

SAM-M10Q module



u-blox M10 standard precision GNSS antenna module

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



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 omnidirectional 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

SAM-M10Q antenna module



Product performance

Receiver type	u-blox M10 engine GPS L1 C/A, QZSS L1 C/A L1S, GLONASS L1OF BeiDou B1C, Galileo E1B/C SBAS L1 C/A: WAAS, EGNOS, MSAS, GAGAN		
Nav. update rate	Up to 5 Hz (4 concurrent GNSS) Up to 18 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 Spoofing detection and reporting		
Device integrity	Receiver configuration lock by command		
Secure interface	Signed UBX messages (SHA-256) 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

Further information

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

For more product details and ordering information, see the [product data sheet](#).

Package

20 pin LGA (Land Grid Array): 15.5 x 15.5 x 6.3 mm, 6 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
Environmental testing	ISO 16750
EMC (electromagnetic compatibility)	2014/53/EU RED
Quality management	Manufactured and fully tested in IATF 16949 certified production sites

Interfaces

Serial interfaces	1 UART 1 I2C
Digital I/O	Configurable timepulse 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	Real-time online A-GNSS service with assured global availability
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
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