

AFEDRI SDR-USB-HS – short user manual

1. AFEDRI SDR-USB-HS main information.

The image of AFEDRI SDR-USB-HS receiver, it contains also the external connectors and indication LEDs that are marked on the picture (see **Figure 1.**). There is short description of marked connectors and indication LEDs.

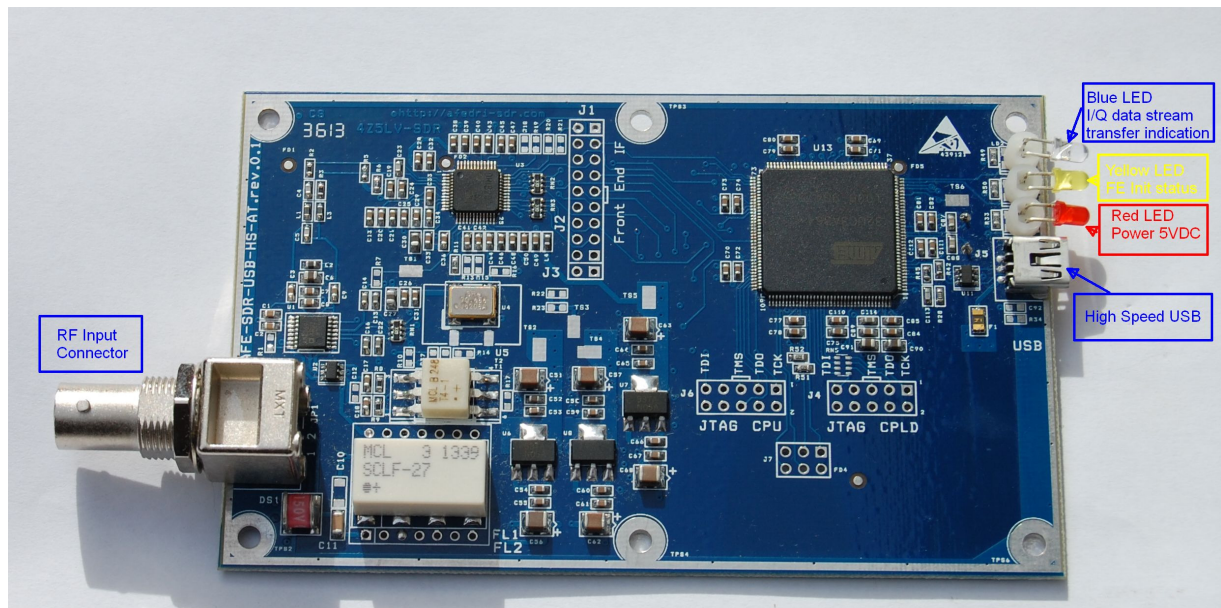


Figure 1.1 AFEDRI SDR-USB-HS receiver

1.1 JP1 connector (RF Input connector) – This SMA or BNC type connector, it is used to connect external antenna or any other RF signal source (maximum limit is 13dbm).

1.2 J10 connector (USB connector) – it is used to connect USB cable (mini-B USB type) between SDR and PC. This connector provides +5VDC power supply for SDR, and control/data stream transfer. Mini-B USB connector pin-out you can see on **Figure.2**

Table 6-2. USB Series “mini-B” Connector Termination Assignment

<u>Contact Number</u>	<u>Signal Name</u>	<u>Typical Wiring Assignment</u>
<u>1</u>	<u>VBUS</u>	<u>Red</u>
<u>2</u>	<u>D-</u>	<u>White</u>
<u>3</u>	<u>D+</u>	<u>Green</u>
<u>4</u>	<u>ID</u>	<u>not connected</u>
<u>5</u>	<u>GND</u>	<u>Black</u>
<u>Shell</u>	<u>Shield</u>	<u>Drain Wire</u>

Figure 1.2 Mini-B USB connector pinout

1.3 Blue LED (blue or green) – during data stream transfer is indicating that AFEDRI SDR-USB-HS front-end IC is functioning properly, including all electronics, that is servicing data stream transfer path (CPU). If there is not problem during data stream transfer, so Blue LED has to be blinking (switching On and OFF) consequently, **during data transfer only**. If Blue LED is not blinking, i.e. LED is constantly lighting (On) or switched OFF during data reception, so there is problem in hardware functioning or in software. In the case of problem you need to “reset” AFEDRI SDR-USB-HS by USB cable disconnection.

1.4 Yellow LED (yellow) – is used for indication of proper finishing of Front-end IC initialization. The Yellow LED will be slow blinking If front-end was initialized successfully.

Attention!!! You should not start any software that is using AFEDRI SDR-USB-HS (Linrad, SDR-Radio, Winrad, HDSDR, WRPlus), till SDR's firmware will finish start-up initialization, so you need to wait till Yellow will begin to blink!!!

1.5 Red LED (red) – this LED is connected to +5V voltage, that coming from USB line. It is constantly lighting if 5VDC voltage is present.

