

HL79xx Low Power Mode Measurement

TECHNICAL NOTE

This document provides guidance in using OTII ARC to measure the HL7900 hibernate current consumption with a CMW500.

Introduction

This document is provided to Semtech distributors and clients to aid more rapid development of embedded applications using the Semtech portfolio of cellular solutions. To request a new technical note, contact your regional Semtech Product Marketing Manager.

- [Document History](#)
- [Important Notice](#)

Development Kit Setting for Low Power Mode Measurement

Semtech suggests to use the development kit to measure HL79xx in low power mode.

Development Kit (Blue) Setup

Removing and shorting jumpers will allow the board to be powered by the USB while allowing the module to be powered by an external source (e.g. the OTII). Refer to the following jumper settings:

- CN805 — Development Kit main power from UART0/1
- CN301 — Enables UART0 power
- CN401 — Enables UART1 power
- CN1301 (pins 1 and 2) – Enables module's power using external source only
- CN1308 and CN1309 — Disconnects isolating capacitors to power lines
- CN1310 — Disables DC Power from USB source
- SW203 — Turns off Wakeup switch
- CN1000 — GPIO13 is External Wake up

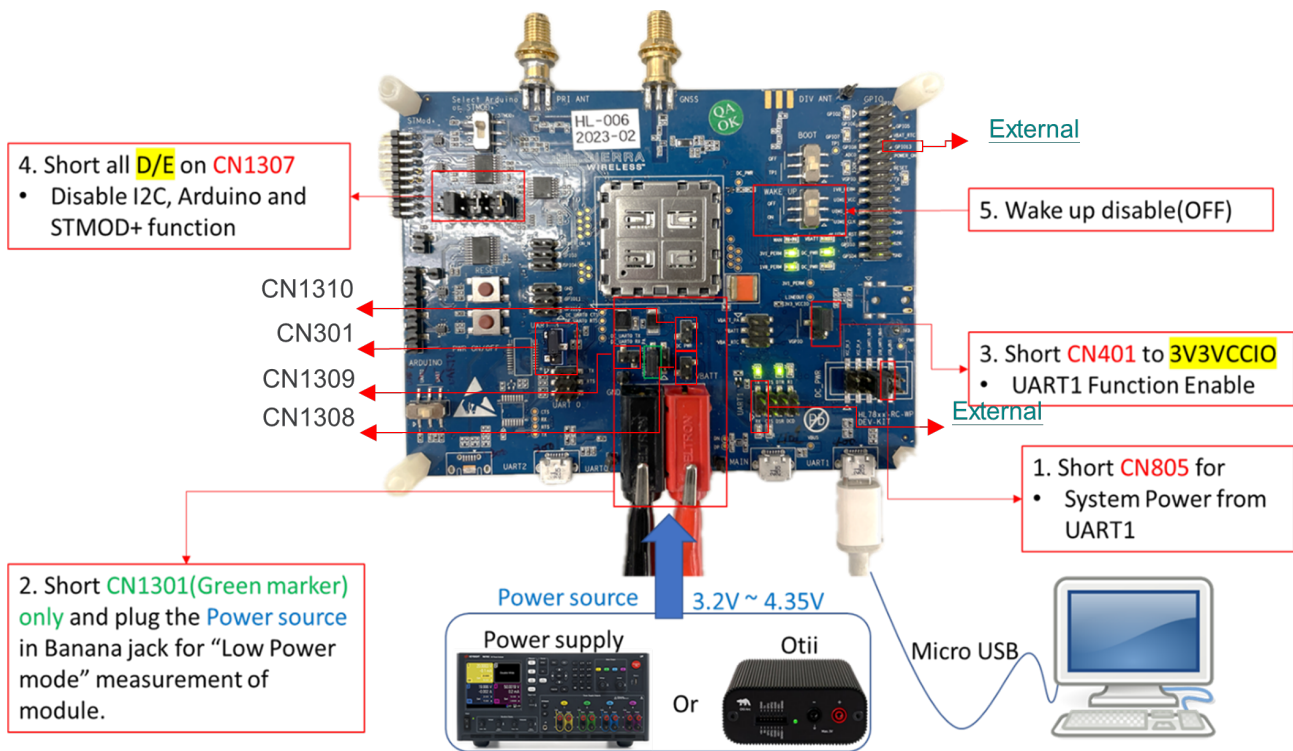


Figure 1: Setting Up the Development Kit (Blue HL78xx EVK)

