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LTE IoT 5 Click

PID: MIKROE-4325

LTE IoT 5 Click is add-on board with compact and cost-effective secure cloud multi-band module solution designed for IoT applications. This board features the SARA-R510M8S, a cellular module that supports LTE-M/NB-IoT* bands with integrated high performance standard precision M8 GNSS receiver for global position acquisition from u-Blox. Board itself is equipped with UART and USB interfaces, Network and Status indicators, familiar AT commands set over the UART interface, USB type C connector for interfacing with software applications. The module is a low power, size-optimized solution specifically designed for IoT, integrating an in-house developed cellular modem, over-the-air firmware updates, end-to-end trusted domain security, and u-Blox's leading GNSS technology. This product is perfect for secure low power IoT applications requiring deeper range (underground) and long battery life.

LTE IoT 5 Click is supported by a mikroSDK compliant library, which includes functions that simplify software development. This Click board™ comes as a fully tested product, ready to be used on a system equipped with the mikroBUS™ socket.

How does it work?

LTE IoT 5 Click is based on the SARA-R510M8S, a cellular module that supports LTE Cat M1/Cat NB2 bands with integrated high-performance standard precision M8 GNSS receiver from u-Blox. It comes in a miniature SARA LGA form factor module that is a drop-in migration from other u-Blox cellular module families. The SARA-R510 series modules provide software-based multi-band configurability enabling international multi-regional coverage in LTE Cat M1/NB2 radio access technologies, supporting a comprehensive set of 3GPP Rel. 14 features that are relevant for IoT applications with data communications up to 1200 kbit/s.

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LTE SMA Antenna Connector
GNSS SMA Antenna Connector
SARA-R510M8S
Configurable GPIOs / External Interrupt
Module Power-On Button
Logic Voltage Level Selector
Power LED Indicator
Network Status LED Indicator

Active GNSS Antenna Voltage Selection
TPS7A7002
USB Type C Connector
NANO SIM Card Holder
Module Status LED Indicator
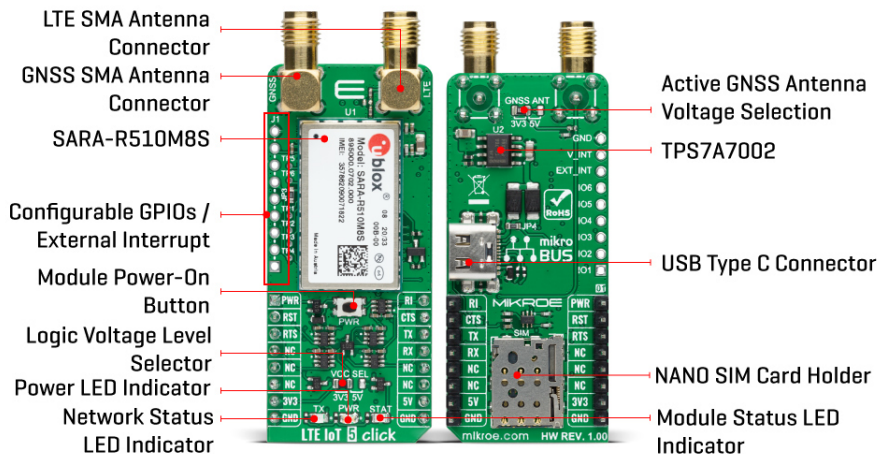
The GNSS RF input of the SARA-R510M8S, designed with 50Ω characteristic impedance and with an internal DC block, is suitable for both active and/or passive GNSS antennas due to the built-in SAW filter followed by an LNA in front of the integrated high performing u-Blox M8 concurrent positioning engine.

This module requires a power supply of 3.8V. Therefore, the Click board™ incorporates an integrated buck (step-down DC-DC) converter, labeled as TPS7A7002 by Texas Instruments. This IC can output up to 3A of current, still maintaining an excellent regulation. Its task is to provide a stable 3.8V power supply, capable of mitigating voltage drops at the input when a high current peak appears (typically at the StartUp of the device).

The SARA-R510M8S communicates with MCU using the UART interface with automatic baud rate detection used for module control from the external application host processor that can be conveniently configured through AT commands that u-Blox provides. This Click board™ is also USB 2.0 compliant, equipped with the USB type C connector with a maximum 480 Mbit/s data rate available for the diagnostic purpose only. The module itself acts as a USB device and can be connected to any USB host equipped with compatible drivers.

Besides two female SMA connectors (for LTE and active GNSS antennas), the LTE IoT 5 Click also has a nano-SIM card slot that provides multiple connections and interface options. The J1 header allows you to access the configurable GPIO and EXT Interrupt pin of the SARA module, while test points labeled from TP1 to TP6 enables you easy FW upgrades and testing of the module.

The onboard active-low push-button labeled as PWR routed to the AN pin on the mikroBUS™ socket represents the Ignition (Power-On) button, which successful action will be indicated by the STAT LED. If the device is already powered up, a LOW pulse with a duration of 1.5s on this pin will power the module down. It is also possible to power down the module by issuing the AT+CPWROFF command or with a Reset function routed to the RST pin on the mikroBUS™ socket that will cause an abrupt Power-Down (forced Power-Down) by sending an active low input on this pin with the duration of 10s.

