

Full Waveguide Band Schottky Mixers for Terahertz Applications

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Abstract

Although diode mixers have been supplanted by cryogenically cooled SIS and HEB mixers for ultra low-noise radio-astronomical purposes; Schottky mixers are still the best solution for most other scientific and commercial applications. Their room temperature operation, broad signal and IF frequency bandwidths and overall robust operation, coupled with their modest LO power requirements and relative sensitivity make them ideal for atmospheric studies and modern test and measurement systems, such as VNA frequency extenders. This paper will discuss the ongoing development of low-noise Schottky mixers that operate across complete waveguide bands without LO power tuning and without DC bias requirements. These subharmonically pumped mixers are being developed to achieve very compact and easy to operate receiver systems that are ideal for planetary missions. As an example, the figure shows the measured mixer noise temperature of a WR1.9SHM being developed as a prototype for a proposed atmospheric probe for Venus. The goal is to cover the frequency band from 440-590GHz with only a few milliwatts of LO power (220-295GHz) and a noise temperature of less than 2,000K, DSB. Results for an optimized version of this mixer will be presented at the conference.

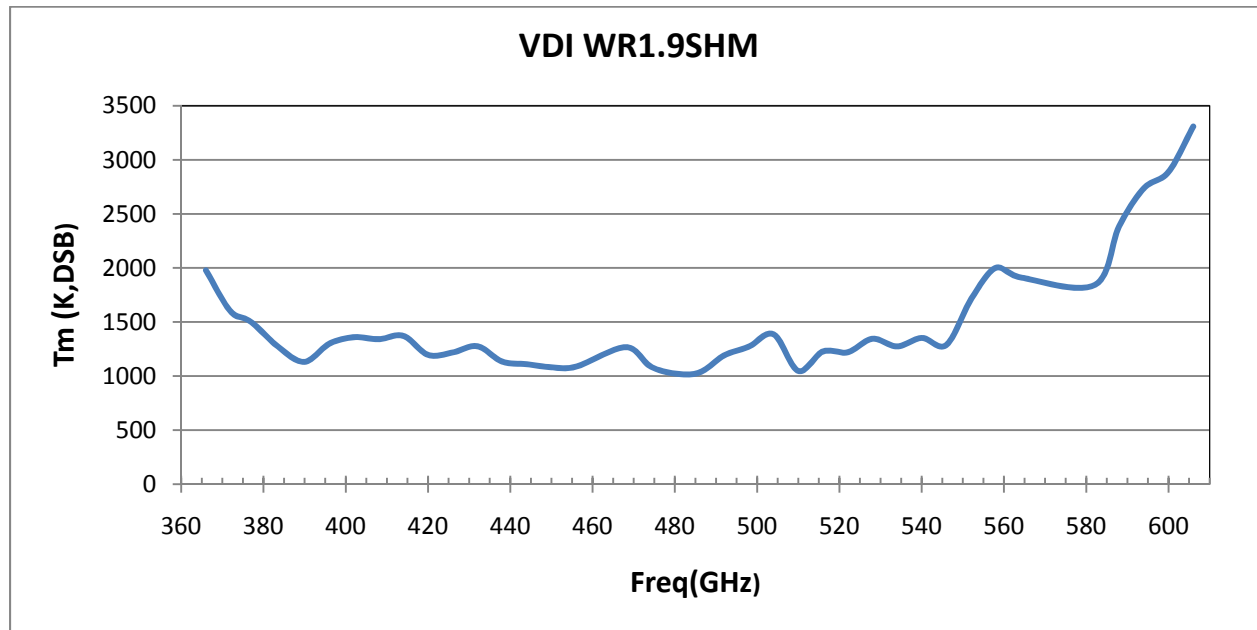


Fig. 1. The measured sensitivity of a broadband WR1.9SHM design with flat LO power across the band. The mixer designs being pursued use no DC bias and require no LO power adjustments as the frequency is tuned across the band. The final mixer design will be optimized for the VESPER frequency band of 440-590GHz.

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