

ELAD FDM-S2



USER MANUAL

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2 FDM-S2 Overview

2.1 Sampler Exploit

FDM-S2 is the second born device in our ELAD SDR SAMPLER line. This product line is developed to give the user the possibility to exploit and study the capability of Sampling technique.

With 122.88MHz sampling frequency FDM-S2 can offer the possibility to be a good HF and 6m receiver, but also allow to receive FM Band and part of VHF Band simply adding appropriate pre-selection filters in the front-end of ADC.

Some users of FDM-S2 already exploit the under-sampling technique to use it as pan adapter tuning it at IF frequencies of 68-70 MHz of their transceivers, while others use it to monitor the spectrum of a particular known frequency.

2.2 Front Panel Description



Power Led

Turns on when the receiver is connected to a USB port of the PC and it is switched on

Communication Led

Shows the communication between the receiver and the PC

2.3 Rear Panel Description



USB 2.0 Connector

Connection with the PC. Please use the supplied cable.

On/Off Switch

Turn On/Off the FDM-S2

HF Antenna Input

SMA 50 Ω input connector for HF band +20dBm max

VHF Antenna Input

SMA 50 Ω input connector for VHF band +20dBm max

External Hardware Connector

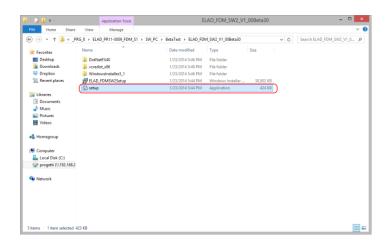
DB9 connector for external hardware (eg pre-selector filters board). This is NOT a serial port.

3 Software & Driver Installation

3.1 Software installation in Windows 8 Windows 7 and Windows XP

3.1.1 First-time install in Windows 8 and Windows 7

Double-click the file "setup.exe" in the CD .



The windows installer first installs the prerequisites:

- Microsoft VC++ 2010 Runtime libraries
- Microsoft .NET Framework 4.0 (Only for Windows 7)

and then the FDM-SW2 software.

• Click on "Accept" (Only for Windows 7)

ELAD FDM-SW1 Setup	X
For the following components:	
Microsoft .NET Framework 4 (x86 and x64)	
Please read the following license agreement. Press the page down key to see the of the agreement.	rest
MICROSOFT SOFTWARE SUPPLEMENTAL LICENSE TERMS	
SUPPLEMENTAL LICENSE TERMS	
SUPPLEMENTAL LICENSE TERMS MICROSOFT .NET FRAMEWORK 4 FOR MICROSOFT	
SUPPLEMENTAL LICENSE TERMS MICROSOFT .NET FRAMEWORK 4 FOR MICROSOFT WINDOWS OPERATING SYSTEM	
SUPPLEMENTAL LICENSE TERMS MICROSOFT .NET FRAMEWORK 4 FOR MICROSOFT WINDOWS OPERATING SYSTEM	

Click on "Install"

5	ELAD FDM-SW2 Setup	×
The following o	components will be installed on your machine:	
Visual C++	2010 Runtime Libraries (x86)	
Do you wish	to install these components?	
If you choose	Cancel, setup will exit.	
	Install	

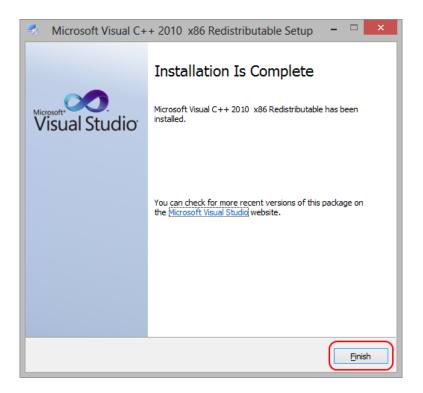
Click on "Yes"



Click on Install

MICRO	SOFT SOFTWARE	LICENSE TERMS		^
	SOFT VISUAL C+ CE PACK 1	+ 2010 RUNTIME	LIBRARIES W	пн
Corpora	ation (or based on	an agreement betv where you live, or hey apply to the so	ne of its affiliates	
I have	read and accept the	license terms.		4
	and information along	it my setup experience	a ta Microsoft Corp	aration.
Voc. o				

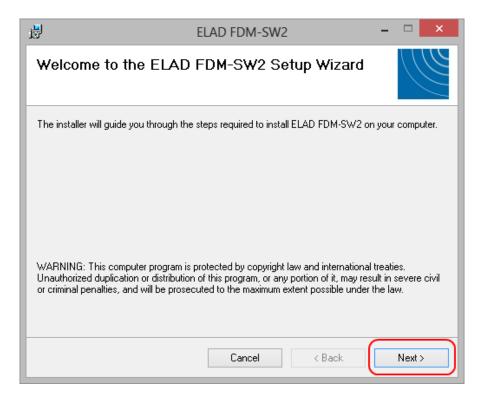
Microsoft Visual C++ 2010 x86 Redistributable installation is complete, click on "Finish"



