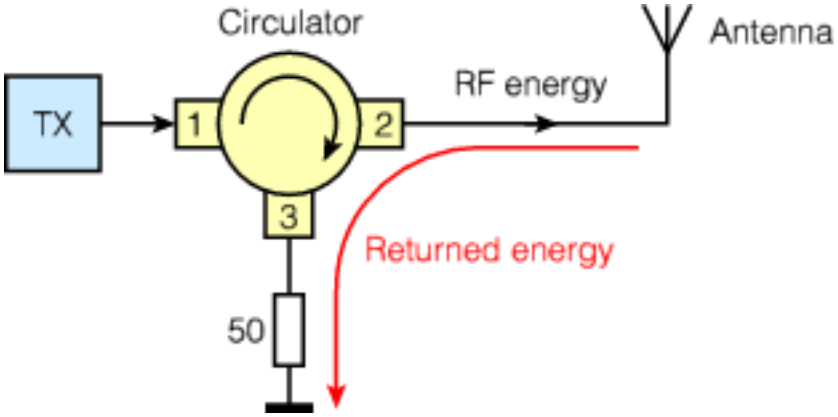
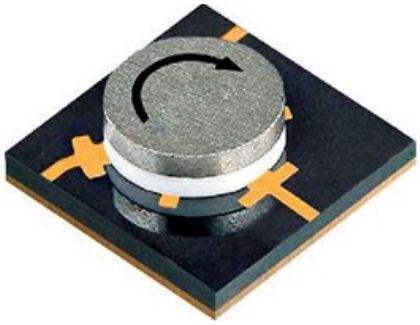
Ham Monograph — Circulators for Ham Use

I had not given much thought to the use of a Circulator (Isolator) for Ham use until I was asked if I had one by Marc at JagRF in reference to a procedure he is writing for us. My only experience with these devices was in the microwave bands and I frankly did not know they were available down to the lower VHF frequencies.

A Circulator is basically like a narrow-band RF diode. It is made with a circuit board sandwiched between ferrite cylinders and magnets complete with several tuning components. It passes RF energy clockwise to the next port. Circulators are RF magic.

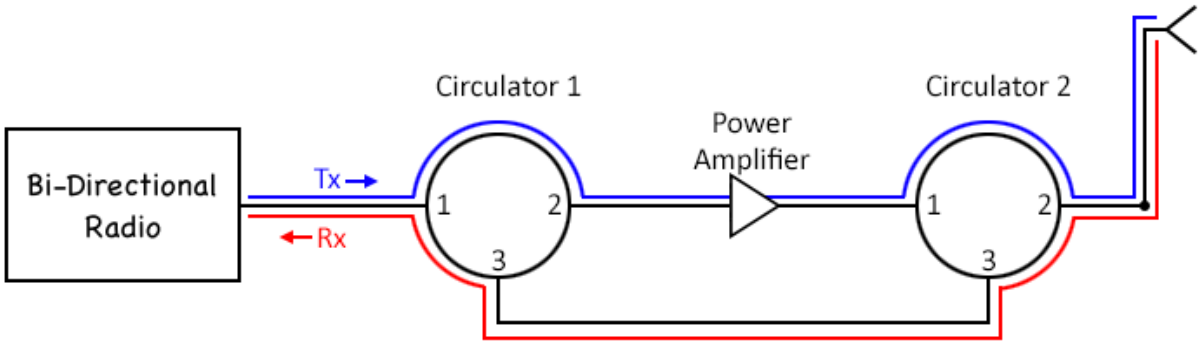




For the JagRF case in point, the Circulator would be placed between the TX and an untuned duplexer. Any untuned duplexer reflects power (presents high SWR). The Circulator would send the reflected power to a dummy load and protect the transmitter or signal source.

Consider the advantages this device would provide in a repeater installation - especially a repeater installed in close proximity to other strong RF sources. Outgoing energy is passed while reflected energy or unwanted RF energy is sent to a dummy-load.

Also consider the use of several Circulators in lieu of a duplexer.



The numbers are good. A single Circulator can have an insertion loss of less then 0.5 dB outgoing with at least 35 dB of rejection for incoming frequencies. A dual Circulator can have 0.7 and 75 dB numbers.

In urban areas and shared repeater sites with high RF congestion, Hams may be required to install a circulator in order to get approval to co-locate. The circulator would be placed between the TX output and the duplexer TX input. This requirement is for harmonics and inter-mod suppression. However, this practice can be applied to any site and is especially useful if there is a antenna mismatch. Often Hams may be required to use an existing antenna and coax without the ability to replace (or replace economically). A circulator in this instance takes the reflected power to the dummy load thus preventing it from reaching the repeater's PA. Always ensure that the dummy load is sized to handle the reflected power.

Bottom line: The use of a Circulator should be a consideration for any Ham repeater.