

# MFU PROGRAMMING PROCEDURE STEP BY STEP

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## 1 Introduction

This document describes step by step the programming procedure for Multifunctional Unit (MFU) module.

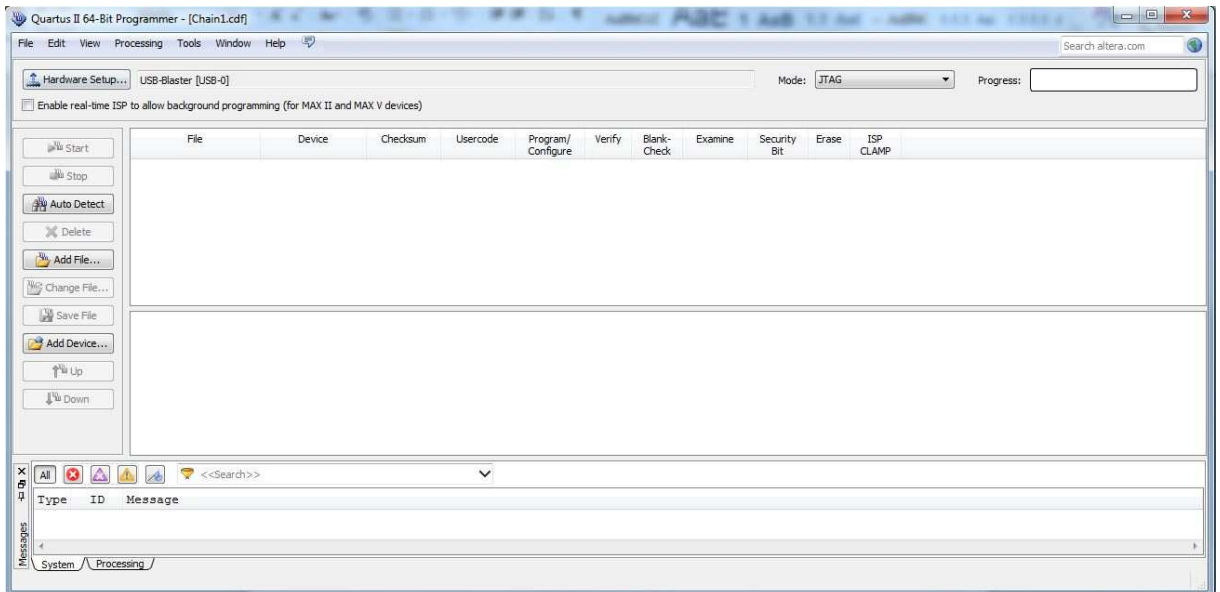
Some of the steps described in the CommonModulesProgrammingProcedure document are valid also here, but please note that they are not enough.

## 2 Steps

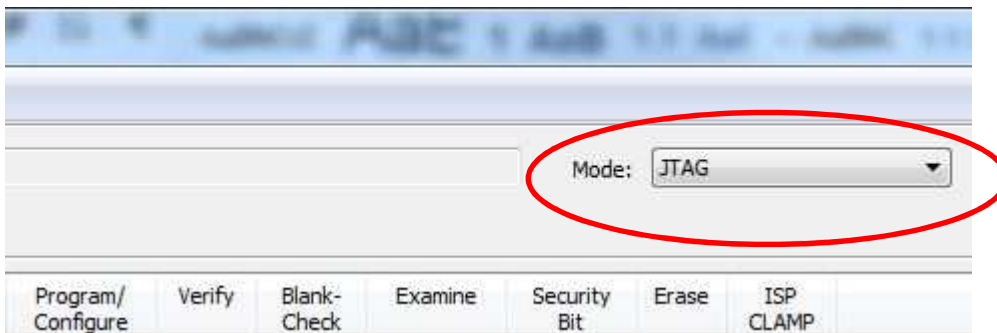
1. Connect USB Blaster cable to the JTAG connector.



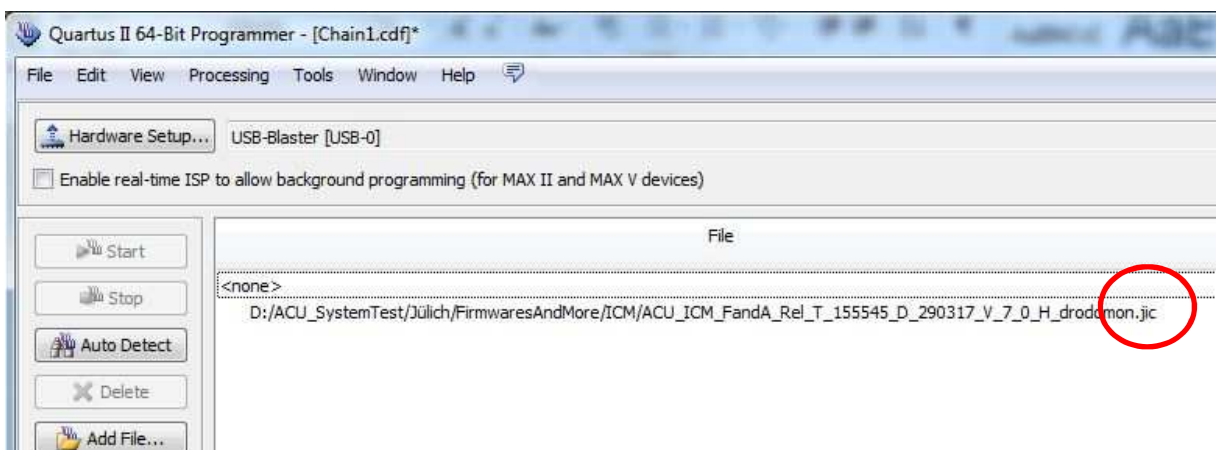
- Open Quartus Programmer tool(`quartus_pgmw.exe`); it is located in the Altera installation folder (`altera\13.1\quartus\bin`).



- Check if the programming modality is JTAG, otherwise select it.

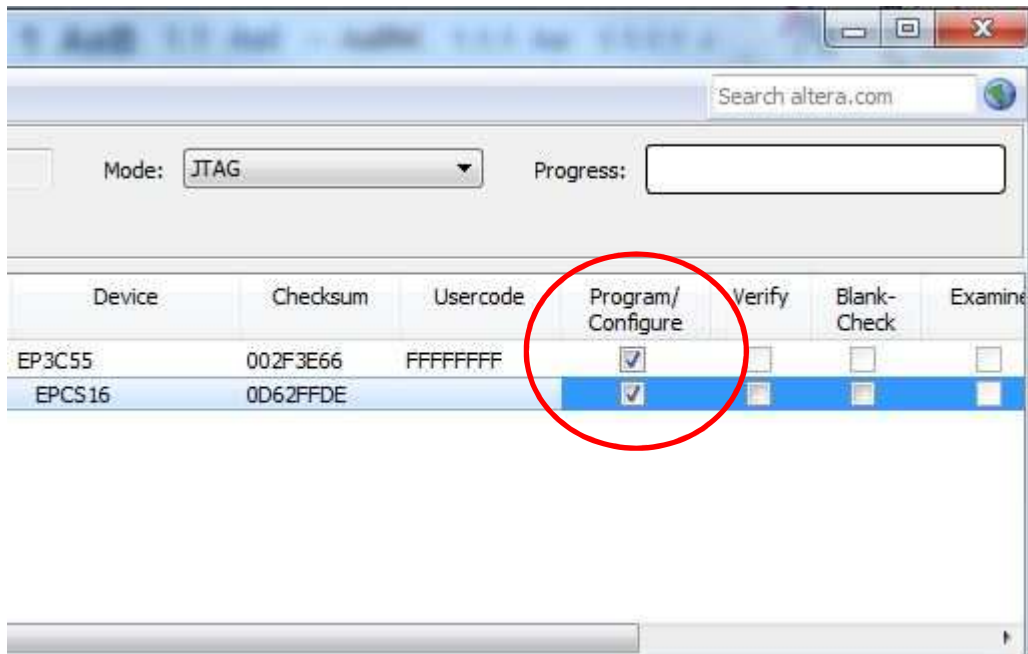


- Push *Add File...* button and select the firmware file with `.jic` as extension. Below there is, only as example, the ICM Firmware file selected. Please select the appropriate file compliant with the FPGA to configure.

