Product summary

# SAM-M10Q module

## u-blox M10 standard precision GNSS antenna module

**P**

**Ultra-low-power GNSS antenna module for easiest integration**

- Simple design-in with no RF expertise required
- Less than 38 mW power consumption without compromising GNSS performance
- Maximum position availability with 4 concurrent GNSS reception
- Advanced spoofing and jamming detection
- Pin-compatible with previous SAM-M8Q

15.5 × 15.5 × 6.3 mm

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SAM-M10Q

### Product description

The SAM-M10Q is a patch antenna module built on the ultra-low-power u-blox M10 GNSS platform, which supports concurrent reception of four GNSS (GPS, GLONASS, Galileo, and BeiDou) and provides exceptional sensitivity and fast acquisition times for all L1 GNSS systems.

The extremely low power consumption of 37 mW in continuous tracking mode with four concurrent GNSS allows great power autonomy for battery-operated devices, without compromising on GNSS performance.

A front-end SAW filter and an LNA is integrated in the SAM-M10Q module. This setup ensures excellent out-band jamming immunity, for example when a cellular modem is nearby. SAM-M10Q also detects jamming and spoofing attempts and reports them to the host, so that the system can react to such events.

The high-gain 15 x 15 mm patch antenna provides the best balance between performance and small size. The omni-directional radiation antenna pattern increases flexibility for device installation.

Incorporating the SAM-M10Q module into customer designs is easy and straightforward, thanks to the integrated antenna, robust design, and simple interface. SAM-M10Q is a surface-mount device, enabling simple and automated manufacturing.

SAM-M10Q is pin-to-pin compatible with the previous SAM-M8Q module, which saves designers time and cost when upgrading their designs to the advanced low-power u-blox M10 GNSS technology.

| | SAM-M10Q |
|---|---|
| **Grade** | |
| Automotive | |
| Professional | • |
| Standard | |
| **GNSS** | |
| GPS / QZSS | • |
| GLONASS | • |
| Galileo | • |
| BeiDou | • |
| Number of concurrent GNSS | 4 |
| **Interfaces** | |
| UART | 1 |
| I2C | 1 |
| **Features** | |
| Additional SAW | • |
| Additional LNA | • |
| RTC crystal | • |
| Oscillator | T |
| Built-in antenna | • |
| Timepulse | 1 |
| **Power supply** | |
| 2.7 V – 3.6 V | • |

T = TCXO

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# SAM-M10Q antenna module

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## Product performance

| | |
|---|---|
| Receiver type | u-blox M10 engine<br>GPS L1 C/A, QZSS L1 C/A L1S, GLONASS L1OF<br>BeiDou B1C, Galileo E1B/C<br>SBAS L1 C/A: WAAS, EGNOS, MSAS, GAGAN |
| Nav. update rate | Up to 10 Hz (4 concurrent GNSS)<br>Up to 25 Hz (single GNSS) |
| Horizontal position accuracy [1] | 1.5 m CEP |

| Acquisition [1] | | |
|---|---|---|
| | Cold start | 23 s |
| | Aided start | 1 s |
| | Hot start | 1 s |

| Sensitivity [1] | | |
|---|---|---|
| | Tracking & Nav. | -165 dBm |
| | Reacquisition | −158 dBm |
| | Cold start | −146 dBm |
| | Hot start | −157 dBm |

## Tracking features

| | |
|---|---|
| u-blox Super-S | Improved accuracy with small antenna |
| 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<br>Spoofing detection and reporting |
| Device integrity | Receiver configuration lock by command |
| Secure interface | Signed UBX messages (SHA-256)<br>JTAG debug interface disabled by default |

## Electrical data

| Power consumption at 3 V | | Continuous tracking | PSM [2] |
|---|---|---|---|
| | 2 GNSS: | 31 mW | 21 mW |
| | 3 GNSS: | 34 mW | 21 mW |
| | 4 GNSS: | 37 mW [1] | N/A [3] |

| | |
|---|---|
| Power supply | 2.7 V to 3.6 V |
| Backup supply | 1.65 V to 3.6 V |

1 = Default mode: GPS/SBAS/QZSS+GLONASS+Galileo+BeiDou
2 = Power save mode, 1 Hz cyclic tracking
3 = Power save mode not available when BeiDou B1C is enabled

## Package

20 pin LGA (Land Grid Array): 15.5 x 15.5 x 6.3 mm, 5.6 g

## Environmental data, quality, and 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 | Qualified according to u-blox qualification policy, based on a subset of AEC-Q104 |
| Quality management | Manufactured and fully tested in IATF 16949 certified production sites |

## Interfaces

| | |
|---|---|
| Serial interfaces | 1 UART<br>1 I2C |
| Digital I/O | Configurable timepulse<br>1 EXTINT input for Wakeup |
| Raw Data output | Code phase data |
| Timepulse | Configurable: 0.25 Hz to 10 MHz |
| Protocols | NMEA 4.11, UBX binary |

## Compatible u-blox location services

| | |
|---|---|
| AssistNow | Achieves premium performance in challenging IoT environments |
| CloudLocate | Extends the life of energy-constrained IoT applications. |

## Support products

| | |
|---|---|
| EVK-M10QSAM | u-blox M10 concurrent GNSS evaluation kit supports SAM-M10Q |
| u-center 2 | Highly intuitive software for GNSS performance evaluation |

## Product variants

| | |
|---|---|
| SAM-M10Q | u-blox M10 concurrent GNSS LGA patch antenna module, ROM, TCXO, SAW, LNA |

## Further information

For contact information, see www.u-blox.com / contact-us.

For more product details and ordering information, see the product data sheet.