Abstracts

A Reflected-Wave Ruby Maser with K-Band Tuning Range and Large Instantaneous Bandwidth

C.R. Moore and R.C. Clauss. "A Reflected-Wave Ruby Maser with K-Band Tuning Range and Large Instantaneous Bandwidth." 1979 Transactions on Microwave Theory and Techniques 27.3 (Mar. 1979 [T-MTT]): 249-256.

A novel maser concept is outlined and a unique design described which permits wide bandwidth and waveguide tuning range by employing four stages cascaded via cryogenically cooled circulators. Theoretical considerations for gain, bandwidth, gain ripple, and noise temperature are included. Operated on a chased-cycle helium refrigerator with a superconducting persistence-mode magnet, the four-stage amplifier is tunable from 18.3 to 26.6 GHz with 30 dB of net gain and achieves 240 MHz of 3-dB bandwidth near the center of this band. The measured noise temperature is 13 ±2 K referred to the room-temperature input flange. Applications are foreseen utilizing cooled parametric downconverters and upconverters with this amplifier at IF to extend the low-noise performance up to millimeter frequencies and down to L-band for radio astronomy and planetary spacecraft communication.

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