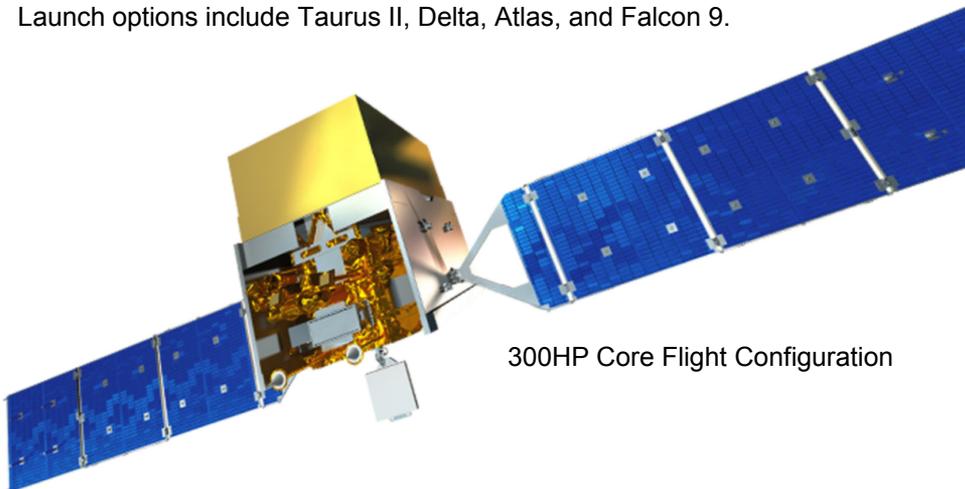


RSDO Rapid III 300HP Specification/Data Sheet

Orbital's GD-300HP (300HP) Spacecraft is a highly capable spacecraft for mid-sized operational, major science, and demonstration missions. The 300HP is the choice when lifetime, high performance and reliability are required at an affordable price. The 300HP supports programs ranging from Explorer, Earth Science Decadal Survey, and Discovery through NASA flagship missions. Launch options include Taurus II, Delta, Atlas, and Falcon 9.



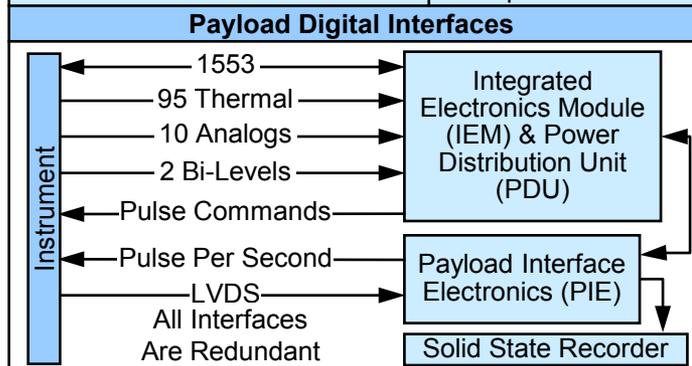
300HP Core Flight Configuration

Highlights & Features:

- Suitable for Operational and Flagship Missions
- High Power and Payload Mass
- High Capacity Avionics Architecture Supports High Data Rates with Precision Pointing, Orbit Knowledge, and Timing
- Fully Redundant for Long Life
- Extensive Flight Heritage
 - 5 Missions Launched (3 for NASA): NMP DS1, Coriolis, Swift, Fermi, GeoEye-1
 - LDCM in Development
- Architecture is Applicable to Both Low Earth Orbiting and Interplanetary Space Missions
- Compatible with Mid-Sized Launch Vehicles
- Demonstrated Contamination Control Processes for Sensitive Instruments

Core Spacecraft Performance Parameters	
Parameter	Performance
Spacecraft Dry Mass	1169 kg
Propellant Load	353 kg
Spacecraft Bus Voltage	25-34 V
Orbit Knowledge	33 m, 1 σ
Pointing Knowledge	6 arc sec, 1 σ
Pointing Control	120 arc sec, 1 σ
Max. Maneuver Rate	0.125 deg/sec
Timing Accuracy	40 μ s
Total Radiation Dose	25 krad
Spacecraft Ps @ 5 years	0.85

Core Payload Accommodation Parameters	
Parameter	Performance
Instrument Mass	3,000 kg
Instrument OAP	775 W
Instrument Data Storage	160 Gb
Achievable Downlink Rate	40 Mbps



- Supports multiple, complex instruments
- Unobstructed 2π steradian instrument field of view
- Large instrument radiator surfaces
- Instrument-mounted attitude reference bench for high accuracy science pointing knowledge
- 300HP is a fully-redundant 3-axis stabilized spacecraft intended for missions with a 5-10 year nominal duration

