

806

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Abstract: The study of backward wave oscillators with folded waveguide circuits at frequencies at W band and Y band have been carried out in this paper. W band TWT with folded waveguide manufactured with EDM has reached continuous wave 10W and pulsed 100W at 20% duty in the authors' research group, while for higher frequency devices, we start from W band folded waveguide pencil beam BWO of 100mW power level, for which the entire design and simulation have been finished and the permanent magnet system has been assembled and tested. Y band 220GHz folded waveguide BWO with pencil beam for practical tubes and sheet beam for transmission experiment are also designed and simulated. The impedance and field flatness across the beam were monitored in the simulation. UV-LIGA and DRIE techniques are investigated for the research of micro-fabrication process for W band folded waveguide slow wave structures.

Keywords: BWO, MEMS, Terahertz