IKALOGIC
Logic Analyzer

I. PRESENTATION

The logic analyzers used in the classrooms are **SQ50** and **SQ100** models from the **IKALOGIC**[1] brand.

Associated to the **ScanaStudio**[2] software (also designed by IKALOGIC), they allow the user to capture digital signals, to perform time analysis on them and to decode communication protocols.

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1   https://ikalogic.com/sq-logic-analyzer-pattern-generator/
2   https://ikalogic.com/scanastudio/
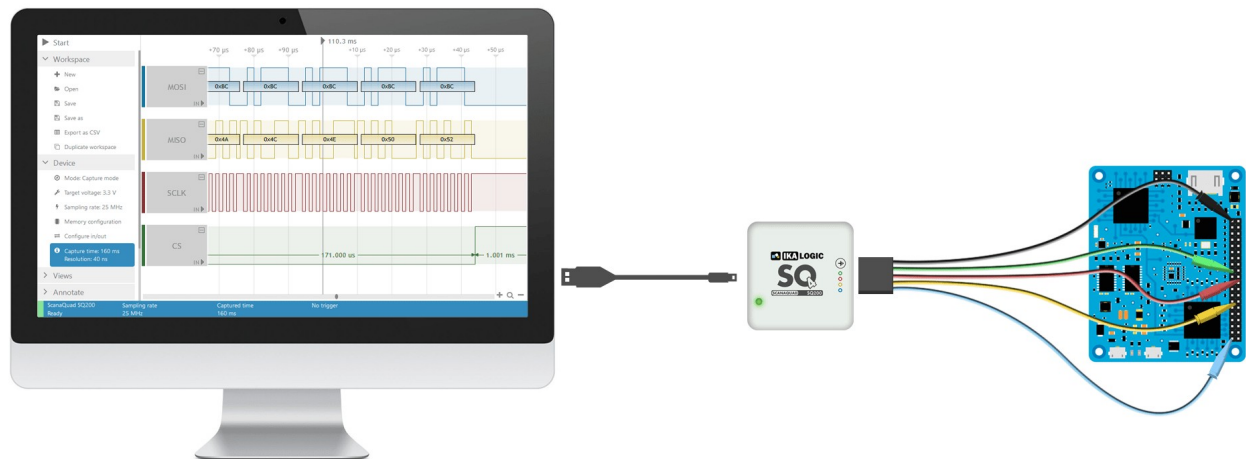
II. SQ HARDWARE

The logic analyzers from the SQ series have two connectors.

The **mini-USB connector** must be attached to a computer onto which the ScanaStudio software is installed. This link is used to transfer acquired data from the logic analyzer to the computer, and to send the capture parameters from the computer to the logic analyzer.

The second connector is made of five male pins. It is used for the **5-wire probe cable** (4 channels + 1 ground wire).

WARNING

The probe connector has no *poka-yoke*!

Beware to plug the cable in the good way: the cable colors must match with the colors printed on the logic analyzer's case.
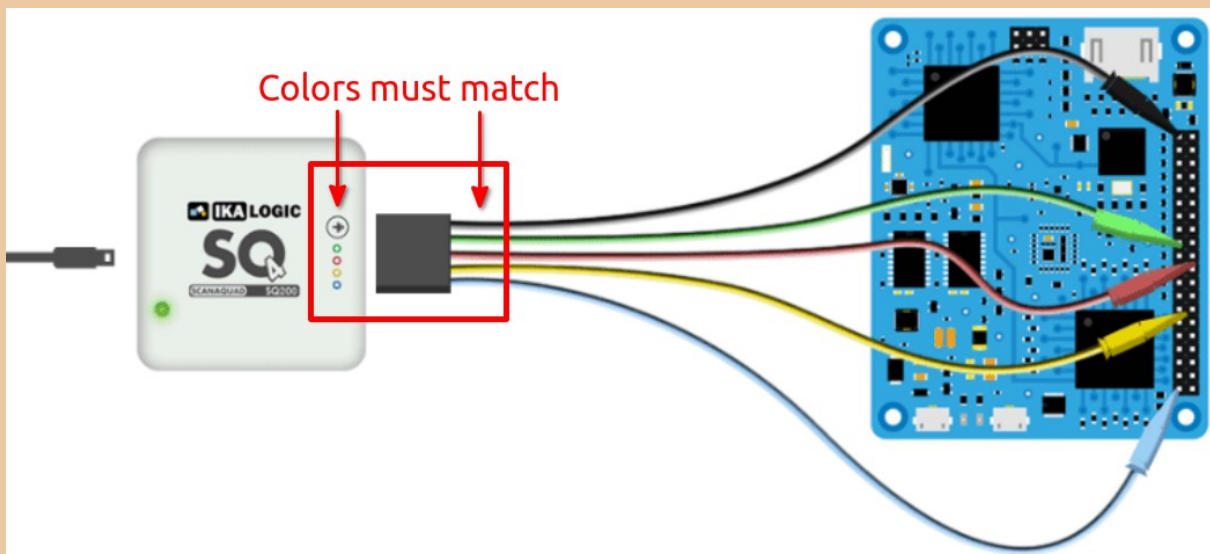
III. SCANASTUDIO SOFTWARE

III.1. First steps

The ScanaStudio software has a tab on the left from which all the acquisition parameters will be set. Captured data will be displayed on the central part of the windows.