Click on "Yes" to start the installation of the .Net Framework 4.0 (Only for Windows 7)

😵 User Account Control 🛛 💌
Do you want to allow the following program to make changes to this computer?
Program name: dotNetFx40_Full_x86_x64.exe Verified publisher: Microsoft Corporation File origin: Hard drive on this computer
Show details
Change when these notifications appear

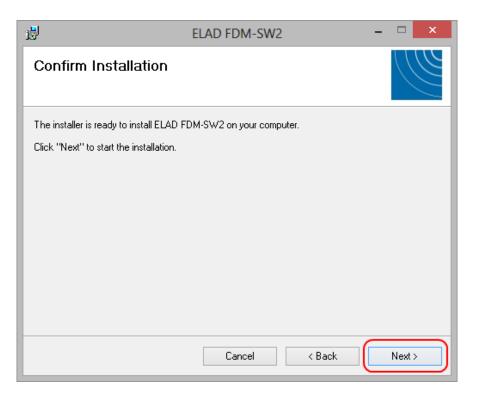
Click to "Next" to start the FDM-SW2 software installation



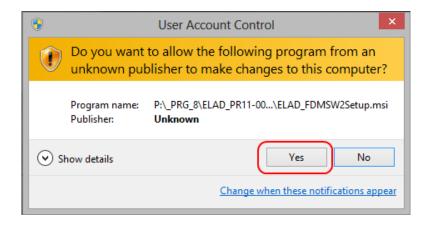
Chose the installation folder, then click on "Next"

த் EL	AD FDM-SW2	- 🗆 🗙
Select Installation Folder		
The installer will install ELAD FDM-SW2 to	the following folder.	
To install in this folder, click "Next". To ins	tall to a different folder, ent	er it below or click "Browse".
Eolder: C:\Program Files\ELAD\ELAD FDM-S\	w2\	Browse
		Disk Cost
Install ELAD FDM-SW2 for yourself, or fo	or anyone who uses this co	omputer:
	Cancel <	Back Next >

Click on "Next"



Click on "Yes"

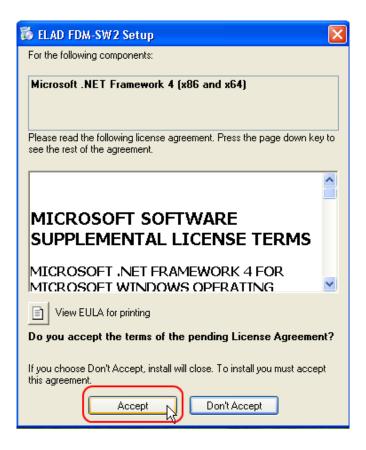


3.1.2 First-time install in Windows XP

Double-click the file "setup.exe" in the installation folder.

ELAD_FDM_SW2_V1_00Beta3			
File Edic View Payorites Tools	nap		M
🌀 Back 🔹 🕥 🕤 🏂 🔎 S	earch 💫 Folders 🔢 🛛		
Address 🛅 P:\ PRG 8\ELAD PR11-000	9_FDM_S1\SW_PC\BetaTest\ELAD_FI	DM 5W2 V1 00Beta30	✓ → 60
	Name 🔺	Size Type	Date Modified
File and Folder Tasks 🛛 🖄	DotNetFX40	File Folder	1/23/2014 5:46 PM
	vcredist x86	File Folder	1/23/2014 5:46 PM
Rename this file	WindowsInstaller3_1	File Folder	1/23/2014 5:46 PM
😥 Move this file	BELAD FDMSW2Setup.msi	30.902 KB Windows Installer P	1/23/2014 5:44 PM
Copy this file	🔂 setup.exe	424 KB Application	1/23/2014 5:44 PM
🚳 Publish this file to the Web			
🔗 E-mail this file			
X Delete this file			
· ·			
Other Places 🙁			
🕞 BetaTest			
A My Documents			
Shared Documents			
😼 My Computer			
Second Se			
Details			
Decails			

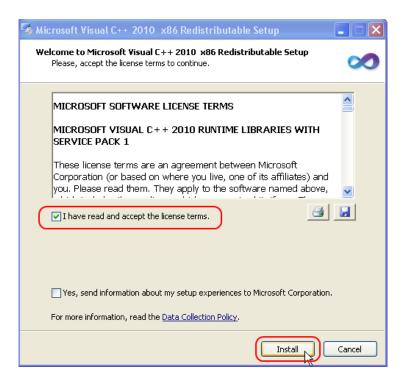
Click on "Accept"



