OneEye_DAS_Oscilloscope_1 for KIT_AURIX_TC275_SB

Oscilloscope over DAS using OneEye

AURIX™ TC2xx Microcontroller Training
V1.0.0

Scope of work

Demonstrate how to implement the OneEye oscilloscope over the DAS interface.

After configuring the OneEye DAS interface, a OneEye oscilloscope is created with two signals. The signals are updated and sampled every millisecond. OneEye is used to visualize the signal values.

Introduction

- **OneEye** is a GUI that enables the creation of interactive Graphical User Interface. Graphical elements can be drag from a toolbox and drop onto the GUI. The behavior of the created GUI can be customized. Different communication interfaces like UART, Ethernet, CAN, DAS can be used to interact with the embedded system

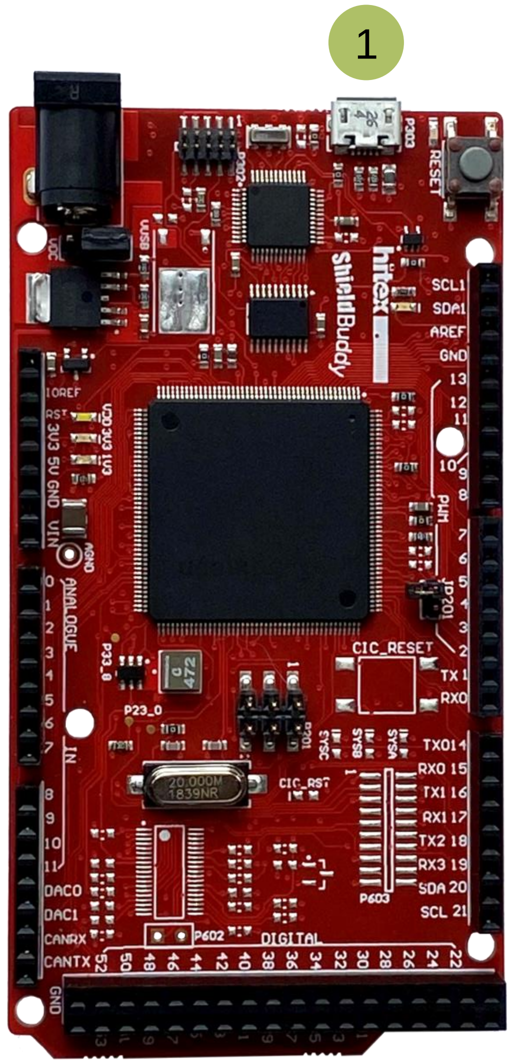
- The **DAS** (Device Access Server) can be used in line with Infineon Microcontroller Starter Kits, Application Kits and DAP MiniWiggler to access the micro controller resources

- **Recommendation**: It is recommended to go through some of the **basic tutorials** listed in the help embedded in OneEye (Menu: Help -> OneEye help). This enables a quicker ramp-up in the OneEye concept and ensure a nice journey with OneEye

Hardware setup

This code example has been developed for the board KIT_AURIX_TC275_ARD_SB.

The board should be connected to the PC through the USB port 1



Implementation - AURIX

Configuring the OneEye Oscilloscope

A OneEye oscilloscope (***Ifx_Osci***) is a special object that is recognized by OneEye. It enables streaming of data and controls the oscilloscope state.
The OneEye oscilloscope is initialized with ***Ifx_Osci_init()***.

The ***autoAddChannels*** parameter enables to automatically add channels for each created oscilloscope signal. The sample period (***samplePeriod***) is set to 1ms and provides OneEye information about sample timing. The ***triggerMode*** is set to automatic, note that this value can be changed from the OneEye oscilloscope interface later.
The **Ifx_Osci.h** file can be found in the Libraries\OneEye directory.

Adding signals to the oscilloscope

Oscilloscope signals are mainly pointers that the oscilloscope can use for data sampling. The signals are added using ***Ifx_Osci_addSignal()***. The function takes as parameter the signal **name** displayed by the oscilloscope, the signal **type** which informs the oscilloscope how to read the pointer value and a **source** pointer to the data. The last parameter corresponds to the **q format** used in case of fix point data, or 0 if not used.

Starting the oscilloscope

The oscilloscope is started with ***Ifx_Osci_start()***.

Implementation - AURIX

Configuring the signal generator

A signal generator is used to provide the user with some value to read / write. The signal generator does nothing more that incrementing two signals, ***signalA*** and ***signalB***, stored in the structure ***g_signalGenerator*** up to a maximum value before resetting them.
The initialization of the signal generator is done with ***initSignals()***.