2 Description of AFEDRI SDR-USB-HS in two alternative USB modes

AFEDRI SDR-USB-HS can be configured to work in two alternative USB modes:

USB Audio device emulation and **USB Mass Storage Device (MSD)**. User can configure SDR for desired mode using SDR_Network_Control_box utility (HDSDR/Winrad plug-in). Required controls are located on Command shell tab (see **Figure 2.1**). To configure AFEDRI SDR-USB-HS to desired mode, you need to do next:

- Start SDR_Control.exe utility
- Go to “Command shell” tab
- To use SDR in **USB Audio mode** – check “USB Audio” check box
- To use SDR in **USB Mass Storage device** mode - uncheck “USB Audio” check box
- Press “Save USB mode” button, to save desired mode

- Reboot SDR - press “Reset SDR” button located on “About” tab or disconnect and connect again USB cable from SDR.

The new USB mode is actual only after SDR reset!

Below you can find the short description of each mode:

2.1 USB Audio emulation mode

In this mode SDR is detected by PC as USB Audio device (Sound Card) and USB HID device

USB Audio interface is used for I/Q data transfer, USB HID for radio control. This mode is similar to USB mode of AFEDRI SDR-Net receivers with some limitations:

- On Windows OS – on some PCs the maximal sample rate can be 96kHz only! This depends on used motherboard and windows USB system drivers
- On Linux OS the maximal sample rate can be up to 981333 Hz (you can prefer to use the standard USB Audio values: 48kHz, 96kHz, 192kHz, 384kHz, 768kHz)

2.2 USB Mass Storage Device (MSD)

More universal and advanced mode than USB Audio.

In this mode SDR is detected by PC as USB Mass Storage Device (MSD) or other word USB Flash Removable Disk, operational system will detect and install all needed drivers automatically and will invite you to read the new removable disk storage (ignore it, but – remember the disk letter, let say “F:\” or “H:\” – on Windows or /media/removable – on Linux).

You must define this disk letter to SDR_Control (SDR_Network_Control_Box) using “MSD Path” File box located on “Command shell” tab. After you will choose the SDR latter it will be stored by SDR_Control in configuration file (sdr_config.ini).

Operation of AFEDRI SDR-USB-HS in MSD mode make it easier for SDR application writer - because all control and data stream operation are done using standard **unbuffered** File Input-output operations .

Check this check box to configure SDR for USB Audio mode
Uncheck this check box to configure SDR for MSD mode

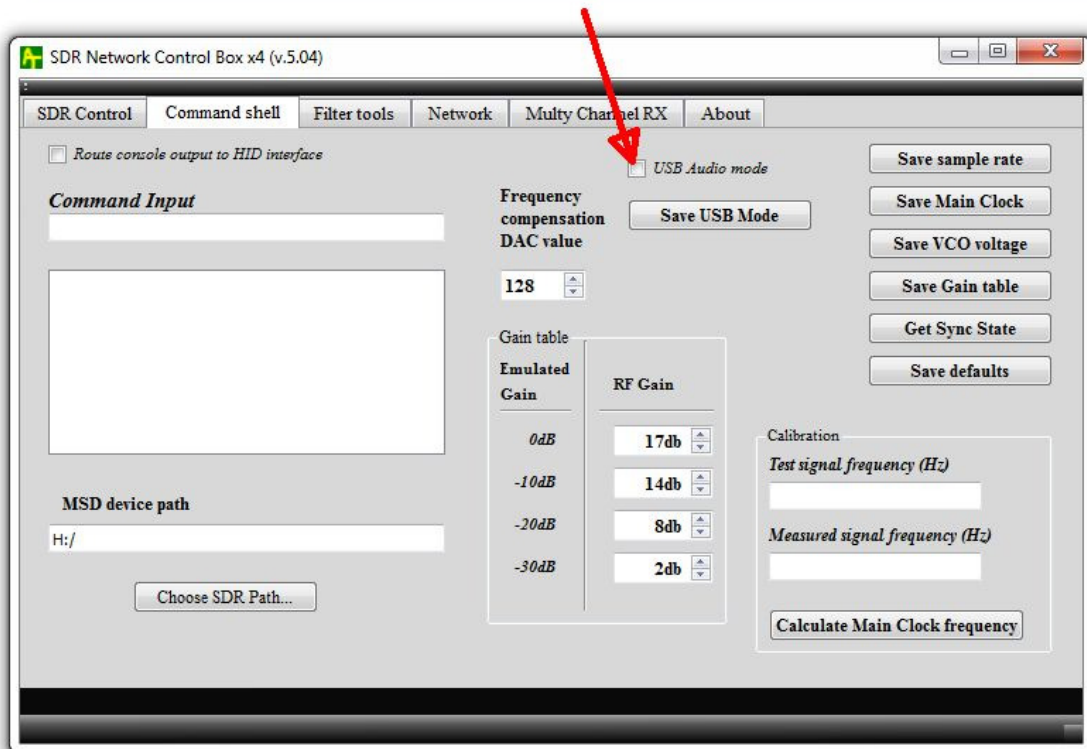


Figure 2.1 USB mode configuration for AFEDRI SDR-USB-HS.

