MikroElektronika
DEVELOPMENT TOOLS | COMPILERS | BOOKS

GNSS 4 click

PID: MIKROE-2045

GNSS 4 click carries SAM-M8Q patch antenna module from u-blox. The click is designed to run on a 3.3V power supply. It communicates with the target microcontroller over I2C or UART interface.

What is GNSS?

GNSS stands for Global Navigation Satellite System, an umbrella term that describes both the United States GPS, the Russian GLONASS global positioning systems and European Galileo.

SAM-M8Q module

The SAM-M8Q module utilizes concurrent reception of up to three GNSS systems (GPS/Galileo and GLONASS), recognizes multiple constellations simultaneously and provides outstanding positioning accuracy in scenarios where urban canyon or weak signals are involved.

Patch antenna

The GNSS patch antenna is RHCP (right hand circular polarization) and has a peak gain of 3 dBic. The patch antenna is insensitive to surroundings and has high tolerance against frequency shifts.

Power management

u-blox M8 technology offers a power-optimized architecture with built-in autonomous power saving functions to minimize power consumption at any given time. Furthermore, the receiver can be used in two operating modes: Continuous mode for best performance or Power Save Mode for optimized power consumption.

Good in hostile environments

Thanks to all these features the SAM-M8Q module is good in GNSS-hostile environments - indoor spaces, urban canyons (when a street is flanked by buildings on both sides), etc.

AssistNow™ service

The u-blox SAM-M8Q module can also benefit from the u-blox AssistNow assistance service. The Online service provides GNSS broadcast parameters, e.g. ephemeris, almanac plus time or rough position to reduce the receiver's time to first fix significantly and improve acquisition sensitivity.

The extended validity of AssistNow Offline data (up to 35 days) and AssistNow Autonomous data (up to 3 days) provide faster acquisition after a long off time.

How it works

A constellation of satellites sends a continuous signal towards Earth. Onboard every satellite is an atomic clock, and all of them are synchronized, thanks to a reference time scale defined by the whole system. So, that the signals coming from the different satellites of the same constellation share the same reference time scale.

The user wanting to use GNSS to determine its position must have an antenna that receives the signals coming from the satellites, and a receiver that translates these signals. The antenna position will be deduced from the measurements of the time delay between the emission time (satellite) and the reception time (receiver) for at least 4 signals coming from different satellites.

Key features

- SAM-M8Q module
    - Power-optimized architecture
    - GNSS patch antenna
    - AssistNow service
- Interface: I2C, UART
- 3.3V power supply

Applications	Asset tracking, for navigation devices based on GPS and GLONASS, road navigation devices, public transport, wearable devices, etc.
On-board modules	SAM-M8Q from u-blox
Key Features	High accuracy, I2C and UART interface, 3.3V power supply
Key Benefits	Good in hostile environments
Interface	I2C or UART
Power Supply	3.3V
Click board size	M (42.9 x 25.4 mm)

Pinout diagram

This table shows how the pinout on **GNSS 4 click** corresponds to the pinout on the mikroBUS™ socket (the latter shown in the two middle columns).

Notes	**Pin**	**mikroBUS^{tm}**				**Pin**	**Notes**
Not connected	NC	**1**	AN	PWM	**16**	NC	Not connected
Active Low	**RST_N**	**2**	RST	INT	**15**	NC	Not connected
Not connecred	NC	**3**	CS	TX	**14**	**TXD**	UART transmit
Not connected	NC	**4**	SCK	RX	**13**	**RXD**	UART receive
Not connected	NC	**5**	MISO	SCL	**12**	**SCL**	I2C Clock
Not connected	NC	**6**	MOSI	SDA	**11**	**SDA**	I2C Data
Power supply	**+3.3V**	**7**	3.3V	5V	**10**	NC	Not connected
Ground	**GND**	**8**	GND	GND	**9**	**GND**	Ground

Programming

Code examples for GNSS 4 click, written for MikroElektronika hardware and compilers are available on Libstock.

GNSS 4 library analyzes the NMEA messages sent by the module. All standard response messages are parsed, and the data is made available for use.

Code snippet

The following code snippet shows the function that feeds the data into a buffer untill sentence is ready for parsing, and sets the appropriate flag when such event occurs.

```
void gnss_put( char input )
{
    static bool sentence_flag;

    if( ( input != 'r' && input != 'n' ) && buffer_position < BUFFER_MAX )
    {
        buffer[ buffer_position++ ] = input;
    }
    else if( input == 'r' )
    {
        sentence_flag = true;
    }
    else if( input == 'n' && sentence_flag )
    {
        buffer[ buffer_position ] = '';
        buffer_position = 0;
        strcpypvt( process_buffer, buffer );
        sentence_flag = false;
        process_flag = true;
    }
    else
    {
        buffer_position = 0;
    }
}
```