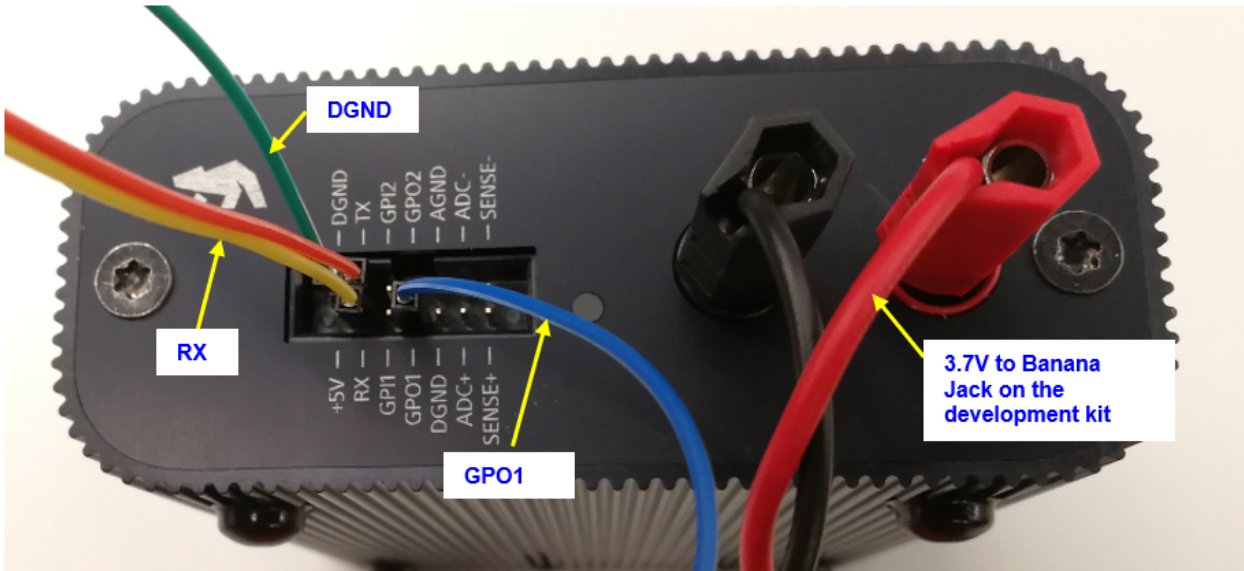
The HL79xx and HL78xx share the same PIN defined in RING-C, excluding the USB function. Therefore, the development kit can accommodate HL79xx RING-C features such as GPIOs, RF, GPS, UART, ADC, etc. For support regarding the HL79xx RING-B function (JTAG, PSRAM, Dual-FLASH, etc.), see the HL7900 Product Technical Specification.

Note: Garbage characters may appear on the UART1 sometimes as it is a known issue on the HL7900 Development Kit. It is recommended to add a pull-up resistor (10K-100K Ω based on customer design) on UART1_Rx.

