# Trimble AX940i

## GNSS TRIPLE-FREQUENCY SMART ANTENNA WITH INTEGRATED INERTIAL NAVIGATION SYSTEM

### GNSS AND INERTIAL TIGHT INTEGRATION

Taking advantage of Trimble's expertize in both GNSS and Inertial technology the Trimble® AX940i 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 using the advanced Trimble ProPoint™ positioning engine.

The receiver is also ideal for use as a GNSS DGPS/RTK base station.

### MULTI CONSTELLATION GNSS

The Trimble AX940i 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 AX940i 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 AX940i 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.

With the option of utilizing OmniSTAR or RTX services with Integrity Monitoring, the AX940i delivers varying levels of performance down to centimeter-level without the use of a base station or cell modem.

### HIGH PERFORMANCE INTEGRATED INERTIAL SENSORS

The Trimble AX940i integrates the latest in precision inertial sensors in a compact package.

With the AX940i 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 environment

► Lever arm calculation from antenna to navigation point of interest

► Robust moving baseline RTK for precision landing on moving platform

► Single-antenna heading not influenced by magnetic field variations

### FLEXIBLE INTERFACING

The Trimble AX940i 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.

### RUGGED PACKAGE

The unit comes in an environmentally sealed enclosure that is very easy to install. The unit is rigorously tested to perform in harsh environmental conditions with the reliability you expect from Trimble.

## Key Features

► Trimble Maxwell™ 7 Technology

► Trimble ProPoint™ positioning engine

► 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

► Rugged IP67 Smart Antenna

► Compact design for mobile applications

► Flexible RS232, USB, CAN and Ethernet interfacing

► Centimeter-level position accuracy

► Advanced RF Spectrum Monitoring

► Integrated WiFi, Bluetooth

**⊕ Trimble.**

# Trimble AX940i Smart Antenna

## TECHNICAL SPECIFICATIONS[1]
- Trimble Maxwell™ 7 Technology
- Trimble ProPoint™ positioning engine
- On-board Advanced MMS inertial sensors
- 336 Tracking Channels:
  - GPS: L1 C/A, L2E, L2C, L5
  - BeiDou: B1, B2
  - GLONASS: L1 C/A, L2 C/A, L3 CDMA[2]
  - Galileo[3]: 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 3.0, 3.1[4], 3.2, 3.3
- 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
- 2 x RS232 ports:
  - Baud rates up to 460,800
- 1 CAN Port
- Control Software:
  - HTML web browser, Internet Explorer, Firefox, Safari, Opera, Google Chrome
- Bluetooth, fully integrated, fully sealed 2.4 GHz communication port
- WiFi, 802.11 b/g, access point and client mode, WPA / WPA2 / WEP64 / WEP128 encryption

## PERFORMANCE SPECIFICATIONS
Time to First Fix (TTFF)[5]
Cold Start[6] . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . <60 seconds
Warm Start[7] . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . <30 seconds
Signal Re-acquisition . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .<5 seconds
Velocity Accuracy[8,9]
Horizontal . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .0.007 m/sec
Vertical . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 0.020 m/sec
Maximum acceleration GNSS tracking. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . +/- 11g
Inertial Sensors
Maximum accelerations . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . ±6 g
Maximum angular rate . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . ±350 deg/sec
Maximum Operating Limits[10]
Velocity . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .515 m/sec
Altitude . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .18,000 m
RTK initialization time[8]. . . . . . . . . . . . . . . . . . . . . . . . . . . typically <10 seconds
RTK initialization reliability[8]. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . >99.9%
Position Latency[11] . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . <20ms
Maximum Position/Attitude Update Rate. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 100 Hz

## PHYSICAL AND ELECTRICAL CHARACTERISTICS
Size. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 221 mm x 218 mm x 52 mm
Power. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 9 VDC to 28 VDC
Typical 3.0 W (L1/L2 GPS + L1/L2 GLONASS)
Weight . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .0.66 kg
Connectors
I/O. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 26-pin Tyco SUPERSEAL

## ENVIRONMENTAL CHARACTERISTICS[12]
Temperature
Operating . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .−40 °C to +70 °C
Storage . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . −40 °C to +80 °C
Vibration . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 9.8 gRMS operating
Mechanical shock. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . MIL810D
±40 g 10ms operating
±75 g 6ms survival
Operating Humidity . . . . . . . . . . . . . . . . . . . . .5% to 95% R.H. non-condensing, at +60 °C
IP Rating . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . IP67

## ORDERING INFORMATION
Smart Antenna Part Number . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .129401-XX
Smart Antenna . . . . . . . . . . . . . . . . . . . . . . . . . . Trimble AX940i GNSS available in a variety of
configurations from L1 SBAS upwards

1  Trimble AX940i is available in a variety of software configurations. Specifications shown reflect full capability.
2  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.
3  Developed under a License of the European Union and the European Space Agency.
4  Input only network correction
5  Typical observed values (95%).
6  No previous satellite (ephemerides / almanac) or position (approximate position or time) information.
7  Ephemerides and last used position known
8  May be affected by atmospheric conditions, signal multipath, and satellite geometry. Initialization reliability is continuously monitored to ensure highest quality.
9  1 sigma level add 1 ppm for RTK position accuracies.
10 As required by the U.S. Department of Commerce to comply with export licensing restrictions.
11 At maximum output rate.
12 Dependent on appropriate mounting design.
13 Also available in configurations with RTK accuracies limited to 10 and 30 centimeters.
14 Trimble RTX and OmniSTAR accuracies depend on correction service chosen.

Specifications subject to change without notice.

## POSITIONING SPECIFICATIONS [8,13,14]

| | 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 |

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