



# UD-R8001E5 High Precision GNSS/INS System

## Dual-antenna RTK / GNSS+INS Deeply Coupling Navigation Anti-Spoofing and Anti-Interference

### Description

UD-R8001E5 deeply-couples the INS (Inertial Navigation System) measurement data and the GNSS satellite data. With the accuracy of GNSS positioning and the high sensitive IMU, UD-R8001E5 achieves a real-time navigation and results with centimeter positioning in static environment.

The UD-R8001E5 is enhanced with the anti-spoofing and anti-interference capability. Native GNSS signal or transformed GNSS signal will be identified by the advance mathematical and RAIM (Receiver Autonomous Integrity Monitoring) algorithm.

The dual antennas design, that independently receives GNSS signal to achieve the accurate position and attitude, further improving the robustness and simplicity of the integrated navigation system. It can cope with or overcome the environment of complex urban road obstruction and highway signal interference, providing continuous, stable and reliable real-time high-precision positioning services for intelligent vehicles.

The hardware design provides multiple interfaces, including CAN bus, Ethernet, serial and event I / O etc. that work with other sensors (such as LIDAR, SLAM, etc.) together for vehicle controlling.



### Highlights

- Deeply coupled GNSS+INS navigation engine
- Built-in high precision positioning and heading board
- Built-in high precision IMU module with Gyro Bias in 3 °/h
- RAIM enhanced anti-spoofing and anti-interference
- Connection options including serial, CAN and Ethernet
- Multi-vector RTK positioning engine
- All-GNSS, multi-frequency RTK positioning solution
- Support modern signal systems such as BDS-3 and Galileo
- Support GNSS/IMU raw data output and post processing
- Low latency



## Technical Specification

System Type	GNSS/INS Receiver	
GNSS	GPS	L1C/A, L2C, L2P, L5
	GLONASS	G1, G2
	BDS	B1I, B2I
	BDS-3	B1I, B1C, B2a
	Galileo	E1, E5b
	QZSS	L1C/A, L2C, L5
	NavIC (IRNSS)	L5
Gyroscope	Range	$\pm 450$ deg/s
	Rate bias repeatability	0.1 deg/s
	Rate bias stability	3 deg/hr
	Angular random walk	0.2 deg / $\sqrt{\text{hr}}$
Accelerometer	Range	$\pm 5$ g
	Rate bias repeatability	5 mg
	Rate bias stability	70 $\mu\text{g}$
	Velocity random walk	0.03 m/s / $\sqrt{\text{hr}}$
Horizontal Accuracy (RMS)	Single point	1.5 m
	RTK	1 cm + 1 ppm
Vertical Accuracy (RMS)	Single point	2.5 m
	RTK	1.5 cm + 1 ppm
Time to First Fix (TTFF)	Cold start	$\leq 45$ s
	Hot start	$\leq 30$ s
Maximum Data Rate	GNSS measurement	5 Hz
	RTK position	5 Hz
	INS position / attitude	125 Hz
	IMU raw data rate	125 Hz
Communication Port	RS232	$\times 2$
	CAN Bus & Ethernet	$\times 1$ (each)
	PPS & Event output	$\times 1$ (each)
Physical	Dimension	116 x 114.2 x 38.6 mm
	Weight	432 g
	Input Voltage	+9V ~ +32 VDC
	Consumption	4.8 W
	Protection	IP67

## Performance during GNSS signal loss

Outage Duration	Positioning Mode	POSITION ACCURACY (M) RMS		VELOCITY ACCURACY (M/S) RMS		ATTITUDE ACCURACY (DEGREES) RMS		
		Horizontal	Vertical	Horizontal	Vertical	Roll	Pitch	Azimuth
0 sec	RTK	0.015	0.02	0.019	0.014	0.018	0.018	0.084
	PP	0.01	0.02	0.016	0.012	0.008	0.008	0.03
10 sec	RTK	0.235	0.14	0.058	0.024	0.035	0.035	0.11
	PP	0.015	0.02	0.02	0.017	0.01	0.01	0.034