Trimble BD992-INS

DUAL-ANTENNA RECEIVER WITH INTEGRATED INERTIAL NAVIGATION SYSTEM AND MSS BAND DEMODULATOR

GNSS AND INERTIAL TIGHT INTEGRATION

Taking advantage of Trimble's expertize in both GNSS and Inertial technology the Trimble® BD992-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 and orientations are produced in all environments.

TRIMBLE MAXWELL™ 7 TECHNOLOGY

The Trimble BD992-INS supports triple frequency for the GPS, GLONASS, BeiDou and Galileo constellations. As the number of satellites in the constellations grows the BD992-INS is ready to take advantage of the additional signals. This delivers the quickest and most reliable RTK initializations for centimeter positioning. For applications that do not require centimeter accuracy the BD992-INS integrated GNSS-Inertial engine also delivers high accuracy GNSS, DGNSS positions in the most challenging environments such as urban canyons. With the latest Trimble Maxwell™ 7 Technology, the BD992-INS provides:

- 2 x 336 Tracking Channels
- Trimble Everest Plus multipath mitigation
- Advanced RF Spectrum Monitoring and Analysis
- Proven low-elevation tracking technology

With the option of utilizing OmniSTAR or RTX services, the BD992-INS delivers varying levels of performance down to centimeter-level without the use of a base station.

ROBUST CENTIMETER ACCURATE SOLUTIONS

The Trimble BD992-INS integrates the latest in precision inertial sensors in a compact package. With the BD992-INS you are buying a robust navigation solution, not just a GNSS receiver.

Key features include:

- High update rate position and orientation solutions
- Dual-antenna for rapid heading alignment
- 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

TRIMBLE PROPOINT ENGINE

The Trimble BD992-INS is now available with the ProPoint Engine. For optimal performance in GNSS degraded conditions the ProPoint Engine delivers premium accuracy, availability and integrity for your application.

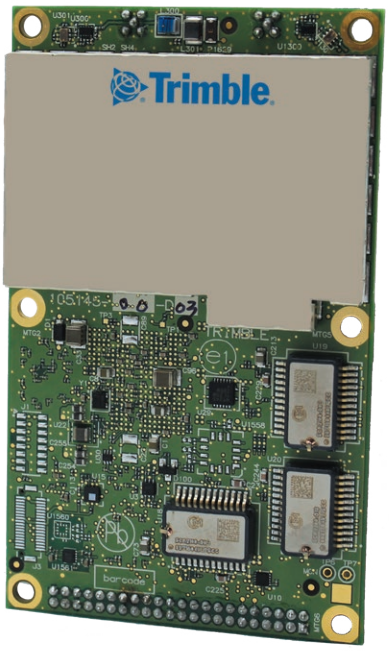
FLEXIBLE INTERFACING

The Trimble BD992-INS was designed for easy integration and rugged dependability. Customers benefit from the Ethernet connectivity available on the board, allowing high speed data transfer and configuration via standard web browsers. USB, CAN 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.

Different configurations of the module are available. All features are password-upgradeable, allowing functionality to be upgraded as your requirements change.

Key Features

- Trimble Maxwell™ 7 Technology
- Trimble ProPoint™ positioning engine (Optional)
- Onboard high accuracy inertial sensor package integrated with GNSS for precise position and orientation
- 336 Channels for multi-constellation GNSS support
- Trimble RTX and OmniSTAR Support
- Compact design for mobile applications
- Flexible RS232, USB and Ethernet interfacing
- Centimeter-level position accuracy
- Advanced RF Spectrum Monitoring



DATASHEET

Trimble BD992-INS Module

TECHNICAL SPECIFICATIONS[1]

- Trimble Maxwell™ 7 Technology
- Trimble ProPoint™ positioning engine (optional)
- Onboard Advanced MEMS inertial sensors
- Position Antenna based on 336 Channel Maxwell™ 7 chip:
  - GPS: L1 C/A, L2E, L2C, L5
  - BeiDou: B1, B2, B313
  - GLONASS: L1 C/A, L2 C/A, L3 CDMA[14]
  - Galileo[2]: E1, E5A, E5B, E5AltBOC, E614
  - IRNSS: L5
  - QZSS: L1 C/A, L1 SAIF,L1C, L2C, L5
  - SBAS: L1 C/A, L5
  - MSS L-Band: OmniSTAR, Trimble RTX
- Vector Antenna based on second 336 Channel Maxwell 7 chip:
  - GPS: L1 C/A, L2E, L2C, L5
  - BeiDou: B1, B2, B3
  - GLONASS: L1 C/A, L2 C/A, L3 CDMA[14]
  - Galileo[2]: E1, E5A, E5B, E5AltBOC, E6[14]
  - IRNSS: L5
  - QZSS: L1 C/A, L1 SAIF, L1C, L2C, L5, LEX
- High precision multiple correlator for GNSS pseudorange measurements
- Trimble Everest Plus™ multipath mitigation
- Supports Trimble CenterPoint RTX, Trimble FieldPoint RTX (only with ProPoint Engine) and Trimble RangePoint RTX (only with ProPoint Engine)[15]
- 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
- 3 x RS232 ports:
  - Baud rates up to 460,800
- 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
- Maximum acceleration GNSS tracking ..... ± 11 g

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 <8 seconds
- RTK initialization reliability[3] ..... >99.9 %
- Position Latency[5] ..... <20ms

Maximum Position/Attitude Update Rate ..... 100 Hz

PHYSICAL AND ELECTRICAL CHARACTERISTICS

Size ..... 100 mm x 60 mm x 11.6 mm

Power ..... 3.3 V DC +5%/-3%
Typical 2.6 W (L1/L2 GPS + L1/L2 GLONASS)

Weight ..... 62 grams

Connectors
- I/O ..... 44-pin header
- GNSS Antenna ..... 2 x MMCX receptacle

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

Minimum required LNA Gain ..... 32.0 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 10ms operating
±75 g 6ms survival

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

ORDERING INFORMATION

Module Part Number X20992-XX

Module ..... Trimble BD992-INS GNSS available in a variety of configurations from L1 SBAS upwards

Evaluation Kit ..... Includes interface board, power supply

1 Trimble BD992-INS is available in a variety of software configurations. Specifications shown reflect full capability.
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 using Trimble Zephyr 2/3 antennas, Add 1 ppm for RTK position accuracies.
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 The hardware of this product is designed for BeiDou B3 compatibility (trial version) and its firmware will be enhanced to fully support such new signals as soon as the officially published signal interface control documentation (ICD) becomes available.
14 There is no public GLONASS L3 CDMA or Galileo E6 ICD. The current capability in the receivers is based on publicly available information. As such, Trimble cannot guarantee that these receivers will be fully compatible.
15 Detailed specifications are available at oemgnss.trimble.com
16 Also available in configurations with RTK accuracies limited to 10 and 30 centimeters.

Specifications subject to change without notice.

POSITIONING SPECIFICATIONS[3, 4, 16]

	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) on 2 m Baseline	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09
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) on 2 m Baseline	N/A	N/A	N/A	N/A	0.50	0.50	0.50	0.50

Contact your local dealer today