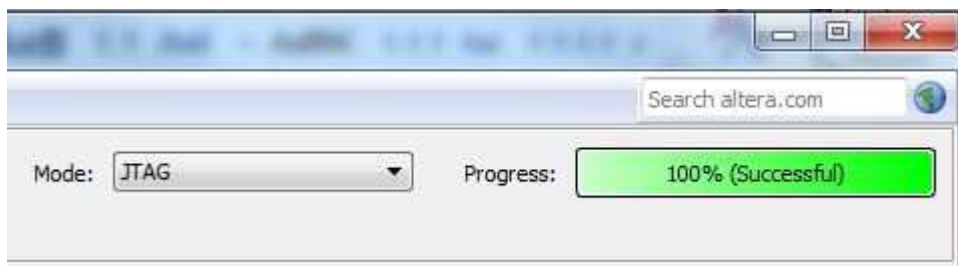


**NOTE!!:** There are two MFU firmware versions available, one for the so called Legacy Edition (LE) and one for the Second Edition (SE). Pay much more attention in the file selection.

5. Check the second from the top *Program/Configure* check box; the first will be automatically checked.



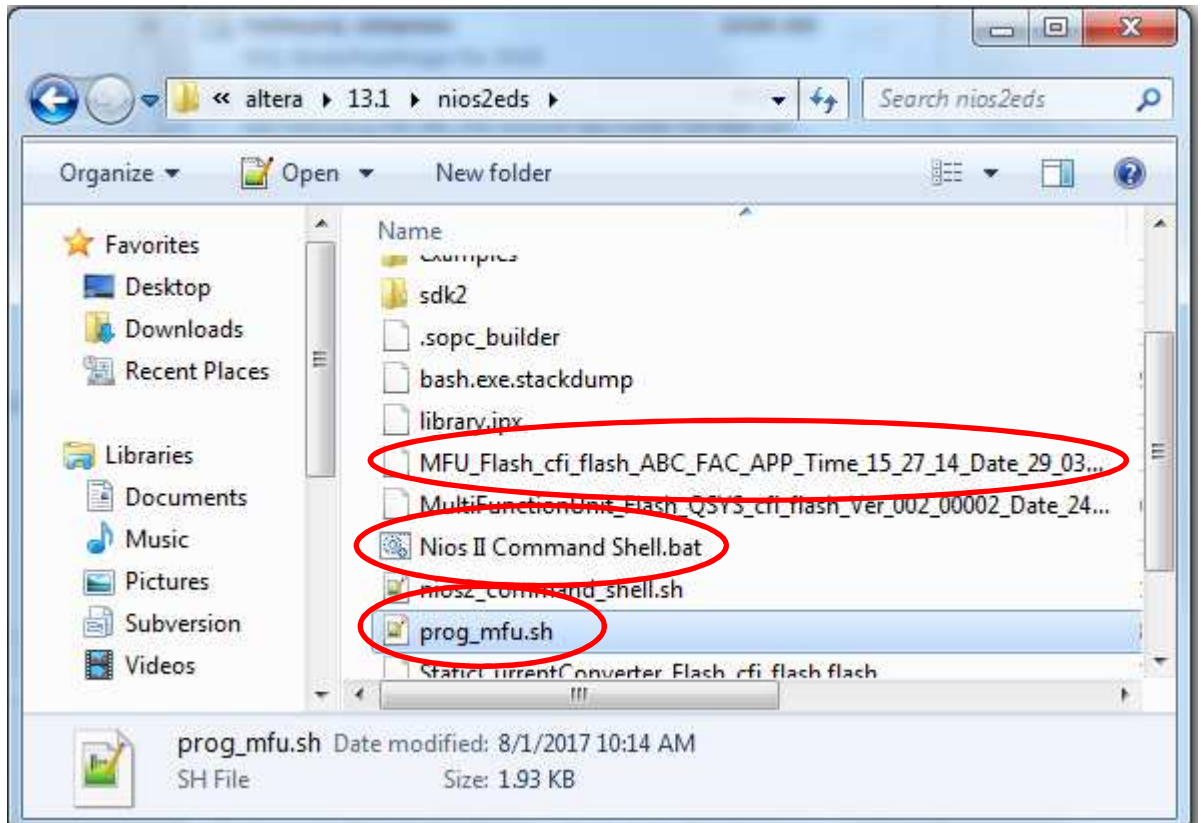
6. Push *Start* button and wait till the progress bar reaches the 100% and the *Successful* label appears in it (as in the picture below).



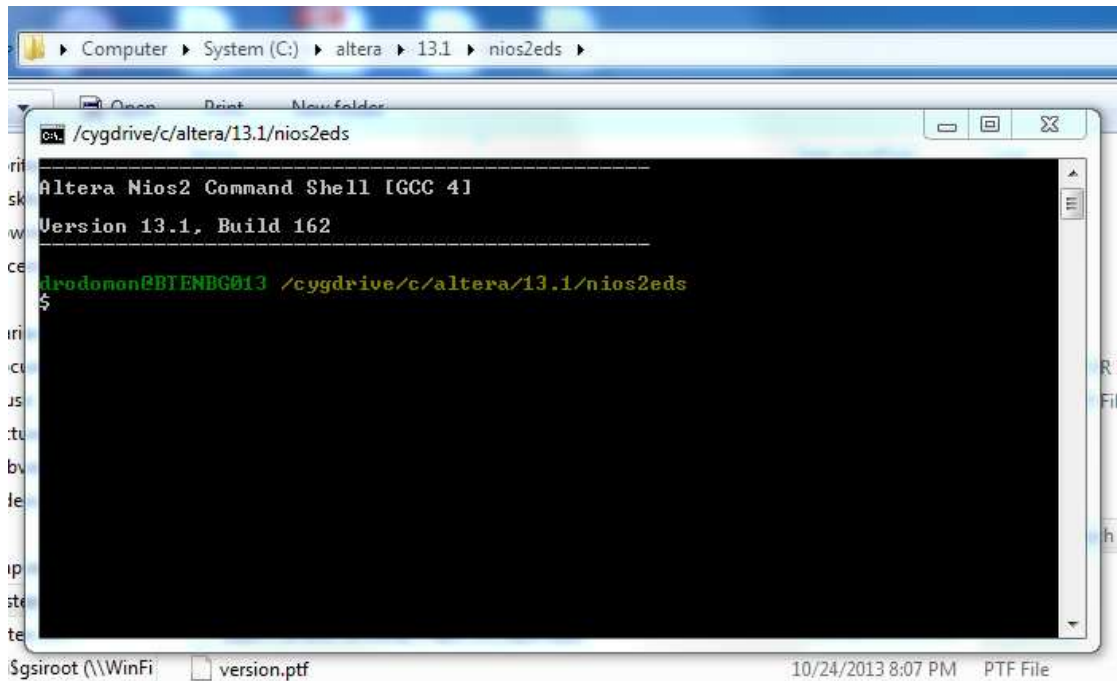
7. Power OFF and ON the board in order to start the new downloaded Firmware.