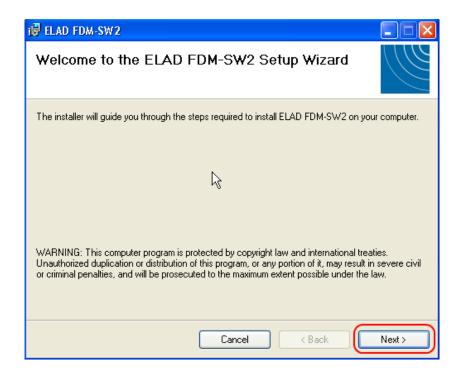
Click on "Install"

🐞 ELAD FDM-SW2 Setup	×
The following components will be installed on your machine:	
Visual C++ 2010 Runtime Libraries (x86)	
Do you wish to install these components?	
If you choose Cancel, setup will exit.	
Install Cancel	

Click on "Install"



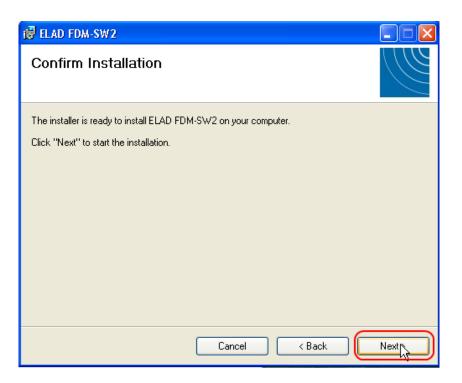
Click on Next to install the FDM-SW2 software



Select the installation folder, then click on "Next"

🗟 ELAD FDM-SW2
Select Installation Folder
The installer will install ELAD FDM-SW2 to the following folder.
To install in this folder, click "Next". To install to a different folder, enter it below or click "Browse".
Eolder: C:\Program Files\ELAD\ELAD FDM-SW2\ Disk Cost
Install ELAD FDM-SW2 for yourself, or for anyone who uses this computer:
• Everyone
O Just me
Cancel < Back N

Click on "Next"



The FDM-SW2 Software installation is completed

🛃 ELAD FDM-SW2	
Installation Complete	lla
ELAD FDM-SW2 has been successfully installed.	
Click "Close" to exit.	
Please use Windows Update to check for any critical updates to the .NET Framework.	
	Chur
Cancel < Back	Close

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3.1.3 Update an existing software version

Double click on file ELAD_FDM_SW2_V_x.xx.msi included in the update and follow the instructions.

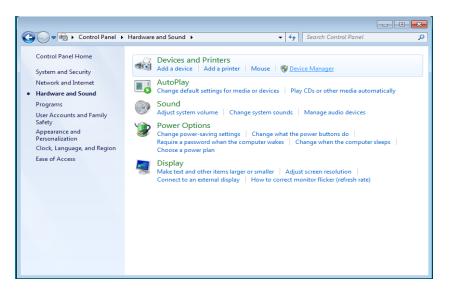
3.2 FDM-S2 USB driver

3.2.1 FDM-S2 USB driver installation in Windows 8 and Windows 7

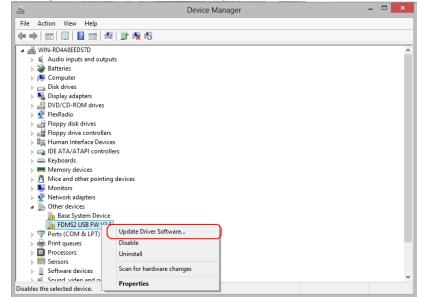
3.2.1.1 First driver installation

To install ELAD FDM-S2 driver, connect FDM-S2 sampler to a USB 2.0 socket on PC to power on the device. When Windows detects the new hardware, follow the steps listed below to install driver correctly:

Open **Control Panel** from **Start** menu, select "System" and "Device Manager". Expand "Other Devices" node: the system reads FDM-S2 firmware version named as FDMS2 USB FW 2.X.



Select FDMS2 USB FW 2.5, right click on it and execute "Update driver software".



When Windows starts the installation procedure, select the option "Browse my computer for driver software" (the second option).

	×
How do you want to search for driver software?	
Search automatically for updated driver software Windows will search your computer and the Internet for the latest driver software for your device, unless you've disabled this feature in your device installation settings.	
Browse my computer for driver software Locate and install driver software manually.	
[Cancel

In the next dialog-box, insert the driver folder location using "Browse" button and check the option "Include subfolders". In this way manual driver search is enabled.

