

ORAL SESSION n°7

« Devices, Receivers & Instruments »

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Chaired by :

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A Novel 520 to 600 GHz Subharmonic Biasable Mixer

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Abstract

There is a demand for mixers operating in the submillimeter band between 300 and 1200 GHz for observation of various atomic and molecular lines. For Earth and planetary observations Schottky mixers have adequate sensitivity. Additionally, they have the substantial advantage of working with little or no cooling below room temperature, although their performance does improve at lower temperatures. Near term example missions is a proposal for water detection observations on Mars [1], and measurements of middle atmosphere trace gases and gas dynamics on Venus [2].

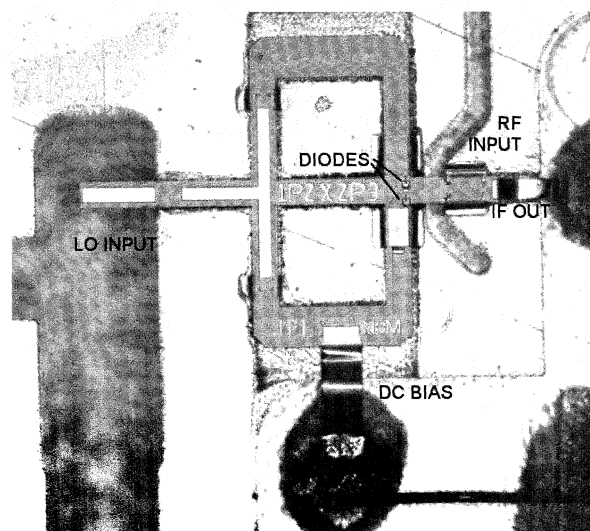


Figure 1. 560 GHz JPL biasable mixer.

To meet these requirements, we have developed a new biasable mixer that takes advantage of the frameless membrane technology developed at JPL [3]. Similarly to some previous designs [4], the diodes are fabricated in an antiparallel configuration with each diode having one electrode grounded using beam leads. See Figure 1. The ability to be biased makes these mixers operable from very low LO power, as required by many planetary missions. The mixers have been fabricated and will be measured soon. They are expected to give

single sideband noise temperatures at the diode of about 2000 K, with conversion loss around 10 dB.

- [1] Report of the NASA Science Definition Team for the Mars Reconnaissance Orbiter (MRO), available at http://mro.larc.nasa.gov/mro/MRO_SDReport.pdf, Feb. 2001.
- [2] Solar System Exploration Survey, Space Studies Board of the National Research Council, "New Frontiers in the Solar System" available at <http://www.nas.edu/ssb/SSE-Survey-Report-Part-1.PDF>, July 2002.
- [3] S. Martin, B. Nakamura, A. Fung, P. Smith, J. Bruston, A. Maestrini, F. Maiwald, P. Siegel, E. Schlecht, and I. Mehdi, "Fabrication of 200 to 2700 GHz multiplier devices using GaAs and metal membranes," *2001 MTT-S International Microwave Symposium Digest*, pp. 1641-1644.
- [4] E.R. Carlson, M.V. Schneider, and T.F. McMaster, "Subharmonically pumped millimeter-wave mixers," *IEEE. Trans. Microwave Theory Tech.*, vol MTT-26, no. 10, pp. 706-715, Oct. 1978.