EPIC 2023

Airbus DS Power Processing Units PPU : HET Products, New developments and technologies status

DEFENCE AND SPACE

EPIC Naples
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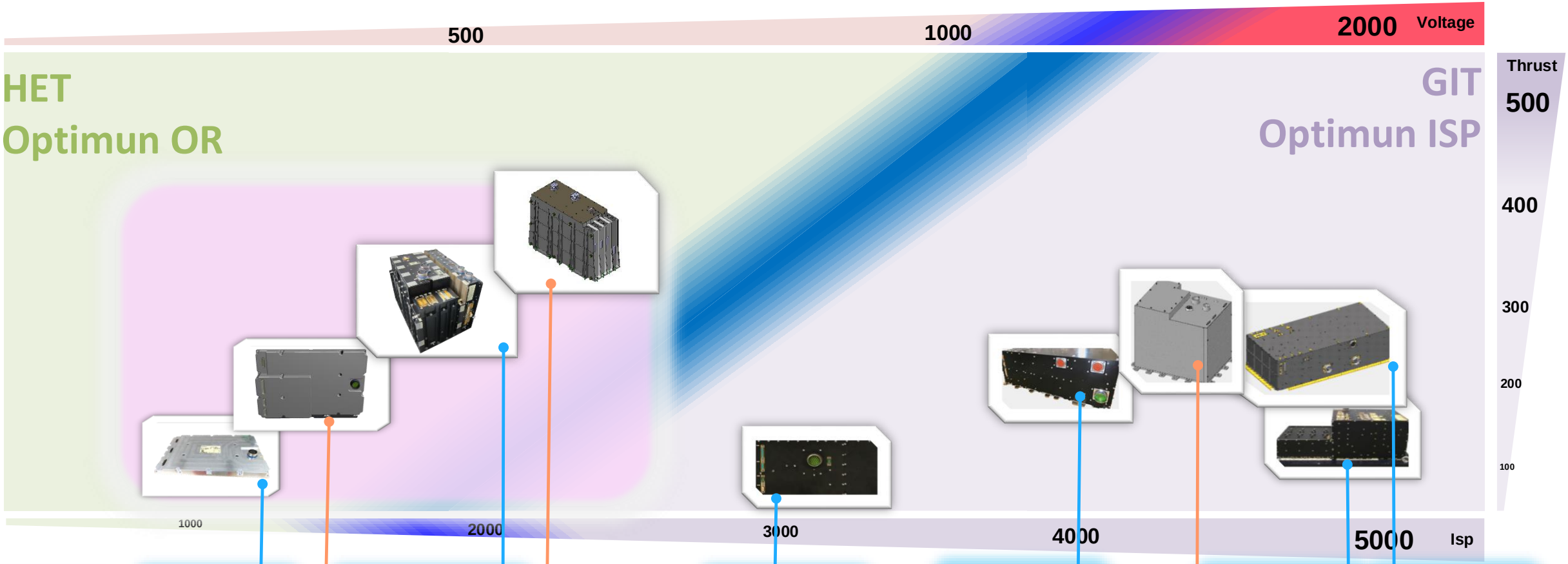
PPU Airbus DS Portfolio



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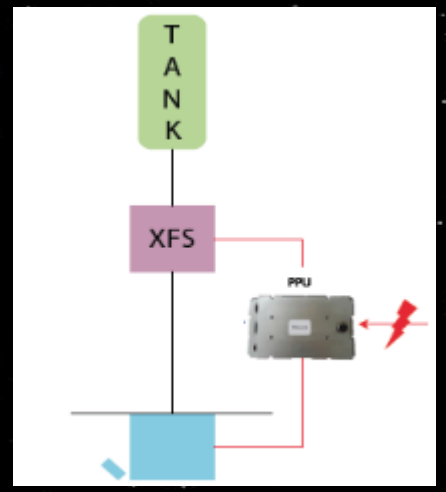
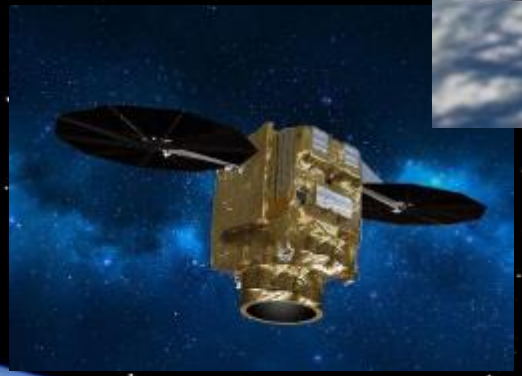
TOPAZ PPU - PPU HET 300W class

Bi-compatibility to the latest generation plasma thrusters
Disruptive reliable rad hardened COTS design
Breakthrough price-performance ratio
10 years lifetime in LEO
Unregulated bus 27-38V
SoCANBUS (N&R) or MILBUS 1553
Mass optimized
Qualification concluded in 2018
Mass production with >600 units delivered



THORs S/S



~Unique flight heritage

- **Equipped systems in orbit >600**
- **cumulative hours of operation >600 000**

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PPUNG1 – PPU HET 5kW class

PPU for **main Hall Effect** Thrusters 5000W class
Optimum design and cost driven approach

Dual mode operation 300 - 400V
Wide power range 3kW - 5kW
Full in-flight flexibility for thruster parameters and operation

