

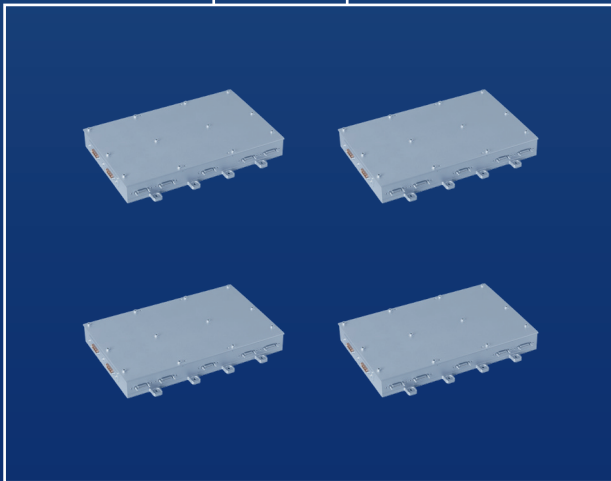
## DEFENCE AND SPACE Space Products

# Emerald

Payload Interface Unit



P u r e L i n e



**About PureLine - The PureLine series was initially developed for constellation applications with large quantities, paving the way to offer disruptive unit prices while keeping high quality products. This approach can now be extended to global satellite applications.**

PureLine is aimed at markets that can embrace the following key features: models are produced in large batches, with automotive quality grade parts and justification files based on constellation heritage. The main advantage of this product line is that it offers very cost-effective products without compromising reliability and quality. This new value proposition is a pivotal enabler for commercial space-based applications, and is made possible solely thanks to the innovative business approach of Airbus Spacecraft Equipment.

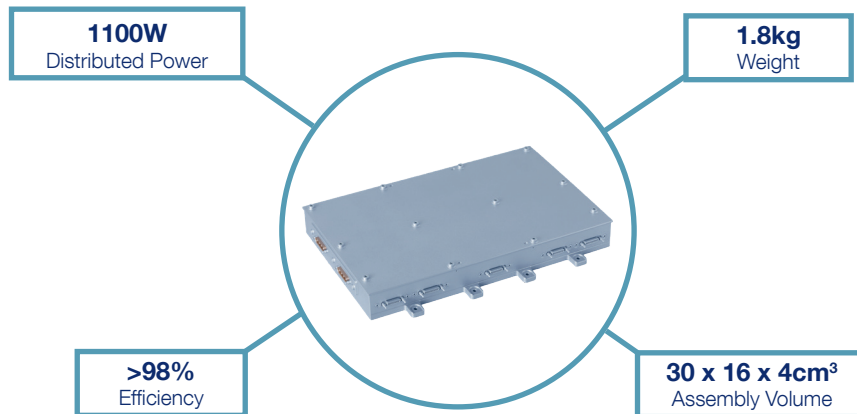
The PureLine Emerald Payload Interface Unit offers the best of essential functionalities in our most compact and lightweight design ever. Emerald is the central payload power distribution unit of the satellite. It allows distribution of power to payload and heater loads via protected and switchable power lines. In addition, Emerald includes stepper motor control and analog interfaces.

Emerald is part of the spacecraft Electrical Power Subsystem, and comprises the following main functions:

- Power Distribution to loads with fuse protected lines
- Distribution of switched and protected power to payload heaters
- Secondary power supply generation for internal purposes
- Stepper motor control drive electronics able to drive up to four different motors
- TM & TC Interface with OBC via CAN serial bus

Innovations introduced on our PureLine products allow us to offer to the global space market cost-effective power equipment featuring a typical 10-year lifetime in LEO.

All components of Emerald have been intensively radiation-tested to ensure flawless in-orbit operations.



### FUNCTIONS

- Payload interface unit
- Power Distribution lines to external users
- Control drive electronics for stepper motors

### KEY FEATURES

- Power Capability: 1.1kW Steady State Max. Power
- Distribution Lines: 18 as follows:
  - Fuse + Switch lines: 12
  - Fuse + Double Switch lines: 6
- Fuse capability up to 7.5Amp
- Motor control electronics able to drive up to four different motors.
- CCSDS TM/TC

### BUDGETS

- Mass: 1.8kg
- Volume: 296 x 158 x 35mm<sup>3</sup>
- Power dissipation: < 18W
- Energy transfer efficiency: > 98%

### INTERFACES

- Input Power Bus I/F: 22-38V (battery follower)
- TM/TC interface: CANBUS
  - 35 Analog TM
  - 26 Switch TC
- Battery Current I/F: 45Amp. max
- Motor control electronics: 4 Stepper motors

### ENVIRONMENT / RELIABILITY

- Temperature: [-30°C; +60°C]
- Vibration level: // 18.3g Rms ⊥ 9.5g Rms
- Shock level: 1 000g (10 000Hz)
- EMI/EMC: tailored ECSS-E-ST-20-07C

### RADIATION

- Latch-Up Free parts
- Error Protection Mechanisms
- Total dose TID compatible with typical 10 years LEO

### RELIABILITY

- Reliability better than 450 FIT (FIDES standard)

### HERITAGE

- Airbus Spacecraft Equipment quality legacy
- Automotive COTS process
- On orbit since February 2019

### Hardware and Functional architecture

Emerald is composed of a single board that includes the complete functionality and provides the following main features:

- Distribution based on lines protected with serial fuse + switch for essential / non-essential loads
- Protected lines with serial fuse and double serial switch (safety+driver) barrier to secure open capability in case of failure
- Optimised control drive electronics able to drive up to four stepper motors
- TM / TC interface managed internally by a FPGA, providing the following services:
  - Serial bus communication (CANBUS)
  - Analog TM acquisition
  - Distribution lines commands
  - Drive electronics control

Supported by:

