

## ABSTARCT

3 dB coupler is always used in many practical electrical circuits such as balanced mixer, balanced amplifier, quadrature modulator, multiplexer/duplexer, etc. in quadrature modulator two signal with  $90^\circ$  phase difference is needed, while oscillator only need one, thus a  $90^\circ$  phase shift is needed.

Branchline coupler can distribute power equally and produce output with  $90^\circ$  phase difference without any phase shifter. But conventional branchline coupler inherently has narrow bandwidth ( $BW < 20\%$ ) and for frequency under 2 GHz, its dimension becomes larger which resulting in higher attenuation. To extend the bandwidth, a few branchlines is cascaded, making its dimension become even bigger and the attenuation also higher. To overcome this, conventional branchline is modified by giving capacitive load, so even though it's cascaded, its dimension becomes relatively smaller and the attenuation becomes lower.

In this final project, a branch-line hybrid coupler had been designed and built using reduced micro strip line and wide bandwidth by giving capacitive load in form of open circuit. The result was response that is almost flat from the frequency of 1700-2500 MHz, with return loss  $\geq 15$  dB. Isolation 13 dB from the frequency 1700-1760 MHz and  $\geq 15$  dB at frequency of 1780-2500 Mhz. on frequency of 1700-2500 MHz, conventional circuit has vary value output [S21] averagely -3.79 dB, coupling [S31] averagely -3.63 and phase difference between [S21] and [S31] averagely  $90.148^\circ$  and for open stub circuit for output [S21] averagely is -3.36 dB, coupling [S31] averagely -3.42 and phase difference between [S21] and [S31] averagely  $87.885^\circ$

**Keywords :** *Branch-Line Hybrid Coupler Conventional dan Open Stub, Coupler 3dB, fasa  $90^\circ$*