Getting Started with nRF93M1 DK

v0.4

Contents

Revision history

Date	Version	Description
2026.07.03	0.4	Updated content, nRF Cloud provisioning details and screenshots. Version for the modem firmware (MFW) version 1.4.1 of the nRF93M1 DK v0.4.
2026.04.17	0.3	First version for the modem firmware version (MFW) v1.3 and v0.3 of the nRF93M1 DK

1. Introduction

This guide gets you started with your new nRF93M1 Development Kit (DK) for the first time. It covers how to familiarize yourself with the nRF93M1 Cat 1 bis connectivity module, how to connect to send data, nRF Cloud connectivity and location services, and power consumption measurements.

In addition to this getting started guide, the following documents are available and recommended for reference.

- nRF93M1 DK Hardware User Guide
- nRF93M1 Datasheet
- nRF93M1 Design and Verification Guide
- nRF93M1 AT Command Guide

The nRF93M1 firmware currently supports the following connectivity stack options:

- IPv4 and IPv6
- TCP and UDP
- TLS and DTLS
- CoAP
- HTTP(S)

Other stack options such as MQTT and FTP are not yet supported and should not to be used.

For any questions or feedback contact your local sales department, field application support, or contact us on DevZone.

2. Hardware requirements

To follow this guide, make sure you have all the required hardware. The package from Nordic Semiconductor contains the following:

- nRF93M1 Development Kit (DK)
- Antenna with SMA connector from Taoglas
- SIM Card from Onomondo
- USB-C cable (Not available in the package)

3. Board Overview and Assembly

The nRF93M1 DK is a development kit that contains the nRF93M1-LABA module, an nRF54L15 host MCU option, and an nRF5340 board controller MCU with SEGGER J-Link support.

It also includes features that enable power consumption measurements and support firmware development for the nRF54-based host MCU.

This getting started guide focuses on accessing the nRF93M1 from a PC over USB to test connectivity, nRF Cloud services, and power consumption.

It does not cover how to get started with nRF54L15 host MCU application development using Nordic's nRF Connect for Desktop and nRF Connect SDK environments. For assistance with this, contact our sales or technical support on DevZone.

The assembly process is as follows:

1. Attach the antenna to the SMA connector on the kit and ensure it is properly connected.
2. Insert the SIM card in the SIM socket and press until you notice a click and the SIM is secured.

Figure 1 nRF93M1-DK with SIM inserted and antenna connected

4. Prerequisites

To complete this getting started guide you need the following:

- PC or Laptop with USB connectors
- USB C cable connected to a port with minimum 500mA power delivery support
- nRF Command Line Tools (nRF Util)
- nRF Connect for Desktop
- Serial terminal tool
    - Serial Terminal app, PuTTY, and so on

This guide uses nRF Connect for Desktop Serial Terminal in all examples.

To connect and use the nRF Cloud for messaging and location services, you will need:

- nRF Cloud account. Free setup. See https://nrfcloud.nordicsemi.com/pricing/.
- Python3 with pip installed to run the nRF Cloud onboarding script.

In addition, the Power Profiler Kit II (PPK2) is recommended if you are interested in testing and measuring power consumption.

5. USB and Serial Terminal connection

It is recommended to install nRF Util, as it is used later in this getting started guide.
Refer to the following documentation for installations:

- Installing nRF Util
- Installing the nRF Command Line Tools

To ensure nRF Util is installed correctly, enter the following in our command line window:

```
nrfutil –version
```

For more information, see the following documentation:

- nRF Command Line Tools
- nRF Util

Complete the following steps for USB and Seral Terminal connections:

1. Connect USB1 on the nRF93M1 DK to the PC.

Figure 2 nRF93M1 DK connected to USB and antenna mounted

2. Open a command line window and send the **nrfutil device list** command to check that the AT COM port, ***vcom: 1*** is the port that communicates with the nRF93M1 DK:

```
PS C:\> nrfutil device list
1059935161
Product          J-Link
Ports            COM38, vcom: 0
                 COM39, vcom: 1
Traits           jlink, seggerUsb, serialPorts, usb

Supported devices found: 1

PS C:\>
```

Figure 3 nrfutil device listing terminal window showing COM39 connected to nRF93M1 DK

3. Open your Serial Terminal, select **vcom1** as the COM port, and set the baud rate to 115,200 bps:

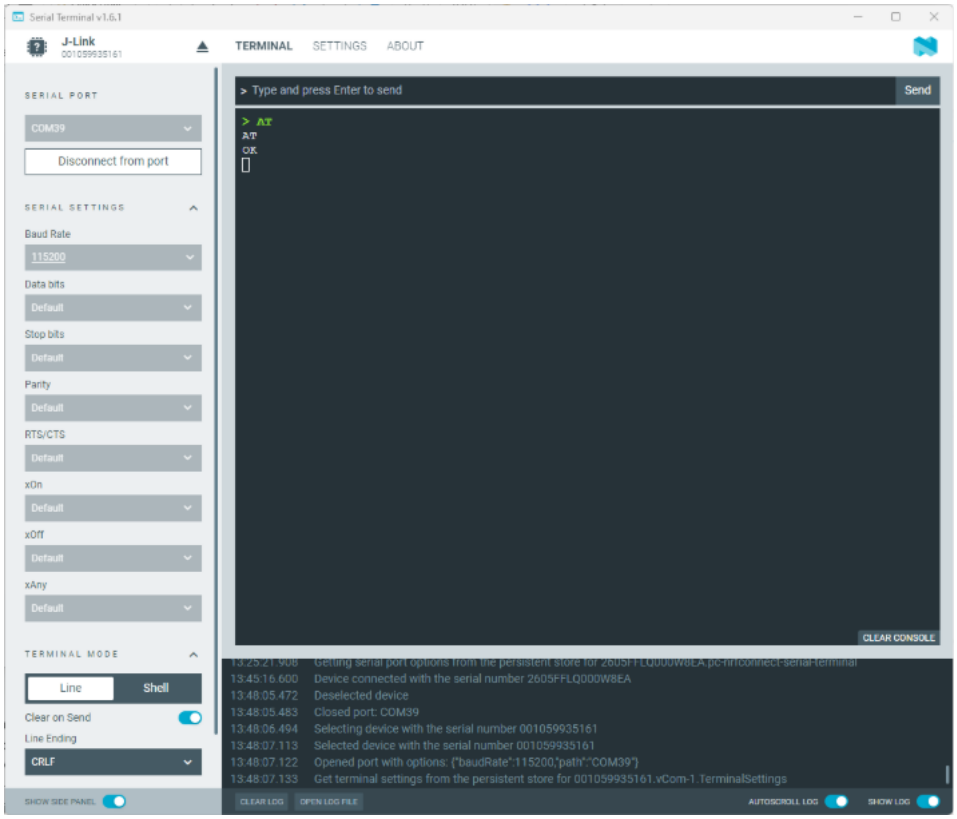


Figure 4 nRF Connect for Desktop Serial Terminal window

You can now send AT commands to test the nRF93M1 DK and nRF93M1 module.

