

NGPSR

Next Generation GPS Receiver

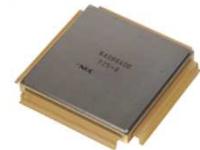
Multi frequency global positioning system receiver with CMOS direct sampling front end provides high precision navigation.

NEC Space Technologies unveiled a next generation multi frequency GPS receiver based on its extensive GPS navigation experience and flight heritage. One package multi chip module, which includes three direct sampling radio-frequency front end and dual frequency correlator, is key innovation of this product, which is primarily aiming at LEO applications.

RF-circuitry with direct sampling A/D converter is integrated into one chip, which exploits low power consumption of CMOS technology. High speed correlator is fabricated on JAXA qualified radiation hardened silicon on insulator (SOI) ASIC. These processing elements are integrated into one multi chip module with a 64 bit high speed RISC processor and main memory, which realizes small and low mass profile.



GPSP : GPS processor (A5 size profile)



Multi Chip Module integrates DSRF, DFAC, and 64bit MPU.
 DSRF : Direct Sampling Radio-frequency Front-end
 DFAC : Dual Frequency Advanced Correlator



GPSA : GPS antenna



GPSL : GPS Low noise amplifier

Typical configuration with 3 antenna inputs. (2 antennas or 1 antenna configurations are also available.)

ACCURACY

- L1C/A – 36ch (max) *
- L2C(C/A) – 36ch (max) *
- L2P(Y) – 16ch (max)
- *3 antennas for 12 satellites acquisition
- Navigation Accuracy: (95%)
- L1C/A only: Position: < 6m (Typ 3m),
 Velocity: < 0.03m/s (Typ 0.005m/s)
- L1C/A and L2C: Position: < 3m (Typ 1.7m),
 (GPS-system) Velocity: < 0.03m/s (Typ 0.003m/s)
- Warm Start: < 12 min (Typ < 1 min)
- Cold start: < Avg. 18 min (Typ 8 min)
- 1PPS accuracy: < 200ns (Typ < 20ns)
- L1 C/A pseudo range: $\leq 2m@3\sigma$ (typ 1.2m)
- L2P(Y) pseudo range: $\leq 10m@3\sigma$ (typ 4.0m)
- L2C(C/A) pseudo range: $\leq 3m@3\sigma$ (typ 1.2m)
- L1 C/A career wave phase: $\leq 4mm@3\sigma$ (typ 2.5mm)
- L2P(Y) career phase: $\leq 18mm@3\sigma$ (typ 10.0mm)
- L2C(C/A) career phase: $\leq 8mm@3\sigma$ (typ 4.9mm)

INTERFACE CONDITIONS

Dimensions	GPSP: 63(W) x 218(D) x 155(H) GPSL: 64(W) x 145(D) x 43(H) GPSA: 139Φ x 75(H)
Mass	GPSP: 1.95kg (max) GPSL: 0.51kg (max) GPSA: 0.42kg (max)
Power consumption	16W (nominal), 19W (max)
Primary Power	30V~50V Protections for low voltage and over current are provided.
Environment conditions:	Operating temperature: -15° C to +55° C Radiation: Cumulative dose >30 kRad (Si)

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BUS SYSTEM INTERFACE

Telemetry / Command Interfaces	Serial TC/TM Interface (RS-422*) SpaceWire TC/TM interface is available (optional) Four 1 PPS outputs (RS-422) Two 1 MPPS outputs (RS-422) Two time data outputs (RS-422*) Primary power interface: 30V ~52V 3 antenna inputs (L1/L2) *Enable, Clock, Data line interface.
Telemetry Data (256kbps, binary output) * Output order and output items are programmable.	GPSR status, Time code (GPS week number, GPS week-second), Observation data (Pseudo range, Carrier phase), WGS84 position, WGS84 velocity, clock bias, clock drift, Keplerian (TOD, J2000), Legacy NAV almanac raw data, Legacy NAV ephemeris raw data, CNAV ephemeris raw data (FEC decoded)

FEATURES

Re-programming (Over-all / Partial modification):

Program code and internal parameters are modifiable in EEPROM and SRAM (total 300kbytes). Transmission data rate can be reduced through partial modification patch function.

Dual frequency navigation:

High precision accuracy with L1 C/A and L2C is available on expected regular L2C service. L2C signal observation data is available before L2C regular service.

High precision navigation with Kalman filter:

The ionospheric delay estimation on orbit
 Inter-antenna bias estimation for dual and triple antenna
 Bias estimation for each channel against GPS satellite error (SIS-URE)
 Compensation for attitude pointing and orbit control.

Attitude pointing compensation:

Continuous field of view during attitude pointing with up to 3 antennas,
 Dynamic antenna switching for high power reception,
 Preventing error accumulation during attitude pointing by providing the data of antenna position, the center of gravity of the satellite, and attitude data in advance.

Orbit control maneuver compensation:

Preventing error accumulation by estimating perturbation acceleration (0.05m/s² max).

Suppress RF interference effect:

Guard signal input for anticipated RF interference period.
 Automatic gain control for signal attenuation caused by the cable length between GPSL and GPSP.

OPTIONAL ATTACHMENTS



PIU
(Fully compatible SpaceWire / RMAP interface)



Space Cube® 2
(Onboard Computer)



SWR
(SpaceWire router)



DR
(Data Recorder)

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