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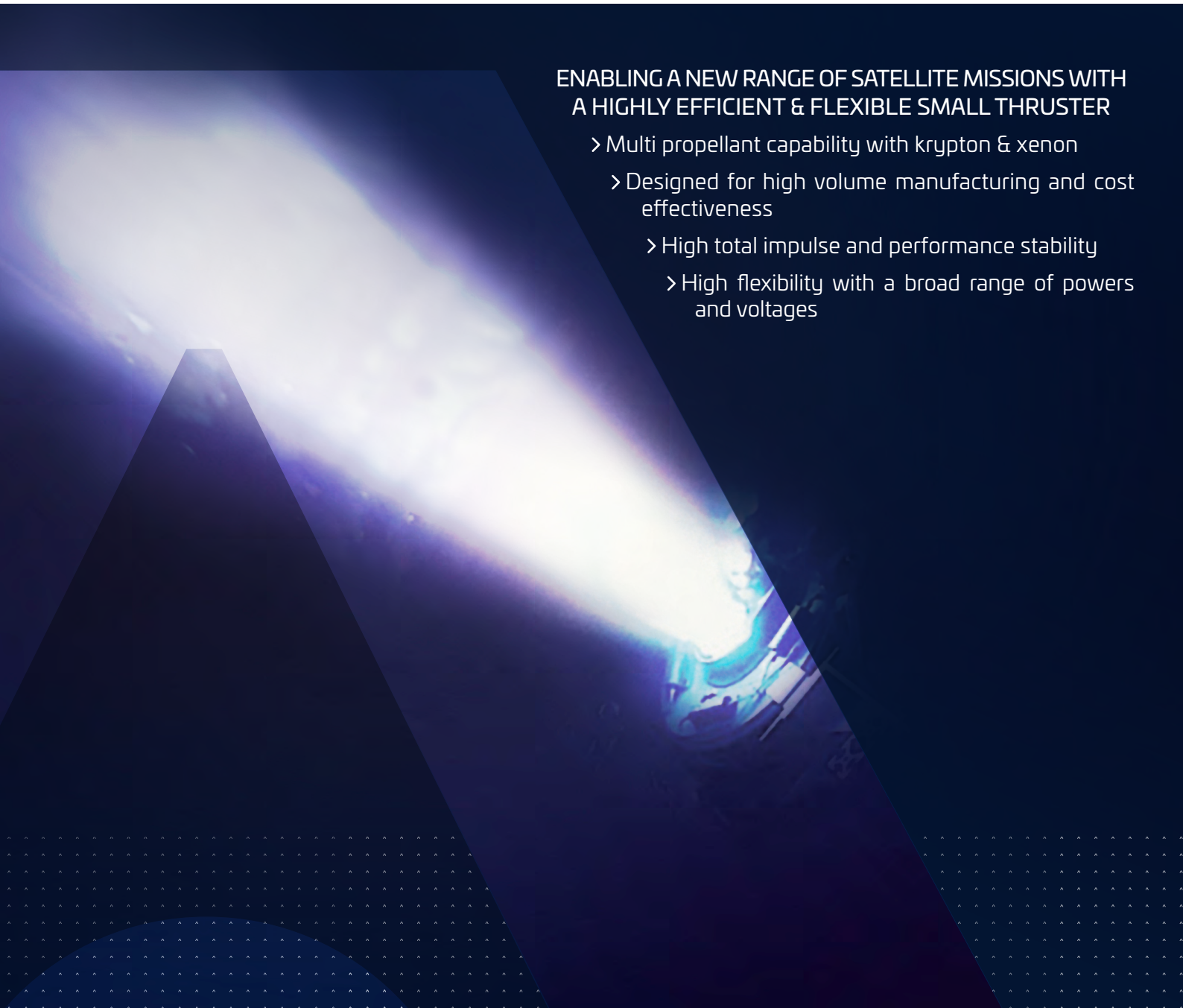
THALES
Building a future we can all trust

HEMPT EVO
High performance electric thruster for satellites and constellations



ENABLING A NEW RANGE OF SATELLITE MISSIONS WITH A HIGHLY EFFICIENT & FLEXIBLE SMALL THRUSTER

- Multi propellant capability with krypton & xenon
- Designed for high volume manufacturing and cost effectiveness
- High total impulse and performance stability
- High flexibility with a broad range of powers and voltages

HEMPT EVO

High performance electric thruster for satellites and constellations

MORE THAN ONE BILLION HOURS OF OPERATIONS IN SPACE

Thales has developed a new electric propulsion technology capitalising on our heritage with traveling wave tubes (TWT).

