

DATASHEET & HARDWARE MANUAL

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BASE-X5A

Multi-Band RTK GPS GNSS Receiver Module

Product No. QM5002B — dual-role base/rover RTK receiver with integrated industrial-grade IMU

GNSS CONSTELLATIONS

GPS · GLONASS · Galileo · BeiDou · QZSS · SBAS · IRNSS

POSITIONING MODES

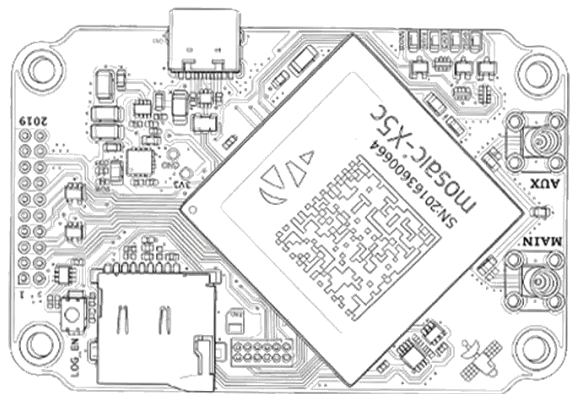
StandAlone, DGPS, SBAS, RTK (Base/Rover), PPP

INTERFACES

Micro-USB · TTL UART · MMCX · TF-Card · PPS/Event

DATA FORMATS

NMEA-0183 · RTCMv2/v3 · SBF



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About This Manual

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Safety and Warning Instructions

This manual outlines the commissioning, installation, and operation of the BASE-X5A (QM5002B) Multi-Band RTK GPS GNSS Receiver Module.

- This equipment may only be used for the purpose specified by the manufacturer.
- This manual should be kept accessible.
- Illegal changes and the use of spare parts as well as accessories that have not been sold or recommended by the manufacturer of this unit can cause operational failures or hazards. Such measures lead to an exclusion of liability, and the manufacturer accepts no responsibility.
- Repairs may only be carried out by the manufacturer or accredited distributor/re-seller.
- Basis for the guarantee of the manufacturer is the version of the warranty policy for the unit at the time of purchase. No liability is accepted for inappropriate, incorrect manual or automatic setting of parameters, or improper use.
- The distributor/re-seller is responsible for ensuring that the device is assembled and integrated according to recognised technical guidelines as well as valid regulations in the country of use.

Contents

- 1. Introduction Summary 4**
- 2. Product Overview & Technology 5**
 - Dual-Role Multi-Band RTK Receiver for Base and Rover Deployment 5
 - Key Components 5
- 3. Technical Data & Specifications 6**
 - Interfaces, Data Formats & Logging 6
 - Timing & Interference Mitigation 6
 - Configuration & Persistent Settings 6
- 4. Field-Proven Advantages 7**
- 5. Interfaces & UART Pinout 8**
 - UART Communication 8
- 6. Configuration & Operation 10**
 - Base and Rover Roles 10
- 7. Timing & Event Synchronisation 11**
- 8. Target Applications 12**
- 9. Ordering, Shipping & Support 13**

1. Introduction Summary

This datasheet and hardware manual outlines the technical characteristics, interfaces, configuration paths and integration guidelines for the BASE-X5A (QM5002B) Multi-Band RTK GPS GNSS Receiver Module. It collects the published product datasheet together with the information needed to commission the module — specifications, connector pinout, configuration interfaces, timing and event synchronisation, target applications and support terms — so that an integrator can design the module in and bring it into service from one document.

2. Product Overview & Technology

Dual-Role Multi-Band RTK Receiver for Base and Rover Deployment

The BASE-X5A (QM5002B) is a dual-role positioning module: the same board runs as a local base station broadcasting RTCMv3 corrections, or as a rover consuming CORS corrections over NTRIP. Both roles share one multi-constellation engine that tracks GPS, GLONASS, Galileo, BeiDou and QZSS across L1/L2/L5 and holds RTK-Fixed status while the machine is moving.

