vidyut | VIDYUT · LIGHTNING

Power for electric propulsion.

Lightweight GaN-based power processing and control units for Hall-effect thrusters — under development by the team that built PPCU-class hardware for ISRO.

PPCU · 300 W – 6.5 kW | GaN EM IN DESIGN | NON-US ORIGIN | BENGALURU · INDIA

The thruster gets the papers. The power unit gets the schedule.

A Hall thruster is a plasma device wrapped in a harder power-electronics problem: kilovolt-class anode supplies, ignition transients, floating heater and keeper rails, magnet control — space-grade, and qualified.

2×	**95%**	**3.5 yr**	**€5.4 M**
the PPU outweighs the thruster it powers, even in NASA's purpose-built low-mass architecture (1 kg thruster, 2 kg PPU)	of PPU power flows through one high-voltage discharge stage — the stage that drives qualification cost	of life-qualification testing on NASA's high-power EP — named by GAO among its worst schedule drivers	across EU programmes attacking PPU cost (Hall-focused ECOPROPU; gridded-ion DEEP-PPU)

Sources: NASA NTRS 20160005342 · GAO-25-107591 · CORDIS 101082685 & 101081987 — "the power electronics [are] one of the major cost drivers of an electric propulsion system."

Everyone builds their own. Almost no one sells one.

We surveyed 23 electric-propulsion thruster makers worldwide. Nearly all build PPUs in-house — plasma teams doing power-supply engineering — because the merchant market barely exists.

> "There are few PPUs on the market now, with most companies building them in-house — a time-consuming process that becomes harder as the power level rises."
>
> Steve Kiser, CEO, Phase Four — Payload, 2026

23 : 9

thruster makers surveyed vs merchant PPU vendors worldwide

1

merchant vendor outside the US/EU — SETS, in wartime Ukraine

0

in India — or anywhere in Asia outside China

Survey: company sites, satsearch, IEPC papers, Payload. Merchant vendors: SITAEL, Airbus Crisa, TAS-Belgium/ETCA, CPE, SETS, ASP GmbH, EPC Space, ExoTerra, OHB.

US law controls the PPU by name. The world is routing around it.

EAR · ECCN 9A515.i

"Electric (plasma/ion) thrusters and their associated power control systems"

Even after the 2024 ITAR-to-EAR reform, US PPUs need an export licence to every destination except Australia, Canada and the UK. India is not on the list.

The response — Europe

"non-US-origin" is now a marketed feature

SITAEL: the HT-100 "and all the key sub-system components are fully based on European, ITAR-free technologies." Rocket Lab markets its new Gauss line as ITAR/EAR-free for constellations.

The opening — India

No equivalent supplier exists east of Europe

A flight-heritage, export-unencumbered PPCU house in India serves domestic demand license-free and the world as a neutral second source.

Sources: Federal Register 2024-23975/23958 · space.commerce.gov ITAR clarification · sitael.com · rocketlabcorp.com/gauss-propulsion.

India just went electric — and had to shop abroad.

ISRO's EP is flying and scaling

GSAT-9 flew ISRO's plasma-thruster EP for station-keeping; the programme is now moving EP into its mainline GEO buses.

LPSC's 300 mN SPT passes 1,000-hour life test (Mar 2025)

The 5.4 kW thruster now heading for in-orbit validation on TDS-01 — **the same thruster class our founding team's PPCU was built to drive.**

₹1,200 crore national EO constellation (2026→2029)

Pixxel-led consortium contracted by IN-SPACe: 12 satellites, privately built and operated.

Sources: isro.gov.in (SPT life test) · PIB (GSAT-9 EP) · SatNews (Allied Orbits) · exotrail.com (Pixxel).

India's leading private satellite maker, Pixxel, sources its electric propulsion from Exotrail — in France.

Orbital Today, Feb 2026 — the clearest possible demand signal for a domestic supplier

The domestic supply side today

ISRO's PPCU is internal. Bellatrix integrates vertically for its own thrusters. Avionics houses (Ananth, Centum) sell no EP power product. **Merchant EP power electronics in India: nobody.**

The merchant PPCU house.

One lightweight GaN-based product family under development, three power classes, for thruster makers and satellite primes — so plasma companies can stay plasma companies.

CLASS I · SUB-KW

50–500 W PPCU

Small-sat Hall systems and cathode heaters. The volume tier — the "couple decks of cards" market the US is only now entering.

