STSW-IME014 - APPLICATION NOTE

Introduction

This document describes how to use the STSW-IME014 software.

This tool helps the end user to configure and use STEVAL-IME014.

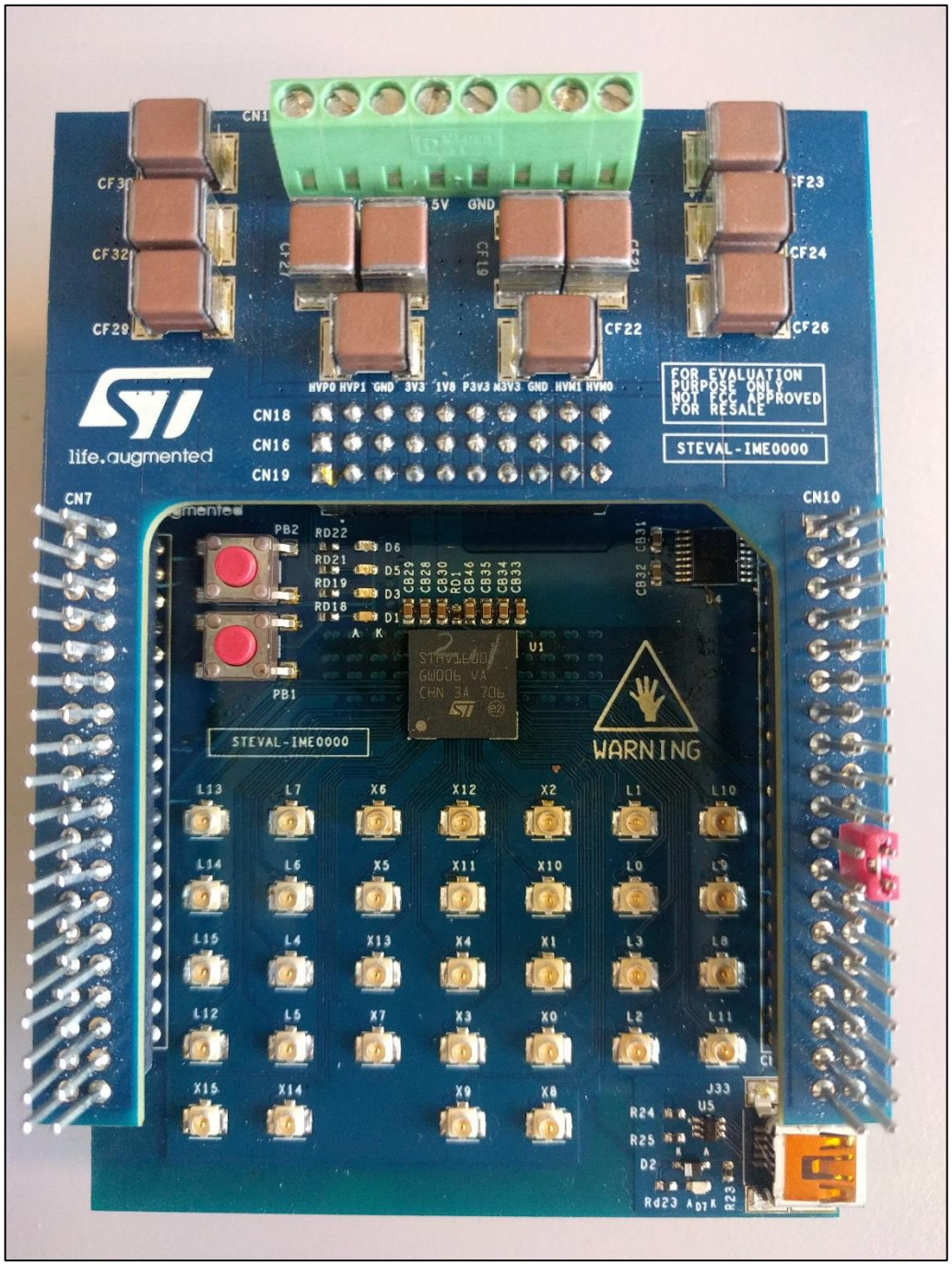


Figure 1: STEVAL-IME014

ST Confidential

Contents

1 Getting started

1.1 System requirements

This software has been designed and tested using Windows 7.

We couldn’t exclude that it is able to run with other OS version.

It use the microsoft framework so it doesn’t need specific libraries.

If the right framework is not installed on PC, the OS ask for the update.

The minimum screen resolution is 1024 x 768.

1.2 Download and Installation

STSW-IME014 application is available for download on ST’s website at:
http://www.st.com/en/switches-and-multiplexers/ultrasound-pulser-ics.html

This software doesn’t need installation procedure, just run ‘STSW-IME014_V10.exe’ file.

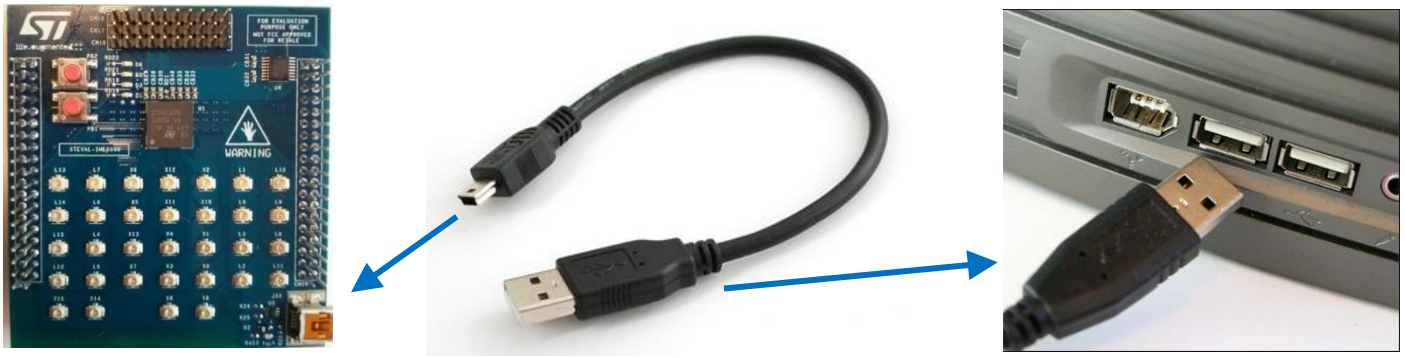
2 How to connect STEVAL-IME014 to the PC

Once STSW-IME014 has been downloaded and installed, the user only has to connect the evaluation board through a USB cable (type A to mini B) to the PC.