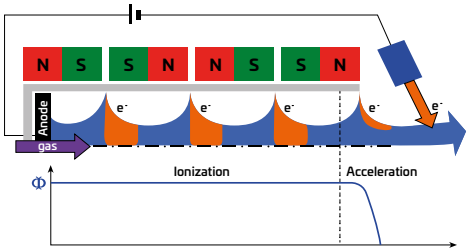
- Expertise in electron beamforming
- More than 23,000 space TWT delivered to various customers
- Large space cathodes in orbit heritage
- Reuse of 85% of the technology and 80% of the processes from TWT to HEMPT
- Industrial excellence and high volume manufacturing capability

FROM LOW EARTH TO GEOSTATIONNARY ORBIT AND INTERPLANETARY EXPLORATION

The HEMPT technology was first designed for long GEO operations and then derived to fit any mission to any orbit.

Thales has spent 20 years working on this technology to improve it and make it the best in-class thruster EVO.

- Electron confinement by permanent magnets allowing high total impulse
- Strongly separated ionization and acceleration zones allowing high efficiency
- GEO demonstrator, HEMPT 3050, TRL8 with extreme qualification flying on H2Sat since July 2023



THE BEST 700W THRUSTER FOR LONG KRYPTON OPERATIONS

- Self-radiating, low mass & easy to accommodate on a spacecraft
- Designed for multi-thruster operations as well as single thruster operations
- Robust design & long lifetime
- Neutralizer designed and manufactured in-house with in-orbit heritage

SYSTEM COMPONENTS & CONFIGURATIONS

Thales Microwave & Imaging Sub-systems has developed strong partnerships with industry leaders for system integration, PPU & fluidic management. The HEMPT full propulsion system is available and ready to fly.

- Several different PPU* from major space equipment companies with flexible operating points
- Propellant storage and management system specifically designed for low dry mass and high storage density with krypton propellant
- Compatibility with several FCU** including flight-proven hardware
- Highly integrated PMA*** compatible with krypton & >300 bar MEOP
- Plug & Play electric propulsion modules with full system capability

THALES ULM WORLD CLASS FACILITY

Thales' world-class R&D and production facility enables us to design & manufacture state-of-the-art and innovative equipment benefitting from large-scale production of highly technical products. At our Ulm site in Germany which is dedicated to space products, our HEMPT EVO is manufactured in an environment that is fully equipped with dedicated test facilities (end-to-end testing, vector scanning and thrust measurement, 22m^2 vacuum chamber) and is certified according to ISO9001:2000, AS9100, ISO 14001.

SPECIFICATIONS	HEMPT EVO
Thruster technology	HEMPT (High Efficiency Multistage Plasma Thruster)
Propellant	Krypton ; Xenon
Operating power range	200 - 700 W
Operating voltage range	300 - 800 V
Total impulse	>1.2 MNs
Lifetime	>10 000 hours
Weight	W/o harness: 1275g typical / 1300g max
Thruster envelope	168 x 192 x 91 mm

OPERATING POINTS PERFORMANCES	High trust	High ISP
Power	700 W	700 W
Voltage	400 V	800 V
Thrust	~26 mN	~21 mN
ISP	~1700 s	~2200 s
Efficiency	35%	40%

** Power Processing Units* *** Flow Control Units* **** Propellant Management Assembly*

Thales – 2, rue Marcel Dassault – 78140 Vélizy-Villacoublay – France
Tel: +33 (0)1 30 70 35 00 > thalesgroup.com <