

LooUQ MTC2-N9151

Getting Started Guide

Thank you for purchasing the MTC2-N9151 embedded modem. As LooUQ's flagship MTC.2 device, the MTC2-N9151 supports several LPWAN wide-area applications, including terrestrial cellular (LTE-M, NB-IoT), non-terrestrial networking (NTN), and DECT-NR+. Whatever your communication needs, this guide will help you get started. For detailed instructions on using the MTC2-N9151 in each of these scenarios, see the technology-focused Getting Started Guides.

This guide assumes you are using the MTC2-N9151 with either the Breakout (MTC2-N9151-BRK) or UXplor (MTC2-N9151-UXP) development board. Both boards provide access to key MTC2-N9151 functions, including power, debug/flash (SWD), reset, and GPIO. UXplor adds USB-C supplied power and an RGB-LED display (I₂C) for convenience to the straight through Breakout. When you are ready to create your own application board design, it will reuse the concepts demonstrated here.

Navigating the Breakout/UXplor Development Boards

The Breakout and UXplor development boards have a nearly identical layout, with the UXplor board adding some features. Below, a UXplor with a MTC2-N9151 installed on it.

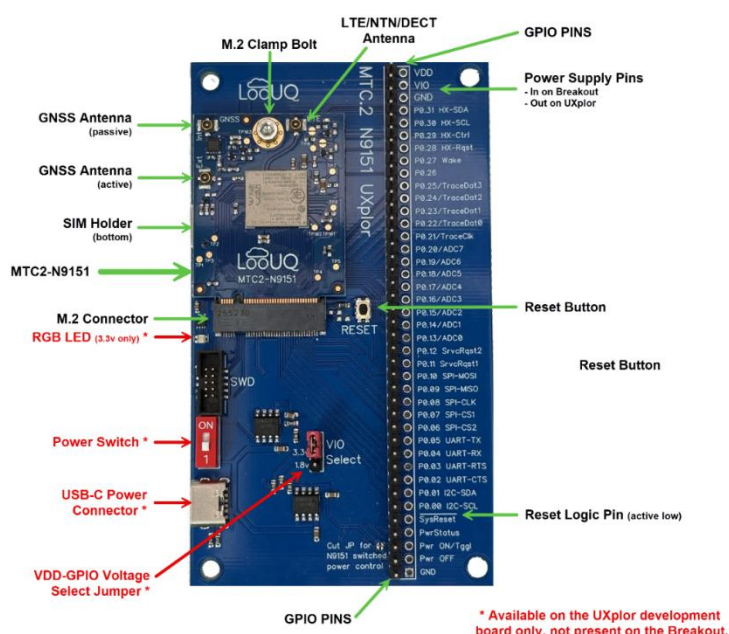


Figure 1-UXplor with MTC2-N9151



Figure 2-Breakout (empty)

Power/Reset

The MTC2-N9151 requires two power supply rails: VDD and VDD-GPIO. The VDD supply is the primary source of power to the MTC2-N9151, while VDD-GPIO acts as a reference voltage for components interfacing with the MTC2-N9151 (including GPIO, I2C, SPI, UART, etc.).

The MTC2-N9151 requires the same voltage levels as the nRF9151 SIP on the board.

Nordic Semiconductor specifications call for

- **VDD:** 3.0 V to 5.0 (5.5 V maximum)
- **VDD-GPIO:** 1.7 V to 3.6 V
- Peak power efficiency is achieved with VDD at 3.7 volts.

Reset is available as a physical button and as a logical I/O pin. The reset button is found immediately to the right of the M.2 connector. The logical I/O pin is active-low.

Breakout

The Breakout board provides a straight through connection to the MTC2-N9151. Users must provide external power to the Breakout board for both VDD and VDD-GPIO.

UXplor

UXplor has integrated power supplies for both VDD and VDD-GPIO. The USB-C connector near the lower-left corner of the board provides the power to run the MTC2-N9151 and UXplor. The switch immediately above the USB-C connector controls the UXplor power supplies.

Inserting/Removing the SIM Card

The MTC2-N9151 has a micro-SIM (4FF) card slot on the bottom of the device, facing left when viewed from above. It operates as a push-push latched card holder. The micro-SIM is the smallest form found in typical tri-format SIMs in wide distribution.

Inserting

1. Position the SIM with the contacts facing up and the corner notch towards the MTC2-N9151 as shown.
2. Push the SIM in until it stops... that's it.



Removing

1. Push the SIM in fully to release the latch and let the card slide out by itself.
2. Once released, pull the card out and free of the device.

Adding/Removing the MTC2-N9151

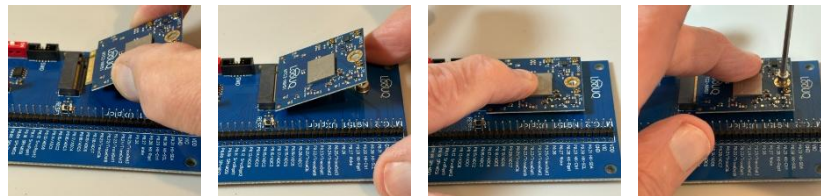
MTC2-N9151 mounts on the Breakout/UXplor development boards in a manner like any other M.2 form-factor board. If you have swapped out memory in your laptop, you are already a pro. If you need a refresher, follow along. The bolt that secures the MTC2-N9151 is a metric 2mm hex head.