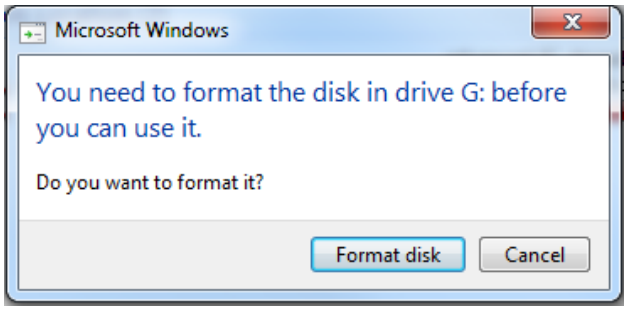
PC will install it like a Mass Storage Device.

To do it, please follow next steps:

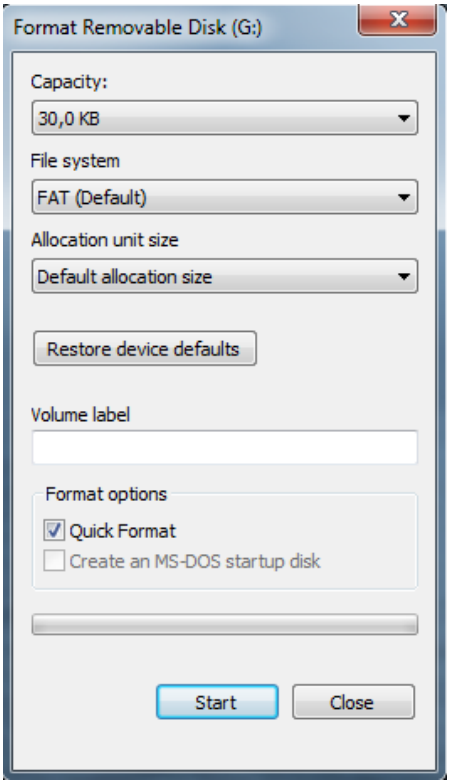
1) Connect the STHV1600 Module to the PC via a USB cable (ATTENTION: don't use the USB connector on Nucleo, use the connector on STHV1600 Module)



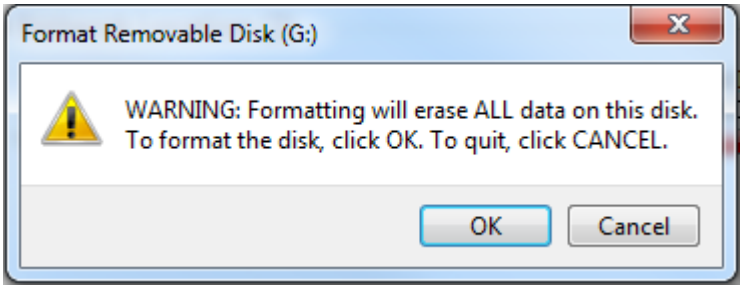
2) Only for first connection, a formatting request will be asked.



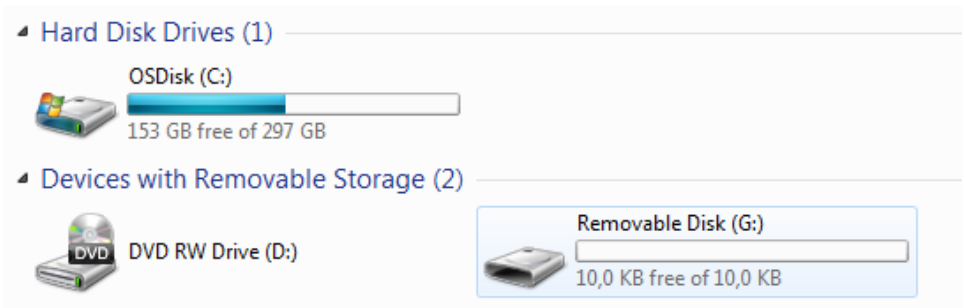
3) Say Format Disk



4) Click on Start

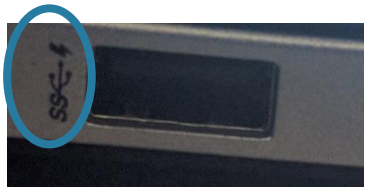


5) Then say OK
6) After the format procedure is end a new removable disk (10 KB capacity) is available in the Computer Resources (G: in my case)



a. Sometime USB device is not recognized

b. In this case we suggest to try using a USB + charging port, with the following symbol



c. If this trial doesn't work, we suggest to provide the 5V power supply and GND on Power Supply Module before to connect the USB cable

3 How to use STSW-IME014

Once STSW-IME014 has been downloaded and STEVAL-IME014 has been connected and installed, the program can be launched.

On Figure *2* the main form has shown

On Figure *3* the description and location of the 2 only hardware buttons PB1 and PB2 used.

Next paragraphs will explain each part of application.

Figure 2: Main form

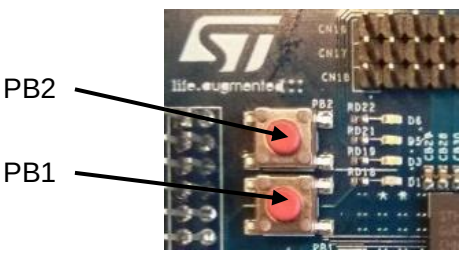


Figure 3:PB1 and PB2 location

3.1 Environment setup management

The form section used to manage the Environment setup is shown on Figure *5* (Red square).

It include 3 boxes:

1) **fCLKSYS** box: it allow to select CLKSYS frequency for STHV1600.
   The available values are:
   - **10MHz**
   - **50MHz**
   - **100MHz**
   - **200MHz** (WARNING: Because the STEVAL-IME014 interface is CMOS, It can work improperly at this frequency.)

