

# The IAA in Venus: the Spanish contribution to EnVision



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## Abstract

EnVision mission was selected by ESA's Science Programme Committee in 2021 as the fifth Medium-class mission in the Agency's Cosmic Vision plan, targeting a launch in the early 2030s. It follows on from ESA's highly successful Venus Express (2005-2014) that focused primarily on atmospheric research, but also made dramatic discoveries that pointed to possible volcanic hotspots on the planet's surface.

The VenSpec suite will be part of this scientific payload to study the planet atmosphere and surface, as well as the interaction between them. It consists of three spectrometers (VenSpec-H, VenSpec-U devoted to study the atmospheres and VenSpec-M mainly devoted to map the planet's surface) and a dedicated Central Control Unit (CCU).

The IAA-CSIC is responsible for the development of the central Power Supply Unit (PSU) for the entire VenSpec suite located in the CCU and for specific sub-PSU for several of the channels. The central power supply unit will perform two operations: the generation of the low-level voltages for the CCU digital handling units, and the filtered power bus distribution to the channels' dedicated sub-power supplies.

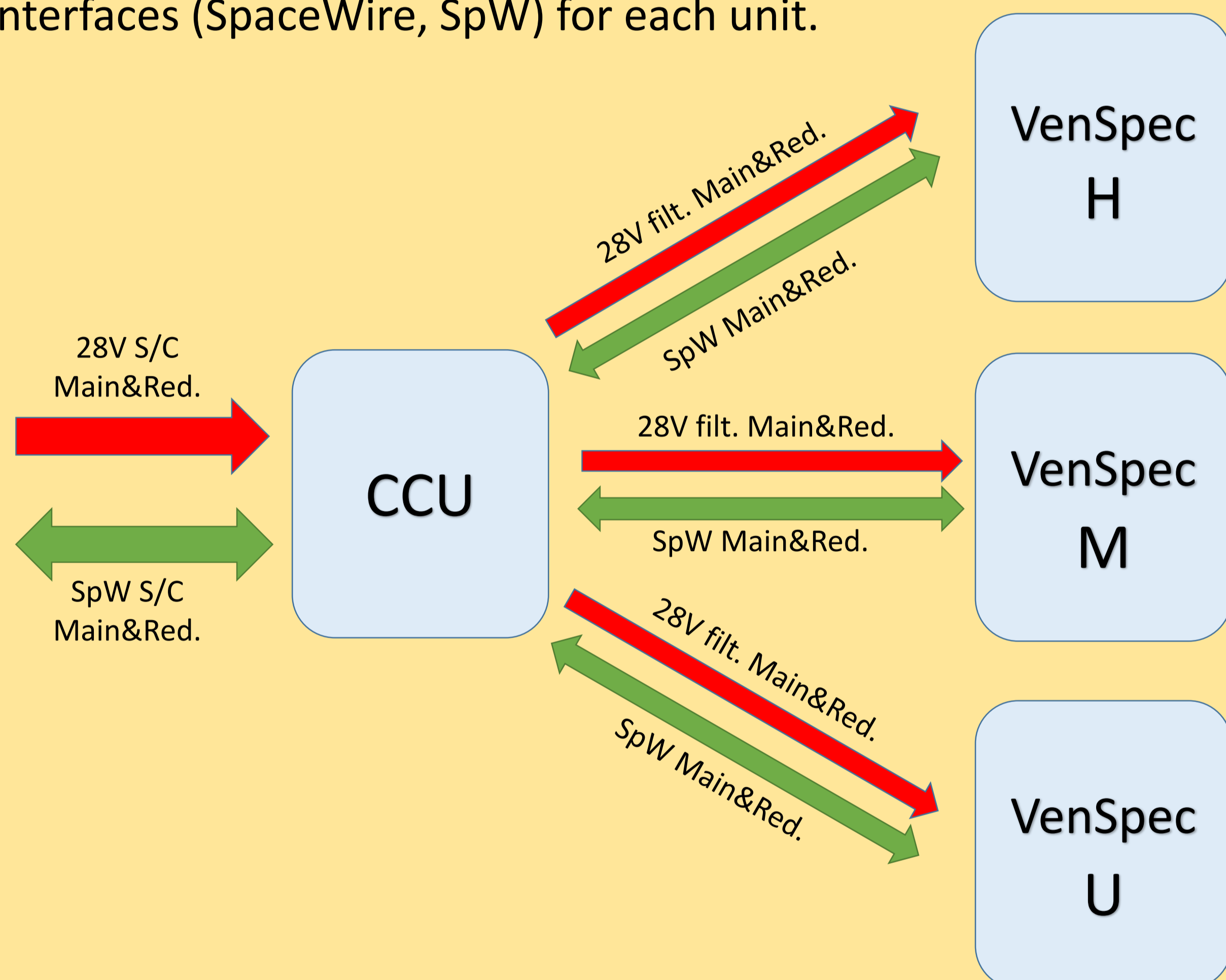
An assessment study, funded by ESA, for the entire suite electronic design has been carried out and its results for the power supplies architecture is presented in this poster.