All the capture and analysis parameters are stored in **workspaces**. You need to create one to start a new capture.

Plug the IKALOGIC analyzer to the computer.

On the "Workspace" tab (on the left), click on "New" (1), select the logic analyzer (2) and then click on "Create workspace" (3). The IKALOGIC LED should switch from orange to green when the project has been created.
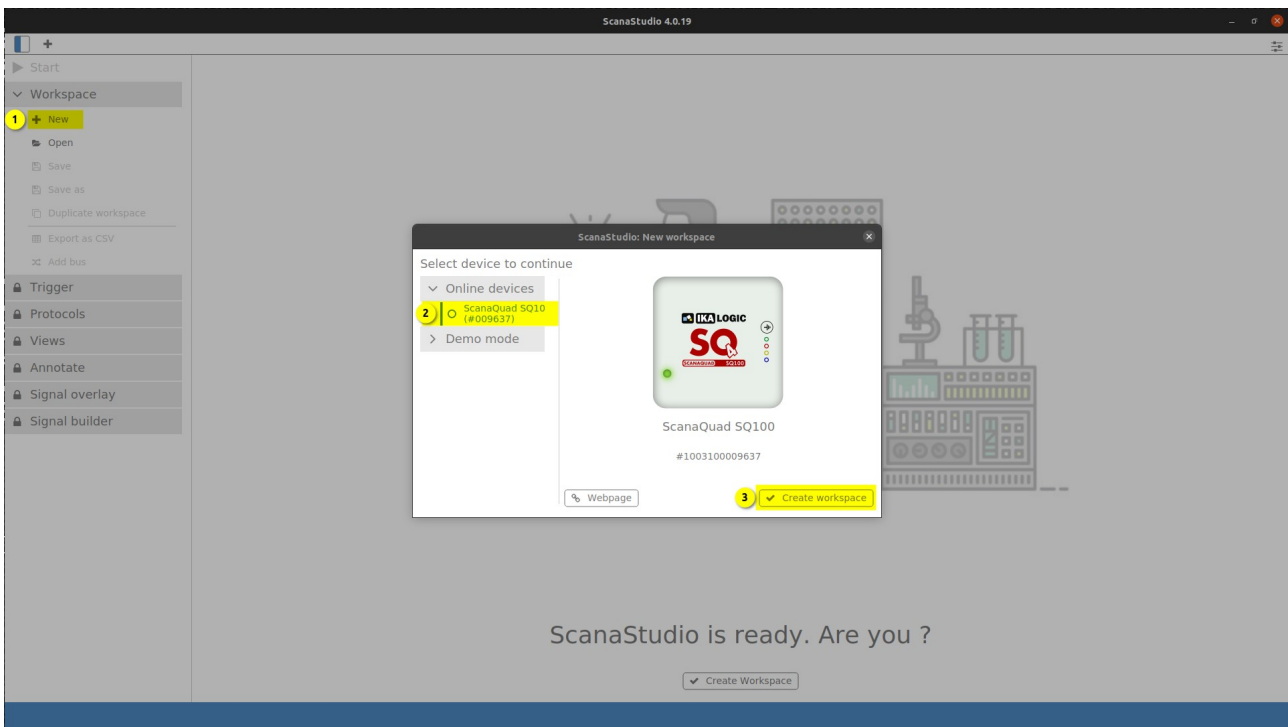

When all the capture parameters will be set according to your needs, you will be able to save the current workspace if you want to use them later on.

III.2. Naming and sorting the channels

To avoid any interpretation mistake, it is highly recommended to rename the acquisition channels. To do that **double-click on the channel name (1) and rename it**.