6. AT Commands

The nRF93M1 supports an optimized set of 3GPP standard and Nordic propriety AT commands for enabling easy and efficient Cat 1 bis connectivity for cellular IoT devices. The following AT commands are useful for verifying communication and setup.

The **AT** command is used to check communication with the module.
The command has no parameters.

```
AT
OK
```

If the module is ready, it responds **OK**.

Check the functional mode:

```
AT+CFUN?
+CFUN: 0
OK
```

This confirms that the module boots in minimum functionality mode (**CFUN=0**) as intended.

Unlike most Cat 1 bis modules, it provides full control before the modem attempts to attach to the network.

Verify that the SIM is connected and detected by the nRF93M1 module.
Put the module in offline or flight functionality mode for the SIM verification to work.

```
AT+CFUN=4
OK
AT+CPIN?
+CPIN: READY
```

Check Nordic modem firmware version (mfw) for verification:

```
AT+CGMR
mfw_nrf93m1_1.3.0
OK
```

The correct output will be **mfw_nrf93m1_1.3.0** (or the latest modem firmware version).

7. Network Connection Step by Step

Complete the following steps to connect the nRF93M1 module to the network and ensure everything is configured before enabling the modem.

1. Confirm **CFUN=4** if you followed the previous steps, or **CFUN=0** if you started directly with the network connection:

```
AT+CFUN?
+CFUN: 4
OK
```

2. Run **+CEREG** command to subscribe to unsolicited *EPS* network registration status notifications.
   This allows you to monitor the module's network connection without polling.

```
AT+CEREG=5
OK
```

3. Enable packet domain event reporting using the **+CGEREP** commands, which enables unsolicited notifications when PDP/PDN contexts activate, deactivate, or change - indicating when your data connection goes up or down:

```
AT+CGEREP=1
OK
```

4. Use **CFUN** to connect to the network:

```
AT+CFUN=1
OK
```

The expected output using this sequence and the supplied Onomondo SIM is shown in the following figure:

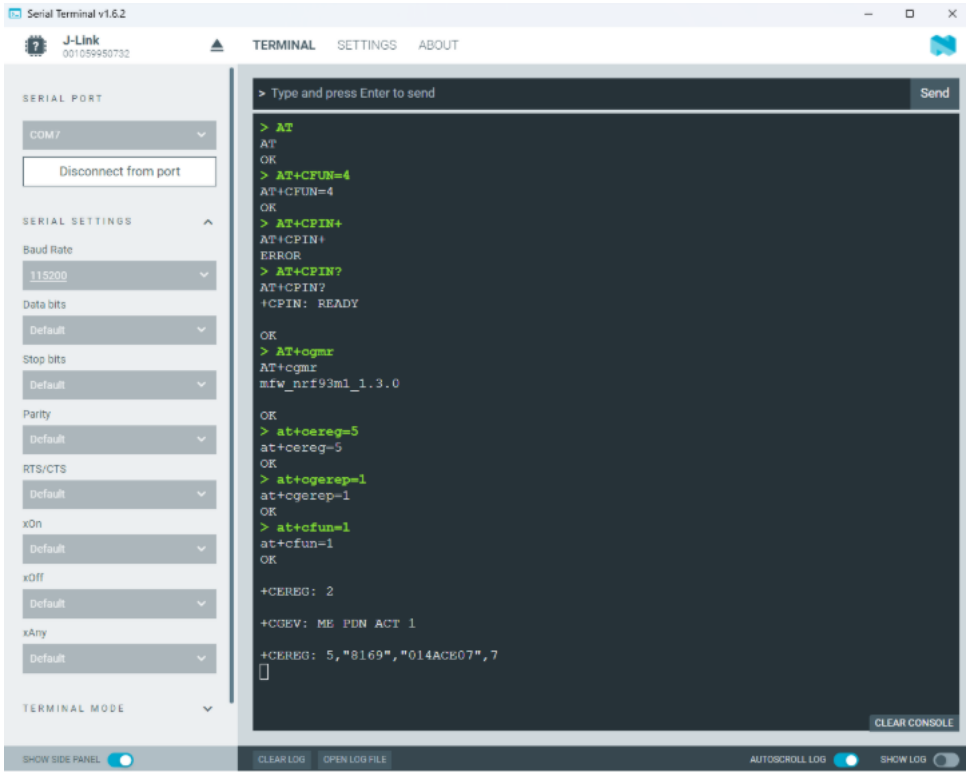


Figure 5: Connecting to the network and expected response

You can now test the connectivity by sending an ICMP echo request:

```
AT%PING=8.8.8.8
OK
```