3 AFEDRI SDR-USB-HS firmware upgrade

3.1 Firmware upgrade of AFEDRI SDR-USB-HS receiver can be done using USB connection. At first you should install the Flip 3.4.7 utility that contains all needed drivers and utilities required for firmware upgrade, it can be downloaded from Atmel web site using next link:

<http://www.atmel.com/tools/FLIP.aspx>

You need to do next sequence for AFEDRI SDR-USB-HS firmware upgrade:

- 3.1.1. Download [Flip 3.4.7 utility from Atmel site](#) and install it on your PC
- 3.1.2. Download latest firmware from [afedri-sdr.com](#) web site (for example the file afedri-sdr-usb-hs-fw_v2012.zip)
- 3.1.3. Save firmware archive in any folder on your hard Disk and extract files from this archive, you will see the next files that were extracted from archive (see **Figure 3.1**). Where for example you can see next files:
 - afedri_usb_ms.hex – it is firmware hex file
 - firmware_upgrade.bat – command shell batch file that will run upgrade process
 - start.bat - command shell batch file that will help you to cancel firmware upgrade if you decide do not make upgrade.

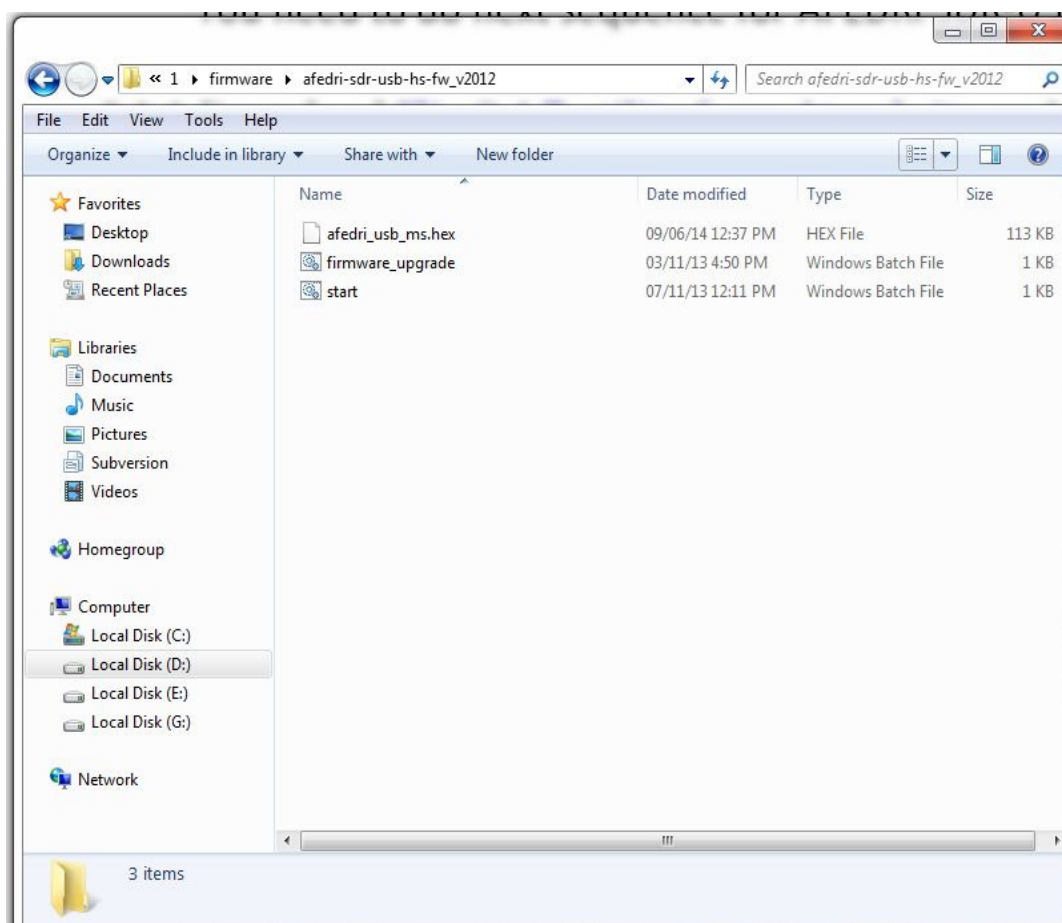


Figure 3.1 Firmware archive files

3.1.4. You need to switch AFEDRI SDR-USB-HS to firmware upgrade mode using command that sent from "SDR Network Control Box" application. User need to press the button "Firmware Upgrade", that is located on the "About" tab (see **Figure 3.1**). Alternatively you can boot SDR in Firmware upgrade mode using twizzers and shorting pins 5 and 3 of J7 connector and connecting USB cable to PC when this two pins are shortened (see Figure 3.1.1).

