



L3HARRIS®
FAST. FORWARD.

PROTECTED GLOBAL POSITIONING SYSTEM (PGPS)

Embedded M-Code GPS receiver

The L3Harris Protected Global Positioning System (PGPS) offers ruggedized Military Code (M-Code) capability providing assured position, navigation and timing (PNT) for operation in contested environments. The PGPS is specifically designed to support the high-dynamic environments of launch vehicle, missile and hypersonic applications including operation in a space-radiation environment. The PGPS uses an embedded GPS receiver specialized for high-dynamic applications satisfying the mandate to transition to M-Code GPS in support of national space launch assured access to space. The PGPS supports multiple and simultaneous use cases including 10 Hz RCC-324 range tracking, navigation aiding and as an external GPS sensor compatible with autonomous flight safety systems.

SPECIFICATIONS

Inputs

- 2 DS-101 GPS key interface
- 2 L-Band RF inputs (1 with +5VDC for external LNA support)
- 1 liftoff discrete

Outputs

- 2 RS-422 GPS sensor telemetry
- 1 pulse per second (10 Hz)
- 1 optional three-wire RTD

Bi-Directional Inputs/Outputs

- 1 RS-422 command and status for ground and vehicle telemetry
- 1 RS-422 command and status for flight computer telemetry
- 1 optional three-wire RTD

Power Supply

Supply Voltage	Redundant +28 VDC primary power
Power Consumption	< 12 W (including GPS)

PHYSICAL AND ENVIRONMENT CHARACTERISTICS

Physical

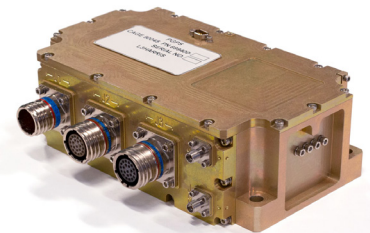
Volume	62.8 in ³ (159.51 cm ³)
Dimensions	7.00 x 3.90 x 2.50 in (17.78 x 9.90 x 6.35 cm)
Weight	2.6 lbs (1.17 kg)

Reliability

Operating Life	10,000 hours
Storage	10 years
Reliability	> 0.9995 at 95% confidence

Reliability

Thermal Environment	-29.2 to +159.8°F (-34 to +71°C)
Pyrotechnic Shock	> 1,800 G @ 10,000 Hz
Acceleration	20 G 30 sec ea ± axis (180 sec total)
Random Vibration	35 Grms, 300 sec/axis, 18 Grms, 60 sec/axis



KEY FEATURES:

- > Embedded M-Code L1/L2 GPS receiver, RCC-324 compliant
- > M-Code GPS receiver based on the L3Harris TRUTRAK-M™ optimized for high-dynamic applications
- > Dual-use PNT sensor for navigation and range tracking
- > True 10 Hz update rate
- > Continuous atmospheric correction for improved solution accuracy
- > Radiation tolerant by design
- > Autonomous flight termination unit (AFTU) compatible external sensor
- > Designed for applications where low size, weight and power are critical
- > Customizable for specific user mission needs

BUILT-IN M-CODE GPS RECEIVER

The PGPS includes an embedded M-Code GPS receiver based on the L3Harris TRUTRAK-M™, tailored to provide 10 Hz output rates customizable telemetry. The TRUTRAK-M has been granted security approval by the MilComm and PNT Directorate. In addition to cost, weight and space savings, the embedded GPS provides built-in compliance to the congressional M-Code mandate, while maintaining compatibility with the current GPS constellation. The PGPS is fully backward compatible with legacy Selective Availability Anti-Spoofing Module receivers, providing the capability to obtain precise positioning service using M-Code, Y-Code or Mixed Y- and M-Code operation. Specialized for high-dynamic applications, the PGPS built-in GPS receiver features a unique atmospheric correction capability which improves solution accuracy at high altitudes.

OPTIMIZED GPS TELEMETRY

The PGPS provides optimized telemetry formats for multiple, simultaneous use cases. Position, velocity, time, GPS tracking information and data quality indicators can all be reported at a true 10 Hz rate without extrapolation. Temperature, self-test results and secondary voltage monitors are available along with GPS telemetry for unit-level health and status reporting. Telemetry formats can be customized for application-specific telemetry needs. Ground support equipment and flight computer interfaces are both configurable for GPS telemetry for hardware-in-the-loop testing. Dual AFTU telemetry interfaces provide identical GPS information formatted for direct compatibility with the L3Harris AFTU.

DESIGNED FOR HIGH DYNAMICS AND HIGH ALTITUDE

Leveraging decades of space avionics experience, the PGPS is designed for the strenuous environments of a launch vehicle and the rigors of space. Radiation-tolerant by design, the PGPS includes mitigation techniques to maintain a high-system availability while balancing size, weight, power and cost. For increased radiation environments, the PGPS can support components with increased radiation tolerance.

EXPERT SUPPORT

The PGPS is designed, built, assembled and tested in one facility and is serviced and supported by engineering professionals with decades of spaceflight design experience. Every PGPS delivered is accompanied by domain expertise in parts, materials, radiation analysis, mechanical engineering, power supply design, digital signal processing, radio frequency design and manufacturing engineering. L3Harris has been providing time-tested range tracking and launch vehicle telemetry hardware for more than 60 years. The PGPS has a performance history that can be trusted for your next mission.

GPS RECEIVER PERFORMANCE

Solution Accuracy

Position Accuracy $\leq 50 \text{ m } 3\sigma$

Velocity Accuracy $\leq 1 \text{ m/s } 3\sigma$

Startup Conditions

Cold Start $\leq 180 \text{ sec}$

Hot Start $\leq 60 \text{ sec}$

Reacquisition

Rapid Reacquisition $\leq 2 \text{ sec}$

On-Orbit $\leq 10 \text{ sec}$



Photo Credit: NASA

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