

## A Wide-Band High-Gain Compact SIS Receiver Utilizing a 300- $\mu$ W SiGe IF LNA

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**Abstract**—Low-power low-noise amplifiers integrated with Superconductor-Insulator-Superconductor (SIS) mixers are required to enable implementation of large-scale focal plane arrays. In this work, a 220-GHz SIS mixer has been integrated with a high-gain broad-band low-power IF amplifier into a compact receiver module. The low noise amplifier (LNA) was specifically designed to match to the SIS output impedance and contributes less than 7K to the system noise temperature over the 4-8 GHz IF frequency range. A receiver noise temperature of 30-45 K was measured for a local oscillator frequency of 220 GHz over an IF spanning 4-8 GHz. The LNA power dissipation was only 300  $\mu$ W. To the best of the authors' knowledge, this is the lowest power consumption reported for a high-gain wide-band LNA directly integrated with an SIS mixer.

**Keywords (Index terms)**— Superconductor-Insulator-Superconductor (SIS) mixers, heterodyne receivers, cryogenic, low noise amplifier (LNA), focal plane arrays, Silicon-Germanium (SiGe).

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