8. Copy and paste the following to files provided by the designer in the nios2eds folder (altera\13.1\nios2eds).
  - a. prog\_mfu.sh
  - b. <MFU Flash File Name>.flash

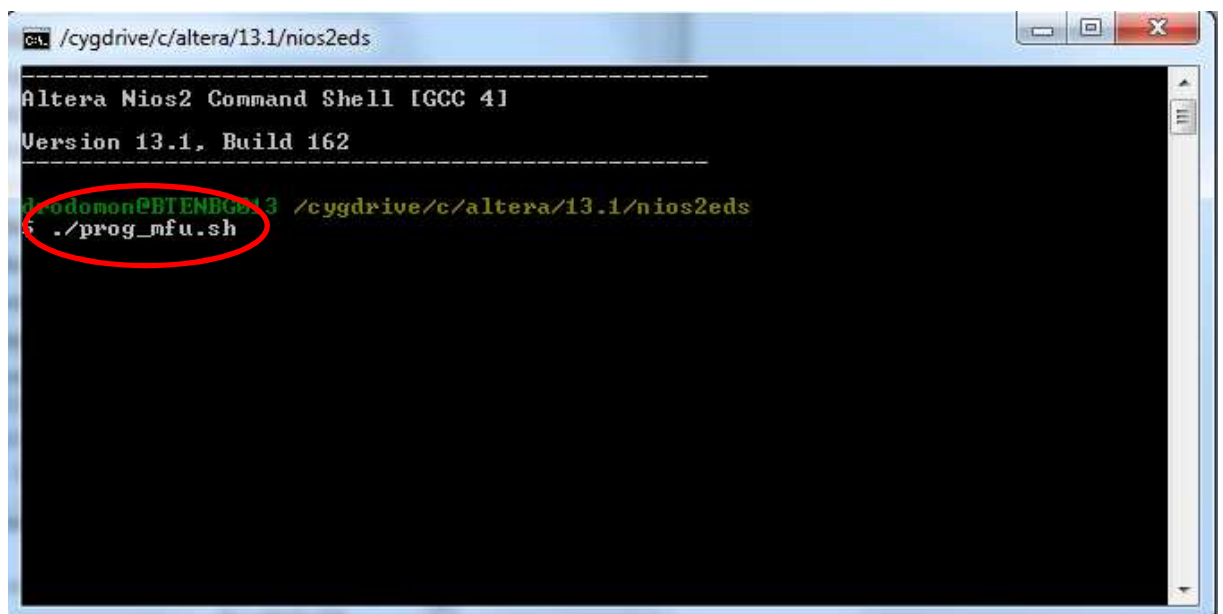
In the example below the .flash file name is ***MFU\_Flash\_cfi\_flash\_ABC\_FAC\_APP\_Time\_15\_27\_14\_Date\_29\_03\_2017.flash***



- Double click the **Nios II Command Shell.bat** file. An extra window DOS style should be automatically opened as shown below.

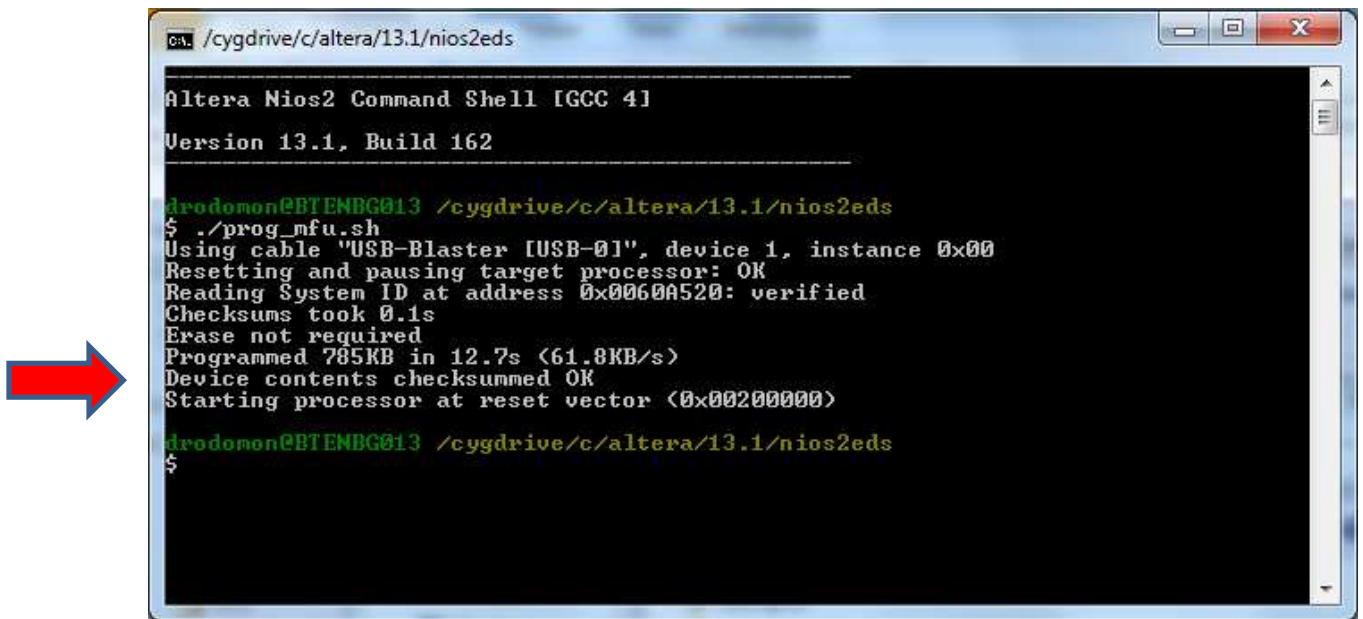


- Type `./prog_mfu.sh` and press enter.





11. Check if the programming action is successfully over as in the pictures below.



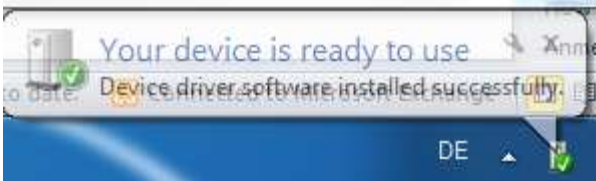
```

ca. /cygdrive/c/altera/13.1/nios2eds
-----
Altera Nios2 Command Shell [GCC 4]
Version 13.1, Build 162
-----
dromomon@BTENBG013 /cygdrive/c/altera/13.1/nios2eds
$ ./prog_mfu.sh
Using cable "USB-Blaster [USB-01]", device 1, instance 0x00
Resetting and pausing target processor: OK
Reading System ID at address 0x0060A520: verified
Checksums took 0.1s
Erase not required
Programmed 785KB in 12.7s (61.8KB/s)
Device contents checksummed OK
Starting processor at reset vector (0x00200000)
dromomon@BTENBG013 /cygdrive/c/altera/13.1/nios2eds
$
  
```

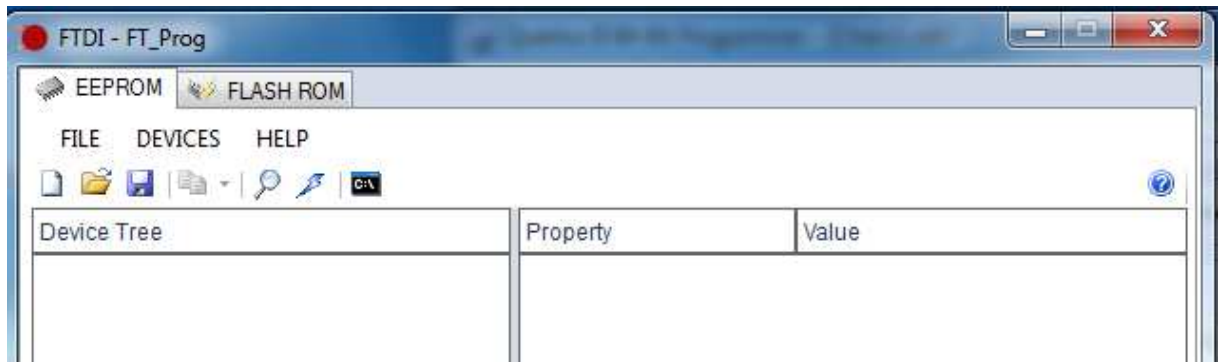
12. Power OFF and ON the board in order to start the new downloaded software.



