

RTK Base Click

PID: MIKROE-5442

RTK Base Click is a compact add-on board used to improve the positional accuracy of the compatible RTK Rover board. This board features [Quectel's LG69TASMD](#), a dual-band, multi-constellation GNSS module featuring a high-performance and high-reliability positioning engine. This module provides an RTK base station function by calculating and transmitting differential correction data, via radio, to allow the roving GPS to correct its position. It features STMicroelectronics®' fifth generation positioning receiver platform with 80 tracking and four fast acquisition channels, and supports up to four concurrent global constellations (GPS, QZSS, Galileo, and BDS) alongside RTCM 3.x protocol and commonly used UART interface. This Click board™ is suitable for many applications requiring a base station, such as surveying, point cloud development, precision farming, and autonomous navigation.

RTK Base Click is fully compatible with the mikroBUS™ socket and can be used on any host system supporting the [mikroBUS™](#) standard. It comes with the [mikroSDK](#) open-source libraries, offering unparalleled flexibility for evaluation and customization. What sets this [Click board™](#) apart is the groundbreaking [ClickID](#) feature, enabling your host system to seamlessly and automatically detect and identify this add-on board.

NOTE: The LG69TASMD supports RTK functionality as a base station allowing the roving GPS to correct its position to achieve centimeter precise positioning. To complement your RTK Base Click with its compatible RTK Rover board, visit the RTK Rover Click [product page](#).

How does it work?

RTK Base Click is based on the LG69TASMD, a multi-constellation GNSS module featuring a high-performance and high-reliability positioning engine from Quectel Wireless Solutions, that improves the positional accuracy of the compatible RTK Rover board. The LG69TASMD has a dual-band supporting up to four concurrent global constellations. It features STMicroelectronics®' fifth generation positioning receiver platform with 80 tracking and four fast acquisition channels, plus Quectel's high-performance [YG0063AA](#) geodetic antenna.

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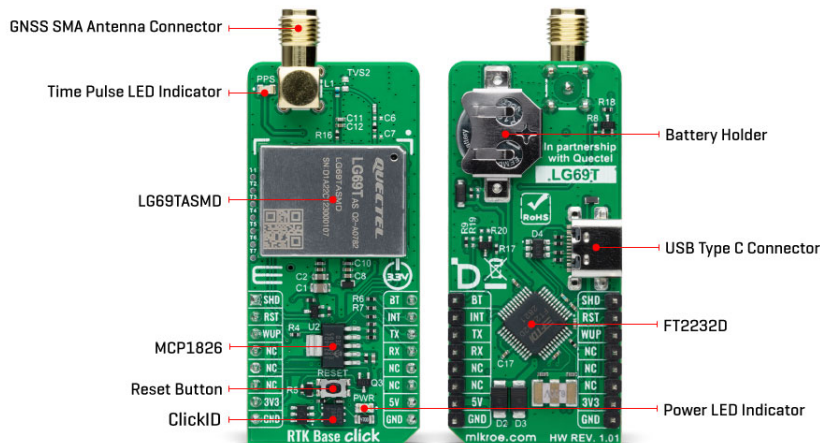
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Designed according to the IATF 16949:2016 standard, the LG69TASMD comes with GPS+BD5+Galileo+QZSS as a default GNSS constellation and an integrated LNA for improved sensitivity. It can receive and track GPS L1 C/A and L5 and Galileo E1 and E5a signals centered at 1575.42MHz and 1176.45MHz, and BeiDou B1I and B2a signals centered at 1561.098MHz and 1176.45MHz. The ability to receive and track BeiDou signals in conjunction with GPS results in higher coverage, improved reliability, and better accuracy.

RTK Base Click communicates with an MCU using the UART interface, with commonly-used RX and TX pins alongside one data-ready pin (INT), which informs the host MCU to receive data when the buffer transmission is full. It is also equipped with a USB type C connector, which allows the module to be powered and configured by a personal computer (PC) using [FT232RL](#), a compact USB to a serial UART interface device designed to operate efficiently with USB host controllers.

The LG69TASMD module provides RTK data output as a base station, supporting static mode alongside fixed mode, set using corresponding commands. It can use its previously-measured antenna positioning coordinates. If this coordinate has the best effect, this method can ensure that the Rover achieves the best accuracy. The LG69TASMD can also self-survey its coordinates in situations without using other methods to measure the base station antenna. In this mode, the user provides accuracy constraints and the shortest observation time.