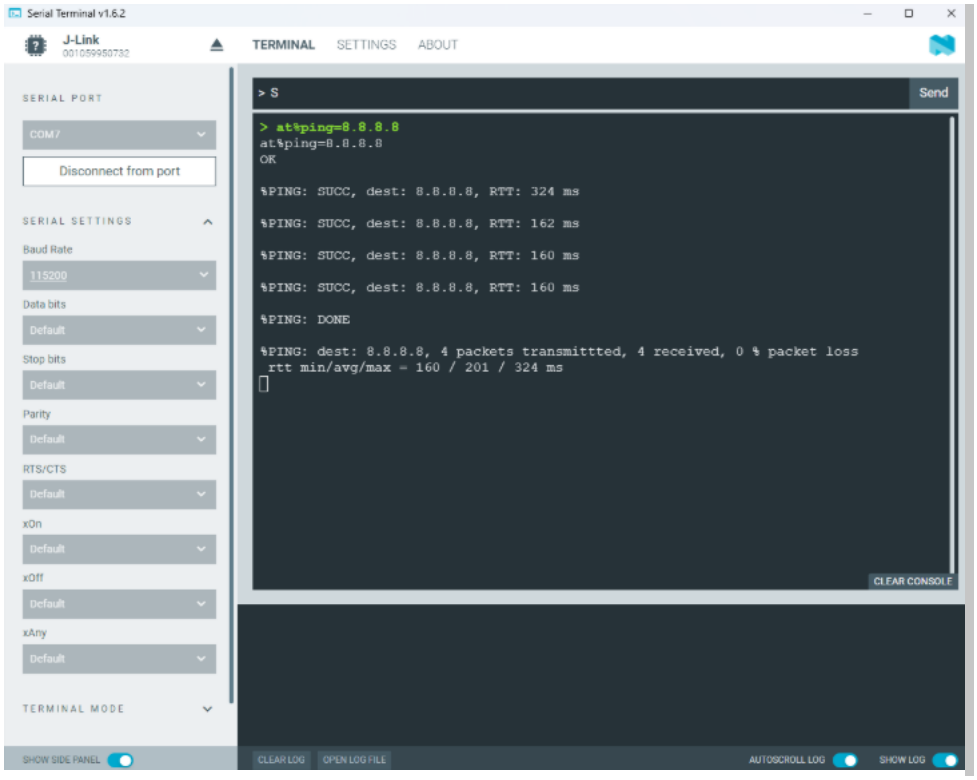


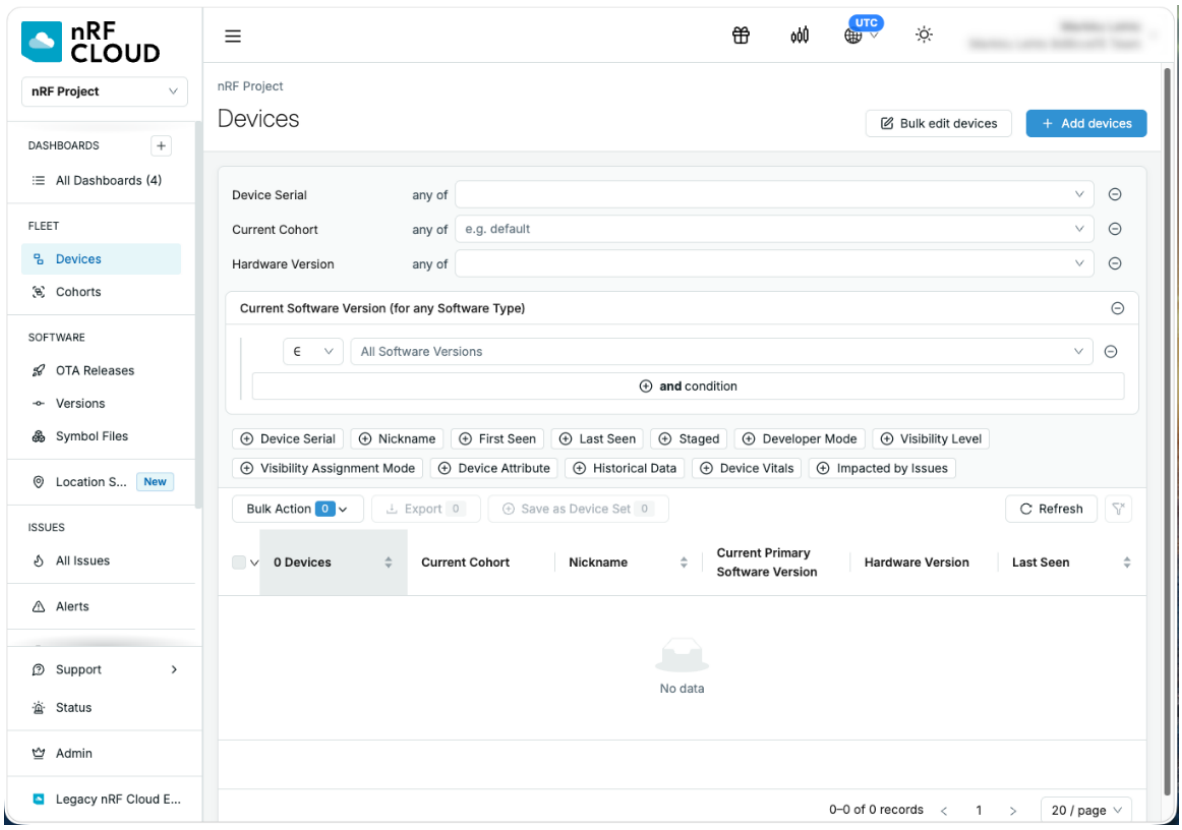
Figure 6: %PING with expected response (the “transmittted” typo fixed in the latest firmware release)

8. Connecting to nRF Cloud

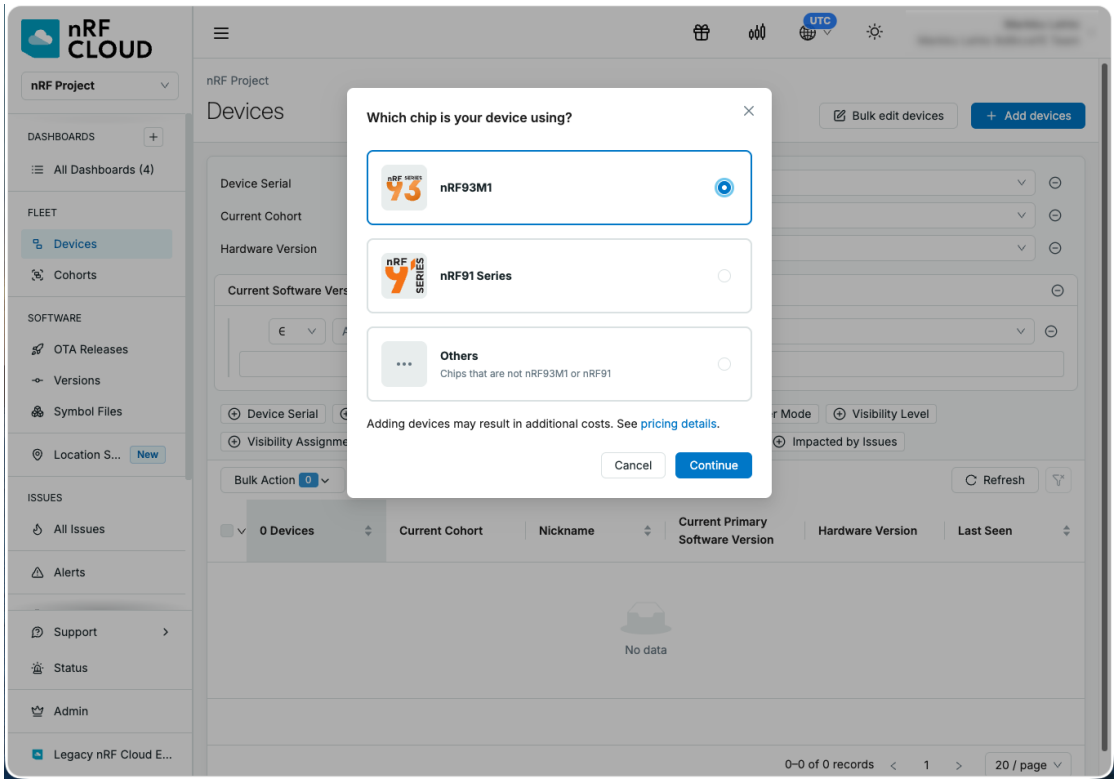
With an LTE connection enabled, nRF93M1 DK is ready and allows seamless interaction with nRF Cloud for sending messages and using Location Services.

