

## Design of a ThinSat Payload to Support Three Experiments

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**Abstract:** ThinSats, weighing less than 1 kg, provide an inexpensive means for scientists and engineers to perform experiments in Extreme Lower Earth Orbit. Research in space is beneficial due to orbital conditions which are hard to replicate on Earth, such as vacuum and microgravity. This paper describes the system design and testing of a ThinSat equipped to perform three simultaneous experiment: (1) evaluation of materials for battery thermal shielding, (2) ultra-high frequency spectrum analysis in the amateur satellite radio band to determine feasible frequencies for uplink and downlink communications, and (3) comparison of efficiency of two electrical power systems. The satellite mission profile was simulated using Systems Tool Kit to drive design decisions for the experiments. The satellite bus was configured with a common power source, microcontroller, and communication link. The payload design was verified through vibration, vacuum, data collection, and operational testing. Requirements, design, and test results will be presented.

*Keywords:* ThinSat, Extreme Lower Earth Orbit, Satellite Design