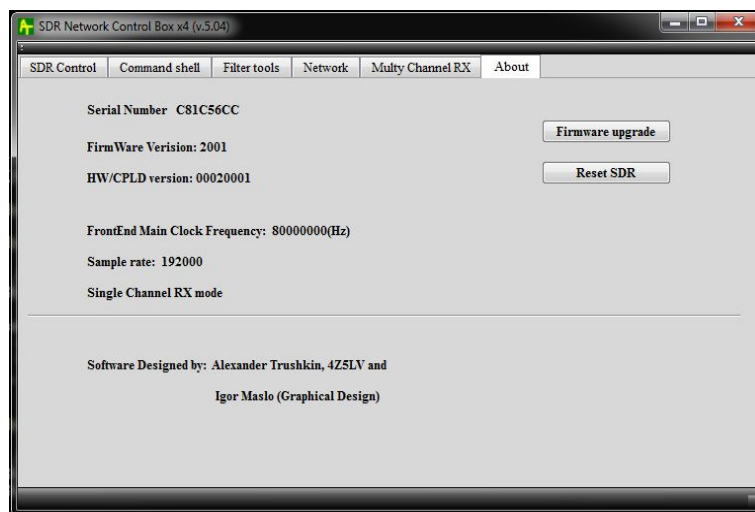


Figure 3.1 «About» tab, «Firmware Upgrade» button

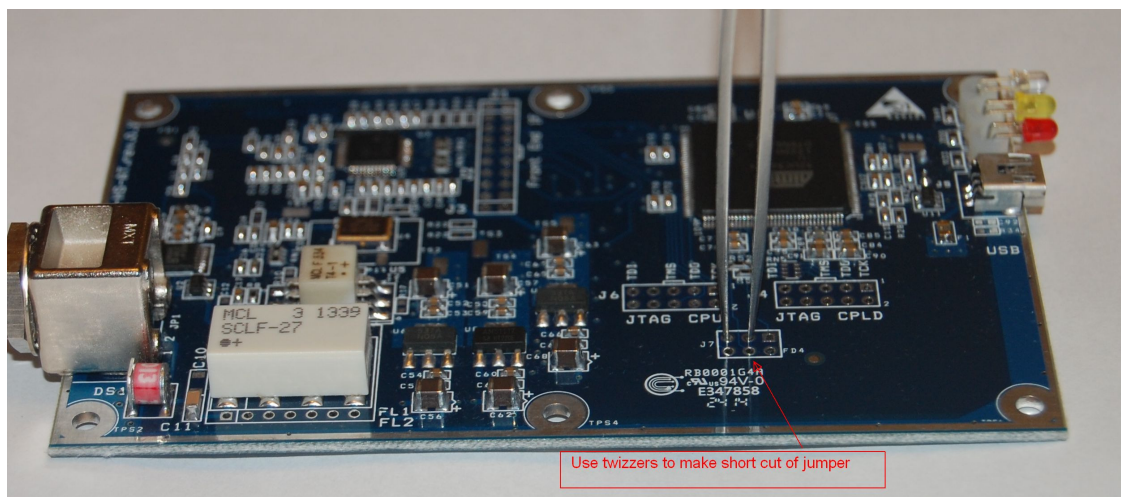


Figure 3.1.1 Jumper place (short cut by twizzers)

- 3.1.5. When you press “Firmware upgrade” button the SDR will reset and starting in the new firmware-upgrade (DFU) mode, please wait till Operational system will detect the new USB device and install required drivers (required for upgrade process)
- 3.1.6. When Drivers successfully installed – you should start DOS shell (Command shell) window (see **Figure 3.2**)

