

Q SERIES - DUAL-FREQUENCY GNSS RECEIVER FOR LOW-COST SATELLITE APPLICATIONS

Introduction

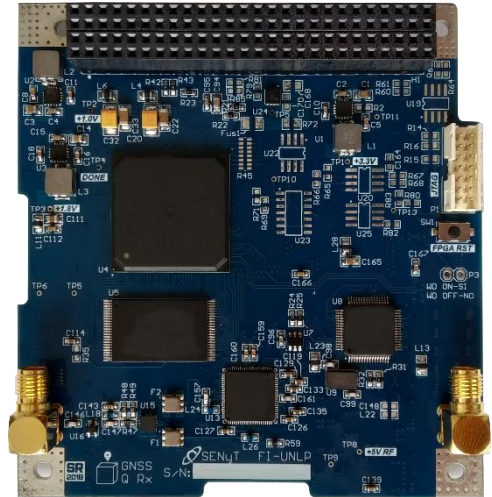
The Q Series is family of configurable dual-frequency GPS/GLONASS receivers that offer positioning solutions for low-orbit and low-cost satellite applications. Its form factor, low power, and high-performance provides an ideal solution for CubeSats and other nano-satellite missions.

Applications

- LEO satellite navigation.
- Precise orbit determination.
- High precision terrestrial navigation.

Features

- One or two antenna inputs.
- Two configurable RF channels for each antenna.
- Capable of receiving GPS L1/L2C and GLONASS L1.
- Works with active or passive antenna.
- Single +5 V DC supply.
- Single and dual-frequency PVT navigation solution.
- Pulse Per Second (PPS) output pin.
- Raw pseudorange and carrier-phase measurements.
- UART main navigation interface with RS-422 signaling.
- USB secondary navigation interface available on main connector for optional USB-UART communication interface with the receiver.
- Two CAN bus interfaces available.
- Watchdog monitor circuit for system reset.
- Current measurement and short-circuit protection with fail flag available on main connector.
- Eight GPIO pins available on main connector.



Physical and Electrical Characteristics

Dimensions	90 x 96 x 15 mm
Weight	< 200 g
Power	
Input voltage	+5.0 V \pm 5%
Power consumption¹	
GPS L1 on one antenna	~ 1.5 W
GPS L1/L2C on one antenna	~ 1.7 W
GPS L1/L2C on each antenna	< 2 W
Active antenna power	
On board bias-T	+3.0 V
Max output current	50 mA

¹ Typical values under nominal GPS constellation using passive antenna.

Connectors

PC104-like configuration (Pumpkin CubeSat Bus)	2 x 54-pin dual row female header
Antenna inputs	SMA female

Performance
Tracking channels

GPS L1 C/A - GLONASS L1	24
GPS L2/C	12

Tracking sensitivity

27 dB-Hz

Time to first fix

Cold start	< 15 min, 10 min typical
Warm start (user PVT and GPS almanac)	< 5 min, 3 min typical

Solution accuracy (in orbit, GPS dual-frequency)
3D position error

Punctual solution	< 5 m (1 σ), < 3 m typical
Filtered solution	< 3 m (1 σ), < 2 m typical

3D velocity error

Punctual solution	< 0.4 m/s (1 σ), < 0.2 m/s typical
Filtered solution	< 2 cm/s (1 σ), < 5 mm/s typical

Orbital Dynamics

Altitude	LEO (approx. 200 km to 2000 km)
Velocity	< 15 km/s
Acceleration	< 5G

Data Outputs

PVT navigation solution	GPS L1 C/A GLONASS L1OF GPS L1 C/A + GPS L2C
Raw pseudorange, carrier-phase, and C/N ₀	1 Hz
Pulse Per Second (PPS) signal	

Configuration Options

Model	Antenna configuration	GNSS signals
QS1000	Single	GPS L1 C/A
QD1000	Dual	GPS L1 C/A
QS0100	Single	GLONASS L1OF
QD0100	Dual	GLONASS L1OF
QS2000	Single	GPS L1 C/A + GPS L2C
QD2000	Dual	GPS L1 C/A + GPS L2C
QX1100	Single (at both inputs)	GPS L1 C/A + GLONASS L1OF
QX2100	Single (at both inputs)	GPS L1 C/A + GPS L2C + GLONASS L1OF

Revision History

Date	Detail
23/06/2023	Release V1.0.

Disclaimer

SENyT reserves the right to make any changes without further notice to correct errors and improve reliability, function, or design.