Before using nRF Cloud, you must provision the nRF93M1 DK to your account by completing the following steps:

1. Register for a free nRF Cloud Account.
2. After signing in to nRF Cloud powered by Memfault, navigate to **Fleet** -> **Devices** in the left-hand navigation menu and in the top-right corner, click on **+ Add New Devices**:

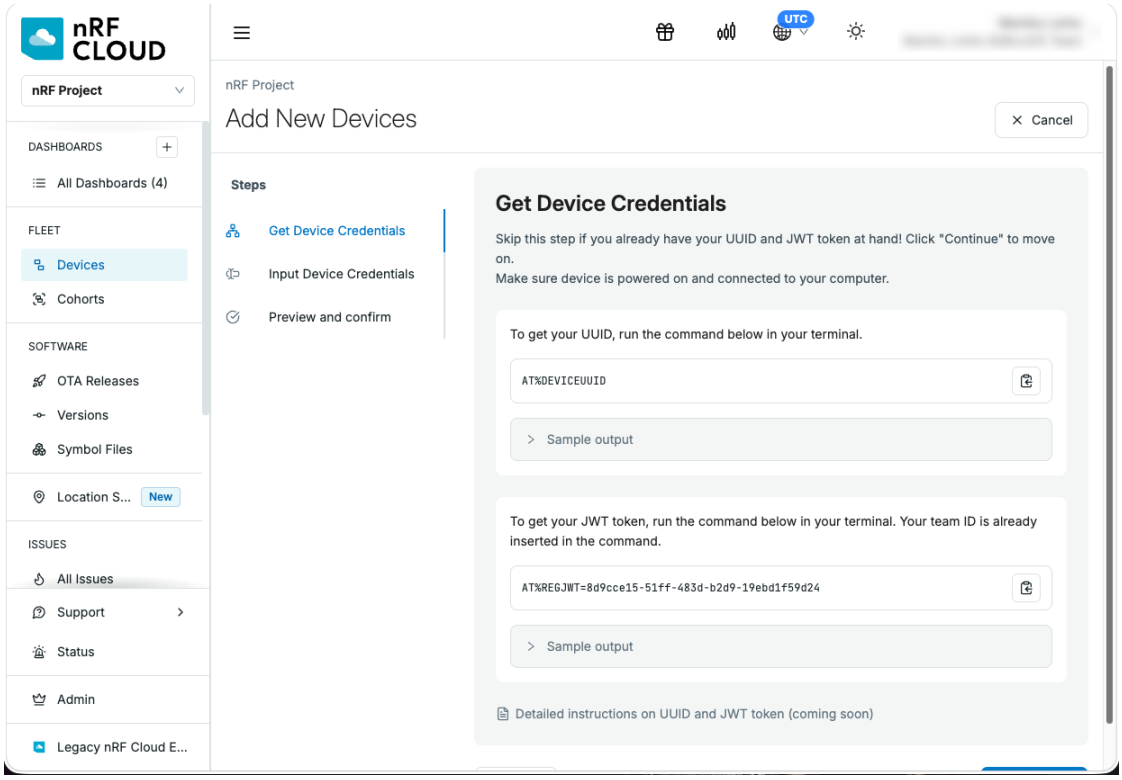


3. Select the nRF93M1 from the experience chooser:



4. Make sure that you have the Team-ID ready for using the AT commands **AT%DEVICEUUID** and **AT%REGJWT**. Note that Team-ID is prepopulated for you so you can copy it to the serial terminal as provided. If it is not, please follow these instructions how to get your team-id:

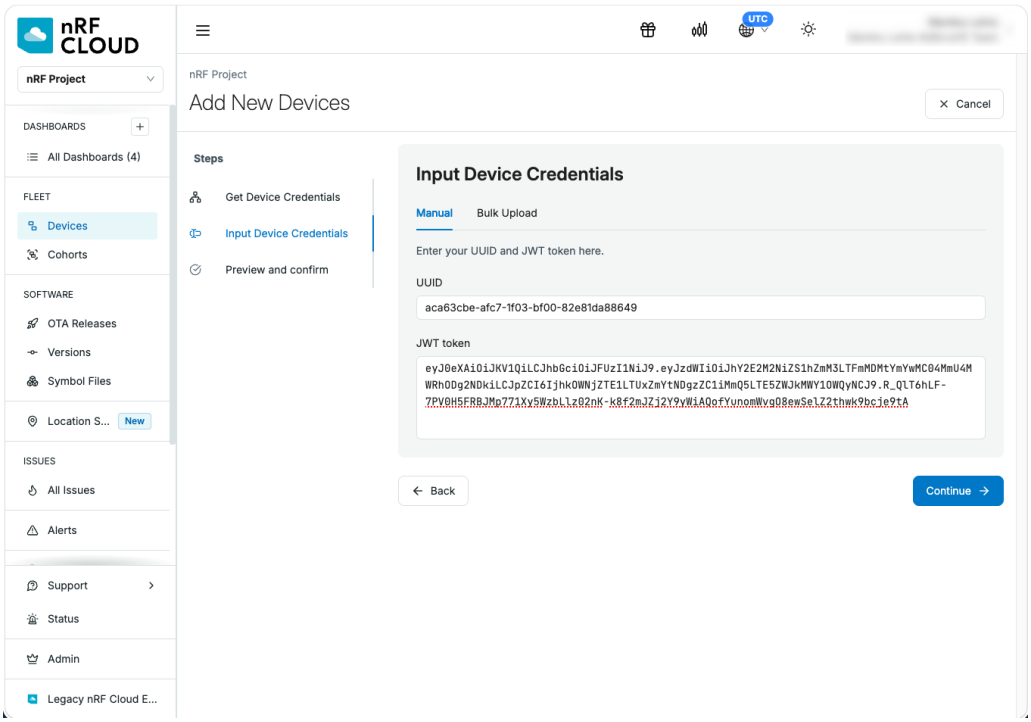
    1. Navigate to Legacy nRF Cloud Experience.
    2. Click on the bottom left-hand panel.
    3. Click top-right hamburger menu and select Team.
    4. Find your Team ID, which is displayed in the top middle section of the screen. Note this ID.
    5. Return to the new nRF Cloud experience by clicking **Memfault** in the bottom-left panel.



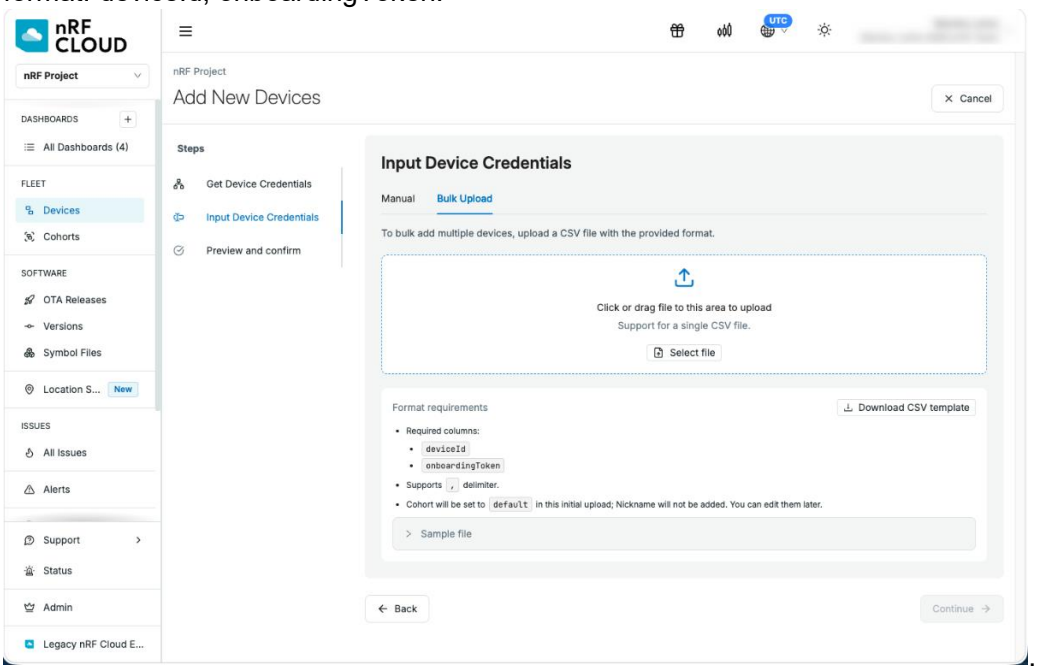
5. Open your serial terminal and run the two AT commands: **AT%DEVICEUUID** and **AT%REGJWT**. If you encounter errors, please retry.