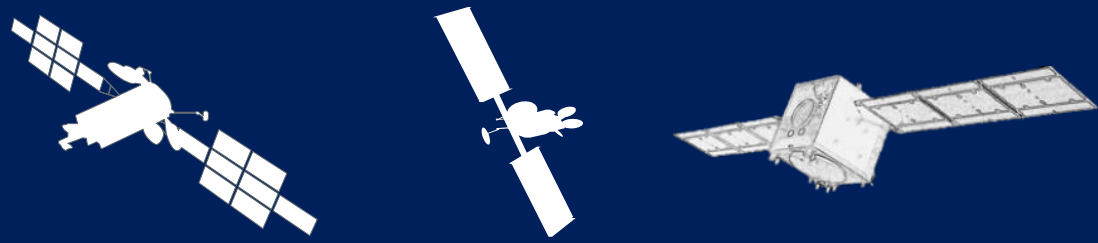
Regulated 100V bus with primary bus protection integrated
Filter Unit integrated in the PPU
MILBUS 1553

Qualification concluded in 2017
Flying with **PPS5000 and SPT140D**

Two versions available :
FU-PPU connected to one thruster
FTSU-PPU: connected to 2 Thrusters in cold redundancy

On board for GEO, MEO, Telecom and Nav. missions

ELEKTRO - PPU NG1



Major customers in **Europe and USA**

>140 flight models ordered
82 flight models already delivered
23 flight models in orbit since 2021
40 units per year production rate

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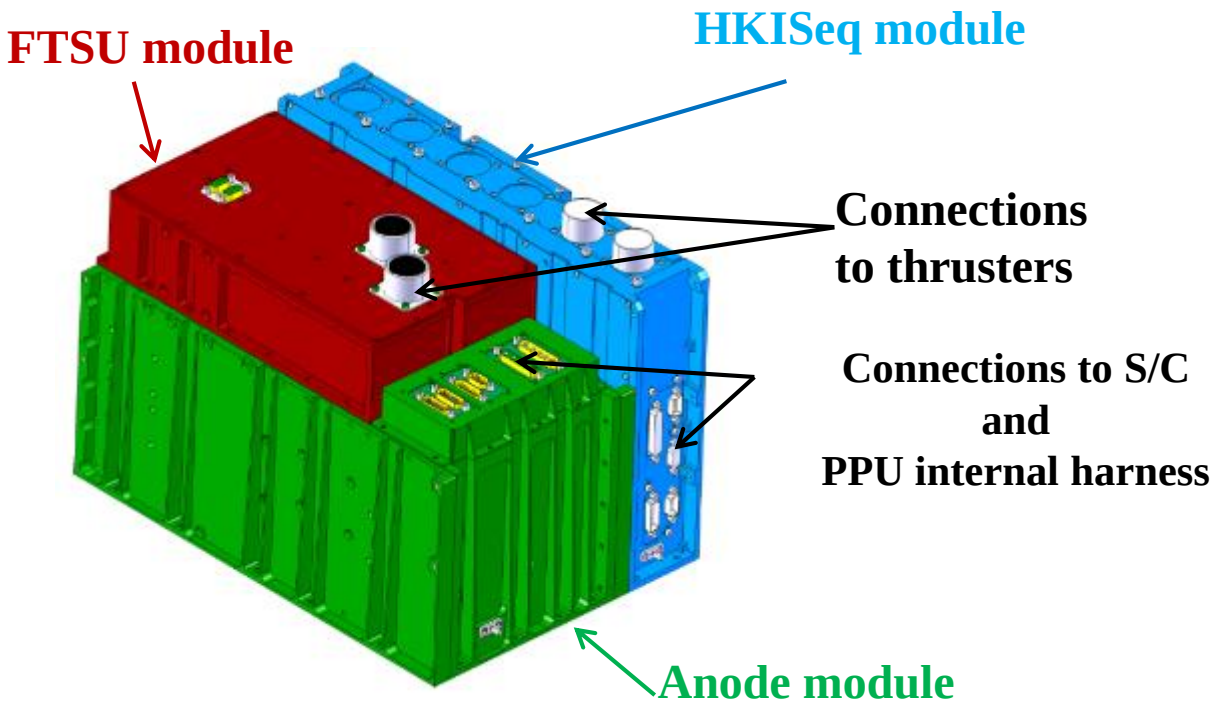
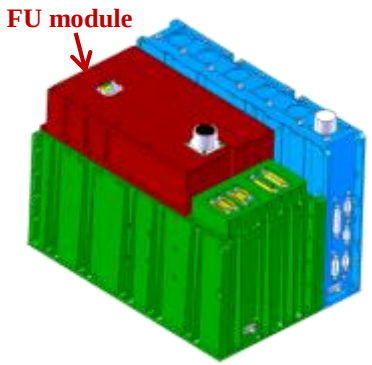
PPU NG1 - Architecture





Anode Module

Anode *Supply,* ***Magnet*** *supply*
XFC *Xenon Flow Control*

HKI Module

Cathodes interfaces and sequencing Include
Heater, ***Keeper*** *and* ***Ignitor*** *supplies*
1 thruster (FU version)
2 thrusters in cold redundancy (FTSU version)

Filter and Thruster Selection Module (FTSU)

Interface with 2 thrusters in cold redundancy

Filter Unit Module (FU)

