GI227

High Precision MEMS Integrated Navigation System

Technical Manual

Introduction

The GI227 integrated navigation sensor can provide a wide range of position and roll, pitch, and azimuth measurements to solve navigation and positioning solutions for users.

In GI227, acceleration and angular velocity can be measured directly. The sensor system runs a complex filter and combines the fusion algorithm,
To produce high-precision metering output. Including geomagnetic compensation, acceleration offset compensation, sensor error compensation, automatic zero calibration, noise cancellation. The sensor can output acceleration, angular velocity, roll angle, pitch angle, azimuth, position, Euler angle, and quaternion. All sensors are temperature compensated according to the real-time temperature coefficient. The use of MEMS technology gives the sensor system the advantages of high accuracy, small size, and light weight.

The system is equipped with debug software, which can be used for equipment configuration, real-time measurement monitoring and data recording. In addition, standardized data communication protocols are also very convenient for user applications.

Applications

- UAV, aerial surveying and mapping, photoelectric detection stability
- Intelligent unmanned vehicle, urban mapping, vehicle satellite
- Hydrographic survey, marine compass, unmanned aerial vehicle

Specifications

Inertial measurement unit (IMU) sensor output

	Accelerometer	Gyro	Magnetometer
Measuring range	±2 g	300°/sec (standard) ±75, ±150, ±900°/sec(optional)	±2.5 Gauss
Non-linear	±0.05 % fs	±0.05 % fs	±0.5 % fs
Resolution	<0.04 mg	<0.0025°/sec	-
Stability	±0.1 mg	50°/hr	-
Initial offset error	±0.001 g	±0.05°/sec	±0.003 Gauss
Stability scale factor	±0.05 %	±0.05 %	±0.1 %
Noise density	50 µg/√Hz	0.002°/sec/√Hz	100 µGauss/√Hz
Correction error	±0.05°	±0.05°	±0.05°
Adjustable bandwidth	250 Hz (max)	160 Hz (max)	-
Vibration noise	-	0.06°/s RMS/gRMS	-
Vibration rectification error ,VRE	0.03%	0.001°/s/g2RMS	-
Sampling frequency	100 Hz	100 Hz	100 Hz
IMU filter	Fourth-order filtering: analog low-pass filter; digital sigma-delta wideband anti-aliasing filter		
IMU data output rate	1 Hz to 100 Hz		

Calculation output

Positioning accuracy	±5 m RMS Horizontal
Attitude accuracy	±0.5° RMS roll & pitch, ±1° RMS heading (typ)
Attitude range	360° about all axes
Attitude resolution	< 0.01°
Repeatability	0.1° (typ)

Global Navigation Satellite System (GNSS) output

Receivable signal	72 channels GPS/QZSS L1 C/A , GLONASS L10F , Beidou B1 , SBAS L1 C/A : WAAS,EGNOS,MSAS Galileo-ready E1B/C
GNSS Data output rate	1 Hz to 4 Hz
Start Time	Cold start: 27 sec, Recapture: 1 sec, Hot start: <1 sec
Sensitivity	Tracking: -162 dBm, cold start: -147 dBm, hot start: -156 dBm
Orientation accuracy	1°
Horizontal position accuracy	GNSS: 5 m CEP (automatic) ; SBAS: 2.0 m CEP (Still,24hours,SEP3.5m)
Time pulse signal accuracy	30 nsec RMS < 60 nsec 99%
Acceleration limit	≤ 4g
Height limit	No limit
Speed Limit	500 m/sec (972 knots)

