Trimble R12i
GNSS SYSTEM

KEY FEATURES

► Trimble® Inertial Platform™ (TIP) technology. Calibration-free and magnetically immune IMU-based tilt compensation for topo measurements and stakeout.
► Trimble ProPoint™ GNSS positioning engine. Engineered for improved accuracy and productivity in challenging GNSS conditions.
► 672-channel solution with Trimble 360 satellite tracking technology
► CenterPoint® RTX correction service delivers fast, RTK level accuracy worldwide via satellite/IP
► Trimble xFill® correction outage technology
► Optimized for Trimble Access™ field software
► Android™ and iOS platform support
► Cellular, Bluetooth®, Wi-Fi data connectivity
► Military-spec rugged design and IP-67 rating
► Ergonomic form factor
► All day battery with built-in status indicator
► 6 GB internal memory
► Supports augmented reality capabilities through Trimble SiteVision™

Learn more: geospatial.trimble.com/R12i
### Performance Specifications

**GNSS Measurements**

- Constellation agnostic, flexible signal tracking, improved positioning in challenging environments\(^1\) and improved measurement and stakeout productivity and traceability with Trimble TIP\(^\circ\) technology.
- Advanced Trimble Custom Survey GNSS chips with 672 channels.
- Reduced downtime due to loss of radio signal or cellular connectivity with Trimble xFill technology.

Signals tracked simultaneously:
- **GPS:** L1C, L1C/A, L2C, L2E, L5
- **GLONASS:** L1C/A, L1P, L2/C/A, L2P, L3
- **SBAS (WAAS, EGNOS, GAGAN, MSAS):** L1C/A, L5
- **Galileo:** E1, E5A, E5, E6
- **BeiDou:** B1, B1C, B2, B2A, B2B, B3
- **QZSS:** L1C/A, L1S, L1C, L1C, L5, L5
- **NavIC (IRNSS):** L5
- **L-band:** Trimble RTX\(^\circ\) Corrections

- Iridium filtering above 1616 MHz allows antenna to be used up to 20 m away from an iridium transmitter.
- Japanese LTE filtering below 1510 MHz allows antenna to be used up to 100 m away from a Japanese LTE cell tower.

- Digital Signal Processor (DSP) techniques to detect and recover from spoofed GNSS signals.
- Advanced Receiver Autonomous Integrity Monitoring (RAIM) algorithm to detect and reject problem satellite measurements to improve position quality.
- Improved protection from erroneous ephemeris data.

**Positioning Performance**

#### Static GNSS Surveying

<table>
<thead>
<tr>
<th>Type</th>
<th>Horizontal</th>
<th>Vertical</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Precision Static</td>
<td>3 mm + 0.1 ppm RMS</td>
<td>3.5 mm + 0.4 ppm RMS</td>
</tr>
<tr>
<td>Static and Fast Static</td>
<td>3 mm + 0.5 ppm RMS</td>
<td>5 mm + 0.5 ppm RMS</td>
</tr>
</tbody>
</table>

#### Real Time Kinematic Surveying

- Single Baseline <30 km
  - Horizontal: 8 mm + 1 ppm RMS
  - Vertical: 15 mm + 1 ppm RMS

- Network RTK\(^4\)
  - Horizontal: 8 mm + 0.5 ppm RMS
  - Vertical: 15 mm + 0.5 ppm RMS

- RTK start-up time for specified precisions\(^5\)
  - 2 to 8 seconds

#### Trimble Inertial Platform (TIP) Technology

- **TIP Compensated Surveying\(^6\)**
  - Horizontal: RTK + 5 mm + 0.4 mm/° tilt (up to 30°) RMS
  - Horizontal: RTX + 5 mm + 0.4 mm/° tilt (up to 30°) RMS