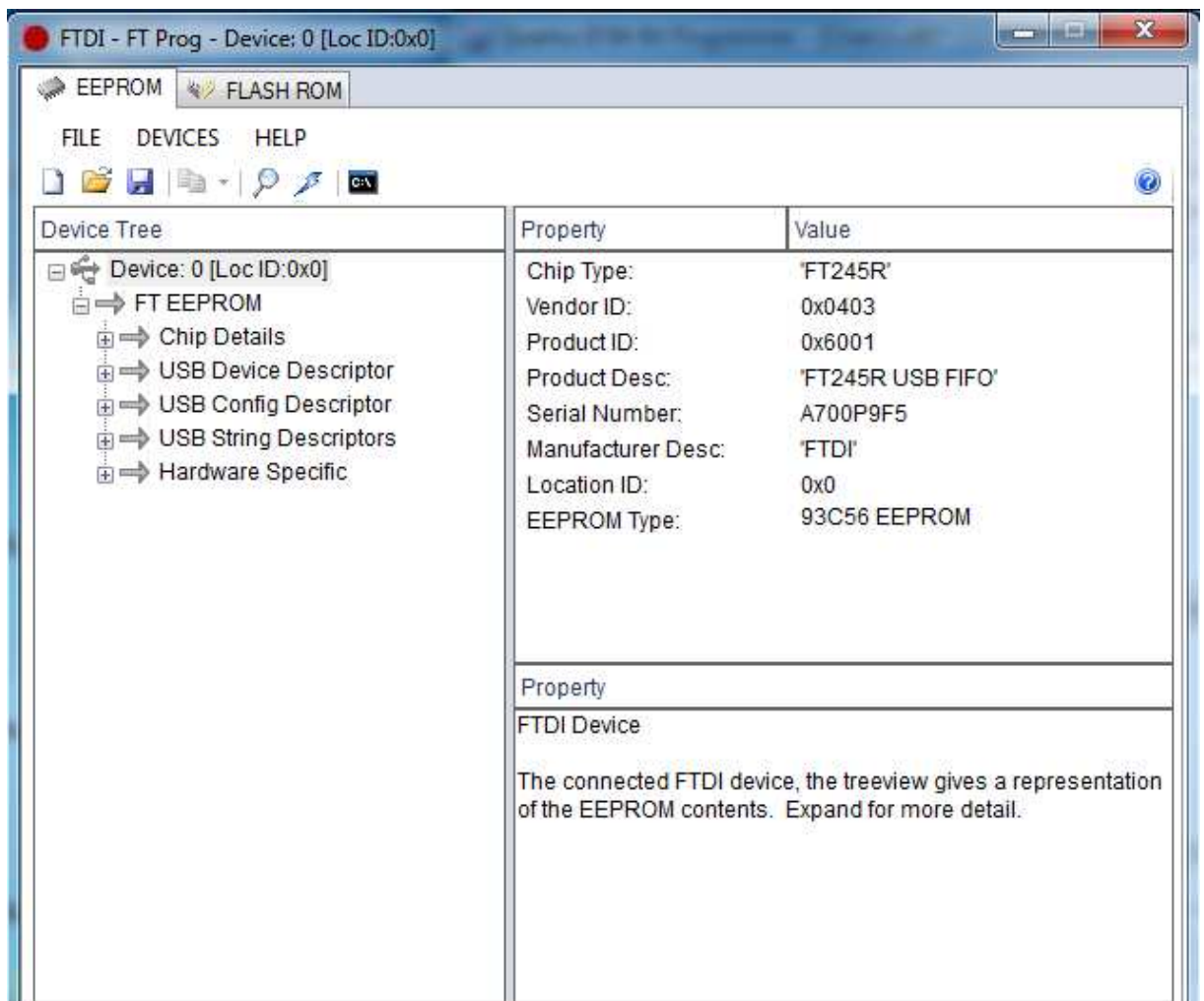
13. Connect a USB cable to the MFU front port and wait till the USB device is correctly recognized by Windows operating system.



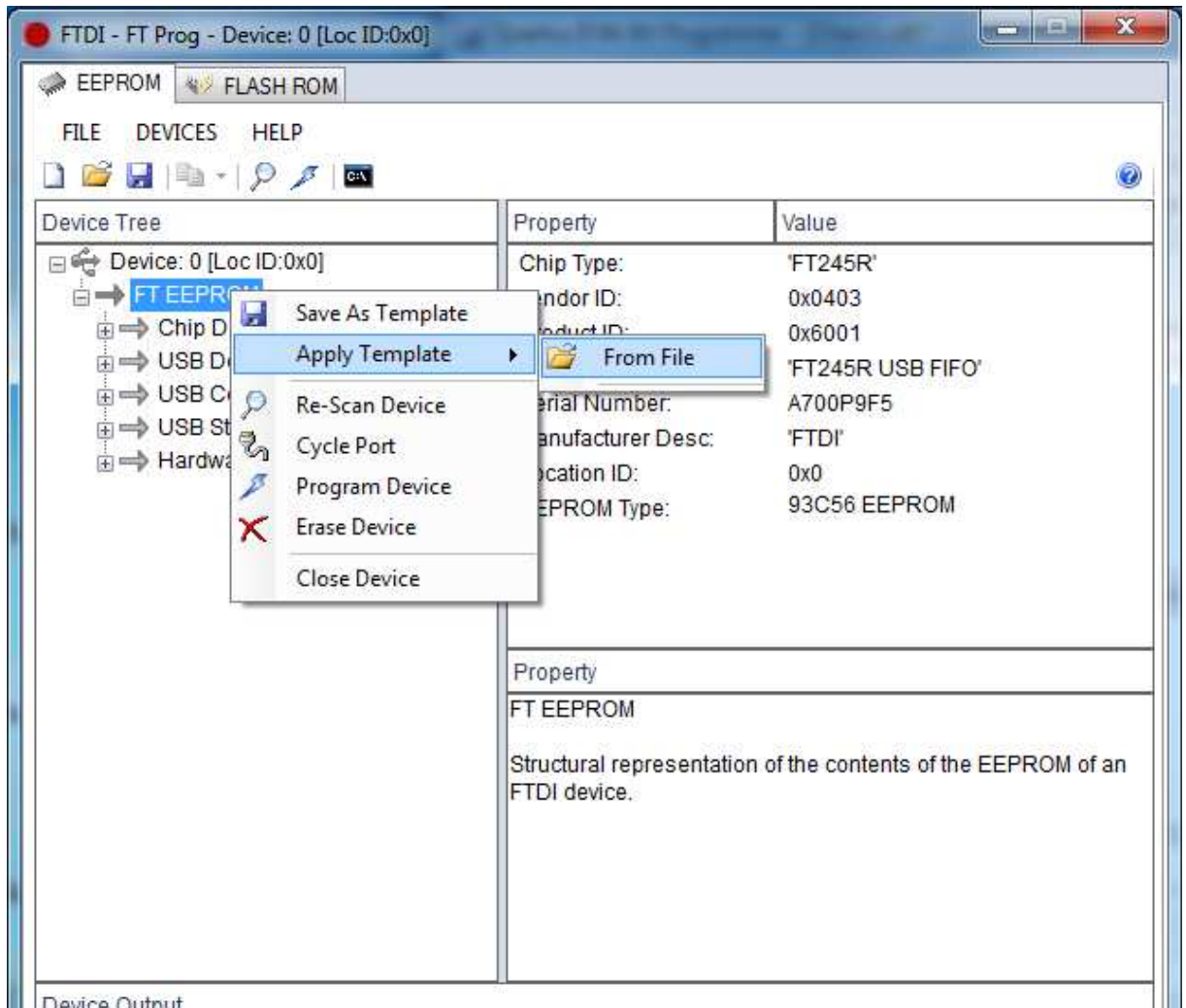
- Open FT\_Prog software tool. If it is not installed on your PC, download it from the FTDI web page (<http://www.ftdichip.com>)