2) **Operative Mode** box: the available selections are (see Figure 4):
   - **Single**: a single trigger event is generated for each pressure of button PB1. On XDCRs just a single repetition of waveforms
   - **Continuous**: a multiple trigger is generated, triggers are separated by the time entity specified in **Rep time** box. On XDCRs a pulse train will be generated up to the second pressure of PB1.
   - **CW**: a continuous switching wave is generated, the waveform stops pushing PB1

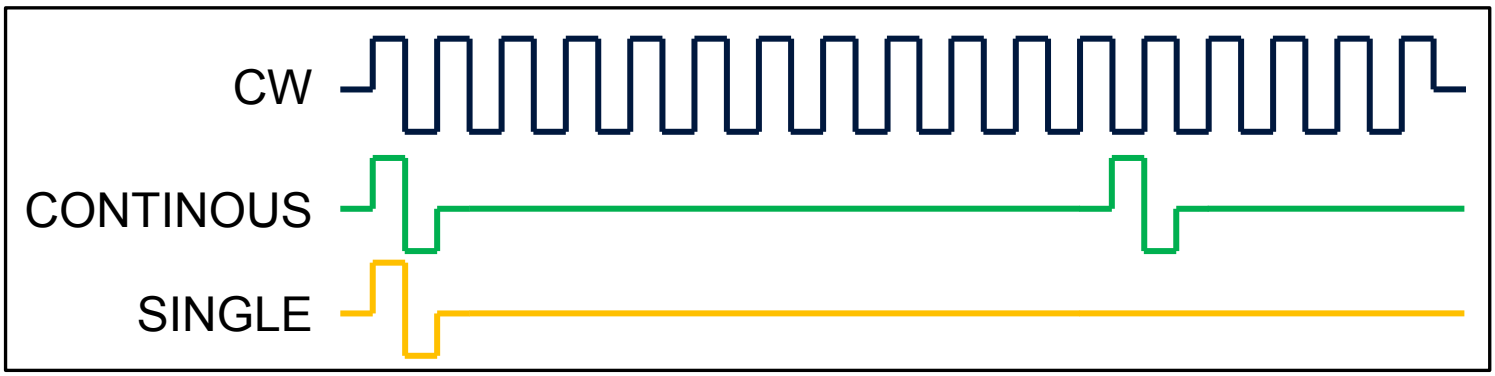


Figure 4: Operative mode example

3) **Rep time** box: it is used only in Continuous mode, it is the time between a trigger rising edge and the next one

Figure 5: Environment setup management

3.2 Channel enabled/disabled management

The form section used to manage the Channel enabled/disabled is shown on Figure *6* (Red square).

Each channel can be enabled or disabled in TX and/or RX checking specific boxes.

If box is checked, channel is enabled, if it is unchecked, channel is disabled.

The selection can be easy using the 'Select All' or 'Deselect All' buttons on bottom; they can be used to select or deselect all channels at same time.

Figure 6: Channel enable management

3.3 PW waveform management

If ‘single’ or ‘continuous’ modes are selected on ‘**Operative mode**’ box, the waveforms will be built using **PW WAVEFORM FORM** (see Figure 7)

To open it push ‘Waveform SET’ button.

On the new form, using TABs, all usable waveforms can be created.

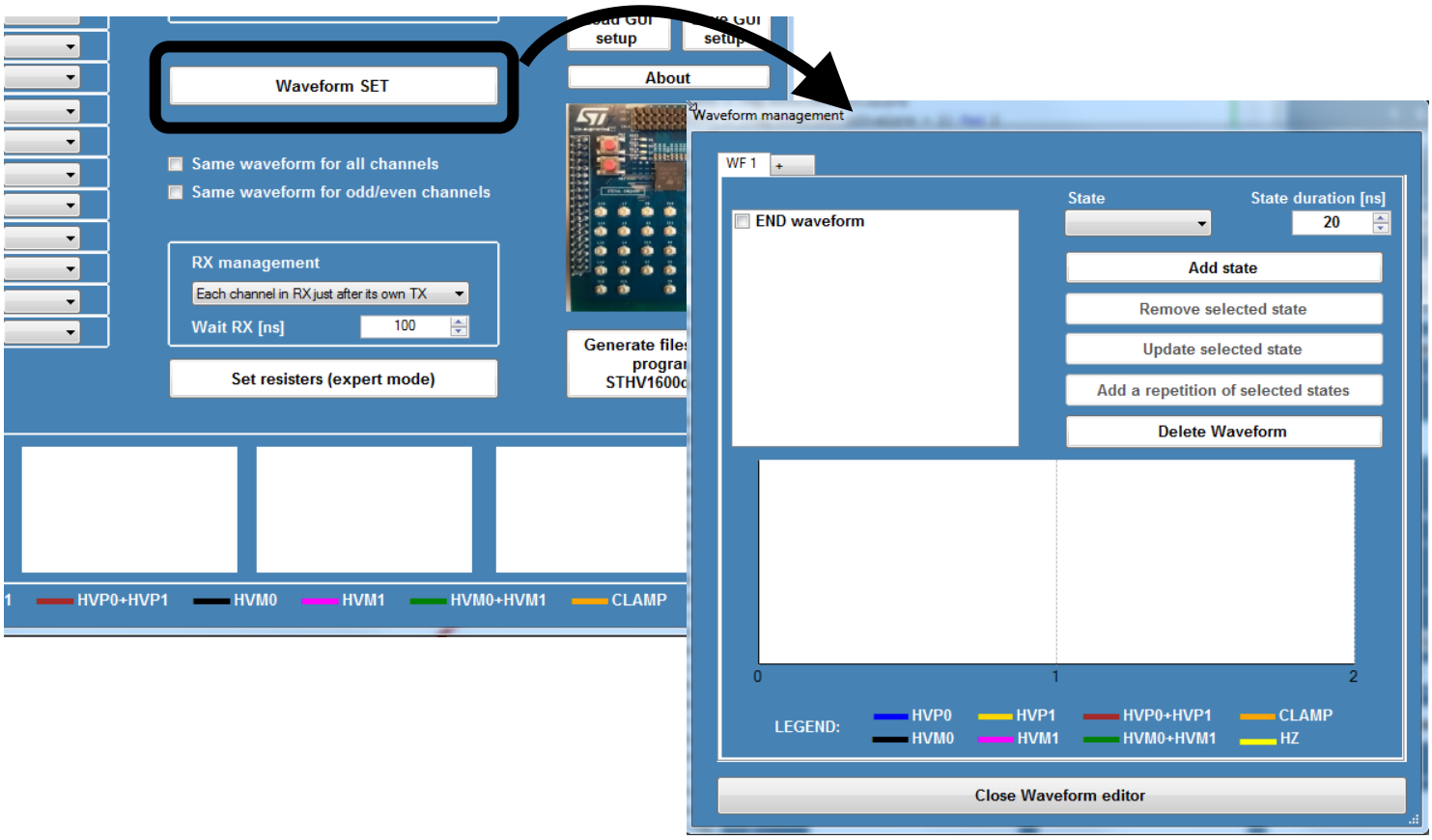


Figure 7: PW waveform management

Each **TAB** is dedicated to 1 waveform, the waveform will be identified by the name of TAB (ex.: WF1)

