

GNSS 21 Click



PID: MIKROE-6409

GNSS 21 Click is a compact add-on board designed for precise and reliable satellite-based positioning. This board features the [PNT-SG3FS](#), a GNSS module from [Lantronix](#), featuring the Teseo III GNSS receiver from STMicroelectronics. This board supports multi-constellation tracking with up to 32 satellites across GPS, GLONASS, Galileo, BeiDou, QZSS, and SBAS systems, and includes features like Assisted GNSS, Differential GPS, and onboard 16Mb flash for data logging, geofencing, and firmware updates. With high sensitivity of -163 dBm, 1.5m CEP accuracy, and sub-decimeter precision when used with RTK/PPP algorithms, it ensures fast and stable performance in demanding environments. Thanks to the Click Snap feature, size, weight, and power consumption can be reduced for final-phase prototyping. Ideal for applications such as geolocation, fleet tracking, mapping, and any system requiring high-accuracy GNSS data.

For more information about **GNSS 21 Click** visit the official [product page](#).

How does it work?

GNSS 21 Click is based on the PNT-SG3FS, a Global Navigation Satellite System (GNSS) module from Lantronix, built around the Teseo III GNSS receiver by STMicroelectronics. Designed to provide reliable and precise positioning, this module supports multi-constellation satellite tracking with the ability to simultaneously monitor up to 32 satellite signals. It covers a wide range of navigation systems, including GPS L1C/A, Galileo E1B/C, BeiDou B1, GLONASS L1OF, QZSS L1C/A, and SBAS L1C/A services such as WAAS, EGNOS, MSAS, and GAGAN. For improved positioning accuracy, the module offers Differential GPS (DGPS) capabilities in compliance with RTCM 10402.3 and supports advanced Assisted GNSS techniques using either local ephemeris prediction or server-based assistance, enabling fast acquisition and minimal Time to First Fix

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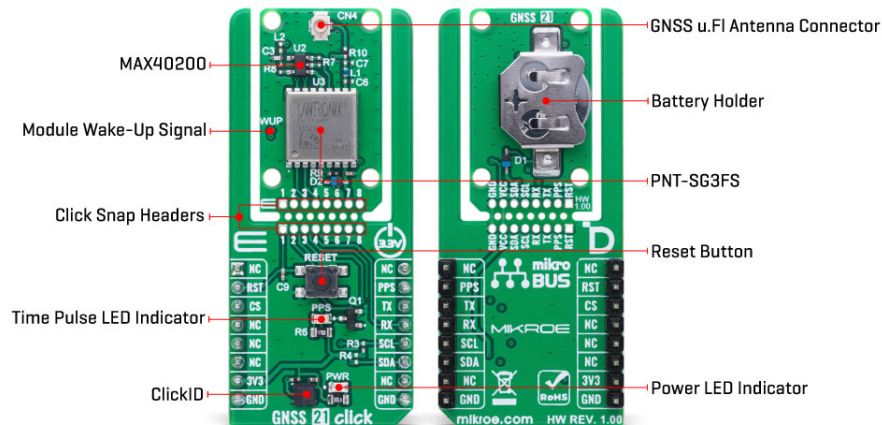


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(TTFF), even under challenging conditions.



In addition to its core navigation capabilities, the PNT-SG3FS integrates a 16Mb flash memory, allowing for a rich feature set including data logging, geofencing, odometer functionality, firmware updates, and up to 5 days of autonomous assisted GNSS data retention. The onboard temperature-compensated crystal oscillator (TCXO) ensures high stability and accuracy in navigation performance, while the integrated real-time clock (RTC) oscillator supports clock trimming to optimize timing precision based on the 32.768kHz crystal, making it suitable for time-sensitive applications.

The PNT-SG3FS is capable of delivering highly accurate positioning with a circular error probable (CEP) of 1.5 meters, and when used alongside external RTK or PPP client algorithms, it can achieve sub-decimeter accuracy, under 10 centimeters. It boasts a remarkable -163dBm tracking sensitivity and can achieve a cold start TTFF in less than 32 seconds. Certified for compliance with various international standards including the Radio Equipment Directive (RED) 2014/53/EU and several ETSI and EN norms, GNSS 21 Click ensures reliable performance and regulatory approval across a wide range of applications.

This Click board™ is designed in a unique format supporting the newly introduced MIKROE feature called "Click Snap." Unlike the standardized version of Click boards, this feature allows the main module area to become movable by breaking the PCB, opening up many new possibilities for implementation. Thanks to the Snap feature, the PNT-SG3FS can operate autonomously by accessing its signals directly on the pins marked 1-8. Additionally, the Snap part includes a specified and fixed screw hole position, enabling users to secure the Snap board in their desired location.

The GNSS 21 Click communicates with the host MCU through a UART interface using the standard UART RX and TX pins. The default communication speed is set at 115200bps, ensuring efficient data exchange. It also provides an I2C interface for communication with a host MCU in the I2C Fast speed mode (400kHz). Still, it must be noted that the I2C interface can only be operated in the peripheral mode.

