



# EVK-L2

## TOBY-L2 series LTE/DC-HSPA+/EGPRS cellular evaluation kits

### User guide



### Abstract

This guide explains how to set up the EVK-L2x Evaluation Kits to begin evaluating the u-blox TOBY-L2 series LTE/DC-HSPA+/EGPRS cellular modules

# Document information

|                               |                                                            |             |
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|-------------------------------|-------------------------------------|----------------------------------------------------------------------------------------|
| In development / Prototype    | Objective specification             | Target values. Revised and supplementary data will be published later.                 |
| Engineering sample            | Advance information                 | Data based on early testing. Revised and supplementary data will be published later.   |
| Initial production            | Early production information        | Data from product verification. Revised and supplementary data may be published later. |
| Mass production / End of life | Production information              | Document contains the final product specification.                                     |

This document applies to the following products:

| <b>Product name</b> | <b>Ordering code</b> | <b>Firmware version</b> | <b>Application version</b> | <b>PCN reference</b> | <b>Product status</b> |
|---------------------|----------------------|-------------------------|----------------------------|----------------------|-----------------------|
| EVK-L20             | EVK-L20-00S-02       | 15.90                   | A01.00                     | UBX-15029946         | End of Life           |
|                     |                      | 15.90                   | A01.10                     | UBX-16031212         | End of Life           |
|                     |                      | 17.00                   | A01.01                     | UBX-21036626         | Mass production       |
| EVK-L21             | EVK-L21-00S-02       | 15.63                   | A01.03                     | UBX-15029946         | End of Life           |
|                     |                      | 15.63                   | A01.10                     | UBX-16031212         | End of Life           |
|                     |                      | 17.00                   | A01.01                     | UBX-21036626         | Mass production       |
|                     | EVK-L21-62S-01       | 16.05                   | A01.02                     | UBX-17003573         | End of Life           |
| EVK-L22             | EVK-L22-00S-00       | 09.93                   | A01.07                     | UBX-15021135         | End of Life           |
|                     |                      | 20.06                   | A01.01                     | UBX-21036626         | Mass production       |
| EVK-L23             | EVK-L23-00S-02       | 15.63                   | A01.03                     | UBX-15029946         | End of Life           |
|                     |                      | 15.63                   | A01.10                     | UBX-16031212         | End of Life           |
|                     |                      | 17.00                   | A01.01                     | UBX-21036626         | Mass production       |
| EVK-L24             | EVK-L24-00S-01       | 15.93                   | A01.00                     | UBX-16025501         | End of Life           |
|                     |                      | 16.25                   | A01.00                     | UBX-20058840         | Mass production       |

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# 1 Starting up

## 1.1 EVK-L2 overview


The EVK-L2 kits are powerful and easy-to-use tools that simplify the evaluation of u-blox TOBY-L2 series multimode LTE/DC-HSPA+/EGPRS cellular modules.

The evaluation kits differ depending on which TOBY-L2 series module is mounted:

- EVK-L20 evaluation kit is for evaluation of TOBY-L200, in details:
  - EVK-L20-00S-02 evaluation kit is for evaluation of TOBY-L200-03S
- EVK-L21 evaluation kit is for evaluation of TOBY-L210, in details:
  - EVK-L21-00S-02 evaluation kit is for evaluation of TOBY-L210-03S
  - EVK-L21-62S-01 evaluation kit is for evaluation of TOBY-L210-62S
- EVK-L22 evaluation kit is for evaluation of TOBY-L201, in details:
  - EVK-L22-00S-00 evaluation kit is for evaluation of TOBY-L201-02S
- EVK-L23 evaluation kit is for evaluation of TOBY-L280, in details:
  - EVK-L23-00S-02 evaluation kit is for evaluation of TOBY-L280-03S
- EVK-L24 evaluation kit is for evaluation of TOBY-L220, in details:
  - EVK-L24-00S-01 evaluation kit is for evaluation of TOBY-L220-02S

This document identifies all the EVK-L20, EVK-L21, EVK-L22, EVK-L23 and EVK-L24 evaluation kits as EVK-L2.

This section describes the main connections and settings required to get started.

 See the TOBY-L2 series data sheet [\[3\]](#) and TOBY-L2 / MPCI-L2 series system integration manual [\[4\]](#) for the features supported by u-blox TOBY-L2 series LTE/DC-HSPA+/EGPRS cellular modules.

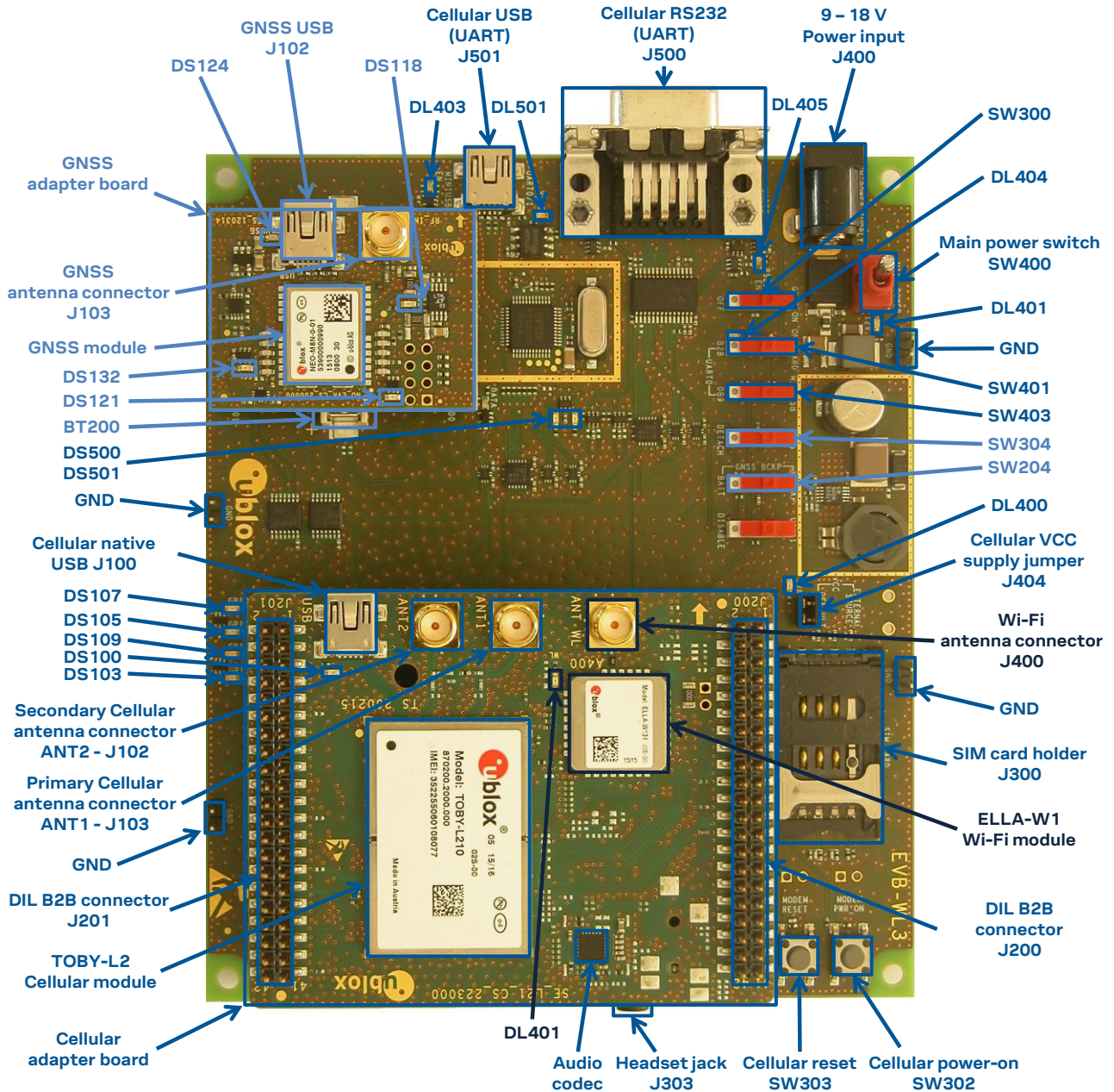


Figure 1: Overview of EVK-L2 evaluation kit for TOBY-L2 modules



The u-blox ELLA-W1 Wi-Fi module and related parts are not installed on the EVK-L24.

