SENSSET
SENSOR SEQUENCE

SSI-NS310

Inertial Combined Navigation System

PRODUCTS FEATURES

- High performance, small volume, light weight and low power consumption.
- The use of mass production of high-performance, highly reliable inertial sensors.
- -40 degrees Celsius to 60 degrees Celsius, full temperature calibration.
- 1KHz high sampling rate, 1KHz compensation operation, 1KHz navigation operation, 5Hz Kalman filtering.
- Software, algorithm and interface protocol can be highly customized according to the user's usage scenario.
- can be external odometer, DVL, vision, radar to do combination navigation.
- Form factor: 76mm X 64mm X 19.5mm
- Weight: 100g.

1. Product performance indicators

Table 1. Inertial device accuracy indicators..

Gyroscope	
Parameter	**Value**
Measurement range	±500° /s
Deviation Calibration	100 seconds, second-average sampling, < 3°/h (1σ)
	1 hour, second-average sampling, hundred-second smoothing, zero change, < 15°/h
Zero bias repeatability	< 15°/h (1σ, typical)
Bandwidth	80Hz (customizable)
Accelerometer	
Measurement range	±5g (customizable)
Zero bias stability	100 seconds, second-average sampling, < 0.1mg (1σ)
	1 hour, second average sampling, hundred second smoothing, zero change, < 0.2mg
Zero bias repeatability	< 0.2mg（1σ）
Bandwidth	80Hz (customizable)

Table 2. GNSS receiver performance indicators

Parameter	Value
Transition	432 channels
Frequency	BDS B1/B2, GPS L1/L2, GLONASS L1/L2, Galileo E1/E5b
Positioning at one point (RMS value)	Plane: 1.5m; Elevation: 3.0m
DGPS(RMS)	Plane: 0.4m; Elevation: 0.8m
RTK(RMS	Plane: 1cm+1ppm; Elevation: 1.5cm+1ppm
Directional accuracy (RMS)	0.2 degrees / 1m baseline
Time accuracy (RMS)	20ns
Speed accuracy (RMS)	0.03m/s
Cold Start	<30 seconds
Differential Data	RTCM 2.X/3.X CMR
Data update rate	20Hz
Power consumption	2.3W (typical case)

Table 3. Combined navigation performance indicators.

Parameter		Value
Position accuracy	Single point mode	1.5m（CEP）
	RTK mode	0.01m+1ppm（CEP）
Speed accuracy		0.01m/s
Gesture	tilt and turn	0.03° (RMS, dynamic), 0.015° (RMS, static)
	roll across	0.03° (RMS, dynamic), 0.015° (RMS, static)
	Measurement Range	Pitch: ±90°, traverse roll: ±180°
Direction of navigation	Direction	0.05° (1m baseline)
	Measurement Range	±180°
Positioning time	Cold Start	< 30s
	Hot start	2s
	Recapture	< 1s

Table 4. Electrical parameters.

Parameter	Value
Operating Voltage	6V～36V DC
Power Ripple	<50mV
Maximum power consumption	<3.5W
Operating temperature	-40℃~+85℃
Storage temperature	-50℃~+100℃

2. External interface

The RF connector is SMA connector with male thread and female hole, external power supply is 5.0V, driving capacity is 200mA. GNSS antenna is chosen to support high precision differential positioning and dual antenna orientation. The system adopts the highly reliable J30J_15ZK for external output and J30J_15TJL for user terminal.

Table 5. Definition output

Number	Net Name	Description
8	POWER_IN	6-36V power supply, maximum 3.5W power consumption
15	GND	
6	RS232_RXD1	INS output, RS232 interface
5	RS232_TXD1	
4	GND	
10	RS422_A	INS output, RS422 interface
2	RS422_B	
9	RS422_Y	
1	RS422_Z	
14	RS232_RXD2	COM1 output of the GPS board, independent communication port, freely configurable by the user. Differential information input port.
7	RS232_TXD2	
13	GND	
11	GPS_PPS	PPS signal output, 3.3V LVTTL
3	TEST	Test output, generic IO, can also be used as event input
12	GND	

3. Data Protocols.

The product supports a variety of protocols for output, which can be configured through FLASHBURN software or customized for customer requirements for communication protocols. The default protocol is NAVITEST standard protocol.

3.1. NAVITEST protocol.

The data frame format is 1 bit start, 8 bits data, 1 bit stop, no parity bit, low byte first, high byte second, low bit per byte sent first. The transmission frequency and baud rate can be configured by FLASHBURN software.

Table 6.