Update Driver Software - FDMS2 USB FW V2.5	
Browse for driver software on your computer	
Search for driver software in this location:	
C:\Program Files\ELAD\ELAD FDM-SW2\ELAD_FDM_Driver V Browse	
✓ Include subfolders	
Let me pick from a list of device drivers on my computer This list will show installed driver software compatible with the device, and all driv software in the same category as the device.	ver
Ne	xt Cancel

For 32 bit system select the folder: C:\Program Files\ELAD\ELAD FDM-SW2\ELAD_FDM_Driver For 64 bit system select the folder: C:\Program Files (x86)\ ELAD\ELAD FDM-SW2\ELAD_FDM_Driver Then click "Next".

Click Install.



Let the hardware installation automatically completes and, at the procedure ending, click on "Close"; then disconnect and connect FDM-S2 device on the same USB socket.

	×
Windows has successfully updated your driver software	
Windows has finished installing the driver software for this device:	
ELAD FDM-S2-25	
~	
	\square
	Close

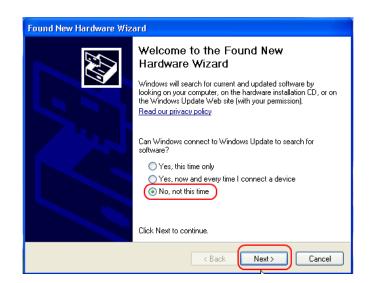
Now ELAD FDM-S2 driver is installed on your PC.

3.2.2 FDM-S2 USB driver installation in Windows XP

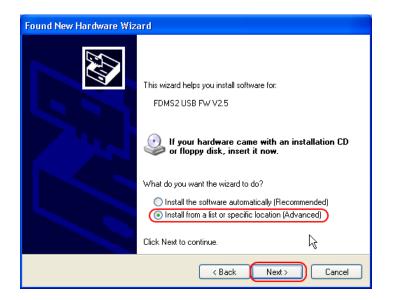
3.2.2.1 First driver installation

To install ELAD FDM-S2 driver, connect FDM-S2 sampler to a USB 2.0 socket on PC to power on the device. Windows XP detects the new hardware and starts the hardware installation wizard. Then, next steps to install FDM-S2 driver are listed below:

At the first dialog box, select the last option "No, not this time" and "Next".



Select "Install from a list or specific location (Advanced)" and "Next".



In the next dialog-box, check the options "Search for the best driver in these location" and "Include this location in the search" to enable manual driver search. Clicking on "Browse", select the path where the driver folder is located: Local Drive (C:) \Programs\ELAD\ELAD FDM-SW2\ELAD_FDM_Driver. Then click "Next".

Found New Hardware Wizard
Please choose your search and installation options.
Search for the best driver in these locations.
Use the check boxes below to limit or expand the default search, which includes local paths and removable media. The best driver found will be installed.
□ Search removable media (floppy, CD-ROM) ✓ Include this location in the search:
m FilesXELADXELAD FDM-SW2XELAD_FDM_Driver
O Don't search. I will choose the driver to install.
Choose this option to select the device driver from a list. Windows does not guarantee that the driver you choose will be the best match for your hardware.
< Back Next > Cancel

Let the hardware installation automatically completes and click on "Finish"; then disconnect and connect FDM-S2 device on the same USB socket.



Now ELAD FDM-S2 driver is installed on your PC.

3.2.2.1 Driver installation verify in Windows 8 and Windows 7

To verify FDM-S2 driver current version, connect the device to USB socket (where the device driver is already installed) and open **Control Panel** from **Start** menu. Click on "System" and select "Device Manager".

Expanding "ELAD Samplers" node, FDM-S2 device driver is installed as "ELAD FDM-S2-25": right click on "ELAD FDM-S2-25" and select "Properties".

-	Device Manager – 🗖	×
File Action View Help		
	🖹 🙀 🕫	
Imaging devices I		~
 Sensors Software devices 		- 5
Software devices Sound, video and game of	optrollers	
Storage controllers	ondoners	
Sustem devices		~

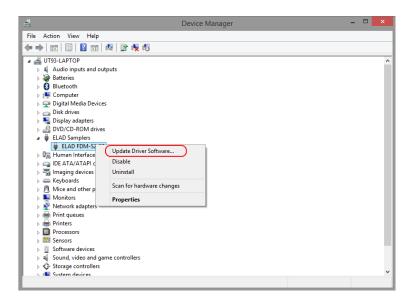
When dialog box opens, select "Driver" label: you must read provider name, current driver release date and current driver version. The figure shows an old FDM-S2 driver version.

