Explorer GPS Spaceborne Receiver

Building on the 200+ years of on-orbit Viceroy® performance

Design based on legacy space qualified digital design

20 years of trouble-free spaceflight heritage

Same reliable position, velocity, time, pseudorange and carrier phase at 1Hz

Same form-factor and interface control as heritage Viceroy receiver

Overview

General Dynamics' Explorer Global Positioning System (GPS) Spaceborne Receiver provides position, velocity, and time information for Low Earth Orbit (LEO) and Geostationary Earth Orbit (GEO) applications. Performance and satellite visibility are enhanced through the use of dual antennas (LEO configuration only); each of the 12 GPS channels can be assigned to either antenna. The design supports an RS-422 bus interface.

Key Features

- Space Qualified Digital Design
- Full Spaceborne Capability
- Autonomous Operation
- Pseudorange and Integrated Carrier Phase at One Second Rate
- One PPS Clock Output Synchronized to GPS Time
- Radiation Tolerant Design
- 12 Receive Tracking Channels
- Only 56 Cubic Inches
- 22 to 34 VDC Operation
- Improved Radiation Tolerant Digital Electronics
- 12 Channels Support All-in-View Tracking
- Dual Antenna – Any Channel Assigned to Either Antenna (LEO only)
- Fast Cold Start Mode Simplifies Integration and Autonomous Operation
- Low Signal Acquisition and Tracking Supports GEO Sidelobe Tracking
- Enhanced Resolution 1 Pulse per Second Output
- Tailorable parts level

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Performance Characteristics

Receiver Architecture

- 12 channels with enhanced fast acquisition processor
- Dual antenna – any channel to either antenna (LEO only)
- L1: 1575.42 MHz, C/A code
- Carrier-aided code tracking
- Based on legacy Viceroy architecture (hardware and software)

Input/Output

- RS-422 serial I/O
- X.25 protocol with ECEF position, velocity, time, longitude, latitude, pseudorange, carrier phase
- One pulse per second (GPS, UTC, or Measurement Epoch Time)
- 9-pin male Micro-D for prime power
- 25-pin female Sub-D for command and telemetry
- SMA female connector for RF signal

Solution Accuracy

- Autonomous Position: < 15 meters, 1 sigma (LEO)
  < 100 meters, 1sigma (GEO)
- Autonomous Velocity: < 0.1 meters/second, 1 sigma (LEO)
  < 0.01 meters/second, 1 sigma (GEO)
- 1PPS time: < 100 ns, 1 sigma (typical)

Time to First Fix

- LEO: 4 minutes, cold start
- GEO: 10 minutes, cold start

Orbital Dynamics

- Altitude: LEO (approx 200km to 2000km)
  GEO (approx 35,800km)
- Velocity: up to 16,000 meters/second
- Acceleration: 1G+

Optional and Custom Features: Contact Factory

- Time Strobe Input: < 100 ns, 1 sigma
- Precision internal reference Ovenized Crystal Oscillator (OCXO)
- Enhanced Radiation Hardening

Physical/Environmental

- Size: 6.4 x 5.2 x 1.7" (161 x 132 x 42 mm)
- Weight: 2.5 lbs (1.2 kg) max
- DC Power: 8 W max steady state tracking (22-34Vdc)
- Vibration: 19 grms
- Shock: 3000 G
- Temperature: -20°C to +60°C
- Radiation Tolerant Design
- Single Event Latch-up Immune

GENERAL DYNAMICS
Mission Systems