Push on ‘+’ TAB to add a new waveform (you can build no more than 100 waveforms)

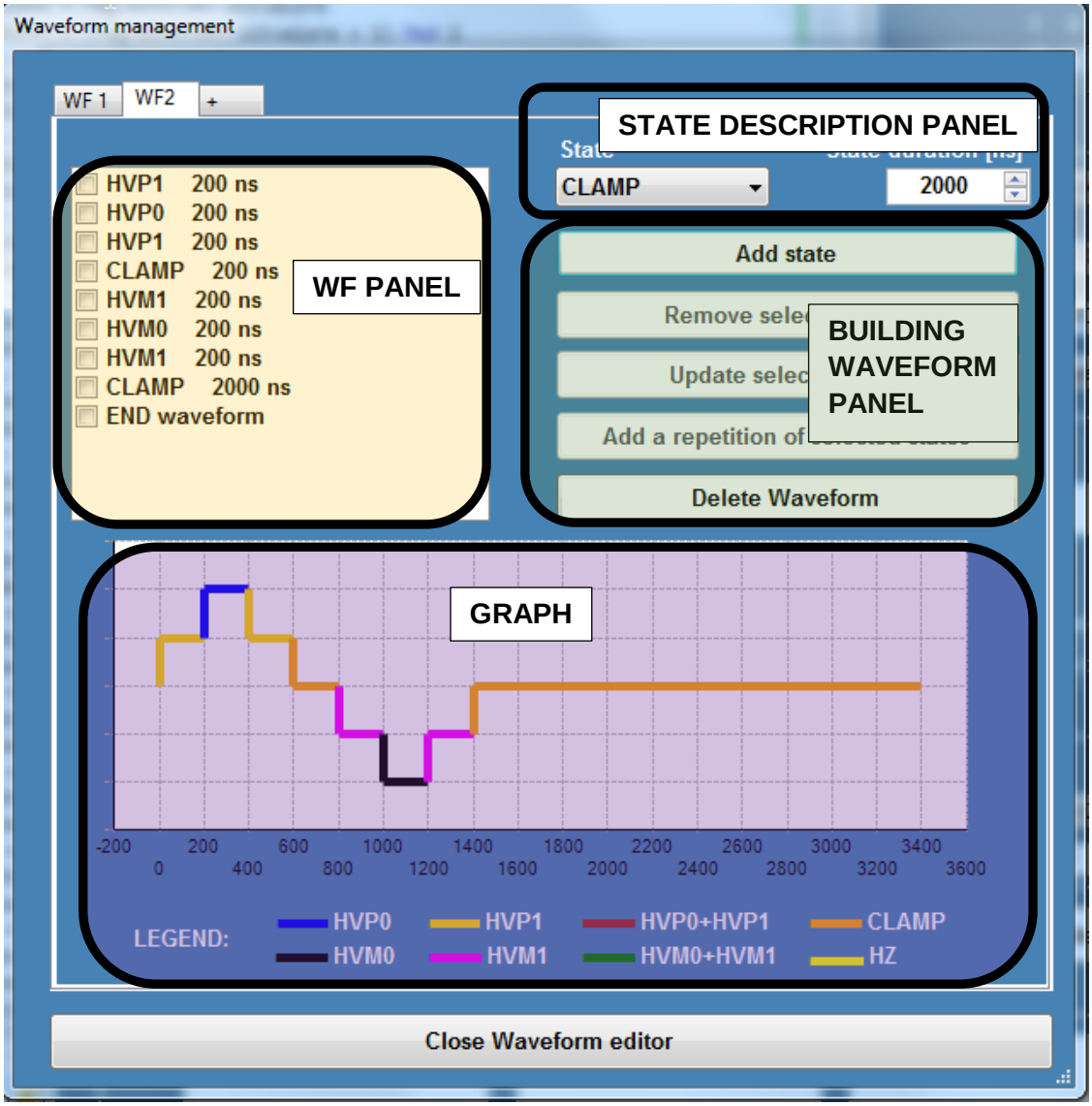


Figure 8: PW waveform form sections

Figure *8* shows the 4 section of this form:

1) **WF PANEL** section: it is the description state-by-state of built waveform. It can be used to check waveform or to select a single or a group of states to update/delete it using **BUILDING WAVEFORM PANEL**
2) **GRAPH** section: it is used to show the built waveform (states are identified through the color)
3) **STATE DESCRIPTION PANEL** section: used to set state 'type' and 'duration' before to add or update it on waveform
4) **BUILDING WAVEFORM PANEL** section: it is used to create, correct or delete states. It include 5 buttons that can be enabled or disabled depending on the number of states selected on **WF PANEL**:

   - 'Add state' button: used to add a new state. Normally it add the new state (like on **STATE DESCRIPTION PANEL**) at the end of waveform but if 1 state is selected on

WF PANEL, STSW-IME014 gives you the possibility to add new state before or after the selected one

- 'Remove selected state' button: enabled only if 1 or more states from **WF PANEL** are selected. It is able to remove from waveform the selected states.
- 'Update selected state' button: enabled only if 1 state is selected. The selected state on **WF PANEL** will be substituted with the new one described on **STATE DESCRIPTION PANEL**
- 'Add a repetition of selected states' button: enabled only if more than 1 state is selected, the selected states must be consecutive. STSW-IME014 ask you for the number of repetition and add, after the selection, an equivalent replica of selected states
- 'Delete waveform' button: remove the waveform

3.4 CW waveform management

If ‘CW’ mode is selected on ‘**Operative mode**’ box, the waveforms will be built using **CW WAVEFORM FORM** (see Figure 9)

To open it push ‘CW Waveform SET’ button.

On the new form, using TABs, all usable waveforms can be created.