EL/	AD FDM-S2-25 Properties
General Driver Deta	ails Events
ELAD FDM-	S2-25
Driver Provid	ler: ELAD srl Italy
Driver Date:	1/22/2014
Driver Versio	n: 3.0.0.0
Digital Signe	r: ELAD Srl
Driver Details	To view details about the driver files.
Update Driver	To update the driver software for this device.
Roll Back Driver	If the device fails after updating the driver, roll back to the previously installed driver.
Disable	Disables the selected device.
Uninstall	To uninstall the driver (Advanced).
	OK Cancel

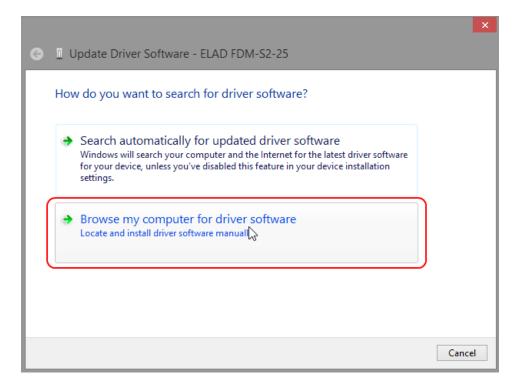
3.2.2.2 Manual driver update

To update FDM-S2 driver, connect the device to USB socket (where the device driver is already installed) and open **Control Panel** from **Start** menu. Click on "System" and select "Device Manager".

Under "ELAD samplers" list, the driver for FDM-S2 is installed as "ELAD FDM-S2-25". Select "ELAD FDM-S2-25", right click on it and execute "Update driver".



When Windows starts the installation procedure, select the last option "Browse my computer for driver software".



In the next dialog-box, disable the option "Include subfolders" and choose "Let me pick from a list of device drivers on my computer". Don't click "Next".

		×
e	Update Driver Software - ELAD FDM-S2-25	
	Browse for driver software on your computer	
	Search for driver software in this location:	
	C:\Users\ELAD\Desktop\DRIVER_WINUSB_FDM_v3000_TestSign V Browse	- 1
	✓ Include subfolders	- 1
		- 1
		- 1
	Let me pick from a list of device drivers on my computer This list will show installed driver software compatible with the device, and all driver	
	software in the same category as the device.	
	Next Cance	
	Next Cance	

Verify that "Show compatible hardware" option is checked and ELAD FDM-S2 is selected: then click on "Have a Disk". In this way the manual driver update is enabled. Don't click "Next".

	×
🔄 🧕 Update Di	river Software - ELAD FDM-S2-25
Select the de	evice driver you want to install for this hardware.
1	Install From Disk you have a
Show Model	Insert the manufacturer's installation disk, and then make sure that the correct drive is selected below.
ELAC	Copy manufacturer's files from:
	nas an Authenticode(tm) signature.
<u>Tell me wh</u>	y driver signing is important
	Next Cancel

Click on "Browse" and search for FDM-S2 driver update folder location; then open winusb fdmsampler.inf file. Click "OK" and then "Next".

Let the hardware installation automatically completes and, at the procedure ending, click on "Close"; then disconnect and connect FDM-S2 device on the same USB socket.

		×
G	Update Driver Software - ELAD FDM-S2-25	
	Windows has successfully updated your driver software	
	Windows has finished installing the driver software for this device:	
	ELAD FDM-S2-25	
	·	

To verify that a correct update is done, enter "Device Manager" in Control Panel; under "ELAD samplers" label select ELAD FDM-S2 driver (see sub-chapter "2.2.1.2 Driver installation verify"): right click on it and choose "Properties": select "Driver" label to visualize the last driver version (an example is depicted in figure below).

ELAD FDI	Л-S2-25 Properties	k
General Driver Details Even	nts	
ELAD FDM-S2-25		
Driver Provider: El	AD srl Italy	
Driver Date: 1/	22/2014	
Driver Version: 3.	0.0.0	
Digital Signer: El	.AD Srl	
Driver Details To v	ew details about the driver files.	
Update Driver To u	pdate the driver software for this device.	
	device fails after updating the driver, roll to the previously installed driver.	
Disable Disa	bles the selected device.	
Uninstall To u	ninstall the driver (Advanced).	
	OK Cancel	

3.2.2.3 Driver installation verify in Windows Xp

To verify FDM-S2 driver current version, connect the device to USB socket (where the device driver is already installed) and open **Control Panel** from **Start** menu. Click on "System" and select "Device Manager" under "Hardware" label.

Expanding "ELAD Samplers" node, FDM-S2 device driver is installed as "ELAD FDM-S2-25": right click on "ELAD FDM-S2-25" and select "Properties".

🚇 Device Manager	
File Action View Help	
UT96-0FA846E120 Batteries Disk drives Disk drives DVD/CD-ROM drives LLAD FDM-S2-22 DVD/CD-ROM drives LLAD FDM-S2-22 Forest Convolue Uninstall DE ATA/ATAP1 con Scan for hardware changes Properties Network adapters Properties Properties Processors Scal of AID controllers Support (COM & LPT) Support (COM &	
Opens property sheet for the current selection.	