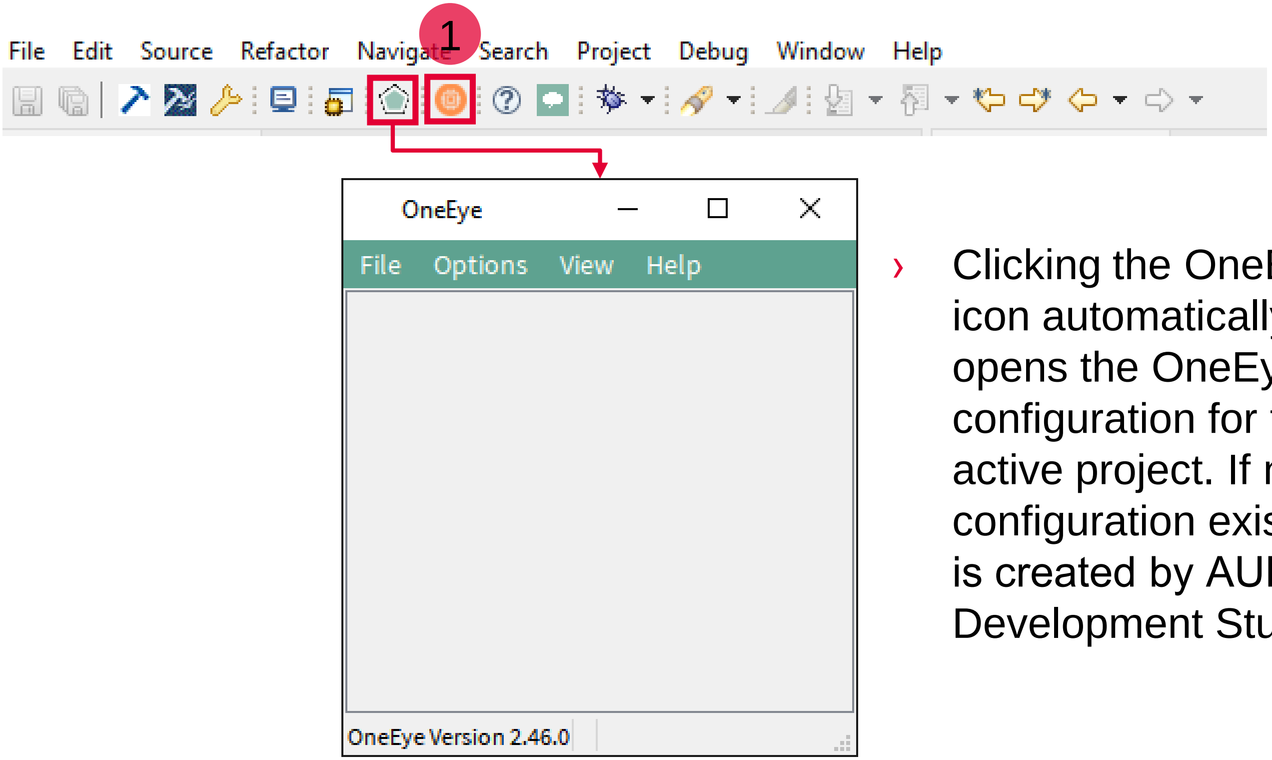
Running the signal generator and the oscilloscope

The signal generator is executed in the background loop every 1ms with ***computeSignals()***. For that a **deadline** variable is initialized with ***getDeadLine()*** and periodically updated with ***addTTime()*** to obtain the 1ms period.
The oscilloscope is run in the same background loop with ***Ifx_Osci_step()***. This function handles the triggering, and sampling of data.

Note: the call to ***Ifx_Osci_step()*** can be moved to an interrupt service routine if required by the application use case.

Run and Test

- After code compilation, flash the device using the Flash button 1 to ensure that the program is running on the device
- For this training, the OneEye application is required for visualizing the values. OneEye can be opened inside the AURIX™ Development Studio using the following icon:



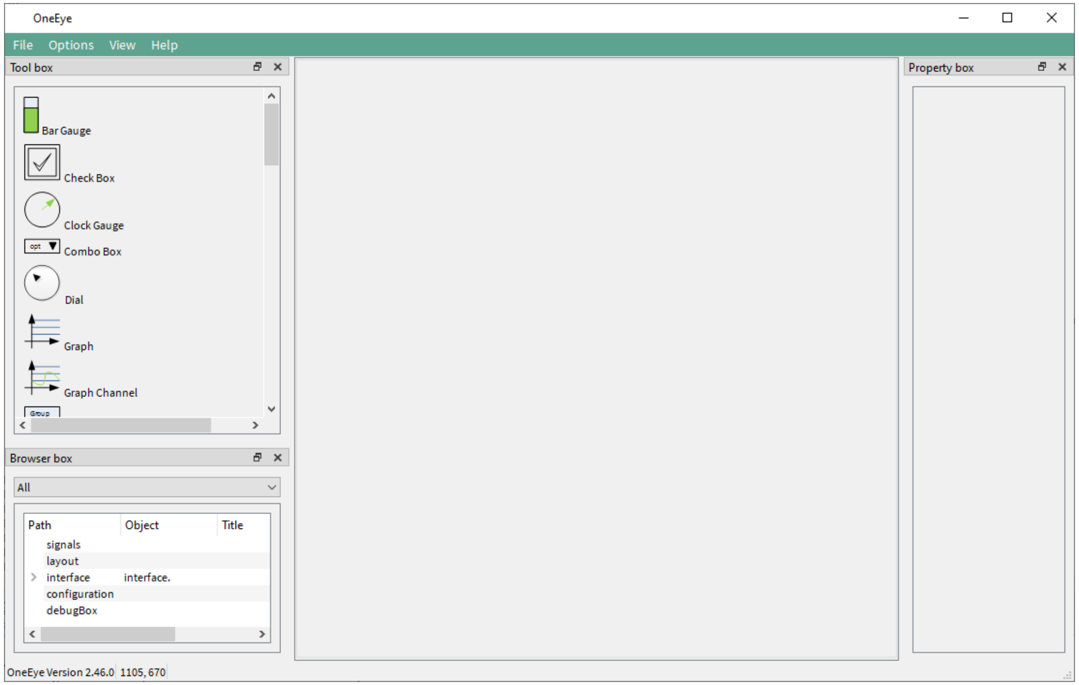
- Clicking the OneEye icon automatically opens the OneEye configuration for the active project. If no configuration exists, it is created by AURIX™ Development Studio

Implementation - OneEye

In this training, the OneEye configuration is provided inside the Libraries folder. The following steps are needed to configure the oscilloscope from a brand-new configuration.

Setup OneEye for editing

Select the OneEye menu "**Options -> Edit mode**" (if not already checked) to enable the edit mode. Select the OneEye menu "**View -> Browser box**", "**View -> Property box**" , "**View -> Tool box**" (if not already checked) to display the browser, property box, and tool box.

