Abstract— Terahertz/millimeter wave gas spectroscopy is an important tool for space exploration due to strong rotational transitions of many gases. We report on a tunable 245 GHz SiGe transmit/receive system based on SiGe technology. The system performance is demonstrated by high resolution gas spectroscopy.

The frequency tuning can be realized either by a phase-locked loop (PLL) or by directly applying a voltage to the VCO. For the latter setup, a voltage-frequency calibration was made by tuning the frequency with a PLL and reading out the corresponding voltage applied to the VCO. With respect to the calibration, a linear frequency scan can be performed by a nonlinear voltage ramp. By direct voltage frequency tuning a 2f spectrum of 12 Pa methanol from 238 to 251 GHz was measured. It exhibits a high SNR of 560 at an absorption line with an integrated absorption coefficient of $S = 4.8 \times 10^{-23}$ cm.

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