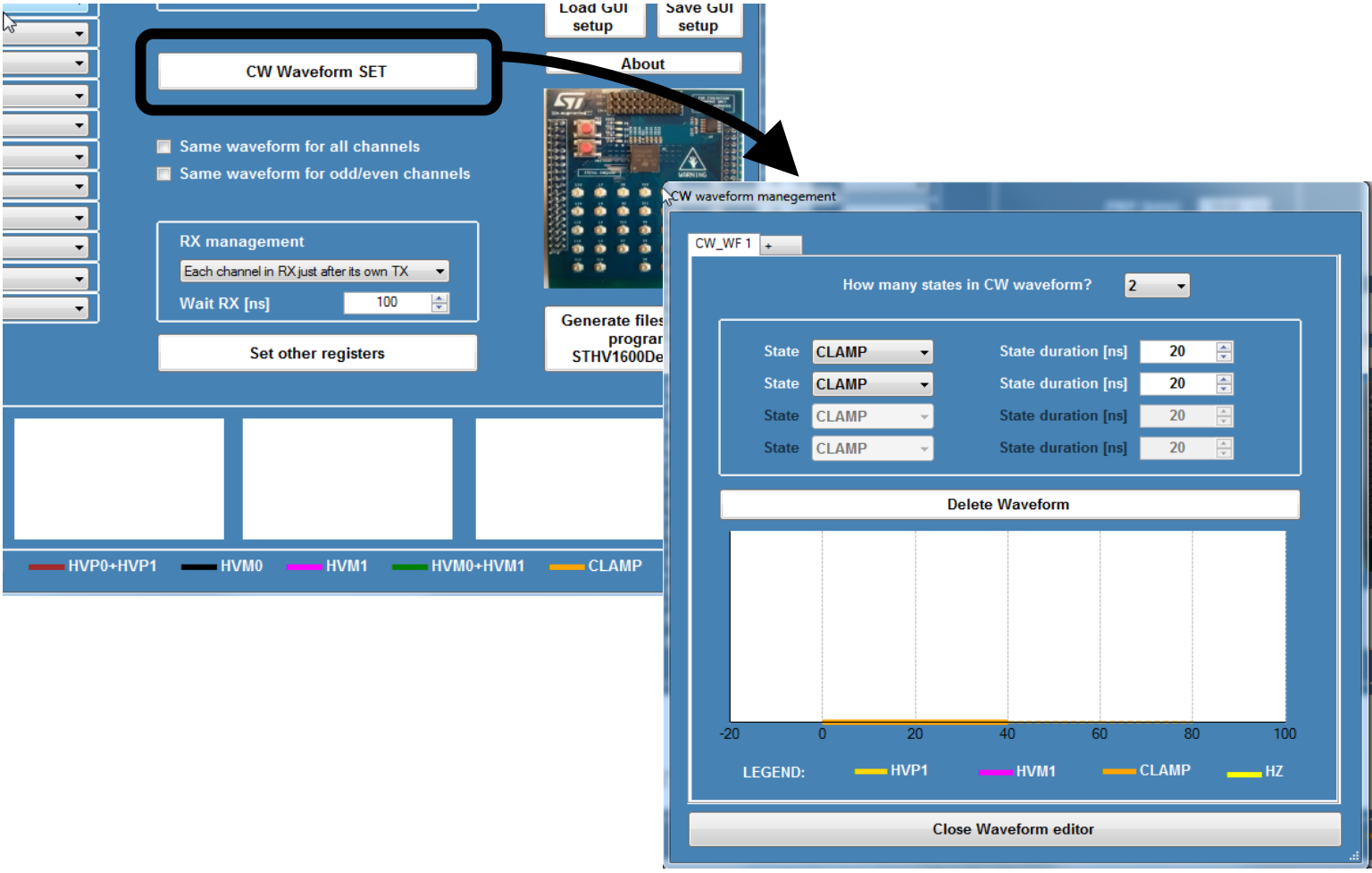


Figure 9: CW waveform management

Each **TAB** is dedicated to 1 waveform, the waveform will be identified by the name of TAB (ex.: CW_WF1)

Push on ‘+’ TAB to add a new waveform (you can build no more than 100 waveforms)