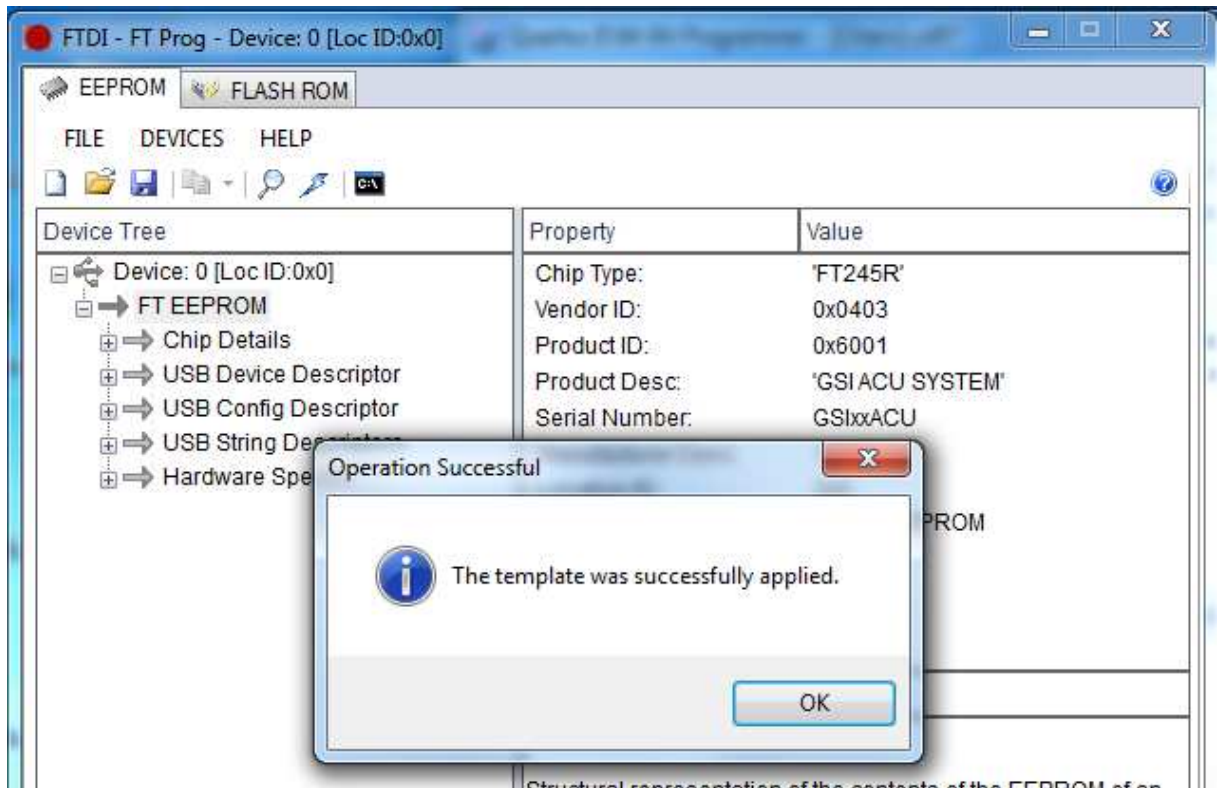
- Click on magnifying glass symbol and what you should get is the following:



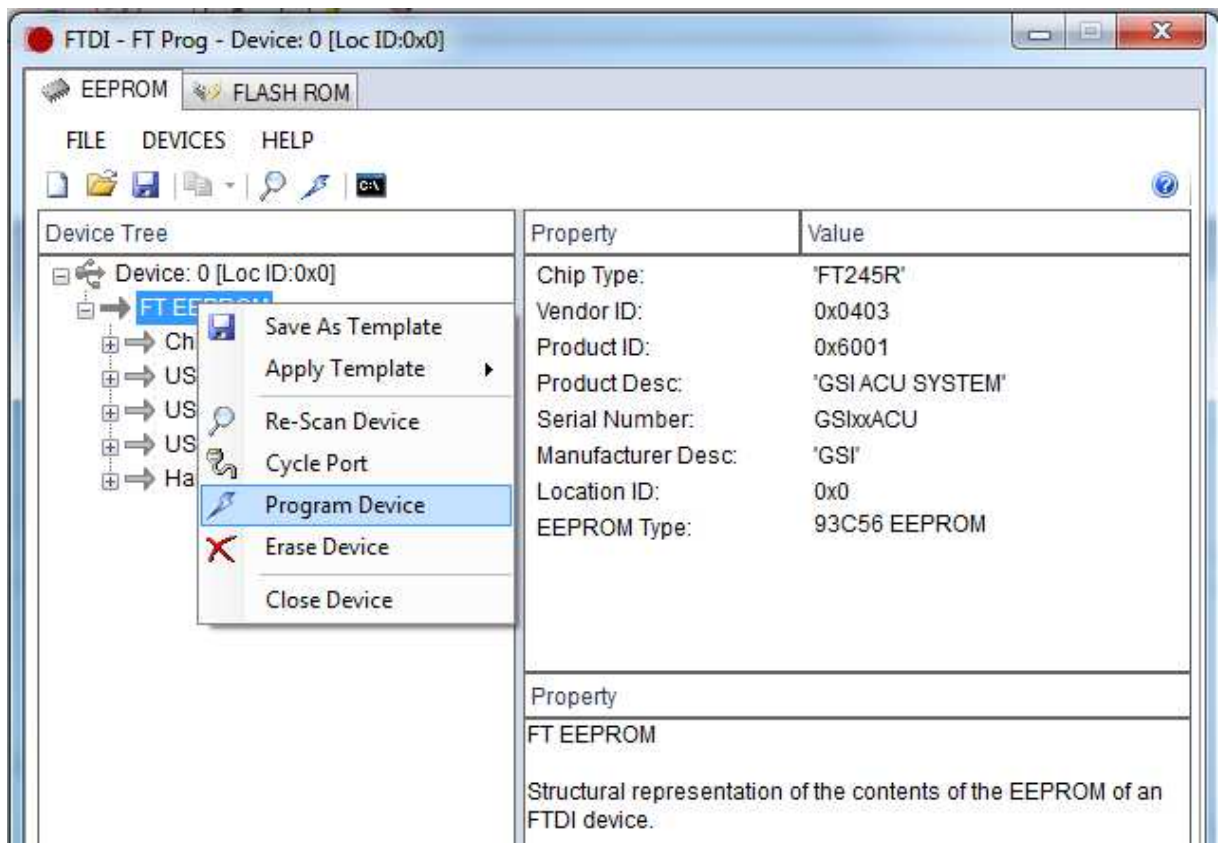
- Right click on FT EEPROM (left side of the window) and select **Apply Template/From File**



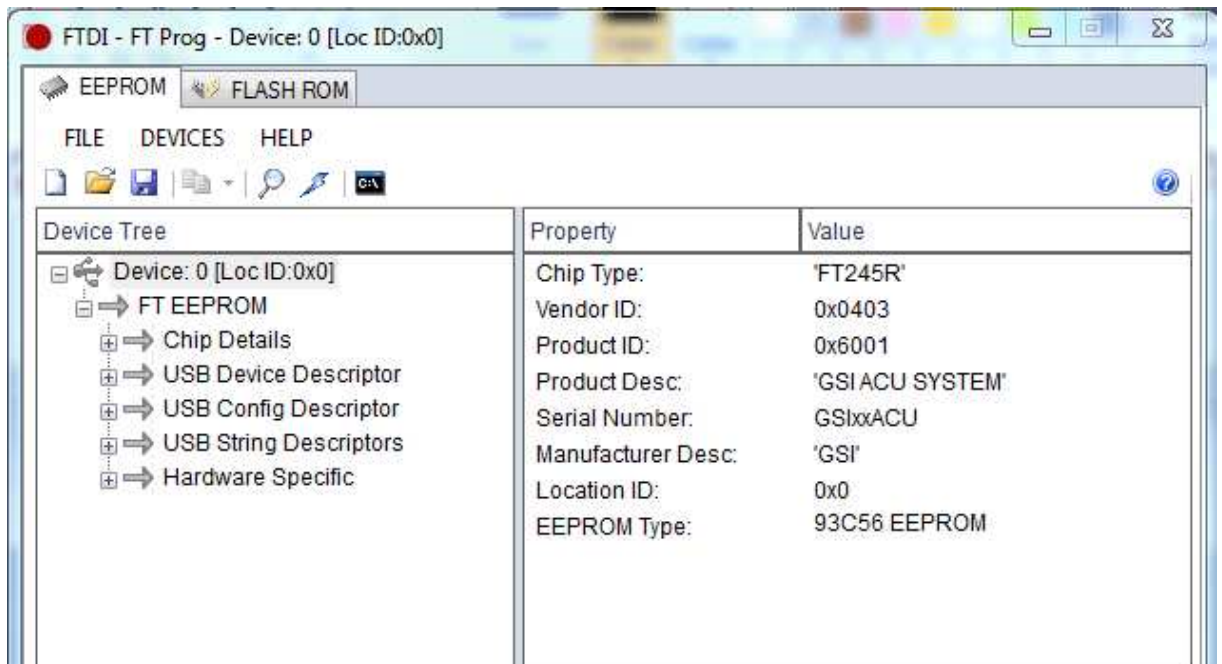
- In the folder **SVN\CODEWork\lib\FTDI\_FTProg**, select **USB\_FT245R\_ACU.xml** file. Please double check if some USB-Blaster devices are connected to the PC. In that case disconnect them.



