

## Miniature Thin-Film SQUID Susceptometer for Magnetic Microcalorimetry and Thermometry

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**Abstract**— We have developed a miniature thin-film SQUID susceptometer for research in magnetic microcalorimetry and miniature magnetic thermometry. We have previously reported measurements at 4K characterizing performance of the first generation of this device using modulation-based flux-locked feedback electronics and at  $\sim 50\text{mK}$  using a spherical superconducting test sample. Here we describe design, fabrication, and new measurements of the second generation of the device using two-stage SQUID amplification to characterize the improved noise, bandwidth, persistence switch and field coil performance. The device now meets or exceeds all requirements for magnetic microcalorimetry sensor testing, achieving noise of  $\sim 0.75\mu\Phi_0/\sqrt{\text{Hz}}$  and bandwidth  $\sim 1.2\text{MHz}$  near  $50\text{mK}$ , and trapping and stably holding magnetizing field of at least  $5.9\text{mT}$ .

**Index Terms**— Detectors, SQUID magnetometers, Superconducting switches

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