Trimble BD1092i

Dual antenna receiver module with integrated inertial navigation system for industrial applications

Precise positioning and orientation

The Trimble® BD1092i is a high accuracy, quad-band, dual-antenna GNSS/INS receiver module designed for applications requiring continuous centimeter level position and orientation accuracy in a board level package.

Maxwell 8 technology

The Trimble BD1092i is built around a set of hardware and software innovations that are collectively known as Trimble Maxwell™ 8 technology. At the core of the technology is the Maxwell 8 baseband GNSS ASIC (application-specific integrated circuit). This is the 8th generation ASIC in the Maxwell family featuring an architecture engineered from the silicon level up to support the most advanced Trimble jammer anti-jamming mitigation. Trimble JammerGuard™ provides continuous high accuracy and reliable positioning by actively monitoring and mitigating unwanted interference across all GNSS frequency bands. L5 Assured™ enables L5-only startup during total L1 jamming, delivering reliable RTK/RTX positioning when L1 is unavailable.

Maxwell 8 technology also incorporates advanced spoofing innovations to detect and neutralize the growing threat of fraudulent GNSS signals. By identifying these sophisticated spoofing attacks, the system prevents the receiver from calculating erroneous positions that could otherwise deviate by significant distance. The architecture leverages Trimble RTX®-NMA and Galileo OSNMA for real-time authentication of broadcast GNSS ephemeris data.

Trimble ProPoint engine

Driven by a high-performance quad-core processor, the field-proven Trimble ProPoint® positioning engine delivers accuracy, availability and integrity from the Maxwell 8 precision measurements. Tight fusion with onboard inertial sensors provides optimal performance during GNSS outages or degraded signal environments. Trimble IonoGuard™ Technology mitigates the effects of high ionospheric activity caused by solar storms, significantly increasing operational uptime. It also provides real-time diagnostics for each individual satellite for enhanced user awareness.

The Trimble ProPoint engine supports a variety of GNSS and GNSS/INS positioning modes. Depending on the availability of differential corrections (SBAS, DGNSS, RTK or RTX) the engine will gracefully transition positioning modes to deliver uninterrupted positioning and best available accuracy.

Flexible Integration

Designed for embedded industrial applications, the compact BD1092i board allows flexible hardware and software integration. Ethernet support enables rapid data throughput and remote configuration via a standard web-browser interface. It also supports USB, CAN and RS-232 serial protocols for a wide range of hardware compatibility. An intuitive, interactive web GUI simplifies complex setup tasks, including the precise input of sensor lever arms.

Key benefits

- Trimble Maxwell 8 technology
- 1400 channels for all available satellite signals
- Trimble JammerGuard jamming mitigation
- Spoofing protection including RTX-NMA and OSNMA
- Trimble ProPoint RTK/RTX positioning engine with IonoGuard
- Trimble EVEREST™ Plus Multipath mitigation
- High Accuracy MEMS inertial sensors for precise position and orientation
- 10x improvement in vibration sensitivity
- PTP high-precision timing support
- Advanced RF Spectrum® Analyzer toolkit
- Easy to integrate board form factor



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Technical specifications[1]

- Trimble Maxwell 8 technology
- Trimble JammerGuard Jamming mitigation
- Trimble ProPoint positioning engine
- Onboard Advanced MEMS inertial sensors
- Position Antenna based on 700 Channel Maxwell 8 chip:
  - GPS: L1 C/A, L1C, L2E, L2C, L5
  - BeiDou: B1, B2, B2A, B2B, B3
  - GLONASS: L1 C/A, L1P, L2 C/A, L2P, L3 CDMA
  - Galileo: E1, E5A, E5B, E5AltBOC, E6
  - IRNSS: L5
  - QZSS: L1 C/A, L1 SAIF,L1C, L2C, L5, LEX
  - SBAS: L1 C/A, L5
  - MSS L-Band: Trimble RTX
- Vector Antenna based on second 700 Channel Maxwell 8 chip:
  - GPS: L1 C/A, L2E, L2C, L5
  - BeiDou: B1, B2, B3
  - GLONASS: L1 C/A, L2 C/A, L3 CDMA
  - Galileo: E1, E5A, E5B, E5AltBOC, E6
  - 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
- Trimble RTX-NMA, Galileo OSNMA spoofing protection
- Supports Trimble CenterPoint® RTX, Trimble FieldPoint RTX and Trimble RangePoint® RTX[10]
- Galileo HAS and QZSS CLAS support
- Advanced RF Spectrum Monitoring and Analysis software
- 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, 3.2, 3.3, 3.4 (MSM)
- Navigation Outputs:
  - ASCII: NMEA-0183
  - Binary: Trimble GSOF, NMEA2000
- 1 Pulse Per Second Output
- PTP high-precision timing protocol support
- Event marker input support
- Supports Fault Detection & Exclusion (FDE), Receiver Autonomous Integrity Monitoring (RAIM)