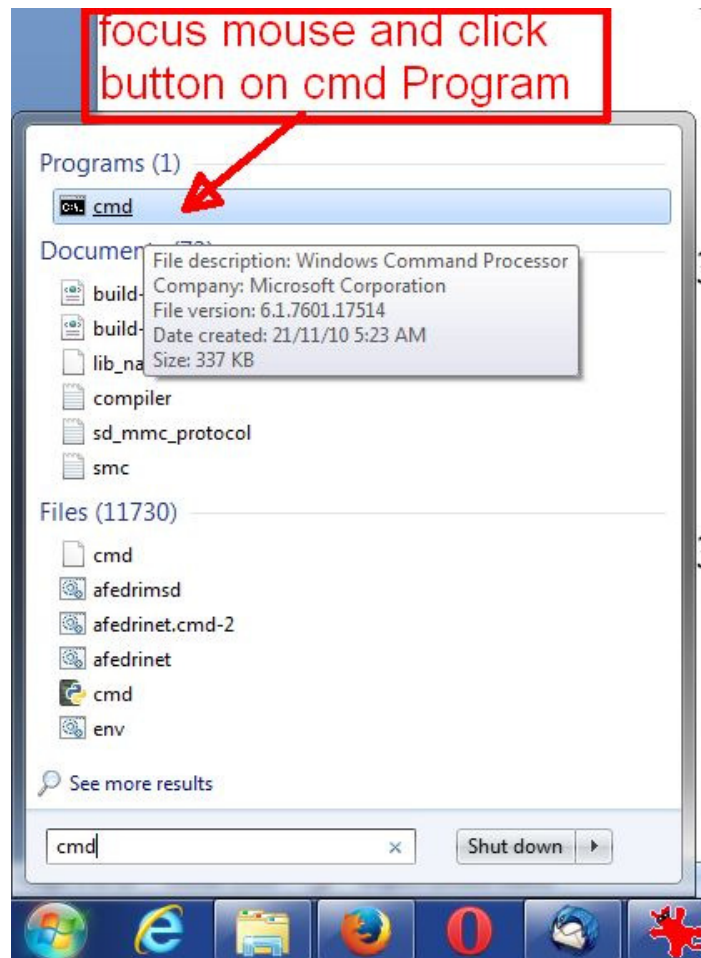
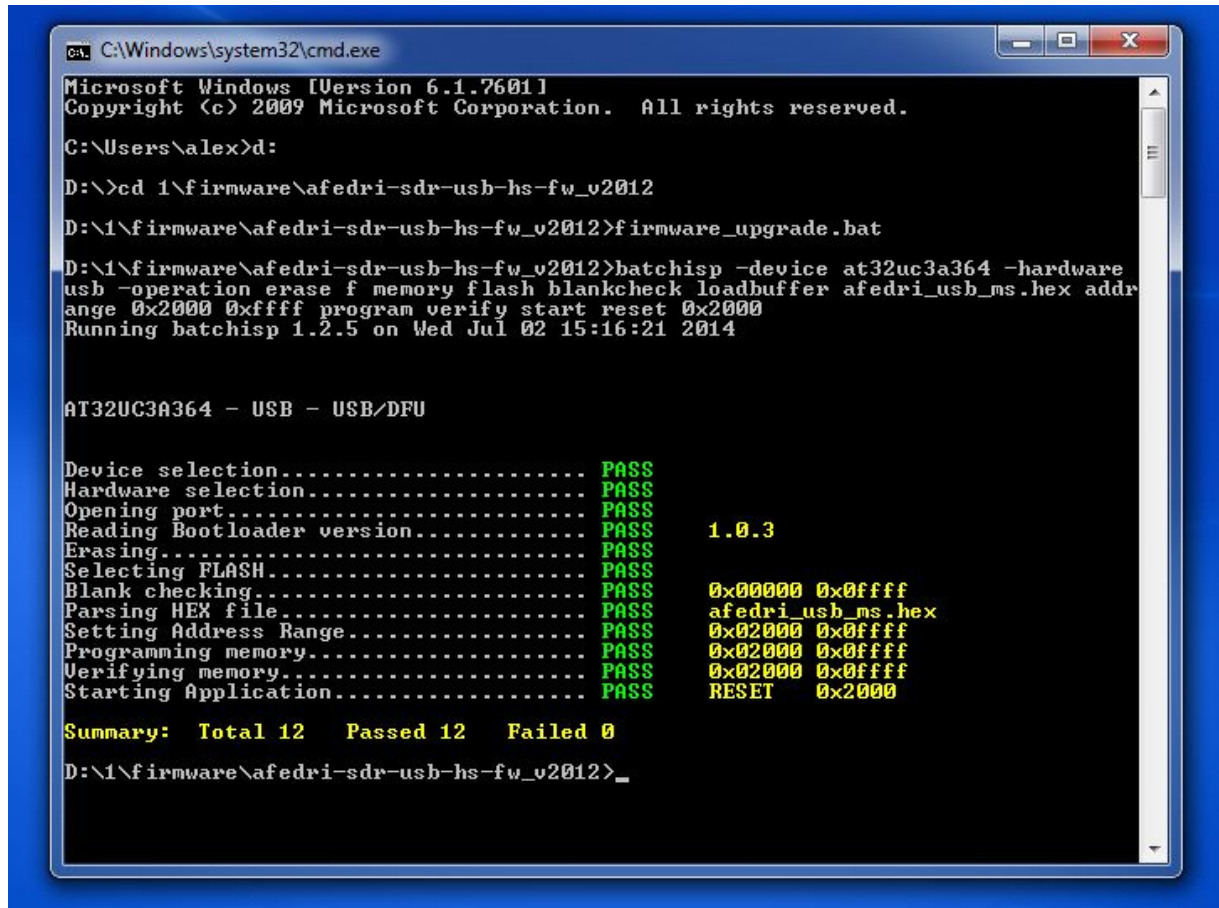


Figure 3.2 DOS (Command shell) strat.