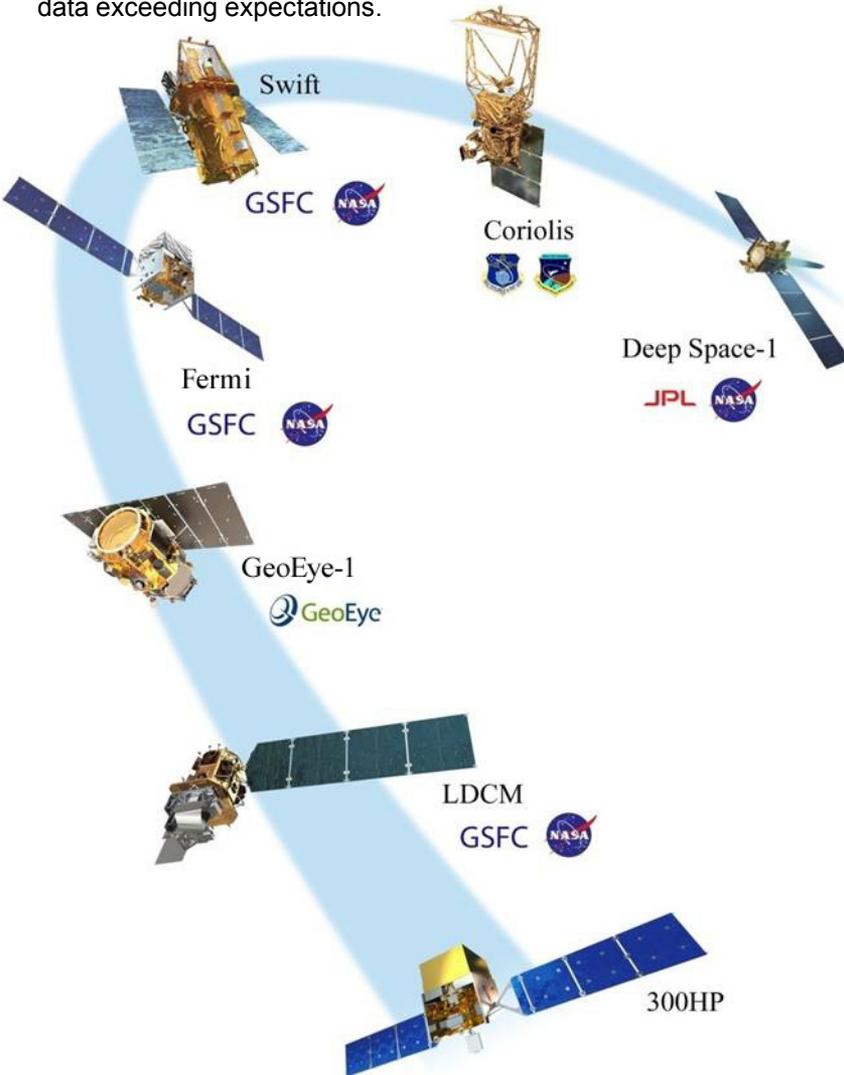
300HP Additional Capabilities

In addition to our Core 300HP Rapid III capabilities, we have demonstrated the capabilities shown below in other 300HP missions. Some of these capabilities would require additional funding or schedule adjustments to our Baseline Rapid III offering.

Additional Capabilities or Options
740 Mbps X-band Space-ground and 40 to 200+ Mbps Ku-band Space-space Mission Data Links; Up to 3.1 Tb On-board Storage
Payload Instruments Can be Thermally Isolated from the Spacecraft or the Spacecraft Can Provide Thermal Control for the Instruments or Instrument Electronics
Slew Rates up to 3 deg/sec; Highly Agile Earth and Space Pointing Attitudes
Provision for On-Orbit Operations Using Orbital's Mission Operations Centers (Rapid-III Contract Option)
Upgradable Attitude Control Components Enable Very High Accuracy Pointing, Knowledge, and Timing with Flight-proven Algorithms
Propellant Capacity can be Adjusted by Selecting Tank Size or Tailoring the Fill Fraction

Mission Heritage

300HP spacecraft have successfully flown Space, Earth, and National Security operational missions. The 300HP line has also supported interplanetary missions providing the first proximal images of the Asteroid Braille in 1999 and Comet Borely in 2001 in the NMP DS1 configuration. Since first flight in 1998, all 300 HP missions have provided superior support to their missions, resulting in news-making science and essential national security data exceeding expectations.



