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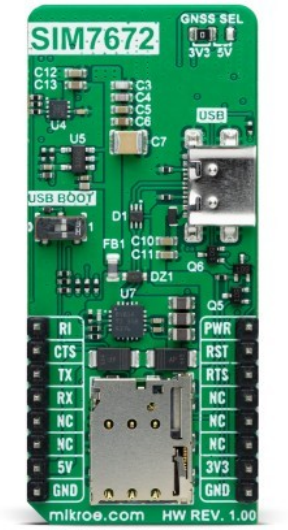
LTE Cat.1 7 Click



PID: MIKROE-6434

LTE Cat.1 7 Click is a compact add-on board designed for reliable LTE Cat 1 connectivity and GNSS support. This board features the SIM7672E module from SIMCom, which incorporates the QCX216 chipset, supporting LTE-FDD mode with multi-band coverage for Europe and Australia. The module offers data rates of up to 10Mbps downlink and 5Mbps uplink, supports multi-constellation GNSS, and supports drivers for operating systems like Windows, Linux, and Android. Key features include a UART interface for communication, a USB Type-C connector for power and data, firmware upgrade functionality, and visual indicators for network and power status. This Click board™ is ideal for various IoT applications, such as telematics, metering, surveillance devices, industrial routers, and remote diagnostics.

For more information about **LTE Cat.1 7 Click** visit the official product page.

How does it work?

LTE Cat.1 7 Click is based on the SIM7672E, an LTE Cat 1 module based on the latest QCX216 chipset from SIMCom with coverage for regions like Europe and Australia. The SIM7672E supports LTE-FDD wireless communication mode and has a maximum 10Mbps downlink rate and 5Mbps uplink rate. Besides, it also supports multiple LTE bands (B1/B3/B7/B8/B20/B28), integrates a multi-constellation GNSS support with multiple built-in network protocols, and supports drivers for operating systems (USB driver for Windows, Linux, and Android) and AT commands. Based on its broad features, this Click board™ is suitable for many IoT applications such as telematics, metering, surveillance devices, industrial routers, and remote diagnostics.

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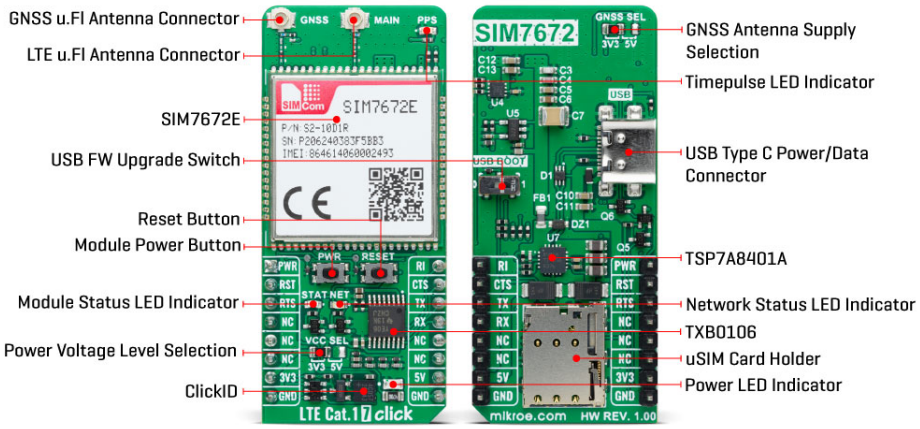

Communication between the SIM7672E and the host MCU is made through a UART interface, using standard UART RX and TX pins and hardware flow control pins (CTS/RTS/RI - Clear to Send/Ready to Send/Ring Indicator) for data transfer. The module defaults to a communication speed of 115200bps, allowing for data exchange over AT commands. This Click board™ also includes a USB Type C connector for both power and data transfer, which is compliant with the USB 2.0 specification (peripheral only). In addition to this interface, the board also features a USB FW upgrade switch on the back of the board labeled USB BOOT to manage firmware upgrades. This switch has positions 0 for normal operation and 1 for firmware upgrades over USB, ensuring a straightforward upgrade process.

The LTE Cat.1 7 Click includes several additional functionalities that enhance its usability and control. The PWR button allows users to easily power the module on or off, while the RESET button provides a quick way to reset the module. These functions can also be controlled digitally via the mikroBUS™ pins PWR and RST, offering greater flexibility. Moreover, these controls have dedicated test points for easier debugging and testing. The board also features some visual indicators to provide real-time status updates.

The first yellow NET LED indicates the module's current network status. When the LED is always on, the device searches for a network. A faster blinking pattern (200ms ON/OFF) indicates data transmission or 4G network registration. When the LED is off, the device is powered OFF or sleep mode. The second red STAT LED indicates the module's power status, which stays off when the module is OFF and turns ON when the module is powered on. The third green PPS LED indicator emits a synchronized pulse signal from the SIM7672E once per second.