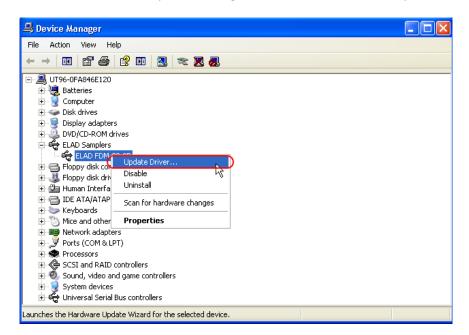
When dialog box opens, select "Driver" label: you must read provider name, current driver release date and current driver version. The old ELAD FDM-S2 driver version is shown in figure below as example.

ELAD FDM-S2-25 Properties
General Driver Details
ELAD FDM-S2-25
Driver Provider: ELAD srl Italy
Driver Date: 1/22/2014
Driver Version: 3.0.0.0
Digital Signer: Not digitally signed
Driver Details To view details about the driver files.
Update Driver To update the driver for this device.
Roll Back Driver If the device fails after updating the driver, roll back to the previously installed driver.
Uninstall To uninstall the driver (Advanced).
OK Cancel

3.2.2.4 Manual driver update in Windows Xp

To update FDM-S2 driver, connect the device to USB socket (where the device driver is already installed) and open **Control Panel** from **Start** menu. Click on "System" and select "Device Manager" under "Hardware" label.

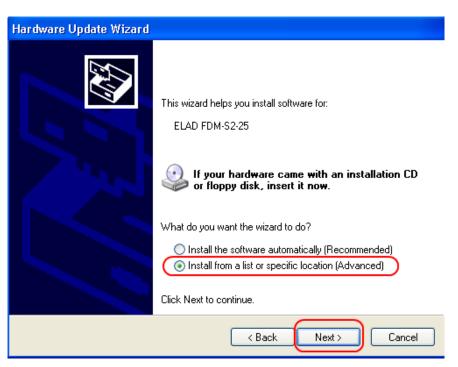
Select "ELAD FDM-S2" from "ELAD Samplers" list, right click on it and execute "Update driver"



Now Windows XP launches the hardware update wizard: select the last option "No, not this time" and "Next".

Hardware Update Wizard	
	Welcome to the Havdware Update Wizard
	Windows will search for current and updated software by looking on your computer, on the hardware installation CD, or on the Windows Update Web site (with your permission). <u>Read our privacy policy</u>
	Can Windows connect to Windows Update to search for software?
	Yes, this time only
	Yes, now and every time I connect a device
	O No, not this time
	Click Next to continue.
	< Back Next > Cancel

At next step select "Install from a list or specific location (Advanced)" and "Next".



Then, disable all check-boxes that the system automatically sets and choose the last option for manual driver update, as depicted in figure. Select "Next".

Hardware Update Wizard
Please choose your search and installation options.
Search for the best driver in these locations.
Use the check boxes below to limit or expand the default search, which includes local paths and removable media. The best driver found will be installed.
Search removable media (floppy, CD-ROM)
Include this location in the search:
C:\Program Files\ELAD\ELAD FDM-SW2\ELAD_FD 👽 Browse
Oon't search. I will choose the driver to install.
Choose this option to select the device driver from a list. Windows does not guarantee that the driver you choose will be the best match for your hardware.
< Back Next > Cancel

Verify that "Show compatible hardware" option is checked and ELAD FDM-S2 is selected: then click on "Have a Disk". Don't click "Next".

Hardware Update Wizard					
Select the device driver you want to in	istall for this hardware.				
Select the manufacturer and model of your hardware device and then click Next. If you have a disk that contains the driver you want to install, click Have Disk.					
Model					
ELAD FDM-S2-25					
This driver is not digitally signed! <u>Tell me why driver signing is important</u>	Have Disk				
	< Back Next > Cancel				

Click on "Browse" and search for the FDM-S2 driver update folder location; then open winusb fdmsampler.inf file, as depicted in figure. Click "OK" and then "Next".

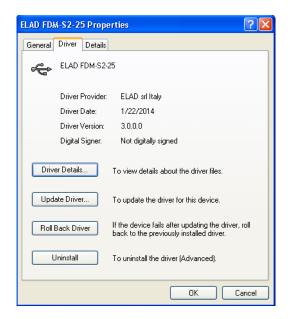
Hardware Update Wizard					
Se	Select the device driver you want to install for this hardware.				
æ	Install F	rom Disk 🛛 🔀 '			
S Mo		Insert the manufacturer's installation disk, and then make sure that the correct drive is selected below. Cancel			
		Copy manufacturer's files from: Files\ELAD\ELAD FDM-SW2\ELAD_FDM_Driver V Browse			
		< Back Next > Cancel			

Now driver update starts: at next dialog box select "Continue Anyway" and ignore the warning.