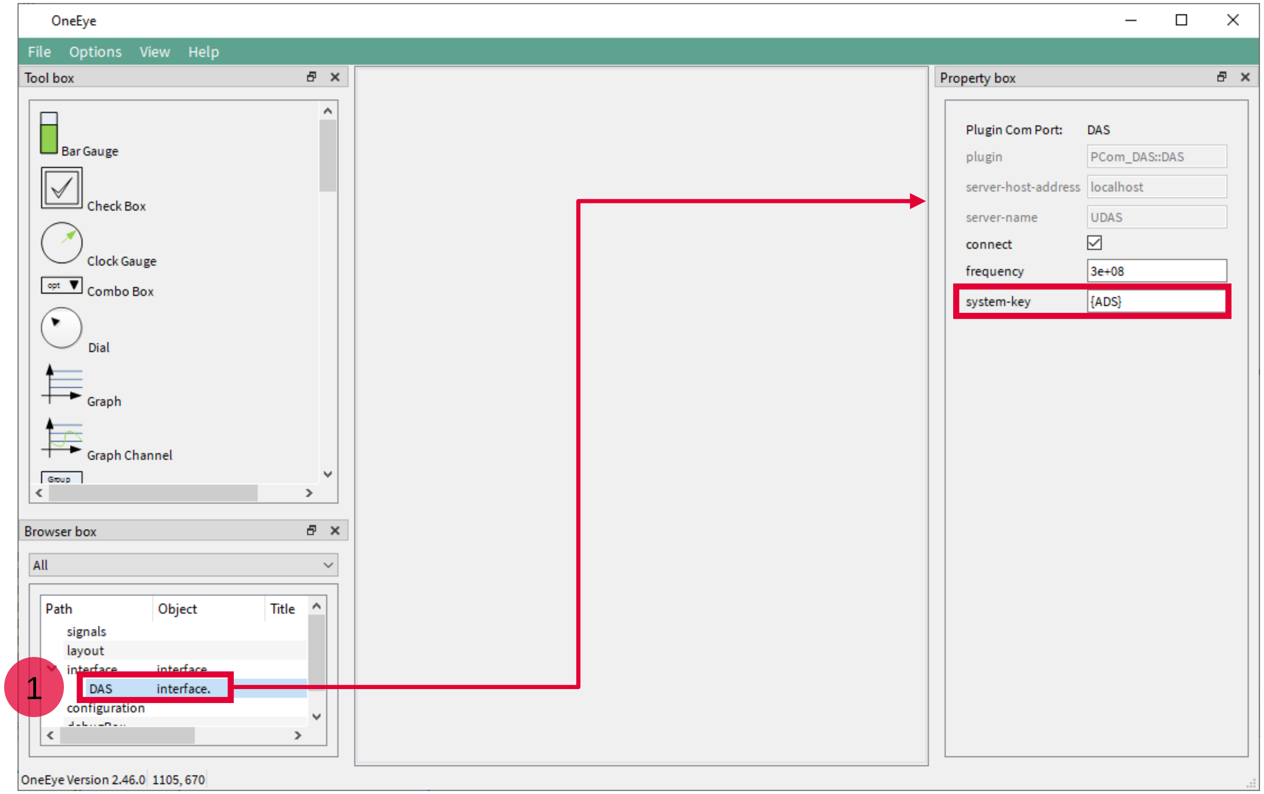


Implementation - OneEye

Configuring the DAS interface

When the OneEye configuration is created by ADS, it is already setup with a DAS interface.
Select the DAS interface in the Browser box 1.

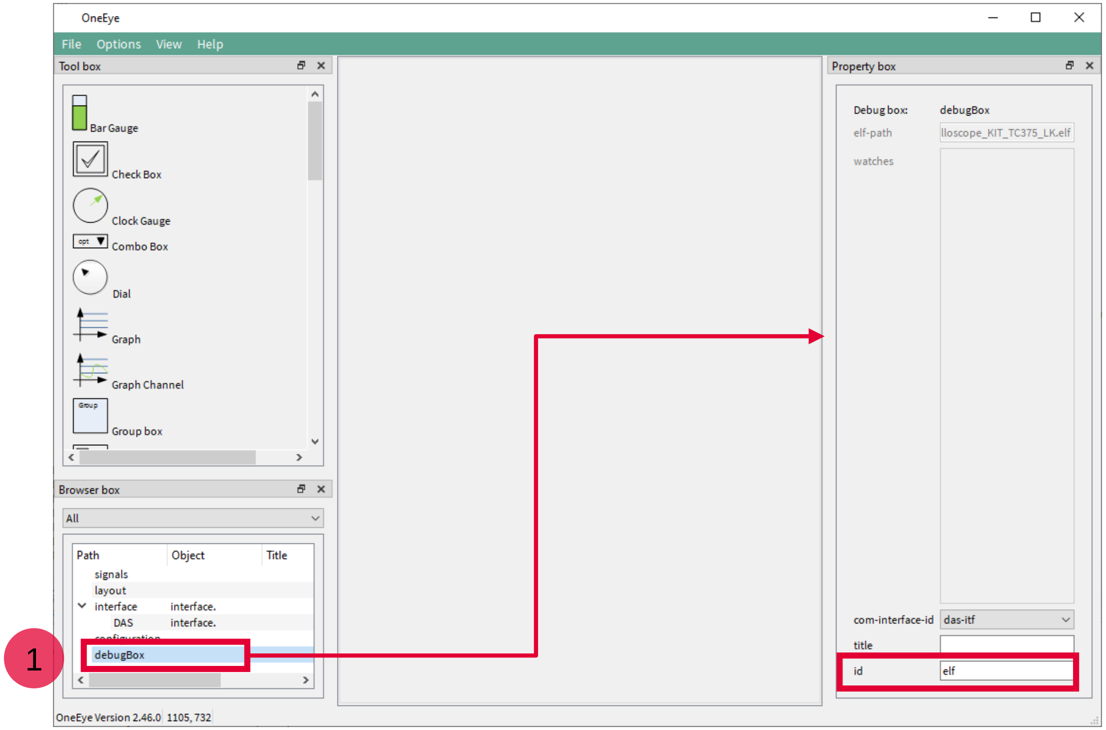
Notice the “system-key” **{ADS}** that enables the connection to the device in parallel with the ADS debugger.



Implementation - OneEye

Create a debug box to get access to variables from the .elf file

A debugBox item is already setup by default when ADS creates the OneEye configuration, preconfigured with the project .elf file path.
Select the DAS interface in the Browser box 1.
Set the id property to "**elf**", which enables to group variables into the signal tree later.
Note: this value is not set by default by ADS.