## 1.2 EVK-L2 block diagram

Figure 2 shows the main interfaces and internal connections of the EVK-L2 evaluation kit:

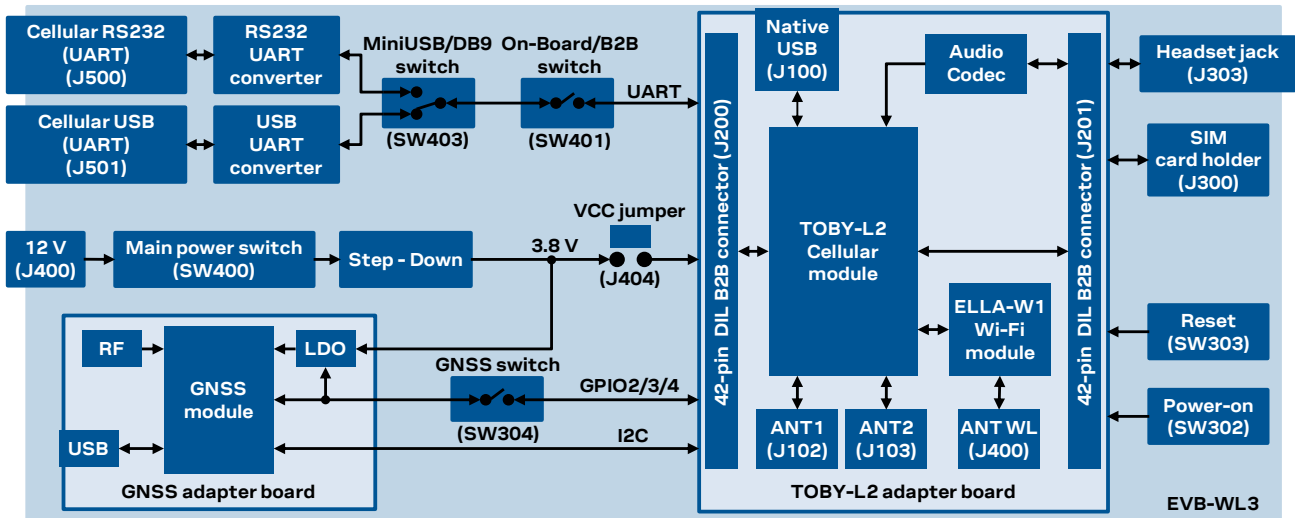


Figure 2: Block diagram of EVK-L2 for TOBY-L2 modules

The EVK-L2 is formed by three boards:

- The lower one, called EVB-WL3, contains the power supply and other peripherals for the TOBY-L2 series cellular module (SIM card holder, Reset button and Power-on button).
- The cellular adapter board, called ADP-L2, contains the TOBY-L2 series cellular module, the cellular antenna connectors, and the USB connector for the cellular module. It also contains the u-blox ELLA-W1 series Wi-Fi module and the Wi-Fi antenna connector (except for the EVK-L24), and an audio codec.
- The GNSS adapter board, called ADP-GNSS, contains the u-blox GNSS module, the GNSS antenna connector, and the USB connector for the GNSS module.

The boards are connected by means of male header board-to-board connectors provided on the bottom of the adapter boards and their corresponding female connectors provided on top of the lower board.

The USB interface of the cellular module is available on the native USB connector on the cellular adapter board, while the other peripherals are available on the Dual-In-Line male Board-to-Board connectors provided on the top layer of the cellular Adapter Board (J300 / J301 or J200 / J201), which are pin-to-pin compatible to the connectors on the bottom layer of the adapter board.



















The lower board (EVB-WL3) is designed to also be used with other u-blox cellular adapter boards. It contains additional switches, jumpers, connectors, LEDs and parts that are partially described in [Figure 1](#), [Figure 2](#) or in this document, because they are intended for use only with other u-blox cellular modules. It is recommended to leave any additional connector unconnected, and to leave any additional switch in its default configuration.

## 1.3 Switches, jumpers, and buttons

| Function              | Description                                                                                                                                                              | Name  | Board |
|-----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-------|
| Main Power Switch     | Power on / off of the whole evaluation kit                                                                                                                               | SW400 | EVB   |
| Cellular VCC          | Jumper socket to provide the 3.8 V supply to the cellular module VCC input                                                                                               | J404  | EVB   |
| Cellular Power-on     | Push button to switch-on the cellular module                                                                                                                             | SW302 | EVB   |
| Cellular Reset        | Push button to reset the cellular module                                                                                                                                 | SW303 | EVB   |
| Cellular UART detach  | Slide switch to attach / detach cellular module UART from USB / RS232 connectors: when detached, UART signals available only on DIL B2B connector on ADP board           | SW401 | EVB   |
| Cellular UART routing | Slide switch to select cellular module UART routing on USB or on RS232 connector                                                                                         | SW403 | EVB   |
| Cellular GPIO detach  | Slide switch to attach / detach the cellular module GPIOs, SIM_DET from peripherals: when detached, the signals are available only on the DIL B2B connector on ADP board | SW300 | EVB   |
| Cellular GNSS detach  | Slide switch to attach / detach the cellular module to the GNSS module (GPIO2-3-4): when detached, the signals are available only on DIL B2B connector on ADP board      | SW304 | EVB   |
| GNSS V_BCKP           | Slide switch to connect / disconnect backup battery to V_BCKP pin of GNSS module                                                                                         | SW204 | EVB   |

**Table 1: EVK-L2 switches and buttons description**


## 1.4 LEDs

| Function                 | Description                                                                                                                                    | LED # | Board    | Color                                                                                 |
|--------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|-------|----------|---------------------------------------------------------------------------------------|
| Main Power               | Power supply plugged in the 9 - 18 V Power Input                                                                                               | DL401 | EVB      |   |
| Cellular VCC             | Cellular module supplied. Main Power Switch must be switched on                                                                                | DL400 | EVB      |  |
| Cellular native USB      | USB cable plugged in Cellular native USB connector                                                                                             | DS100 | ADP-L2   |  |
| Cellular USB             | USB cable plugged in Cellular USB connector for UART access                                                                                    | DL501 | EVB      |  |
| Cellular USB / UART      | Green light is activated when UART is routed to Cellular USB connector<br>Red light blinks at UART TX or RX data on Cellular USB connector     | DL403 | EVB      |  |
| Cellular UART detach     | UART signals are available only on the DIL B2B connector on ADP board                                                                          | DL404 | EVB      |  |
| Cellular RS232 / UART    | Green light is activated when UART is routed to Cellular RS232 connector<br>Red light blinks at UART TX or RX data on Cellular RS232 connector | DL405 | EVB      |  |
| Cellular RI indicator    | RI line turns ON (active low)                                                                                                                  | DS501 | EVB      |  |
| Cellular CTS indicator   | CTS line turns ON (active low)                                                                                                                 | DS500 | EVB      |  |
| Cellular GPIO1 indicator | Green light is activated when cellular GPIO1 is high                                                                                           | DS107 | EVB      |  |
| Cellular GPIO2 indicator | Green light is activated when cellular GPIO2 is high                                                                                           | DS105 | EVB      |  |
| Cellular GPIO3 indicator | Green light is activated when cellular GPIO3 is high                                                                                           | DS109 | EVB      |  |
| Cellular GPIO4 indicator | Green light is activated when cellular GPIO4 is high                                                                                           | DS103 | EVB      |  |
| Wi-Fi indicator          | Green light is activated when there is Wi-Fi activity                                                                                          | DL401 | ADP-L2   |  |
| GNSS VCC supply          | GNSS module supply is turned ON                                                                                                                | DS118 | ADP-GNSS |  |
| GNSS USB                 | USB cable plugged in GNSS USB connector                                                                                                        | DS124 | ADP-GNSS |  |
| GNSS Timepulse           | Pulses at 1 Hz when valid GNSS fix                                                                                                             | DS121 | ADP-GNSS |  |
| Cellular / GNSS DDC      | Cellular / GNSS module communication over DDC (I2C) interface                                                                                  | DS132 | ADP-GNSS |  |



**Table 2: Description of EVK-L2 LEDs**



## 1.5 Connectors

| Function                   | Description                                                                                             |                                                                                   | Name                                 | Board                                  |          |
|----------------------------|---------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|--------------------------------------|----------------------------------------|----------|
| 9 - 18 V Power Input       | Connector for the AC / DC power adapter of the EVK<br>AC: 100-240 V, 0.8 A, 50-60 Hz / DC: +12 V, 2.5 A |  | IEC 60417-5172<br>Class II equipment | J400                                   | EVB      |
| SIM card holder            | SIM card holder                                                                                         |                                                                                   |                                      | J300                                   | EVB      |
| Primary cellular antenna   | SMA connector for the cellular module primary antenna (ANT1, Tx/Rx)                                     |                                                                                   |                                      | J104 <sup>1</sup><br>J103 <sup>2</sup> | ADP-L2   |
| Secondary cellular antenna | SMA connector for the cellular module secondary antenna (ANT2, Rx)                                      |                                                                                   |                                      | J1031<br>J1022                         | ADP-L2   |
| Wi-Fi antenna              | SMA connector for the Wi-Fi module antenna (ANT WL, Tx/Rx)                                              |                                                                                   |                                      | J4002                                  | ADP-L2   |
| Cellular native USB        | Mini USB connector for cellular module native USB interface                                             |                                                                                   |                                      | J100                                   | ADP-L2   |
| Cellular USB (UART)        | Mini USB connector for cellular module UART interface converted as USB interface                        |                                                                                   |                                      | J501                                   | EVB      |
| Cellular RS232 (UART)      | DB9 connector for cellular module UART interface converted as RS232 interface                           |                                                                                   |                                      | J500                                   | EVB      |
| DIL B2B headers            | Dual-In-Line Board-to-Board connectors for cellular module interfaces                                   |                                                                                   |                                      | J300-J3011<br>J200-J2012               | ADP-L2   |
| Cellular headset           | Audio headset jack connector for cellular module audio interface                                        |                                                                                   |                                      | J303                                   | EVB      |
| GNSS antenna               | SMA connector for the GNSS module antenna (GNSS Antenna)                                                |                                                                                   |                                      | J208                                   | ADP-GNSS |
| GNSS USB                   | Mini USB connector for GNSS module USB interface                                                        |                                                                                   |                                      | J102                                   | ADP-GNSS |
| GNSS backup battery        | Backup battery socket for the GNSS module (under GNSS adapter board)                                    |                                                                                   |                                      | BT200                                  | EVB      |
| GND                        | Ground terminals for probe reference                                                                    |                                                                                   |                                      | J402, J403<br>J405, J406               | EVB      |

**Table 3: Description of EVK-L2 connectors**

-  Caution! In the unlikely event of a failure in the internal protection circuitry there is a risk of an explosion when charging fully or partially discharged battery. Replace battery when it no longer has sufficient charge for unit operation. Control the battery before use if the device has not been used for an extended period of time.
-  Caution! Risk of explosion if battery is replaced with an incorrect type. Dispose of used batteries according to the instructions!

