

## GNSS 18 Click



PID: MIKROE-6127

GNSS 18 Click is a compact add-on board designed for high-precision GNSS applications. This board features the SAM-M10Q, M10 standard precision GNSS module from u-blox, known for exceptional sensitivity and rapid acquisition of L1 GNSS signals. It supports concurrent reception of GPS, Galileo, GLONASS, and BeiDou B1C, with additional support for QZSS and SBAS. Featuring u-blox Super-S technology for improved dynamic position accuracy and low power consumption of 37mW in continuous tracking mode, it is ideal for battery-operated devices. The integrated GNSS patch antenna, SAW filter, and LNA ensure superior signal reception and jamming immunity. GNSS 18 Click is perfect for applications like asset tracking, navigation systems, and location-based services where high precision and reliability are crucial.

### How does it work?

GNSS 18 Click is based on the SAM-M10Q, a high-precision GNSS antenna module from u-blox. This module uses the u-blox M10 standard precision GNSS platform, known for its outstanding sensitivity and rapid acquisition time across all L1 GNSS signals. The M10 platform supports the simultaneous reception of signals from four GNSS systems. By default, the SAM-M10Q-00B is configured to concurrently receive signals from GPS, Galileo, GLONASS, and BeiDou B1C, with additional support for QZSS and SBAS. Its single RF front-end architecture allows it to capture multiple GNSS constellations simultaneously, providing flexibility to configure for a subset of GNSS constellations to optimize power consumption. Accessing many visible satellites ensures the receiver can select the strongest signals, maximizing position availability even in challenging environments like deep urban canyons.

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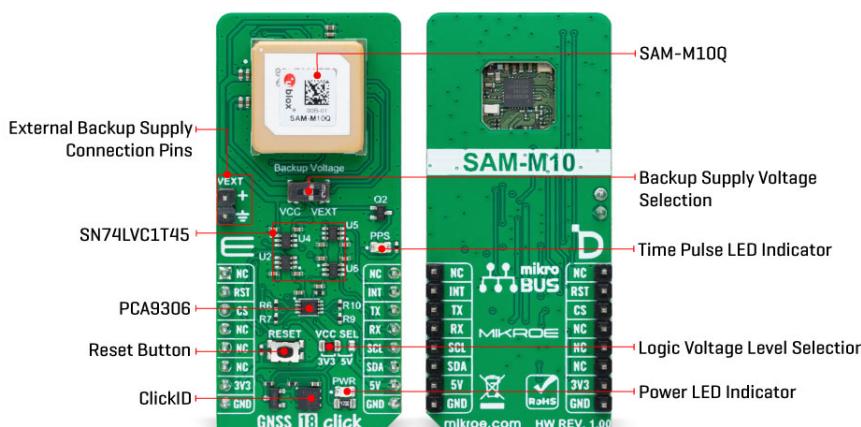
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u-blox Super-S (Super-Signal) technology enhances the RF sensitivity of the SAM-M10Q module, significantly improving dynamic position accuracy in non-line-of-sight scenarios. Assuming an Airborne 4g platform, the module's operational limits include an altitude capability of up to 80,000 meters and a velocity of up to 500 meters per second. With a remarkably low power consumption of just 37mW in continuous tracking mode while concurrently tracking four GNSS, this module ensures excellent power efficiency, making it ideal for battery-operated devices like asset trackers without sacrificing GNSS performance.

The SAM-M10Q module has an integrated GNSS patch antenna, ensuring optimal signal reception. An internal SAW filter and a low-noise amplifier (LNA) further enhance the RF signal, which provides superior out-band jamming immunity, making it highly effective even when a cellular modem is nearby. The SAM-M10Q is equipped with features to detect jamming and spoofing attempts, promptly reporting these events to the host system to enable an appropriate response.

Communication between the SAM-M10Q and the host MCU is made through a UART interface using the standard UART RX and TX pins. The module communicates at 115200bps by default, allowing efficient data exchange. Also, for developers looking to build their software from scratch, the module also includes I2C communication capabilities, operational only in Slave mode, with clock frequencies up to 400kHz. Besides interface pins, this Click board™ also incorporates a reset pin (RST) and RESET button for direct module resetting and an external interrupt signal (INT) that can be programmed for various functions, such as waking up the module. It also features an orange PPS LED indicator that signals the pulse per second, adjustable to different conditions.

This SAM-M10Q also has the possibility of a backup 3V supply from an external source connected to VEXT pins. The main and backup power source can be selected via the Backup Voltage switch, which can be placed in the desired position: VCC for the internal and VEXT for an external power source.