Interface with 1 thrusters

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PPU NG2 – One step ahead

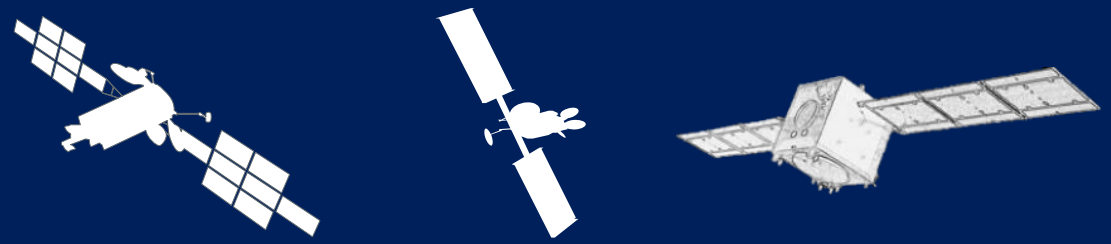
- Disruptive reliable **rad hardened COTS** design
- **Compatible** with main thrusters PPS, SPT, BHT **…**
- **Multi fluidics** management system, PV, BB and TT
- **Dual mode operation** range 300V– 600V
- Filter Unit **integrated** in the PPU

- State of the art design based on **GaN** + **digital control**
- Full **in-flight flexibility** for thruster parameters & operation
- Optimized DFM /DFT for **full automatic production**
- Self-diagnostics & self-tests
- **Patented** innovations

- Regulated **100V bus** or **70V Unregulated**
- Adaptation to other primary buses possible
- MILBUS 1553 or CANbus

Competitiveness, flexibility and modularity

ELEKTRO - PPU NG2

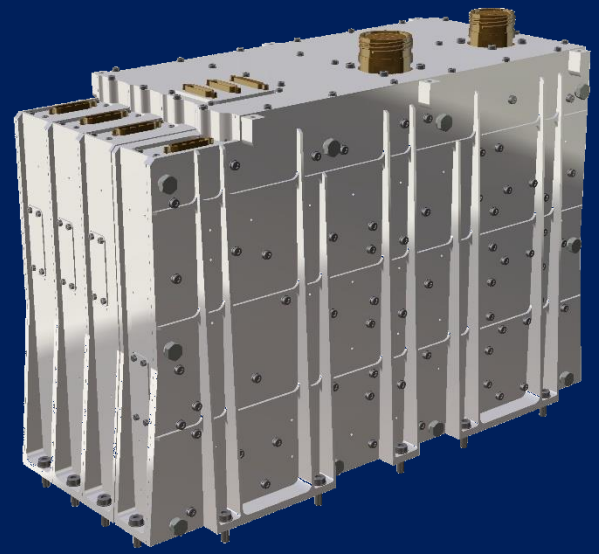


Key figures:

Modular compact concept **1 to 20kW**

50% Cost reduction

30% Mass reduction



PATENT PENDING

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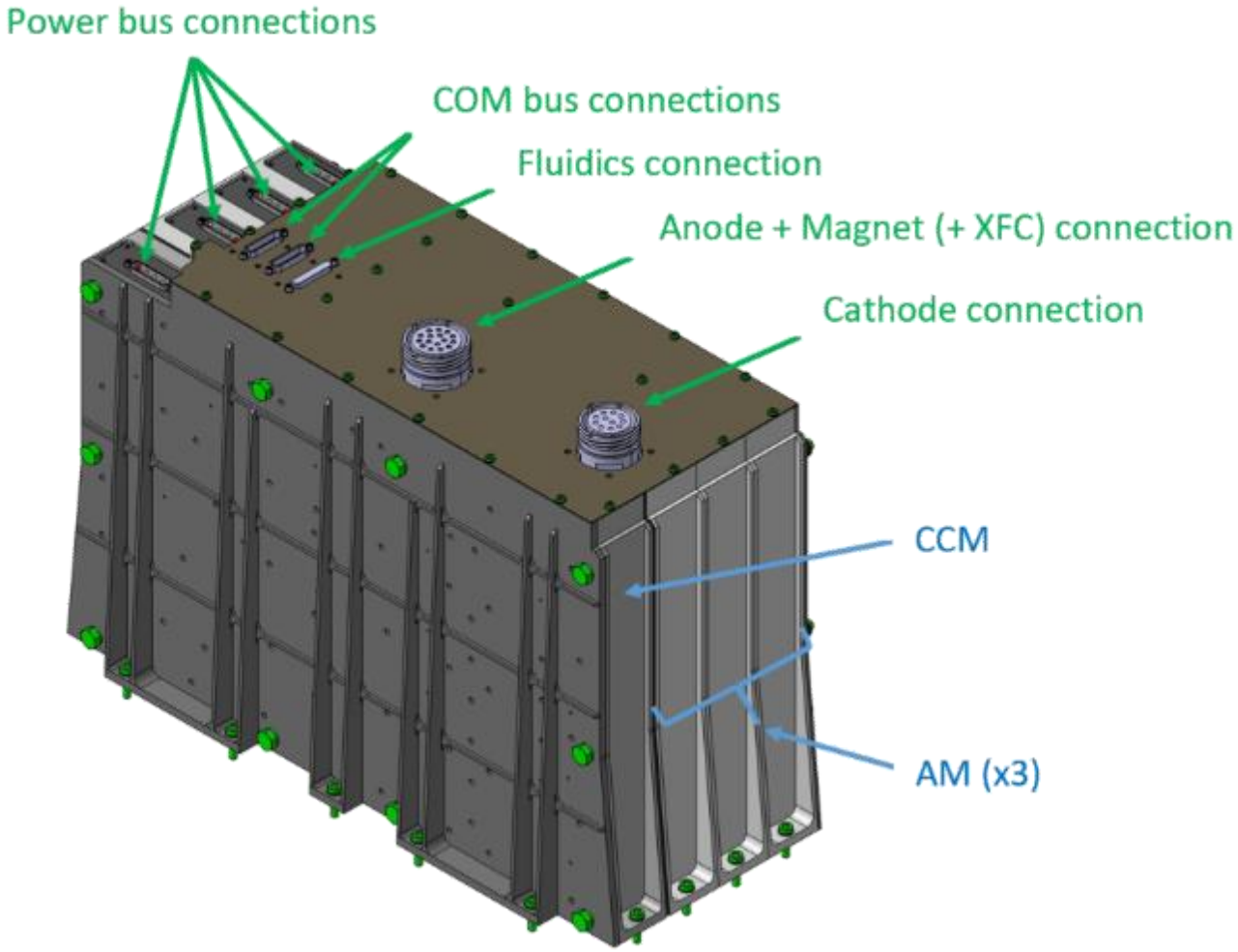
PPU NG2 - Architecture