<sup>1</sup> EVK-L2x evaluation kit for TOBY-L2 modules, product version "01"

<sup>2</sup> EVK-L2x evaluation kit for TOBY-L2 modules, product versions "02" / "62" onwards



## 1.6 EVK-L2 pin out


| TOBY-L2 series |              | DIL B2B        | TOBY-L2 series |              | DIL B2B                  | TOBY-L2 series |          | DIL B2B                  |
|----------------|--------------|----------------|----------------|--------------|--------------------------|----------------|----------|--------------------------|
| Pin N°         | Name         | Name / Pin N°  | Pin N°         | Name         | Name / Pin N°            | Pin N°         | Name     | Name / Pin N°            |
| 1              | RSVD         | Not present    | 32             | GND          | J201 Pins 7-10           | 63             | SDIO_D2  | Not present <sup>3</sup> |
| 2              | GND          | J201 Pins 7-10 | 33             | RSVD         | Not present              | 64             | SDIO_CLK | Not present <sup>3</sup> |
| 3              | V_BCKP       | J201 Pin 3     | 34             | RSVD         | Not present              | 65             | SDIO_CMD | Not present <sup>3</sup> |
| 4              | VUSB_DET     | Not present    | 35             | RSVD         | Not present              | 66             | SDIO_D0  | Not present <sup>3</sup> |
| 5              | V_INT        | J201 Pin 36    | 36             | RSVD         | Not present              | 67             | SDIO_D3  | Not present <sup>3</sup> |
| 6              | RSVD         | Not present    | 37             | RSVD         | Not present              | 68             | SDIO_D1  | Not present <sup>3</sup> |
| 7              | RSVD         | Not present    | 38             | RSVD         | Not present              | 69             | GND      | J201 Pins 7-10           |
| 8              | RSVD         | Not present    | 39             | RSVD         | Not present              | 70             | VCC      | J200 Pins 7-10           |
| 9              | RSVD         | Not present    | 40             | RSVD         | Not present              | 71             | VCC      | J200 Pins 7-10           |
| 10             | DSR          | J201 Pin 18    | 41             | RSVD         | Not present              | 72             | VCC      | J200 Pins 7-10           |
| 11             | RI           | J201 Pin 17    | 42             | RSVD         | Not present              | 73             | GND      | J201 Pins 7-10           |
| 12             | DCD          | J201 Pin 11    | 43             | RSVD         | Not present              | 74             | GND      | J201 Pins 7-10           |
| 13             | DTR          | J201 Pin 12    | 44             | GND          | J201 Pins 7-10           | 75             | ANT_DET  | Not present              |
| 14             | RTS          | J201 Pin 13    | 45             | RSVD         | Not present              | 76             | GND      | J201 Pins 7-10           |
| 15             | CTS          | J201 Pin 14    | 46             | GND          | J201 Pins 7-10           | 77             | RSVD     | Not present              |
| 16             | TXD          | J201 Pin 15    | 47             | RSVD         | Not present              | 78             | GND      | J201 Pins 7-10           |
| 17             | RXD          | J201 Pin 16    | 48             | RSVD         | Not present              | 79             | GND      | J201 Pins 7-10           |
| 18             | RSVD         | Not present    | 49             | RSVD         | Not present              | 80             | GND      | J201 Pins 7-10           |
| 19             | RSVD         | Not present    | 50             | I2S_WA       | Not present <sup>3</sup> | 81             | ANT1     | Not present              |
| 20             | PWR_ON       | J201 Pin 29    | 51             | I2S_TXD      | Not present <sup>3</sup> | 82             | GND      | J201 Pins 7-10           |
| 21             | GPIO1        | J201 Pin 33    | 52             | I2S_CLK      | Not present <sup>3</sup> | 83             | GND      | J201 Pins 7-10           |
| 22             | GPIO2        | J201 Pin 31    | 53             | I2S_RXD      | Not present <sup>3</sup> | 84             | RSVD     | Not present              |
| 23             | RESET_N      | J200 Pin 26    | 54             | SCL          | J200 Pin 20              | 85             | GND      | J201 Pins 7-10           |
| 24             | GPIO3        | J201 Pin 32    | 55             | SDA          | J200 Pin 21              | 86             | GND      | J201 Pins 7-10           |
| 25             | GPIO4        | J201 Pin 25    | 56             | SIM_CLK      | J200 Pin 15              | 87             | ANT2     | Not present              |
| 26             | HOST_SELECT0 | J201 Pin 2     | 57             | SIM_IO       | J200 Pin 14              | 88             | GND      | J201 Pins 7-10           |
| 27             | USB_D-       | Not present    | 58             | SIM_RST      | J200 Pin 16              | 89             | GND      | J201 Pins 7-10           |
| 28             | USB_D+       | Not present    | 59             | VSIM         | J200 Pin 13              | 90             | GND      | J201 Pins 7-10           |
| 29             | RSVD         | Not present    | 60             | GPIO5        | J201 Pin 23              | 91             | RSVD     | Not present              |
| 30             | GND          | J201 Pins 7-10 | 61             | GPIO6        | Not present <sup>3</sup> | 92             | GND      | J201 Pins 7-10           |
| 31             | RSVD         | Not present    | 62             | HOST_SELECT1 | J201 Pin 4               | 93-152         | GND      | J201 Pins 7-10           |

**Table 4: Interfaces of TOBY-L2 series modules, as routed on the 42-pin Dual-In-Line Board-to-Board connectors (J200, J201) available on the adapter board ADP-L2 of the EVK-L2 evaluation kit**

<sup>3</sup> 0R jumper can be populated in order to route the signal to the 42-pin Dual-In-Line Board-to-Board connectors

| Signal Name   | DIL B2B J201 |        | Signal Name   | Signal Name   | DIL B2B J200 |        | Signal Name   |
|---------------|--------------|--------|---------------|---------------|--------------|--------|---------------|
|               | Pin N°       | Pin N° |               |               | Pin N°       | Pin N° |               |
| HOST_SELECT0  | 2            | 1      | GND           | Not connected | 2            | 1      | GND           |
| Not connected | 4            | 3      | V_BCKP        | Not connected | 4            | 3      | Not connected |
| Not connected | 6            | 5      | Not connected | Not connected | 6            | 5      | Not connected |
| GND           | 8            | 7      | GND           | VCC           | 8            | 7      | VCC           |
| GND           | 10           | 9      | GND           | VCC           | 10           | 9      | VCC           |
| DTR           | 12           | 11     | DCD           | Not connected | 12           | 11     | Not connected |
| CTS           | 14           | 13     | RTS           | SIM_IO        | 14           | 13     | VSIM          |
| RXD           | 16           | 15     | TXD           | SIM_RST       | 16           | 15     | SIM_CLK       |
| DSR           | 18           | 17     | RI            | Not connected | 18           | 17     | Not connected |
| Not connected | 20           | 19     | Not connected | SCL           | 20           | 19     | Not connected |
| Not connected | 22           | 21     | Not connected | Not connected | 22           | 21     | SDA           |
| Not connected | 24           | 23     | GPIO5         | Not connected | 24           | 23     | Not connected |
| Not connected | 26           | 25     | GPIO4         | RESET_N       | 26           | 25     | Not connected |
| Not connected | 28           | 27     | Not connected | MIC_BIAS      | 28           | 27     | MIC_GND       |
| Not connected | 30           | 29     | PWR_ON        | Not connected | 30           | 29     | Not connected |
| GPIO3         | 32           | 31     | GPIO2         | Not connected | 32           | 31     | Not connected |
| HOST_SELECT1  | 34           | 33     | GPIO1         | SPK_N         | 34           | 33     | SPK_P         |
| V_INT         | 36           | 35     | Not connected | Not connected | 36           | 35     | Not connected |
| Not connected | 38           | 37     | Not connected | Not connected | 38           | 37     | Not connected |
| Not connected | 40           | 39     | Not connected | Not connected | 40           | 39     | Not connected |
| GND           | 42           | 41     | GND           | GND           | 42           | 41     | Not connected |

**Table 5: Pin-out of the 42-pin Dual-In-Line Board-to-Board connectors (J201, J200) available on the adapter board ADP-L2 of the EVK-L2 evaluation kit for TOBY-L2 series modules**

 The pins / interfaces that are not supported by a specific TOBY-L2 module product version should be not driven by an external device (see the TOBY-L2 series data sheet [3] and TOBY-L2 / MPC1-L2 series system integration manual [4] for the features supported by each TOBY-L2 module product version).

