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Space Systems and Architectures Featuring Cross-Platform Compatibility (7)

Author: Ms. Laura León Pérez
Space Florida, Spain, laura.leon@solar-mems.com

Prof.Dr. Jose M. Quero
University of Seville, Spain, quero@us.es
Dr. José Miguel Moreno
Space Florida, Spain, jmmoreno@solar-mems.com
Mr. Manuel Rodriguez Halcón
Solar MEMS Technologies S.L., Spain, manuel.rodriguez@solar-mems.com

STANDARDIZING A FAST AND SIMPLE WAY TO REACH AN ORBIT

Abstract

The Space missions have traditionally been accessible only for few professionals with broad knowledge and large experience. However, most of the experts in advance technology or in research cannot reach this sector due to how expensive, long-term and hard requirements the satellite projects are.

The purpose is to create an inexpensive, fast and simple manner to become affordable the in-orbit technology demonstration. The nanosatellite platforms allow low-cost missions, however the payload integration is complex and the schedule from the kick-off to the launch usually takes several years.

The TEST IN SPACE EASY GUIDELINES (TISEG) has been devised to standardize the payload integration facilitating the accommodation of different payloads and it also avoids risks applying Quality and Product Assurance (QPA). This methodology has optimized the communication between the payload designer and integrators through the payload interface specifications, the payload tests definition and the design criteria. The payload interface specifications cover the mechanic, electric and TMTC (telemetry telecommand) interfaces between the platform and the payloads for a given envelope. These features shall depend on the payload slot which can be a standard Cubesat PCB slot of 95,45mm x 90,3mm x 16mm, a part of this PCB or a larger slot including several stacks.

The payload tests definition is the procedure and levels of the minimum required analysis which proves that it shall not represent a risk for the platform itself nor the launcher. Finally, the design criteria consist of a list of materials, processes, electronic components and manufacturers advisable due to their proper behavior in space environments. This is based on the ECSS and experiences in previous missions and it involves the most critical parts of the payload design in order to accelerate it preventing significant corrections.

The TISEG has already been applied in the first Andalusian satellite mission, Cepheus, where different technologies were integrated for in-orbit validation. This method made possible the integration of a fuel cell, a Star Tracker, a Sun Sensor and a Radio transceiver in the same satellite, some of them carried out by unexperienced developers in Space. In addition, these guidelines are being implemented by the commercial service TEST IN SPACE which provides the in-orbit technology experimentation through an inexpensive, fast and simple way. This proposal shall be an important step to facilitate the technology introduction in the space sector and to boost the nanosatellite industry.