DATASHEET

Trimble R780

GNSS System

CERTIFICATIONS	
	FCC Part 15 Subpart B (Class B Device), Part 15.247, Part 90
	Canadian ICES-003 (Class B), RSS-GEN, RS-102, RSS-247
	IEC62368-1 2nd Edition
	CISPR 32, EN 55032, EN55035
	RCM mark, AS/CISPR 32, AS/NZS 4768
	Japan MIC
	CE mark, Radio Equipment Directive (RED 2014/53/EU)
	RoHS compliance
	WEEE compliance
TRIMBLE PROTECTED PROTECTION PLANS	
	Add a Trimble Protected protection plan for worry-free ownership over and above the standard Trimble product warranty. Added enhancements include coverage for wear & tear, environmental damage, and more. Accidental damage is covered with Premium plans, available only at point-of-sale in selected regions. For details, visit **trimbleprotected.com** or contact a local Trimble distributor.

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 and/or reflected off of trees, buildings, and other objects. Actual results may vary based on user's geographic location and atmospheric activity, scintillation levels, GNSS constellation health and availability, and level of multipath and signal occlusion.
2 The current capability in the receivers is based on publicly available information. As such, Trimble cannot guarantee that these receivers will be fully compatible with a future generation of Galileo satellites or signals.
3 Precision and reliability may be subject to anomalies due to multipath, obstructions, satellite geometry, and atmospheric conditions. The specifications stated recommend the use of stable mounts in an open sky view, EMI and multipath clean environment, optimal GNSS constellation configurations, along with the use of survey practices that are generally accepted for performing the highest-order surveys for the applicable application including occupation times appropriate for baseline length. Baselines longer than 30 km require precise ephemeris and occupations up to 24 hours may be required to achieve the high precision static specification.
4 Network RTK PPM values are referenced to the closest physical base station.
5 May be affected by atmospheric conditions, signal multipath, obstructions and satellite geometry. Initialization reliability is continuously monitored to ensure highest quality.
6 TIP references the overall positioning error estimate at the tip of the surveying pole throughout the tilt compensation range. RTK refers to the estimated horizontal precision of the underlying GNSS position, which is dependent on factors that affect GNSS solution quality. The 8 mm constant error component accounts for residual misalignment between the vertical axes of the receiver and the built-in Inertial Measurement Unit (IMU) after factory calibration, assuming the receiver is mounted on a standard 2 m carbon fiber range pole which is properly calibrated and free from physical defects. The tilt-dependent error component is a function of the quality of the computed tilt azimuth, which is assumed here to be aligned using optimal GNSS conditions. For best IMU tilt compensated results, perform a pole bias adjustment.
7 RMS performance based on repeatable in field measurements. Achievable accuracy and initialization time may vary based on type and capability of receiver and antenna, user's geographic location and atmospheric activity, scintillation levels, GNSS constellation health and availability and level of multipath including obstructions such as large trees and buildings.
8 Accuracies are dependent on GNSS satellite availability. xFill positioning without an xFill Premium subscription ends after 5 minutes of radio downtime. xFill Premium will continue beyond 5 minutes providing the solution has converged, with typical precisions not exceeding 3 cm horizontal, 7 cm vertical. xFill is not available in all regions, check with your local sales representative for more information.
9 RTK refers to the last reported precision before the correction source was lost and xFill started.
10 Depends on SBAS system performance.
11 Receiver will operate normally to -40 °C, internal batteries are rated from -20 °C to +60 °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.

Specifications subject to change without notice.

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GNSS SYSTEM

Highly accurate GNSS receiver built to handle the toughest survey environments.

Key features

- Configurable receiver, scalable for future requirements.
- Available in base & rover, rover only, or base only configurations.
- Trimble® Inertial Platform™ (TIP™) technology for magnetically immune IMU-based tilt compensation.
- Trimble ProPoint® GNSS positioning engine for improved accuracy and productivity in challenging GNSS conditions.
- Trimble Maxwell™ 7 GNSS ASIC.
- 9 GB internal memory.
- Trimble xFill® correction outage technology.
- Supports Trimble CenterPoint® RTX corrections for RTK level accuracy worldwide via satellite/IP.
- Military-grade ultra-rugged design, IP68 rating.
- Optimized for Trimble Access™ field software.

