perancangan menggunakan perangkat lunak Advanced Design System (ADS) dan dilakukan fabrikasi menggunakan material substrat Duroid dengan nilai permitivitas dielektrik 2.2, ketebalan substrat 1.575 mm, dan loss tangent 0.0009. Hasil simulasi singleband untuk masing-masing frekuensi 900 MHz, 1800 MHz dan 2400 MHz diperoleh kinerja S21 = 0.179 dB dan S11 = -34 dB, S21 = 0.25 dB dan S11 = -29.9 dB, dan S21 = 0.26 dB dan S11 = -26.3 dB. Dualband BPF pada frekuensi 900 MHz dan 1800 MHz masing – masing diperoleh nilai S21 = 0.4 dB, S11 = -33.3 dB dan S21 = 0.44 dB, S11 = -23 dB. Dan dualband BPF frekuensi 900 MHz dan 2400 MHz masing – masing diperoleh nilai S21 = 0.6 dB, dB S11 = -24dB dan S21 = 0.24 dB, S11 = -21.9 dB. Hasil simulasi maupun pengukuran menunjukkan bahwa BPF ini telah bekerja dengan sesuai yang diharapkan.

.....In this study, a microstrip bandpass filter (BPF) single-band and dual-band were designed consisting of 3 BPF single-band (900 MHz, 1800 MHz, and 2400 MHz) and 2 dual-band BPF (900 MHz / 1800 MHz and 900 Hz / 2400 MHz). The design uses a combination of stubs that are capable of producing transmission zero (TZ) values. With the TZ value generated, this filter has the ability to tune the value of center frequencies & the desired passband bandwidth without changing the schematic circuit. Design using Advanced Design System (ADS) software and fabrication using Duroid substrate material with 2.2 dielectric permittivity, 1,575 mm thickness, and 0,0009 loss tangent. Single-band results for 900 MHz, 1800 MHz and 2400 MHz frequencies obtained S21 = 0.179 dB and S11 = -34 dB, S21 = 0.25 dB and S11 = -29.9 dB, and S21 = 0.26 dB and S11 = -26.3 dB, respectively. Dual-band BPF at 900 MHz and 1800 MHz obtained S21 = 0.4 dB, S11 = -33.3 dB and S21 = 0.44 dB, S11 = -23 dBm, respectively. And dual-band BPF at 900 MHz and 2400 MHz obtained S21 = 0.6 dB, dB S11 = -24dB and S21 = 0.24 dB, S11 = -21.9 dB, respectively. Simulation and measurement results show that this BPF has worked as expected.