Advantages of YIG-Tuned Filters

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YIG filters utilize the same high-Q microwave resonance phenomenon as other YIG-based products but in a slightly different way. In YIG-based products, the resonant frequency exhibited by the YIG material is determined by an applied magnetic field. By placing a YIG sphere inside a magnetic field created by an electromagnet, for example, the resonant frequency can be changed by adjusting the current through the electromagnet. The resonant frequency of YIG-based oscillators and filters can vary over a wide range with a high degree of linearity by simply controlling the magnet drive current.

For signal sources, this resonance is used to create the tank circuit component of the oscillator. For filters, this resonance acts as a frequency selective coupler to transfer an RF signal from an input line to an output line (as a Band Pass Filter) or from an input line to ground (as a Band Reject Filter or Notch Filter). Whereas a YIG-based oscillator will work with a single YIG sphere, a YIG-tuned filter typically will use several YIG spheres or “stages” tuned individually in order to meet the wide variety of filter specifications.

The combination of the high Q and broadband tuning range of the YIG filter make it extremely valuable. There are presently no other tuned filter technologies that can match the YIG filter for highly linear, wide tuning range (over an octave) and high Q. These factors make the YIG-tuned filter an excellent choice for broadband pre-selectors and electronic warfare (EW) receiver front-end applications.

Giga-tronics has received several multi-million dollar awards in the last year for YIG-tuned filters used on the F-15 and F-18 aircraft. Giga-tronics has designed a wide array of custom YIG filter products over the years and we look forward to working on one with you! YIG filters are just one of the many YIG-based products produced by Giga-tronics. These products include YIG oscillators and YIG-based low noise frequency synthesizer modules, as well as YIG-oscillator-based high-performance microwave signal generators.
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