

Basic development of ultra light digital down converter for investigation of Jovian radio emission

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Recently, many scientists pay attention for problems about mechanism of radio emission from Jupiter such as QP-burst (Quasi-Periodic-burst) in Kilometric radio frequency range (KOM). Also some scientists have interest in fine structure of L-burst (Long-burst), in Decametric radio frequency range that contains sometimes a group of S-burst (Short-burst). However, due to the effect of terrestrial ionosphere disturbance and inter planetary scintillation (IPS), it is difficult to observe the fine structure of these burst phenomena from the ground and orbital observatory around the earth.

To solve these problems, an in-situ observation of the jovian magnetosphere is needed. To realize the installation of the radio wave receiver, we are now developing a receiver with an ultra light weight and a low electric power consumption for future jovian mission.

The receiver has a capability of down conversion RF signal (1kHz~40MHz) to low frequency (below 10kHz) using ISL5416 digital down converter IC and PC program to control the hardware made of Intersil Corp. RF frequency is set to observe the jovian radio emission frequency range, and converted signal is selectable depending on the telemeter transmission rate. Since this device has 4channel digital down converters and filters, we are planning to use 2 tips to observe 5 component of electro-magnetic field, that makes possible to identify the direction of jovian radio emission from the spacecraft.

We confirmed the basic function of the down converter from 24 MHz to below 10kHz by using ISL5416 evaluation board. After this basic development test, we will make a breadboard model, which is possible to apply to the observation of solar radio emission on the ground.