PPU NG2 in its 5kW configuration

Anode Modules

Anode *Supply,* ***Magnet*** *supply and* ***Filter*** *Unit*

Cathode Control Module

Heater, ***Keeper*** *and* ***Ignitor*** *supplies*
Fluidics *management interfaces*

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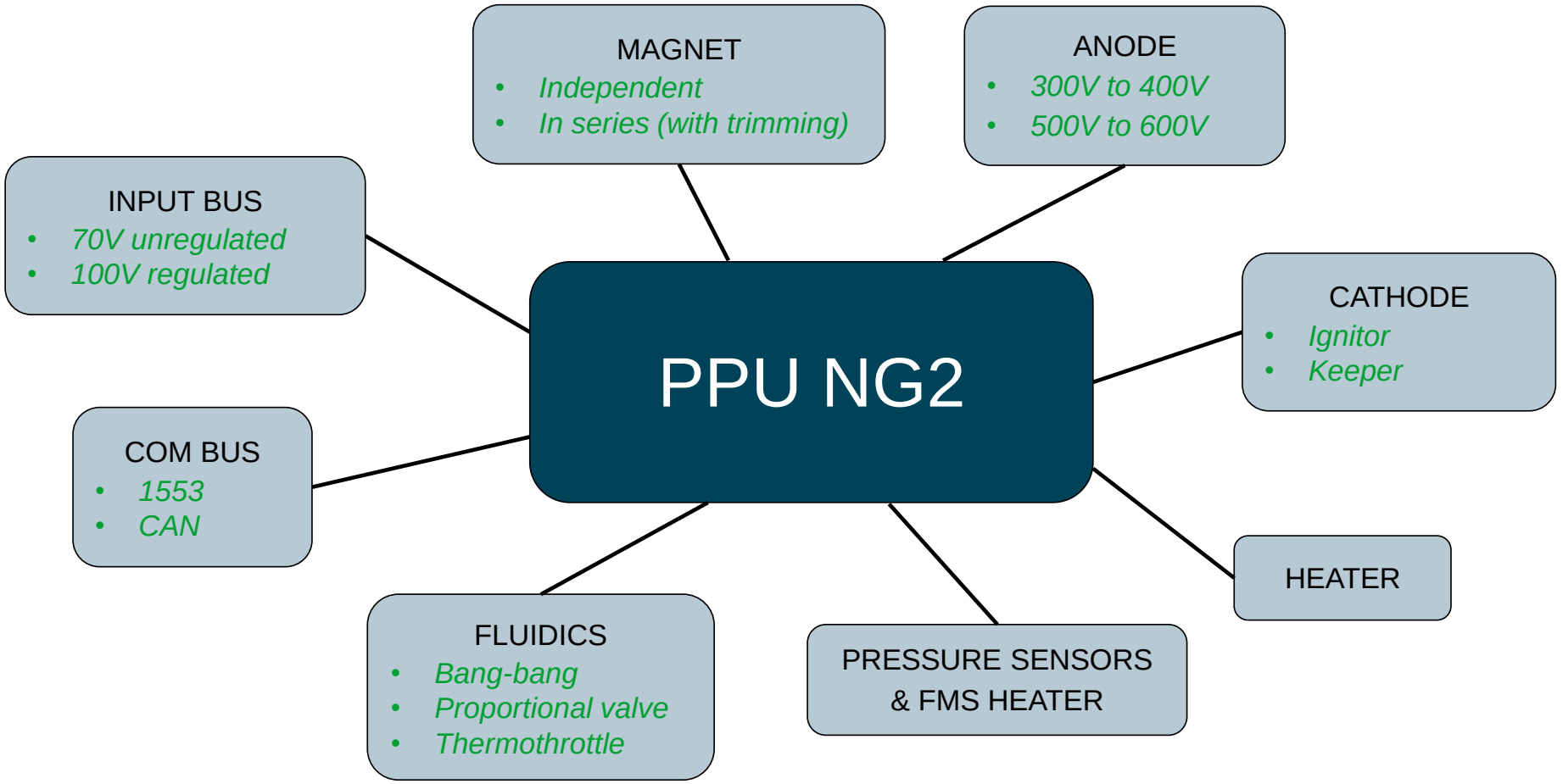

PPU NG2

Versatility !!