6. Input your UUID and JWT token:

   a. Single: Paste your UUID and JWT into the text entry:

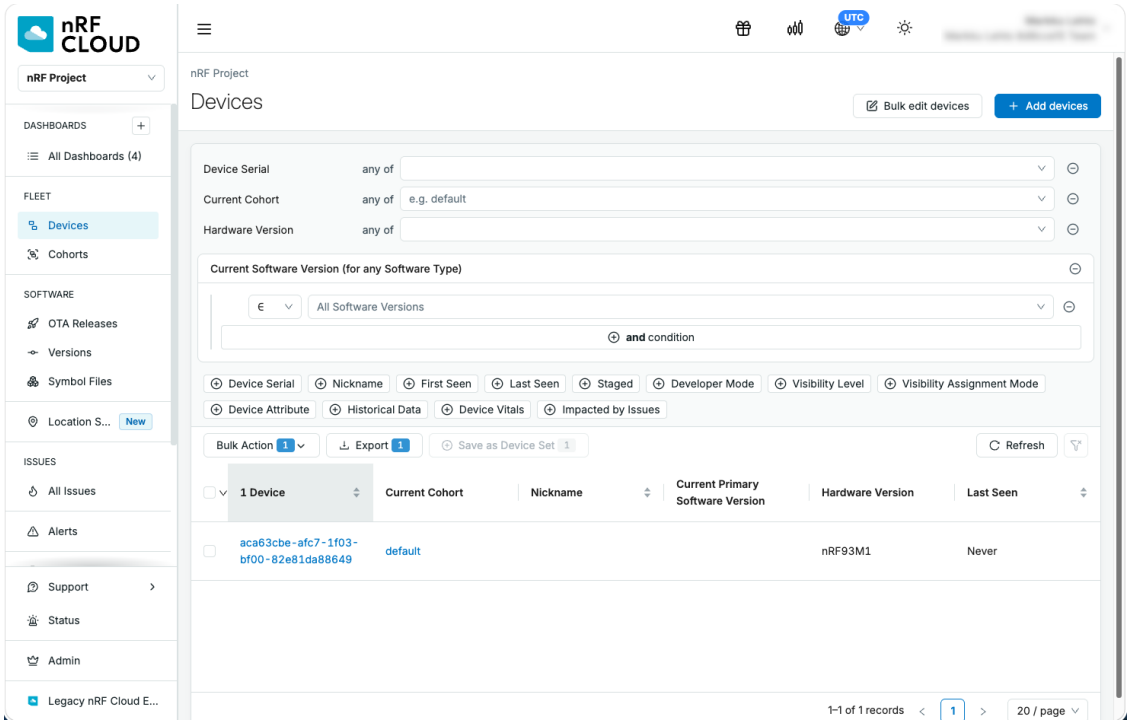


b. Multiple: You can upload up to 1000 nRF93M1 devices by using the Bulk Upload feature with a CSV file. Each line in the CSV must contain comma-separated fields in the format: deviceId, onboardingToken.



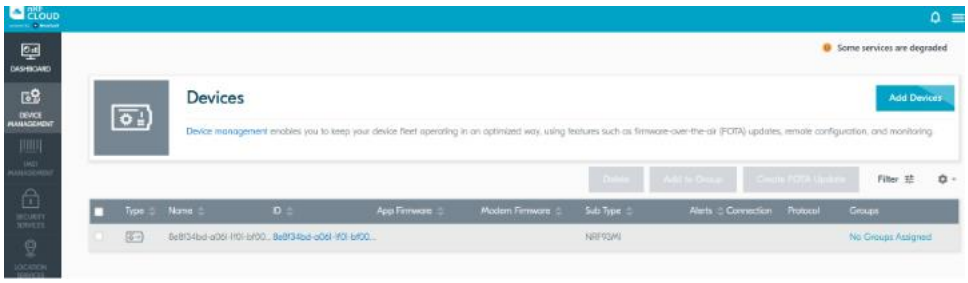
7. Review and confirm the devices you are adding.

You have successfully connected your nRF93M1 DK to nRF Cloud powered by Memfault. Your newly added device must now appear in the device list. Note, it might take few seconds to appear in the list.



You can also verify that the device was added successfully by going to Legacy nRF Cloud Experience:

1. Open the bottom-left panel and click **Legacy nRF Cloud Experience**.
2. In the left-hand panel, select **Device Management**.
3. Click **Devices**.
4. Check the device list to confirm that your newly added devices are displayed.



8.1. nRF Cloud Location Services

The nRF93M1 DK supports Wi-Fi® and Cellular, including single-cell and multi-cell methods. You can also use nRF Cloud to select the most accurate option between MCELL and Wi-Fi.

Once the device is authenticated with nRF Cloud using the onboarding JWT, your device can automatically get its location using the **AT%NRFCLOUDLOCATION** command. You can use the following AT commands to test location data:

Description	Cellular	Wi-Fi
AT Command	AT%BCINFO	AT%WIFISCAN
Data collected	Serving cell and neighboring cell tower data (MCC, MNC, TAC, Cell ID, RSRP)	BSSID, RSSI, channel per access point

To get a location, you must first select the type of location request you want to perform. They are Wi-Fi, MCELL (Multi-cell triangulation), SCELL (single cell tower), or allow nRF Cloud to pick the most accurate location between MCELL and Wi-Fi.

To make a location request, use the following command format:
AT%NRFCLOUDLOCATION=<type>,<mode>

- Setting <mode> to 1 returns the location response.
- Setting <mode> to 0 sends the location result only to the server-side.

The location response is delivered in the following format:
%NRFCLOUDLOCATION: <latitude>,<longitude>,<accuracy_meters>,<fulfilled_with>

where <fullfilled_with> indicates to you the response type between W-Fi, MCELL, or SCELL.