18. Right click on FT EEPROM again, but this time select **Program Device**



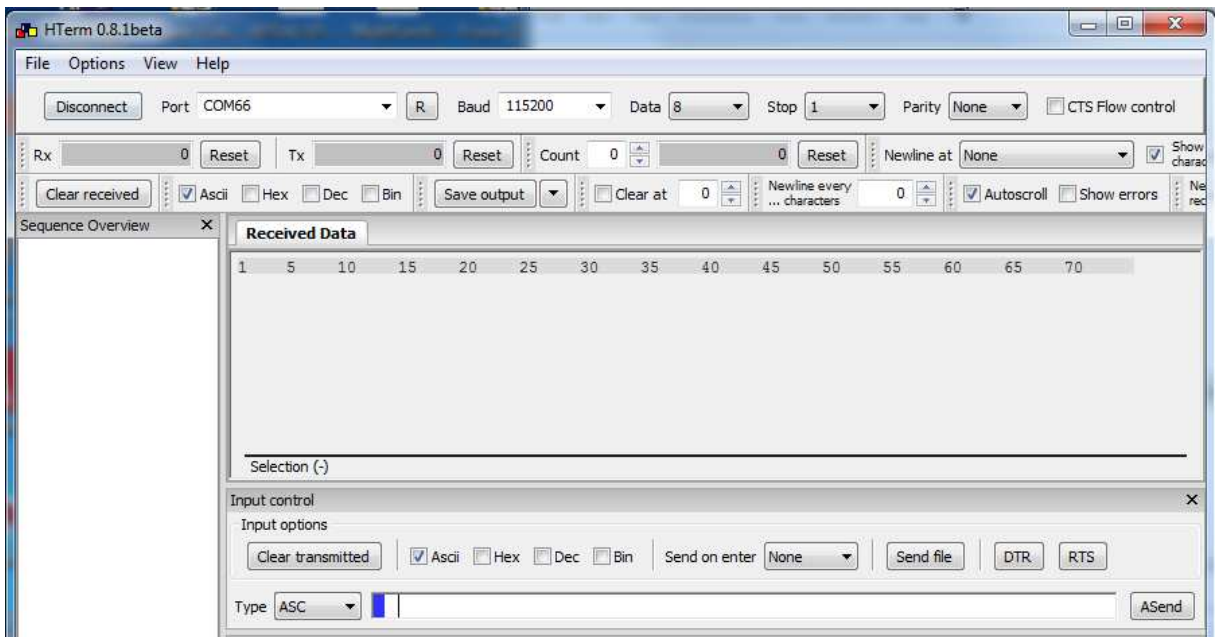
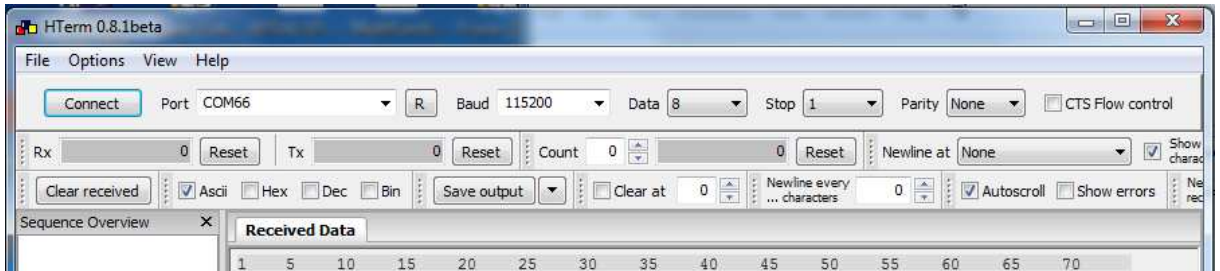
19. After a while click again on the magnifying glass symbol and check if the software window looks like the one below.



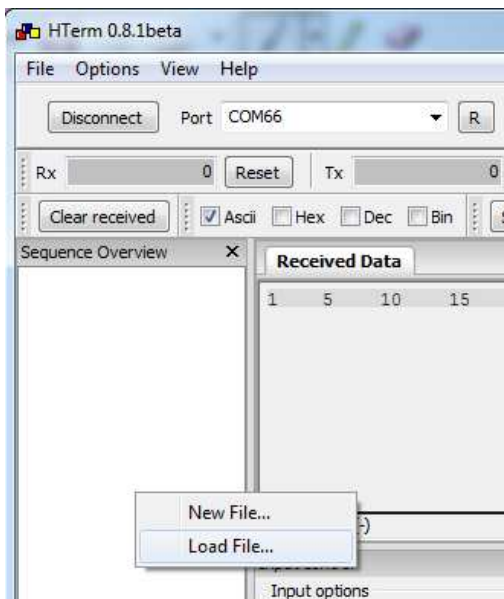
20. Close the FT Program software tool and power OFF and ON the board in order to restart the chip configuration.



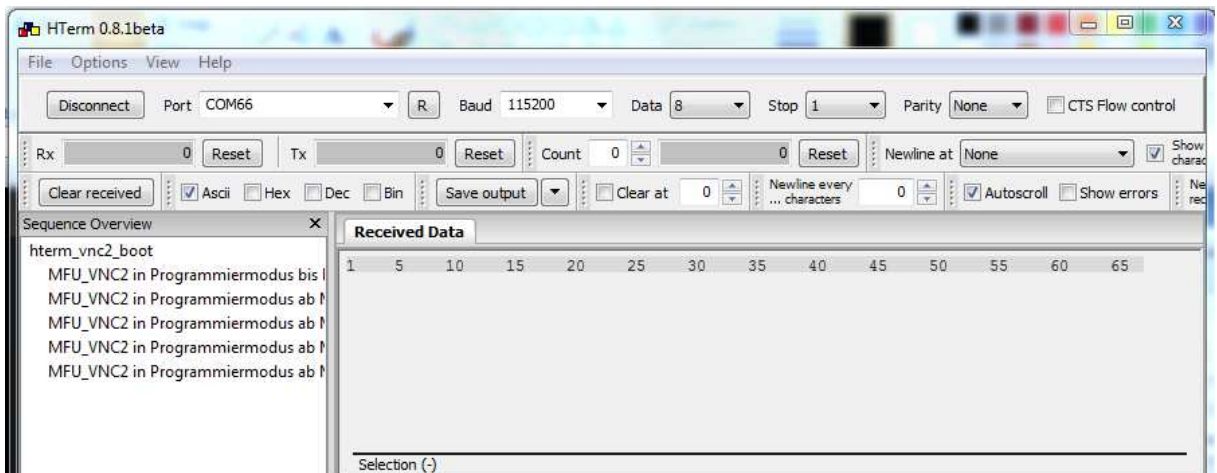
21. Open HTerm.exe program and click the connect button. In the **Input control** window check if the connection is really establish (a blue rectangle should be displayed).
- NOTE!!!:** the port can be different of COM66