The board features two u.FI connectors for LTE and GNSS antennas that MIKROE offers, like the LTE Flat Rotation Antenna and Active GPS Antenna, combined with an IPEX-SMA cable for flexible and efficient connectivity options. In addition, the users can easily choose the power supply of the GNSS antenna by choosing between 3.3V and 5V on the GNSS ANT jumper. The board is equipped with a micro SIM card holder that supports both 1.8V and 3.0V uSIM cards, ensuring compatibility with a wide range of cellular networks and allowing users to select the most appropriate service provider for their particular use case.

This Click board™ can operate with both 3.3V and 5V logic voltage levels selected via the VCC SEL jumper. Since the SIM7672E module operates at 3.8V, a logic-level translator, the TXB0106 is 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

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equipped with a library containing easy-to-use functions and an example code that can be used as a reference for further development.

Specifications

Type	GSM/LTE
Applications	Ideal for various IoT applications, such as telematics, metering, surveillance devices, industrial routers, and remote diagnostics
On-board modules	SIM7672E - LTE Cat 1 module based on the latest QCX216 chipset from SIMCom
Key Features	LTE-FDD communication mode, coverage for Europe and Australia, multi-band LTE support, multi-constellation GNSS, USB-C for power and high-speed data transfer, micro SIM, firmware upgrade support, and more
Interface	UART,USB
Feature	ClickID
Compatibility	mikroBUS™
Click board size	L (57.15 x 25.4 mm)
Input Voltage	3.3V or 5V,External

Pinout diagram

This table shows how the pinout on LTE Cat.1 7 Click corresponds to the pinout on the mikroBUS™ socket (the latter shown in the two middle columns).

Notes	Pin	mikroBUS™				Pin	Notes
Module Power-ON	**PWR**	1	AN	PWM	16	**RI**	Ring Indicator
Reset / ID SEL	**RST**	2	RST	INT	15	**CTS**	UART CTS
UART RTS / ID COMM	**RTS**	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	STAT	-	Module Operational Status LED Indicator
LD3	NET	-	Network Activity Status LED Indicator
LD4	PPS	-	Timepulse LED

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			Indicator
JP1	VCC SEL	Left	Power Voltage Level Selection 3V3/5V: Left position 3V3, Right position 5V
JP2	GNSS ANT	Left	GNSS Antenna Supply Selection 3V3/5V: Left position 3V3, Right position 5V
T1	RESET	-	Module Reset Button
T2	PWR	-	Module Power-ON Button
SW1	USB BOOT	Left	USB FW Upgrade Switch 0/1: Left position 0, Right position 1
TP1	RESET	-	Module Reset Test Point
TP2	PWR	-	Module Power-ON Test Point

LTE Cat.1 7 Click electrical specifications

Description	Min	Typ	Max	Unit
Supply Voltage	3.3	-	5	V
LTE Frequency Range	703	-	2690	MHz
LTE Output Power	-	-	+23	dBm
GNSS Frequency Range	1559	-	1609	MHz
GNSS Horizontal Position Accuracy	-	0.8	-	m
GNSS Tracking Sensitivity	-	-166	-	dBm

Software Support

LTE Cat.1 7 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

Application example shows device capability of connecting to the network and sending SMS or TCP/UDP messages, or retrieving data from GNSS using standard "AT" commands.

Key Functions

- ltecat17_cfg_setup Config Object Initialization function.
- ltecat17_init Initialization function.
- ltecat17_set_sim_apn This function sets APN for sim card.
- ltecat17_cmd_run This function sends a specified command to the Click module.
- ltecat17_set_power_state This function sets a desired power state by toggling PWR pin with a specific time for high state.

Application Init

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Initializes the driver and logger.

Application Task

Application task is split in few stages:

- LTECAT17_POWER_UP:

  Powers up the device, performs a device factory reset and reads system information.

- LTECAT17_CONFIG_CONNECTION:

  Sets configuration to device to be able to connect to the network (used only for SMS or TCP/UDP demo examples).

- LTECAT17_CHECK_CONNECTION:

  Waits for the network registration indicated via CEREG command and then checks the signal quality report (used only for SMS or TCP/UDP demo examples).

- LTECAT17_CONFIG_EXAMPLE:

  Configures device for the selected example.

- LTECAT17_EXAMPLE:

  Depending on the selected demo example, it sends an SMS message (in PDU or TXT mode) or TCP/UDP message or waits for the GPS fix to retrieve location info from GNSS. By default, the TCP/UDP example is selected.

In order for the examples to work (except GNSS example), user needs to set the APN and SMSC (SMS PDU mode only) of entered SIM card as well as the phone number (SMS mode only) to which he wants to send an SMS. Enter valid values for the following macros: SIM_APN, SIM_SMSC and PHONE_NUMBER_TO_MESSAGE.

Example:

- SIM_APN "internet"
- SIM_SMSC "+381610401"
- PHONE_NUMBER_TO_MESSAGE "+381659999999"

Application Output

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

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- 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

LTE Cat.1 7 click example package

LTE Cat.1 7 click 2D and 3D files v100

SIM7672 datasheet

SIM767xx series AT command manual

LTE Cat.1 7 click schematic v100