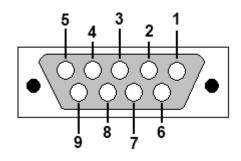
Let the hardware update automatically completes and, at the procedure ending, click on "Finish"; then disconnect e connect FDM-S2 device on the same USB socket.

🛃 ELAD FDM-SW2	
Installation Complete	
ELAD FDM-SW2 has been successfully installed.	
Click "Close" to exit.	
Please use Windows Update to check for any critical updates to the .NET Framework.	
Cancel < Back	Close

To verify that a correct update is done, enter "Device Manager" from **Control Panel**; under "Universal Serial Bus controllers" list, select ELAD FDM-S2 driver (see chapter "2.2.2.2 Driver installation verify") right click on it and choose "Properties". Select "Driver" label to visualize the last driver version (an example is depicted in figure below).



Annex A FDM-S2 External Hardware Connector



- Pin 1: SFE Latch 595
- Pin 2: I2C SCL
- Pin 3: SFE CLOCK 595
- Pin 4: I2C SDA
- Pin 5: Ground
- Pin 6: Mute
- Pin 7: Reserved
- Pin 8: SFE Data 595
- Pin 9: Vcc (4.5V)

To mute the FDM-S2, connect the Pin 6 to ground.

Note: the maximum cable length should not exceed 100 mm.

FDM-S2 Technical Specifications

		ELAD FDM-S2				
		TECHNICAL SPECIFICA	TIONS	Rev. 2 02/2014		
GENERAL	Frequency Coverage	HF+50MHz Band (10 kHz ÷ 54 MHz): Direct Sampling Mode VHF1 Band (74-108MHz): Undersampling Mode VHF2 Band (135-148MHz): Undersampling Mode Bypass for experimenting use				
	Antenna Connectors	+F+50MHz Band input: SMA (50 Ω) SMA/BNC adapter included /HF1 & VHF1 Bands input: SMA (50 Ω) SMA/BNC adapter included				
	Temperature Range	0 ÷ 40 °C				
	PC Interface	High-Speed USB 2.0 (480 Mbit/s)				
		USB powered with double USB cable (included)				
	Power Consumption	ess than 4 W (5 V-750 mA) from USB (double USB cable required) With slow Sample Rate DIls (for example 192kSamp/sec) typical 2.6 W				
	External I/O Connector	emale DB9 (mute control, I ² C and SPI interface)				
	Absolute Maximum RF Input Level	+20 dBm				
		110 (W) x 40 (H) x 90 (D) mm				
	Weight	360 g	60 g			
	Configuration	Direct sampling – ADC DDC with FPGA Xilinx Spar	Direct sampling – ADC DDC with FPGA Xilinx Spartan6 XC6LXC25			
	A/D Conversion	122.88 MSPS @ 16 bit/sample				
	Sensitivity	HS ⁽¹⁾ Typical: -122 dBm (CW, BW 500 Hz, 10 dB (S+N)/N)	LS ⁽²⁾ Typical: -110 dBm (CW, BW 500 Hz, 10 dB (S+N)/N)			
	3 rd Oder Intercept Point	HS ⁽¹⁾ Typical: +23 dBm @ 14 MHz, Spacing 2 kHz +16 dBm @ 50 MHz, Spacing 2 kHz	LS ⁽²⁾ Typical: +31 dBm @ 14 MHz, Spacing 2 kHz +25 dBm @ 50 MHz, Spacing 2 kHz			
HF+50MHz Band RECEIVER	Blocking Gain Compression	Typical: > 115 dB @ 10 MHz, Spacing 2 kHz, CW, BW 500 Hz				
RECEIVER	Noise Floor (MDS)	HS ⁽¹⁾ Typical: -132 dBm @ 14 MHz, CW, BW 500 Hz, NR ⁽³⁾ Off -138 dBm @ 14 MHz, CW, BW 500 Hz, NR ⁽³⁾ On -130 dBm @ 50 MHz, CW, BW 500 Hz, NR ⁽³⁾ Off -136 dBm @ 50 MHz, CW, BW 500 Hz, NR ⁽³⁾ On	LS ⁽²⁾ Typical: -120 dBm @ 14 MHz, CW, BW 500 Hz, NR ⁽³⁾ Off -126 dBm @ 14 MHz, CW, BW 500 Hz, NR ⁽³⁾ On -118 dBm @ 50 MHz, CW, BW 500 Hz, NR ⁽³⁾ Off -124 dBm @ 50 MHz, CW, BW 500 Hz, NR ⁽³⁾ On			
	Clipping Level	HS ⁽¹⁾ : -8 dBm @ 14 MHz, -12 dBm @ 50 MHz	LS ⁽²⁾ : +4 dBm @ 14 MHz, 0 dBm @ 50 MHz			
	Internal Spurious Carriers	Typical: < -115 dBm @ 384 kSamp/sec, HS ⁽¹⁾				
	Configuration	Undersampling – ADC DDC with FPGA Xilinx Spart	tan6 XC6LXC25			
	A/D Conversion	122.88 MSPS @ 16 bit/sample				
	Sensitivity (WBFM @ 12 dB SINAD)	HS ⁽¹⁾ Typical: 2.5 μV @ 98 MHz	LS ⁽²⁾ Typical: 10 μV @ 98 MHz			
VHF1 Band	3 rd Oder Intercept Point	HS ⁽¹⁾ Typical: +21 dBm @ 98 MHz, Spacing 2 kHz	LS ⁽²⁾ Typical: +29 dBm @ 98 MHz, Spacing 2 kHz			
RECEIVER	Noise Floor (MDS)	HS ⁽¹⁾ Typical: -126 dBm @ 98 MHz, CW, BW 500 Hz, NR ⁽³⁾ Off -132 dBm @ 98 MHz, CW, BW 500 Hz, NR ⁽³⁾ On	LS ⁽²⁾ Typical: -114 dBm @ 98 MHz, CW, BW 500 Hz, NR ⁽³⁾ Off -120 dBm @ 98 MHz, CW, BW 500 Hz, NR ⁽³⁾ On			
		HS ⁽¹⁾ : -3 dBm @ 98 MHz	LS ⁽²⁾ : +9 dBm @ 98 MHz			
	Internal Spurious Carriers	Typical: < -110 dBm @ 384 kSamp/sec, HS ⁽¹⁾				
	Configuration	Undersampling – ADC DDC with FPGA Xilinx Spartan6 XC6LXC25				
	A/D Conversion	122.88 MSPS @ 16 bit/sample				
	Sensitivity (FM @ 12 dB SINAD)	Typical: 0.4 μV @ 145 MHz, NR ⁽³⁾ Off 0.2 μV @ 145 MHz, NR ⁽³⁾ On				
VHE2	3 rd Oder Intercept Point	Typical: +5 dBm @ 145 MHz, Spacing 2 kHz				
VHF2 Band RECEIVER	Noise Floor (MDS)	Typical: -137 dBm @ 145 MHz, CW, BW 500 Hz, NR ⁽³⁾ Off -143 dBm @ 145 MHz, CW, BW 500 Hz, NR ⁽³⁾ On				
	Clipping Level	Typical: -19 dBm @ 145 MHz				
	Internal Spurious Carriers	Typical: < -100 dBm @ 384 kSamp/sec				
	FM Band Rejection	> 60 dB Typical: 75 dB Measured: 80dB @ 145 MHz, Interferer @ 100.76 MHz				

