

ABSTRACT

Long Term Evolution (LTE) is considered as one of today's latest cellular technologies using frequencies of band 3 (1.8 GHz), which the FDD-LTE band is at 1710-1785 MHz for the uplink and at 1805-1880 for the downlink and has been recommended by 3GPP. In order to pass the required frequency, it needs a bandpass filter.

In the study of this final project, a bandpass filter is designed, built, and evaluated to pass the required uplink frequency on the band 3 for LTE eNodeB. This filter type requires a sharp slope to minimize the interference from adjacent frequencies. This filter is designed using hairpin line method with the addition of Dumbbell Defected Ground Structure and Chebyshev with 0.01 dB ripple as the frequency response.

The resulting filter dimension is 80.43 mm x 48.34 mm using Duroid RT-5880 ($\epsilon_r = 2.2$) as the substrate and has a bandwidth of 75 MHz. The results of measurement at the middle frequency (1.7475 GHz) are -2.027 dB on the insertion loss, -18.944 dB on the return loss, 1.255 on the VSWR, and $57.006 - 5.026j \Omega$ on the resonator impedance. The result of the stopband rejection at 1.8 GHz is -9.8994 dB.

Keyword: Bandpass filter, hairpin line, Dumbbell Defected Ground Structure, Chebyshev, eNodeB LTE