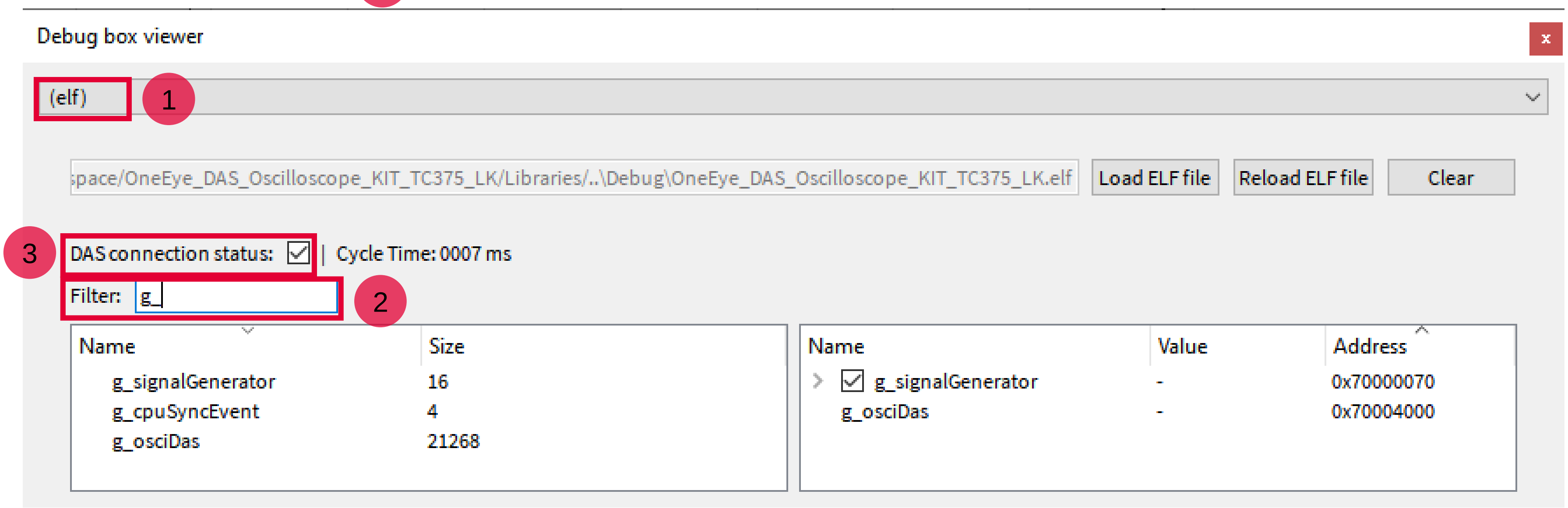
Implementation - OneEye

Open the debug box viewer and connect to the device

Select the OneEye menu “**View -> Debug box viewer**” (if not already checked) to display the debug box. Select the debug box with the id “(elf)” 1 if not yet selected by default.
Note that the debug box enables the selection of the .elf file to be used to get information about the variables.

The **Filter** field 2, enables to filter variables by name. E.g. in this example, entering “g_” will filter for global variables.

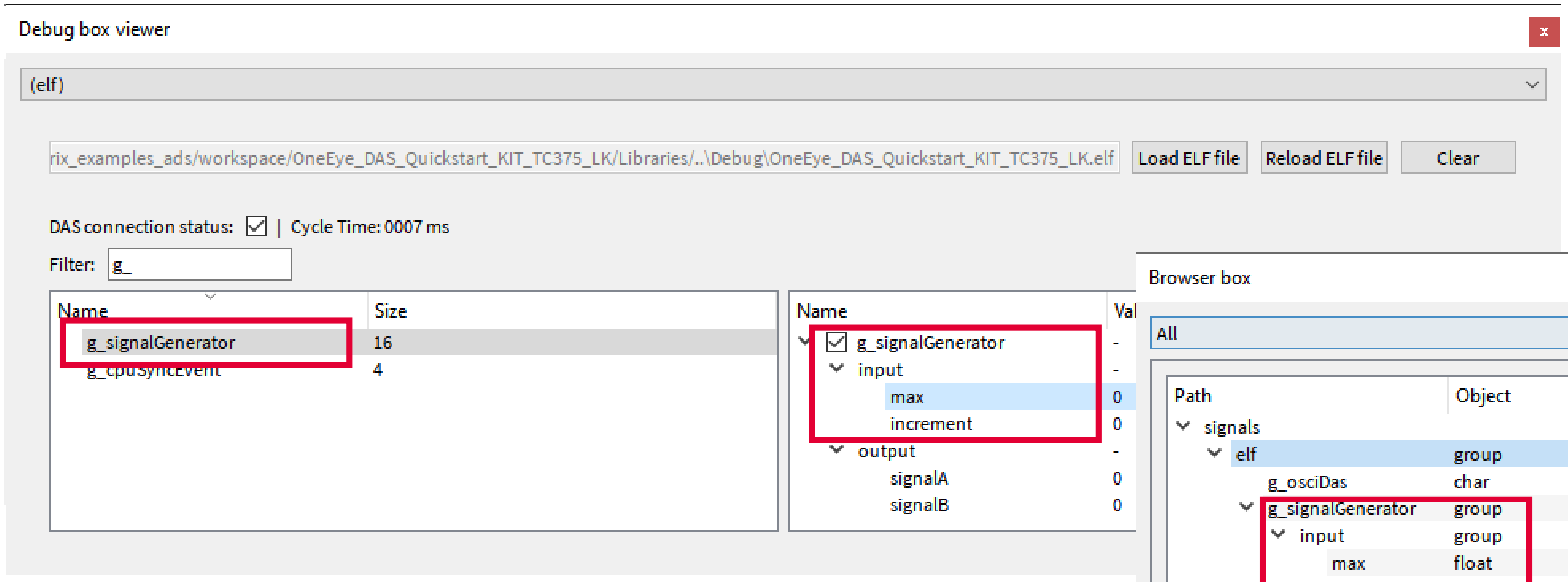
To enable the connection with the microcontroller and have read / write access to variables, check the “**DAS connection status**” box 3.



