HYPERPOWER

ACTUATION, PROPULSION AND POWER SYSTEM CONTROL

Hypervelocity vehicles require high-density control systems optimized for size, weight, and power. Moog offers the HyperPOWER controller, which tightly couples actuation and propulsion control, power management, sensor conditioning, and battery activation into a single package. Compared to a classic federated vehicle approach consisting of multiple separate units, a control system based on HyperPOWER provides 25% volume savings and reduced interconnects. HyperPOWER's roadmap includes a tactical variant, a space radiation-hardened variant, options to host a flight computer package, and Moog can modify the design for application specific environments and communication protocols.

KEY FEATURES

- HyperPOWER integrates actuation, propulsion, and power system control into a single package, yielding increased system performance and savings in volume and latency.
- A control system based on HyperPOWER offers a single solution to control many aspects of a hypervelocity vehicle, also resulting in reduced programmatic and schedule cost and risk.
- HyperPOWER includes provisions to incorporate a flight computer for navigation, guidance, attitude, and motion control loops.
- A robust roadmap drives gated maturation based on relevant testing with HWIL integration and through flight testing.
- This next generation control system enables increased lethality and range in deployed weapons systems due to reduced weight, power, and volume (25% or greater reduction possible.)

Credit: U.S. Air Force

Credit: Amy Smith

Credit: Lt. Jennifer Bowman

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HYPERPOWER

HYPERPOWER 1.0: AEROSPACE GRADE OPTION PERFORMANCE

Characteristics	Specifications
Overview	4-channel reconfigurable hypervelocity actuation controller
Power inputs	28 VDC avionics power, 140-270 VDC motor power
Power output	Designed for up to 12,000 watts per channel, custom power levels available
Communications	RS-422 and LVDS communications
Key features	Sine drive field oriented control, or 6-step motor drive
	Reprogrammable FPGA with external memory and tunable parameters
	Resolver commutation, LVDT feedback interfaces
	Resizable power stages available
	Operation to >1,000 km altitude
Optional features	4x differential analog telemetry inputs (pressure, temperature, etc.)
	2x squib fire drivers (for battery initiation, pyro initiators, etc.)
	8x solenoid/brake drivers (dual switching)
	Up to 6x additional RTD interfaces
EEE parts grade	Commercial aerospace grade, automotive (AEC-Q-200/100)
Radiation tolerance	N/A, technical insertion → version 2.0 & 3.0
EMI/EMC	MIL-STD-461 compliant
Thermals	-40 ˚C to +70 ˚C baseplate
Physical properties	9.5" x 9.5" x 3.8", 10.5 lbs
Manufacturing	IPC-6010 class 3, J-STD-001

HYPERPOWER 2.0: SPACE RADIATION HARDENED OPTION PERFORMANCE

Characteristics	Specifications
Overview	2-4-channel reconfigurable space radiation hardened hypervelocity actuation controller
Power inputs	28 VDC avionics power, 140-270 VDC motor power
Power output	Designed for up to 12,000 watts per channel, custom power levels available
Communications	RS-422 and discrete digital safety/interlock interfaces
Key features	Qty 2 or qty 4 sine drive field oriented control or 6-step motor drive
	Qty 6 solenoid drivers for ACS thrusters
	Reprogrammable FPGA with external memory and tunable parameters
	Resolver commutation, LVDT feedback interfaces
	Resizable power stages available
	Space radiation hardened logic/ACS electronics for operation through exo-atmospheric flight
Optional features	4x differential additional analog telemetry (pressure, temperature)
	2x squib fire drivers (for battery initiation, pyro initiators, etc.)
	2x additional solenoid drivers (brake drive, pin-pullers, etc.)
	Up to 6x additional RTD interfaces
EEE parts grade	Control/ACS electronics: space radiation hardened
	Power electronics: Commercial aerospace grade, PEMS/automotive (AEC-Q-200/100), powered off during exoatmospheric flight
EMI/EMC	MIL-STD-461 compliant
Thermals	-40 ˚C to +70 ˚C baseplate
Physical properties	2-channel variant: 9.5" x 6.5" x 3.8", 10.0 lb
Manufacturing	IPC-6010 class 3, J-STD-001

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