- 3.1.7. Go to the folder where firmware archive files are located and run firmware_upgrade.bat command file. Wait till the process finish. (see **Figure 3.3**)



```
C:\Windows\system32\cmd.exe
Microsoft Windows [Version 6.1.7601]
Copyright (c) 2009 Microsoft Corporation. All rights reserved.

C:\Users\alex>d:
D:\>cd 1\firmware\afedri-sdr-usb-hs-fw_v2012
D:\1\firmware\afedri-sdr-usb-hs-fw_v2012>firmware_upgrade.bat
D:\1\firmware\afedri-sdr-usb-hs-fw_v2012>batchisp -device at32uc3a364 -hardware
usb -operation erase f memory flash blankcheck loadbuffer afedri_usb_ms.hex addr
ange 0x20000 0xffff program verify start reset 0x20000
Running batchisp 1.2.5 on Wed Jul 02 15:16:21 2014

AT32UC3A364 - USB - USB/DFU

Device selection..... PASS
Hardware selection..... PASS
Opening port..... PASS
Reading Bootloader version..... PASS      1.0.3
Erasing..... PASS
Selecting FLASH..... PASS
Blank checking..... PASS      0x00000 0xffff
Parsing HEX file..... PASS      afedri_usb_ms.hex
Setting Address Range..... PASS      0x02000 0xffff
Programming memory..... PASS      0x02000 0xffff
Verifying memory..... PASS      0x02000 0xffff
Starting Application..... PASS      RESET  0x2000

Summary: Total 12 Passed 12 Failed 0
D:\1\firmware\afedri-sdr-usb-hs-fw_v2012>
```

Figure 3.3 Firmware upgrade shell window.

4 Recommendations for AFEDRI SDR-Net used with USB connection and Windows 7

If you has changed sample rate of AFEDRI SDR-USB-HS, when it connected by USB line to PC with Windows 7 installed, you can see error message, that shown on **Figure 4.1**. This message can appears when user is pressing “Start” button of Winrad (HSDR, WRPlus etc.).

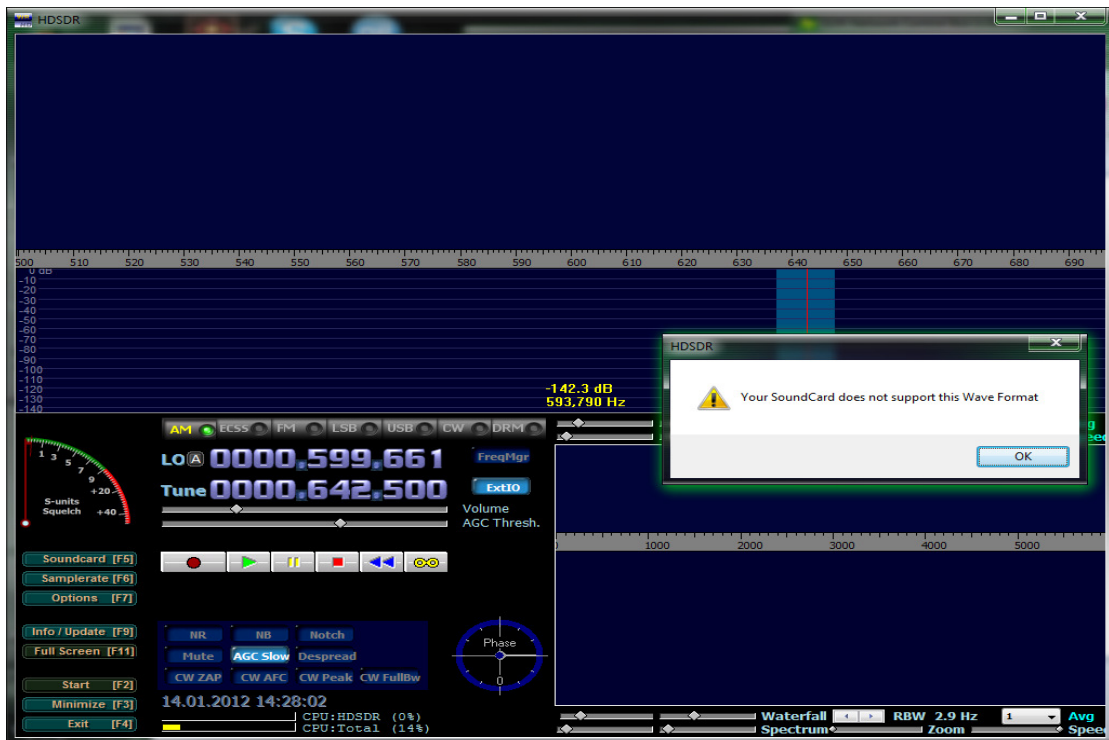


Figure 4.1 USB Audio Device Wave Format error message on Windows 7.

With latest AFEDRI SDR-USB-HS firmware versions this message shows that HDSDR was configured to use “AFEDRI SDR-Net audio Line input” as input Sound card or/and you did not install the SDR_Control box dll as plugin for HDSDR!!! To install SDR_Control box as HDSDR plug-in you should:

- Exit HDSDR
- copy all files from SDR_Network_Control_Box directory to folder where HDSDR installed (for example to C:\Program Files\HDSDR).
- Restart HDSDR application.

When SDR_Control is installed as plug-in it should be started automatically when users starts HDSDR application, you should not start is manually!

