



## The ultimate GPS+GLONASS+SBAS Dual-Frequency OEM Board

With the new MB 500 multi-constellation board, Magellan brings to the OEM market a unique blend of technologies which increases RTK availability and data integrity. Embedded BLADE™ technology ensures powerful performance and a patented way to use multiple GNSS constellations for high-accuracy positioning, and surveying solutions:

### Features

- BLADE technology
- GPS+GLONASS+SBAS
- L1 C/A GPS and GLONASS, L2 P GPS and GLONASS, L2C GPS
- Advanced multi-path mitigation
- Network RTK compliant
- Moving base operation
- Heading and pitch or roll

- Fast initialization and accuracy at long-range
- Patented multi-constellation signal processing
- Advanced multi-path mitigation and robust signal tracking
- RTK solution maintained if data link is briefly dropped
- Interoperability with any vendor's reference station transmitting GPS+GLONASS L1/L2

### Unique and Powerful BLADE Technology

A growing number of available satellites are providing significantly improved GNSS receiver performance in difficult satellite tracking conditions. However, GLONASS signal quality is not always stable. GNSS receivers must be able to overcome this instability to ensure high-quality RTK results. The MB 500 board with BLADE has the ability to provide the best possible measurements from three constellations – one of the key differentiators offered by the BLADE technology. The board itself makes all the checks and preparations needed to mitigate any negative effects of GLONASS signal instabilities. The result is more reliable measurement processing and usage than with competing board offerings.

Additionally, the MB 500 board can work with any other manufacturer's base or reference stations by automatically measuring and removing the biases that are inherent with the Frequency Dependent Multiple Access (FDMA) technique used in GLONASS. The MB 500 gets the full benefit of any available GLONASS corrections.

### Seamless Integration and Flexibility

The MB 500 features low power consumption in a compact board design, and a variety of output messages and data formats for extensive OEM solution interoperability.

The MB 500 multi-constellation board is available as a base and as a rover and supports standard and advanced RTK operations:

- RTK base up to 20Hz update rate
- Time-tagged RTK and fast RTK
- Standard RTK against a single static base
- Advanced RTK against a moving base for relative positioning
- Advanced RTK solutions using SBAS and GLONASS satellites
- Network RTK using third party network corrections: VRS, FKP, MAC
- Heading and pitch or roll determination with baseline auto-calibration between two receivers

# MB 500 Technical Specifications (Including Options)

## GNSS Characteristics

- 75 channels:
- GPS L1 C/A L1/L2 P-code, L1/L2 full wavelength carrier
- GLONASS L1 C/A, L2 P-code, L1/L2 full wavelength carrier
- SBAS: code & carrier (WAAS/EGNOS/MSAS)
- Quick signal detection engines for fast acquisition and re-acquisition of GPS/GLONASS/SBAS signals
- Fully independent code and phase measurements
- Magellan BLADE technology for optimal performance
- Advanced multi-path mitigation

## Features

- Up to 20 Hz Real-time GPS, GLONASS and SBAS raw data output (code and carrier)
- Real-time GPS, GLONASS and SBAS sub-frames output
- Ephemeris and almanac for GPS, GLONASS and SBAS output
- Ionosphere data output
- NMEA0183 messages output (ALM, GGA, GLL, GRS, GSA, GST, GSV, RMC, VTG, ZDA)
- Up to 20 Hz raw data and position output
- Advanced multi-path mitigation
- 1PPS timing signal (5V TTL)
- Event marker
- RTK base and rover modes

## RTK Base

- Up to 20 Hz update rate
- RTCM-2.3: Types 1, 3, 9, 16, 18, 19, 20, 21, 22, 23, 24, 31, 32, 34, 36
- RTCM-3.1: Types 1001 to 1013, 1019, 1020, 1029, 1033
- CMR: Types 0, 1, 2, 3<sup>6</sup>
- CMR+: Type 0, 3<sup>6</sup>
- ATOM™ (Magellan proprietary format): Type 1, 2, 3, 4, 5, 6
- Moving base operation

## RTK Rover

- BLADE technology
- Up to 10 Hz Synchronized RTK
- Up to 20 Hz Fast RTK
- RTCM-2.3: Types 1, 3, 9, 16, 18, 19, 20, 21, 22, 23, 24, 31, 32, 34, 36, 59 (FKP)

