MIA-M10 series

u-blox M10 standard precision GNSS SiP modules

Ultra-low-power GNSS module for miniature asset-tracking devices
- 4.5 x 4.5 mm chip-sized module requiring no external components
- Less than 25 mW power consumption without compromising GNSS performance
- Twice the battery life by leveraging optimized power save modes
- Maximum position availability with concurrent reception of 4 GNSS
- Proven excellent performance, even with small antennas

Product summary

Product description
The MIA-M10 series is built on the ultra-low-power u-blox M10 GNSS platform, which provides exceptional sensitivity and acquisition times for all L1 GNSS systems.

The extremely low power consumption of less than 25 mW in continuous tracking mode allows great power autonomy for all battery-operated devices, such as asset trackers, without compromising on GNSS performance.

MIA-M10 supports concurrent reception of four GNSS (GPS, GLONASS, Galileo, and BeiDou). The high number of visible satellites enables the receiver to select the best signals. This maximizes the position availability, in particular in challenging conditions, such as in deep urban canyons.

u-blox Super-S technology offers great RF sensitivity and can improve the dynamic position accuracy by up to 25% with small antennas or in a non-line-of-sight scenario.

MIA-M10Q integrates an LNA followed by a SAW filter in the RF path for maximum sensitivity in passive antenna designs. MIA-M10C without an LNA or SAW filter offers the flexibility for active antenna designs.

The small, highly integrated System-in-Package requires only 20 mm² board space without the need of any external components.

MIA-M10 detects jamming and spoofing attempts and reports them to the host, so that the system can react to such events. Advanced filtering algorithms mitigate the impact of RF interference and jamming, thus enabling the product to operate as intended.
## MIA-M10 series

### Product performance

- **Receiver type**: u-blox M10 engine
- **GPS L1 C/A, QZSS L1 C/A L1S, GLONASS L1OF, BeiDou B1I/B1C, Galileo E1B/C, SBAS L1 C/A, WAAS, EGNOS, MSAS, GAGAN
- **Nav. update rate**: Up to 10 Hz (4 concurrent GNSS)  
  Up to 18 Hz (single GNSS)
- **Horizontal position accuracy**: 1.5 m CEP

<table>
<thead>
<tr>
<th>MIA-M10C 1</th>
<th>MIA-M10Q 2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Acquisition</strong></td>
<td></td>
</tr>
<tr>
<td>Cold start</td>
<td>28 s</td>
</tr>
<tr>
<td>Aided start</td>
<td>2 s</td>
</tr>
<tr>
<td>Hot start</td>
<td>1 s</td>
</tr>
<tr>
<td><strong>Sensitivity</strong></td>
<td></td>
</tr>
<tr>
<td>Tracking &amp; Nav. Reacquisition</td>
<td>-164 dBm</td>
</tr>
<tr>
<td>Cold start</td>
<td>-148 dBm</td>
</tr>
<tr>
<td>Hot start</td>
<td>-159 dBm</td>
</tr>
</tbody>
</table>

### Tracking features
- **u-blox Super-S**: Improved accuracy with small antennas
- **Data batching**: Autonomous tracking up to 10 min. at 1 Hz
- **Odometer**: Measure traveled distance with support for different user profiles
- **Protection level**: Real-time position accuracy estimate with 95% confidence

### Security features
- **Signal integrity**: RF interference and jamming detection and reporting
- **Device integrity**: Receiver configuration lock by command
- **Secure interface**: Signed UBX messages (SHA-256)

### Electrical data

<table>
<thead>
<tr>
<th>MIA-M10C</th>
<th>MIA-M10Q</th>
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<tbody>
<tr>
<td><strong>Tracking mode</strong></td>
<td>Continuous (PSM 1)</td>
</tr>
<tr>
<td><strong>Power consumption</strong></td>
<td></td>
</tr>
<tr>
<td>Continuous (PSM 1)</td>
<td>2 GNSS: 27 (18) mW 1</td>
</tr>
<tr>
<td>Continuous (PSM 2)</td>
<td>3 GNSS: 30 (19) mW</td>
</tr>
<tr>
<td>Not applicable</td>
<td>4 GNSS: 34 mW</td>
</tr>
<tr>
<td><strong>Power consumption</strong></td>
<td></td>
</tr>
<tr>
<td>Continuous (PSM 1)</td>
<td>2 GNSS: 19 (9) mW 1</td>
</tr>
<tr>
<td>Continuous (PSM 2)</td>
<td>3 GNSS: 22 (10) mW</td>
</tr>
<tr>
<td>Continuous (PSM 3)</td>
<td>4 GNSS: 25 mW</td>
</tr>
<tr>
<td>4 GNSS: 31 mW</td>
<td></td>
</tr>
<tr>
<td><strong>Power supply</strong></td>
<td></td>
</tr>
<tr>
<td>1.3 V to 1.98 V</td>
<td>1.76 V to 3.6 V</td>
</tr>
<tr>
<td><strong>Backup supply</strong></td>
<td></td>
</tr>
<tr>
<td>1.65 V to 3.6 V</td>
<td>1.65 V to 3.6 V</td>
</tr>
</tbody>
</table>

1 = GPS/Galileo + SBAS/QZSS continuous tracking  
2 = GPS/Galileo/Beidou + SBAS/QZSS continuous tracking  
3 = Power save mode, 1 Hz cyclic tracking

### Package
- 53 pin S-LGA (Soldered Land Grid Array): 4.5 x 4.5 x 1.0 mm, 0.055 g

### Environmental data, quality & reliability

| Operating temp. | −40 °C to +85 °C |
| Storage temp.   | −40 °C to +85 °C |
| Environmental grade | 2015/863/EU RoHS-3 |

### EMC (electromagnetic compatibility)
- 2014/53/EU RED

### Environmental testing
- ISO 16750

### Quality management
- Manufactured and fully tested in IATF 16949 certified production sites

### Interfaces
- **Serial interfaces**: 1 UART, 1 DDC (I2C compliant)
- **Digital I/O**: Configurable timepulse, 1 EXTINT input for Wakeup
- **Raw Data output**: Code phase data
- **Timepulse**: Configurable: 0.25 Hz to 10 MHz
- **RTC crystal**: Optional, can be connected to external RTC clock

### Supported antennas
- Active and passive

### Protocols
- NMEA 4.11, UBX binary

### Compatible u-blox location services
- **AssistNow**: Real-time online A-GNSS service with assured global availability
- **CloudLocate**: Extends the life of energy-constrained IoT applications.

### Support products
- **EVK-M101**: u-blox M10 GNSS evaluation kit with UBX-M100050-KB chip and TCXO
- **EVK-M101C**: u-blox M10 GNSS evaluation kit with UBX-M100050-KB chip and crystal oscillator
- **u-center 2**: Highly intuitive software for GNSS performance evaluation

### Product variants
- **MIA-M10C**: u-blox M10 concurrent GNSS SiP module, firmware in ROM, crystal oscillator, 1.8 V
- **MIA-M10Q**: u-blox M10 concurrent GNSS SiP module, firmware in ROM, SAW filter, LNA, TCXO, 1.8/3 V

### NOTE:

This document provides an objective specification overview of this product. Please refer to the data sheet for details on firmware-related performance and feature support.

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**Further information**

For contact information, see [www.u-blox.com/contact-u-blox](http://www.u-blox.com/contact-u-blox).  
For more product details and ordering information, see the product data sheet.

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