## The VenSpec suite

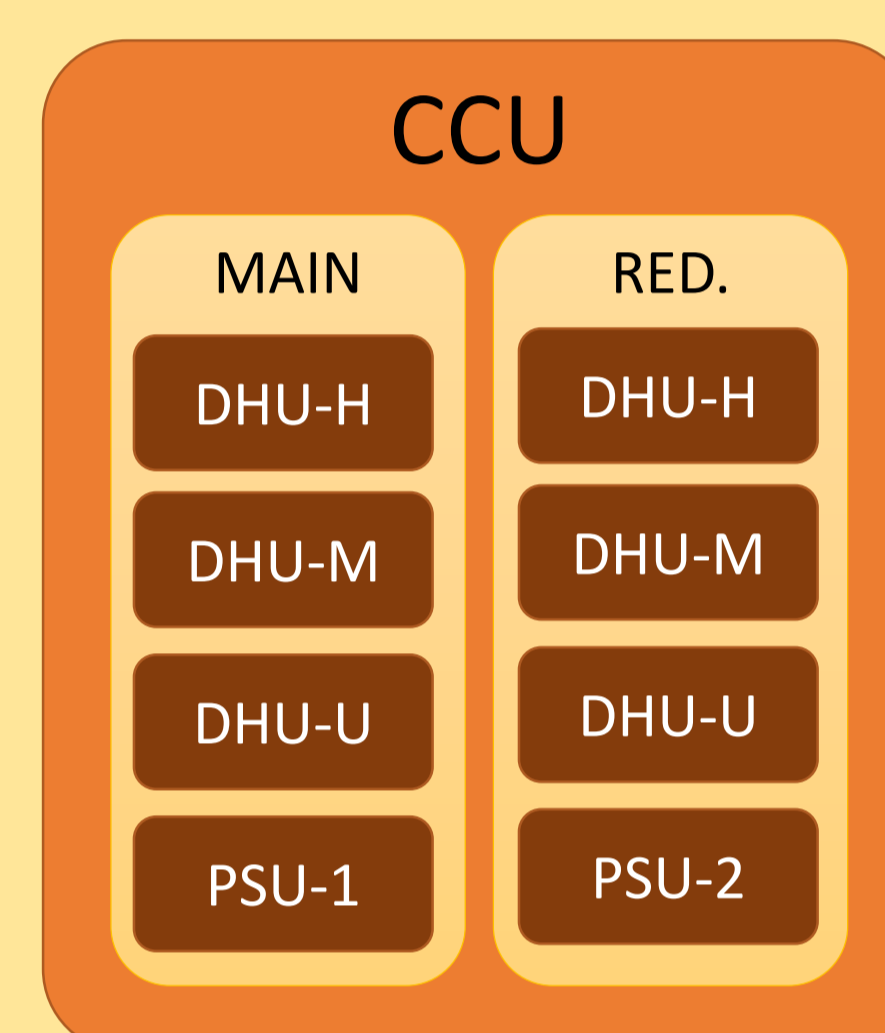
The VenSpec suite will consist of four parts. Three spectrometers and a Central Control Unit which will act as a supervisory control unit.

All three channels will have their independent optics due to the very different imaging concepts and wavelengths ranges covered.

There will be cold redundancy in the power and communication interfaces (SpaceWire, SpW) for each unit.

