MEPSI Micro Propulsion System

XV0E10889-01

SPACE

The MEMS PicoSat Inspector (MEPSI) Micro-Propulsion System (MiPS) is a cold gas propulsion system designed for 1U CubeSats.

Using Chemically Etched Micro System (ChEMS™) technology, VACCO has produced a complete propulsion system including propellant storage, pressurization, distribution and thrusters. This simple, highly integrated design uses a self-pressurizing liquid propellant that is expelled as a gas.

Capable of 23 N-Sec of total impulse with up to 43,000 firings, MiPS brings true propulsion capabilities to micro-spacecraft for formation flying, attitude control and velocity change (delta-v).

Features

- Five thrusters for pitch, yaw, roll and delta-v
- 53 mN thrust
- Up to 43,000 minimum impulse firings
- Redundant, frictionless valves
- All-welded titanium construction
- Dry mass: 456 grams
- Integral pressure & temperature sensors

Operating Parameters

Max Operating Pressure	150 psia
Proof Pressure	225 psia
Burst Pressure	375 psia
Thrust	53 mN @ 20ºC
Internal Leakage	3.6 scc/hr GN2 @ 20ºC
External Leakage	1.0 x 10^{-6} scc/hr GN2 @ 20ºC
Operating Temperature	0°C to +60°C
Vibration	16 Grms
Cycle Life	80,000 cycles

Minimum Impulse Bit	0.53 mN-sec
Operating Voltage	4.0 to 6.0 vdc
Tank Pressure Sensor Output	0.5 to 3.5 vdc
Gas Tank Pressure Sensor Output	0.5 to 3.5 vdc
Coil Resistance	5.3 +/- 0.5 Ω coil
Pull-in Voltage	3.5 vdc max @ 20°C
Drop Out Voltage	1.0 vdc min @ 20°C
Mass	456 grams (dry)

Performance characteristics are based on customer requirements. As such, they are not representative of component capabilities or limitations.

VACCO Industries | 10350 Vacco Street | South El Monte, CA 91733
T: (626) 443-7121 | F: (626) 442-6943 | E: space@vacco.com | W: www.vacco.com
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Envelope Drawing

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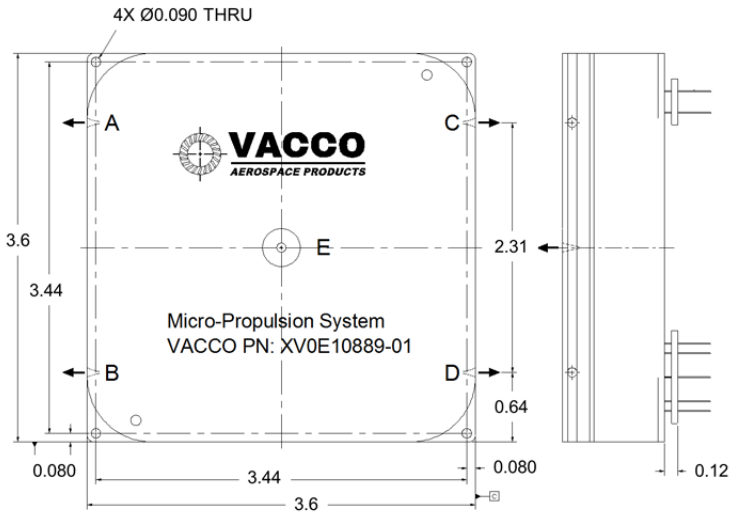
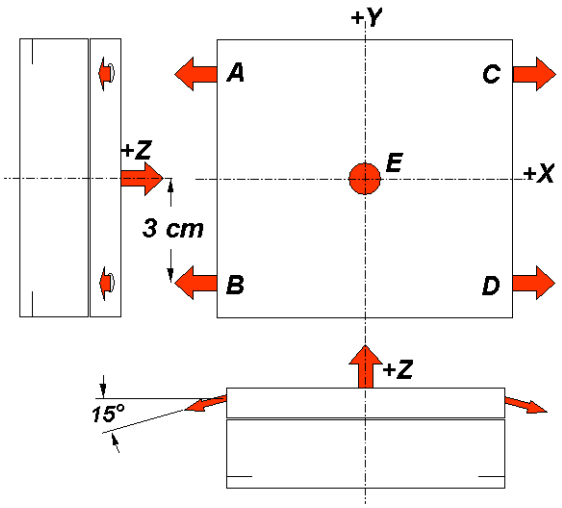
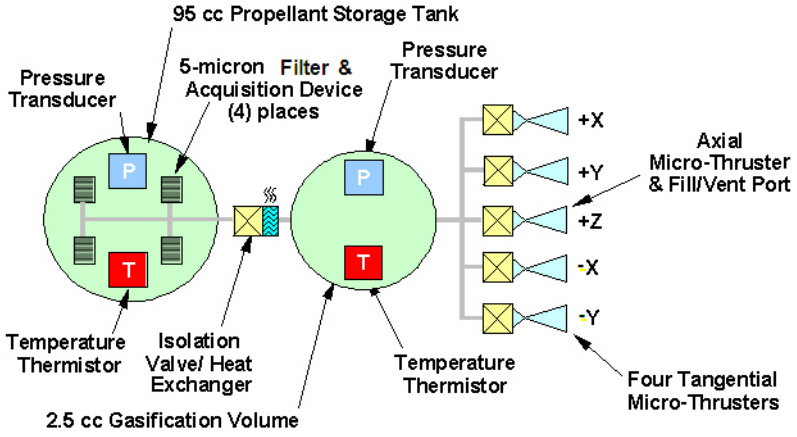


Performance Characteristics



Maneuver	Thrusters
+Yaw (+X	AB
-Yaw (-X)	CD
+Pitch (+Y)	Roll 90° CW, then CD
-Pitch (-Y)	Roll 90° CW, then AB
CW Roll	AD
CCW Roll	CB
Delta V (+Z)	ABCD
Delta V (-Z)	E

System Schematic



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