- **IMU Integrity Monitor**
  - Bias monitoring: Temperature, age and shock

#### Trimble RTX Correction Services

- **CenterPoint RTX\(^7\)**
  - Horizontal: 2 cm RMS
  - Vertical: 5 cm RMS
  - RTX convergence time for specified precisions in Trimble RTX Fast regions: < 1 min
  - RTX convergence time for specified precisions in non RTX Fast regions: < 15 min
  - RTX QuickStart convergence time for specified precisions: < 1 min

- **Trimble xFill\(^8\)**
  - Horizontal: RTK\(^\circ\) + 10 mm/minute RMS
  - Vertical: RTK\(^\circ\) + 20 mm/minute RMS

- **Trimble xFill Premium\(^8\)**
  - Horizontal: 3 cm RMS
  - Vertical: 7 cm RMS

#### Code Differential GNSS Positioning

- Horizontal: 0.25 m + 1 ppm RMS
- Vertical: 0.50 m + 1 ppm RMS
- SBAS\(^9\): typically < 5 m}

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\(^1\) Increased measurement and stakeout productivity and traceability with Trimble TIP\(^\circ\) technology.

\(^2\) TIP Compensated Surveying.

\(^3\) Includes RTX\(^\circ\) and xFill technologies.

\(^4\) Includes CenterPoint RTX and xFill technologies.

\(^5\) Specific RTK start-up times based on specified accuracies.

\(^6\) Includes RTX and xFill technologies.

\(^7\) Includes RTX and xFill technologies.

\(^8\) Includes RTX and xFill technologies.

\(^9\) Includes RTX and xFill technologies.
## HARDWARE

### PHYSICAL

<table>
<thead>
<tr>
<th>Dimensions (W×H)</th>
<th>11.9 cm x 13.6 cm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight</td>
<td>1.12 kg with internal battery, internal radio with UHF antenna, 3.95 kg items above plus range pole, Trimble TSC7 controller &amp; bracket</td>
</tr>
</tbody>
</table>

### Temperature

<table>
<thead>
<tr>
<th>Type</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating</td>
<td>−40 °C to +65 °C</td>
</tr>
<tr>
<td>Storage</td>
<td>−40 °C to +75 °C</td>
</tr>
</tbody>
</table>

### Humidity

| Condition     | 100%, condensing |

### Ingress protection

<table>
<thead>
<tr>
<th>Standard</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>IP67</td>
<td>Dustproof, protected from temporary immersion to depth of 1 m</td>
</tr>
</tbody>
</table>

### Shock and vibration (Tested and meets the following environmental standards)

<table>
<thead>
<tr>
<th>Condition</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shock</td>
<td>Non-operating: Designed to survive a 2 m pole drop onto concrete. Operating: to 40 G, 10 msec, sawtooth</td>
</tr>
<tr>
<td>Vibration</td>
<td>MIL-STD-810F, FIG.514.5C-1</td>
</tr>
</tbody>
</table>

### ELECTRICAL

#### Power

<table>
<thead>
<tr>
<th>Type</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>11 to 24 V DC external power input with over-voltage protection on Port 1 and Port 2 (7-pin Lemo)</td>
<td>Rechargeable, removable 7.4 V, 3.7 Ah Lithium-ion smart battery with LED status indicators</td>
</tr>
</tbody>
</table>

#### Operating times on internal battery

<table>
<thead>
<tr>
<th>Type</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>450 MHz receive only option</td>
<td>6.5 hours</td>
</tr>
<tr>
<td>450 MHz receive/transmit option (0.5 W)</td>
<td>6.0 hours</td>
</tr>
<tr>
<td>450 MHz receive/transmit option (2.0 W)</td>
<td>5.5 hours</td>
</tr>
<tr>
<td>Cellular receive option</td>
<td>6.5 hours</td>
</tr>
</tbody>
</table>

### COMMUNICATIONS AND DATA STORAGE

#### Serial

<table>
<thead>
<tr>
<th>Type</th>
<th>3-wire serial (7-pin Lemo)</th>
</tr>
</thead>
</table>