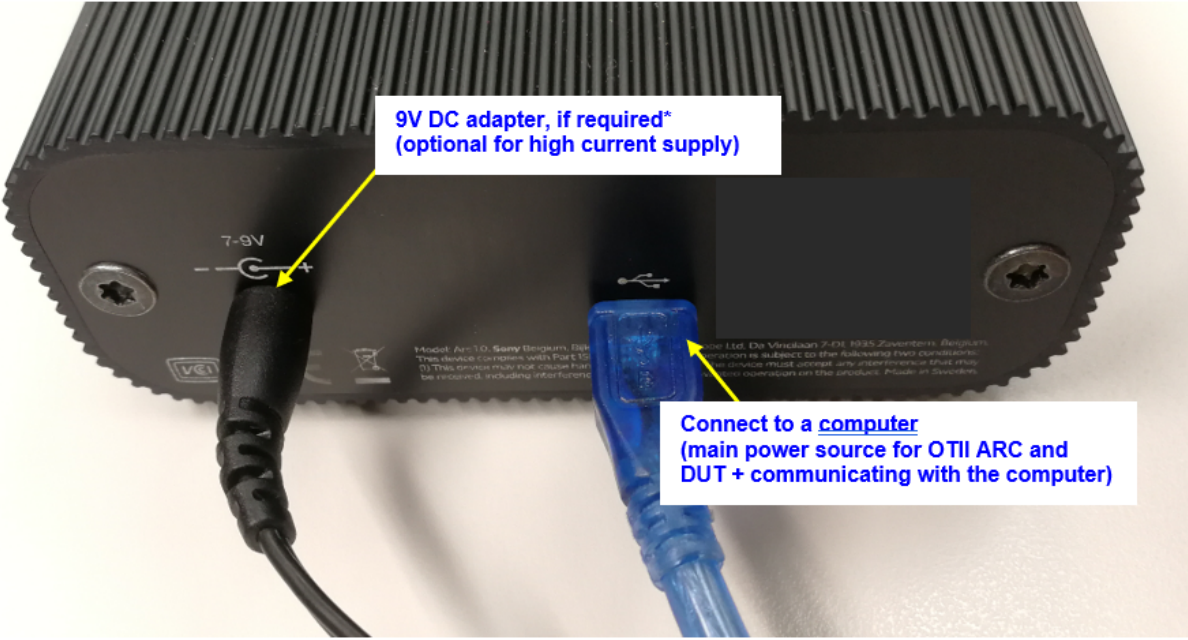
OTII Arc Setup

To set up the OTII ARC:

1. Connect 3.7V to a Banana Jack on the development kit.
2. Connect DGND to the GND on the development kit.
3. RX should be connected to the development kit UART1 RX if taking AT log is required. Otherwise, leave this disconnected.
4. GPO1 should be connected to the development kit if controlling the module's external WAKE_UP pin. Otherwise, leave this disconnected.

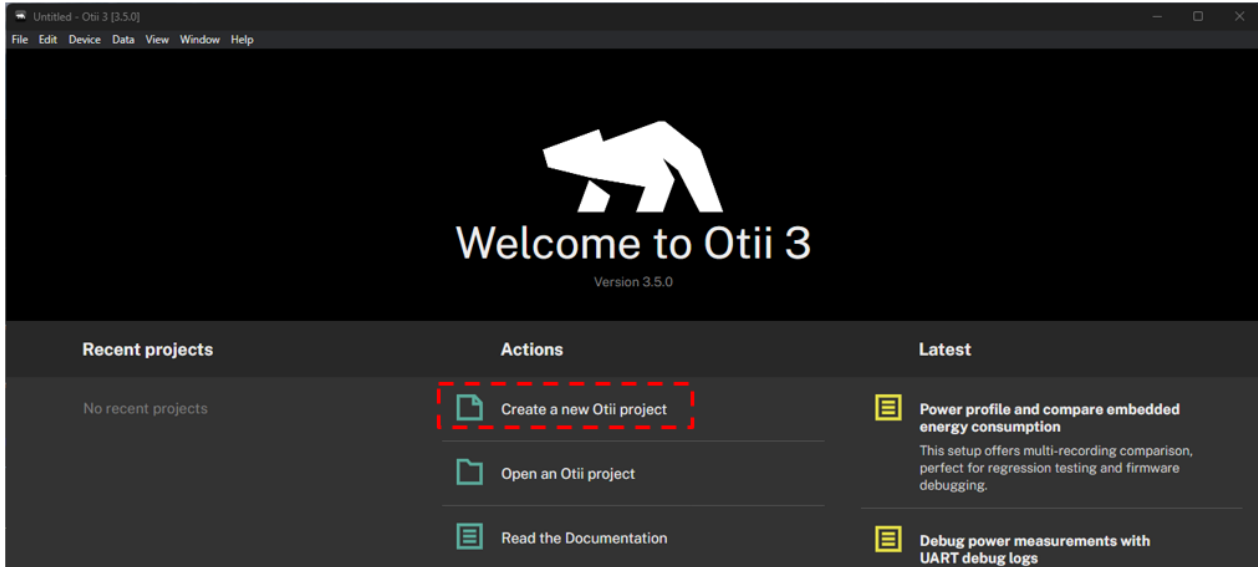


- 5. Connect the USB port to a computer. Use a PC USB port with a marking, if possible. This indicates high power and the port may provide up to 1.5A to your device. USB ports without this sign can normally provide only up to 500mA.

