

ABSTRACT

LTE (Long Term Evolution) is the Universal Mobile Telecommunications System that is a next step towards the 4th generation (4G) of radio technologies that is designed to increase the capacity and network speed of mobile communication systems. LTE working in various frequency ranges, uplink and downlink. Each country has different frequencies as well. To pass the desired frequencies (pass band) and reduce unwanted frequencies (stop band) using a device called a filter. Frequency to be passed compatible with the type of used filter with different characteristics. Therefore, in this final project aims to design and realize a filter that works in the uplink frequency range of that LTE, is 1850 MHz - 1891MHz.

Type of filter to be made is the Band Pass Filter on LTE technology using Hairpin method based on microstrip, a Chebyshev mathematical approach and filter manufacturing through photoetching. Before going through the photoetching process, filter design begins with the counting process in order to obtain the ideal dimensions number of the filter. Conducting simulations using Ansoft HFSS 10 software, then the filter is designed in the form of hardware. Then, the next step is measurement using a Network Analyzer to test the filter to be able to pass the desired frequency, and last, conducting analysis to compare the measurements results with earlier specifications.

The results of BPF design using microstrip hairpin based on LTE technology acquired hairpin filter dimensions, the resonator length of 45.51 mm, the width of the resonator at 1:48 mm, length 10 mm tap, tap width of 2.3 mm, the distance between the resonator $M_{1,2} = M_{3,4} = 3.2$ mm, $M_{2,3} = 4.3$ mm, and tap the location of 1.335 mm. The measurement results obtained using the Network Analyzer center frequency 1880 MHz with a 3 dB bandwidth of 58 MHz, 30 dB bandwidth of 185 MHz, Insertion loss at middle frequency is 11.957 dB, return loss 14.200 dB (input) and 14.602 dB (output), VSWR ≤ 1.5 , the terminal impedance of $58.888 + j19.655$ ohm (input) dan $46.351 + j17.898$ ohm (output). Thus, the results still do not meet the design specifications.

Key words: *Band Pass Filter, Hairpin, Long Term Evolution, Microstrip, Standing Wave Ratio, Network Analyzer*