SoftSpot AQUILA

Real-Time Software Space GNSS Receiver

SYNTONY GNSS

Locate & Be Located

For organizations engaged in space exploration, satellite operations, or long-duration missions, the need for reliable performance, precise positioning, and long-term durability is paramount. Space activities demand solutions that not only withstand challenging environments but also deliver consistent results over extended timeframes.

With a design offering high resilience against space radiation and ensuring reliable operation and accurate positioning in harsh and dynamic environments, AQUILA addresses the demands of long-duration space missions, including those spanning over 5 years. AQUILA supports multi-constellation, multi-band capabilities, making it a dependable choice for missions requiring persistent GNSS data.

With its optimized durability and advanced features, AQUILA is ideal for projects that demand long-term performance and adaptability. It provides a robust solution for organizations seeking to meet stringent requirements in hostile space environments.

Extensive options

- ✓ Embedded GNSS Receiver
- ✓ 1 or 2 RF stages for mono or bi-frequency
- ✓ High performance GNSS reception
- ✓ Robust to vibration
- ✓ Operating temperature from -35 to +60°C
- ✓ Full Post-delivery upgradability:
  - Fonctional, Performance or option upgrade
  - Compatibility enhance
- ✓ ADC 12 bits I/Q
- ✓ From 25 to 50 MHz sampling rate
- ✓ From pure L1C/A up to Multi-GNSS
- ✓ Mono or multi-frequency
- ✓ Mono or bi-antenna
- ✓ Important: Independant acquisition for all signals, allowing L5-only acquisition when L1 is not available or jammed

AQUILA hardware platform is based on the following design choices:

- AD9361 robust RF stages (L1&L5) and redundancy with AD9364
- Xilinx ZU3EG or Zynq 7000 SoC (depending on version)
- Ruggerized design able to withstand most of the usual conditions (ground transportation, aircraft, launcher)
- Robust Aluminum & Surtec case (2mm)
- Basic level of anti-jamming robustness
- In option: Ethernet connectivity

AQUILA receiver embeds the SDR GNSS receiver called SoftSpot which:

- Performs the cold and warm acquisition independently for each signal, constellation and frequency
- Computes the correlators
- Makes the tracking independently for all signals also
- Computes the pseudo ranges
- Computes the PVT (Position, Velocity, Time) taking into account the signals that are in visibility

The acquisition, tracking and PVT being done independently on all signals, there is no need for the receiver to acquire GPS L1C/A to be able to compute a PVT, whereas most of the existing chipsets on the market have this drawback.

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Specifications

Software

Signals

GPS	L1C/A, L5
GALILEO	E1OS, E5a
GLONASS, BEIDOU, IRNSS, SBAS, GBAS, QZSS	on demand

Specific features

Mono or Dual Antenna (passive and/or active)

Supports Radio-Occultation and Reflectometry measurement (Opt.)

Data Interface

TM/TC supported protocols

PUS-ISIS	Mission Specific TM & TC service Service 3 for periodic TM Service 1 for TC verification (Acceptance, Execution)
SYNPROTO v2.2.0	Syntony Proprietary Protocol

Telemetry

Receiver information	Position, Velocity, GPS/GALILEO time
Constellation	Satellites C/No, Doppler, Pseudorange
Rx Status	Health, Modes (Ack, Track, etc.)

Telecommand

Live configuration	Activation/Deactivation of Signal/ Constellation. FDE (Fault Detection and Exclusions) configuration TM Frame Rates
Remote Update	Remote FW/SW update through TC

Performances

Accuracy @45 dBHzfor typical LEO satellite @700 km

Position 3D RMS	1.08 m
Velocity 3D RMS	4.3 cm/s
Time RMS	2.3 ns

Hardware

RF Input

Frequency Bands	1575 MHz / 1176 MHz
RF Bandwidth	25MHz (customizable up to 50MHz on demand)
Input Power	[-97 dBm ; -50 dBm] operating -10 dBm without damage

Connectors

Antenna	2 SMA (50 Ω)
Power Supply	5V DC +/-5%
TM/TC	Sub-D
FPGA reset	Sub-D
1PPS	Sub-D

Active Antenna

Alimentation	3.3 V regulated
Power	250 mW

Physical dimensions and characteristics

Overall (box)	80 mm x 90 mm x 34 mm
Weight	~0.220 Kg
Fixation	x4 M4
Storage Temperature	From -40 to +85°C
Operating Temperature	From -35 to +60°C
Consumption	Nominal 7 W –Max 10 W

Miscellaneous

Licenses

Exportation outside Europe	European Dual use exportation regulation applies
ITAR	Free / No constraint

Standard

IPC-A-600 class 3, IPC-A-610 class 3

Space Environment

Radiation Robustness

TID	20 Krad
SEE	SEL immune SEU Tolerant -Error Detection and Correction

Mechanical Constraints

Vibration, Shock	The RX withstands without Damage mechanical constraints during Ground Operation, Launch and Flight
Vacuum	The RX withstands free space vacuum of 1.33.10-8 Pa in flight

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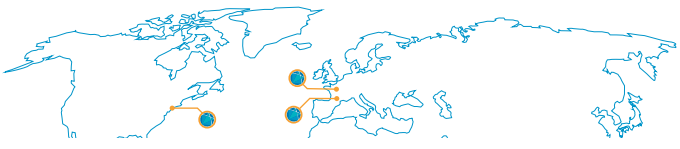

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