# Development of Oscilloscope and Current probe for nano-satellite

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## 1. Background & Purpose

In recent years, there is tend to increase of a satellite bus voltage. As a result of high voltage generation, however, many arcing incidents occurred on spacecraft solar arrays. We studying the arc phenomenon and arc mitigation technology through ground-based tests at Kyutech. However, several arcing tests were also carried out in space on-orbit. In May 2011, PASCAL (Primary Arc effects Solar Cell At LEO), was launched by STS-134. PASCAL carried out an arcing test on ISS (International Space Station) to observe degradation phenomenon of solar arrays caused by arcing. PASCAL also tried to measure arcing current, but failed. HORYU-3 is a 3U cubesat currently under development in Kyutech. HORYU-3 will attempt to measure arcing current in orbit. Therefore, this research purpose is development of a miniature oscilloscope (On-Board Oscilloscope : OBO) and current probe (Onboard Current Probe : OCP) for HORYU-3.

### 2. <u>Development of OBO</u>

I show a figure of system of OBO which we developed (Fig2.1).



Fig2.1 System of OBO



Fig2.2 Test result

### 3. Development of OCP

OCP uses a current trans configuration using the mutual induction.



#### Fig3.1 Current trans configuration

Generally speaking, if the output voltage is big, a core causes magnetic saturation. I examined the threshold of the output voltage when caused magnetic saturation by changing the reel number and a load resistance value. As a result of analysis, the magnetic saturation threshold is uneven, but it is in the range of about 1~2V currently.

## 4. <u>Summary</u>

The measurement of the arc current is possible by OBO system. But development of OCP needs more experiment.