## 1.7 Software installation

The related USB drivers are available with the EVK-L2. Executable files can be downloaded from [www.u-blox.com/evk-downloads](http://www.u-blox.com/evk-downloads) and saved to any location on the computer hard drive. The installation can be started by running the executable file on a computer with the Windows operating system.

## 1.8 Board setup

1. Insert a SIM card into the **SIM card holder** (J300 on the EVB).
2. Connect a cellular antenna provided with the evaluation kit box to the **Primary cellular antenna** SMA connector on the ADP-L2 (ANT1, RF input/output for transmission and reception of LTE/3G/2G RF signals).
3. Connect a cellular antenna provided with the evaluation kit box to the **Secondary cellular antenna** SMA connector on the ADP-L2 (ANT2, RF input for the reception of the LTE RF signals as per the Down-Link MIMO 2 x 2 and for the reception of the 3G RF signals as per the Down-Link Rx diversity). Place the secondary cellular antenna far enough from the primary cellular antenna (should be more than 20 cm).
4. If the Wi-Fi functionality is required, connect the Wi-Fi antenna provided with the evaluation kit box to the **Wi-Fi antenna** SMA connector on the ADP-L2 (ANT WL). Place the Wi-Fi antenna far enough from the cellular antennas (should be more than 20 cm).



Wi-Fi functionality is available on the EVK-L2 for TOBY-L2 product versions "02", "62" onwards

5. If the GNSS functionality is required, connect the GNSS antenna provided with the evaluation kit box to the **GNSS antenna** SMA connector on the EVB. Place the GNSS antenna in a location with good sky view.



Interface to the GNSS module is not supported by TOBY-L2 modules<sup>4</sup>.

6. Connect the AC / DC +12 V power adapter provided with the evaluation kit to the **9 – 18 V Power Input** connector (J400 on the EVB). LED DL401 lights blue.
7. Be sure to provide a jumper socket on the **Cellular VCC supply jumper** (J404 on the EVB). This provides the connection from the 3.8 V output of the supply circuit on the EVB to the VCC input of the module.
8. To enable the board power supply, turn the **Main power switch** (SW400 on the EVB) to the ON position. LED DL400 lights green. The cellular module switches on.
9. For communication via USB, connect the USB cable to the **Cellular native USB** connector (J100 on ADP). LED DS100 on ADP lights blue. After the end of the module boot, the following devices are by default enabled with Windows (details as the ports numbering can be seen via the Windows Device Manager)<sup>5</sup>:
  - Modems → u-blox Composite USB Modem Interface
  - AT commands interface is available over this modem COM port
  - Network adapters → Remote NDIS based Internet Sharing Device
  - Ethernet-over-USB connection is available over this network adapter

Run an AT terminal application (e.g. the u-blox m-center tool) selecting the u-blox Composite USB Modem Interface COM port, with these settings:

- Data rate: 115200 b/s
- Data bits: 8
- Parity: N
- Stop bits: 1
- Flow control: HW

See Appendix A for how to configure the u-blox m-center AT terminal for Windows.

<sup>4</sup> Supply for the GNSS module can be provided by mounting the 0R jumper R106 and removing the 0R jumper R107 on the ADP-GNSS.

<sup>5</sup> A message of "driver installation fail" may appear on Windows if the USB cable has been connected before the end of the module boot, but this can be ignored as the normal operating functionality of the module will be anyway available after the end of the module boot.

10. For communication via the TOBY-L2 module's UART interface, the following connections are allowed and can be alternatively enabled in a mutually exclusive way (see [Table 6](#) for switch position and LED status):

- Connect a USB cable to mini USB connector (**Cellular USB**, J501 on EVB), LED DL501 lights blue
- Connect an RS232 cable to DB9 connector (**Cellular RS232**, J500 on EVB)

When a USB cable is connected to the mini USB connector, two COM ports are enabled in Windows (the numbering of the COM ports can be seen via the Windows Device Manager). The serial port for AT commands is available over the first numbered COM port opened by the driver.

| Type of connections                                                                                                                                        | SW401    | SW403       | LED   |
|------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|-------------|-------|
| Access to cellular UART over the Cellular USB (UART) mini USB connector (J501)                                                                             | ON BOARD | MINIUSB     | DL403 |
| Access to cellular UART over the Cellular RS232 (UART) DB9 connector (J500)                                                                                | ON BOARD | DB9         | DL405 |
| Access to cellular UART on DIL Board-to-Board connector on the adapter board: cellular UART detached from USB (UART) J501 and RS232 (UART) J500 connectors | B2B      | Do not care | DL404 |

**Table 6: Serial interface configuration**

Run an AT terminal application (e.g. the u-blox m-center tool) selecting the COM port, with these settings:

- Data rate: 115200 b/s
- Data bits: 8
- Parity: N
- Stop bits: 1
- Flow control: HW

See [Appendix A](#) for how to configure the u-blox m-center AT terminal for Windows.

11. If the audio functionality is required, connect the headset provided with the evaluation kit box to the **Headset jack** connector (J303 on EVB).

## 1.9 Enabling error result codes

| Command sent by DTE (user) | DCE response (module) | Description                                                       |
|----------------------------|-----------------------|-------------------------------------------------------------------|
| AT+CMEE=2                  | OK                    | Enables the cellular module to report verbose error result codes. |

## 1.10 PIN code insertion (when required)

| Command sent by DTE (user) | DCE response (module) | Description                                                                                                      |
|----------------------------|-----------------------|------------------------------------------------------------------------------------------------------------------|
| AT+CPIN="8180"             | OK                    | Enter the PIN code, if needed (enter the PIN of the SIM card – 8180 is written here as an example).              |
| AT+CLCK="SC", 0, "8180"    | OK                    | Unlock the PIN at power on (the last parameter is the PIN of the SIM card – 8180 is written here as an example). |
| AT+CLCK="SC", 1, "8180"    | OK                    | Lock the PIN at power on (the last parameter is the PIN of the SIM card – 8180 is written here as an example).   |

## 1.11 Registration on a cellular network

| Command sent by DTE (user) | DCE response (module)      | Description                                                                                                                                                                                                    |
|----------------------------|----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| AT+CREG?                   | +CREG: 0,1<br>OK           | Verify the network registration.                                                                                                                                                                               |
| AT+COPS=0                  | OK                         | Register the module on the network.<br>The cellular module automatically registers itself on the cellular network. This command is necessary only if the automatic registration failed (AT+CREG? returns 0,0). |
| AT+COPS?                   | +COPS: 0,0,"I TIM",7<br>OK | Read the operator name and radio access technology (RAT).                                                                                                                                                      |

For further AT command examples regarding Mobile Network Operator, Radio Access Technology, and band selection and configuration, see the u-blox AT commands examples application note [\[2\]](#).

## 1.12 Enable audio codec configuration to provide voice capability

| Command sent by DTE (user) | DCE response (module)                                                                                                                        | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| AT+UGPIOC?                 | +UGPIOC:<br>10,15<br>11,15<br>12,15<br>13,15<br>21,16<br>22,255<br>24,255<br>25,0<br>50,12<br>51,12<br>52,12<br>53,12<br>60,7<br>61,14<br>OK | Check the configuration of I2S pins (<gpio_id>=50, 51, 52, 53): they must be configured as I2S digital audio interface (<gpio_mode> = 12, as the factory-programmed value) to provide voice capability at the headset jack connector using the external audio codec mounted on the EVK-L2.<br>Check the configuration of the GPIO6 pin (<gpio_id>=61): it must be configured as clock output (<gpio_mode> = 14, as the factory programmed value) to provide voice capability at the headset jack connector using the external audio codec mounted on the EVK-L2. |
| AT+USPM?                   | +USPM: 1,1,0,0,2<br>OK                                                                                                                       | Check the audio path mode setting: both the up-link and the down-link paths must be configured as I2S digital audio interface (e.g. <main_uplink> = 1, <main_downlink> = 1, as the factory-programmed value) to provide voice capability at the headset jack connector using the external audio codec mounted on the EVK-L2.                                                                                                                                                                                                                                     |
| AT+UEXTDCONF=0,1           | OK                                                                                                                                           | Enable the automatic configuration of the external Maxim MAX9860 audio codec mounted on the EVK-L2. The setting is saved in the non-volatile memory (NVM) and it is applied at each subsequent module power-on.                                                                                                                                                                                                                                                                                                                                                  |
| AT+CPWROFF                 | OK                                                                                                                                           | Switch off the EVK-L2.<br>The external Maxim MAX9860 audio codec mounted on the EVK-L2 will be fed by the 13 MHz clock provided by the GPIO6 and it will be dynamically programmed over I2C interface at any subsequent re-boot of the module and every time audio path is enabled, providing voice capability at the headset jack connector of the EVK-L2.                                                                                                                                                                                                      |

## 1.13 Switching off the EVK-L2

To switch off the EVK-L2, send the +CPWROFF AT command. Make sure to use this command before switching off the main power, otherwise settings and configuration parameters may not be saved on the EVK-L2.