300HP Missions

Landsat Data Continuity Mission (LDCM)

Mission: Collect Global Mid-Resolution Highly-Calibrated Earth Surface Imagery on a Continuing Basis
 PLs: Operational Land Imager, Thermal IR Sensor
 Launch: 2012, Atlas V
 Status: In Development

GeoEye-1

Mission: 0.4m Resolution Commercial Land Imaging
 PL: 1.1m Five-Band Vis Optical Earth Imaging Telescope
 Launch: 2008, Delta 7420
 Status: Fully Operational

Fermi Gamma-ray Space Telescope

Mission: Flagship Gamma-ray Observatory
 PLs: Gamma-ray Large Area Telescope (LAT) and GLAST Burst Monitor (GBM)
 Launch: 2008, Delta 7920
 Status: Fully Operational

Swift Gamma-ray Burst Observatory

Mission: Gamma-ray Burst Astronomy (MIDEX)
 PLs: Burst Alert Telescope (BAT), X-Ray Telescope (XRT), UV/Optical Telescope (UVOT)
 Launch: 2004, Delta 7320
 Status: Fully Operational

Coriolis

Mission: Tech Demo of Polarimetric Radiometry from Space to Develop Ocean Wind Vector
 PLs: Windsat Passive Polarimetric Radiometer with 30 RPM Conical Scanning Reflector, Visible Solar Mass Ejection Imager (SMEI)
 Launch: 2003, Titan II
 Status: Fully Operational

New Millennium Program Deep Space 1 (NMP DS1)

Mission: Comet and Asteroid Deep Space Flyby and Technology Demonstration
 PLs: Xenon-ion Propulsion and 11 Other Technologies
 Launch: 1998, Delta 7320
 Status: Mission Completed

Previously Launched 300HP Top Level Spacecraft Parameters

Parameter	NMP DS1	Coriolis	Swift	Fermi	GeoEye-1	LDCM
Orbit (km x inclination)	Interplanetary	830, 98.7	600, 22	565, 25.6	683, 98	716, 98
Design Life (design/goal, mos)	11/48	36/60	24/60	60/120	84	60
Redundancy	Single String	Redundant	Redundant	Redundant	Redundant	Redundant
Propulsion	Xenon, Hydr.	Hydrazine	None	Hydrazine	Hydrazine	Hydrazine
Payload Mass (kg)	30	340	791	3097	455	630
Bus Mass (wet, kg)	456	477	611	1251	1500	2070
Payload Power (watts OAP)	136	454	593	845	285	500
Attitude Knowledge (arcsec, 1σ)	600	24	1	6	0.5	7
Mission Data Rate (Mbps)	0.031	51.2 (X)	2.25 (S)	40 (Ku)	740 (X)	384 (X)

