



SNS COLLEGE OF ENGINEERING

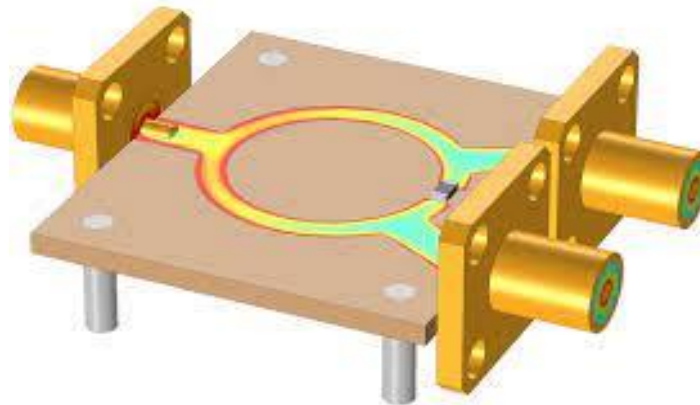
(Autonomous)

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING



19EC602- MICROWAVE AND OPTICAL ENGINEERING

UNIT-2 CIRCULATOR AND ISOLATOR



Circulator

Circulators are micro-optic devices and can be used with any number of ports, however, commonly 3 ports/4 ports circulators are used. It has a relatively low loss 0.5 dB to 1.5 dB port-to-port.

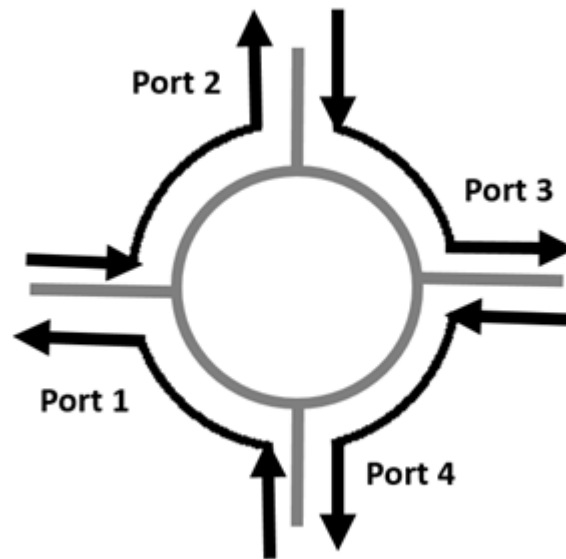


FIG: CIRCULATOR





CIRCULATOR AND ISOLATOR



- The basic function of a circulator is shown in the above figure.
- Light entering any particular port (say port 1) travels around the circulator and exits at the next port (say port 2). Light entering at port 2 leaves at port 3, and so on. The device is symmetric in operation around a circle. Circulators are micro-optic devices and can be made with any number of ports. However, 3 and 4 port circulators are very common. Circulators have very low loss. Typical port-to-port loss is around .5 to 1.5 db.





CIRCULATOR AND ISOLATOR

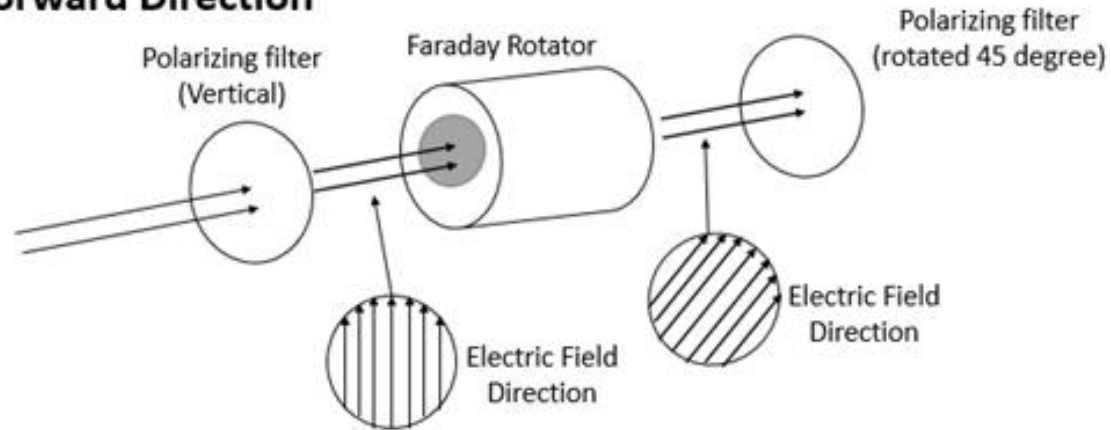


Isolator:

- Isolator is a non-reciprocal device that allows light to pass along a fiber in one direction and offers very high attenuation in the opposite direction. Isolators are needed in the optical system to prevent unwanted reflections, coming back down a fiber and disrupting the operation of a laser (producing noise). In manufacturing isolators “**Faradays Effect**” is used, which is polarization dependent.



Forward Direction



Reverse Direction

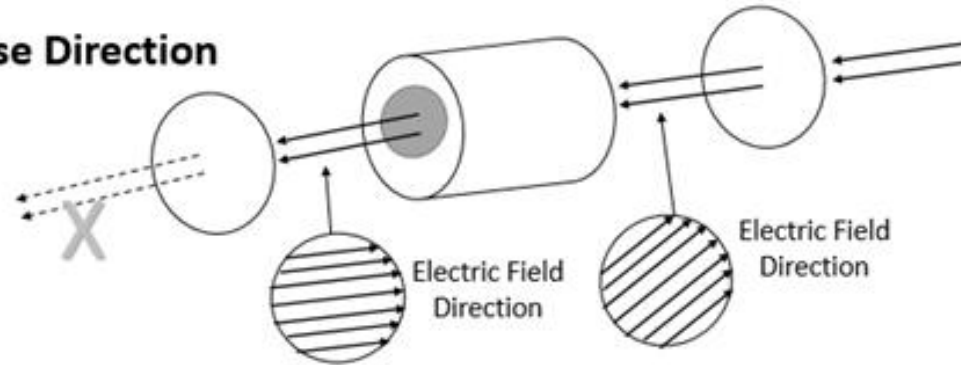


FIG: ISOLATOR





CIRCULATOR AND ISOLATOR



- Isolators are constructed using optical polarizers, analyzers and Faradays rotator. The optical signal passes through the polarizer, oriented parallel to the incoming state of polarization. Faradays rotator will rotate the polarization of optical signal by 45 degrees.
- The signal then passes through the analyzer, which is oriented at 45 degrees with respect to the input polarizer. The isolator passes an optical signal from left to right and changes its polarization by 45 degrees and produces about 2 dB loss.





Thank
you

