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Author: Dr. Toshinori Kuwahara
Tohoku University, Japan

Prof.Dr. Kazuya Yoshida
Tohoku University, Japan

Dr. Yuji Sakamoto
Tohoku University, Japan

Mr. Yoshihiro Tomioka
Tohoku University, Japan

Mr. Kazufumi Fukuda
Tohoku University, Japan

Prof. Yukihiro Takahashi
Hokkaido University, Japan

Dr. Junichi Kurihara
Hokkaido University, Japan

Prof. Hiroshi Yamakawa
Kyoto University, Japan

Dr. Atsushi Takada
Kyoto University, Japan

A JAPANESE MICROSATELLITE BUS SYSTEM FOR INTERNATIONAL SCIENTIFIC MISSIONS

Abstract

Professor Shinichi Nakasuka of University of Tokyo is now leading a small satellite development activity within the scope of a Japanese FIRST (Funding Program for World-Leading Innovative RD on Science and Technology) program. In this program at least five 50-kg class microsatellites are going to be developed and launched by the end of Japanese fiscal year of 2013, including one scientific micro-satellite under international cooperation. This program as a whole shall contribute to enhance the activities of world's small satellite research societies and industries, and to build the basis of new paradigm for the future, where cost-effective and reliable small satellites are widely utilized for both research and business purposes. Tohoku University has been assigned as the project leader of the above mentioned international scientific microsatellite, named as RISESAT (Rapid International Scientific Experiment Satellite), and is inviting scientific payload instruments from all over the world together with Hokkaido University and Kyoto University. This satellite shall demonstrate the performance of its bus system which is supposed to be offered as a common bus system for international scientific missions in the future. The selection of scientific instruments will be completed by the end of the Japanese fiscal year 2010, namely, by the end of March 2011. So far we have successfully received more than 10 LOI's from worldwide academic/research institutions. Within these proposed instruments, we have some radiation measuring instruments, Earth observation CMOS/CCD camera systems, a thermal luminescence detector, an electro-dynamic tether and so forth, which are of our great interest. The orbit of the RISESAT is planned to be a sun-synchronous orbit with an altitude of between 500km and 800km. In order to accommodate as many payload instruments as possible, the satellite is equipped with two deployable side solar panels enabling a maximum power consumption of up to about 80 W. Many of the attitude determination and control components

are going to be developed by the Tohoku University achieving an attitude control accuracy of better than 0.1 deg. It is also equipped with an X-band transmitter with a baud rate of up to around 10 Mbps. The electrical interface between the payload instruments and the bus system is going to be based on a space plug and play avionics. This paper summarizes the system design of the satellite and progress report of the development activities, as well as the detail of selected scientific instruments.