It is also possible to mask out a unused channel, by clicking on the "-" sign in the channel's upper right corner (2). Masked out channels are listed on the top of the main view (3). You can also change the channels order by performing a drag-and-drop.
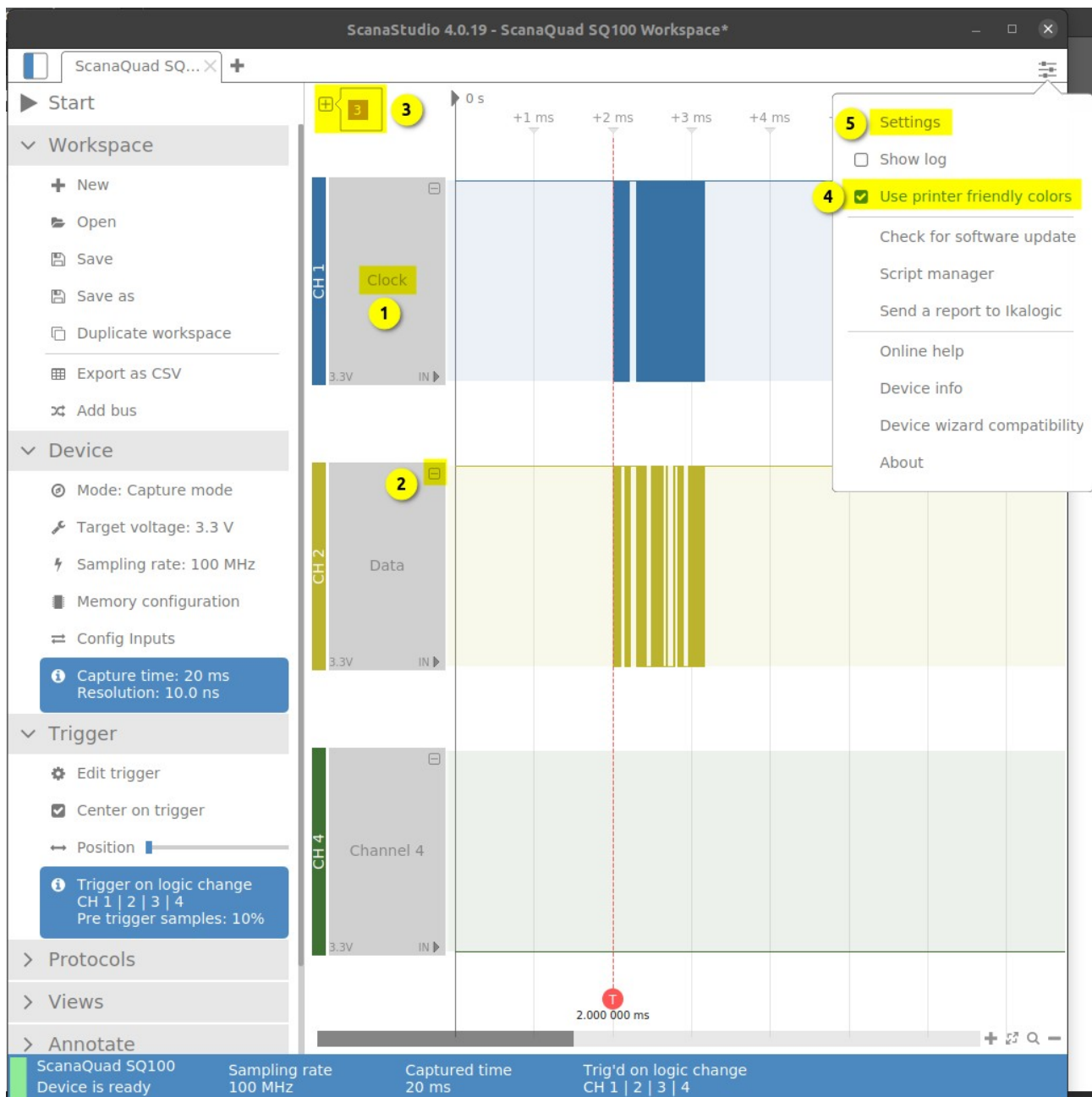
Last, it is possible to use either a light or dark theme for the capture window with the "Use printer friendly colors" option (4), independently of the main window's theme.

To change the main window's them, click on "Settings" (5), then 'Display'.

III.3. Launch an acquisition

By default the acquisition starts whenever the "Start" button is pressed. But it could be better if it would wait for an interesting event. You can change this setting so that the **acquisition triggers when we want it to.**