Anode Voltage

Anode Power

Magnet

Fluidics

ComBus

Primary Bus

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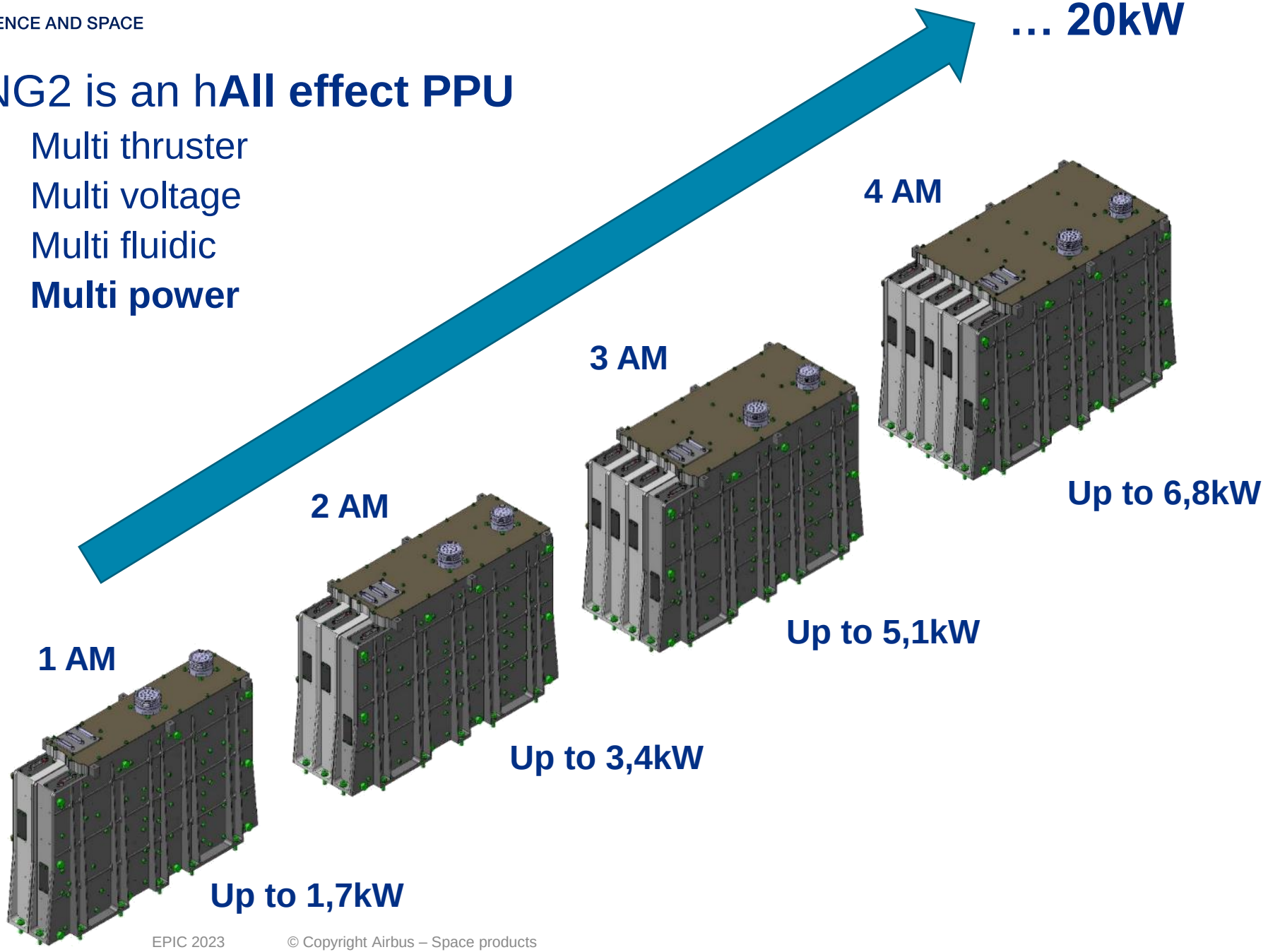
NG2 is an h**All effect PPU**

- Multi thruster
- Multi voltage
- Multi fluidic
- **Multi power**



PPU NG2

Modularity!!

