Trimble BD940-INS

TRIPLE FREQUENCY RECEIVER WITH INTEGRATED INERTIAL NAVIGATION SYSTEM AND MSS BAND DEMODULATOR

Preliminary

GNSS AND INERTIAL TIGHT INTEGRATION

Taking advantage of Trimble's expertize in both GNSS and Inertial technology the Trimble® BD940-INS module has been designed for applications requiring continuous centimeter accuracy in a compact package. By integrating inertial sensors on the same module, robust high accuracy positions are produced in all environments.

The GNSS components are fully shielded. This design ensures the high quality signals are protected from the sources of EMI on the host platform.

MULTI CONSTELLATION GNSS

The Trimble BD940-INS supports both triple frequency for the GPS and GLONASS constellations plus dual frequency from BeiDou and Galileo. As the number of satellites in the constellations grows the BD940-INS is ready to take advantage of the additional signals. This delivers the quickest and most reliable RTK initializations for 1–2 centimeter positioning. For applications that do not require centimeter accuracy the BD940-INS integrated GNSS-Inertial engine delivers high accuracy GNSS, DGNSS positions in the most challenging environments such as urban canyons. Different confi gurations of the module are available. These include everything from a DGPS L1 unit all the way to a four constellation triple frequency RTK unit. Choose the receiver that suits your application and price point. All features are password-upgradeable, allowing functionality to be upgraded as your requirements change.

With the option of utilizing OmniSTAR or RTX services, the BD940-INS delivers varying levels of performance down to centimeter level without the use of a base station.

HIGH PERFORMANCE INTEGRATED INERTIAL SENSORS

The Trimble BD940-INS integrates the latest in precision inertial sensors in a compact package. With the BD940-INS you are buying a robust navigation solution, not just a GNSS receiver. Key features include:

- High update rate position and orientation solutions
- Continuous positioning in GNSS denied environments
- Lever arm calculation from antenna to navigation point of interest
- Robust Moving Baseline RTK for precision landing on moving platforms
- Single antenna heading not infl uenced by magnetic field variations

FLEXIBLE INTERFACING

The Trimble BD940-INS was designed for easy integration and rugged dependability. Customers benefi t from the Ethernet connectivity available on the board, allowing high speed data transfer and configuration via standard web browsers. USB and RS-232 are also supported. Just like other Trimble embedded technologies, easy to use software commands simplify integration and reduce development times. An intuitive 3D interactive graphical web page allows easy input of lever arms. Dynamic and graphic models for various vehicle types can also be selected.

Key Features

- Trimble Maxwell 7 Technology
- Onboard high accuracy inertial sensor package integrated with GNSS for precise position and orientation
- 336 Channels for multi-constellation GNSS support
- OmniSTAR/RTX Support
- EMI shielded module
- Compact design for mobile applications
- Flexible RS232, USB and Ethernet interfacing
- Centimeter level position accuracy
- Advanced RF Spectrum Monitoring



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Trimble BD940-INS MODULE

TECHNICAL SPECIFICATIONS[1]

- Trimble Maxwell 7 Tech
- On-board Advanced MEMS inertial sensors
- 336 Tracking Channels:
  - GPS: L1 C/A, L2E, L2C, L5
  - BeiDou B1, B2
  - GLONASS: L1 C/A, L2 C/A, L3 CDMA[13]
  - Galileo[2]: E1, E5A, E5B, E5AltBOC
  - IRNSS L5
  - QZSS: L1 C/A, L1 SAIF, L2C, L5, LEX
  - SBAS: L1 C/A, L5
  - MSS L-Band: OmniSTAR, Trimble RTX
- High precision multiple correlator for GNSS pseudorange measurements
- Trimble Everest Plus multipath mitigation
- Advanced RF Spectrum Monitoring and Analysis
- Unfiltered, unsmoothed pseudorange measurements data for low noise, low multipath error, low time domain correlation and high dynamic response
- Very low noise GNSS carrier phase measurements with <1 mm precision in a 1 Hz bandwidth
- Proven Trimble low elevation tracking technology
- Reference outputs/inputs
  - CMR, CMR+, sCMRx, RTCM 2.1, 2.2, 2.3, 3.0, 3.1[12], 3.2
- Navigation outputs
  - ASCII: NMEA-0183 GSV, AVR, RMC, HDT, VGK, VHD, ROT, GGK, GGA, GSA, ZDA, VTG, GST, PJT,PJK, BPQ, GLL, GRS, GBS and Binary: Trimble GSOF, NMEA2000
- 1 Pulse Per Second Output
- Event Marker Input Support
- Supports Fault Detection & Exclusion (FDE), Receiver Autonomous Integrity Monitoring (RAIM)