On the "Trigger" tab, click on "Edit trigger" (1). Several options are available. The simplest one is "Logic change" (2) that launches an acquisition when one of the selected inputs (3) changes of logic state. You can start a new acquisition with the "Start" button (4) or the "Ctrl+R" shortcut.
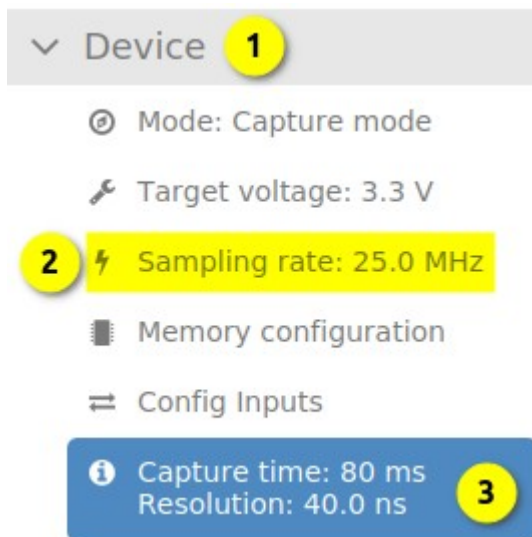
The logic analyzer waits for a logic state change before capturing the channels. Once all the samples have been obtained, they are sent onto the ScanaStudio software.
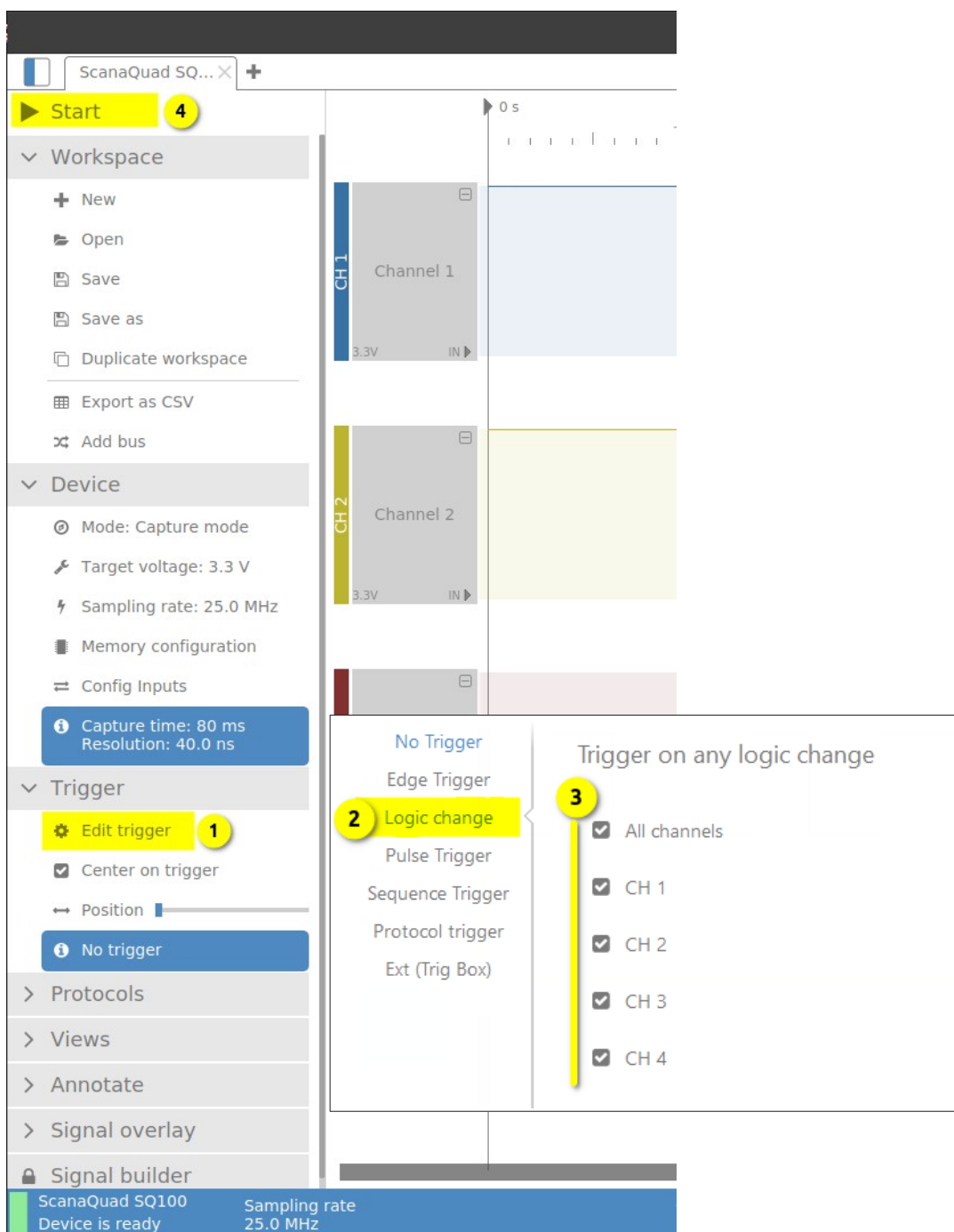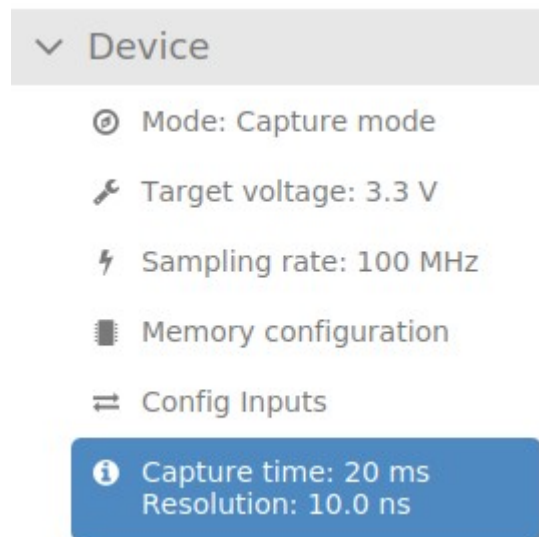
III.4. Time scale settings