Byte Number	Format	Content	Unit	Resolution	Description
1	Unsigned Char	0x55	—	—	Frame header
2	Unsigned Char	0xAA	—	—	Frame header
3	Unsigned Char	0x4C	—	—	Data length
4～7	Unsigned Int	TimeCnt	ms	1	Navigation time
8～11	Unsigned Int	Reserved	—	—	For sending low frequency messages in packets
12～15	Float	—	°/s	—	X angular velocity
16～19	Float	—	°/s	—	Yangular velocity
20～23	Float	—	°/s	—	Zangular velocity
24～27	Float	—	m/s^2	—	XAcceleration
28～31	Float	—	m/s^2	—	YAcceleration
32～35	Float	—	m/s^2	—	ZAcceleration
36～39	Float	—	m/s	—	North Speed
40～43	Float	—	m/s	—	Sky Speed
44～47	Float	—	m/s	—	East Speed
48～51	Float	—	m	—	Height
52～55	Int	—	°	1e-7	Longitude
56～59	Int	—	°	1e-7	Latitude
60～63	Float	—	°	—	Scroll
64～67	Float	—	°	—	Direction
68～71	Float	—	°	—	pitch and tilt
72～75	Unsigned Int	—	—	65536	UTC milliseconds, time zero is1970.01.01,00:00:00
76～77	Unsigned Short	—	—	1	
78～79	Short	—	mm	1	Lifting and sinking displacement
80	Unsigned Char	—	—	—	Checksum

4. External dimensions.

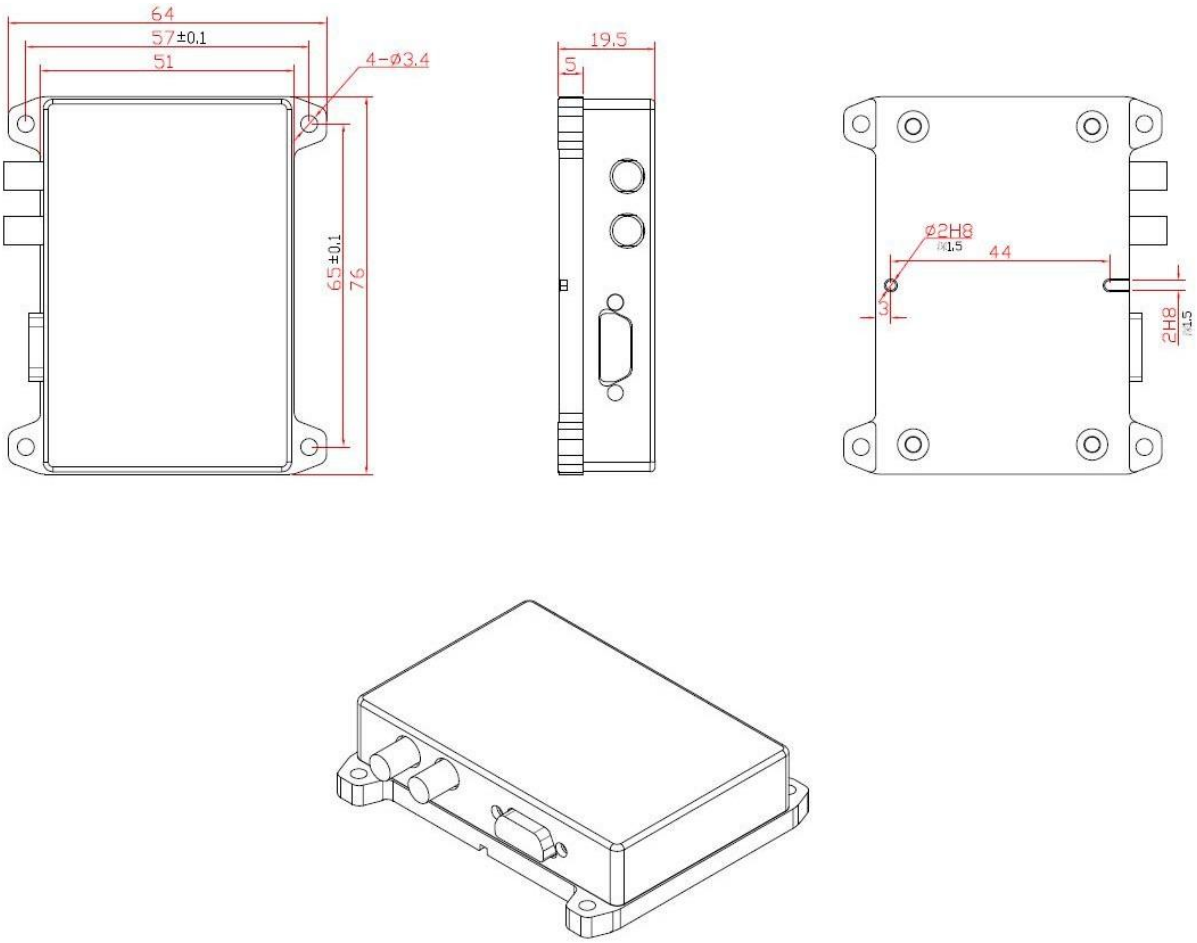

Figure 4.1. Mechanical dimensions

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Development, production and supply of high-tech sensors