

## 2.7 THz Waveguide Balanced HEB Mixer Development

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*Abstract*— We develop balanced waveguide-based mixers operating at molecular transition frequencies of OH and HD lines expected respectively at 2.5 and 2.7 THz. The receivers use NbN HEB mixers and 90° quadrature hybrids. Beyond 1.5 THz, the realization, among others, of the waveguides by conventional machining fabrication techniques becomes complicated and novel techniques such as gold-plating and silicon micromachining technologies are used. Hence, waveguides as well as channels that hold mixers are not machined directly on a metal part as usual but defined on an intermediate piece made of a thick silicon substrate by means of UV-photolithography and gold microplating techniques. The concept would facilitate the downscaling for operation at higher frequencies, particularly around 5 THz for the detection of atomic oxygen OI line. We present in detail the main steps of the development and first experimental results.