BGT-X5
Green Monopropellant Thruster
ASCENT thruster for high performance space applications

Delivers 0.5N of thrust and 565N-s of impulse in a 1U CubeSat volume.

Busek's BGT-X5 green monopropellant thruster system produces 0.5N thrust and features a highly stable "green" propellant alternative to hydrazine. The thruster features a patented long-life catalyst reactor, high temperature thruster body, and low- power piezo microvalve (flight heritage). The novel propellant tank and patent-pending Post-Launch Pressurization System (PLPS) enable a compact high-thrust propulsion solution for Cubesats and Smallsats. The BGT-X5 system has 1U volume and easily scales by increasing the size of the propellant tank to support higher total impulse applications. Alternately, multiple systems can be easily integrated onto a single spacecraft for modular attitude control and translational thrust.

The thruster delivers 500 mN thrust at 220-225 seconds specific impulse at approximately 400 psi feed pressure. As a 1U system, it delivers 146 m/s delta-V to a 4 kg CubeSat and is capable of multiple start-stops for precision firing and short impulse bits on the order of 0.05 N-s. The rugged flight electronics includes an integrated DCIU with communication via RS-485.

Figure 1: 0.5N Monopropellant thruster

Figure 2: BGT-X5 system

System Details

The system uses a highly stable, 'green' propellant (ASCENT), which offers 10% higher specific impulse, and 45% greater density than hydrazine, a highly toxic monopropellant. Replacing hydrazine with ASCENT translates to a smaller, lighter propellant tank and lower wet mass for a given mission.

The stable propellant reduces transportation costs and ground handling time, and allows for simplified storage given its lower vapor pressure. Based on system performance, operational responsiveness, size, and safety features, the BGT-X5 is the clear choice among small monopropellant solutions.
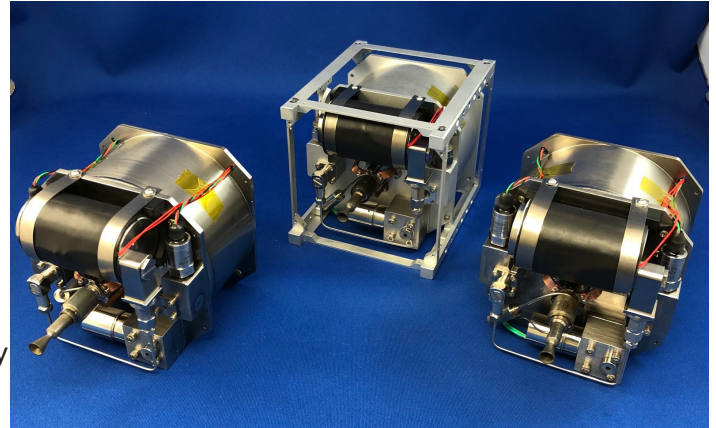

Figure 4: BHT-X5 System trio

Table: Standard Specifications

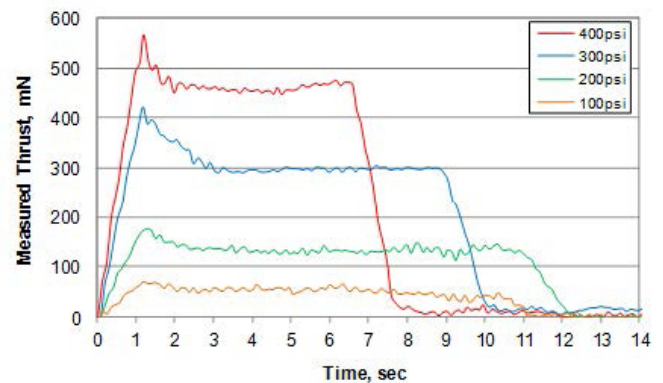| System Power:	
Input Voltage:	6 - 16 VDC (nominal 12V)
Interface:	RS-485
System Volume:	10x10x10cm = external "tuna can" volume occupied by the ejector spring of a 3U CubeSat Launcher
System Mass	1.5 kg BOL
Propellant:	ASCENT
Pressurant	Launch unpressurized- Post Launch Pressurization System (PLPS) provides rechargeable 450 psi feed pressure via cold CO_2 gas generator
Thrust	500 mN nominal
Specific Impulse:	220-225 seconds
Minimum Impulse Bit	0.05 N-s
Total Impulse:	565 N-s

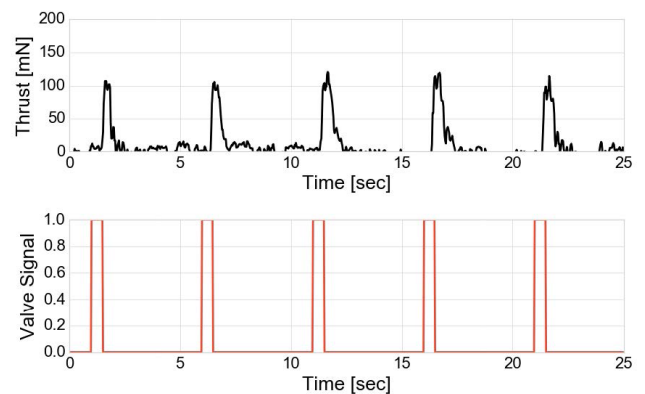Figure 4: BGT-X5 thruster operating in vacuum

Figure 5: BGT-X5 thrust (top) and microvalve input (bottom) at 0.2Hz, 10% duty cycle