Super Light Weight GNSS RTK Receiver with Inbuilt Helical Antenna

and Compass for

High Precision Centimeter Level Positioning

GPS L1/L2, GLONASS G1/G2, BDS B1/B2, GALILEO E1/E5b, QZSS L1/L2

RKI-3023

GenX RTK F9P Air is a light weight 20 gram RTK GNSS module with U-blox ZED-F9P, QMC5883 Compass and inbuilt high gain helical antenna. The whole package is packaged in lightweight but strong enclosure which makes it dust and splash resistant and easy to mount on drone body.

The GenX RTK F9P Air can receive and track multiple GNSS systems. With state of the art multi-band RF front-end architecture, all four major GNSS constellations (GPS, GLONASS, Galileo, and BDS) can be acquired simultaneously. All satellites in view can be processed to provide an RTK navigation solution when used with correction data from RTK base. The module communicates on multiple protocols like UBX, NMEA and RTCM and can be easily integrated with any modern flight controller.

It can be configured for concurrent GPS, GLONASS, Galileo, BDS, QZSS, and SBAS reception to provide a high-performance position reporting and navigation solution. It provides exceptional sensitivity and acquisition times, and interference suppression measures enable reliable positioning even in difficult signal conditions.

Specifications

GNSS module	U-blox ZED-F9P	
Compass	QMC5883	
Weight	20g	
Application	Rover (Aircraft) or Base	
Receiver type	■ GPS L1C/A L2C ■Galileo E1 E5b ■ GLONASS G2 G1 ■BDS B1l B2l	
Sensitivity	Tracking	-163dBm
	Reacquisition	-147dBm
Time-To-First-Fix[1]	Cold Start	≤35 s
	Warm Start	20s
	Hot Start	1 s
Position accuracy[2]	Autonomous	2.0 m CEP
	DGNSS	0.5m CEP
	RTK	1cm+1ppm (Horizontal)[3]
Accuracy of time pulse signal	RMS	30ns
Velocity accuracy	GNSS	0.1 m/s
	D-GNSS	0.05 m/s
Operational limits[4]	Dynamics	≤ 4 g
	Altitude	18000 m
	Velocity	515 m/s
Baud Rate	38400-230400 bps （Default 38400 bps）	
Max navigation update rate	10Hz	

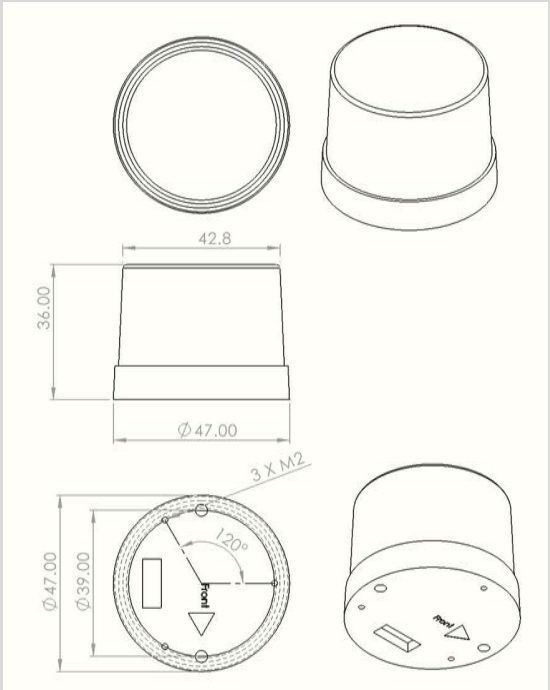
1. All satellites at ≥-130dBm

2. CEP, 50%, 24 hours static, ≥-130dBm, > 8SVs

3. Based on 30km, the accuracy error increases by 1cm every 10km from the base station

4. Assuming Airborne < 4 g platform

		Pinouts	Dimensions
Pin	**Label**	**Description**	
1	GND	Ground	
2	TX2	UART 2 Data Output, TTL	
3	RX2	UART 2 Data Input, TTL	
4	SDA	Compass I2C SDA Pin	
5	SCL	Compass I2C SCL Pin	
6	TX1	UART 1 Data Output, TTL	
7	RX1	UART 1 Data Input, TTL	
8	VCC	Module Power Supply, 3.6-6.0 VDC, 5.0V recommended. 5V Power from Serial Port (GPS or telemetry) of FC is ideal.	



Usage with Ardupilot / PX4 / Pixhawk Based Flight Controllers

- Connect module to serial port of flight controller

GenX RTK F9P Air	Flight Controller Serial Port
VCC	VCC
GND	GND
TX1	RX
RX1	TX

- If using with Pixhawk Cube use GPS 2 Port, If no other GPS is connected on GPS 1 port set parameter **SERIAL3_PROTOCOL** to **-1** or anything else than 5. You can also use Telemetry 1 or Telemetry 2 Port but make sure no other ports protocol is set to 5(GPS) except the one on which GPS is connected.
- Without RTK Base correction data module can be used as normal GPS (GNSS) module.
- When RTK Base is available the correction data can be sent to flight controller through ground station software (Mission planner / QGroundControl) and telemetry link.

Using module for GPS Altitude (Instead of barometer)

- Normal GNSS modules do not provide good accuracy in vertical direction making it unusable for altitude control and that's why most flight controllers use barometers which measures atmospheric pressure to control altitude of aircraft.
- Change in temperature and pressure may cause large drifts in altitude in few minutes. Sometimes this may lead to inaccurate data or crash in challenging terrains.
- When RTK is available GPS can be used for GPS altitude as first option, this helps achieve control over altitude in centimeter level precision.
- However it should be set to barometer when no RTK correction data is present.
- For more details see : https://ardupilot.org/copter/docs/common-gps-for-alt.html

Using 2 modules for GPS Yaw (Instead of Magnetometer)

- For high power drones or ground vehicles where magnetic interference from motors, ESCs or external things like power line can harm stability of drones or ground vehicles, GPS yaw can be used to estimate heading.
- In this case 2 GPS modules are used on the drone and RTK base is optional. All processing is done onboard making it a more reliable system.
- Out of 2 modules used on board, one acts and moving base and second acts as rover.
- This is advance feature and should be used with caution. More documentation here : https://ardupilot.org/copter/docs/common-gps-for-yaw.html