Integration is deliberately open. Observation and correction data leave the module as NMEA-0183, SBF or RTCM, and dual-virtual-COM micro-USB, Ethernet and multiple 3.3 V TTL UARTs connect straight to mainstream flight controllers and industrial MCUs. An industrial-grade IMU with dynamic sensor fusion keeps heading and position usable when satellites drop out, while wide-band interference mitigation with three automatic notch filters and code/carrier-phase multipath suppression keep the solution stable in harsh RF. Configurable 1PPS output and external event triggers time-stamp position snapshots for multi-sensor alignment.

Key Components

- L1/L2/L5 multi-band
- Full-constellation (GPS/GLONASS/Galileo/BeiDou/QZSS)
- RTK-Fixed & RTCMv3 base output
- NTRIP / CORS rover mode
- Integrated industrial-grade IMU
- Hardware anti-interference & multipath suppression
- 1PPS + event sync
- micro-USB + Ethernet + 3.3 V TTL UART
- TF-card offline logging

3. Technical Data & Specifications

Parameter	Value	Note
Supported Constellations	GPS, GLONASS, Galileo, BeiDou, QZSS, SBAS, IRNSS	Multi-constellation reception for reliable positioning in challenging environments
Positioning Modes	StandAlone, DGPS, SBAS, RTK (Base/Rover), PPP	From single-point to RTK-Fixed centimeter-level positioning

Interfaces, Data Formats & Logging

Parameter	Value	Note
Interfaces	Micro-USB · TTL UART · MMCX · TF-Card · PPS/Event	Micro-USB (2 virtual COM + Ethernet); multiple 3.3V TTL UARTs; MMCX antenna; TF-Card slot; PPS & event IO
Data Formats	NMEA-0183, RTCMv2/v3, SBF	SBF convertible to RINEX / ASCII / KML for post-processing

Timing & Interference Mitigation

Parameter	Value	Note
Timing	Configurable 1PPS	Selectable GNSS time reference source for synchronization
Interference Mitigation	WBI + 3 notch filters	Wide-band interference mitigation, auto notch filters, code & carrier-phase multipath mitigation

Configuration & Persistent Settings

Parameter	Value	Note
Configuration	RxControl · Web UI · CLI	Web UI (192.168.3.1), RxControl and command console; persistent boot config

4. Field-Proven Advantages

Multi-frequency, multi-constellation high-precision GNSS evaluation platform with full RTK capability, hardware anti-interference, and a complete host-side toolchain.

- **Full-Constellation GNSS:** GPS, GLONASS, Galileo, BeiDou, QZSS and more — with Stand-Alone, DGPS, SBAS, RTK and PPP positioning modes.
- **RTK Base & Rover:** Operates as a base station outputting RTCMv3 corrections, or as a rover with CORS via NTRIP for centimeter-level RTK-Fixed positioning.
- **Multi-Format Output:** Configurable NMEA-0183, proprietary SBF raw observations and RTCM corrections — plus TF-Card offline logging.
- **Hardware Anti-Interference:** Wide-band interference mitigation, 3 auto notch filters and code/carrier-phase multipath suppression for harsh environments.
- **Timing & Event Sync:** Configurable 1PPS output and external event triggers to tag position snapshots for multi-sensor time alignment.
- **Rich Interfaces:** Micro-USB dual virtual COM + Ethernet, multiple 3.3V-TTL UARTs for direct MCU and flight-controller integration.

5. Interfaces & UART Pinout

Micro-USB, 3.3 V TTL UART, MMCX antenna, TF-Card slot and PPS/Event pins. Data leaves the module as NMEA-0183, RTCMv2/v3 or SBF raw observations. The micro-USB connection provides two virtual COM ports and an Ethernet interface; multiple 3.3 V TTL UARTs are available for direct MCU and flight-controller integration.

