ABSTRAK

Penelitian ini membahas tentang penambahan DGS pada *Bandpass Filter* berbasis CSRR. Bentuk DGS dibuat dengan beberapa pola seperti pola kotak, pola bulat dan pola segitiga pada *ground plane.* Adapun, CSRR memiliki pola kotak yang berjumlah 2 pasang yang terdiri dari *ring* dalam dan *ring* luar. BPF SIW yang diusulkan dan dirancang menggunakan substrat dielektrik *FR4 epoxy* dengan ukuran 45m x 40mm. BPF dirancang untuk memiliki frekuensi tengah 6,75 GHz dengan lebar pita frekuensi dari 3 GHz hingga 15 GHz. Adanya DGS dan CSRR dapat memperbaiki parameter S jika dibandingkan dengan *filter* tanpa DGS. Sebelumnya *filter* tanpa adanya penambahan DGS nilai koefisien refleksi (S_{11}) sebesar -11,36 dB dan nilai koefisien transmisi (S_{21}) sebesar -3,02 dB. *Bandwidth* hasil dari realisasi sebesar 6,9 GHz dengan fraksional *bandwidth* sebesar 121%. Hasil realisasi *filter* DGS kotak dengan nilai koefisien refleksi (S_{11}) mencapai -18,44 dB dan nilai koefisien transmisi (S_{21}) mencapai -3,01 dB serta *bandwidth* mencapai 7,1 GHz dengan fraksional *bandwidth* sebesar 122%. Kemudian *filter* dengan DGS bulat nilai koefisien refleksi (S_{11}) sebesar -16,28 dB dan nilai koefisien transmisi (S_{21}) sebesar -2,77 dB. *Bandwidth* hasil dari realisasi sebesar 7 GHz dengan fraksional *bandwidth* sebesar 121,7%. Sedangkan *filter* dengan DGS segitiga nilai koefisien refleksi (S_{11}) mencapai -8,44 dB dan koefisien transmisi (S_{21}) mencapai -2,48 dB serta *bandwidth* mencapai 4,25 GHz dengan fraksional *bandwidth* sebesar 85%.

Kata Kunci: *Bandpass Filter (BPF), Complimentary Split Ring Resonator (CSRR), Substrate Integrated Waveguide (SIW)* dan *Defected Ground Structure (DGS)*

ABSTRACT

This research discusses the Substrate of Integrated Waveguide Bandpass Filter (SIW-BPF) based on Complimentary Split Ring Resonators (CSRRs) and Defected Ground Structure (DGS). The DGS form is made with several patterns such as square patterns, round patterns and triangle patterns on the ground plane. While, CSRR has 2 pairs of grid patterns consisting of an inner ring and an outer ring. The SIW BPF was proposed and designed using a FRx epoxy substrate with a size of 45mm x 40mm. BPF is designed to have a center frequency of 6.75 GHz with a frequency band from 3 GHz to 15 GHz. The existence of DGS and CSRR can produce bandwidth, reflection coefficients (S_{11}) and transmission coefficients (S_{21}) which are better compared to filters without DGS. Previously the filter without the addition of DGS reflection coefficient value (S_{11}) was -11.36 dB and the transmission coefficient value (S_{21}) was -3.02 dB. The bandwidth produced from realization is 6.9 GHz with fractional bandwidth of 121%. The results of the realization of the Square-DGS filter with the reflection coefficient (S_{11}) value is -18.44 dB and the transmission coefficient (S_{21}) value is -3.01 dB and the bandwidth 7.1 GHz with fractional bandwidth of 122%. Then the filter with round DGS reflection coefficient (S_{11}) value is -16.28 dB and transmission coefficient (S_{21}) value is -2.77 dB. Bandwidth results from realization of 7 GHz with fractional bandwidth of 121.7%. While the filter with triangle DGS reflection coefficient (S_{11}) value is -8.44 dB and transmission coefficient (S_{21}) value is -2.48 dB and bandwidth 4.25 GHz with fractional bandwidth of 85%.

Keywords: *Bandpass Filter (BPF), Complimentary Split Ring Resonator (CSRR), Substrate Integrated Waveguide (SIW)* dan *Defected Ground Structure (DGS)*