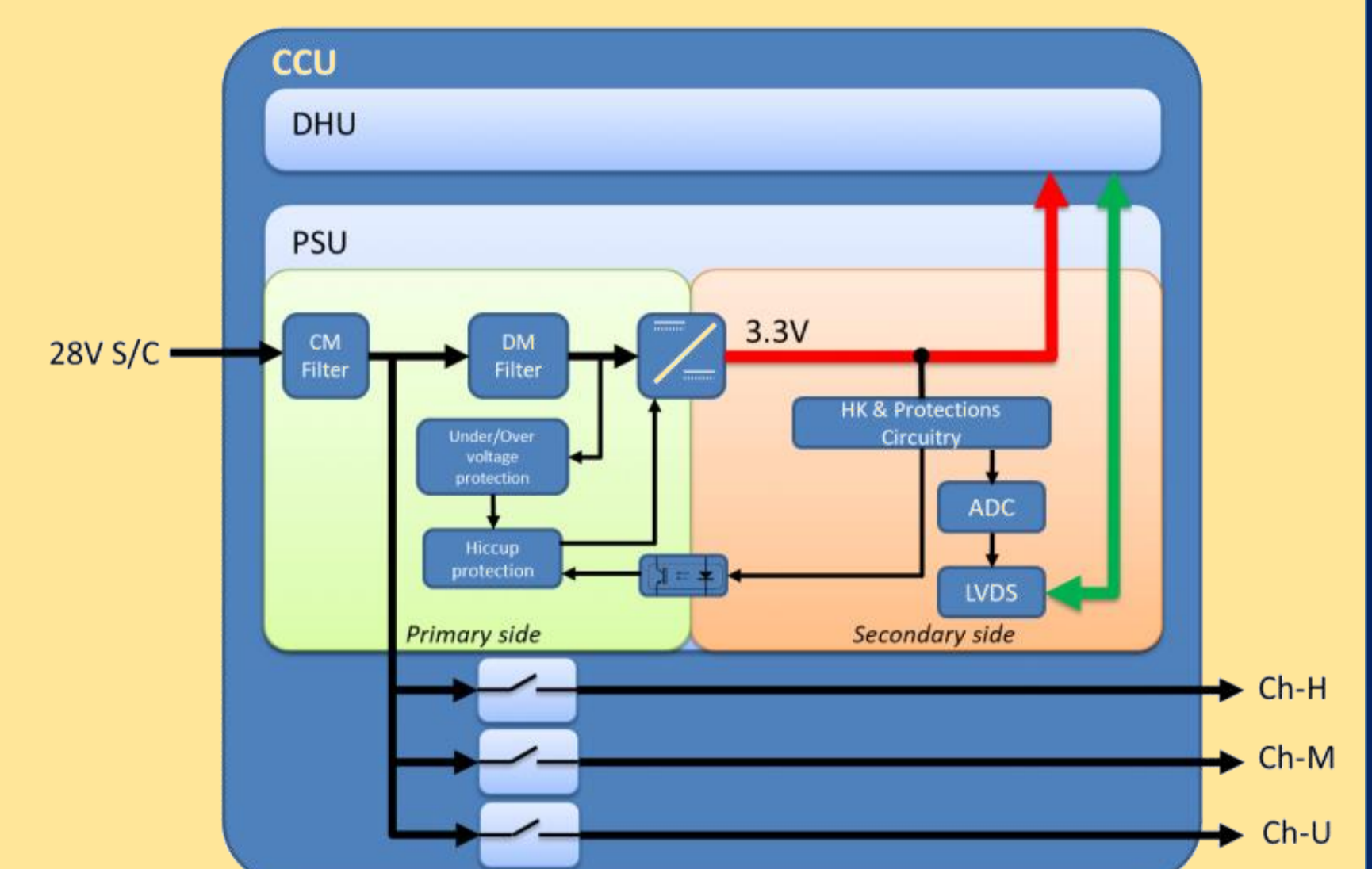