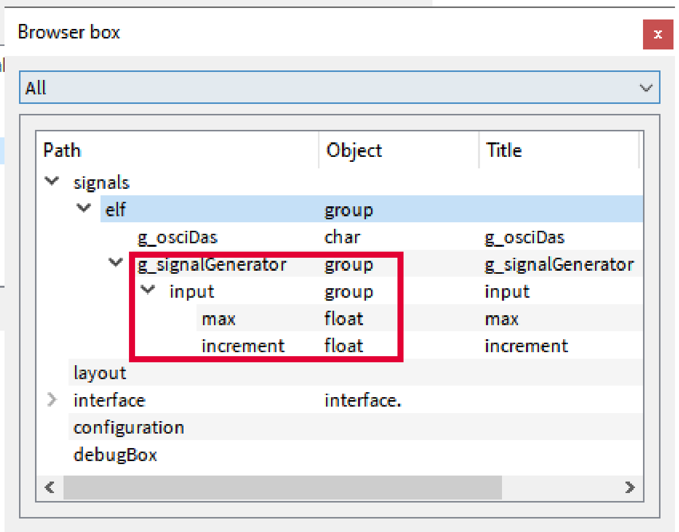
Implementation - OneEye

Create signals for signal generator input parameters

In the debug box, search for the ***g_signalGenerator*** variable, right click on it and select “**Add watch on: g_signalGenerator**”. The watch should appear on the right side of the debug box. Watches are periodically polled for new values on the microcontroller.
Expand the **g_signalGenerator** item on the right and right-click on the **max** and **increment** variables to create two signals with the option “Create signal for: …”



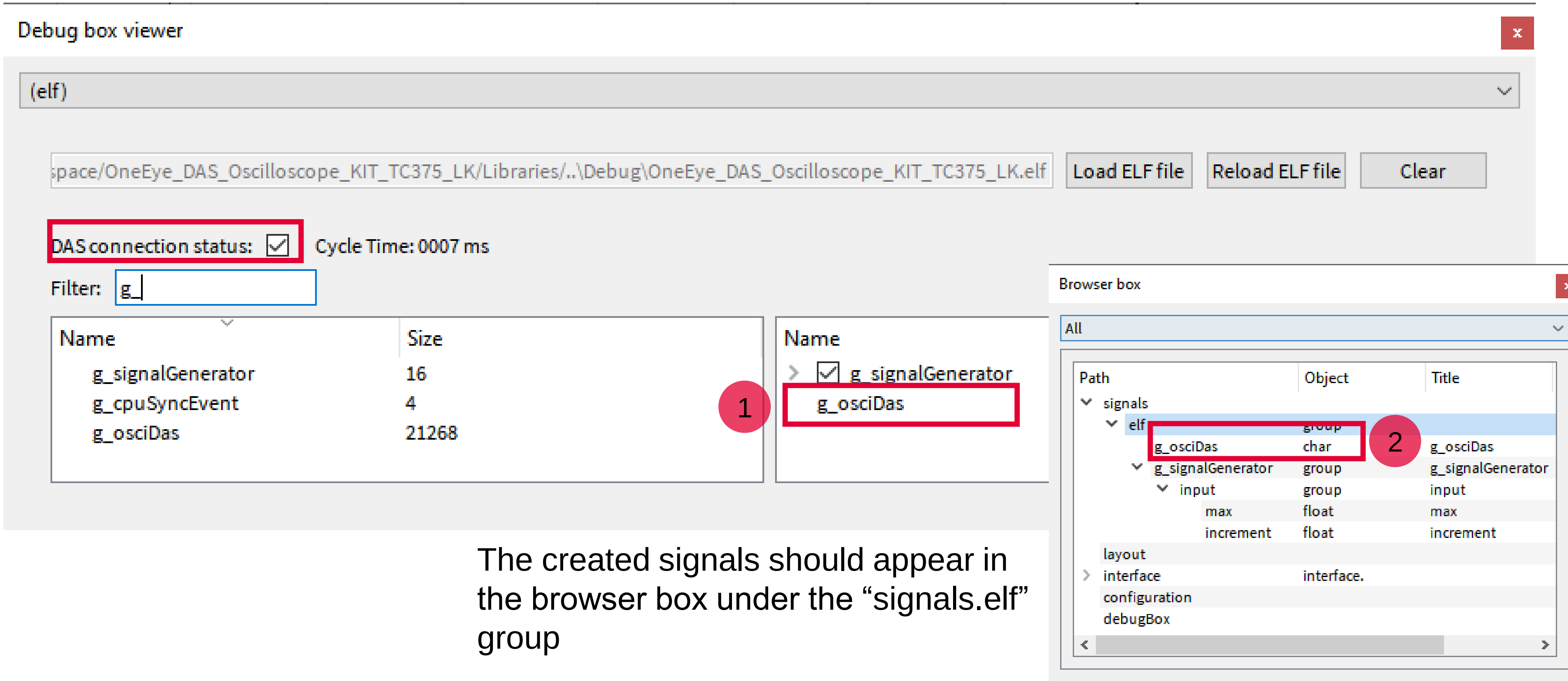
The created signals should appear in the browser box under the “signals.elf” group



Implementation - OneEye

Create signals for the oscilloscope

In the debug box, search for the ***g_osciDas*** variable, right click on it and select “**Create oscilloscope watch on: g_osciDas**”. The watch should appear on the right side of the debug box 1. Watches are periodically polled for new values on the microcontroller.
A signal is also automatically created to access the oscilloscope 2.