Find out more at:
geospatial.trimble.com/R780

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PERFORMANCE SPECIFICATIONS		
GNSS TECHNOLOGY		
	Constellation agnostic, flexible signal tracking, improved positioning in challenging environments[1] and inertial measurement integration with Trimble ProPoint GNSS technology	
	Increased measurement and stakeout productivity and traceability with Trimble TIP™ technology IMU-based tilt compensation	
	Trimble RTX® worldwide corrections	
	Advanced Trimble Maxwell 7 technology	
	Trimble EVEREST™ Plus multipath signal rejection	
	Spectrum Analyzer to troubleshoot GNSS jamming	
	Anti-spoofing capabilities	
	Japanese LTE Filtering below 1510 MHz allows antennas to be used 100 m away from Japanese LTE cell tower	
	Iridium Filtering above 1616 MHz allows the antenna to be used 20 m away from Iridium transfer	
SATELLITE TRACKING		
	GPS: L1C, L1 C/A, L2E (L2P), L2C, L5	
	GLONASS: L1C/A, L1P, L2C/A, L2P, L3	
	Galileo: E1, E5A, E5B and E5AltBOC, E6[2]	
	BeiDou: B1, B2, B3, B1C, B2A	
	QZSS: L1 C/A, L1C, L1S, L2C, L5, LEX/L6	
	IRNSS: L5	
	SBAS: L1 C/A (EGNOS/MSAS GAGAN/SDCM), L1 C/A and L5 (WAAS)	
	L-Band: Trimble RTX	
POSITIONING PERFORMANCE[3]		
STATIC GNSS SURVEYING		
High-Precision Static		
	Horizontal	3 mm + 0.1 ppm RMS
	Vertical	3.5 mm + 0.4 ppm RMS
Static and Fast Static		
	Horizontal	3 mm + 0.5 ppm RMS
	Vertical	5 mm + 0.5 ppm RMS
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 + 8 mm + 0.5 mm/° tilt (up to 30°) RMS
	Horizontal	RTX + 8 mm + 0.5 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	< 3 min
	RTX QuickStart convergence time for specified precisions	< 5 min
TRIMBLE xFILL[8]		
	Horizontal	RTK[9] + 10 mm/minute RMS
	Vertical	RTK[9] + 20 mm/minute RMS
TRIMBLE xFILL PREMIUM[8]		
	Horizontal	3 cm RMS
	Vertical	7 cm RMS

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POSITIONING PERFORMANCE[3] Cont.		
CODE DIFFERENTIAL GNSS POSITIONING		
	Horizontal	0.25 m + 1 ppm RMS
	Vertical	0.50 m + 1 ppm RMS
	SBAS[10]	Typically < 5 m 3DRMS

HARDWARE		
PHYSICAL		
Dimensions (W×H)	13.9 cm x 13 cm (5.5 in x 5.1 in) including connectors	
Weight	1.55 kg (3.42 lb) receiver only including radio and battery	
Temperature[11]		
	Operating	-40 °C to +65 °C (-40 °F to +149 °F)
	Storage	-40 °C to +75 °C (-40 °F to +167 °F)
Humidity		100%, condensing
Ingress protection		IP68 Certified per IEC-60529: waterproof/dustproof (1 m submersion for 1 hour)
Shock and vibration		
	Pole drop	Designed to survive a 2 m (6.6 ft) pole drop onto concrete
	Shock	Non-operating: 75 Gs at 6msec
	Shock	Operating: 40 Gs at 10msec
	Vibration	Mil-Std-810G, FIG 514.6E-1 Cat 24, Mil-Std-202G, FIG 214-1, Condition D
ELECTRICAL		
	Internal	Rechargeable, removable Lithium-ion battery in internal battery compartment
		Internal battery operates as a UPS during an ext power source failure
		Internal battery will charge from external power source as long as source can support the power drain and is more than 11.8 VDC
		Integrated charging circuitry
	External	External power input with over-voltage protection on Port 1 (7-pin Lemo 2-key) Minimum 10.8 V, Maximum 28 VDC, shutdown optimized for 12 V lead acid battery operation
		Power source supply (Internal/External) is hot-swap capable in the event of power source removal or cut off
		DC external power input with over-voltage protection on Port 1 (Lemo)
		Receiver automatically turns on when connected to external power
	Power consumption	3.2 W in rover mode with internal receive radio[12]
		5.2 W in base mode with internal 0.5 W transmit radio
Operating times on internal battery[13]		
	Rover	5.5 hours; varies with temperature
	Base station	5.5 hours; varies with temperature
	450 MHz systems	Approximately 4 hours; varies with temperature
	900 MHz systems	Approximately 4 hours; varies with temperature

COMMUNICATIONS AND DATA STORAGE	
Lemo (Serial 1)	7-pin Lemo 2-key, Power Input, USB. Optional USB to RS232 serial cable. Receiver supports RNDIS communications over USB
Wi-Fi	Client or Access Point. Receive or transmit corrections. Wi-Fi b/g/n
Bluetooth® wireless technology	Fully-integrated sealed 2.4 GHz Bluetooth module
Integrated radios (optional)	Fully-integrated, fully-sealed internal 403-473 MHz; Internal 900 MHz; Rx/Tx
Channel spacing (450 MHz)	12.5 kHz or 25 kHz spacing available
Sensitivity (450 MHz)	-114 dBm (12 dB SINAD)
450 MHz output power	0.5 W, 2.0 W, depending on the local required licensing.
Frequency approvals (403-473 MHz)	Worldwide, depending on the local required licensing.
Positioning rates	1 Hz, 2 Hz, 5 Hz, 10 Hz, and 20 Hz
Data storage	9 GB internal data logging. Moving base and heading
Data format	CMR+, CMRx, RTCM 2.1, RTCM 2.3, RTCM 3.0, RTCM 3.1, RTCM 3.2 input and output 24 NMEA outputs, GSOF, RT17, and RT27 outputs