UART Communication

Pin	Signal
Pin 1	EventB_3V3
Pin 2	VDD
Pin 3	D-
Pin 4	D+
Pin 5	ADV_M_RST
Pin 6	COM3_TX
Pin 7	COM3_RX
Pin 8	COM4_TX
Pin 9	EventA_3V3
Pin 10	NC
Pin 11	COM1_TX
Pin 12	COM1_RX
Pin 13	COM2_TX
Pin 14	COM2_RX
Pin 15	NC
Pin 16	GPLED
Pin 17	GND
Pin 18	GND
Pin 19	PPS0_3V3
Pin 20	COM4_RX

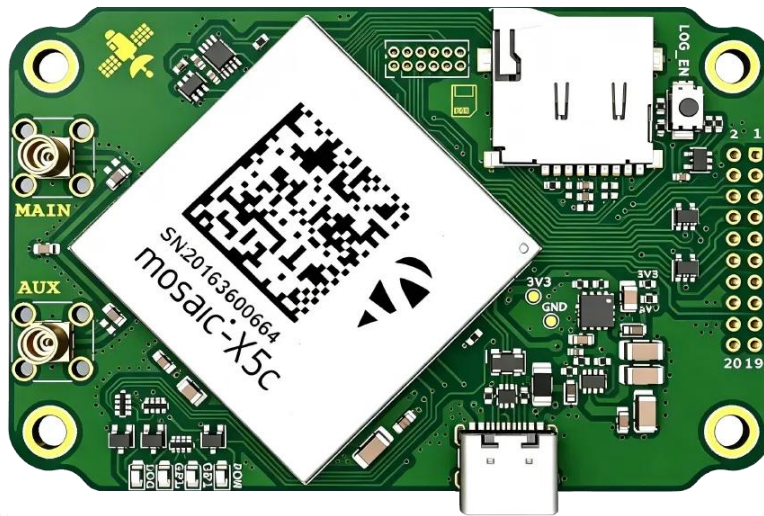


Figure 2 — BASE-X5A board outline and connector positions

6. Configuration & Operation

The module is configured through RxControl, the built-in web UI or the command-line interface, and the configuration persists across reboots. The web UI is reached at the module's own address (192.168.3.1); RxControl and the command console expose the same settings and allow a configuration to be saved as the boot configuration.

Base and Rover Roles

One board covers both deployment roles. As a local base station it broadcasts RTCMv2/v3 corrections; as a rover it consumes CORS corrections over NTRIP and reports centimeter-level RTK-Fixed positions. Because both roles share the same multi-constellation, L1/L2/L5 engine, a spare unit can be re-purposed between the reference and the rover without changing the integration.

7. Timing & Event Synchronisation

A configurable 1PPS output and external event triggers are provided, so position snapshots can be time-stamped against GNSS time for multi-sensor alignment. The GNSS time reference source is selectable, which allows the module to be synchronised to the time base that the surrounding system already uses.

8. Target Applications

Three field deployments where the integrated IMU holds centimeter-level RTK-Fixed fixes when machines, vegetation or the hull block the sky.

1. **Construction & Survey Staking:** One board serves as the site reference and as the stake-out rover, so the crew keeps RTK-Fixed points while machines and material block the sky.
2. **Telecom & Ground Station Timing:** Configurable 1PPS and external event inputs time-stamp position snapshots against GNSS time, aligning ground-station clocks and multi-sensor logs.
3. **Marine & Offshore Survey:** The IMU bridges the gaps when mast and hull hide the satellites, and raw SBF observations logged to the TF card re-process to RINEX, ASCII or KML ashore.

9. Ordering, Shipping & Support

- **Shipping terms:** Goods are quoted FOB Shanghai Airport. The default carrier is DHL Economy; freight is prepaid by the seller and added to the invoice, and delivery to the airport is free of charge. Air freight takes 7–10 days and express courier 3–5 working days, depending on the destination region and the carrier's official tracking. Main markets are Europe, the Middle East, the USA and South America; shipping is worldwide.
- **Volume discounts:** Discounts are granted at the seller's discretion according to the project volume. For special projects and long-term partners, terms and pricing are negotiable — tell us the expected volume and the deployment plan and we will quote accordingly.
- **Documentation:** This document is the BASE-X5A datasheet and hardware manual. Additional product data is published as machine-readable JSON alongside the product page.

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