

## ABSTRACT

Coupler is a passive device in the microwave and bidirectional which can be used as a power combiner and power divider. It has four ports and has matched characteristic at all four ports, over the specified frequency range the reflection are very small, usually less than 0,1. Which make them very suitable for insertion in a circuit or subsystem. There are several types of coupler manufacturing method, and one of them is rat-race hybrid coupler that has four-port network and has  $180^\circ$  phase difference between port outputs.

In this final project has realized a rat-race hybrid coupler. There are many steps to realized it, start from calculation with coupler formula. Then it has simulated with Ansoft v.10. After the simulation has matched with early specification, it can realize using microstrip. The microstrip that has been used is Roger Duroid 5880 with  $\epsilon_r = 2,2$ .

To get the information about performance of coupler that has been realized, the coupler was tested by using a Network Analyzer. The minimum VSWR that has measured is 1,160 and maximum VSWR is 1,380. For coupling factor that has measured between 3,161dB until -3,732dB, so the insertion loss value less than 1dB. The isolation between output port values is between 21,638dB until 22,726dB, isolation between input and isolation port is between 19,682dB until 20,720dB, and the terminal impedance is from  $46,082\Omega$  to  $50,588\Omega$ . However the phase difference between near port is not  $180^\circ$ .

Keyword: coupler, rat-race hybrid, microstrip