The acquisition duration is not a direct parameter, however it is possible to change the **sampling frequency** of the IKIALOGIC logic analyzer. As the latter has a fixed internal memory sizer, changing the sampling frequency is equivalent to changing the acquisition duration.

In the "Device" tab (1), click on "Sampling rate" (2). Select the desired sampling frequency and see acquisition duration (capture time) (3).

The maximum sampling frequency depends on the logic analyzer model: 25 MHz for an SQ25, 50 MHz for an SQ50, …

III.5. Time analysis

The "Annotate" tab allows the user to add **time measurements** on the capture graphs.

The "Add marker" field (1) let us add a time value (the reference is the acquisition trigger) at any place of the timing diagram.

The "Standard measure" field (2) measures a time difference between two samples. The two samples can be taken out of two different channels (see example in blue on the figure below). If several state changes are detected between the two samples, the signal period and frequency are also provided (3).

Finally it is possible to remove all the measurements with the "Delete all annotations" field (4).
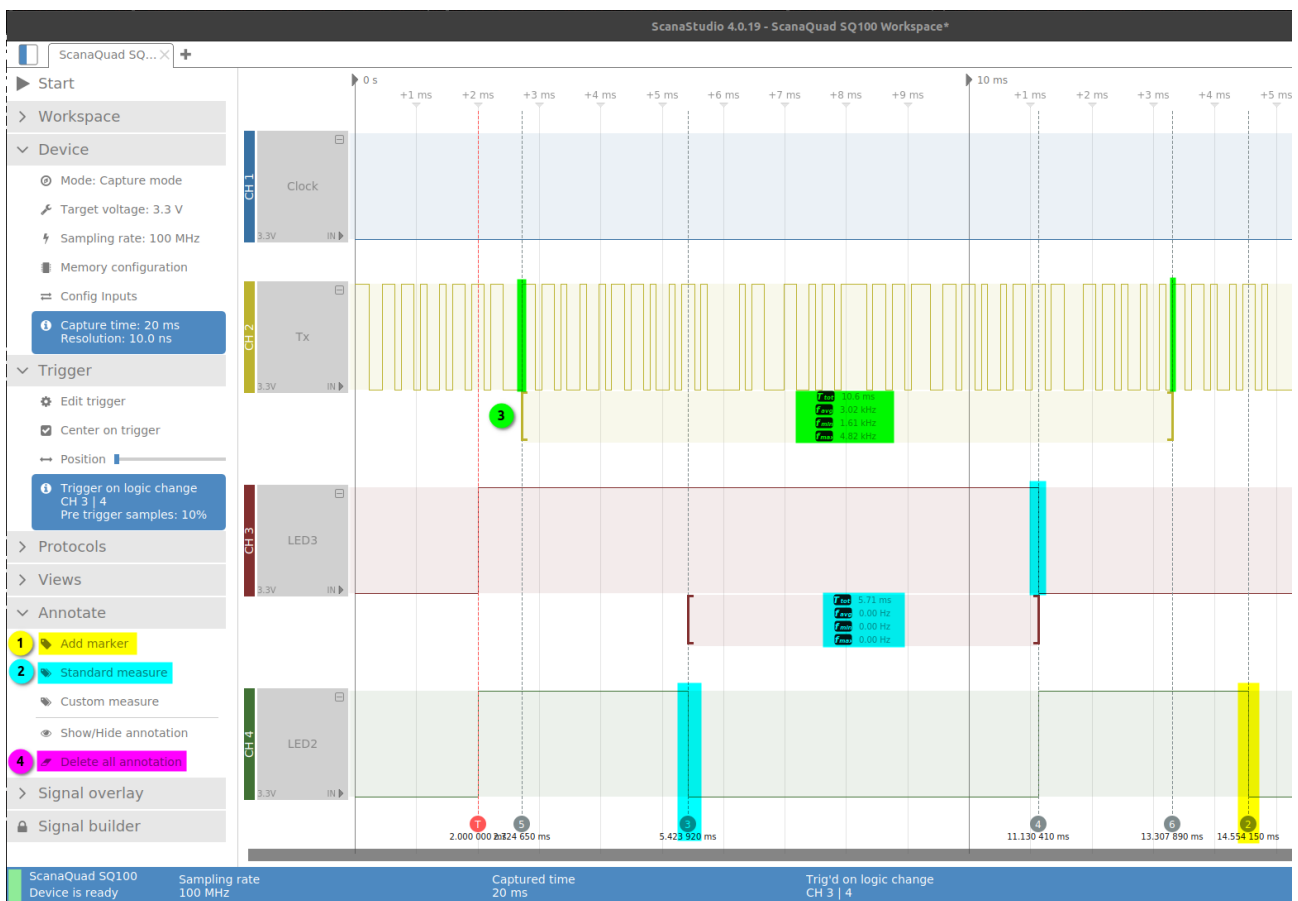
III.6. Communication protocol decoding