One PPU for

h**All** effect thrusters

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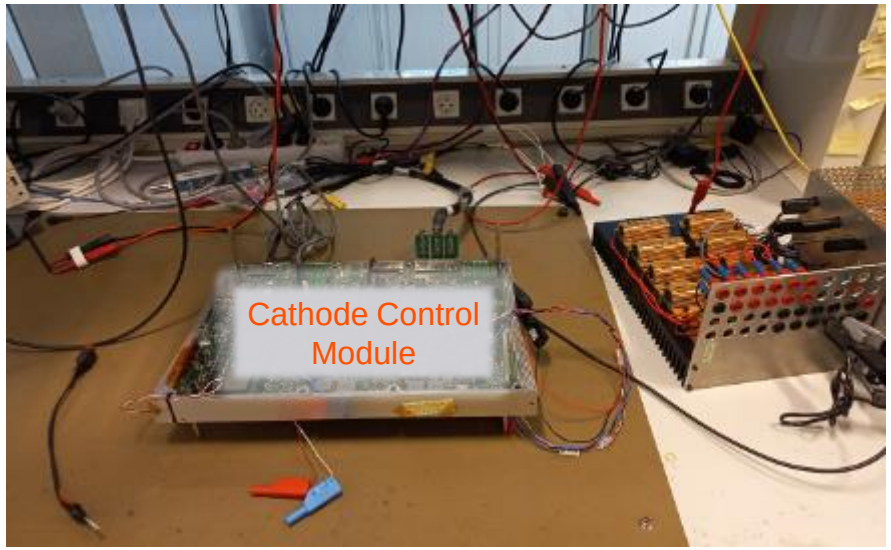
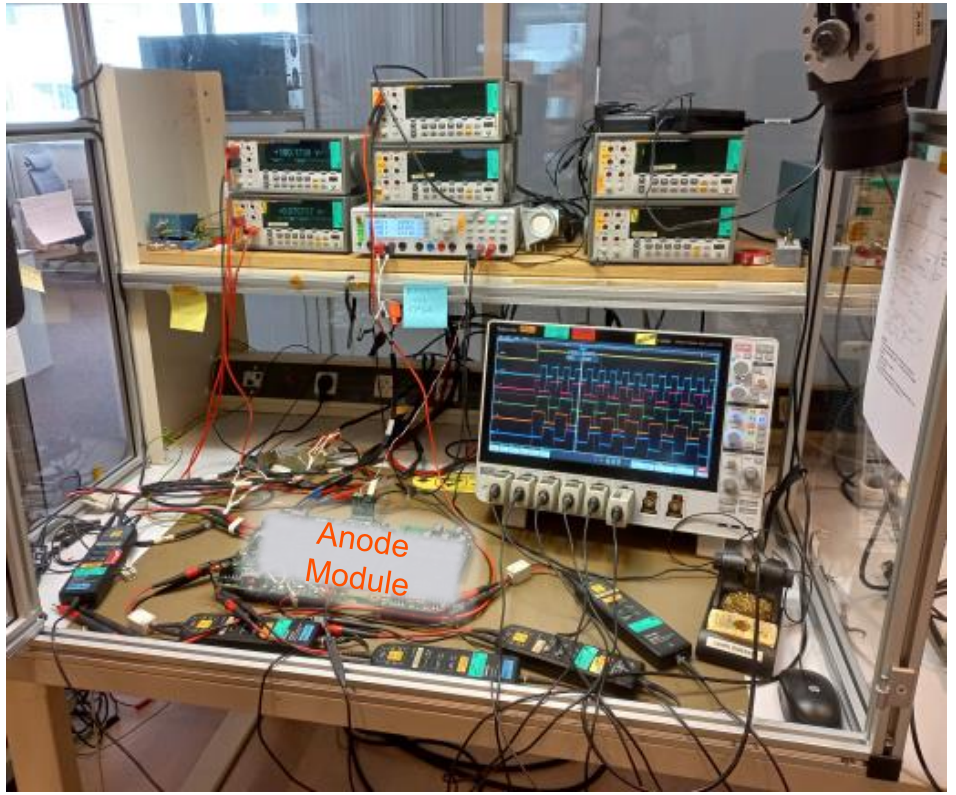
PPU NG2