Performance

Operating parameters

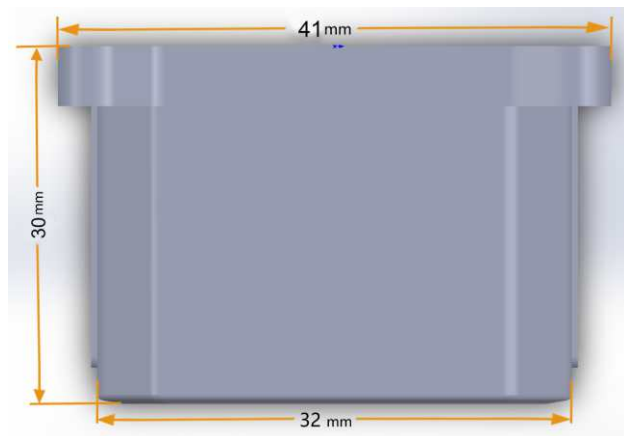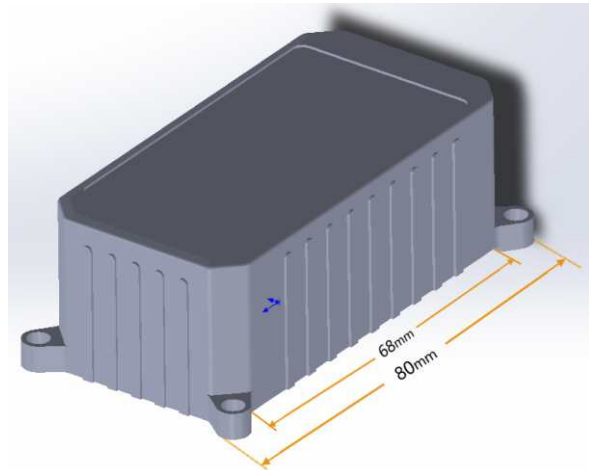|	
Communication	RS232,RS485,TTL Modbus
Power supply	10~35 V DC
Power consumption	2.5 W (typ)
Working temperature	-40 °C to +85 °C
Vibration limit	6 g RMS, 10 Hz to 2 kHz
Mechanical vibration limit	750 g (half-sine, 2 msec powered, any axis)

Physical specifications

Size	80*41*30 mm
Weight	105 g
Certification	ROHS, CE

Integrated information

Interface	Data / power output: micro-DB9 GNSS wireless; MMCX type
Software	BEWIS debug software, Windows XP/Vista/7/8/10 compatible
Compatibility	Compatible with GI100 / 300
SDK	Standard data communication protocol, including existing sampling code (independent of operating system and operating platform)

Product Size

Product Size：L80×W41×H30　(mm)

Note: Unfilled dimensional tolerances are performed in accordance with GB/T1804-2000 Class C.

Executive standard

- Enterprise Quality System Standard: ISO9001:2008 Standard(Certificate No.:10114Q16846ROS)
- CE certification (certificate number: 3854210814)
- ROHS (certificate number: SO81426003)
- GJB 2426A-2004 Fiber Optic Gyro Test Method
- GBT 18459-2001 sensor main static performance index calculation method
- JF 1059-1999 Evaluation and Expression of Measurement Uncertainty
- GBT 14412-2005 mechanical vibration and shock mechanical installation of accelerometer
- General requirements for GJB 450A-2004 equipment reliability
- Quality control of key parts and important parts of GJB 909A
- GJB 899 Reliability Qualification and Acceptance Test
- GJB 150-3A high temperature test
- GJB 150-4A low temperature test
- GJB 150-8A rain test
- GJB 150-12A dust test
- GJB 150-16A vibration test
- GJB 150-18A impact test
- GJB 150-23A Tilt and Swing Test
- GB/T 17626-3A RF electromagnetic radiation immunity test
- GB/T 17626-5A surge (hit) impulse immunity test
- GB/T 17626-8A power frequency magnetic field immunity test
- GB/T 17626-11A voltage dips, short interruptions and voltage changes immunity
- GB/T 2423.22-2012 Environmental testing Part 2:test method Test N:temperature change（IEC 60068-2-14:2009,IDT)
- GB/T 10125-2012Artificial atmosphere corrosion test Salt spray test（ISO 9227:2006,IDT)

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