## B EVK-L2 setup for Internet browsing (Windows)

This section describes how to set up the EVK-L2 for browsing the internet with Windows 7 operating system on a PC connected with the EVK-L2 over the USB physical interface of the TOBY-L2 series module. Follow the board setup instructions described in section 1.8 in order to provide communication via the USB interface of the TOBY-L2 series module. Then use the AT terminal (see appendix A) to enter the following AT command lines:

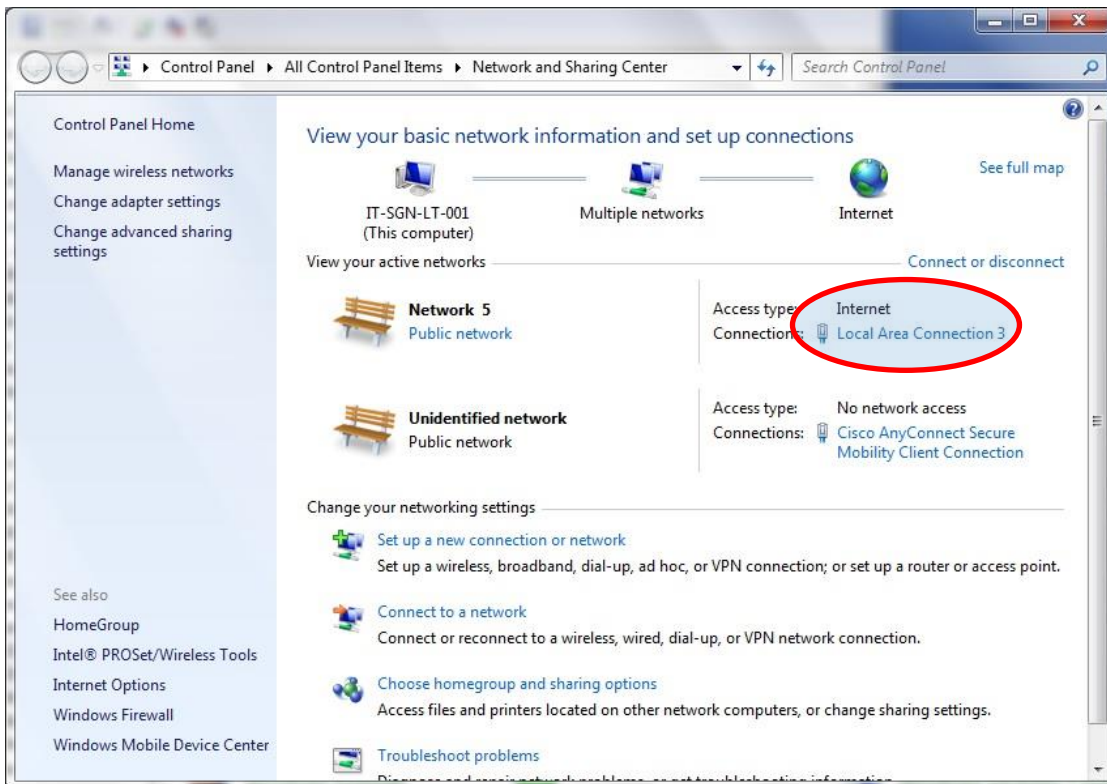
1. Perform the following procedure to activate an external PDP context with the preferred APN:

| Command sent by DTE (user)      | DCE response (module)                                                                                                                                              | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                     |              |              |    |
|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|--------------|--------------|----|
| AT+UBMCONF?                     | +UBMCONF: 1<br>OK                                                                                                                                                  | Check the +UBMCONF <networking_mode>, which must be 1 = Router mode (as the factory-programmed value) for the context activation procedure herein described.                                                                                                                                                                                                                                                                                                                                                           |                     |              |              |    |
| AT+CFUN=4                       | OK                                                                                                                                                                 | Set the module in airplane mode. The module will deregister from network and both RF Tx and RF Rx will be disabled.                                                                                                                                                                                                                                                                                                                                                                                                    |                     |              |              |    |
| AT+CGDCONT=1,"IP","ibox.tim.it" | OK                                                                                                                                                                 | Define a PDP context with preferred APN: in this example, the "ibox.tim.it" APN is selected.                                                                                                                                                                                                                                                                                                                                                                                                                           |                     |              |              |    |
| AT+UCGDFLT=1,"IP","ibox.tim.it" | OK                                                                                                                                                                 | Define the initial PDP context with preferred APN. This will be activated only if the module registers to an LTE network.                                                                                                                                                                                                                                                                                                                                                                                              |                     |              |              |    |
| AT+CFUN=1                       | OK                                                                                                                                                                 | Set the module to full functionality. The module starts the automatic network registration.                                                                                                                                                                                                                                                                                                                                                                                                                            |                     |              |              |    |
| AT+CPIN?                        | +CPIN: READY<br>OK                                                                                                                                                 | Check the SIM PIN status and act accordingly.                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                     |              |              |    |
| AT+COPS?                        | +COPS: 0,0,"I TIM",7<br>OK                                                                                                                                         | Check the +COPS <Act> and act accordingly: <ul style="list-style-type: none"> <li>• <b>If</b> &lt;Act&gt; = 7 (LTE, as it is in this example)</li> <li>• <b>Then</b> no further action is needed</li> <li>• <b>Else</b> activate the context with +CGACT as following:                             <table border="1" data-bbox="949 1332 1385 1400"> <thead> <tr> <th>Command sent by DTE</th> <th>DCE response</th> </tr> </thead> <tbody> <tr> <td>AT+CGACT=1,1</td> <td>OK</td> </tr> </tbody> </table> </li> </ul> | Command sent by DTE | DCE response | AT+CGACT=1,1 | OK |
| Command sent by DTE             | DCE response                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                     |              |              |    |
| AT+CGACT=1,1                    | OK                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                     |              |              |    |
| AT+CGCONTRDP                    | +CGCONTRDP: 4,5,"ibox.tim.it.mnc001.mcc222.gprs", "5.168.209.178.255.255.255.255", "5.168.209.178", "83.224.70.94", "83.224.56.132", "0.0.0.0", "0.0.0.0", 0<br>OK | Check the DNS primary server address: in this example, the DNS primary server address is 83.224.70.94                                                                                                                                                                                                                                                                                                                                                                                                                  |                     |              |              |    |

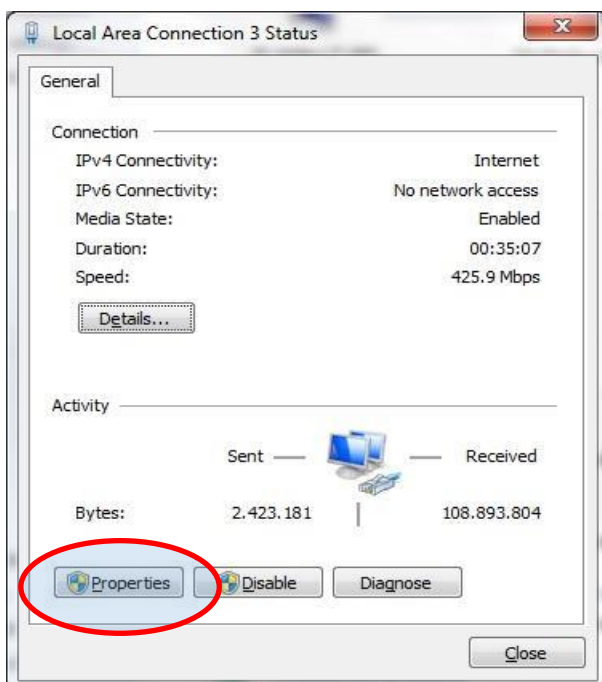
 For the complete description and syntax of supported AT commands, and for further details regarding all the settings configurable by means of AT commands, see the u-blox AT commands manual [1], the u-blox AT commands examples application note [2], and the u-blox TOBY-L2 series networking modes application note [5].