CLASS II · KILOWATT

1–2 kW PPCU

LEO station-keeping and orbit topping. The workhorse class of commercial constellations — comms satellites on EP grow 111 → 532 by 2030.

CLASS III · HIGH POWER

5 kW+ PPCU

Orbit raising and all-electric buses. Where our 6.5 kW silicon ZVZCS programme heritage lives.

ZVZCS → GaN

flight-programme soft-switching heritage, carried into lightweight wide-bandgap engineering models

Modular

one discharge stage to qualify and scale across classes

Non-US-origin design

Indian design authority, licence-free to domestic customers

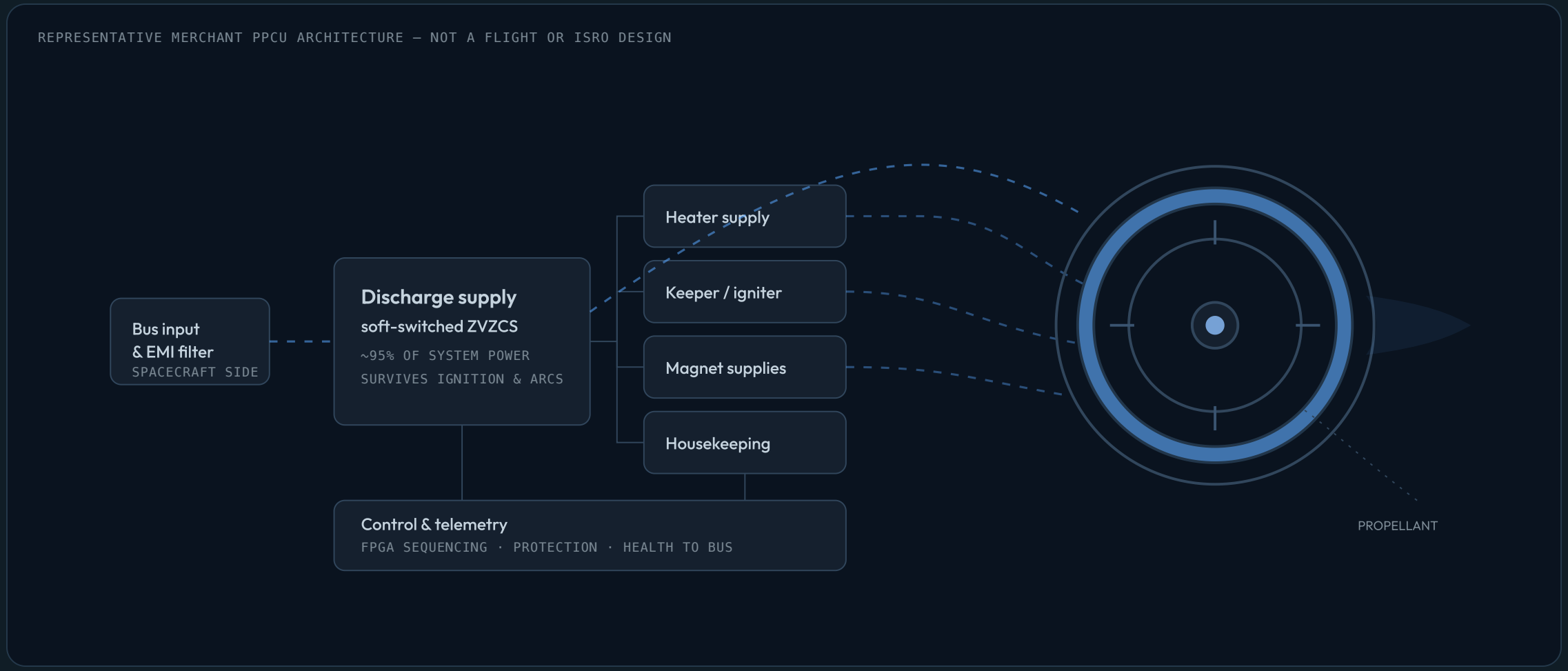
TRL 4

core power stage breadboard on the bench (silicon); GaN EM in design

Why GaN: a PPU's mass lives mostly in its electromagnetics, and magnetics shrink with switching frequency — wide-bandgap devices are the route to a substantially lighter unit per kW. Our field analysis: vidyut.space/landscape/.

