Trimble BD940

TRIPLE-FREQUENCY RECEIVER INTEGRATED WITH MSS BAND DEMODULATOR FOR PRECISE POSITIONING APPLICATIONS

MULTI-CONSTELLATION/ MULTI-FREQUENCY GNSS

The Trimble® BD940 supports both triple-frequency from the GPS and GLONASS constellations plus dual-frequency from BeiDou and Galileo. As the number of satellites in the constellations grow the BD940 is ready to take advantage of the additional signals. This delivers the quickest and most reliable RTK and RTX initializations for centimeter positioning. For applications that do not require centimeter accuracy the BD940 contains an advanced Kalman filter PVT engine that delivers high accuracy GNSS, DGNSS positions in the most challenging environments.

Different configurations of the module are available. These include everything from an autonomous GPS 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. The receiver also supports Fault Detection and Exclusion (FDE) and Receiver Autonomous Integrity Monitoring (RAIM) for safety-critical applications.

COMPACT FULL METAL JACKET DESIGN

The Trimble BD940 GNSS receiver module has been designed for applications requiring centimeter accuracy in a very small package. Mobile platforms can now embed proven Trimble RTK technology using a shielded module with a 51 mm x 41 mm x 7 mm form factor. The Trimble BD940 is a complete drop-in, solder-down module manufactured and tested to Trimble's highest quality standards. This design ensures the high quality GNSS signals are protected from the sources of EMI on the host platform. It also significantly reduces radiated emissions which speeds compliance certification and time to market.

TRIMBLE MAXWELL™ 7 TECHNOLOGY

Industry professionals trust Trimble embedded positioning technologies as the core of their precision applications. With the latest Trimble Maxwell™ 7 Technology, the BD940 provides assurance of long-term future-proofing and trouble-free operation. Moving the industry forward, the Trimble BD940 redefines high performance positioning:

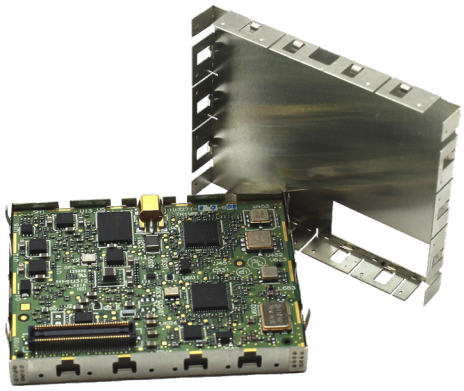
- 336 Tracking Channels
- Trimble Everest Plus™ multipath mitigation
- Advanced RF Spectrum Monitoring and Analysis
- Proven low-elevation tracking technology

FLEXIBLE INTERFACING

The Trimble BD940 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 and RS-232 are also supported. Just like other Trimble embedded technologies, easy to use software commands simplify integration and reduce development times.

Key Features

- Trimble Maxwell™ 7 Technology
- 336 Channels for multi-constellation GNSS support
- Trimble RTX and OmniSTAR Support
- EMI shielded module
- Compact design for mobile applications
- Flexible RS232, USB and Ethernet interfacing
- Centimeter-level position accuracy
- Advanced RF Spectrum Monitoring



Trimble BD940 Module

TECHNICAL SPECIFICATIONS[1]

- Trimble Maxwell™ 7 Technology
- 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
    - > RNDIS Support
- 4 x RS232 ports:
  - Baud rates up to 230,400
- Control Software:
  - HTML web browser, Internet Explorer, Firefox, Safari, Opera, Google Chrome
- 1 CAN Port (requires addition of CAN Transceiver by customer)

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

Maximum acceleration GNSS tracking ..... +/- 11g
RTK initialization time[3] ..... typically <8 seconds
- RTK initialization reliability[3] ..... >99.9%
- Position Latency[5] ..... <20ms

Maximum Position ..... 50 Hz

PHYSICAL AND ELECTRICAL CHARACTERISTICS

Size ..... 51 mm x 41 mm x 7 mm
Power ..... 3.3 VDC +5%/-3%
Typical 1.4 W (L1/L2 GPS + L1/L2 GLONASS)
Typical 2.2 W (L1/L2/L5 GPS/GLONASS/BeiDou/Galileo)
Weight ..... 27 grams
Connectors
- I/O ..... 80 pin Narrow Pitch Panasonic Socket
- GNSS Antenna ..... MMCX receptacle

Antenna LNA Power Input
- Input voltage ..... 3.3 VDC to 5 VDC
- 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 90940-XX
Module ..... Trimble BD940 GNSS available in a variety of configurations from L1 SBAS upwards
Evaluation Kit ..... Includes interface board, power supply

1 Trimble BD940 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 to 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 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 Trimble 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.
15 Also available in configurations with RTK accuracies limited to 10 and 30 centimeters.

Specifications subject to change without notice.

POSITIONING SPECIFICATIONS[3,4,14,15]

	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)	N/A	N/A	N/A	N/A
Roll/Pitch (deg)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Heading (deg)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

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