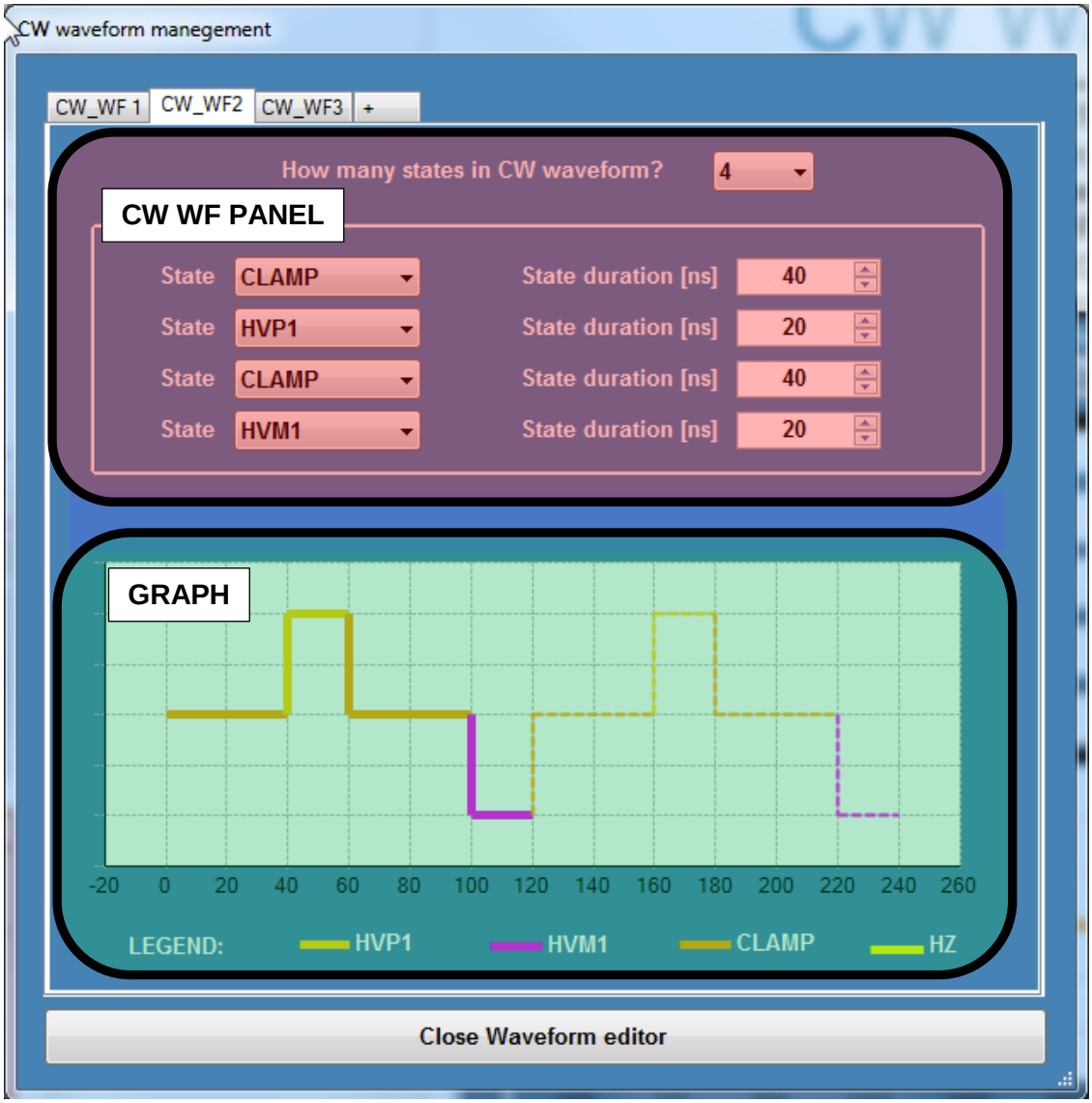


Figure 10: CW waveform form sections

Figure *10* shows the 2 sections of this form:

1) **CW WF PANEL** section: it describes the waveform state-by-state. In CW the number of states is from 2 up to 4. Use the box on upper part of section to set it. On lower part the states can be defined setting 'type' and 'duration'.
2) **GRAPH** section: it shows the waveform (all states are identified through the color)

3.5 Waveform setting

The sections of main form in Figure 11 are used to link single channel to a prebuilt waveform.

1) **SELECTOR PANEL** section: select a waveform among the available ones for each channel. The available one are shown on **GRAPHS**
2) **GRAPHS** section: all available waveforms are shown here. It is usable to check which one is selected.

The selection can be easy using the 'Same waveform for all channels' and 'Same waveform for odd/even channels' buttons to group all or odd/even channels with same waveform.

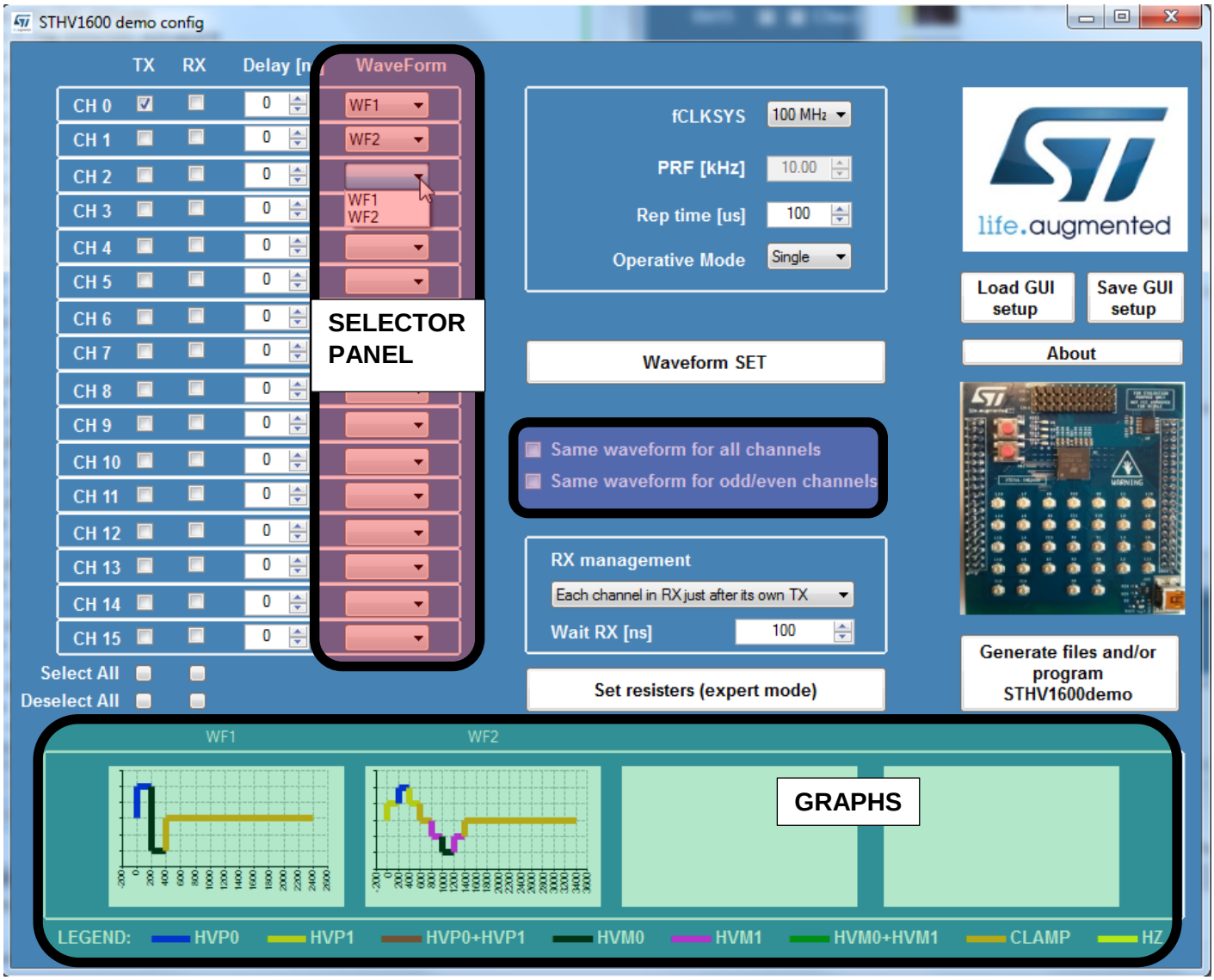


Figure 11: Waveform setting

3.6 Beamforming delay and RX management

The sections of main form in Figure 12 are used to set beamforming delays and RX settings.