The following outlines the requests and responses for each location type:

Location Request Type	Command Request	Command Response
SCELL	AT%NRFCLOUDLOCATION=1,1	%NRFCLOUDLOCATION: <latitude>,<longitude>,<accuracy_meters>,1
MCELL	AT%NRFCLOUDLOCATION=2,1	%NRFCLOUDLOCATION: <latitude>,<longitude>,<accuracy_meters>,2
SCELL or MCELL	AT%NRFCLOUDLOCATION=3,1	%NRFCLOUDLOCATION: <latitude>,<longitude>,<accuracy_meters>,<1 or 2>
Wi-FI	AT%NRFCLOUDLOCATION=4,1	%NRFCLOUDLOCATION: <latitude>,<longitude>,<accuracy_meters>,4
SCELL or Wi-FI	AT%NRFCLOUDLOCATION=5,1	%NRFCLOUDLOCATION: <latitude>,<longitude>,<accuracy_meters>,<1 or 4>
MCELL or Wi-FI	AT%NRFCLOUDLOCATION=6,1	%NRFCLOUDLOCATION: <latitude>,<longitude>,<accuracy_meters>,<2 or 4>
Pick the most accurate location between Wi-Fi and MCELL	AT%NRFCLOUDLOCATION=7,1	%CLOUDLOCATION: <latitude>,<longitude>,<accuracy_meters>,<1, 2 or 4>

8.2. Device to nRF Cloud messaging

Once connected to nRF Cloud, the nRF93M1 can send messages to nRF Cloud. All device-to-cloud messaging is handled using CoAP, which optimizes minimal power and bandwidth consumption. The following commands are used to connect and manage messaging between the nRF93M1 and nRF Cloud:

AT Command	Description	Sample Output
AT%NRFCLOUDOBSUPLOAD[=<projectKey>]	Upload observability data (optional project key to override CoAP-project-key auto routing)	%NRFCLOUDOBSUPLOAD: UPLOADED,<n> OK
AT%NRFCLOUDOBSHEARTBEAT	Trigger heartbeat (debug command)	OK
AT%NRFCLOUDOBSFORWARD=<base64_chunk>	Forward chunk from host MCU	OK
AT%NRFCLOUDOBSCOREDUMP=<enable>	Configure coredump reporting	OK
%NRFCLOUDMESSAGE=<message>	Send a JSON message	%NRFCLOUDMESSAGE: SENT OK
AT%NRFCLOUDSHADOW=<path>[,<value>]	Get or set device shadow	%NRFCLOUDSHADOW: <path>,<value> OK
AT%NRFCLOUDFOTA=0,<projectKey>,<hwVer>,<swType>,<swVer>	Check for host MCU OTA	%FOTA: UPDATE_AVAILABLE or %FOTA: NO_UPDATE
AT%NRFCLOUDFOTA=1,<chunk_idx>	Download host MCU OTA in segments	%FOTA: <segment_base64>,<checksum>,<0:1 another segment exists?>
AT%NRFCLOUDFOTA=2,<project_key>	Check for MFW OTA	%FOTA: UPDATE_AVAILABLE or %FOTA: NO_UPDATE
AT%NRFCLOUDFOTA=3,<project_key>	Update MFW	%FOTA: ERASING %FOTA: DOWNLOADING %FOTA: VERIFYING %FOTA: UPGRADING

		%FOTA: "APPLY" %FOTA: "DONE",0
AT%NRFCLOUDFOTA=4	Clear host MCU OTA data	OK

9. Power Consumption Measurements

The nRF93M1 is optimized for low power through its System Disabled, System OFF, and System ON IDLE operating states.

For details on how to set up the nRF93M1 DK hardware with the Power Profiler Kit II to measure current as shown in the following sections, refer to section 4 in the **nRF93M1-DK_0.4_Hardware_User_Guide**.

The below plots are generated from the Power Profiler Kit II and the Power Profiler Kit Hardware.

To measure power consumption in a simple, predictable, and repeatable way, the nRF93M1 includes the proprietary AT Command (**%PMUCFG)** that puts the nRF93M1 in certain, known power states. This is not intended to be used in a final product, as the power management is automated based on the host and LTE modem state and functionality.

Note: These power management commands might change in future modem firmware releases because of further power optimizations.

Before starting any power measurements or using the power management commands, complete the following steps:

1. Configure key features of the nRF93M1 to ensure optimal power usage. This can be done using the **%MODULECFG** command.

```
AT%MODULECFG="ledMode",0 // power off LED
OK
AT%MODULECFG="logCtrl",0 // disable log output
OK
AT%MODULECFG="usbCtrl",2 // disable USB
OK
AT%MODULECFG="usbSlpMask",1 // mask USB sleep vote
OK
AT%SIMCFG="SimPowerSave",1 // enable SIM power save
OK
AT%SIMCFG="SimPresenceDetect",0 // disable SIM detection
OK
AT%PMUCFG=1,4 // Enter System OFF mode
OK
```

2. Configure the nRF93M1 UART to a baud rate of 9600 bps to enable the low-power UART mode with wake-up possibility from System OFF (deep sleep), which is used in this getting started guide.

```
AT+IPR=9600
OK
```

3. Change your Serial Terminal software to operate at 9600 bps.

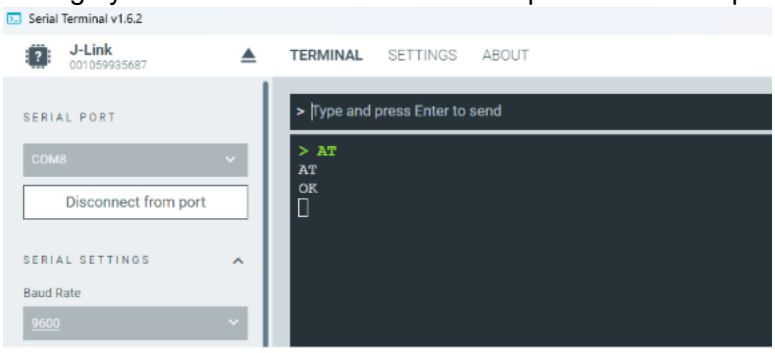


Figure 13 nRF Connect for Desktop Serial Terminal with 9600 baud configurations

9.1. Guidelines for Exiting sleep

As mentioned, the **AT+IPR** command must set the UART to baud rate 9600 bps or lower for the nRF93M1 to be able to wake-up from UART during deep sleep such as System OFF, as used in this guide. If the baud rate is set higher and the device enters deep sleep, the UART will not be able to wake up the module. In such cases, the POWERKEY or power cycle must be used. The support for waking the nRF93M1 from deep sleep at higher baud rates will be optimized in upcoming modem firmware releases.

