GE-920, Dual-RTK Engine/Antenna Support for Precise Heading and Cm-Level Positioning



RoHS Compliant

Overview

The GE-920 features dual high-sensitivity u-blox F9 engines and dual RF connectors, enabling true dual-antenna operation for precise heading determination without reliance on vehicle movement. By operating simultaneously as an RTK moving base and RTK rover, the module delivers accurate real-time position and heading information, making it ideal for applications that require reliable orientation awareness.

Supporting dual-band operation (L1 and L2) across multiple constellations—including GPS, GLONASS, Galileo, BeiDou, QZSS, and SBAS—the GE-920 ensures excellent satellite visibility and robust RTK performance. This multi-constellation capability enables fast convergence and highly accurate positioning, even in challenging environments where GNSS signals are weak or obstructed.

Applications

- UAV heading and navigation
- Precision agriculture with RTK heading
- Robotic guidance and orientation systems

Features

- Powered by u-blox ZED-F9 RTK engine
- Supporting L1/L2 band and multiple constellations simultaneously
  - GPS+Galileo+GLONASS+BeiDou
  - SBAS, QZSS
- Augmentation support:
  - DGNSS RTCM 10403.3 version 3 messages support for RTK fix.
  - SBAS (WAAS, EGNOS, MSAS, GAGAN),
  - QZSS (L1 C/A and L2C signals & L1S SLAS, Sub-meter Level Augmentation Service)
- SPARTN 2.0.1 support
- High sensitivity
  - Acquisition: -148dBm
  - Tracking: -167dBm
- RTK convergence in 10 sec for multi-GNSS.
- Max. RTK update rate (default 5Hz), up to
  - 8 Hz for GPS only
- **Spoofing detection / monitoring**
  - Multiple constellations should be enabled.
- **Jamming / interference indicator**
  - For continuous wave (narrow-band) jammers/interference only
- Two I-PEX connector for GNSS antenna; one for rover and the other for moving base
- Two status LEDs
  - Green: Solid = power on | Flashing = GNSS fix acquired

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- Amber: Solid = RTK fix acquired | Flashing = RTK float mode
- External active antenna **short circuit protection**
- Support UART/TTL interface.
- Windows location sensor support
- OMA SUPL compliant A-GPS support
- Excellent EMI protection
- Industrial operating temperature range: -40 ~ 85℃

Technical Specifications

Receiver Performance Data+

Supported GNSS Constellations	u-blox ZED-F9P GPS/SBAS/QZSS: (MHz) L1 C/A (1575.42), L2C (1227.60) GLONASS: L1OF (1602+k*0.5625, k= -7,…,5,6), L2OF (1246+k*0.4375, k= -7,…,5,6), Galileo: E1-B/C (1575.42), E5b (1207.140) BeiDou: B1I (1561.098) B2I (1207.140)
Position Accuracy (24 hours static)	Horizontal: RTK: 0.01 cm CEP +1 ppm SBAS: 1 m CEP PVT: 1.5 m CEP Vertical: RTK: 0.01m CEP + 1 ppm
Velocity Accuracy	<0.05 m/s (speed) GPS+GLONASS/BDS <0.4° (heading) GPS+GLONASS/BDS (50% @ 30 m/s for dynamic operation)
Time Pulse Signal	0.25Hz...10MHz RMS: 30ns, 99%: 60ns
Time To First Fix (TTFF) Hot start Aided start Cold start	Autonomous (All at -130dBm) 2sec (GPS+Glonass+Galileo+BeiDou) 2sec (GPS+Glonass+Galileo+BeiDou) 25sec (GPS+Glonass+Galileo+BeiDou)
Sensitivity	GPS+Glonass+Galileo+BeiDou Acquisition: -148 dBm Reacquisition: -160 dBm Tracking & navigation: -167 dBm
Max. Update Rate	a. GPS+Glonass+Galileo+BeiDou b. GPS+BeiDou c. GPS RTK: 5Hz@a, 8Hz @b, 20Hz@c PVT: 7Hz@a, 12Hz@b, 25Hz@c RAW: 10Hz@a, 20Hz@b, 25Hz@c
Max. Altitude	80,000 m
Max. Velocity	500 m/s
Moving Base RTK Performance	a. GPS+Glonass+Galileo+BeiDou b. GPS+BeiDoui c. GPS Max. update rate: 8Hz@a, 8Hz@b, 10Hz@c Heading accuracy: 0.4°@a,b,c
Protocol Support Default Settings	NMEA 0183 up to v 4.11, ASCII GGA, GLL, GSA, GSV, RMC, VTG, TXT UBX: u-blox proprietary, binary RTCM 3.3: binary Rover UART & MB UART: 460800bps, N-8-1, 5Hz Rover UART output: PVT, RELPOSNED enabled