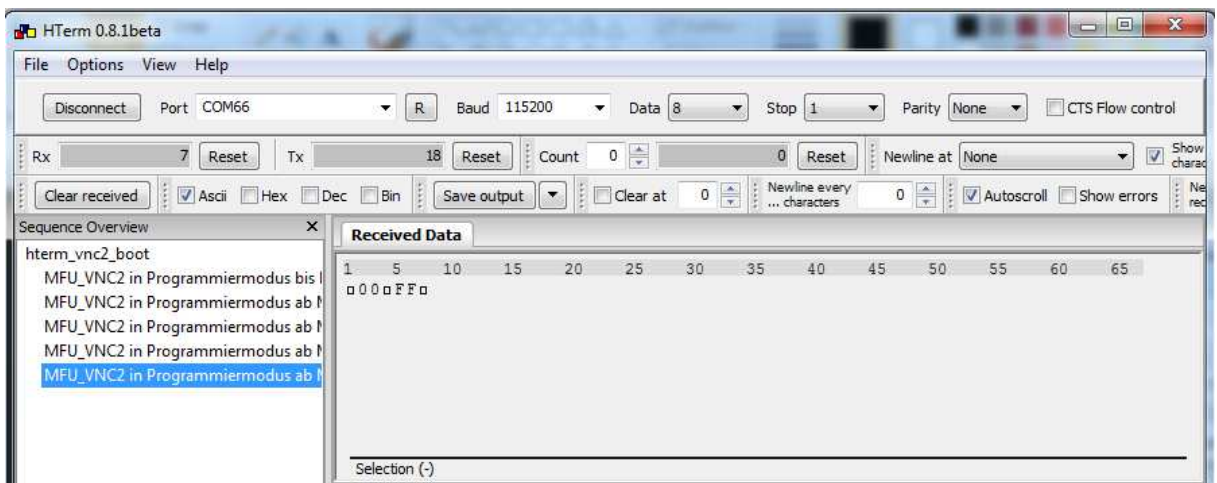
22. Right click in the **Sequence Overview** window and select **Load File...**



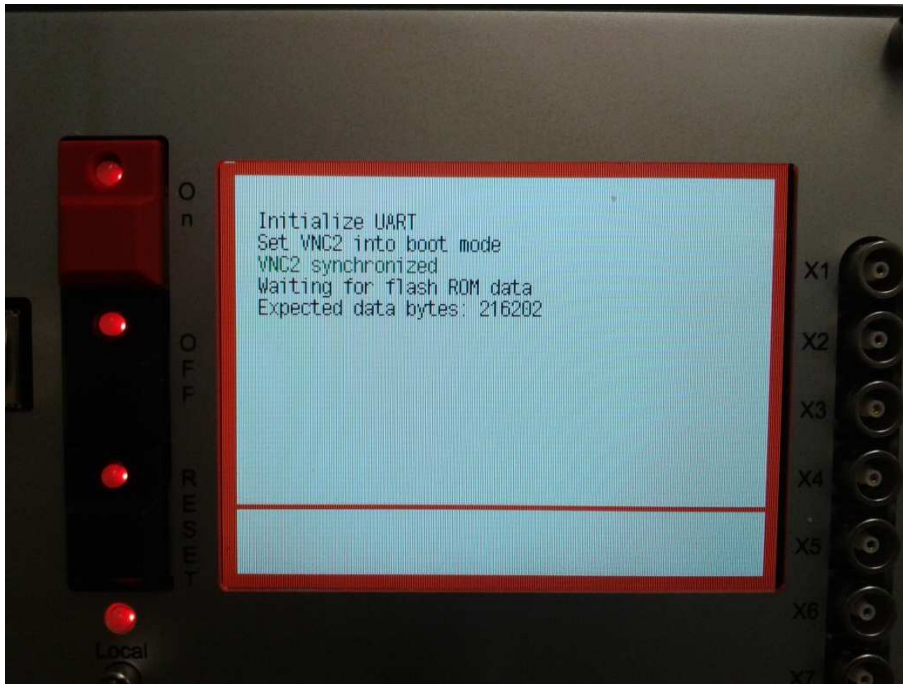
23. Select **hterm\_vnc2\_boot.hts** file in the following directory **SVN\CODEWork\lib\HTerm**. At this point in the **Sequence Overview** window, some line should be displayed at this point.



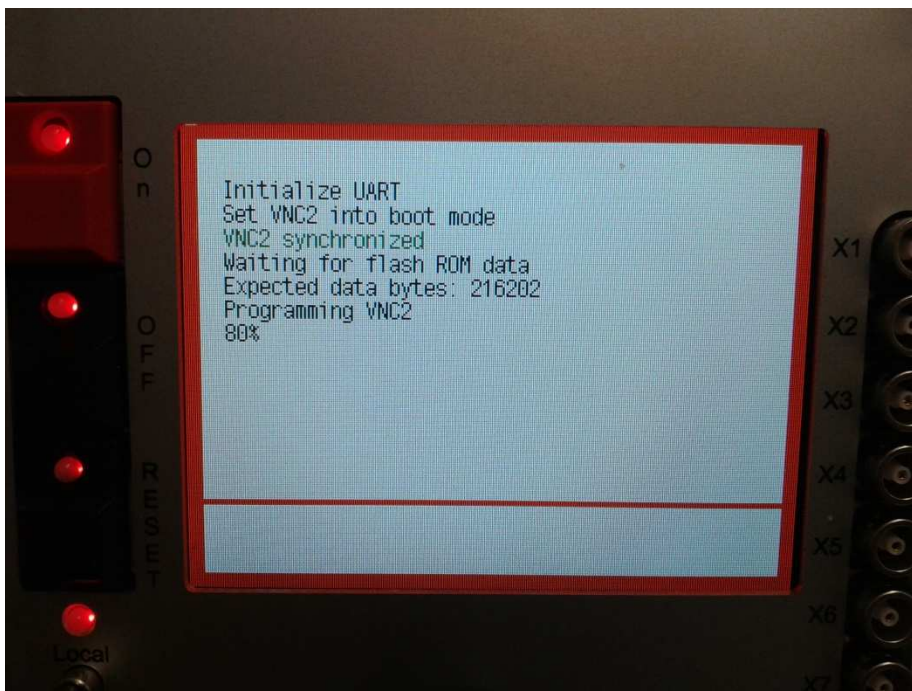
24. Double click on the last one and check if the system received the command correctly. In order to do that there are two ways (both to check):
- The Received Data has to be `000FF0`
  - The system should be ready to receive some data.

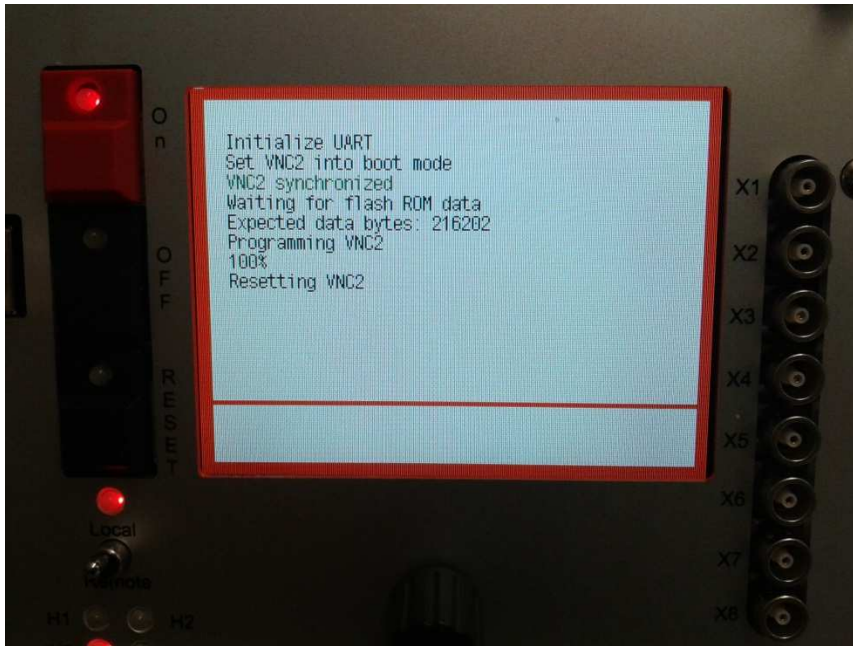






25. Click **Send file** and select **V2DAP\_V202\_SP2\_R1.rom** file in the folder **SVN\CODEWork\prj\VinculumII\V2DAP\Release**.
26. Click the Start button and wait until all bytes are sent.
27. During the data sending, please check also in the TFT display the data transfer evolution.