Validations

- **Both** modules under **validations**
- Early **coupling** with PPS5000



CCM validation



AM validation

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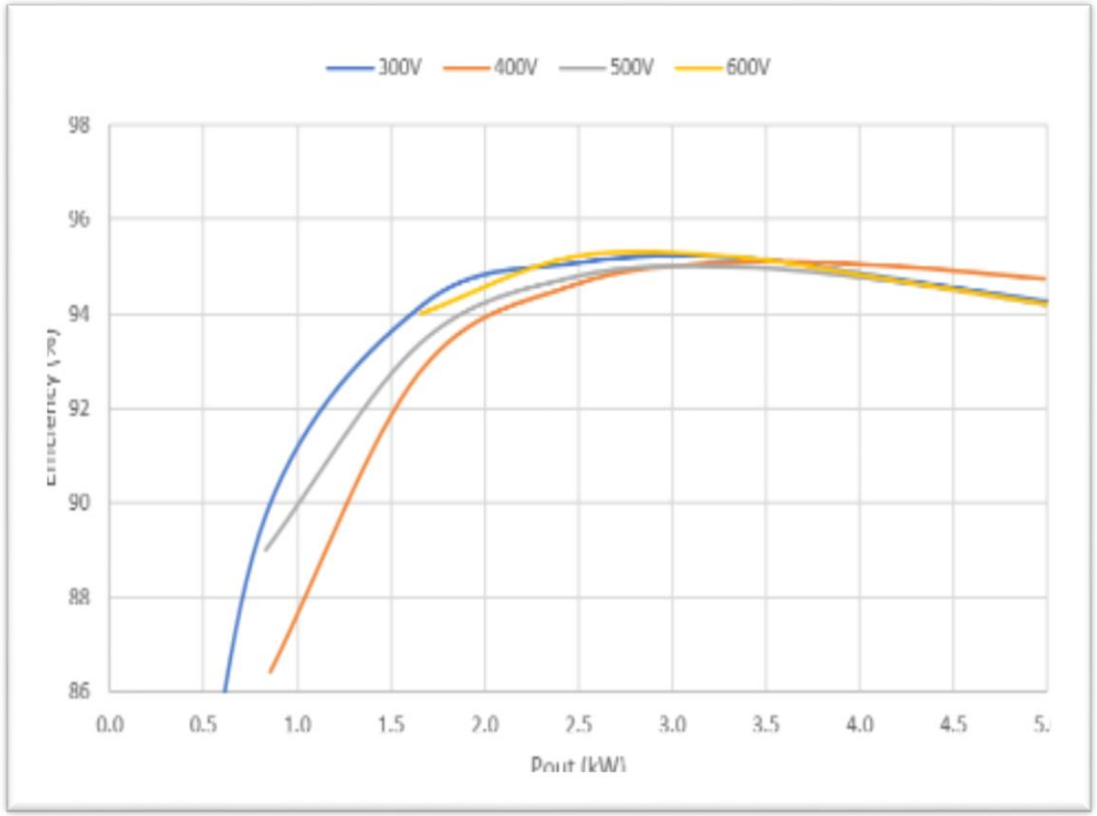
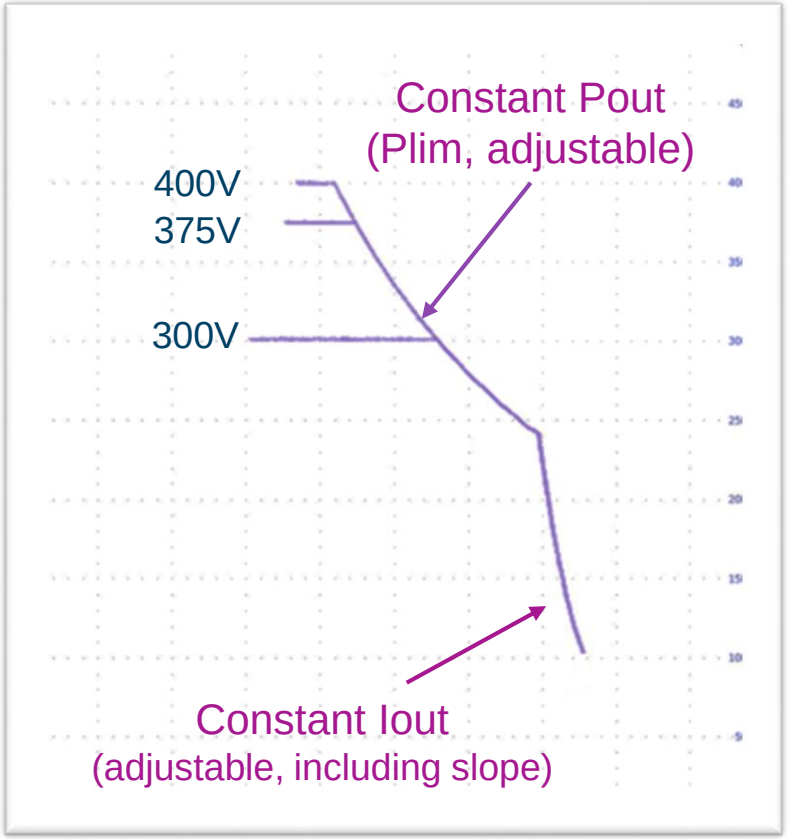
PPU NG2 Some figures

