Abstracts

Millimeter Resonance Isolators Utilizing Hexagonal Ferrites

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Ferrimagnetic resonance isolators operating over waveguide bandwidths have been developed in K, V and Q bands using hexagonal ferrites. Preliminary results on similar isolators operating in M and W bands have also been obtained. The materials employed in these isolators are highly anisotropic uniaxial hexagonal compounds. The compounds of interest for the first three frequency bands are from the Ni/sub 2/W family. The anisotropy field of Ni/sub 2/W is 12.6 kilo-oersteds (Koe). This uniaxial anisotropy field can be controlled over the range of 4 to 12.6 Koe by producing solid solutions of the above compound with that of Zn/sub 2/W and/or Co/sub 2/W, and controlled over the range of 12.6-19.0 Koe by aluminum substitutions. The following operating characteristics have been obtained over the full waveguide bands: K band (18-26.5 Gc), isolation (minimum)---25 db, insertion loss (maximum)---0.7 db, VSWR (maximum)--- 1.15, applied field---1000 oersteds, length---4 1/2 inches weight---6 1/2 ounces; v band (26.5-40 Gc), isolation (minimum)---25 db, insertion loss (maximum)---1.25 db, VSWR (maximum)---1.15, applied field---1000 oersteds, length---4 inches, weight---6 ounces; Q band (33-50 Gc), isolation (minimum)---25 db, insertion loss (maximum) ---1.5 db, VSWR (maximum)---1.15, applied field---1000 oersteds, length---3 1/2 inches, weight---5 1/2 ounces. Improved attenuation ratios and size are obtained when the band-width is reduced. Examples of this are K band where a ratio of 40 to 1 is maintained over a 4-Gc bandwidth in a 3-inch unit, and V band where a ratio of 40 to 1 is maintained over a 5-Gc bandwidth in a 2-inch unit. At the present time the M (50-75 Gc) and W (75-110 Gc) band units provide attenuation ratios exceeding 10 to 1 over 5-Gc bandwidths.

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