

ABSTRACT

Telkom University is conducting research related to nanosatellite that will operate at LEO orbit. Nanosatellite named Tel-USAT 1 has dimension of 10cm x 10cm x 10cm using frequency 2350 MHz with narrow *bandwidth* characteristics for data transmission for monitoring deforestation at an altitude of 700km.

Filter as a device that can select a signal at certain frequency band to minimize the interference from adjacent frequencies. In the implementation of microstrip filter there are various methods such as hairpin, open loop, and *loop resonator*. *Loop resonator* consists of a transmission line that is formed in a circular closed loop, feed line and gap coupling. The optimal *loop resonator* design focus on loosely coupled of the gap, as well as the length of the chamfer at the corner of the bending resonator side and the value of material characteristics such as relative permittivity and loss tangent values. The filter consists of material variation such as Roger Droid RT5880 ($\epsilon_r = 2.2$), FR4 ($\epsilon_r = 4.3$), Roger TMM6 ($\epsilon_r = 6$) and Alumina ($\epsilon_r = 9.9$). The realization process use FR4 for substrate material and copper for stripline.

Microstrip filter design using square *loop resonator* produces the elliptic response, narrow *bandwidth* and small dimension. The measurement results show the performance of the filter at the center frequency 2350 MHz with 50MHz *bandwidth* which generated by the FR4 material, *return loss* up to -44 dB better than the specification below -10 dB, *insertion loss* -6.3 dB or approximately 0.5 transmitted data, and impedance 49.3 Ohm close to the value of characteristic impedance of 50 Ohm.

Keywords: *Nanosatellite, filter, material, resonator*