The most interesting ScanaStudio tool is by far the communication protocol decoder.

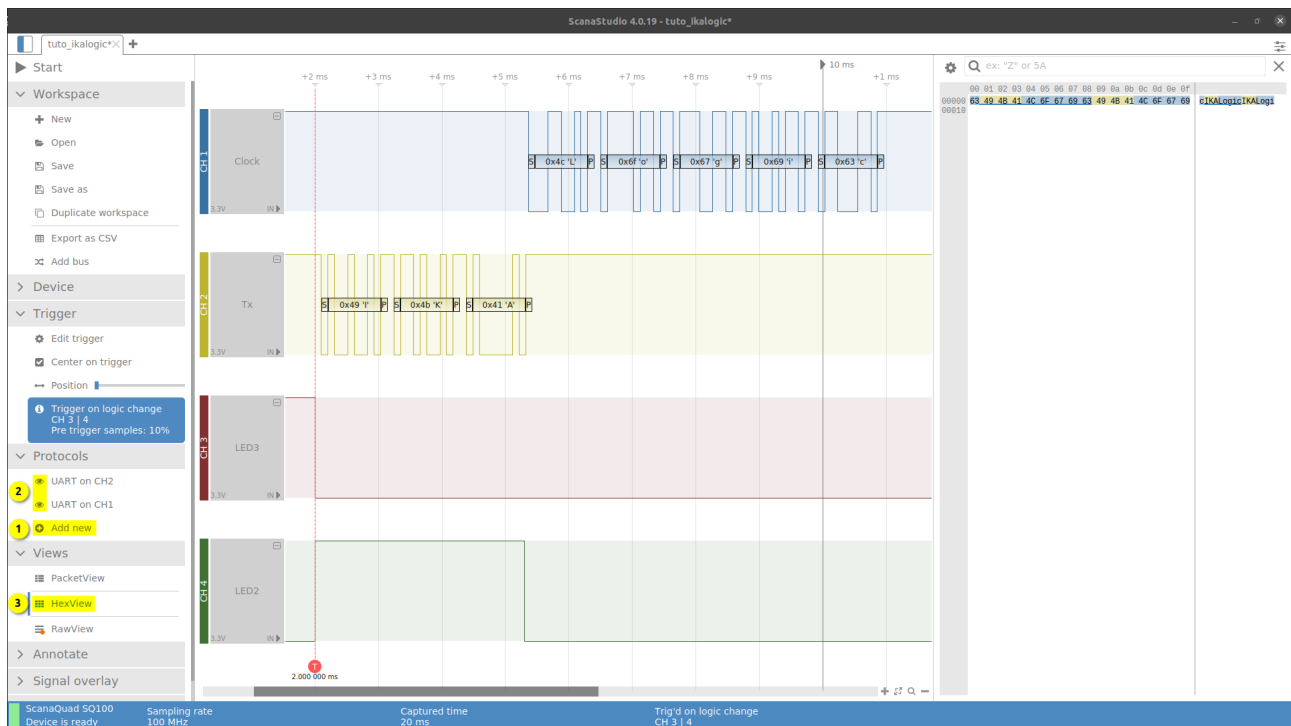In the "Protocols" tab, click on "Add new" (1).

Choose the protocol to decode in the list (note: if the list is empty, first read section III.7. Import protocol decoding scripts page 10 and then go back here).

Fill in the communication parameters for the decoder to work (channel to be decoded, data rate, data format, …) then click on "Finish".

It is possible to decode several channels, with different protocols, at the same time.

