The VN-200 is the world's smallest & lightest, high-performance GPS-Aid-
ed Inertial Navigation System (GPS/INS). Combining an advanced GPS
module with the latest in MEMS inertial & pressure sensor technology, the
patented VN-200 provides unprecedented opportunities for embedded
navigation in a footprint no larger than a postage stamp.

PRODUCT OVERVIEW
- On-board Extended Kalman filter running at 400 Hz,
  IMU data available at 1 kHz
- Continuous attitude solution over the complete 360°
  range of motion
- Coupled position, velocity & attitude estimates
- Dynamic accuracy better than 0.3° in heading, 0.1° in
  pitch/roll
- On-board pressure sensor & u-blox GPS receiver
- Compatible with external GPS, pressure or magnetic
  measurements
- Individually calibrated for bias, scale factor, misalign-
  ment, & gyro g-sensitivity
- Available with standard (at +25°C) or full temperature
  compensation (-40°C to +85°C)
- Miniature, self-locking U.FL & MMCX connectors for
  GPS antenna
- Coning & sculling integrals (ΔV's, ΔΘ's)
- User configurable messages using simple VectorNav
  binary protocol
- Serial TTL, SPI & USB communication interfaces
- Surface mount package (30-pin LGA)
  Dimensions: 24 x 22 x 3 mm; Weight: 4 grams
- Rugged package (10-pin Harwin connector)
  Dimensions: 36 x 33 x 9.5 mm; Weight: 16 grams

VECTOR PROCESSING ENGINE (VPE)
- On-board Extended Kalman filter
- Automatic filter initialization & dynamic alignment
- GPS delay compensation
- Real-time sensor bias drift compensation
- All inertial data synchronized to GPS time
- Automatic transitioning between AHRS and INS Modes
- On-board World Magnetic & Gravity Reference Models
- VPE Toolboxes
  Advanced disturbance rejection
  Adaptive signal filtering
  Dynamic filter tuning
  On-board Hard & Soft Iron compensation

VN-200 SIMPLIFIED BLOCK DIAGRAM
### TECHNICAL SPECIFICATIONS

#### Navigation
- Horizontal Position Accuracy: 2.5 m RMS
- Vertical Position Accuracy: 5.0 m RMS
- Vertical Position Accuracy (w/ Barometer): 2.5 m RMS
- Velocity Accuracy: ±0.05 m/s
- Dynamic Accuracy (Heading, True Inertial): 0.3° RMS
- Dynamic Accuracy (Pitch/Roll): 0.1° RMS
- Static Accuracy (Heading, Magnetic): 2.0° RMS
- Static Accuracy (Pitch/Roll): 0.5° RMS
- Angular Resolution: < 0.05°
- Repeatability: < 0.1°
- Max Output Rate (IMU Data): 1 kHz
- Max Output Rate (Navigation Data): 400 Hz

#### Gyro
- Range: ±2000°/s
- In-Run Bias Stability: < 10°/hr
- Linearity: < 0.1% FS
- Noise Density: 0.0035°/s/√Hz
- Bandwidth: 256 Hz
- Alignment Error: ±0.05°

#### Accelerometer
- Range: ±16 g
- In-Run Bias Stability: < 0.04 mg
- Linearity: < 0.5% FS
- Noise Density: 0.14 mg/√Hz
- Bandwidth: 260 Hz
- Alignment Error: ±0.05°

#### Magnetometer
- Range: ±2.5 Gauss
- Linearity: < 0.1%
- Noise Density: 140 µGauss/√Hz
- Bandwidth: 200 Hz
- Alignment Error: ±0.05°

#### GPS
- Receiver Type: 50 Channels, L1, GPS C/A Code
- Solution Update Rate: 5 Hz
- Time-to-First-Fix (Cold/Warm Start): 36 s
- Time-to-First-Fix (Hot Start): < 1 s
- Altitude Limit: 50,000 m
- Velocity Limit: 500 m/s

#### Pressure Sensor
- Range: 10 to 1200 mbar
- Resolution: 0.0042 mbar
- Accuracy: ±1.5 mbar
- Error Band: ±2.5 mbar
- Bandwidth: 200 Hz

#### Environment
- Operating Temp: -40°C to +85°C
- Storage Temp: -40°C to +85°C

#### Electrical
- Input Voltage: 3.2 V to 5.5 V
- Current Draw: 105 mA @ 3.3 V
- Max Power Consumption: 445 mW
- Digital Interface: Serial TTL, SPI

#### Physical
- Size: 24 x 22 x 3 mm
- Weight: 4 g
- Connector: 30-pin LGA
- GPS Antenna Connector: U.FL

### DEVELOPMENT KITS

#### VN-200 Development Board
- Pre-Soldered VN-200 Surface Mount Part with USB & RS-232 Interfaces
- 30-Pin Header
- SMA Connector for GPS Antenna
- Software Development Kit

#### VN-200 Rugged Development Kit
- USB & Serial Adapter Cables
- GPS Antenna
- Cable Connection Tool
- Carrying Case
- Software Development Kit

### APPLICATIONS
- UAVs, UAS, Manned Aircraft
- Camera/Platform Stabilization
- Marine Antenna Stabilization
- Gimbaled Payloads
- SATCOM, SOTM, VSAT
- Ground Vehicles/Robotics
- Smart Weapons
- Motorsports

### DEVELOPMENT TOOLS
- Sensor Explorer GUI: Powerful and user-friendly GUI allows you to display sensor output as a 3D object, graph inertial data, configure sensor settings, perform data-logging, & more.
- Online Library: A large collection of inertial navigation knowledge and application notes is available on our website to help maximize VN-200 performance for your application.
- Engineering Support: Dedicated and responsive engineering support team with combined experience in sensing, guidance, navigation, and controls.
- Custom Solutions Available: Application-specific modeling & algorithm development; controls & closed-loop navigation solutions; custom form-factors & packaging; integration with other external sensors; displays, GUIs & other software packages; tailored calibrations; custom communication protocols.

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1 With proper magnetic declination, suitable magnetic environment and valid hard/soft iron calibration.
2 Default 800 Hz.
3 Not including active antenna power consumption.