BHT-600

Hall Effect Thruster

Best in-class performance. Life tested for >7000 hours.

High-performance and long life propulsion system designed for small satellites.

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The BHT-600 is a mature propulsion system featuring high performance and compatibility with flight proven heritage components (cathodes, PPUs, and feed systems). The BHT-600 is especially well suited for ESPA-class spacecraft and offers high performance over long-life, as well as operation on xenon, iodine, or krypton propellants.

Available as a direct mount, with 1-axis gimballing, or 2-axis gimballing, the BHT-600 is perfect as primary propulsion for small satellites.

Table: Standard Specifications

Discharge Power:	600 W	**Thruster Mass:**	2.6 kg
Throttle Range:	300 W - 800 W	**Cathode Mass:**	0.2 kg
Nominal Thrust:	39 mN	**Demonstrated Impulse:**	1.0 MN-s
Nominal Specific Impulse:	1500 seconds	**Predicted Total Impulse:**	> 1.5 MN-s
Propellants:	Xenon, Krypton, Iodine		

Busek provides complete and fully integrated Hall Effect thruster systems that work with the BHT-600, including cathode, power processing unit, digital control unit, and propellant management systems.

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Thruster

Thruster Performance Details

The BHT-600 duration test ran from September 2018 through February 2020. In total, 7198 hours of operational time and 699 cycles were accrued on the test article. Thrust data were acquired continuously. Plume and wear data were gathered periodically to document changes in the thruster discharge characteristics and channel geometry.
The test was carried out by GRC's Electric Propulsion Systems Branch in the GRC Vacuum Facility 11 (VF-11) facility. The tank is cryogenically pumped and able to achieve background pressures in the 10-7 Torr regime.

The focus of the test of was Operating Condition 1, where the discharge power was 600 W, the discharge voltage was 300 V, and the discharge current was 2.0 A. Over 99% of the test duration was conducted at this operating condition, and the performance over time is summarized in the below table:

Index i=	Total Hours (hrs)	Discharge Voltage (V)	Discharge Current (A)	Discharge Power (W)	Thrust (mN)	Thrust to Power (mN/kW)	Specific Impulse (sec)
0	0	300	2.00	600	38.5	64.2	1472
1	248	300.3	2.00	601	39	64.9	1514
2	504	300.5	2.00	600	39.1	65.2	1505
3	1231	300.6	2.02	607	39.5	65.1	1493
4	1394	300.6	2.00	602	39.2	65.1	1506
5	1507	300.6	2.00	602	39.3	65.3	1505
6	1779	300.6	1.99	599	39.2	65.4	1494
7	2013	300.5	2.01	603	39.5	65.5	1497
8	2248	300.5	2.01	605	39	64.5	1483
9	2509	300.5	2.01	604	38.7	64.1	1481
10	2741	300.5	2.00	602	39	64.8	1486
11	2882	300.5	2.00	601	39	64.9	1491
12	3004	300.5	2.00	601	38.9	64.7	1484
13	3267	300.5	2.00	601	39.4	65.6	1504
14	3441	300.5	2.00	601	39.1	65.1	1492
15	3513	300.4	2.00	602	39.1	65	1496
16	3912	300.4	1.99	599	39.4	65.8	1510
17	4008	300.4	1.99	598	39.1	65.4	1498
18	4249	300.4	2.00	601	39	64.9	1488
19	4509	300.4	2.00	600	39.3	65.4	1499
20	4820	300.4	2.00	601	39.6	65.9	1510
21	5012	300.4	2.00	602	39.6	65.8	1510
22	5275	300.5	2.01	603	39.8	66	1518
23	5508	300.4	2.00	602	39.9	66.2	1520
24	5790	300.5	2.00	602	39.7	65.9	1517
25	6003	300.5	2.00	601	39.8	66.2	1522
26	6215	300.5	2.00	601	39.8	66.1	1518
27	6358	300.6	2.00	602	39.9	66.2	1524
28	6501	300.6	2.00	601	39.6	65.9	1511
29	6738	300.6	2.01	604	39.9	66	1522
30	6860	300.5	2.00	600	38.3	63.9	1494
31	7144	300.6	2.00	601	38.7	64.4	1501

A full writeup of the 1.0 MN-s lifetest of the BHT-600 is available at the following paper:

Szabo, J. J., Byrne, L., Strain, M., Paintal, S., Sawyer, S., Yu, T., Kolencik, G., Hruby, V., Gray, T. G., Petters, D. P., Haag, T. W., Mackey, J., and Taillefer, Z., "One Million Newton-Second Duration Test of a 600 Watt Hall Effect Thruster Fueled By Xenon," AIAA Propulsion and Energy 2020 Forum, 2020. https://doi.org/10.2514/6.2020-3651

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