Decode data are displayed on the timing diagram. You can hide or display them by clicking on the eye icon in the "Protocols" tab (2).

Finally the "Views" tab gives the "HexView" tool (3). It opens on the right part of the ScanaStudio window. It gathers all decoded data from all channels in the received order. They are displayed in hexadecimal and ASCII formats. This tool is very convenient for analyzing data exchanges on a bi-directional bus.

III.7. Import protocol decoding scripts

The communication protocols decoder uses scripts written in JavaScript. If a protocol is not supported, the corresponding script must be added to ScanaStudio.

In the "Protocols" tab, click on "Add new". In the window that has open, click on "Open script manager".

If a list of scripts appears in the low part of the *Script manager* (1), keep reading here. Otherwise go to the next page (this seems to happen with Ubuntu, not Windows).

In the most simple case you just need to check all the scripts, right-click on one tof them, then "Download checked scripts". After the download, they appear in the upper part of the window (2) and the *Script manager* can be closed (3). You can now decode any supported communication protocol (see III.6. Communication protocol decoding).
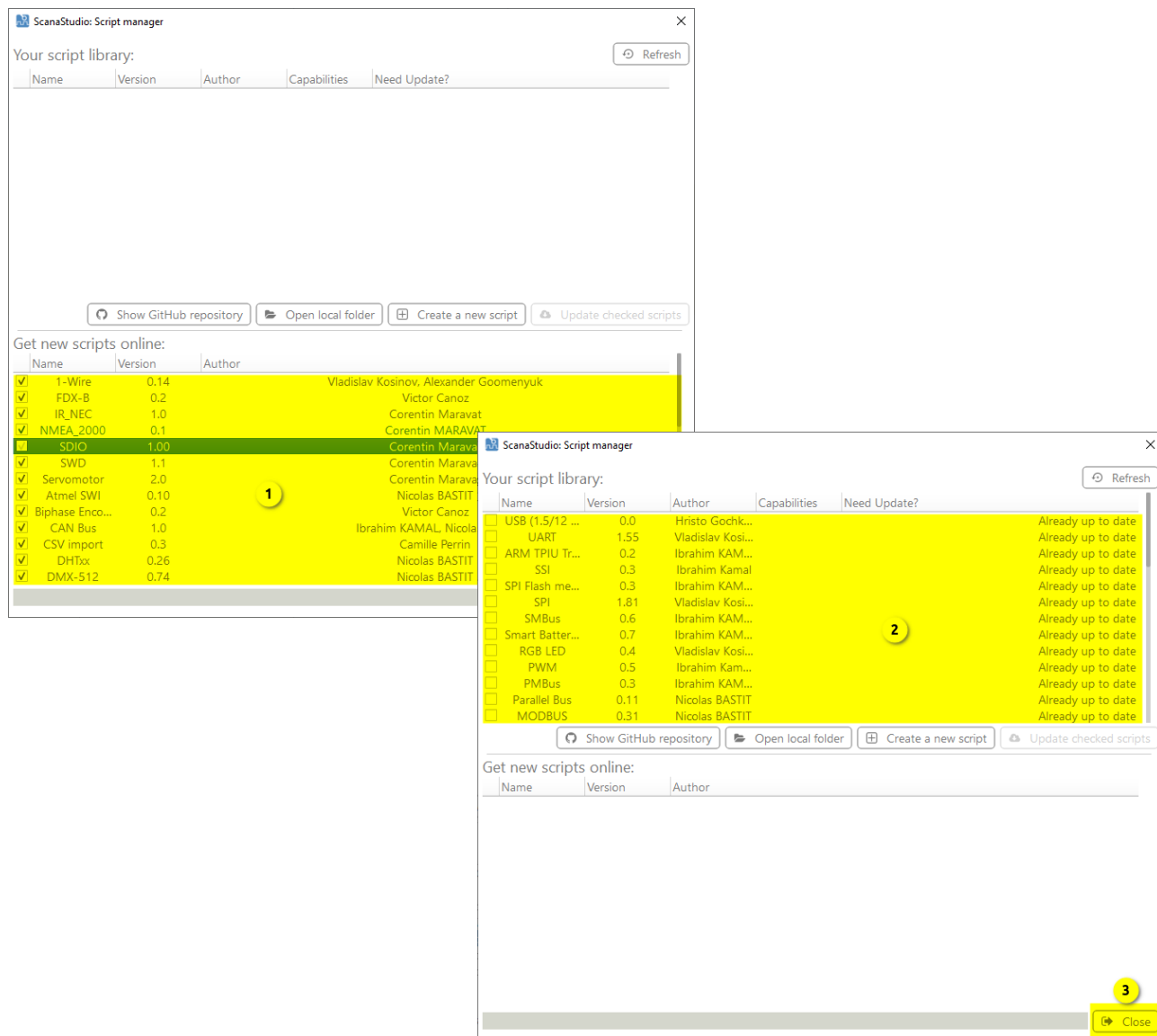
If the scripts do not appear in the lower part of the *Script manager* windows, then you have to manually download them.