If you see System error message “Unspecified Sound error code 1”, when pressing “Start” button, this error appearing when USB port where you connect the SDR is not able provide the sample rate that SDR configured (192kHz by default). (See. **Figure 4.2.**)

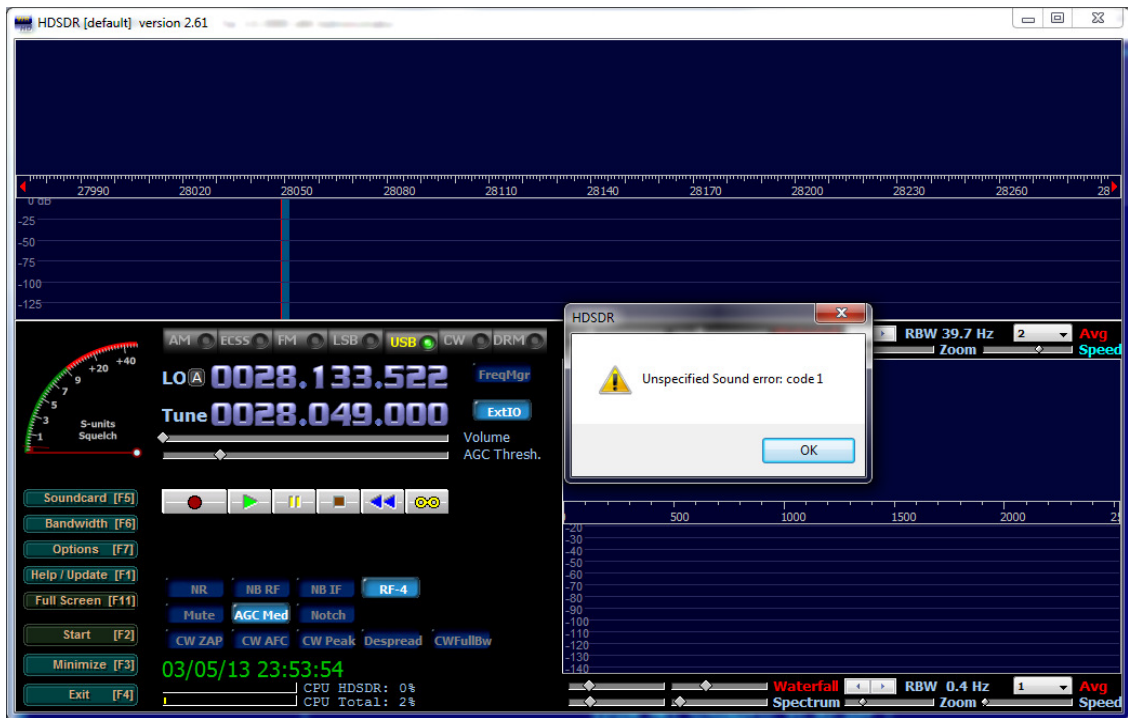


Figure 4.2 “Control Panel” -> “Hardware and Sound” window

This problem can be solved using one of two ways:

- Try to connect SDR to alternative USB port
- Try to decrease AFEDRI SDR-net USB sample rate to lower value (you can try 96000 Hz or 48000 Hz).

The USB sample rate value can be changed using next sequence (See. **Figure 4.2**):

- Run SDR_Control utility
- Switch to “Command shell” tab
- Input the new sample rate value in “Command Input” edit box.
- Press “Save sample rate” button
- To make the new value actual for OS, restart SDR, pressing “Reset SDR” button that located on “About” tab or disconnect USB cable from PC and connect it again.

