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## EPSILON'S DEVELOPMENT AND LAUNCH FOR MULTIPLE SMALL SATELLITES MISSION

**Abstract**

The Epsilon launch vehicle, the latest version of Japan's solid fuel rocket, has extended its capability to deploy multiple satellites: one small satellite up to 200 kg, three micro satellites up to 65 kg and two to six CubeSats in 1U to 3U size (the number depends on the combination). Newly developed systems for the rideshare launch are the ESMS (Epsilon Satellite Mounting Structure), a multi-payload dispenser system, and the E-SSOD (Epsilon Small Satellite Orbital Deployer), a CubeSat deployer. Epsilon's new capability was demonstrated by the successful launch of January 18, 2019, the fourth launch and the first multiple satellites launch mission. All the seven satellites on board were confirmed to be precisely carried into their planned orbits.

The research and development of the Epsilon has been continued to improve the payload environment since the beginning of its development. In the single launch configuration, it achieved the world top level user-friendliness in acoustic, sine-equivalent vibration and shock environments. The recent flight in the multiple launch configuration also confirmed Epsilon's superiority in providing the comfortable environment to small and micro satellites in the rideshare structure ESMS.

In order to ensure compatibility of the mechanical interface with CubeSats, the E-SSOD was developed based on the J-SSOD, Japanese CubeSats deployer currently operated on the International Space Station (ISS), while its entire actuating system was newly designed in consideration of thermal deformation in orbit during ascent phase. With the E-SSOD using non-pyrotechnics to release CubeSats, Epsilon can provide more comfortable conditions than other launchers.

This paper describes these new systems, ESMS and E-SSOD, their interfaces of each satellite and the flight results of the latest mission and discusses future opportunities for small satellites on Epsilon's flights. The improvement plans of the systems for the next Epsilon's rideshare mission are also presented.