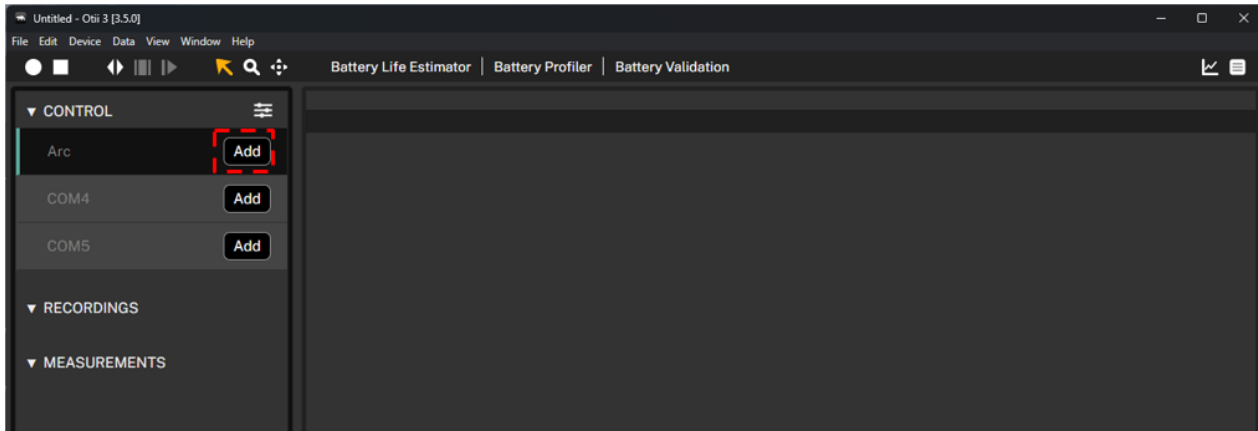


Note: If using an external DC adapter, it is recommended to pick one from an established supplier. The adapter should be low noise, approved for IEC 60950-1 as a Limited Power Source, and have an output of 9 VDC, 2.5 A.

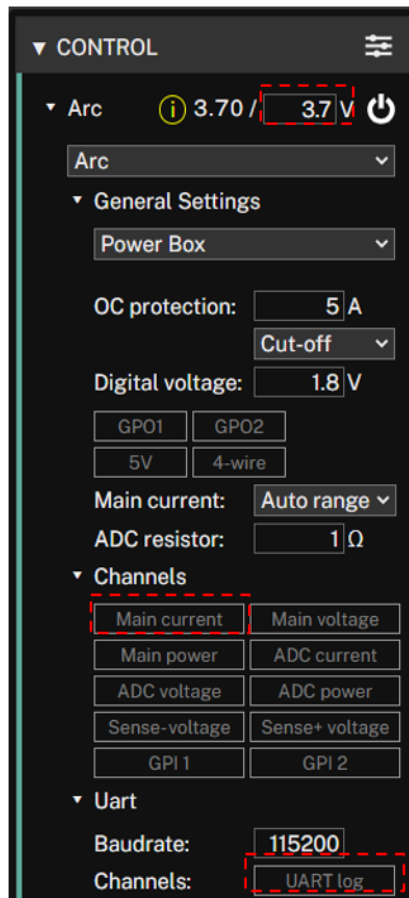
6. From the OTII ARC window, click **Create a new Otii project**.



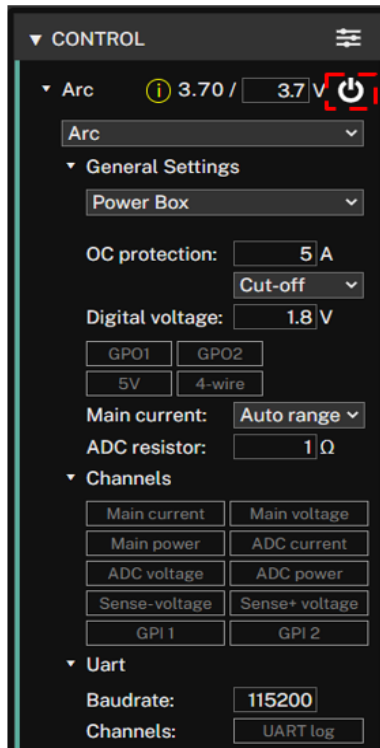
7. Click **Add** to open the Otii COM port.