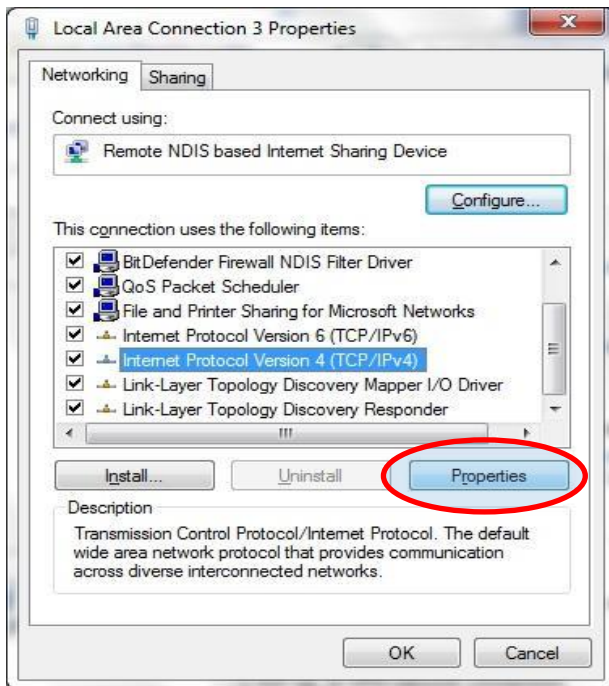
- Open “Network and Sharing Center” and click on **Local Area Connection** (associated to RNDIS interface):



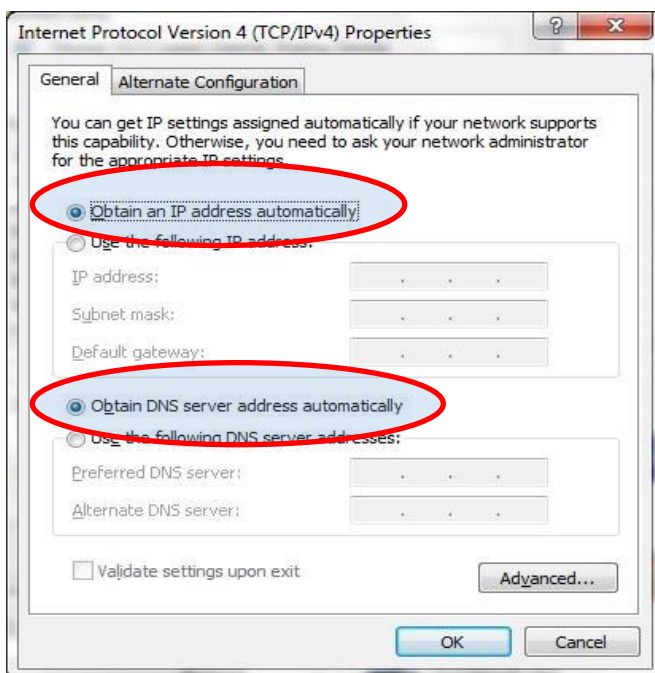
- Click on **Properties**:



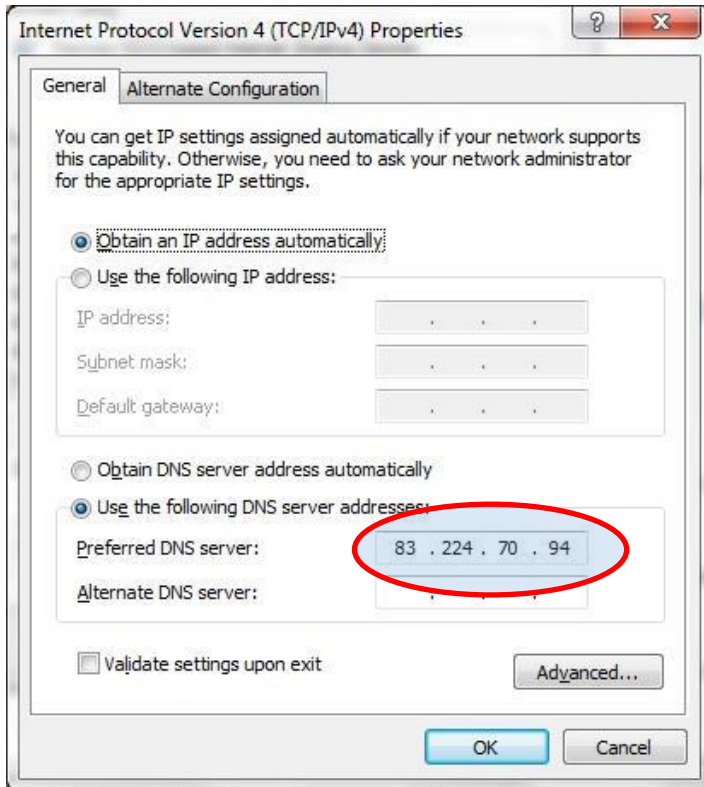
4. Search for “Internet Protocol Version 4 (TCP/IPv4)” and click on **Properties**:



5. Check the **Obtain an IP address automatically** and **Obtain DNS server address automatically** option. This the DHCP



6. If it is not possible to surf the web, then manually set the DNS server address: for example, use the DNS server returned by network (in this example, 83.224.70.94)



## C EVK-L2 setup for Internet browsing (Linux)

This section describes how to set up the EVK-L2 for browsing the internet with a Linux operating system on a PC connected with the EVK-L2 over the USB interface of the TOBY-L2 series module. Follow the board setup instructions described in section 1.8 (except the Windows OS settings) to provide communication via the USB interface of the TOBY-L2 module. Use minicom or a similar program to send AT commands to the TOBY-L2 module.

1. Identify the CDC-ACM connected to the Linux OS (`ls /dev/ttyACM*`) and then launch minicom to use this port. In the example below the port is **ttyACM0**.

```

root@aecel-Latitude-E6230: ~
root@aecel-Latitude-E6230:~# ls /dev/ttyACM*
/dev/ttyACM0
root@aecel-Latitude-E6230:~#

root@aecel-Latitude-E6230: ~
Welcome to minicom 2.7

OPTIONS: I18n
Compiled on Jan  1 2014, 17:13:19.
Port /dev/ttyACM0, 16:42:05

Press CTRL-A Z for help on special keys

at
OK
at+uusbconf?
+UUSBCONF: 3,"RNDIS",,"0x1146"

OK
    
```

2. Use the AT terminal to enter the following AT command lines. Perform the following procedure to activate an external PDP context with the preferred APN:

| Command sent by DTE (user)      | DCE response (module) | Description                                                                                                                                                |
|---------------------------------|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|
| AT+UBMCONF?                     | +UBMCONF: 1<br>OK     | Check the +UBMCONF <networking_mode>, which must be 1 (router mode as the factory-programmed value) for the context activation procedure herein described. |
| AT+CFUN=4                       | OK                    | Set the module in airplane mode. The module will deregister from the network and both RF Tx and RF Rx will be disabled.                                    |
| AT+CGDCONT=1,"IP","ibox.tim.it" | OK                    | Define a PDP context with preferred APN: in this example, the "ibox.tim.it" APN is selected.                                                               |
| AT+UCGDFLT=1,"IP","ibox.tim.it" | OK                    | Define the initial PDP context with preferred APN. This will be activated only if the module registers to an LTE network.                                  |
| AT+CFUN=1                       | OK                    | Set the module to full functionality. The module starts the automatic network registration.                                                                |
| AT+CPIN?                        | +CPIN: READY          | Check the SIM PIN status and act accordingly.                                                                                                              |

| Command sent by DTE (user) | DCE response (module)                                                                                                                                                                 | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                     |              |              |    |
|----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|--------------|--------------|----|
|                            | OK                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                     |              |              |    |
| AT+COPS?                   | +COPS: 0,0,"I TIM",7<br>OK                                                                                                                                                            | Check the +COPS <Act> and act accordingly: <ul style="list-style-type: none"> <li>• <b>If</b> &lt;Act&gt; = 7 (LTE, as it is in this example)</li> <li>• <b>Then</b> no further action is needed</li> <li>• <b>Else</b> activate the context with +CGACT as following:                             <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>Command sent by DTE</th> <th>DCE response</th> </tr> </thead> <tbody> <tr> <td>AT+CGACT=1,1</td> <td>OK</td> </tr> </tbody> </table> </li> </ul> | Command sent by DTE | DCE response | AT+CGACT=1,1 | OK |
| Command sent by DTE        | DCE response                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                     |              |              |    |
| AT+CGACT=1,1               | OK                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                     |              |              |    |
| AT+CGCONTRDP               | +CGCONTRDP: 4,5,"ibox.tim.i<br>t.mnc001.mcc222.gprs", "5.16<br>8.209.178.255.255.255.255",<br>"5.168.209.178", "83.224.70.<br>94", "83.224.56.132", "0.0.0.<br>0", "0.0.0.0", 0<br>OK | Check the DNS primary server address: in this example, the DNS primary server address is 83.224.70.94                                                                                                                                                                                                                                                                                                                                                                                                              |                     |              |              |    |

For the complete description and syntax of supported AT commands, and for further details regarding all the settings configurable by means of AT commands, see the u-blox AT commands manual [1], the u-blox AT commands examples application note [2], and the u-blox TOBY-L2 series networking modes application note [5].

- Use the command `ifconfig` to check if the RNDIS is active or not: in the example below it is not active because it is not listed.
- Open a terminal and use the command `"dmesg | grep rndis"` to identify the interface associated with the RNDIS. In the example below the interface is **usb0**.

```

root@aecel-Latitude-E6230: ~
ae-cel@aecel-Latitude-E6230:~$ sudo -s
[sudo] password for ae-cel:
root@aecel-Latitude-E6230:~# ifconfig
lo          Link encap:Local Loopback
            inet addr:127.0.0.1  Mask:255.0.0.0
            inet6 addr: ::1/128 Scope:Host
            UP LOOPBACK RUNNING MTU:65536 Metric:1
            RX packets:6908 errors:0 dropped:0 overruns:0 frame:0
            TX packets:6908 errors:0 dropped:0 overruns:0 carrier:0
            collisions:0 txqueuelen:0
            RX bytes:487750 (487.7 KB)  TX bytes:487750 (487.7 KB)

root@aecel-Latitude-E6230:~# dmesg | grep rndis
[ 343.419998] rndis_host 1-1:1.0 usb0: register 'rndis_host' at usb-0000:00:14.0-1, RNDIS device, 02:02:07:15:00:0b
[ 343.420053] usbcore: registered new interface driver rndis_host
[ 675.913077] rndis_host 1-1:1.0 usb0: unregister 'rndis_host' usb-0000:00:14.0-1, RNDIS device
[ 682.067068] rndis_host 1-1:1.0 usb0: register 'rndis_host' at usb-0000:00:14.0-1, RNDIS device, 02:02:07:15:00:0b
root@aecel-Latitude-E6230:~#
    
```

- Use the command `dhclient usb0` to configure the DHCP client, now the RNDIS is active.