Before changing baud rate to values above 9600, make sure **%PMUCFG** is disabled or in System ON IDLE mode.

```
AT%PMUCFG?
%PMUCFG: 1,4 // Enter System OFF mode
OK
AT%PMUCFG=1,1 // Enter System ON IDLE
OK
AT+IPR=115200 // Baudrate now can be set to any value
OK
```

If you want to completely reset module, you can issue:

```
AT%FACTORYRESET
OK
```

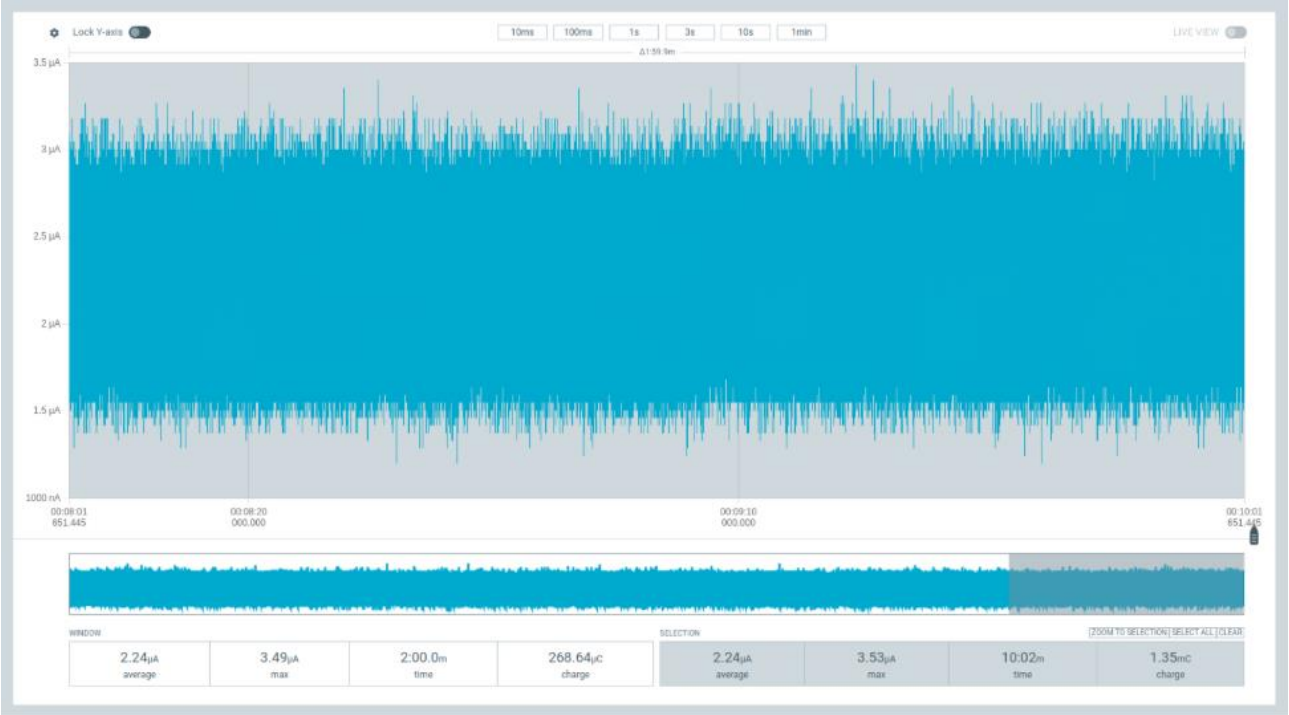
A factory reset will also set the UART baud rate to the default value of 115200 bps.

9.2. Current measurements

Ensure that the baud rate is set to 9600 baud or lower and then use **%PMUCFG** to enter System OFF mode as described in the previous section.

```
AT+CFUN=0 // Modem set to minimal functionality
OK
```

The following plot is generated using the nRF Connect for Desktop Power Profiler app:

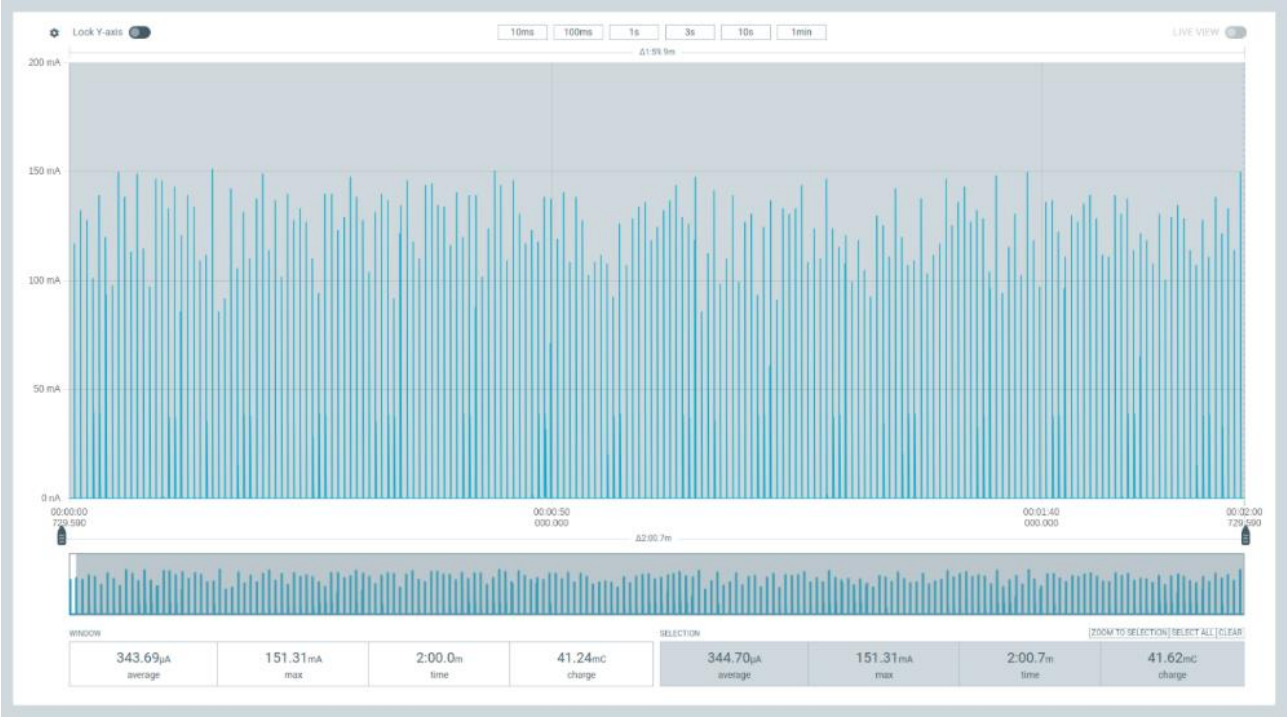


The average current in Offline/Flight mode is 2.24 µA.

The nRF93M1 is set in full functionality mode. During this measurement, the network configured the nRF93M1 to enter RCC Idle with a 640 ms DRX cycle.

```
AT+CFUN=1 // Modem set to full functionality
OK
```

The average current in RCC Idle with 640ms DRX cycle is 345 µA.