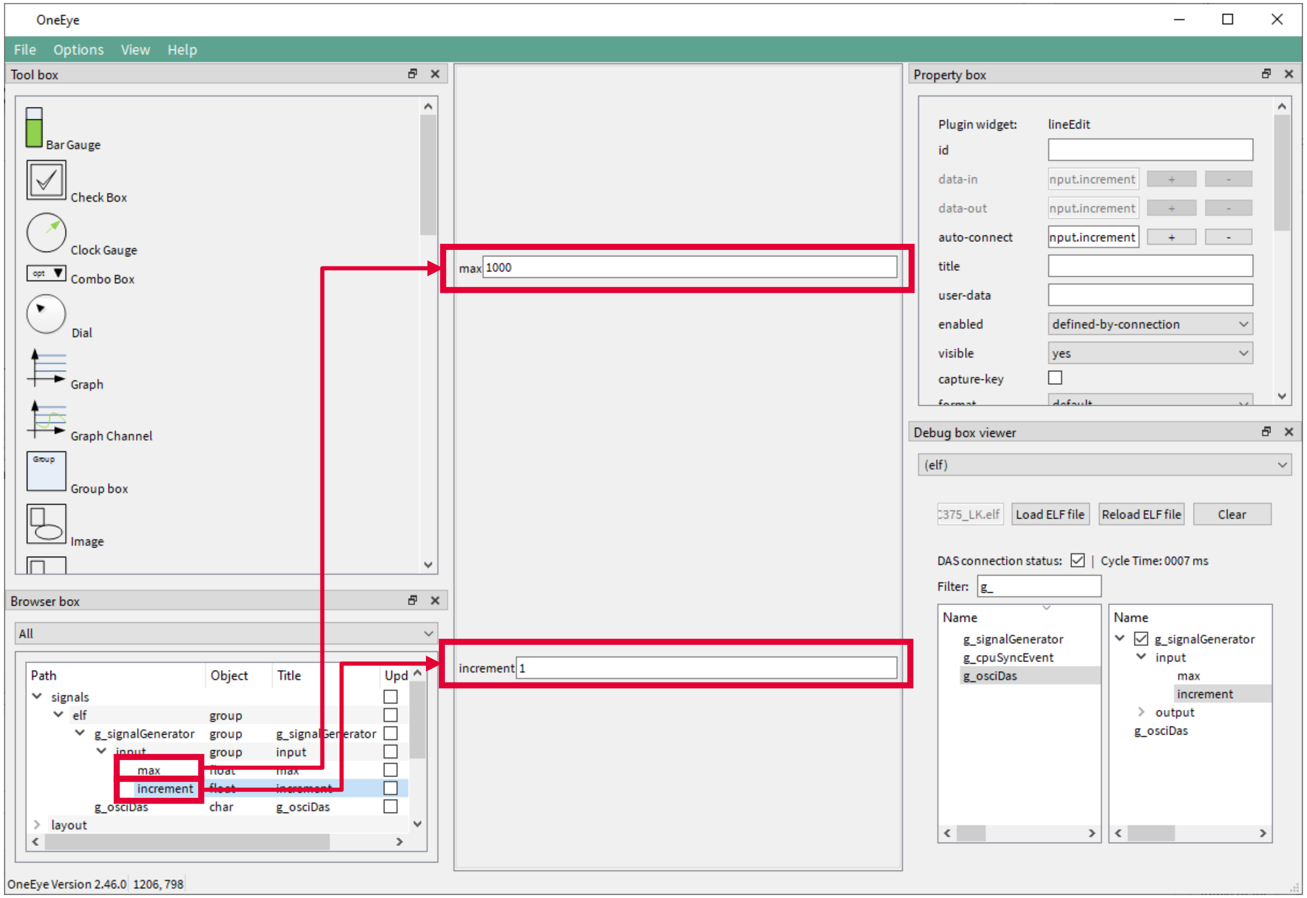


The created signals should appear in the browser box under the “signals.elf” group

Implementation - OneEye

Create edit fields for the generator input parameters

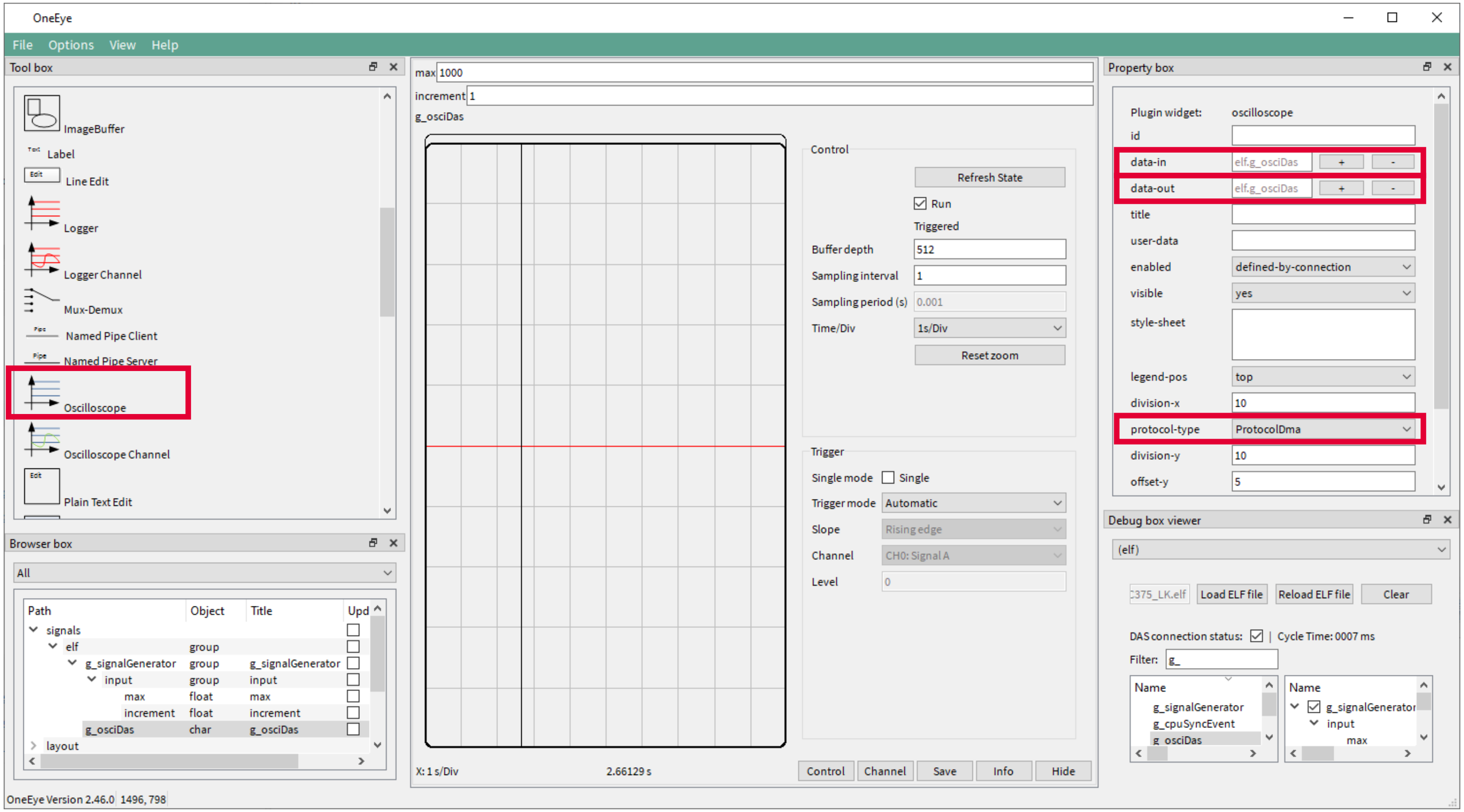
Drag and drop the signals **elf.g_signalGenerator.input.max** and **elf.g_signalGenerator.input.increment** from the browser box onto the layout to create default widget for them.