INSIDE THE SYSTEM

One thruster. Seven power problems.



Every block has to become a qualified space power product in its own right. An interactive version of this system lives at vidyut.space.

We built the Indian programme's own PPCU.

Our founding team designed the power processing and control units for ISRO's 300 mN and 75 mN stationary plasma thrusters — orbit raising and station-keeping — including **ISRO's first ZVZCS-topology power module**.

6.5 kW	90 %	2	1,000 h
power module, flight programme	overall efficiency — a first across ISRO for the class	thruster classes powered: 300 mN orbit-raising · 75 mN NSSK — the 75 mN EP system flew on GSAT-9	life test now passed by the 300 mN SPT our unit class drives (ISRO, 2025)

This is not a team that read about PPUs. It is the team whose PPU the Indian programme was built on — now outside the fence, free to sell it to everyone.

EP is becoming the default drivetrain.

Dollar forecasts for this market vary 15× by scope, so we don't lead with one. The defensible numbers are adoption share and unit counts — and a merchant precedent that already worked once.

> **Thales Alenia Space Belgium sold 56 flight PPUs to Airbus, IAI, Safran, SES, Intelsat, Eutelsat and others — the merchant model at prime scale.**
>
> IEPC / TAS-Belgium ETCA programme history

42→60%

EP's share of in-space propulsion, 2025 → 2030 — overtaking chemical as the default

111→532

communications satellites flying EP, 2025 → 2030 (~5×)

94%

YoY growth in Indian spacetech funding, 2025 ($157M)

Sources: SpaceInsider 2025 EP outlook · IEPC/ETCA history · Inc42 Indian spacetech 2025.

Three builders. Three halves of a PPCU.

Gokul M C
~~FOUNDER & CEO~~

Ex-ISRO Scientist (2017–19). Designed the PPCUs for ISRO's 300 mN and 75 mN SPTs; delivered ISRO's first ZVZCS 6.5 kW power module at 90% efficiency. Managed three technology development projects ($1.4M). B.Tech & M.Tech, IIT Bombay; PhD, NUS. Serial builder — founded and shipped hardware and software products since.

Vishal Kumar Meena
~~CO-FOUNDER~~

Ex-ISRO. PhD researcher in power electronics at UT Austin — low-loss, high-power-density converters, the modern GaN/SiC toolbox the next PPU generation is built from. IIT Delhi.

Kiran Ravikumar
~~CO-FOUNDER~~

Senior Systems Architect, Thales Alenia Space (Switzerland). Technical team lead for embedded & FPGA hardware on high-reliability ESA-programme platforms — the control, telemetry and qualification half of a PPCU, learned inside a European prime. IIT Bombay.

Power topology. Modern converters. Space-grade control and quals. Two of the three have already built PPCU-class and high-reliability space electronics inside the two hardest customers on Earth: ISRO and a European prime.

Breadboard to thruster-coupled EM in 18 months.

M 1–6

Class-II EM design

Freeze the modular lightweight GaN-based architecture, informed by the bench-proven ZVZCS stage; radiation-data-backed GaN parts selection and derating; lab build-out in Bengaluru; first two hires.

M 7–12

EM build & bench qual

Engineering model through thermal and EMI screening; ignition and transient campaigns against a thruster simulator.

M 13–18

Thruster-coupled vacuum test

Coupled firing with a partner thruster in a vacuum facility; first LOI-to-order conversions; IN-SPACe authorization in hand.

~55%	~25%	~12%	~8%
team — power, control, RF/EMI engineers	lab, vacuum test campaigns, EM parts	qualification & compliance	GTM & ops

THE ASK

$400K.
The anchor cheque.

Beacon's $400K anchors a $500K pre-seed and takes vidyut from a working breadboard to a thruster-coupled lightweight GaN engineering model — the artefact that converts India's EP demand into orders.

What we need beyond capital

Go-to-market into thruster makers and primes · IN-SPACe authorization · manufacturing scale-up when orders land.

Entity

MilTek Technologies Pvt Ltd (2019) · ISRO-VSSC registered vendor · Bengaluru, registered office Thiruvananthapuram · bootstrapped, no external capital to date.

The one-line case

EP is becoming the default drivetrain, the PPU is its bottleneck, the merchant market has one supplier outside the US/EU — and the team that built ISRO's own PPCU is available, in India, exactly once.

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