- Use `ifconfig` to check that RNDIS is now active.

```

root@aecel-Latitude-E6230: ~
root@aecel-Latitude-E6230:~# dhclient usb0
root@aecel-Latitude-E6230:~# ifconfig
lo          Link encap:Local Loopback
            inet addr:127.0.0.1  Mask:255.0.0.0
            inet6 addr: ::1/128 Scope:Host
            UP LOOPBACK RUNNING MTU:65536  Metric:1
            RX packets:6766 errors:0 dropped:0 overruns:0 frame:0
            TX packets:6766 errors:0 dropped:0 overruns:0 carrier:0
            collisions:0 txqueuelen:0
            RX bytes:478325 (478.3 KB)  TX bytes:478325 (478.3 KB)

usb0       Link encap:Ethernet  HWaddr 02:02:07:15:00:0b
            inet addr:192.168.1.100 Bcast:192.168.1.255  Mask:255.255.255.0
            inet6 addr: fe80::2:7ff:fe15:b/64 Scope:Link
            UP BROADCAST RUNNING MULTICAST MTU:1500  Metric:1
            RX packets:931 errors:0 dropped:0 overruns:0 frame:0
            TX packets:1203 errors:0 dropped:0 overruns:0 carrier:0
            collisions:0 txqueuelen:1000
            RX bytes:598185 (598.1 KB)  TX bytes:199434 (199.4 KB)

root@aecel-Latitude-E6230:~# ping 8.8.8.8
PING 8.8.8.8 (8.8.8.8) 56(84) bytes of data.
64 bytes from 8.8.8.8: icmp_seq=1 ttl=49 time=72.5 ms
64 bytes from 8.8.8.8: icmp_seq=2 ttl=49 time=56.2 ms
64 bytes from 8.8.8.8: icmp_seq=3 ttl=49 time=59.2 ms
^C
--- 8.8.8.8 ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2003ms
rtt min/avg/max/mdev = 56.286/62.718/72.574/7.082 ms
root@aecel-Latitude-E6230:~#
    
```


- Now it is possible to browse the Internet.

## D Optimal throughput

To reach the highest throughput use one of these interfaces, which are listed with most optimal first:

- the RNDIS interface
- the CDC-ECM interface
- the CDC-ACM interface

The configuration can be set by means of the `+UUSBCONF` AT command (see the u-blox AT commands manual [\[1\]](#)).

 On a Linux OS to reach the highest throughput through the RNDIS, it is necessary to recompile the kernel. Apply the following modification in `/kernel/drivers/net/usb/usbnet.c`:

```
replace "size_t size = dev->rx_urb_size;" with "size_t size = (16*1024);"
```

If it is not possible to recompile the kernel, try to use the following command:

```
AT+UDCONF=67,0
```

This command disables RNDIS driver optimization and can mitigate effects in router mode only.

## E Examples of AT commands

For the complete description and syntax of the AT commands supported by each TOBY L2 series cellular module product version, see the u-blox AT commands manual [\[1\]](#).

For detailed examples of AT commands for network registration and configuration, context activation, data connection management, SIM management, module interfaces configurations and other settings, see the u-blox AT commands examples application note [\[2\]](#).

For detailed examples of AT commands for TOBY L2 series cellular module networking and IP connectivity configuration, see the u-blox TOBY-L2 series networking modes application note [\[5\]](#).

### E.1 Enable communication between cellular and Wi-Fi module

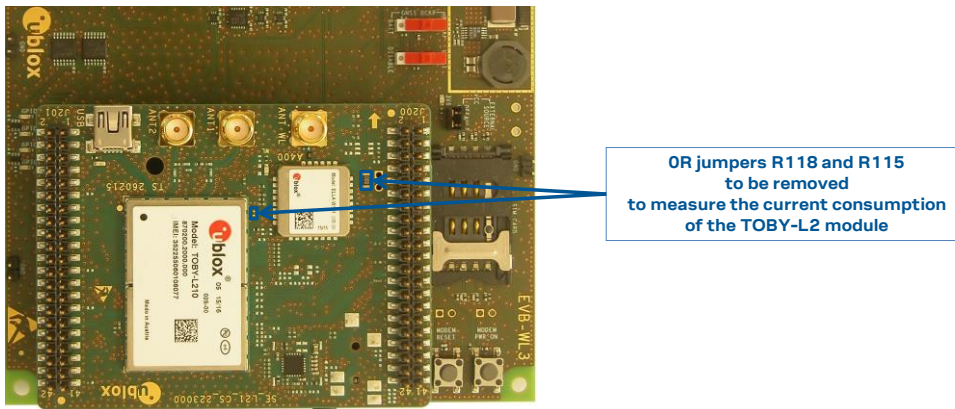
| Command sent by DTE (user) | DCE response (module)                                                                                                                        | Description                                                                                                                                                                                                                                          |
|----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| AT+UGPIOC?                 | +UGPIOC:<br>10,15<br>11,15<br>12,15<br>13,15<br>21,16<br>22,255<br>24,255<br>25,0<br>50,12<br>51,12<br>52,12<br>53,12<br>60,7<br>61,14<br>OK | Check the configuration of the GPIO6 pin (<gpio_id> = 21): it must be configured as Wi-Fi enable (<gpio_mode> = 16, as the factory-programmed value) to provide Wi-Fi capability using the u-blox ELLA-W1 series Wi-Fi module mounted on the EVK-L2. |
| AT+UWCFG=1                 | OK                                                                                                                                           | Turn on the u-blox ELLA-W1 series Wi-Fi module mounted on the EVK-L2 (by default it is turned off)                                                                                                                                                   |

For detailed examples of AT commands for the TOBY-L2 series cellular module and the u-blox ELLA-W1 Wi-Fi module integration and configuration, see the u-blox Wi-Fi / cellular integration application note [\[6\]](#).



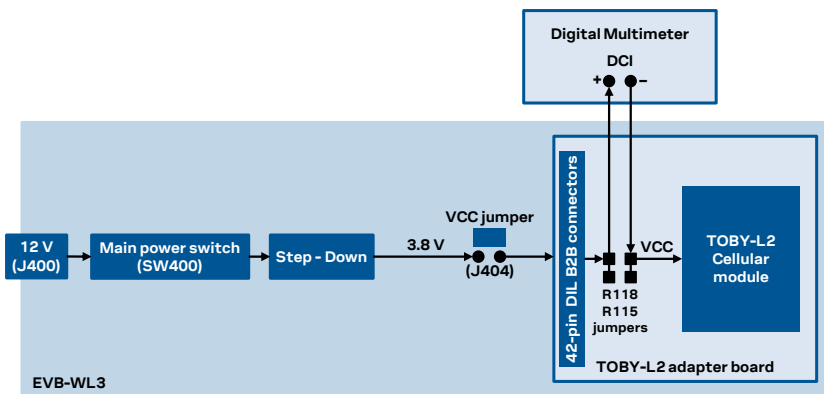
## F Current consumption measurement

Current consumption of TOBY-L2 series module can be measured on the EVK-L2 by removing 0R jumpers **R118** and **R115** mounted on the cellular adapter board, described in [Figure 5](#).



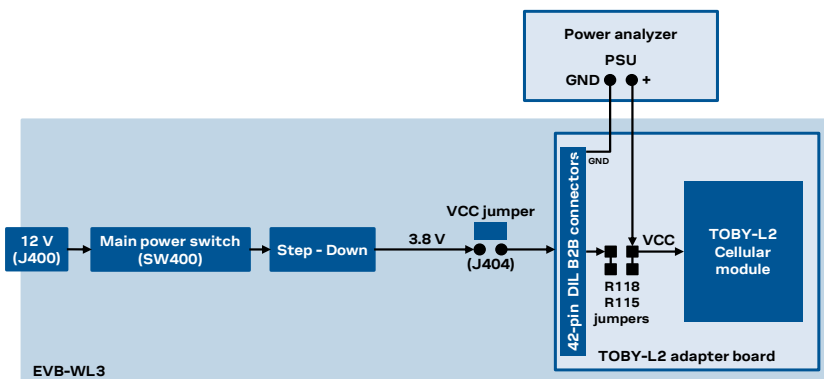
**Figure 5:** 0R jumpers to be removed for TOBY-L2 modules current consumption measurement

A suitable external digital multi-meter (as for example the Keysight 34465A, 34410A or 34411A ) can be used for current consumption measurements: in this case the 3.8 V supply circuit on the EVB will supply the TOBY-L2 module, with the digital multi-meter placed in series as described in [Figure 6](#).