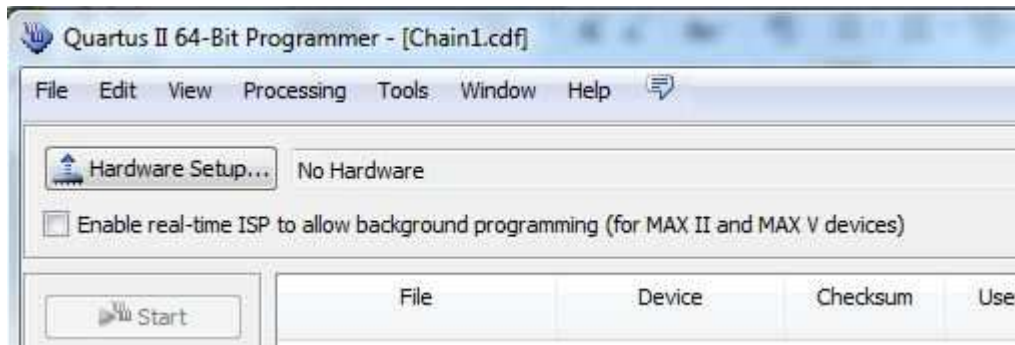




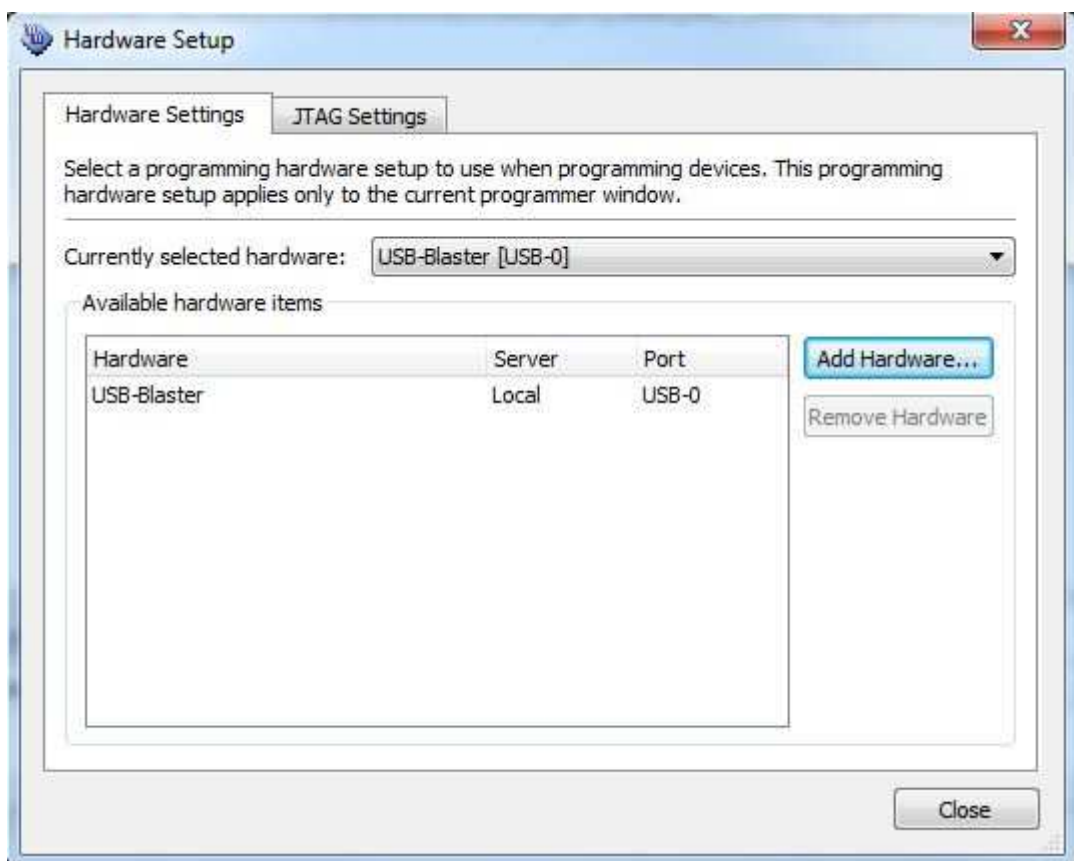
28. Close HTerm software tool and power OFF and ON the board in order to restart the chip configuration.

### 3 COMMON PROBLEMS DURING THE FW DOWLOADING:

1. If pushing the *Start* button has no effect, please check if the USB Blaster hardware is recognized by the Quartus programmer. If not, *No Hardware Selected* should be displayed on the upper window side near to the *Hardware Setup* button as shown below.



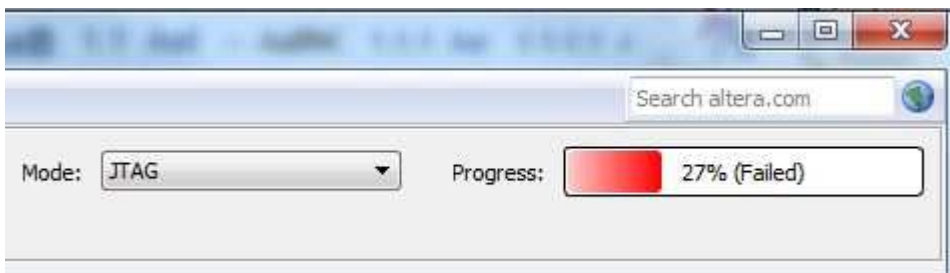
In this case check first of all if the USB Blaster and cable are connected to the PC, after that click the *Hardware Setup* button.



In the Currently selected list select USB-Blaster as shown above, click the *Close* button and try again to program the FPGA.

2. If the progress bar becomes red and inside it is written *Failed*, the causes can be several. Below there are reported the two most common:
  - a. The wrong .jic file is selected and for this reason there is no matching between the FPGA Hardware and Firmware.
  - b. The EPCS memory is broken or defective.

In these cases, please contact the supervisor.



3. If after launching `./prog_mfu.sh` in the **Nios II Command Shell** window, the program takes too much time to finish or the ending message is **Program failed**, press ctrl-C and launch again `./prog_mfu.sh`.

```

dronon@BTENBG013 /cygdrive/c/altera/13.1/nios2eds
$ ./prog_mfu.sh
Using cable "USB-Blaster [USB-1]", device 1, instance 0x00
Resetting and pausing target processor: OK
Reading System ID at address 0x0060A520: verified
Checksummed/read 900kB in 18.3s
Erased 640kB in 200.6s (3.1kB/s)
Program failed
Leaving target processor paused
  
```

4. If the message after the programming action is like the one below, it means that the NIOSII software was already loaded into the system.

```

dronon@BTENBG013 /cygdrive/c/altera/13.1/nios2eds
$ ./prog_mfu.sh
Using cable "USB-Blaster [USB-1]", device 1, instance 0x00
Resetting and pausing target processor: OK
Reading System ID at address 0x0060A520: verified
Checksummed/read 785kB in 20.2s
Erase not required
Programmed 785KB in 0.0s
No change to device contents
Starting processor at reset vector (0x00200000)
  
```

5. If in the step number 21 it is not possible to establish a communication, please follow the steps below:
  - a. Close HTerm
  - b. Disconnect and connect the USB cable
  - c. Open Hterm software tool again
  - d. Press the **Reset** button near to the connection one.

- e. Follow again the step number 21.