Implementation - OneEye

Create the oscilloscope widget

Drag and drop the **oscilloscope** widget from the toolbox onto the layout, set the oscilloscope properties **data-in** and **data-out** to **elf.g_osciDas**. Set the **protocol-type** property to **ProtocolDma**.



Implementation - OneEye

Test the oscilloscope

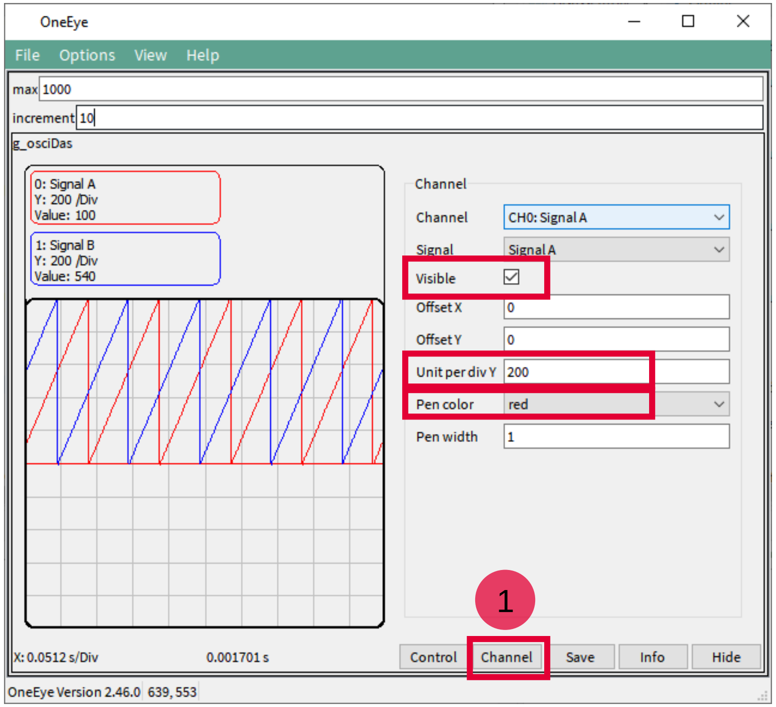
In the oscilloscope Channel tab, click on the Channel button 1 and check the **visible** check box for both **CH0: Signal A** and **CH1: Signal B** to display the two channels.

Set the **Unit per div Y** to **200** for both **CH0: Signal A** and **CH1: Signal B**.

Select the **Pen color red** for **CH0: Signal A** and **blue** for **CH1: Signal B**.

The values for **signalA** and **signalB** should be changing in the oscilloscope, if it is not the case check that the "**DAS connection status**" is checked in the debug box viewer.

One can change the **max** and **increment** values to change the generator behaviour.



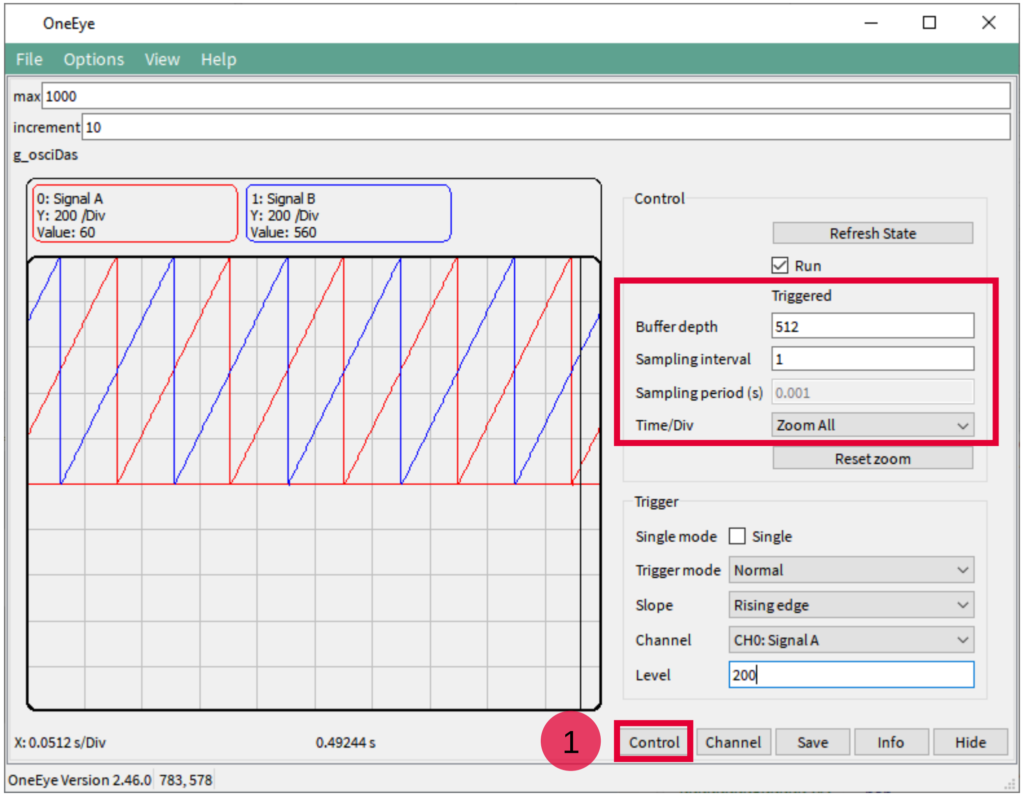
Implementation - OneEye

Test the oscilloscope

The oscilloscope Control tab provides configuration for the trigger and information about the oscilloscope state (armed, triggered, uploading).
Click on the Control button 1 and set the **Time/Div** value to **Zoom All** to configure the horizontal scale to use the full screen of the oscilloscope window.

