Abstracts

Microwave Modulator Requiring Minimum Modulation Power

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A microwave modulator was devised which requires a minimum of modulation power and which has very high modulation efficiency. The modulator functions as a switch, which opens and closes a transmission line proportional to a time function which represents information in digital form. The modulator is a varactor diode operating in the reverse bias region. To obtain the required modulation characteristics, the diode was switched between two resonant modes. It was operated alternatively in series and in shunt resonance by varying the diode's capacitance. To obtain the resonant modes, tuning elements were added in series and in shunt with the varactor diode. At the design frequency of 2.2 Gc the semiconductor modulator has an insertion loss of less than 1 db in the transmission mode and more than 24 db in the rejection mode. In the transmission mode Q/sub L/ is close to one; in the rejection mode Q/sub L/ ranges from 30 to 50. The consumption of modulation power is extremely low. For a modulation voltage of square waveform with the fundamental frequency of 1 Mc, the dissipated modulation power is below 10/sup -8/ watts. The modulation efficiency is nearly one, since the response time of the varactor diode which is operated in the space charge region is below 10/sup -11/ sec.

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