300HP Spacecraft Description

Command and Data Handling

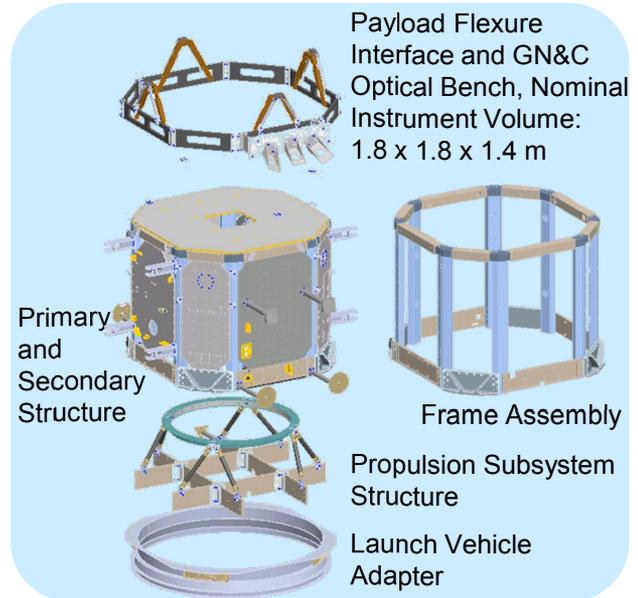
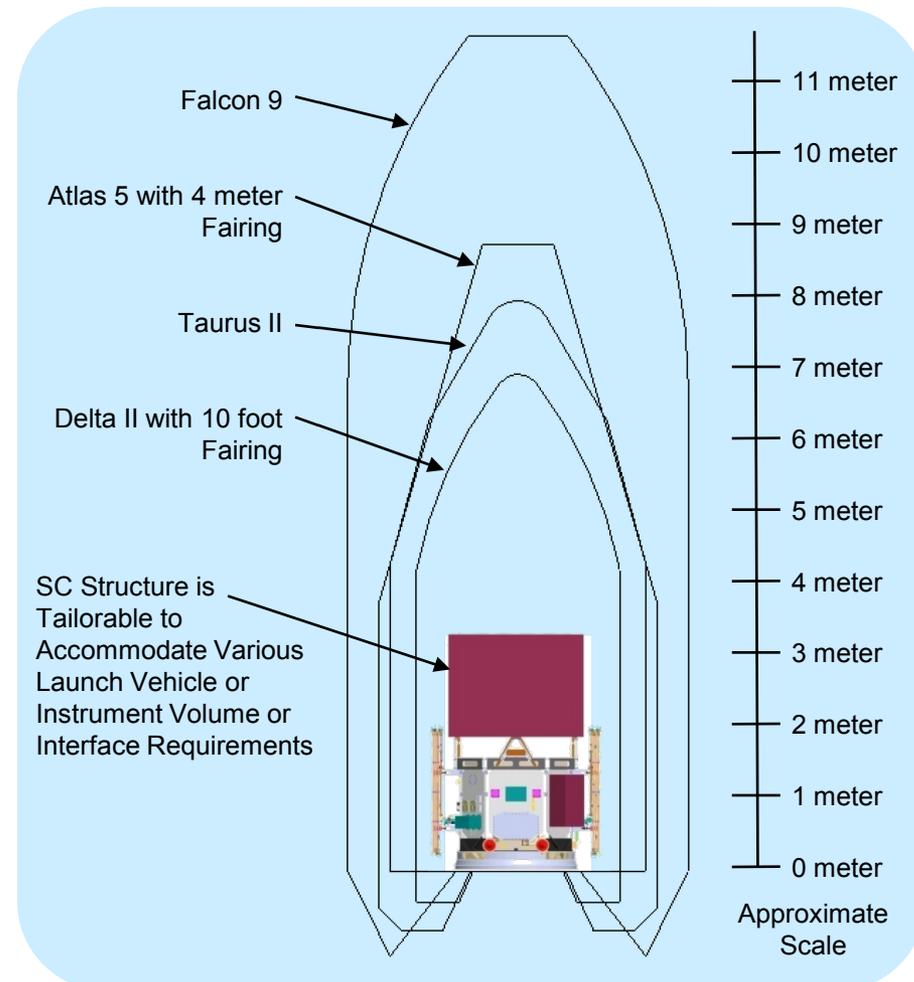
- RAD-750 and cPCI-based Integrated Electronics Module (IEM) for spacecraft operations
- Payload Interface Electronics (PIE) for instrument interface, supports data compression
- LVDS and MIL-STD-1553 data bus interfaces provided
- 160+ Gbit Solid State Recorder for Payload Data Storage, up to 3.1 Tb storage in the latest application 300HP
- Powered on at launch

Communications

- Features both low rate S-Band communications for command and telemetry functions and wideband X or Ku-Band communications for mission data downlink
- S-band system has low-rate TDRSS forward and return link compatibility
- 40 Mbps TDRSS Ku mission data downlink; up to 740 Mbps X-band mission data rate capability in recent 300HP spacecraft
- Commercial command encryption has been implemented in recent 300HP spacecraft

300HP Stowed Configuration

The 300HP is Compatible with Several Launch Vehicles and Fairing Configurations.



Structure

- Octagonal, aluminum stringers and aluminum honeycomb panels
- Kinematic, adiabatic instrument interface
- Instrument-mounted attitude reference bench for high accuracy attitude reference data
- Instrument deck panel provides unobstructed field of view for the instrument

Electrical Power

- Features a direct (solar) energy transfer system with solar array string switching
- Power Distribution Unit (PDU) provides for instrument and spacecraft load control

Thermal

- Primarily passive design; MLI blankets, paints, and tapes used to control temperatures
- Software-controlled heaters provide fine temperature control with thermostatically controlled heaters used as backup

Attitude Control

- Multi-mission functionality
- Utilizes high accuracy star tracker/gyros, GPS
- Zero momentum bias reaction wheels
- Precise pointing and attitude knowledge in any attitude including earth, solar, and inertial, as needed for mission requirements
- Proven attitude control algorithms assure flight performance
- Very high accuracy flight-proven attitude and timing reference algorithms available
- Magnetic momentum unloading

Propulsion

- Features a monopropellant hydrazine blowdown system for deorbit or orbit maintenance
- Twelve 22 N thrusters
- Titanium tank with 353 kg propellant