In addition to the Power LED indicator, this Click board™ has two additional LED indicators: the yellow LED labeled as STAT used to visually indicate the Operational Status of the device, and a red LED labeled as TX used to indicate the Network Status.

Customers can future-proof their solutions through over-the-air firmware updates, thanks to

Mikroe produces entire development toolchains for all major microcontroller architectures.
Committed to excellency, we are dedicated to helping engineers bring the project development up to speed and achieve outstanding results.

ISO 27001: 2013 certification of informational security management system.
ISO 14001: 2015 certification of environmental management system.
OHSAS 18001: 2008 certification of occupational health and safety management system.

ISO 9001: 2015 certification of quality management system (QMS).

the uFOTA client/server solution that utilizes LwM2M, light and compact protocol ideal for IoT. We have also provided accessible test points directly connected to the TxD and RxD pins for FW upgrade purposes.

This Click board™ can be interfaced with both 3.3V and 5V MCUs because a proper logic voltage level conversion is performed by appropriate voltage level shifters, while the on-board LDOs are ensuring that the module is powered by recommended voltage levels.

Specifications

Type	GPS/GNSS,LTE IoT
Applications	LTE IoT 5 Click is ideal for stationary IoT applications that send data only at intermittent intervals such as metering and smart city applications
On-board modules	SARA-R510M8S - two in one package module with the LTE Cat M1/Cat NB2* and integrated GNSS M8 chipset from u-Blox.
Key Features	Optimized specifically for IoT applications, international multi-regional coverage in LTE Cat M1 / NB2 radio access technologies, supporting a comprehensive set of 3GPP Rel. 14 features, interface options and an integrated IP stack, over-the-air firmware updates, integrated GNSS M8 chipset
Interface	GPIO,UART,USB
Feature	No 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 LTE IoT 5 Click corresponds to the pinout on the mikroBUS™ socket (the latter shown in the two middle columns).

Notes	Pin	mikro™ BUS			Pin	Notes
Power-On	**PWR**	1	AN	PWM	16	**RI**	Ring Indicator
Reset	**RST**	2	RST	INT	15	**CTS**	Clear to Send
Ready to Send	**RTS**	3	CS	RX	14	**TX**	UART TX (transmit)
	NC	4	SCK	TX	13	**RX**	UART RX (receive)
	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

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Onboard settings and indicators

Label	Name	Default	Description
LD1	PWR	-	Power LED Indicator (Green)
LD2	TX	-	Network Status LED Indicator (Red)
LD3	STAT	-	Module Status LED Indicator (Yellow)
T1	PWR	-	Module Power-On Button
JP1	VCC SEL	Left	Logic Voltage Level Selection 3V3/5V: Left position 3V3, Right position 5V
JP2	GNSS ANT	Left	Active GNSS Antenna Voltage Selection 3V3/5V: Left position 3V3, Right position 5V
JP3	-	Populated	UART Data Terminal Ready / AUX UART Data Input (Active Low)
JP4	-	Populated	USB Detect Input (Remove 0 ohm resistor for disabling this feature)
TP1	-	-	UART Request to Send - Test point
TP2	-	-	UART Clear to Send - Test point
TP3	-	-	UART Data Output - Test point
TP4	-	-	UART Data Input - Test point
TP5	-	-	UART Data Set Ready / AUX UART Request to Send - Test point
TP6	-	-	UART Data Carrier Detect / AUX UART Data Output - Test point
J1	-	Unpopulated	Configurable GPIO / Interrupt Pins

LTE IoT 5 Click electrical specifications

Description	Min	Typ	Max	Unit
Supply Voltage	-0.3	-	7	V
Operating Frequency Range	700	-	2100	MHz
Operating Temperature Range	-40	-	+85	°C

Software Support

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We provide a library for the LTE IoT 5 Click as well as a demo application (example), developed using MikroElektronika compilers. The demo can run on all the main MikroElektronika development boards.

Library Description

The library covers all the necessary functions to control LTE IoT 5 Click board™.

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

Key functions:

- void lteiot5_cfg_setup (lteiot5_cfg_t *cfg); - Config Object Initialization function.
- LTEIOT5_RETVAL lteiot5_init (lteiot5_t *ctx, lteiot5_cfg_t *cfg); - Initialization function.
- void lteiot5_default_cfg (lteiot5_t *ctx); - Click Default Configuration function.

Examples description

This example reads and processes data from LTE IoT 5 Click.

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

Other mikroE Libraries used in the example:

- MikroSDK.Board
- MikroSDK.Log
- Click.LTEIoT5

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. The terminal available in all MikroElektronika compilers, or any other terminal application of your choice, can be used to read the message.

mikroSDK

This Click board™ is supported with mikroSDK - MikroElektronika 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™

Downloads

SARA-R510M8S datasheet

AT command manual

LTE IoT 5 click 2D and 3D files

LTE IoT 5 click schematic

TPS7A7002 datasheet

LTE IoT 5 click example on Libstock