All stated specifications and other product information provided in this document are subject to change without notice or obligation.

Declaration of Conformity (EC)

The product marked as

FDM-S2

manufactured by

Manufacturer: ELAD S.r.l.

Address:

Via Col De Rust, 11 - Sarone 33070 CANEVA (PN)

is produced in conformity to the requirements contained in the following EC directives:

- ▶ R&TTE Directive 1999/5/CE
- EMC Directive 2004/108/CE
- Low Voltage Directive 2006/95/CE
- ▶ RoHS Directive 2011/65/CE

The product conforms to the following Product Specifications:

Emissions & Immunity:

ETSI EN 300 330-1 ETSI EN 301 489-1 ETSI EN 301 489-15 ETSI EN 301 783-2 EN 55022: 2006 + A1: 2007 EN 55024: 1998 + A1: 2001 + A2: 2003

Safety:

EN 60950-1: 2006 + A11: 2009

And further amendments.

This declaration is under responsibility of the manufacturer:

ELAD S.r.l. Via Col De Rust, 11 - Sarone 33070 CANEVA (PN)

Issued by:

Name: Franco Milan Function: President of ELAD

> Caneva Place

January, 29th 2014 Date

Signature

Declaration of Conformity (FCC)

The product marked as

FDM-S2

manufactured by

Manufacturer: ELAD S.r.l.

Address:

Via Col De Rust, 11 - Sarone 33070 CANEVA (PN)

complies with the following requirements: - FCC (Federal Communications Commission) Part 15

Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) This device must accept any interference received, including interference that may cause undesired operation.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Changes or modification not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

FCC ID: 2AAE5FDM-S2

This product is distributed in USA by:

ELAD USA Inc. 7074 N RIDGE BLVD APT 3E CHICAGO , IL 606453586 USA

Pho: 312-320-8160