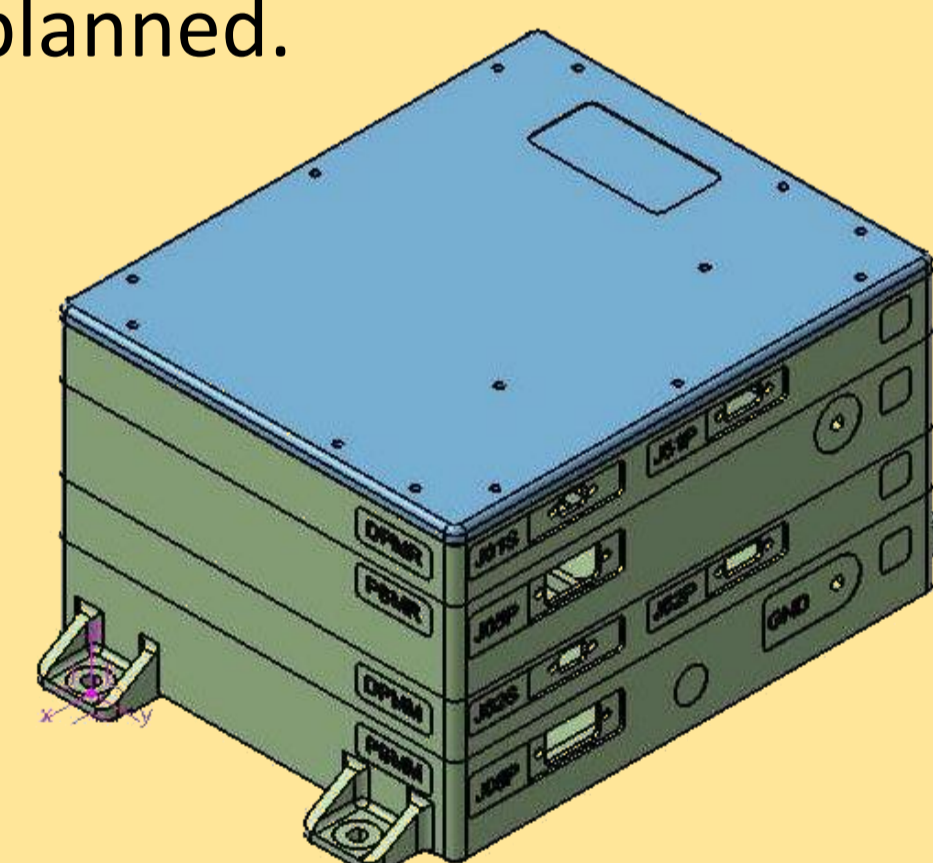