Augmentation System Support	QZSS: Support L1S SLAS Correction data broadcasted on L1 SBAS: WAAS, EGNOS, MSAS, GAGAN DGNSS: RTCM 10403.3 ● RTK rover mode messages: (RTCM) 1001~1007, 1009~1012, 1033, 1074, 1075, 1077, 1084, 1085, 1087, 1094, 1095, 1097, 1124, 1125, 1127, 1230, 4072.0 ● RTK base mode messages: (RTCM) 1005, 1074, 1077, 1084, 1087, 1094, 1097, 1124, 1127, 1230, 4072.0, 4072.1 ● SPARTN 2.0.1 rover messages SM 0-0, 0-1, 0-2, 1-0, 1-1, 1-2, 2-0
Dynamics	< 4g

+ Note. According to IC Spec

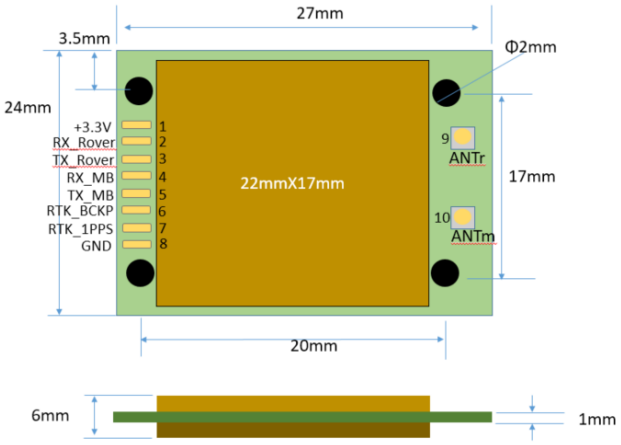
Electrical Data

Power Supply	3.3 ± 0.3 V
Backup power	V_BAT: 3V
Power Consumption	TBD
TTL I/O	V_{IH}: ≥ 2.64V, V_{IL}: ≤ 0.4V V_{OH}: ≥ 2.9V, V_{OL}: ≤ 0.4V

Environmental Data

Operating temperature	-40 ~ 85℃
Storage temperature	-40 ~ 85℃

Mechanical Data – 27 x 24 x 6 (mm)



Pin definition

Name	PINs	Function	I/O
+3.3V	1	3.3V power supply	Input
RX_Rover	2	Rover RX	Input
TX_Rover	3	Rover TX	Output
RX_MB	4	Moving Base RX	Input
TX_MB	5	Moving Base TX	Output
RTK_BCKP	6	Backup power	Input
RTK_1PPS	7	1PPS	Output
GND	8	Ground	Input
ANTm	9	Moving base antenna	Input
ANTr	10	Rover antenna, heading is defined as the direction from ANTm to ANTr	Input

Ordering Information

GE-920X; X=D, default GE-920D

X=	Description
D	Dual-Antenna Support RTK GNSS Engine Board

Optional Accessory

Object	Description
GA-H14	Helical Antenna, L1/L2/L5/L6 bands

*This document is subject to change without notice.

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