

IAF SPACE PROPULSION SYMPOSIUM (C4)
Electric Propulsion (2) (6)

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HIGHLY EFFICIENT, MINIATURIZED POWER PROCESSING AND CONTROL UNIT (PPCU) FOR
HALL EFFECT THRUSTERS (HET)**Abstract**

Hall effect thrusters (HETs) are green thrusters that can replace the chemical thrusters in space for applications like orbit insertion after launcher separation, orbit maintenance, orbit transfer and deorbiting. Bellatrix Aerospace is developing different kind of HET at different Power levels viz. 50W, 200W, 2.5KW, 5KW. The Power Processing and Control Unit (PPCU) is generating the required power supply voltages and current needed to operate HET. Bellatrix Aerospace had developed a 200W PPCU unit for its 200W HET system which works with a Heaterless Hollow Cathode. In PPCU, it has different sub circuits viz. highly efficient Anode power supply, Cathode power supply, Magnet power supply and a Control unit to manage the sequence of operations of HET. PPCU development is noteworthy in view of its ability to handle highly fluctuating plasma load, its design to operate a flight quality heaterless hollow cathode, packaging all the sub circuits designed to minimize the mass, volume, EMI effects etc. The design of the PPCU was carried out by Bellatrix engineers through extensive literature review, evaluated required performance to manage the plasma load of HET, ignition, and stable operation of heaterless cathode, minimizing the mass and volume of the package and use of COTs components making it suitable for space application. The sub circuits of PPCU had been matured over several development cycle and finally the flight version is prepared for an EPS flight Demonstration mission.