This Click board™ can operate with both 3.3V and 5V logic voltage levels selected via the VCC SEL jumper. Given that the SAM-M10Q module operates at 3.3V, a pack of logic-level translators, [PCA9306](#) and several [SN74LVC1T45](#)s, are also used for proper operation and an accurate signal-level translation. This way, both 3.3V and 5V capable MCUs can use the communication lines properly. Also, this Click board™ comes equipped with a library containing easy-to-use functions and an example code that can be used as a reference for further development.

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## Specifications

Type	GPS/GNSS
Applications	Ideal for asset tracking, navigation systems, and location-based services
On-board modules	SAM-M10Q - M10 standard precision GNSS antenna module from u-blox
Key Features	Exceptional sensitivity and rapid acquisition of L1 GNSS signals, concurrent reception of GPS, Galileo, GLONASS, and BeiDou B1C signals, additional support for QZSS and SBAS, Super-S technology for dynamic position accuracy, robust jamming and spoofing detection, low power consumption of 37mW in continuous tracking mode, integrated GNSS patch antenna, UART and I2C interfaces, time pulse indicator, and more
Interface	I2C, UART
Feature	ClickID
Compatibility	mikroBUS™
Click board size	L (57.15 x 25.4 mm)
Input Voltage	3.3V or 5V

## Pinout diagram

This table shows how the pinout on GNSS 18 Click corresponds to the pinout on the mikroBUS™ socket (the latter shown in the two middle columns).

Notes	Pin	mikro™ BUS				Pin	Notes
	NC	1	AN	PWM	16	NC	
Module Reset	<b>RST</b>	2	RST	INT	15	<b>INT</b>	Interrupt
ID COMM	<b>CS</b>	3	CS	RX	14	<b>TX</b>	UART TX
	NC	4	SCK	TX	13	<b>RX</b>	UART RX
	NC	5	MISO	SCL	12	<b>SCL</b>	I2C Clock
	NC	6	MOSI	SDA	11	<b>SDA</b>	I2C Data
Power Supply	<b>3.3V</b>	7	3.3V	5V	10	<b>5V</b>	Power Supply
Ground	<b>GND</b>	8	GND	GND	9	<b>GND</b>	Ground

## Onboard settings and indicators

Label	Name	Default	Description
LD1	PWR	-	Power LED Indicator
LD2	PPS	-	Time Pulse LED Indicator
JP1	VCC SEL	Left	Logic Voltage Level Selection 3V3/5V: Left

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			position 3V3, Right position 5V
T1	RESET	-	Reset Button

## GNSS 18 Click electrical specifications

Description	Min	Typ	Max	Unit
Supply Voltage	3.3	-	5	V
Frequency Range	1575.42	/ 1602		MHz
Time To First Fix (TTFF) - Cold start	-	23	-	sec
Sensitivity - Tracking / Navigation	-	-165	-	dBm

## Software Support

We provide a library for the GNSS 18 Click as well as a demo application (example), developed using MIKROE [compilers](#). The demo can run on all the main MIKROE [development boards](#).

Package can be downloaded/installed directly from NECTO Studio Package Manager (recommended), downloaded from our [LibStock™](#) or found on [MIKROE github account](#).

## Library Description

This library contains API for GNSS 18 Click driver.

### Key functions

- `gnss18_generic_read` This function reads a desired number of data bytes from the module.
- `gnss18_reset_device` This function resets the device by toggling the RST pin.
- `gnss18_parse_gpgga` This function parses the GPGGA data from the read response buffer.

## Example Description

This example demonstrates the use of GNSS 18 Click by reading and displaying the GNSS coordinates.

The full application code, and ready to use projects can be installed directly from NECTO Studio Package Manager (recommended), downloaded from our [LibStock™](#) or found on [MIKROE github account](#).

Other MIKROE Libraries used in the example:

- MikroSDK.Board
- MikroSDK.Log
- Click.GNSS18

## Additional notes and informations

Depending on the development board you are using, you may need [USB UART click](#), [USB UART](#)

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[2 Click](#) or [RS232 Click](#) to connect to your PC, for development systems with no UART to USB interface available on the board. UART terminal is available in all MIKROE [compilers](#).

## mikroSDK

This Click board™ is supported with [mikroSDK](#) - MIKROE Software Development Kit. To ensure proper operation of mikroSDK compliant Click board™ demo applications, mikroSDK should be downloaded from the [LibStock](#) and installed for the compiler you are using.

For more information about mikroSDK, visit the [official page](#).

## Resources

[mikroBUS™](#)

[mikroSDK](#)

[Click board™ Catalog](#)

[Click boards™](#)

[ClickID](#)

## Downloads

[GNSS 18 click example on Libstock](#)

[GNSS 18 click 2D and 3D files v100](#)

[SAM-M100 datasheet](#)

[GNSS 18 click schematic v100](#)

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