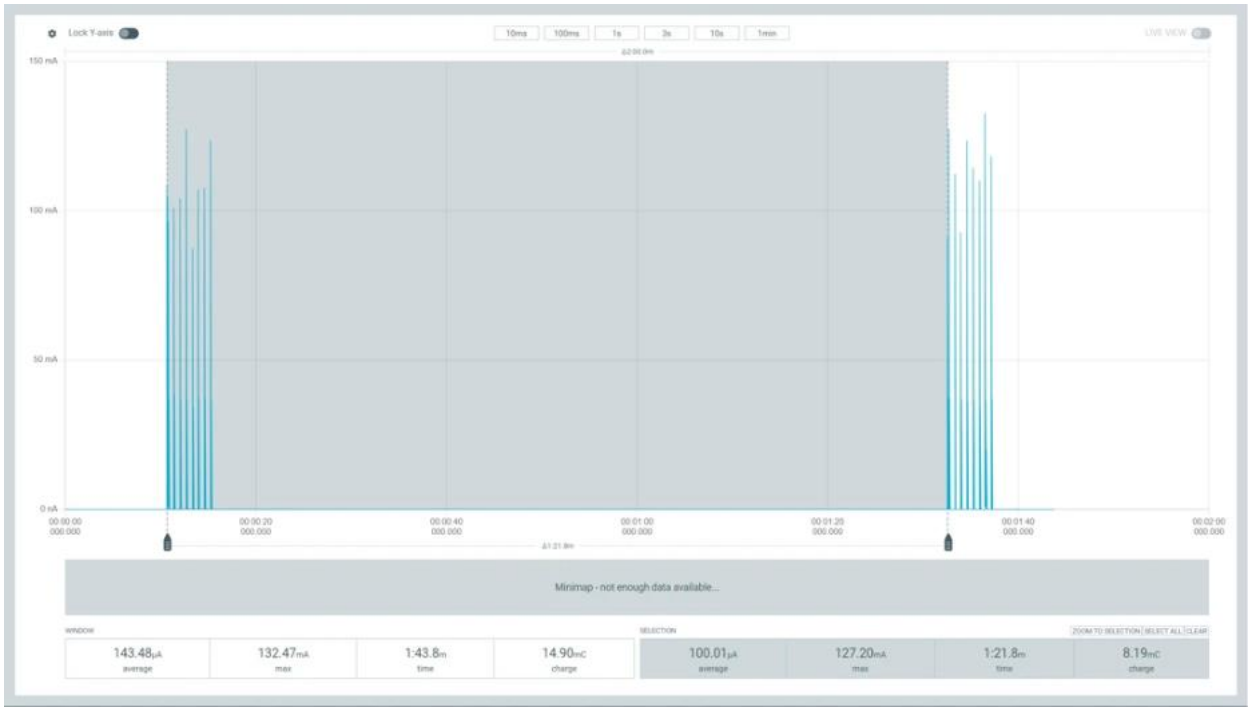


The nRF93M1 is configured to enter eDRX sleep mode and is granted 81.92 seconds eDRX intervals with 5.12 seconds Paging Time Window (PTW) and 640ms Paging Occasion.

Note: Most mobile networks have not (yet) rolled out eDRX support for LTE Cat 1 bis devices.

```
AT+CPSMS=0 // Disable PSM
OK
AT+CEDRXS=1,4,0101 // request eDRX interval of 81.92 seconds
OK
AT+CEDRXRDP // (optional) read eDRX dynamic parameters
+CEDRXRDP: 4,"0101","0101","0011"
OK
```

The average eDRX floor current is around 10 µA.
The complete eDRX cycle average is 100 µA, including the 5.12 s PTW and 640 ms PO interval where the nRF93M1 will have 8 RX events with around 100 mA peak current.



The nRF93M1 is now configured for PSM sleep, requesting a periodic update interval of 3600 seconds (1 hour) with an active time of 60 seconds.

```
AT+CEDRXS=0 // Disable eDRX
OK
AT+CPSMS=1,,,"00000110","00100001" // Request PSM 3600 seconds
OK
```

The average PSM floor current is around 2 µA.

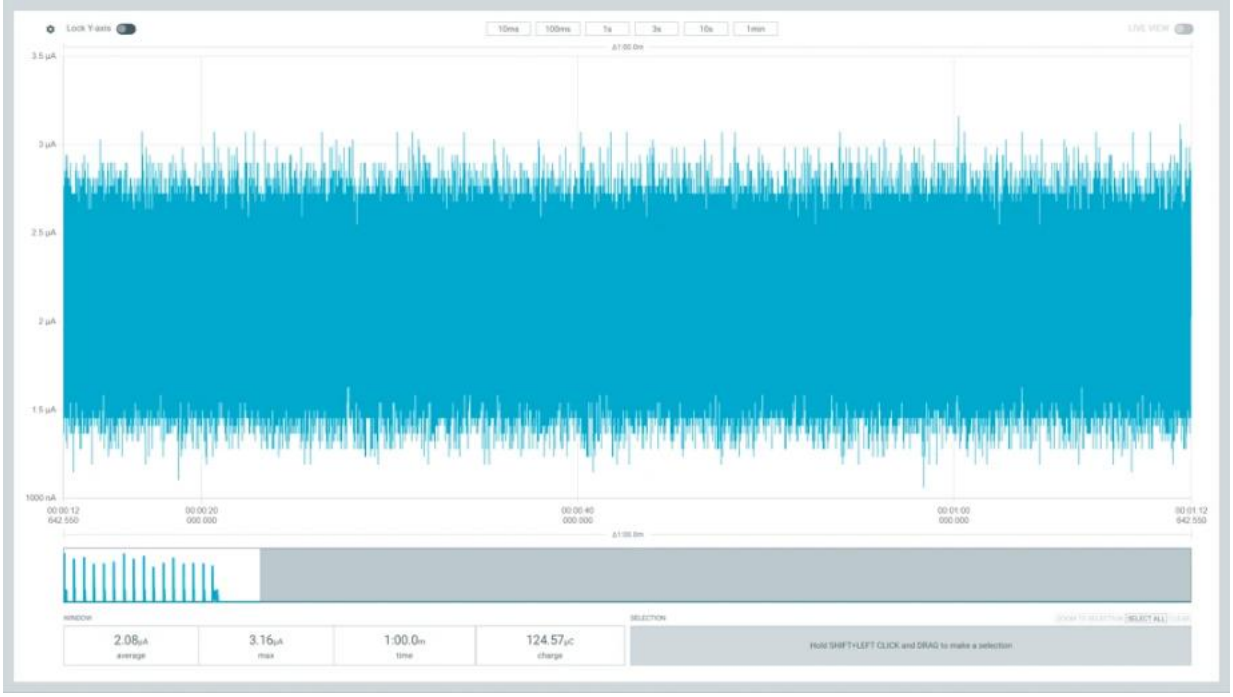


Figure 17 nRF93M1 PSM sleep current measurement

The following is the complete cycle that includes the Tracking Area Update (TAU) of 60 minutes and 60 seconds of active time, where the modem monitors for paging occasions (DRX) to receive any pending data for the network.

The average current for the complete cycle is 22.33 µA.

Figure 18: nRF93M1 PSM cycle with active time

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