Anode supply efficiency for different output voltages



Example of Anode output characteristic



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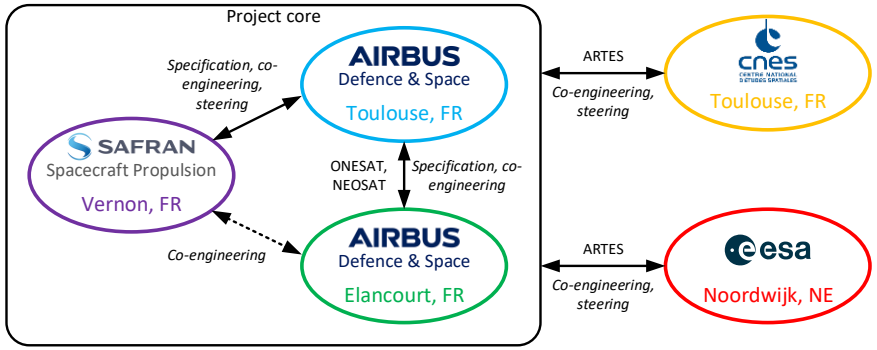
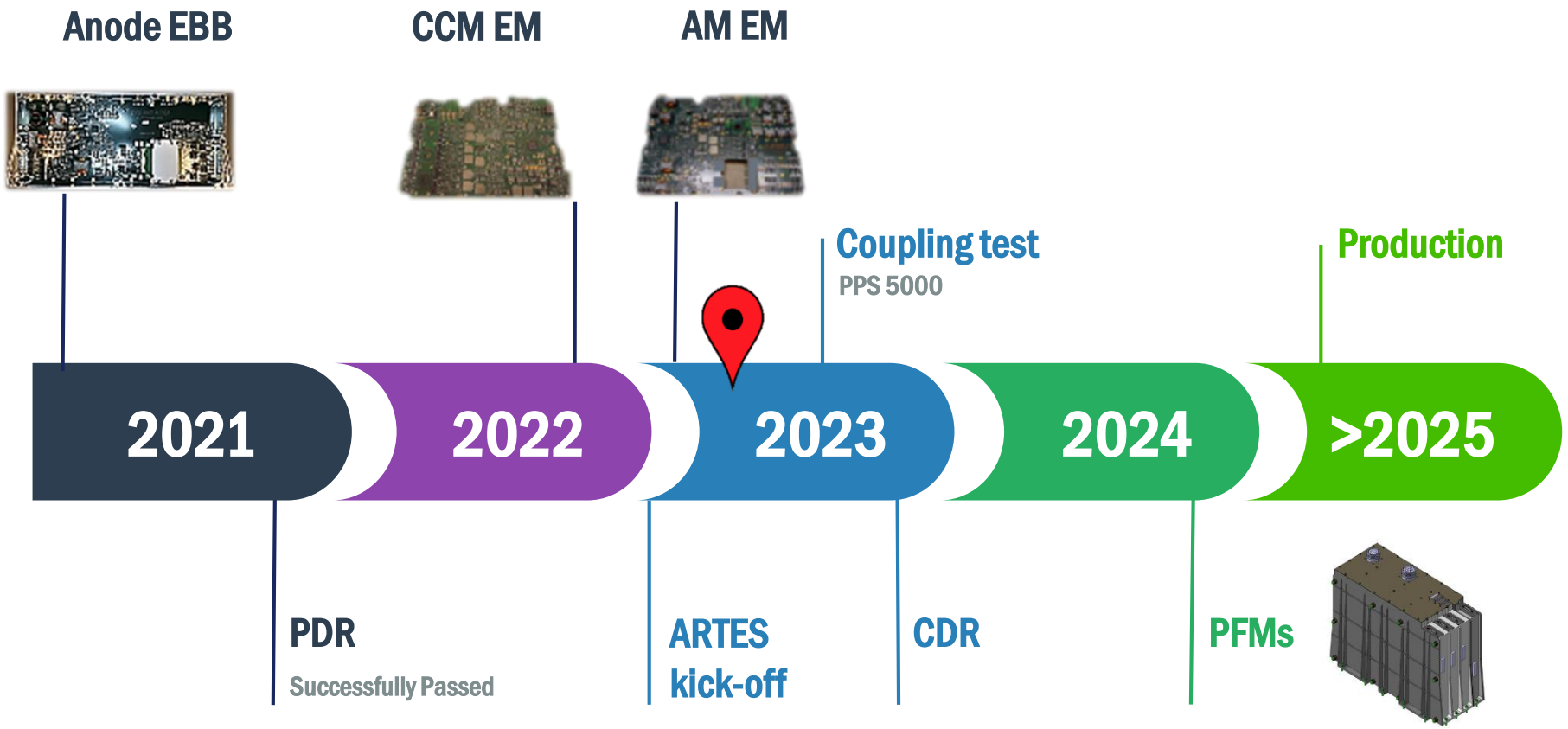
Stakeholders



Timeline



PPU NG2
Development & Timeline

Development in **Airbus DS** in Elancourt

PPU NS

One PPU, PPU Next Space

DfM
optimized
heritage
COTS
efficient
DfCD
DfT
compact
NextSpace
innovative

BUILT UPON THE SUCCESS OF ONEWEB GEN1

CONCLUSIONS

Extensive **heritage** on PPUs

Mastering **cutting edge technologies** to answer the future:

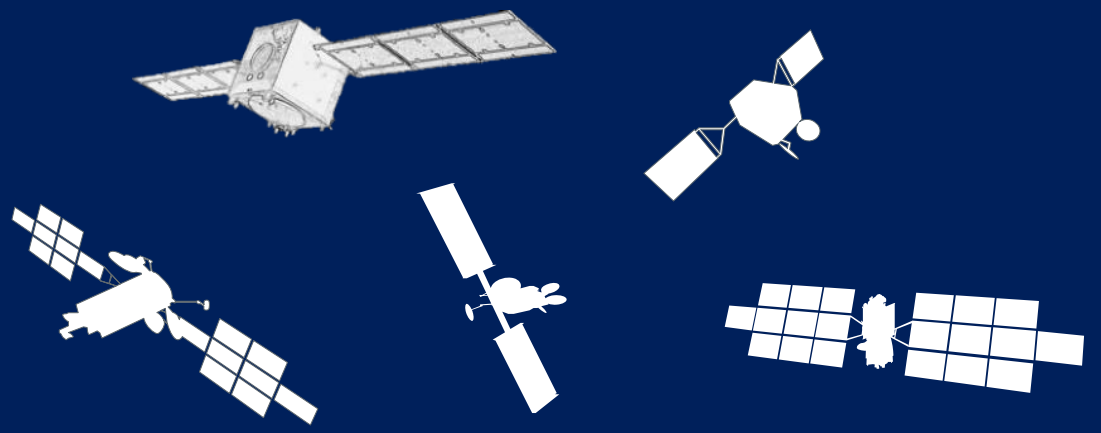
- ✓ **COTS,**
- ✓ **GaN,**
- ✓ **Digital Control**
- ✓ **High Voltage**

EP HET PPU portfolio answers Prime system **needs** :

- ✓ **Power**
- ✓ **Mass**
- ✓ **Efficiency**
- ✓ **Cost**

Power ranges from **Low** (300W) to **High Power** (20kW)

Provide **solutions** for short, mid and long term **needs**



Primes in **Europe** and **USA with:**

> 600 Low Power **PPUs**

> 140 Medium Power **PPUs**

> 600.000 cumulated flying **hours**

> 600 cumulated **years**

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TOPAZ

PPU NS

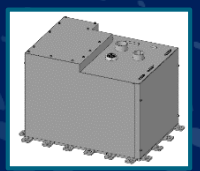
ELEKTRO NG1

ELEKTRO NG2

PPU T5

PPU T6

PPU GIT



MVPPU

Thank you for your attention

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