## CCU



The CCU will be intended to help decouple the development cycle by breaking the direct link between the S/C and the different VenSpec instruments. It will allow the instrument channels to increase the speed of their design cycle by partly decoupling them from changes on the spacecraft interface side.

The CCU PSUs will be located in the main enclosure of the CCU E-box. It will provide 3.3V for each DHU board. For redundancy, two identical PSUs boards are planned.



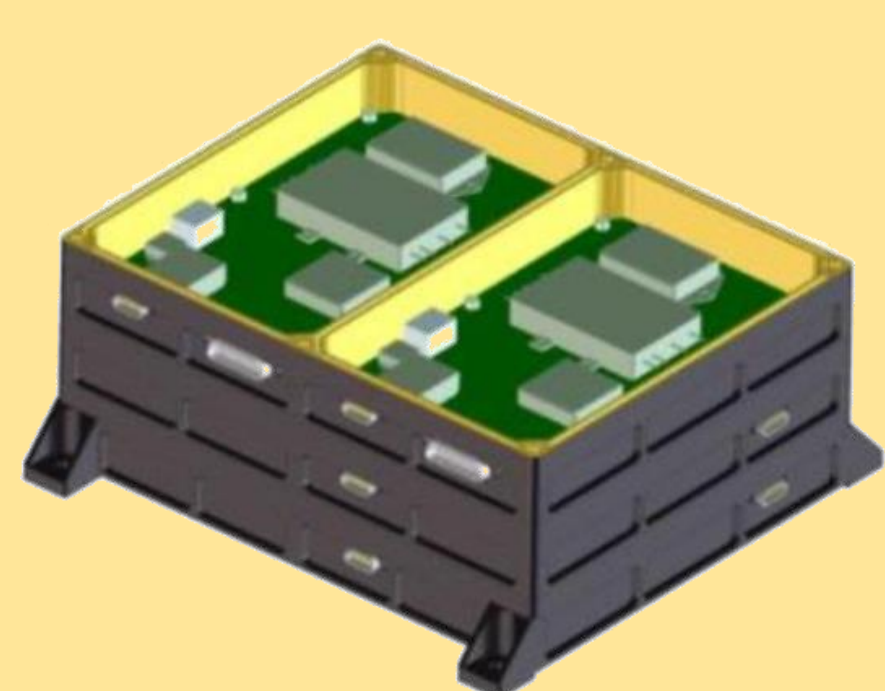
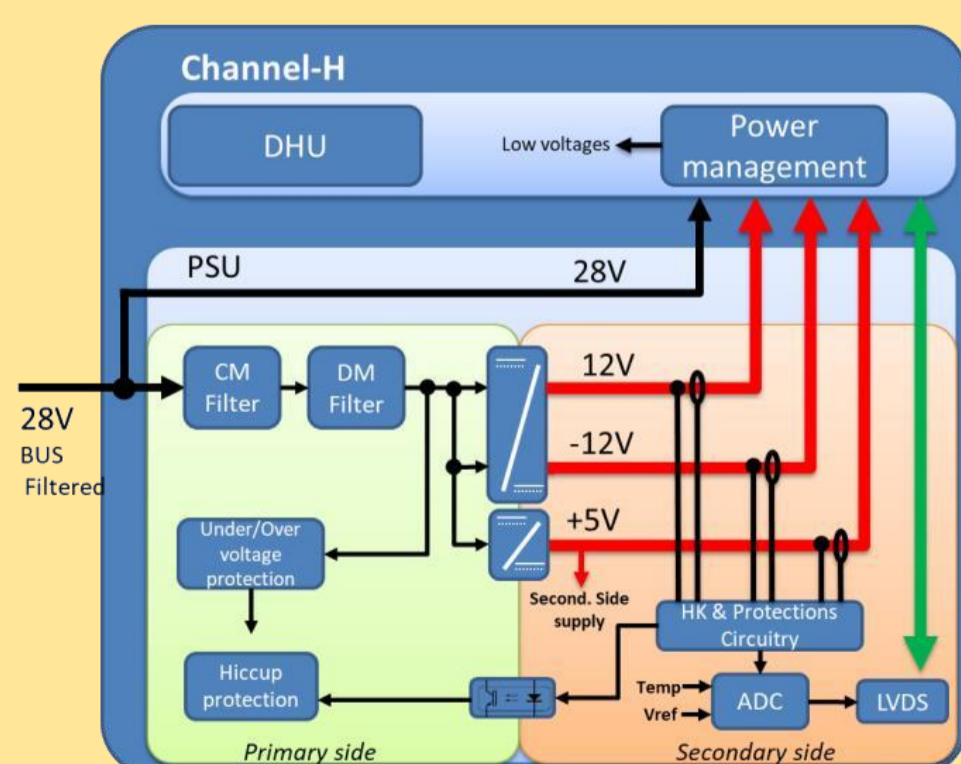
The main and redundant boards will be placed horizontally in the same level of the CCU E-box.

## VenSpec-H

VenSpec-H is a high-resolution infrared spectrometer working in nadir viewing mode.

The channel PSU will provide  $\pm 12V$  and 5V using isolated DC/DC converters and 28V filtered.

The estimated board mass is 330g per PSU. The power budget will be 20W and the efficiency will be greater than 75%