Key features include:

- High update rate position and orientation solution
- Dual-antenna for instantaneous heading alignment
- Continuous positioning in GNSS denied environments
- Lever arm calculation from antenna to reference point of interest
- Patented anti-jamming and anti-spoofing technology
- Form, fit, and function compatible with BD99x modules

Communication

- 1 USB 2.0 Device port
- 2 LAN Ethernet ports:
  - 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)
    - NMEA, GSOF, CMR over TCP/IP or UDP
    - NTripCaster, NTripServer, NTripClient
    - mDNS/uPnP Service discovery
    - Dynamic DNS
    - Email alerts on receiver status
    - Network link to Google Earth™ mapping system
    - Support for external modems via PPP
    - RNDIS Support
    - NTP, PTP
- 3 × RS232 ports:
  - Baud rates up to 921,600
- 1 CAN Port
- WebUI for configuration, status and data transfer
- ROS 1 and ROS 2 drivers available

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Ordering information	
Module Number	210923-XX
Upgrades	Software options including: Accuracy level, Update rate, Heading and INS
Evaluation Kit	Includes interface board, power supply

Performance specifications	
Time to First Fix (TTFF)[5]	
Cold Start[6]	<45 seconds
Warm Start[7]	<30 seconds
Signal Re-acquisition	<2 seconds
Velocity accuracy[2]	
Horizontal	0.007 m/sec
Vertical	0.020 m/sec
Maximum acceleration GNSS tracking	
	±11 g
Inertial sensors	
Maximum acceleration	±8 g
Maximum angular rate	±300 deg/sec
Maximum Operating Limits[8]	
Velocity	600 m/sec
Altitude	18,000 m
Positioning	
RTK initialization time[2]	typically <8 seconds
RTK initialization reliability[2]	<99.9 %
Position latency[3]	<20 ms
Maximum position/ attitude update rate	100 Hz

Physical and electrical characteristics	
Size (L × H × D)	100 mm × 60 mm × 11.6 mm
Power	3.3 VDC +5%/-3%, Typical 5.4 W (L1 GNSS)
Weight	60 grams
Connectors	
I/O	44-pin header, 14-pin socket, 10-pin socket
GNSS Antenna	2 x 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[9]	
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

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Positioning specifications[2, 10] No GNSS Outages	Autonomous	SBAS[4]	DGNSS	RTK	INS-Autonomous	INS-SBAS	INS-DGNSS	INS-RTK
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)[11]	0.10	0.10	0.10	0.10	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

Positioning specifications[2, 10] 10 second GNSS Outages	Autonomous	SBAS[4]	DGNSS	RTK	INS-Autonomous	INS-SBAS	INS-DGNSS	INS-RTK
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)[11]	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

1 Trimble BD1092i is available in a variety of software configurations. Specifications shown reflect full capability.
2 May be affected by atmospheric conditions, signal multipath, and satellite geometry. Initialization reliability is continuously monitored to ensure highest quality. 1 sigma level, when using Trimble Zephyr™ 2/3 antennas, Add 1 ppm for RTK position accuracies.
3 At maximum output rate.
4 GPS only and depends on SBAS System performance. FAA WAAS accuracy specifications are <5 m 3DRMS.
5 Typical observed values.
6 No previous satellite (ephemerides / almanac) or position (approximate position or time) information.
7 Ephemerides and last used position known.
8 Regulated by US State Department International Traffic in Arms Regulations' (ITAR) Munitions List, and the Missile Technology Control Regime (MTCR).
9 Dependent on appropriate mounting/enclosure design.
10 Detailed specifications are available at oemgnss.trimble.com
11 Pitch and roll available in INS positioning modes. Pitch or roll in non INS modes.

Specifications subject to change without notice.

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