

A compact low power ELF/VLF micro-receiver for small satellites

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Stanford University has developed a new generation of radiation-hardened ultra-low-power Low Noise Amplifier (LNA) and Analog-to-Digital-Converter (ADC) pair of Application Specific Integrated Circuits (ASICs) that have been integrated together to form a highly compact low power ELF/VLF receiver for use in a variety of spacecraft missions. The device consists of a single circuit card, with an aspect ratio of 70x100 mm, which connects directly to the terminals of an electric antenna, accepts DC power (+5V, 230 mA), and clock (20 MHz, ~50% duty cycle, 0-3.3 V digital), and outputs continuous data (16 bit, 100 kHz samples) out of a serial port. The LNA and ADC chips have both been demonstrated to be radiation hardened to a level of 2 Mrad, well beyond that is necessary for even mid-level orbits that pass through the heart of the radiation belts. The first flight of this instrument is expected to be on the Tohoku University Sprite-sat mission. This talk will describe the instrument details, and the measured performance specifications, including sensitivity, noise figure, and linear dynamic range.