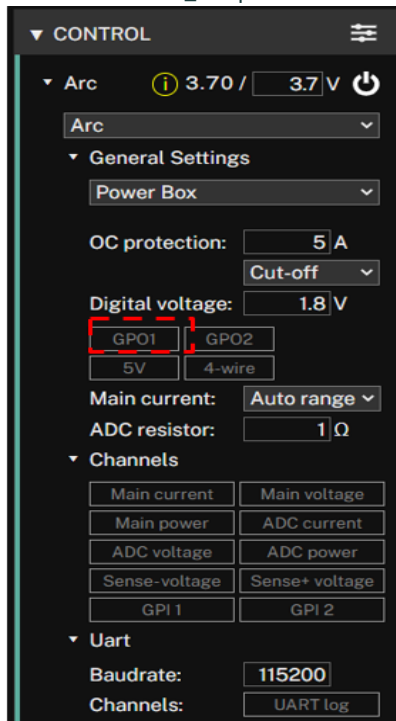
8. Specify the **Main voltage** and click **Main current** to specify measuring current. Click **UART log** if AT log is required.



9. Start supplying the power by clicking power icon.



10. GPO1 controls the module's WAKE_UP pin.



GPO1

Indicates low output

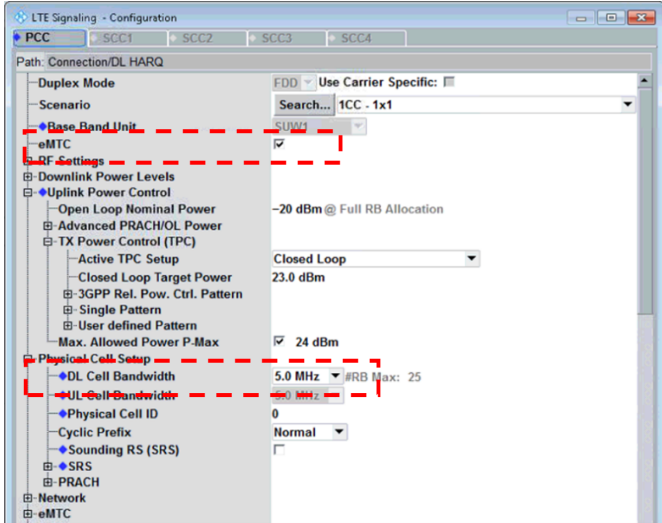
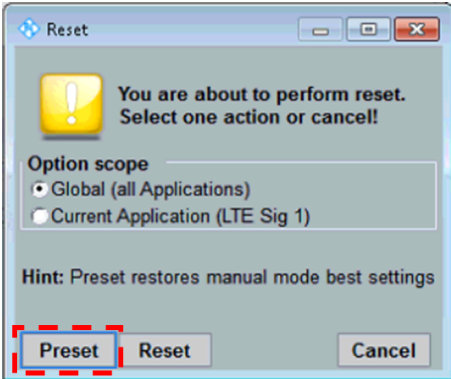
GPO1

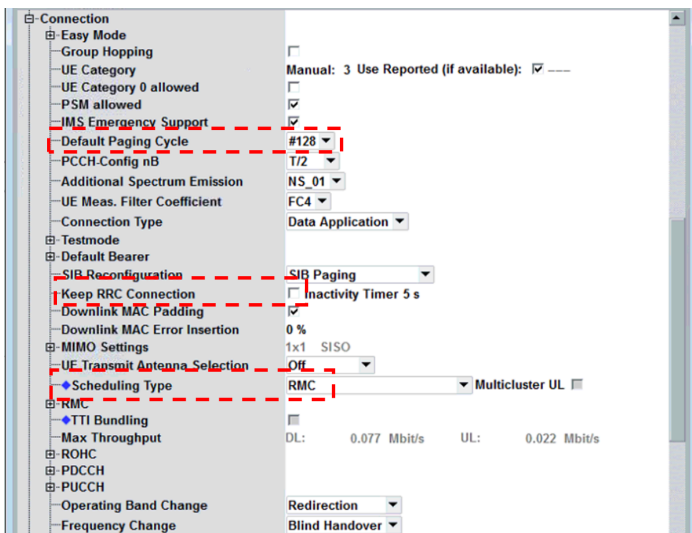
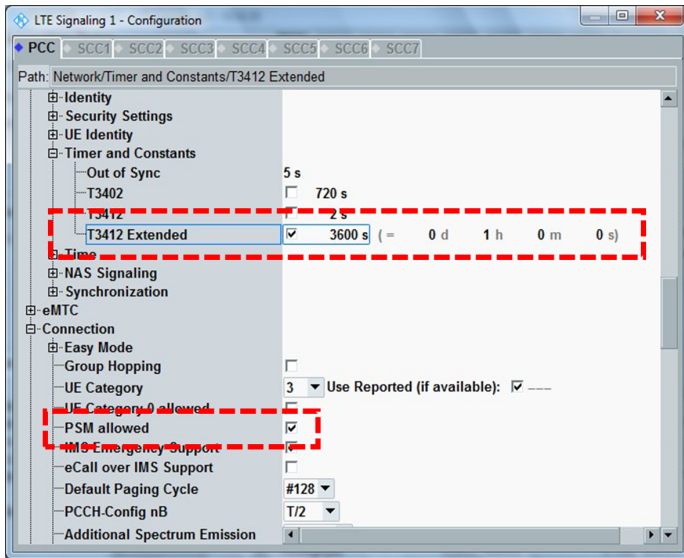
Indicates high output