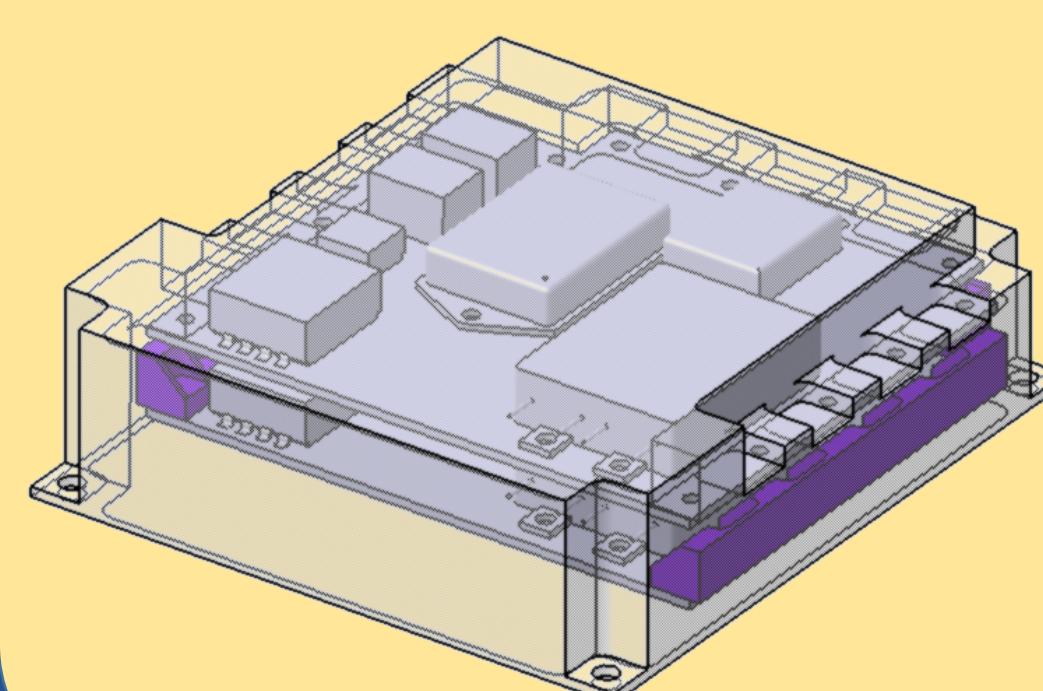
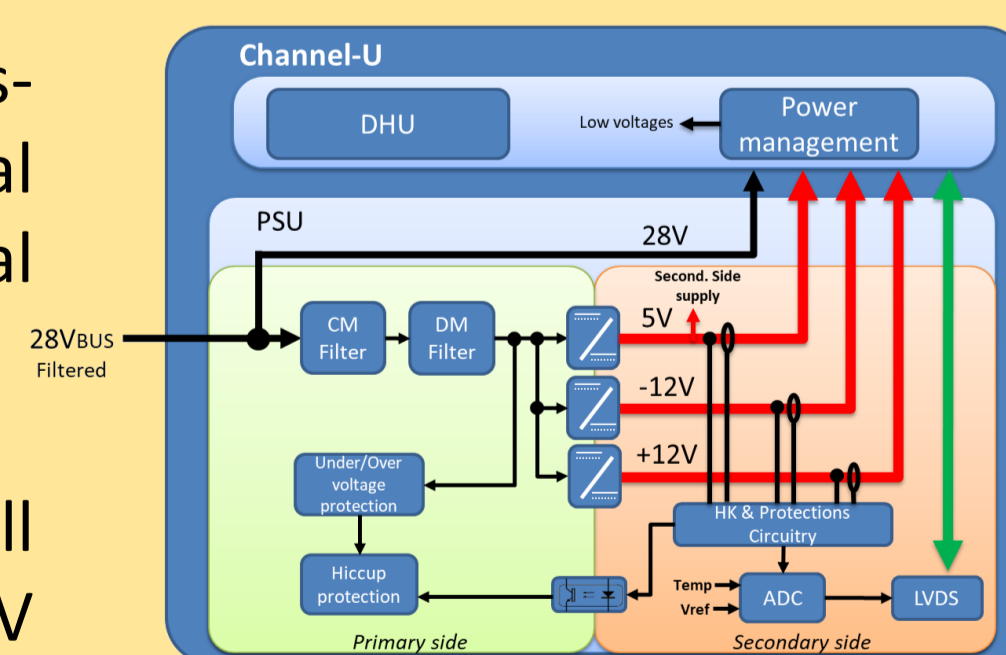
For redundancy, two PSUs are placed in the horizontal plane of the frame as shown in the figure.

## VenSpec-U

The VenSpec-U instrument is a dual channel UV spectral imager.

The channel PSU will provide  $\pm 12V$  and 5V using isolated DC/DC converters and 28V filtered.

The estimated board mass is 240g per PSU. The power budget will be  $\sim 18W$  and the efficiency will be greater than 75%