In addition to the interface pins, this board uses additional mikroBUS™ pins. An active-low reset signal alongside an onboard RESET button, routed on the RST pin of the mikroBUS™ socket, performs a reset function of the module, while the SHD pin routed on the AN pin of the mikroBUS™ enables the power supply to the LG69TASMD to be switched ON/OFF.

The module can use Boot Download Mode for firmware update via the BT pin routed on the RST pin of the mikroBUS™ socket, alongside a blue LED indicator marked as PPS for time pulse signal information and indication. The module enters Normal operating mode by keeping the BT pin on a low logic state during the Startup sequence. Otherwise, when the pin is high during Startup, the module enters Boot Download Mode. A specific addition to this Click board™ is several testpoints that enable additional module features.

This Click board™ can operate with both 3.3V and 5V MCUs. As its main power supply, the LG69TASMD uses 3.3V obtained from the MCP1826 LDO; additional backup power can be provided using a coin-shaped battery. The board must perform appropriate logic voltage level conversion before using MCUs with different logic levels. However, the Click board™ comes

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equipped with a library containing functions and example code that can be used as a reference for further development.

RTK Technology

The Global Navigation Satellite System (GNSS) is a widely deployed and accepted way to determine precise locations without the need for coverage or signal strength of cellular networks. GNSS combined with RTK can realize precise real-time positioning with positional accuracy down to the centimeter level. Quectel's ultra-compact, low-power GNSS modules, such as LG69T-AS and LG69T-AM, provided in the form of RTK Click boards™, cover the full range of requirements in high precision, dead reckoning, and timing for applications as diverse as ADAS and self-driving, crewless flight, and smart agriculture.

In addition to the software support that MikroE provides for this Click board™ in the form of libraries, functions, or example code, there is also software support provided by Quectel. Quectel's QGNSS evaluation software equips end-users with an easy way to interface to Quectel GNSS modules or boards, enabling easy evaluation, testing, development, and debugging of GNSS.

For all additional support questions, the customers can submit a ticket to our [Technical Support](#) or [Design Service Department](#) page.

Specifications

Type	GPS/GNSS,RTK
Applications	Can be used for many applications requiring a base station, such as surveying, point cloud development, precision farming, and autonomous navigation
On-board modules	LG69TASMD - multi-constellation GNSS module from Quectel Wireless Solutions
Key Features	Base station function, 80 tracking channels and 4 fast acquisition channels, high-performance, high-reliability, supports up to 4 concurrent global constellations (GPS, QZSS, Galileo, and BDS), RTCM 3.x protocol, UART and USB interface, PPS indicator, and more
Interface	UART,USB
Feature	ClickID
Compatibility	mikroBUS™
Click board size	L (57.15 x 25.4 mm)
Input Voltage	3.3V,5V

Pinout diagram

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

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Notes	Pin					Pin	Notes
Shutdown	SHD	1	AN	PWM	16	BT	Boot Download Mode
Reset / ID SEL	RST	2	RST	INT	15	INT	Data Ready Interrupt
Module Wake-Up / ID COMM	WUP	3	CS	RX	14	TX	UART TX
	NC	4	SCK	TX	13	RX	UART RX
	NC	5	MISO	SCL	12	NC	
	NC	6	MOSI	SDA	11	NC	
Power Supply	3.3V	7	3.3V	5V	10	5V	Power Supply
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

RTK Base Click electrical specifications

Description	Min	Typ	Max	Unit
Supply Voltage	-	3.3	-	V
Operating Frequency	1176.45	-	1575.42	MHz
Acquisition Sensitivity	-	-145	-	dBm
Tracking Sensitivity	-	-159	-	dBm
Altitude	-	-	18.000	m

Software Support

We provide a library for the RTK Base 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 RTK Base Click driver.

Key functions

- `rtkbase_generic_read` This function reads a desired number of data bytes by using UART serial interface.
- `rtkbase_rx_bytes_available` This function returns the number of bytes available in the RX ring buffer.
- `rtkbase_calculate_crc24` This function calculates and returns the CRC 24-bit of RTCM3 packet input. The CRC across the whole packet should sum to zero (remainder).

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Example Description

This example demonstrates the use of RTK Base Click boards™ by reading and displaying the RTCM3 messages.

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.RTKBase

Additional notes and informations

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

[YG0063AA datasheet](#)

[RTK Base click 2D and 3D files v100](#)

[RTK Base click schematic v100](#)

[FT2232D datasheet](#)

[LG69T datasheet](#)

[RTK Base click example on Libstock](#)

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[RTK Base click schematic v101](#)

[RTK Base click 2D and 3D files v101](#)

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