- RTCM-3.1: Types 1001 to 1017, 1019, 1020, 1029 to 1033
- CMR: Types 0, 1, 2, 3<sup>6</sup>
- CMR+: Type 0, 3<sup>6</sup>
- ATOM (proprietary format): Type 1, 2, 4, 5
- DBEN (Magellan proprietary format)
- Networks: VRS, FKP, MAC
- RTK with moving base operation
- Heading and pitch or roll determination with auto-calibration (against another board or sensor)

## Real-Time Position Accuracy<sup>1</sup>

### Autonomous

- CEP: 3.0 m (9.843 ft)
- 95%: 5.0 m (16.4 ft)

### Differential

- Local Base Station
- CEP: 40 cm (1.31 ft)
- 95%: 90 cm (2.95 ft)

### SBAS

- CEP: 1.0 m (3.28 ft)
- 95%: 3.0 m (9.84 ft)

### RTK (kinematic)

- Fixed RTK
- Horizontal 1 sigma: 1 cm (0.033 ft) + 1 ppm<sup>2,3</sup>
- Vertical 1 sigma: 2 cm (0.065 ft) + 1 ppm<sup>2,3</sup>
- Flying RTK™
- CEP: 5 cm + 1 ppm<sup>2,3</sup>
- CEP: 20 cm + 1 ppm<sup>2,4</sup>

### Heading, Pitch/Roll

- Heading (1 sigma): 0.2 deg/baseline (m)<sup>2,5</sup>
- Pitch/roll (1 sigma): 0.4 deg/baseline (m)<sup>2,5</sup>

## Real-Time Performance

### Instant-RTK™ Initialization

- Typically 2-second initialization for baselines < 20 km
- 99.9% reliability

### RTK Initialization range

- > 40 km

## Velocity Accuracy<sup>1</sup> (knots)

- 95%: 0.1

## Time To First Fix<sup>1</sup>

- Re-acquisition: 3 sec
- Hot start: 11 sec
- Warm start: 35 sec
- Cold start: 90 sec

## Communication

- 1 Fast UART port (LV-TTL) up to 5 Mbits/sec
- 1 RS232 port up to 921.6 kbits/sec
- 1 USB 2.0 port up to 12 Mbits/sec
- CAN bus

## Environmental/Physical

- Operating Temp: -30°C to +70°C (-22°F to 158°F)
- Storage Temp: -40°C to +85°C (-40°F to 185°F)
- Power consumption: 2.5 W (typical GPS + GLONASS at 10 Hz)
- Input voltage: 3.3 to 9V DC
- Back-up power: 2.6 to 3.3V DC
- Antenna power: +5 VDC (±10%), Max current 100mA, Min current 5mA
- Size: 100 x 80 x 13 mm (3.9 x 3.1 x 0.5 in)
- I/O: 30 pins SAMTEC TMM-115-03-G-D connector
- Weight: 61 g/2.18 oz
- Antenna: female MMCX straight connector
- Reference Clock Input signal: female MMCX straight connector
- Dichromatic LED: power status and number of satellites locked for GPS/SBAS and GLONASS separately
- Humidity: 95% non-condensing
- Vibration: MIL-STD-810E "Minimum Integrity Test-General"

## Other Configurations

MB 500 receivers are also available in a compact rugged sensor housing for easy-to-use evaluation kit or other applications.

<sup>1</sup> Accuracy and TTFF specifications based on tests conducted in Nantes and Moscow. Tests at different locations under different conditions may produce different results. Beacon tests based on 40 km baseline. Position accuracy may degrade with longer baselines. Position accuracy specifications are for horizontal positioning. Vertical error is typically < 2 time's horizontal error.

<sup>2</sup> Performance values assume minimum of five satellites, following the procedures recommended in the product manual. High multi-path areas, high PDOP values and periods of severe atmospheric conditions may degrade performance.

<sup>3</sup> Steady state value for baselines < 50 km after sufficient convergence time.

<sup>4</sup> Typical values after 3 minutes of convergence for baselines < 50 km

<sup>5</sup> Typical values for properly installed antenna on vehicle body.

<sup>6</sup> CMR/CMR+ type 3 refers to GLONASS observations

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