**Figure 6:** Block diagram of current consumption setup for TOBY-L2 modules using a multimeter

Alternatively, a suitable external DC power supply with the dynamic current measurement capabilities (as for example, the portable and cheap Qoitech Otii Arc, or the more accurate Keysight N6705B, or the models designed for mobile communications Keysight 66319B/D or 66321B/D) can be used for current consumption measurements, acting also as the 3.8 V supply source for the TOBY-L2 module mounted on the adapter board, as illustrated in [Figure 7](#).



**Figure 7:** Block diagram of current consumption setup for TOBY-L2 modules using a DC power analyzer

## G Glossary

| Abbreviation | Definition                                                             |
|--------------|------------------------------------------------------------------------|
| AC           | Alternating Current                                                    |
| ACM          | Application Communication Module* / Abstract Control Model*            |
| ADP          | Adapter Board                                                          |
| APN          | Access Point Name                                                      |
| AT           | AT Command Interpreter Software Subsystem, or attention                |
| B2B          | Board-To-Board                                                         |
| CDC          | Communication Device Class                                             |
| CTS          | Clear To Send                                                          |
| DC           | Direct Current                                                         |
| DCE          | Data Communication Equipment                                           |
| DDC          | Display Data Channel                                                   |
| DHCP         | Dynamic Host Configuration Protocol                                    |
| DIL          | Dual In Line                                                           |
| DNS          | Domain Name Server                                                     |
| DTE          | Data Terminal Equipment                                                |
| ECM          | Ethernet networking Control Model                                      |
| EGPRS        | Enhanced General Packet Radio Service                                  |
| EVB          | Evaluation Board                                                       |
| EVK          | Evaluation Kit                                                         |
| GND          | Ground                                                                 |
| GNSS         | Global Navigation Satellite System                                     |
| GPIO         | General Purpose Input Output                                           |
| HSPA         | High Speed Packet Access                                               |
| I2C          | Inter-Integrated Circuit                                               |
| I2S          | Inter-IC Sound                                                         |
| IP           | Internet Protocol                                                      |
| LED          | Light Emitting Diode                                                   |
| LTE          | Long Term Evolution                                                    |
| MIMO         | Multiple In Multiple Out                                               |
| NVM          | Non-Volatile Memory                                                    |
| PDP          | Packet Data Protocol                                                   |
| RAT          | Radio Access Technology                                                |
| RI           | Ring Indicator                                                         |
| RNDIS        | Remote Network Driver Interface Specification                          |
| RX           | Receiver                                                               |
| SIM          | Subscriber Identity Module                                             |
| TCP          | Transfer Control Protocol                                              |
| TX           | Transmitter                                                            |
| UART         | Universal Asynchronous Receiver-Transmitter                            |
| URC          | Unsolicited Result Code                                                |
| USB          | Universal Serial Bus                                                   |
| Wi-Fi        | Wireless Local Area Network (IEEE 802.11 short range radio technology) |

**Table 7: Explanation of the abbreviations and terms used**

## Declaration of conformities


The equipment is intended for indoor usage. It is the user's duty to verify if further restrictions apply, such as in airplanes, hospitals, or hazardous locations (such as petrol stations or refineries).

Any changes or modification made to this equipment will void its compliance to the safety requirements.

Maintenance, inspections and/or repairs of the EVK-L2 shall be performed by u-blox AG.

## Related documentation

- [1] u-blox AT commands manual, [UBX-13002752](#)
- [2] u-blox AT commands examples application note, [UBX-13001820](#)
- [3] u-blox TOBY-L2 series data sheet, [UBX-13004573](#)
- [4] u-blox TOBY-L2 / MPC1-L2 series system integration manual, [UBX-13004618](#)
- [5] u-blox TOBY-L2 series networking modes application note, [UBX-14000479](#)
- [6] u-blox Wi-Fi / cellular integration application note, [UBX-14003264](#)

 For product change notifications and regular updates of u-blox documentation, register on our website, [www.u-blox.com](http://www.u-blox.com).

## Revision history

| Revision | Date        | Name | Comments                                                                                                                                                                             |
|----------|-------------|------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| R01      | 25-Mar-2014 | sses | Initial release                                                                                                                                                                      |
| R02      | 21-Jul-2014 | sses | Updated document status to Advance Information, with minor corrections                                                                                                               |
| R03      | 27-Nov-2014 | sses | Updated document status to Early Production Information<br>Updated EVK-L2 description including EVB-WL3 instead of EVB-WL1                                                           |
| R04      | 07-May-2015 | sses | Added EVK-L22, EVK-L23 evaluation kits description                                                                                                                                   |
| R05      | 30-Sep-2015 | sses | Document status reverted to Advance Information<br>Added description of EVK-L2 evaluation kits for TOBY-L2 product version "02"<br>Added current consumption measurement description |
| R06      | 26-Nov-2015 | mace | New section about browsing Internet on Linux OS                                                                                                                                      |
| R07      | 31-Mar-2016 | sses | Minor corrections and description improvements.                                                                                                                                      |
| R08      | 27-Apr-2016 | lpah | Updated document status to Production Information                                                                                                                                    |
| R09      | 19-Apr-2017 | sses | Added EVK-L21-62S and EVK-L24-00S evaluation kits description                                                                                                                        |
| R10      | 26-Jun-2017 | sses | Added note about the GNSS module supply                                                                                                                                              |
| R11      | 22-Jun-2021 | sses | Updated modem, firmware versions, PCN references and products status.<br>Removed description of obsolete product versions.<br>Minor other description improvements.                  |
| R12      | 30-Sep-2021 | alos | Updated application version and PCN reference of EVK-L20-00S-02, EVK-L21-00S-02, EVK-L22-00S-01, EVK-L23-00S-02.                                                                     |

# Contact

For complete contact information, visit us at [www.u-blox.com](http://www.u-blox.com).

## u-blox Offices

### North, Central and South America

#### u-blox America, Inc.

Phone: +1 703 483 3180  
Email: [info\\_us@u-blox.com](mailto:info_us@u-blox.com)

#### Regional Office West Coast:

Phone: +1 408 573 3640  
Email: [info\\_us@u-blox.com](mailto:info_us@u-blox.com)

#### Technical Support:

Phone: +1 703 483 3185  
Email: [support@u-blox.com](mailto:support@u-blox.com)

### Headquarters

#### Europe, Middle East, Africa

#### u-blox AG

Phone: +41 44 722 74 44  
Email: [info@u-blox.com](mailto:info@u-blox.com)  
Support: [support@u-blox.com](mailto:support@u-blox.com)

### Asia, Australia, Pacific

#### u-blox Singapore Pte. Ltd.

Phone: +65 6734 3811  
Email: [info\\_ap@u-blox.com](mailto:info_ap@u-blox.com)  
Support: [support\\_ap@u-blox.com](mailto:support_ap@u-blox.com)

#### Regional Office Australia:

Phone: +61 3 9566 7255  
Email: [info\\_au@u-blox.com](mailto:info_au@u-blox.com)  
Support: [support\\_ap@u-blox.com](mailto:support_ap@u-blox.com)

#### Regional Office China (Beijing):

Phone: +86 10 68 133 545  
Email: [info\\_cn@u-blox.com](mailto:info_cn@u-blox.com)  
Support: [support\\_cn@u-blox.com](mailto:support_cn@u-blox.com)

#### Regional Office China (Chongqing):

Phone: +86 23 6815 1588  
Email: [info\\_cn@u-blox.com](mailto:info_cn@u-blox.com)  
Support: [support\\_cn@u-blox.com](mailto:support_cn@u-blox.com)

#### Regional Office China (Shanghai):

Phone: +86 21 6090 4832  
Email: [info\\_cn@u-blox.com](mailto:info_cn@u-blox.com)  
Support: [support\\_cn@u-blox.com](mailto:support_cn@u-blox.com)

#### Regional Office China (Shenzhen):

Phone: +86 755 8627 1083  
Email: [info\\_cn@u-blox.com](mailto:info_cn@u-blox.com)  
Support: [support\\_cn@u-blox.com](mailto:support_cn@u-blox.com)

#### Regional Office India:

Phone: +91 80 405 092 00  
Email: [info\\_in@u-blox.com](mailto:info_in@u-blox.com)  
Support: [support\\_in@u-blox.com](mailto:support_in@u-blox.com)

#### Regional Office Japan (Osaka):

Phone: +81 6 6941 3660  
Email: [info\\_jp@u-blox.com](mailto:info_jp@u-blox.com)  
Support: [support\\_jp@u-blox.com](mailto:support_jp@u-blox.com)

#### Regional Office Japan (Tokyo):

Phone: +81 3 5775 3850  
Email: [info\\_jp@u-blox.com](mailto:info_jp@u-blox.com)  
Support: [support\\_jp@u-blox.com](mailto:support_jp@u-blox.com)

#### Regional Office Korea:

Phone: +82 2 542 0861  
Email: [info\\_kr@u-blox.com](mailto:info_kr@u-blox.com)  
Support: [support\\_kr@u-blox.com](mailto:support_kr@u-blox.com)

#### Regional Office Taiwan:

Phone: +886 2 2657 1090  
Email: [info\\_tw@u-blox.com](mailto:info_tw@u-blox.com)  
Support: [support\\_tw@u-blox.com](mailto:support_tw@u-blox.com)