CMW500 Setup

CMW500 PSM Setup

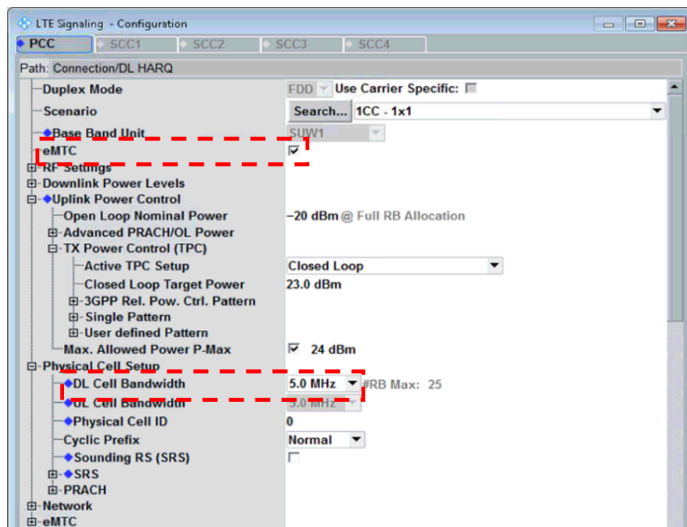
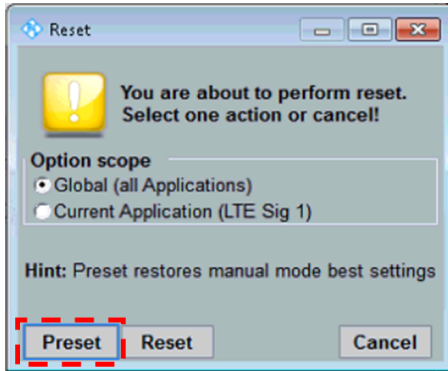
Configure the CMW500 by clicking and setting up the items marked in the following screenshots.