Along with the communication and control pins, this Click board™ also includes a reset pin (RST) and a RESET button, enabling easy module resetting, the timepulse signal indicator (PPS), offering precise time synchronization for applications that require it, module wake-up signal in a form of a test point labeled WUP, and a battery holder for the backup power supply (RAM and RTC backup). The board also features one u.FI connector for GNSS antenna that

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MIKROE offers, like the [Active GPS antenna](#) combined with an [IPEX-SMA cable](#) for flexible and efficient connectivity options.

This Click board™ can be operated only with a 3.3V logic voltage level. The board must perform appropriate logic voltage level conversion before using MCUs with different logic levels. It also comes equipped with a library containing functions and example code that can be used as a reference for further development.

Click Snap


Click Snap is an innovative feature of our standardized Click add-on boards, designed to bring greater flexibility and optimize your prototypes. By simply snapping the PCB along predefined lines, you can easily detach the main sensor/IC/module area, reducing the overall size, weight, and power consumption - ideal for the final phase of prototyping. For more details about Click Snap, visit the [official page](#) dedicated to this feature.

Specifications

| | |
|------------------|--|
| Type | GPS/GNSS |
| Applications | Ideal for applications such as geolocation, fleet tracking, mapping, and any system requiring high-accuracy GNSS data |
| On-board modules | PNT-SG3FS - Global Navigation Satellite System (GNSS) standalone module from Lantronix |
| Key Features | Multi-constellation GNSS support, simultaneous tracking of up to 32 satellites, Assisted GNSS, Differential GPS support, high tracking sensitivity, onboard flash memory for data logging and firmware updates, geofencing and odometer functionality, UART and I2C communication interfaces, backup battery support, timepulse (PPS) output, Click Snap, and more |
| Interface | I2C,UART |
| Feature | Click Snap,ClickID |
| Compatibility | mikroBUS™ |
| Click board size | L (57.15 x 25.4 mm) |
| Input Voltage | 3.3V,External |

Pinout diagram

This table shows how the pinout on GNSS 21 Click corresponds to the pinout on the mikroBUS™ socket (the latter shown in the two middle columns).

| Notes | Pin |  | | | | Pin | Notes |
|-------|-----|---|----|-----|----|-----|-------|
| | NC | 1 | AN | PWM | 16 | NC | |

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| | | | | | | | |
|--------------|-------------|---|------|-----|----|------------|-------------------|
| Reset | RST | 2 | RST | INT | 15 | PPS | Time Pulse Output |
| ID COMM | CS | 3 | CS | RX | 14 | TX | UART TX |
| | NC | 4 | SCK | TX | 13 | RX | UART RX |
| | NC | 5 | MISO | SCL | 12 | SCL | I2C Clock |
| | NC | 6 | MOSI | SDA | 11 | SDA | I2C Data |
| Power Supply | 3.3V | 7 | 3.3V | 5V | 10 | NC | |
| Ground | GND | 8 | GND | GND | 9 | GND | Ground |

Onboard settings and indicators

| Label | Name | Default | Description |
|-------|-------|---------|--------------------------|
| LD1 | PWR | - | Power LED Indicator |
| LD2 | PPS | - | Time Pulse LED Indicator |
| T1 | RESET | - | Reset Button |

GNSS 21 Click electrical specifications

| Description | Min | Typ | Max | Unit |
|-----------------|------|------|------|------|
| Supply Voltage | - | 3.3 | - | V |
| Frequency Range | 1559 | - | 1610 | MHz |
| Sensitivity | - | -163 | - | dBm |

Software Support

[GNSS 21 Click](#) demo application is developed using the [NECTO Studio](#), ensuring compatibility with [mikroSDK](#)'s open-source libraries and tools. Designed for plug-and-play implementation and testing, the demo is fully compatible with all development, starter, and mikromedia boards featuring a [mikroBUS™](#) socket.

Example Description

This example demonstrates the use of GNSS 21 Click by reading and displaying the GNSS coordinates.

Key Functions

- `gnss21_cfg_setup` Config Object Initialization function.
- `gnss21_init` Initialization function.
- `gnss21_generic_read` This function reads a desired number of data bytes by using UART or I2C serial interface.
- `gnss21_parse_gga` This function parses the GGA data from the read response buffer.
- `gnss21_reset_device` This function resets the device by toggling the RST pin.

Application Init

Initializes the driver and logger.

Application Task

Reads the received data, parses the NMEA GGA info from it, and once it receives the position fix it will start displaying the coordinates on the USB UART.

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Application Output

This Click board can be interfaced and monitored in two ways:

- Application Output - Use the "Application Output" window in Debug mode for real-time data monitoring. Set it up properly by following [this tutorial](#).
- UART Terminal - Monitor data via the UART Terminal using a [USB to UART converter](#). For detailed instructions, check out [this tutorial](#).

Additional Notes and Information

The complete application code and a ready-to-use project are available through the NECTO Studio Package Manager for direct installation in the [NECTO Studio](#). The application code can also be found on the MIKROE [GitHub](#) account.

Resources

[mikroBUS™](#)

[mikroSDK](#)

[Click board™ Catalog](#)

[Click boards™](#)

[ClickID](#)

Downloads

[GNSS 21 click example package](#)

[GNSS 21 click 2D and 3D files v100](#)

[GNSS 21 click schematic v100](#)

[PNT-SG3FS datasheet](#)

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