#### USB v2.0

<table>
<thead>
<tr>
<th>Type</th>
<th>Supports data download and high speed communications</th>
</tr>
</thead>
</table>

#### Radio modem

<table>
<thead>
<tr>
<th>Type</th>
<th>Fully Integrated, sealed 450 MHz wide band receiver/transmitter with frequency range of 403 MHz to 473 MHz, support of Trimble, Pacific Crest, and SATEL radio protocols:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transmit power</td>
<td>2 W</td>
</tr>
<tr>
<td>Range</td>
<td>3–5 km typical / 10 km optimal¹⁰¹</td>
</tr>
</tbody>
</table>

#### Cellular

<table>
<thead>
<tr>
<th>Type</th>
<th>Integrated, 3.5 G modem, HSDPA 7.2 Mbps (download), GPRS multi-slot class 12, EDGE multi-slot class 12, Penta-band UMTS/HSDPA (WCDMA/FDD) 800/850/900/1900/2100 MHz, Quad-band EGSM 850/900/1800/1900 MHz, GSM CSD, 3GPP LTE</th>
</tr>
</thead>
</table>

#### Bluetooth

| Type          | Version 4.1¹¹¹                                    |

#### Wi-Fi

| Type          | 802.11 b.g, access point and client mode, WPA/WPA2/WEP64/WEP128 encryption |

#### I/O ports

| Type          | Serial, USB, TCP/IP, IBSS/NTRIP, Bluetooth |

#### Data storage

| Type          | 6 GB internal memory |

#### Data format

<table>
<thead>
<tr>
<th>Type</th>
<th>CMR+, CMRx, RTCM 2.1, RTCM 2.3, RTCM 3.0, RTCM 3.1, RTCM 3.2 input and output</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>24 NMEA outputs, GSOF, RT17 and RT27 outputs, 1 PPS output</td>
</tr>
</tbody>
</table>

### WEBUI

<table>
<thead>
<tr>
<th>Type</th>
<th>Offers simple configuration, operation, status, and data transfer</th>
</tr>
</thead>
</table>

### SUPPORTED CONTROLLERS & FIELD SOFTWARE

<table>
<thead>
<tr>
<th>Type</th>
<th>Trimble TSC7, Trimble T10, Trimble T7, Android and iOS devices running supported apps</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Trimble Access 2020.10 or later</td>
</tr>
</tbody>
</table>

### AUGMENTED REALITY

| Type          | Supports outdoor augmented reality capabilities through Trimble SiteVision running on the Trimble TSC7 controller |

### CERTIFICATIONS

| Type          | FCC Part 15 (Class B device), 24, 32; CE Mark; RCM; PTCRB; BT SIG |

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¹¹¹ Tested and meets the following environmental standards.
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Specifications subject to change without notice.

1 Challenging GNSS environments are locations where the receiver has sufficient satellite availability to achieve minimum accuracy requirements, but where the signal may be partly obstructed by terrain, buildings, and other objects. Actual results may vary based on user’s geographic location and atmospheric activity, satellite availability, GNSS constellation health and availability, and level of multipath and signal occlusion.

2 The current capability in the receiver is limited by the size of the data buffer used to determine if the satellite data is complete. For full performance, it is recommended that an external 6 Ah or higher battery is used.

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5 Tracking GPS, GLONASS and SBAS satellites.

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7 Varies with temperature and wireless data rate. When using a receiver and internal radio in the transmit mode, it is recommended that an external 6 Ah or higher battery is used.

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10 Tracking GPS, GLONASS and SBAS satellites.

11 Receiver will operate normally to –40 °C, internal batteries are rated from –20 °C to +50 °C (ambient +50 °C).

12 Tracking GPS, GLONASS and SBAS satellites.

13 Varies with temperature and wireless data rate. When using a receiver and internal radio in the transmit mode, it is recommended that an external 6 Ah or higher battery is used.

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