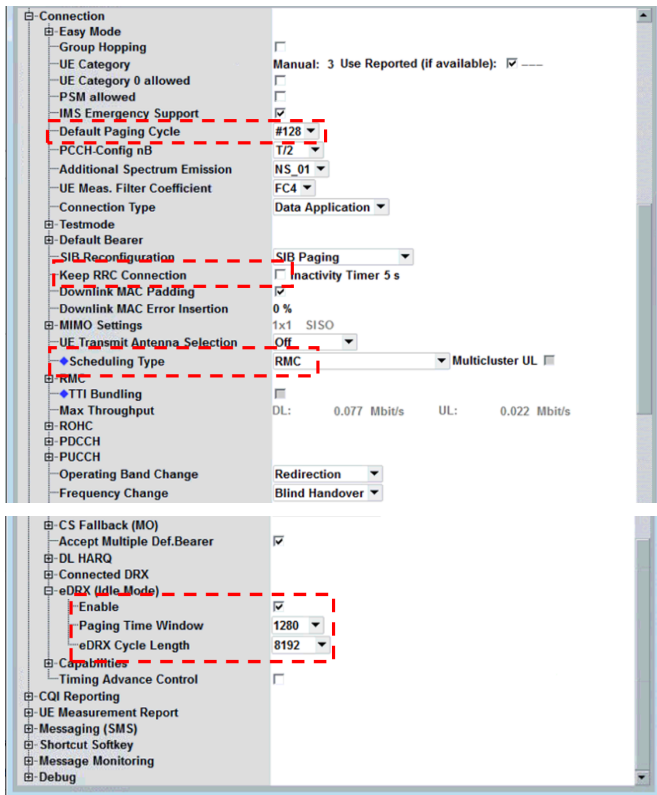




CMW500 eDRX Setup

Configure the CMW500 by clicking and setting up the items marked in the following screenshots.





AT Commands Setup

eDRX

Use the following AT commands to set up the eDRX.

1. Check SIM deactivate.

at+crsm=176,28589,0,0,4
+CRSM: 144,0,"81000802"
 //SIM card should support "UICC deactivated during eDRX". This option is indicated in values 1 and 8 marked in red.
OK
2. Select Cat-M1. — Select Cat-M1 as the LTE category. This command needs a reboot.
AT%RATIMGSEL=1
3. Select Band — Select Cat-M1 band3 as example. This command needs a reboot.
AT+KBNDCFG=0,4

-
4. Stop the Stack — It is important to stop the stack beforehand to deactivate the cellular communication stack temporarily. The command that can be used is: **at+cfun=4**
 5. Deactivate PSM — Power Saving Mode (PSM) must be deactivated if it is currently enabled. PSM is a feature that allows a device to enter a low-power state when it is not actively communicating. The command that can be used to deactivate PSM is: **at+cpsms=0**
 6. Activate eDRX in Cat-M1 — Use the following to activate eDRX in Cat-M1. The **at+cedrxs** parameters are as follows:
 - 1 — Activate eDRX
 - 4 — Use CatM1 technology
 - 5 — Set the requested eDRX value to 81.92 seconds.

The command that can be used is: **at+cedrxs=1,4,5**

7. Activate Hibernating Mode — Put the module in a low power state using eDRX, with the ability to wake it up using an external WAKE_UP pin. The command that can be used is: **at+ksleep=1,2**
8. Activate Unsolicited Commands for EPS — Activate unsolicited commands related to EPS registration. The command that can be used is: **at+cereg=4**
9. Start the Stack — Start the cellular communication stack, possibly after configuring the module for hibernate mode. The command that can be used is: **at+cfun=1**
10. Verify eDRX Activation — Before testing, confirm the activation of eDRX mode with specific values such as CatM1, requested and given eDRX values, and the assigned Paging Time Window (PTW). The command that can be used is: **at+cedrxrdp**

The terminal should have a similar response to this:

+CEDRXRDP: 4, "0101", "0101", "0011"

The parameters are defined as follows:

- 4 — CatM1
- 5 — Requested eDRX value (81.92sec) or eDRX value given by the network (81.92sec)
- 3 — assigned PTW (5.12 sec)