1) **DELAY PANEL** section: used to set the beamforming delay for each channel
2) **RX PANEL** section: used to manage the RX phase. The available selections are:
   - All channels go in RX at same time after last TX
   - Each channel goes in RX a time (set on '**Wait RX**' box) after the own TX, so channels go in RX following the beamforming profile.
3) '**Set registers**' button: it opens a new form where all available STHV1600 registers can be set

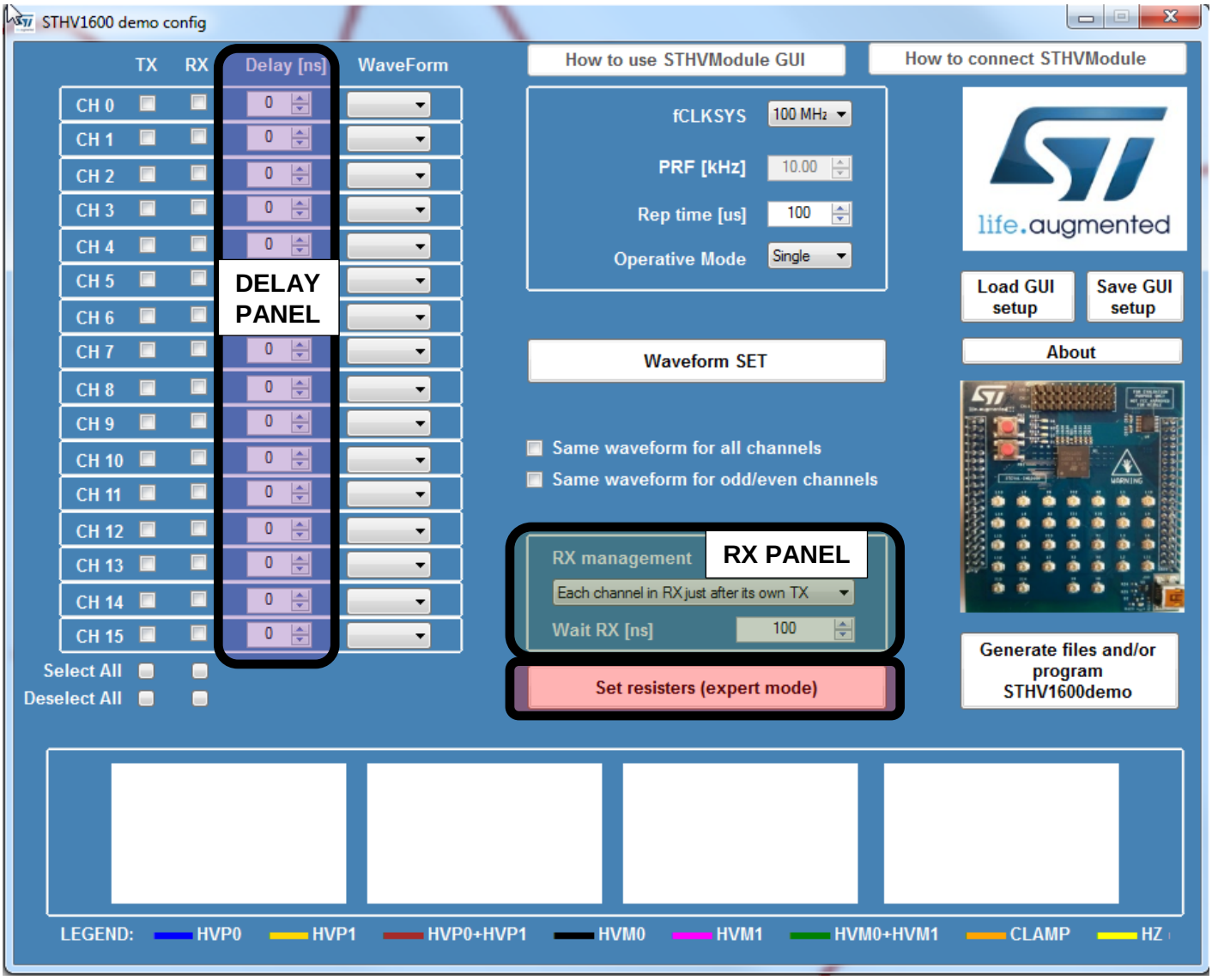


Figure 12: Beamforming delay and RX management

3.7 How to send configurations to STEVAL-IME014

Once STSW-IME014 has been configured, bin configuration file can be sent to the STEVAL-IME014.

Press 'Generate files and/or program STEVAL-IME014' button (Figure *13*).

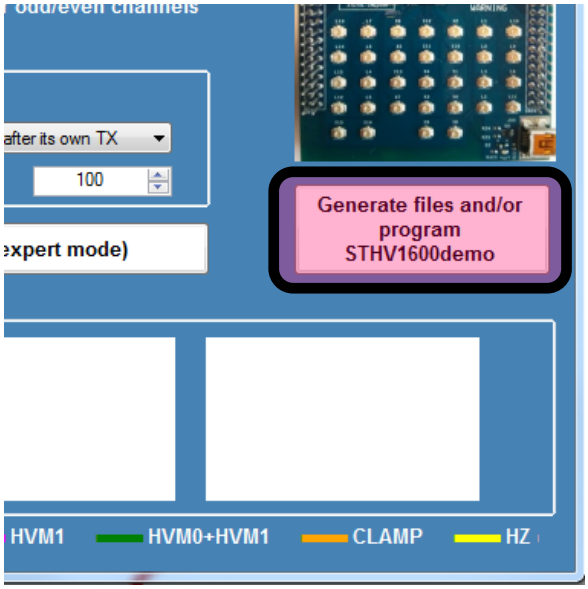


Figure 13: Program STHV1600 button

Software ask if you need to program STEVAL-IME014 or jump directly to the file generation (Figure *14*). Push **YES** to program the device.

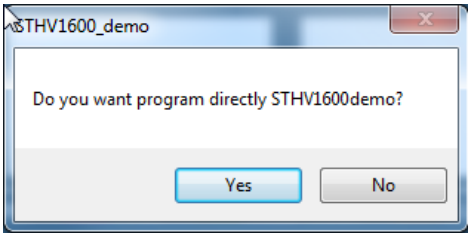


Figure 14: Confirmation form

A reminder appears, STHV1600 must be connected on USB port (Figure *15*).
If it is not already connected, please connect it to PC.
The BIN file already present on it will be deleted and put on PC Trash folder

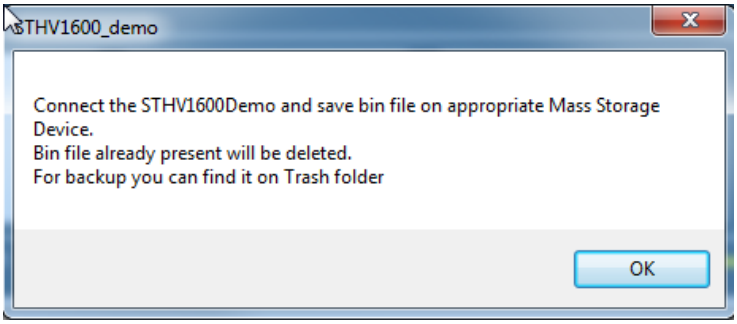


Figure 15: Information form

Push 'OK'.

