

Abstract Submitted
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Design, Fabrication, and Measurement of a MEMS Fabricated 220 GHz Slow Wave Structure MARK FIELD, ROBERT BORWICK, BERINDER BRAR, Teledyne Scientific, YOUNG-MIN SHIN, NEVILLE LUHMANN, University of California, Davis, LARRY BARNETT, Mountain Technologies — We report on the development, fabrication and RF test of a MEMS fabricated structure designed to slow 220 GHz radiation to a group velocity of $8.15E7$ m/s (approximately 27% the speed of light in vacuum). This slow wave structure is designed to operate within a travelling wave tube microwave amplifier, where the group velocity of the radiation matches the electron beam velocity from a 20 keV source. The slow wave structure uses two TE mode gratings in the form of vanes within a waveguide. The two set of vanes on the top and bottom of the waveguide have a phase shift between them resulting in a staggered vane circuit, which provides more than 50 GHz wide bandwidth around the operational frequency of 220 GHz. The measured group velocity remains constant across the operating band. MEMS fabrication techniques have been developed which control the etch processes to produce vertical sidewalls while keeping the surface roughness to an acceptable level.

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