From the *Script manager* window, click on "Open local folder" (1). A folder opens in the file explorer. Its name is "`scripts-library-v3`", keep it open. For now it is empty, but it will contain the protocol decoding scripts.
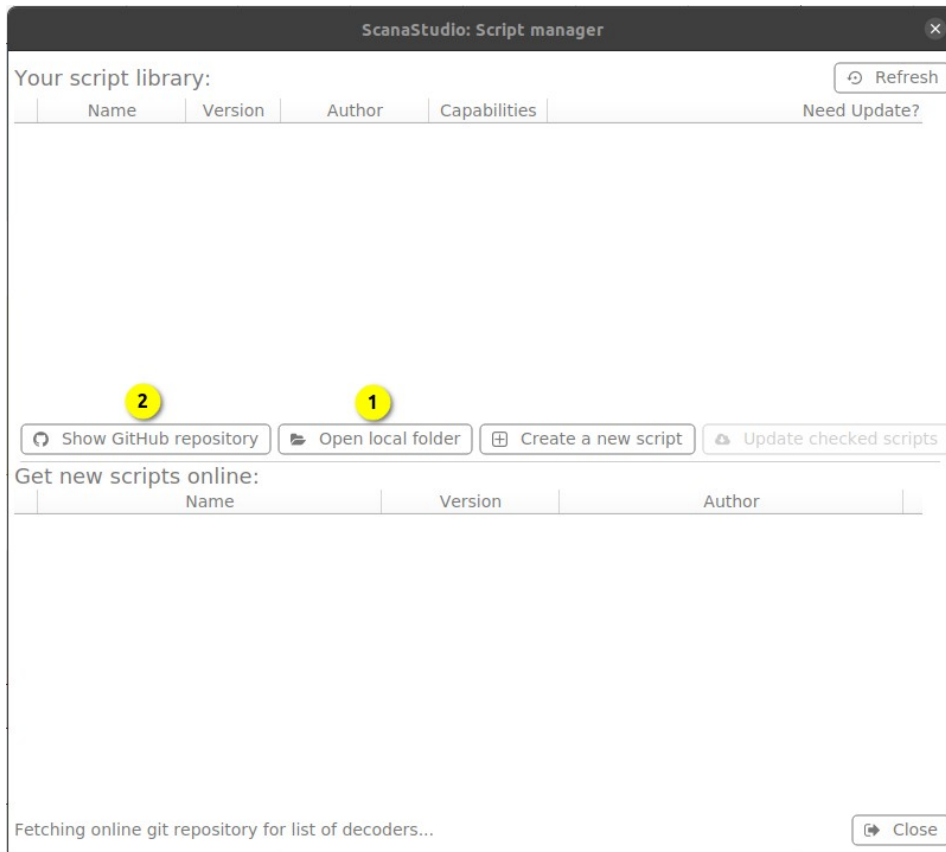
Go back to the *Script manager* and click on "Show GitHub repository" (2). In the we browser, click on "Code" (3), then "Download ZIP" (4).
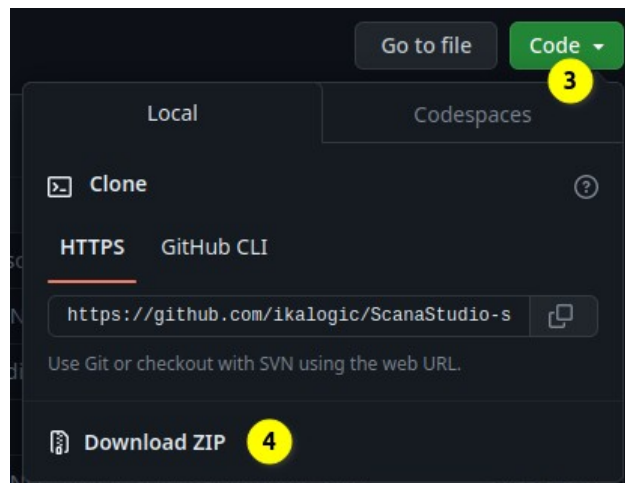
Unzip the downloaded archive and copy-paste the files int the "`scripts-library-v3`" that has been kept open.

In the *Script manager* window, click on the "Refresh" button (5) to see the decoding scripts in the upper part of the windows (6).

You can now decode any communication protocol that is in the list, following the instructions in section III.6. Communication protocol decoding.