Core Scientific Systems Private Ltd.

CoreSSPL

ADVANCED DUAL FREQUENCY GPS RECEIVER

(ADFGPS-000-02)

The digital revolution in the recent years has been utilized by CRS in the design and development of the software-based dual frequency GPS receivers. These receivers utilize minimal hardware and most of the processing is performed in the software. This reduces cost, improves performance, and eliminates obsolescence. It also allows for easier data availability and subsequent data analysis, calibration, and data manipulation.

The basic architecture consists of antennas, downconverters, digitizers, and processors. Dual frequency downconverters are used to bring the signals to suitable IF frequencies. The IF signals are digitized at 60 MSPS/channel. The digitized data is processed using hardware correlation and software modules.

It uses 12 channels (36 correlators) of dual frequency GPS operation, advanced architecture for mitigation of multipath and scintillation effects, superior accuracy, and options for in-band interference rejection are available (for narrowband and broadband interference mitigation). Frequency and time signals are also available.

The complete dual frequency receiver is available in a self-contained enclosure where all the relevant outputs are available through a serial or USB port. Data storage inside the receiver is available as an option. Software for data transfer and control of the receiver to and from PCs via PS-232 and USB is provided. Software for remote operation andcontrol (via Internet) is also available.

These receivers provide improved accuracies, performance, and can be easily adopted for specified applications. The development was originally supported by ONR (Office of Naval Research) as a SBIR program, and the complete receiver has been developed from the ground up, taking full advantage of the most recent electronics and computer technologies.

Some of these applications involve satellite-based navigation, ionospheric and tropospheric monitoring, remote sensing, and ocean scattering. Conventional applications include anti-jamming operations, multipath mitigation, attitude determination, formation flying, RTK processing, INS integration, DGPS and WAAS applications, direct Y-code acquisition, fast acquisition (FFT) operation inside buildings (low signal and multipath conditions), among others. These receivers also allow vertical upgrades to new frequencies and waveforms (Galileo, Mcode, C/A on L_2, L_5, etc.).

In order to facilitate these applications in future upgrades, various user interfaces and tests points are provided. The correlator outputs, pseudo-ranges, and tracking loops are accessible and the user can tap in, modify, and monitor the signal chain.

Core Scientific Systems Pvt.Ltd.
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ACCURACIES

Position Accuracy

Stand alone	less than 1.0 meter CEP

Pseudorange Accuracy

C/A	3.0 mm
P on L_1	2.5 mm
P on L_2	3.5 mm

Phase Accuracy

L_1	2.4 mm
L_2	3.4 mm

RECEIVER SPECIFICATIONS

- 36 Correlators (Twelve L_1 and L_2 channels)
- Continuous, all-in view, dual frequency tracking
- Semi-codeless tracking
- Built-in self-test
- Pseudorange accuracy (variance) of the order of mm
- Independent L_1 and L_2 carrier phases and pseudorange
- Carrier phase measurements normalized with pseudorange

OUTPUTS

1) Binary and Rinex outputs
2) Observables directly useful for Ionospheric Monitoring TEC outputs at 1 sample per second and Scintillation output at 20 samples per second.
3) TEC: Direct real-time monitoring and display of pseudorange (PR), and the Carrier Phase (CP) data for all satellites. Independent PR and CP data and CP smoothed PR data are available.
4) Scintillation: Direct delineations of scintillation power spectrum and scintillation indices for amplitude and phase. Optional logging of scintillation data only when S4 > selected values.
5) Monitoring and display of stored PR and CP
   a. Normalized carrier phase requires minimal processing
   b. Various smoothed options
   c. Choice of different receiver options

FEATURES

- The software-based digital receiver utilizes the most modern electronics and processing capabilities. It provides a flexible, user-definable system.
- Provides superior for advanced GPS performance and flexible operation.
- Specifically developed for advanced GPS performance and flexible operation.
- Provides scheduling, real-time monitoring, and a user-friendly GUI for operation, control, and data analysis.
- Special features (optional):
  1. Built-in calibrator
  2. Multiple antenna and beamformer
  3. Built-in data logger
- Tracks up to 12 satellites in view (24 channels).
- Monitors and reports TEC and scintillation parameters.
- Users can configure the sampling parameters (5 receiver sets are standard; customized configuration can be provided).
- Both L_1 and L_2 are separately monitored to provide independent pseudoranges and carrier phase data.
- Sample intervals can be controlled by the user to vary anywhere between 1 second to 1 hour. Adequate internal memory allows the wide range of sampling intervals.
- Output is available through RS-232 and USB. Utility software for communication with a PC that utilizes Windows® software and a familiar GUI. This minimizes the learning time. The software allows scheduling, controlling, data analysis, and logging. All the data recorded in the PC is stored as binary and/or ASCII (Rinex).
- Real-time visualization tools for visualization of various parameters are provided.
- Scheduled operation is provided to avoid unnecessary operation and data flooding.

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