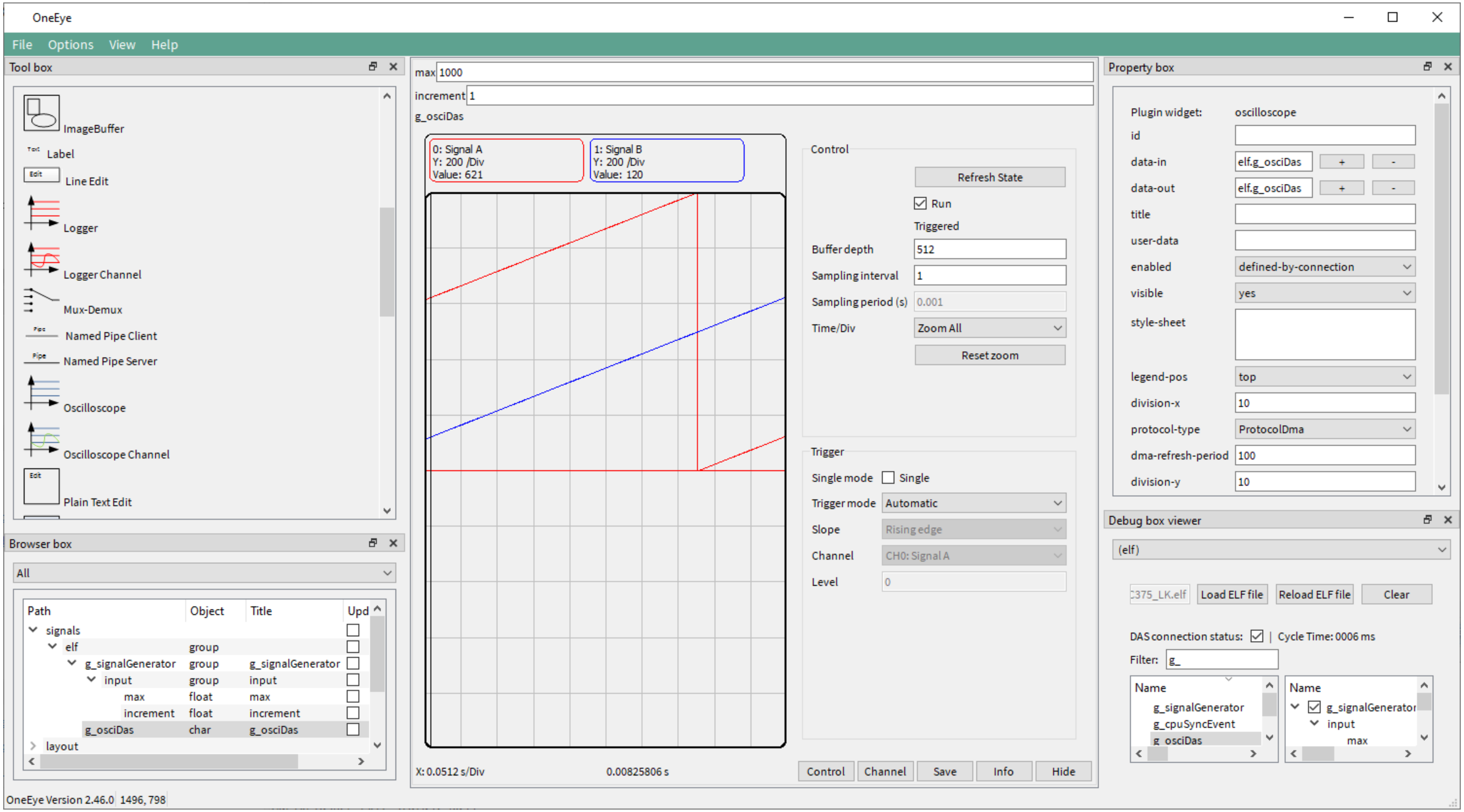
The **Buffer depth**, configures the oscilloscope buffer depth, here 512 points are used to fill the buffer. This value can be changed within the limit set by the software.

The **Sampling interval** provides the oscilloscope the information whether to sample at each interval (1) or not (>1)



Implementation - OneEye

The final configuration should look like the following:



Implementation - OneEye

Advanced options

Advanced configuration can be added to the file ***Ifx_Cfg.h*** to tune the oscilloscope capabilities, this includes:

- ***IFX_OSCI_CFG_MAX_NUM_OF_SIGNALS***: the maximum number of signals that can be declared by the user
- ***IFX_OSCI_CFG_MAX_NUM_OF_CHANNELS***: the maximum number of channels that can be buffered
- ***IFX_OSCI_CFG_NUM_OF_SAMPLES***: the maximum number of sample per channel

Note that the memory used by the oscilloscope is mainly defined by
IFX_OSCI_CFG_MAX_NUM_OF_CHANNELS * IFX_OSCI_CFG_NUM_OF_SAMPLES * 4

Default values for the above mentioned macros are provided in ***Library/OneEye/Ifx_Osci_Cfg.h***.

References

- AURIX™ Development Studio is available online:
- https://www.infineon.com/aurixdevelopmentstudio
- Use the *„Import...“* function to get access to more code examples.

- More code examples can be found on the GIT repository:
- https://github.com/Infineon/AURIX_code_examples

- For additional trainings, visit our webpage:
- https://www.infineon.com/aurix-expert-training

- For questions and support, use the AURIX™ Forum:
- https://www.infineonforums.com/forums/13-Aurix-Forum

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Edition 2022-03
Published by
Infineon Technologies AG
81726 Munich, Germany

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Document reference
OneEye_DAS_Oscilloscope_1_KIT_TC275_SB