PSM

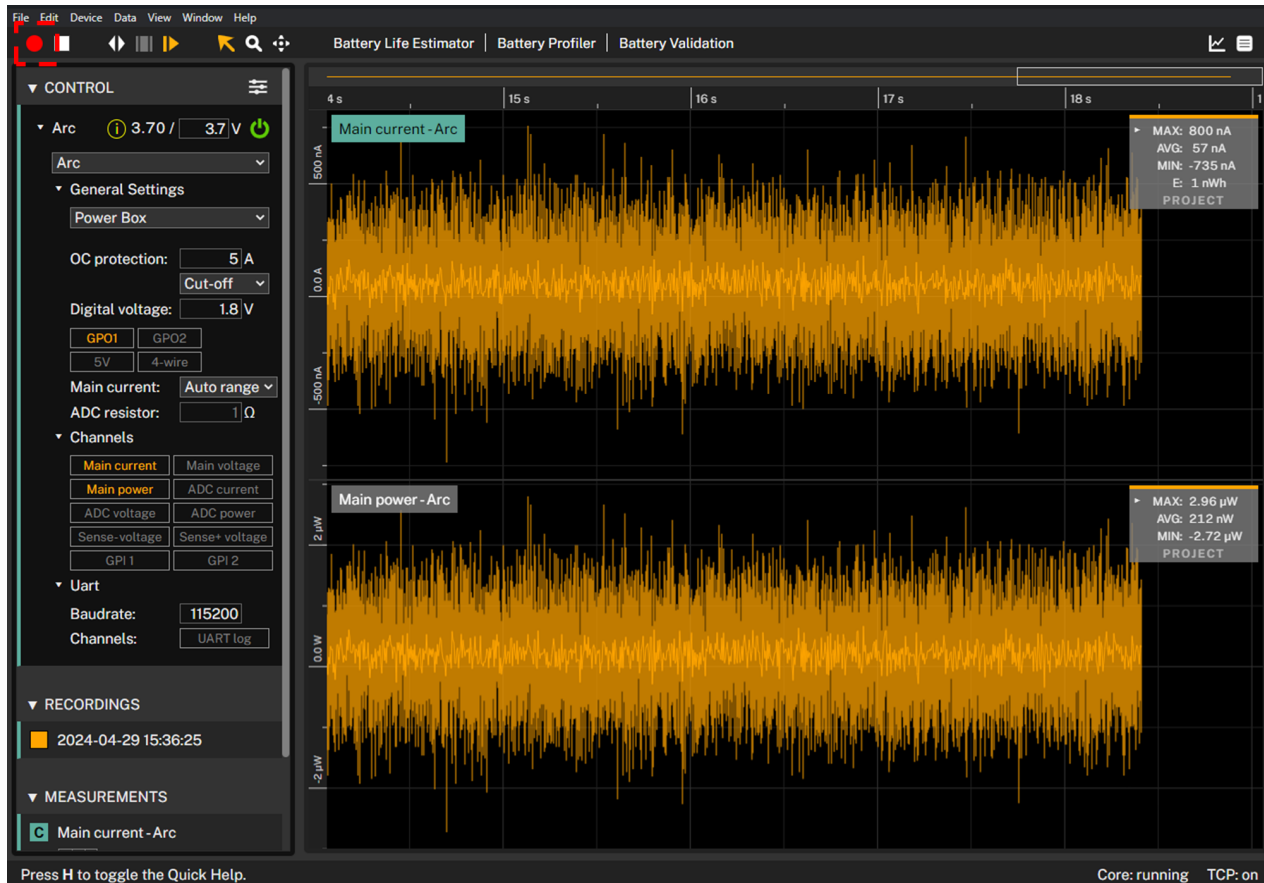
Use the following AT commands to set up the Power Saving Mode (PSM).

1. Select Cat-M1 — Select Cat-M1 as the LTE category. This command needs a reboot. The command that can be used is: **AT%RATIMGSEL=1**
2. Select Band — Select Cat-M1 band3 as example. This command needs a reboot. The command that can be used is: **AT+KBNDCFG=0,4**
3. Stop the Stack — It is important to stop the stack beforehand to deactivate the cellular communication stack temporarily. The command that can be used is: **at+cfun=4**
4. Configure PSM — Configure PSM using the command below. In this example, the values "00000110" and "00001010" represent the parameters for T3412 (1 hour) and T3324 (20 seconds), respectively. The command that can be used is: **AT+CPSMS=1,,,"00000110";"00001010"**
5. Disable eDRX in Cat-M1 — The command that can be used is: **at+cedrxs=0**
6. Activate Hibernating Mode — Put the module in a low-power state using eDRX, with the ability to wake it up using an external WAKE_UP pin. The command that can be used is **at+ksleep=1,2**
7. Activate Unsolicited Commands for EPS — Activate unsolicited commands related to EPS registration. The command that can be used is: **at+cereg=4**
8. Start the Stack — Start the cellular communication stack, possibly after configuring the module for hibernate mode. The command that can be used is: **at+cfun=1**

Current Measurement

Refer to the following steps for enabling current measurement.

1. Follow the CMW500 and Otii setup.
2. Set Otii GPO1 as high to assert the Wake Up pin.
3. Follow the AT commands setup.
4. Set Otii GPO1 low to de-assert the Wake Up pin, allowing the module to hibernate.
5. Click the record icon to start recording and reading the current measurement.



6. The result should be as shown below:

a. PSM



b. eDRX



Document History

Revision number	Release date	Changes
1	July 2024	Document creation, preliminary release

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