

YPSat Thermal Analysis, Design, Integration & Testing

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YPSAT (Young Professionals' Satellite) is a CubeSat-style project led entirely by young professionals across multiple ESA establishments. It will launch on the maiden flight of the Ariane 6, currently scheduled for April 2023. The goal of the mission is to capture image and video of key phases of the flight, including fairing separation and several CubeSat deployments. It will also capture in-orbit imagery of the Earth. To achieve this, YPSAT carries a primary payload of two wide-angle, high-definition cameras developed by Scanway. Secondary payloads include a magnetometer built by a student team at Hasselt University and a PocketQube with deployable antenna developed by the amateur radio community. Support subsystems include COTS OBDH, EPS, and COMMS, as well as custom-built launch detection and payload interface boards. All units - aside from the AMSAT PocketQube and the two cameras - are enclosed within an aluminium panel structure. AMSAT is mounted to the interface plate, outside of the main structure. The cameras are mounted on the top panel and are shielded from the space environment by MLI. The structure is attached to the ballast on the Ariane 6 upper stage via an aluminium interface plate - and remains so for the entire duration of the mission. There is also an MLI blanket covering the entire structure. The ballast onto which the structure is mounted weighs approximately 1.7 tonnes. For this reason, measures are taken to maximize the conductive coupling between the individual units and the ballast, thereby dampening temperature fluctuations during eclipse entry and exit. Given the constraints on time and resources, the thermal design is kept as simple as possible. The thermal architecture therefore consists exclusively of passive hardware. This presentation describes in more detail the thermal analysis, design, integration, and testing activities completed since early 2022.

Primary author: KYCYKU, Atdhe (ESA)

Presenter: KYCYKU, Atdhe (ESA)

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