On next form (Figure *16*) please select the root folder of Mass Storage Device corresponding to the STEVAL-IME014 and fill in the file name (prog2 on example).

Then push 'Save' button

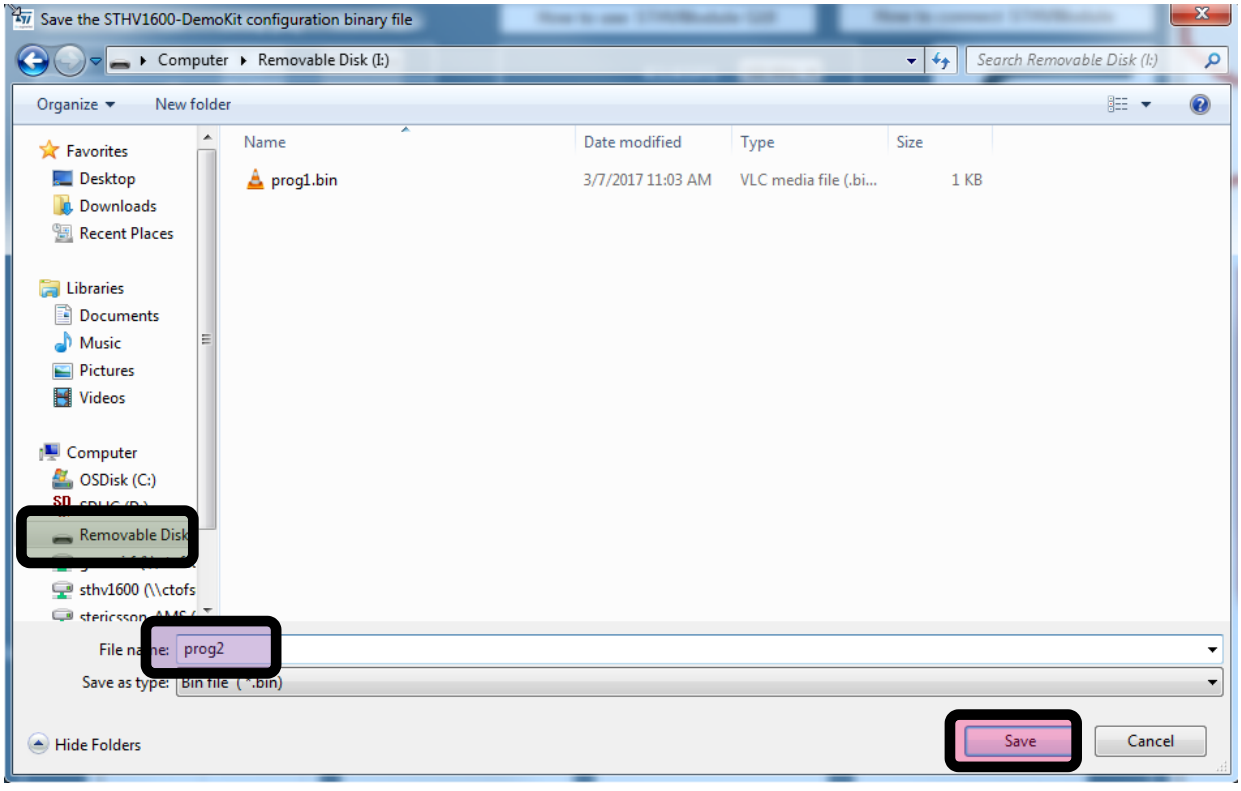


Figure 16: Save file form

Software ask now if you want save the configuration files too (Figure *17*).
They can be useful because:

- txt file lists all the registers set
- bin file can be saved and reused

Push **YES** if you want save files, a couple of form will appears asking for the file names.
The first to save the txt file, the second one for the bin file.

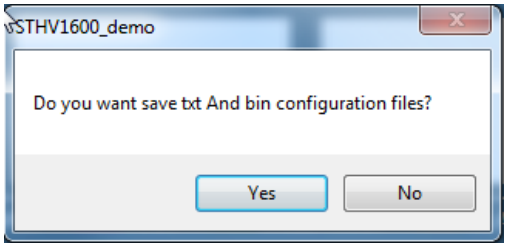


Figure 17: Config files form

3.8 Other features

On main form few more buttons are present (Figure 18).

1) **'**How to use STSW-IME014**'** button: it addresses the user manual of program
2) **'**How to connect STEVAL-IME014**'** button: usable to know how connect STEVAL-IME014 to the PC
3) 'Load GUI setup' and 'Save GUI setup' buttons: used to save and reload the full GUI setup (waveforms, channel settings, environment setting, etc.)
4) **'**About**'** button: it shows the contacts information for support and a short presentation with measurements of main STHV1600 characteristics

Figure 18: Other features

4 How to start TX activity

Using STSW-IME014 the only program 1 is available.

Once the previous steps are completed, bin file is on STEVAL-IME014 ram.

Press once the Start / Stop button (PB1) to start waveforms

- In single mode the waveform generation will stop automatically at the end of the program
- In continuous or CW mode the waveform generation can be stopped by the Start / Stop button (PB1)

If you are using high supply voltage value, we suggest to disconnect the USB cable from PC before to start waveforms

The program from GUI will be on RAM so, removing the supply, the program will be lost. In case of you want store it on flash memory, press PB2 for 3 seconds with USB or supply still connected, the LD1 will light on (red light) (see Figure *19*).

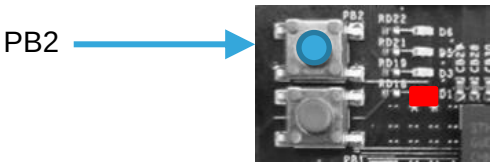


Figure 19: PB1 and PB2 buttons