# Trimble BD935-INS

## TRIPLE FREQUENCY RECEIVER WITH INTEGRATED INERTIAL NAVIGATION SYSTEM

### GNSS AND INERTIAL TIGHT INTEGRATION

Taking advantage of Trimble's expertize in both GNSS and Inertial technology the Trimble® BD935-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. A single intuitive web interface and interface protocol allows a variety of dynamic models to be supported.

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 BD935-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 BD935-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 BD935-INS integrated GNSS-Inertial engine delivers high accuracy GNSS, DGNSS positions in the most challenging environments such as urban canyons. Different configurations 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.

The receiver also supports Fault Detection and Exclusion (FDE) and Receiver. Autonomous Integrity Monitoring (RAIM) for safety-critical applications.

### HIGH PERFORMANCE INTEGRATED INERTIAL SENSORS

The Trimble BD935-INS integrates the latest in precision inertial sensors in a compact package. With the BD935-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 influenced by magnetic field variations

### FLEXIBLE INTERFACING

The Trimble BD935-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 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

- ▶ Onboard high accuracy inertial sensor package integrated with GNSS for precise position and orientation
- ▶ 336 Channels for multi-constellation GNSS support
- ▶ EMI shielded module
- ▶ Compact design for mobile applications
- ▶ Flexible RS232, USB and Ethernet interfacing
- ▶ Centimeter-level position accuracy
- ▶ Proven Trimble Maxwell technology

# Trimble BD935-INS Module

## TECHNICAL SPECIFICATIONS[1]
- Advanced Trimble Maxwell GNSS-Inertial technology
- Advanced MEMS inertial sensors
- 336 Channels:
  - GPS: L1 C/A, L2E, L2C, L5
  - BeiDou B1, B2
  - GLONASS: L1 C/A, L2 C/A, L3 CDMA
  - Galileo[2]: E1, E5A, E5B, E5AltBOC
  - QZSS: L1 C/A, L1 SAIF, L2C, L5
  - SBAS: L1 C/A, L5
- High precision multiple correlator for GNSS pseudorange measurements
- 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
- Up to 100 Hz position, roll, pitch and heading output
- Reference outputs/inputs:
  - CMR, CMR+, sCMRx, RTCM 2.1, 2.2, 2.3, 3.0, 3.1[12]
- 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
- 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
- 2 x RS232 ports:
  - Baud rates up to 115,200
- 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 | +/-6g |
| Maximum angular rate | +/-350 deg/sec |

Maximum Operating Limits[10]
| | |
|---|---|
| Velocity | .515 m/sec |
| Altitude | |

## POSITIONING SPECIFICATIONS[3]

| Mode | Accuracy[4] | Latency[5] | Maximum Rate |
|---|---|---|---|
| Single Baseline RTK | 0.008 m + 1 ppm Horizontal | <20 ms | 100 Hz |
| (<30 km) | 0.015 m + 1 ppm Vertical<br>0.1 deg Roll & Pitch<br>0.5 deg True Heading | | |
| DGNSS | 0.25 m + 1 ppm Horizontal<br>0.50 m + 1 ppm Vertical<br>0.1 deg Roll & Pitch<br>0.5 deg True Heading | <20 ms | 100 Hz |
| SBAS[6] | 0.50 m Horizontal<br>0.85 m Vertical<br>0.1 deg Roll & Pitch<br>0.5 deg True Heading | <20 ms | 100 Hz |

RTK initialization time[3] . . . typically <1 minute
RTK initialization reliability[3] . . . >99.9%
18,000 m

## 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 BD935-INS GNSS available in a variety of configurations from L1 SBAS upwards
Evaluation Kit . . . Includes interface board, power supply

1 Trimble BD935-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 antennas and no GNSS outage. 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

Specifications subject to change without notice.
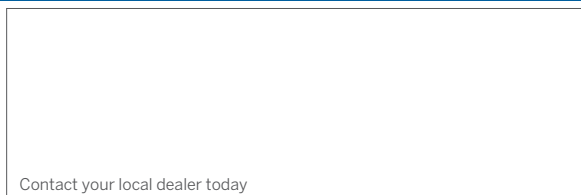
Contact your local dealer today