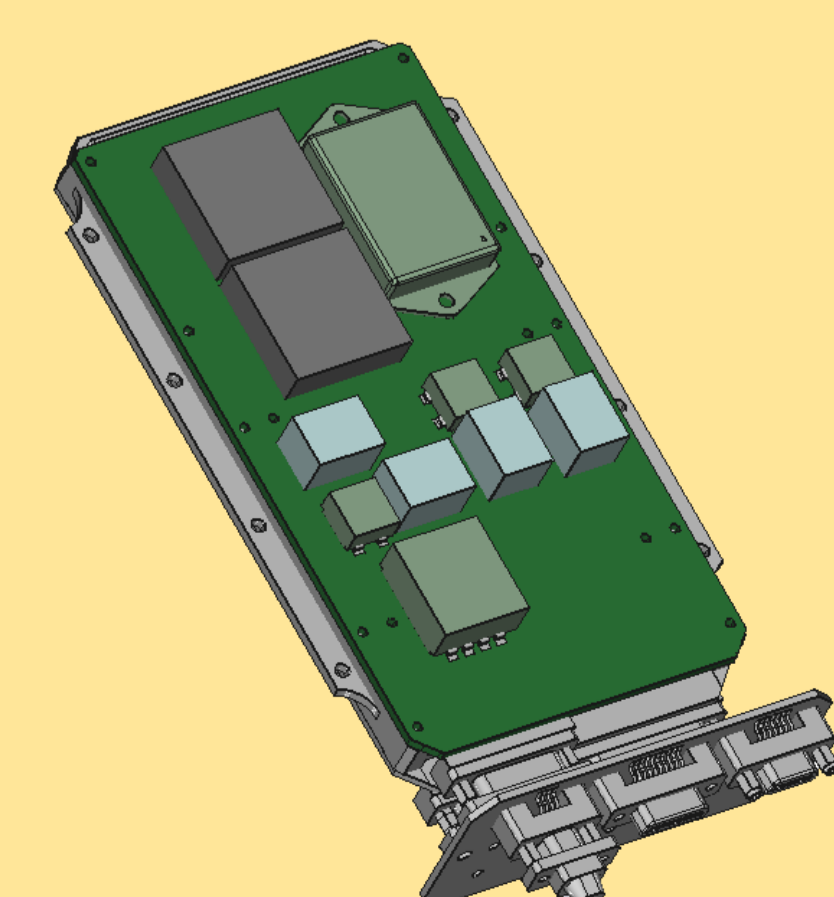
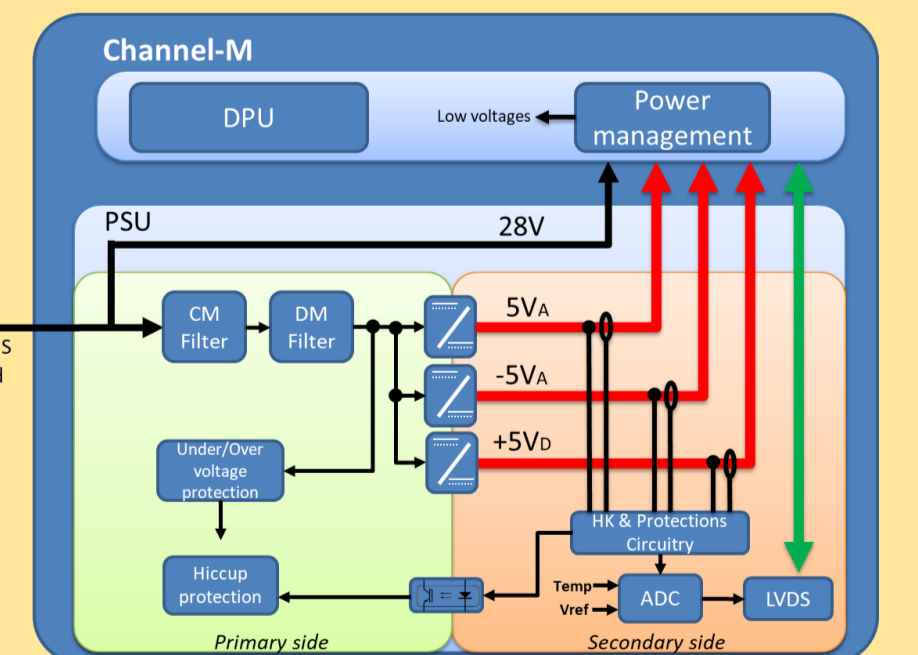


A dedicated external E-box will be used to stack horizontally the two PSUs.

## VenSpec-M

The VenSpec-M spectrometer will obtain repeated imagery of surface thermal emission.

The channel PSU will provide  $\pm 5V$  for the analogue circuitry and an additional +5V using isolated DC/DC converters. It will also provide the input power bus to the DPU.



The estimated board mass is 234g per PSU. The power budget will be  $\sim 19W$  and its efficiency will be greater than 75%.

The VenSpec-M enclosure will be used to allocate the channel PSU.