

## Development of the ASIC analogue filters for the monitor system for space electromagnetic environments

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Monitor system for Space Electromagnetic Environments (MSEE) is designed for the environmental assessment in space. It enables us to monitor the electromagnetic disturbances caused by human activities in space. Since space plasma is essentially collisionless, plasma particles exchange their kinetic energies through plasma waves. This means that electromagnetic disturbances can be monitored by plasma wave observations.

The MSEE consists of many small sensor nodes, which have the capability to measure the plasma waves. The sensor nodes are scattered around target areas such as space station and provide us with the data measured in multiple points. The sensor node should be small so that it could be located in a lot of points around target areas, simultaneously. In order to realize the small sensor node, the miniaturization of plasma wave sensors and electrical circuits is essential. Therefore, we develop the small analogue electrical circuits for the sensor node using the ASIC (Application Specific Integrated Circuit) technology. The present paper especially focuses on the development of the Low pass filter and Band Pass filter. Since it is difficult to use large capacitance and high resistance in the design of the ASIC, our design makes use of the conductance of MOS FET instead of resistance. This type filter is called as gm-C filter. We succeeded in developing the LPF with the cut off frequency of 100kHz. Further, we also developed the multi-channel BPF, which is the filter with changeable different center frequencies. This type of filter is useful for the measurement of plasma waves in different frequencies in time sharing. In the present paper, we show the results of checking the functions and characteristics of these filters implemented inside the ASIC.