COMMUNICATION

- 1 USB 2.0 Device port
- 1 LAN Ethernet port:
  - Supports links to 10BaseT/100BaseT auto-negotiate networks
  - All functions are performed through a single IP address simultaneously—including web GUI access and raw data streaming
  - Network Protocols supported
    - > HTTP (web GUI)
    - > NTP Server
    - > NMEA, GSOF, CMR over TCP/IP or UDP
    - > NTripCaster, NTripServer, NTripClient
    - > mDNS/uPnP Service discovery
    - > Dynamic DNS
    - > eMail alerts
    - > Network link to Google Earth
    - > Support for external modems via PPP
    - > RDNIS Support
- 2 x RS232 ports
  - Baud rates up to 230,400
- 1 CAN Port
- Control Software: HTML web browser, Internet Explorer, Firefox, Safari, Opera, Google Chrome

PERFORMANCE SPECIFICATIONS

Time to First Fix (TTFF)[7]
- Cold Start[8] ..... <45 seconds
- Warm Start[9] ..... <30 seconds
- Signal Re-acquisition ..... <2 seconds

Velocity Accuracy[3,4]
- Horizontal ..... 0.007 m/sec
- Vertical ..... 0.020 m/sec

Inertial Sensors
- Maximum acceleration ..... ±6 g
- Maximum angular rate ..... ±350 deg/sec

Maximum Operating Limits[10]
- Velocity ..... 515 m/sec
- Altitude ..... 18,000 m

RTK initialization time[3] ..... typically <1 minute
RTK initialization reliability[3] ..... >99.9%
Position latency[5] ..... <20ms
Maximum Position/Atitude Update Rate ..... 50 Hz

PHYSICAL AND ELECTRICAL CHARACTERISTICS

Size ..... 60 mm x 67 mm x 15 mm
Power ..... 5.5V DC to 30V DC
Typical 3.5 W (L1/L2 GPS + L1/L2 GLONASS)
Weight ..... 60 grams

Connectors
- I/O ..... 44 -pin header
- GNSS Antenna ..... MMCX receptacle

Antenna LNA Power Input
- Input voltage ..... 3.3V DC to 5V DC
- Maximum current ..... 400 mA

Minimum required LNA Gain ..... 31.0 dB

ENVIRONMENTAL CHARACTERISTICS[11]

Temperature
- Operating ..... –40 °C to +75 °C
- Storage ..... –55 °C to +85 °C

Vibration ..... MIL810F, tailored
Random 6.2 gRMS operating
Random 8 gRMS survival

Mechanical shock MIL810D
±40 g operating
±75 g survival

Operating Humidity ..... 5% to 95% R.H. non-condensing, at +60 °C

ORDERING INFORMATION

Module Part Number 103428-XX
Module ..... Trimble BD940-INS GNSS available in a variety of configurations from L1 SBAS upwards
Evaluation Kit ..... Includes interface board, power supply

1 Trimble BD940-INS is available in a variety of software configurations. Specifications shown reflect full capibility.
2 Developed under a License of the European Union and the European Space Agency.
3 May be affected by atmospheric conditions, signal multipath, and satellite geometry. Initialization reliability is continuously monitored to ensure highest quality.
4 1 sigma level, when usigna Trimble Zephyr 2/3 antennas, add 1 ppm for RTK position accuracies. Heading accuracy is after dynamic alignment and during motion. Performance may be reduced with long stationary or hovering periods.
5 At maximum output rate.
6 GPS only and depends on SBAS System performance. FAA WAAS accuracy specifications are <5 m 3DRMS.
7 Typical observed values.
8 No previous satellite (ephemerides / almanac) or position (approximate position or time) information.
9 Ephemerides and last used position known
10 As required by the U.S. Department of Commerce to comply with export licensing restrictions.
11 Dependent on appropriate mounting/enclosure design.
12 Input only network correction
13 There is no public GLONASS L3 CDMA. The current capability in the receivers is based on publicly available information. As such, Trimble cannot guarantee that these receivers will be fully compatible.
14 RTX and OmniSTAR accuracies depend on correction service chosen. Trimble CenterPoint RTX provides <4cm horizontal accuracy 95% of the time with initializations of less than 30 minutes.

Specifications subject to change without notice.

POSITIONING SPECIFICATIONS[3,4,14]

	Autonomous	SBAS	DGNSS	RTK	INS-Autonomous	INS-SBAS	INS-DGNSS	INS-RTK
No GNSS Outages								
Position (m)	1.00 (H) 1.50 (V)	0.50 (H) 0.85 (V)	0.25 (H) 0.50 (V)	0.008 (H) 0.015 (V)	1.00 (H) 1.50 (V)	0.50 (H) 0.85 (V)	0.40 (H) 0.60 (V)	0.05 (H) 0.03 (V)
Roll/Pitch (deg)	N/A	N/A	N/A	N/A	0.10	0.10	0.10	0.10
Heading (deg)	N/A	N/A	N/A	N/A	0.50	0.50	0.50	0.50
10 second GNSS Outages								
Position (m)	N/A	N/A	N/A	N/A	1.50 (H) 1.80 (V)	1.20 (H) 1.20 (V)	1.00 (H) 1.00 (V)	0.30 (H) 0.20 (V)
Roll/Pitch (deg)	N/A	N/A	N/A	N/A	0.10	0.10	0.10	0.10
Heading (deg)	N/A	N/A	N/A	N/A	0.50	0.50	0.50	0.50

Contact your local Trimble Authorized Distribution Partner for more information

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