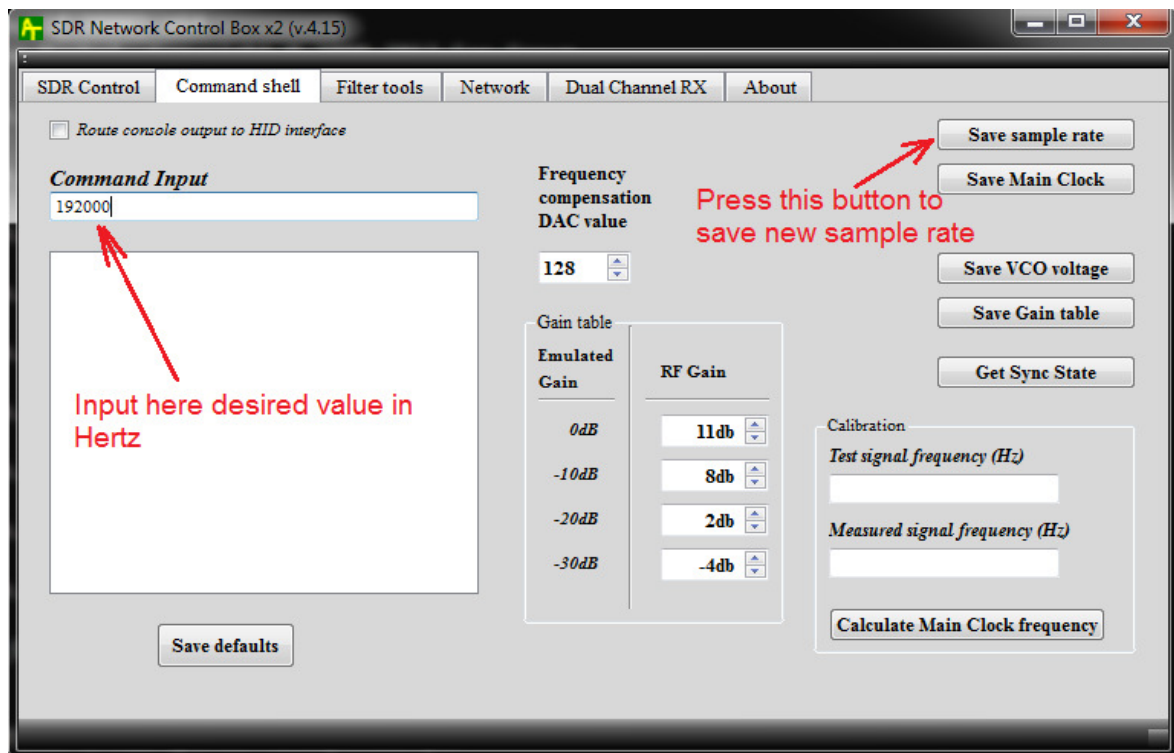


Figure 4.3 USB audio sample rate configuration

4.1.1 Sample rate configuration in USB Mass Storage device (MSD) mode

In USB Mass Storage Device (MSD) mode the sample rate of receiver can be changed on "Network" tab, You need to insert desired value in Hertz units and press "Enter" key to change it.

In MSD mode you can change the sample rate value non-stopping reception process (in real time). See **Figure 4.4**

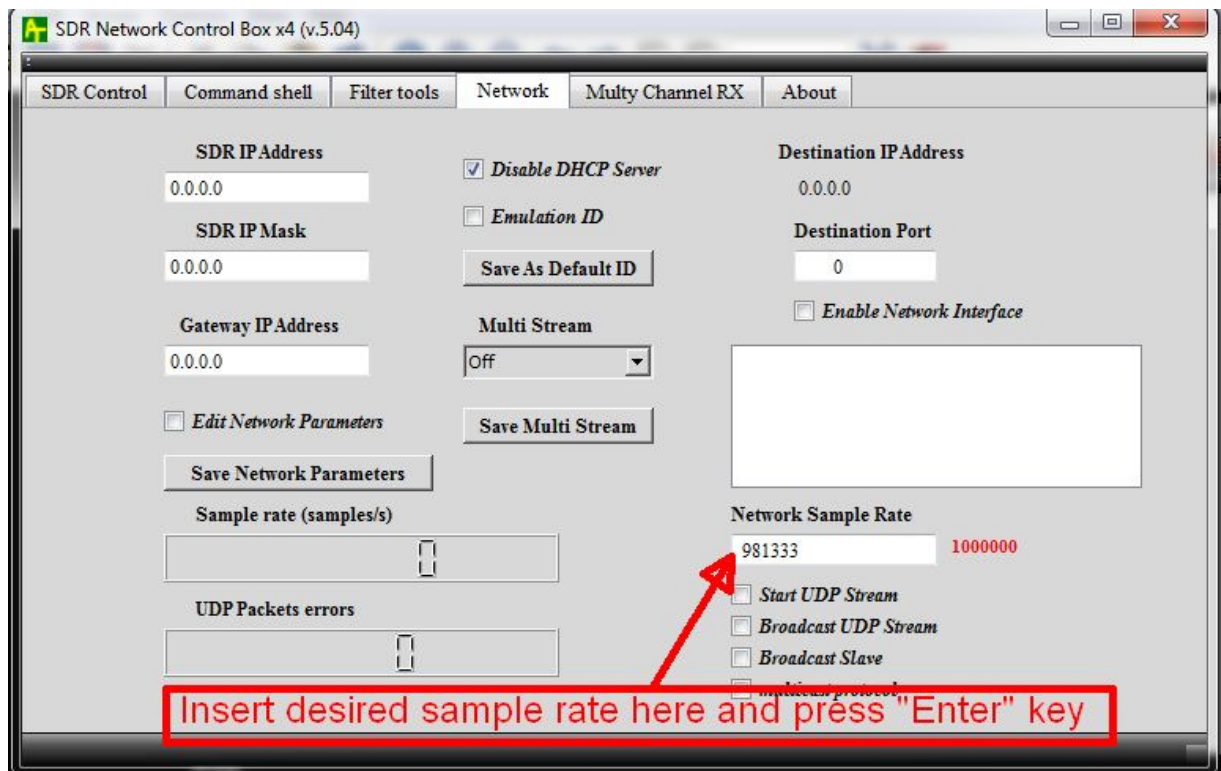


Figure 4.4 Where to change the MSD sample rate.

Enjoy! 73!