Inserting

1. Position the MTC2-N9151's edge connector into the M.2 connector slot at approximately a 45-degree angle.
2. Carefully slide the MTC2-N9151 into the M.2 connector slot.
3. Once fully inserted, press the MTC2-N9151 down on to the bolt support.
4. Insert the bolt securing the device. Moderately tighten the bolt.

Removing

1. Remove any antenna connections or ensure they are not tangled.
2. Remove the bolt by unscrewing it and releasing the modem.
3. Lift the bolt end of the modem up until it is at a 45-degree angle to the M.2 connector.
4. Carefully slide the MTC2-N9151 out of and away from the M.2 connector.



Antenna Connections

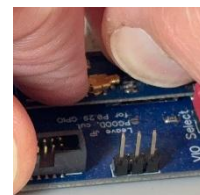
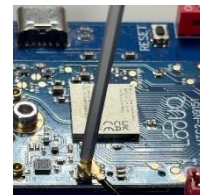
There are 3 antenna connectors on the MTC2-N9151: 2 for GNSS and 1 for LTE/NTN/DECT-NR. All three are standard U.FL/IPEX/UMCC type. The MTC2-N9151 GNSS subsystem supports both passive antennas (without an internal low-noise amplifier, LNA) and active antennas (those antennas with an embedded LNA). For passive GNSS antennas, the MTC2-N9151 has an onboard LNA and noise filter, for active antennas the device has a power-injector circuit for the remote LNA; this is why there are two antenna connectors for GNSS applications.

Attaching

Align the antenna cable with the female connector facing down over the board's male connector. Once aligned, push straight down to snap the connectors together; using a blunt tool can be useful when applying pressure to the back of the connector and making it seat. Once connected, the joint should be able to swivel slightly without coming apart.

Detaching

Gently pull the connector up at the cable entrance, support the board connector by placing your finger on one of the connector flanges to reduce stress on its solder joints. The U.FL/IPEX/UMCC type connector is designed for constrained spaces, not designed for frequent mating.



Programming the MTC2-N9151

The nRF9151 at the heart of the MTC2-N9151 includes two cores: an application core and a modem core. The application core is an Arm Cortex-M33 that runs your application code. The modem core handles communications processing; its only supported programming operation is loading Nordic-provided firmware.

To program modem firmware you will need the Nordic [nRF Connect for Desktop](https://www.nordicsemi.com/Products/Development-tools/nRF-Connect-for-Desktop) application. This utility is available for free download from Nordic Semiconductor. nRF Connect for Desktop is a suite of tools to support any Nordic Semiconductor product.

<https://www.nordicsemi.com/Products/Development-tools/nRF-Connect-for-Desktop>

If you are just getting started with Nordic Development, we strongly recommend the Nordic Developer Academy as a first step. In the Fundamentals course you will learn how to use the Nordic supplied tools and the organization of SDK.

If you purchased a LooUQ Quick-Start kit your modem firmware will already be loaded on your device.

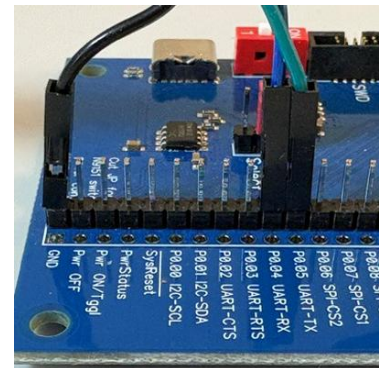
Talking to the MTC2-N9151

Most users will initially talk to the MTC2-N9151 over serial using a terminal program (there is an excellent serial terminal in the nRF Connect for Desktop suite). The LooUQ Quick-Start kits all come preloaded with a shell application program (the program runs in the application core); this allows you to interact with the MTC2-N9151 without writing code initially.

Your serial connection must be logic or TTL level (3.3 volts) voltage to be compatible with the Breakout/UXplor development boards. The default serial setup is 115200 baud, 8 data bits, 1 stop bit, no parity; this configuration does not use handshake (RTS/CTS).

- TX (transmit) pin on the Breakout/UXplor is connected to your cable's RXD (receive) socket (green wire).
- RX pin on the Breakout/UXplor is connected to your cable's TXD socket (blue wire).
- A ground connection between the Breakout/UXplor and your serial adapter is required (black wire).

The common device to use for this type of connection can be purchased online for \$10 - \$20. This DSD Tech [USB-Serial cable](#) has been tested and works with the MTC2-N9151.



MTC2-N9151 Power Saving Options

The two LEDs on the MTC2-N9151 can be disabled to save power. The green LED is always on when the MTC2-N9151 is powered on; the blue LED illuminates when either of the RF circuits are on (LTE/NTN or GNSS).

The MTC2-N9151 automatically cuts power to the onboard GNSS LNA and the external active GNSS antenna power injection circuit.

