

## Development of Miniaturized Plasma Wave Receiver using ASIC

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Plasma waves are an important physical phenomenon for understanding the electromagnetic environments in space. The plasma wave receiver is roughly divided into two types: a waveform receiver and a spectrum analyzer. Spectrum analyzer provides the frequency spectrums with low noises and high frequency resolution. On the other hand, waveform receiver provides the waveform. Though the waveform has more noise than the spectrum provided by the spectrum analyzer, only the waveform has phase information of a plasma wave. Thus it play a complementary role. However, these plasma wave receivers occupy a large amount of space because of its analog circuits, so a late scientific satellite has only a kind of plasma wave receiver. We have developed miniaturized waveform capture (WFC), a kind of waveform receiver, and sweep frequency analyzer (SFA), a kind of spectrum analyzer, using ASIC (Application Specific Integrated Circuit). We realized 6ch WFC in a chip of 5 mm x 5 mm. We execute experiment expose this chip to radiation. We find that though radiation influence WFC component, especially switched capacitor filter, our WFC fit for the space radiation environment. The SFA has fine frequency resolution, but its time resolution is poor. We propose a new kind of SFA combined with FFT. It has an improved time resolution without losing time resolution. We have developed analog circuits in the new SFA using ASIC technology. Furthermore, we propose the multipoint plasma wave observation system that consisted of some sensor probes using these miniaturized plasma wave receiver. We plan the sounding rocket experiment for performance test of this sensor probe.