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IMPROVEMENTS IN THE THERMAL BEHAVIOUR OF A CUBESAT GNSS-R SYSTEM

Abstract

PRETTY is a 3U CubeSat with the mission goal to perform passive reflectometry. For this purpose, a Software-Defined Radio (SDR) receiver with two receive channels and a custom-built two-patch antenna are used to receive and correlate the direct GPS signals and the signals reflected from Earth. A special processing platform incorporating a powerful SoC is used to process the data further. During the environmental unit-level tests of the satellite's subsystems, the payload system consisting of the SDR and the processing platform was thermally measured under vacuum conditions. During these measurements, it was found that due to the small radiation surface and the high power consumption, the payload system could only be operated for such a short time that the intended measurement duration of the passive reflectometer payload system of 30 minutes could not be met. For this reason, various countermeasures were analysed and implemented to increase both the radiation area and the thermal capacity. This paper presents the thermal design of the passive reflectometer measurement system. In addition, the countermeasures are described, and the measured values with and without the thermal improvements are compared.