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Fobos SDR Quick Start Guide

RigExpert[®] Fobos is high-performance general purpose Software Defined Radio (SDR) acquisition board with super speed USB 3.0 interface.

It has continuous 100 kHz to 6GHz operating frequency range and up to 50 MHz bandwidth with true 14-bit waveform sampling resolution and full data integrity.

Board connectivity

External clock input 10 MHz, 0.1-3.0 V p2p,

SMA Male 1 kOhm

Clock output 10 MHz, clipped sine, 3.0 V p2p SMA Male 50 Ohm,

Power control 2-pin 2.54 mm header

Power and data port USB 3.0 Type-B Male Socket

HF1 and HF2

Two auxiliary input channels, coherent direct sampling, 0.1-25 MHz covering SMA Male, 50 Ohm

RF

Primary Rx channel. Double frequency conversion heterodyne, 25 to 6000 MHZ covering, SMA Male, 50 Ohm

Indications

Primary Rx channel enabled (lock detect)



Hardware setup

- 1. Connect VHF and /or UHF antenna to the **RF** connector to receive 25 to 6000 MHZ frequency range.
- 2. Connect HF antennas to **HF1** and/or **HF2** connectors to receive 0.1-25 MHz frequency range. For diversity receiving option two different antennas have to be connected to both HF inputs.

You can use either RF or HF1(2) channels, but you cannot use both channels simultaneously.

- 3. Connect USB-3.0 power and data port to USB-3.0 port on your PC.
 - Please only use USB-3.0 ports. The USB-2.0 operation mode is not supported.
 - Please use brand quality shielded USB-3.0 data cable to provide proper control and data streaming at maximum sample rates.
 - Connect USB cable directly to the root hub of your PC, do not use any splitters, converters, docking stations or extension cables.
 - Try to avoid connection to front panel USB sockets on your desktop, use rear panel sockets located directly on a motherboard.
 - Please disconnect all power-consuming devices connected to the USB ports (such as USB hard drives, charging mobile phones, desktop LED lamps, and other SDR devices).
 You can reconnect them after the Fobos SDR hardware and driver setup is complete.
- 4. Put a jumper on the **power control** connector.
- 5. (Optional) Connect external clock source and use the board clock out to operate in very hig precision and synchronous clock domains. RigExpert[®] Fobos SDR has on-board stable internal clock source suitable for most user cases.
- 6. Disconnect the device and jump to driver setup section.

Driver installation

1. Make sure that proper drivers for your motherboard USB-3.0 root hub controller are installed.

2. Please open the device manager and ensure that there are no unknown devices or conflicted drivers in your system.



3. Connect RigExpert[®] Fobos SDR to USB port, wait a second for device to boot up, make sure that new unknown device named Fobos SDR appeared in device manager tree view.

🚔 Device Manager		
<u>File Action View H</u> elp		
▷ - [®] Mice and other pointing devices		~
Monitors		
Network adapters		
Other devices	-	
Fobos SDR		
Ports (COM & LPT)		-
Processors	L	
Sound, video and game controllers		
Storage controllers		-

If your OS automatically installed some driver for Fobos SDR, uninstall it manually,

Update Driver Software Disable	Confirm Device Uninstall
Uninstall	Fobos SDR
Scan for hardware changes	
Properties	Warning: You are about to uninstall this device from your syste
	Delete the driver software for this device.

then replug the device or click "Scan for hardware changes" button

ction View Help		
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puter Management (Loc	Scan for hardware changes	
ystem Tools	D - Computer	
Task Scheduler	Disk drives	

4. Open your favorite web browser and navigate to <u>https://zadig.akeo.ie</u> then download any version of **Zadig** executable – generic Windows USB driver installer.



5. Start **Zadig** executable (administrator permissions may be required), select **Fobos SDR** item in the drop-down list, ensure the item WinUSB(v.6xxxxx) selected and hit **"Install Driver"** button

Fobos SDR		▼
Driver (NONE) USB ID 16D0 132E WCID ?	WinUSB (v6. 1, 7600, 16385)	More Information <u>WinUSB (libusb)</u> <u>libusb-win32</u> <u>libusbK</u> <u>WinUSB (Microsoft)</u>

6. If your OS still installs its own driver - no problem, just select "List All Devices" in "Options" menu item,

Zadig		
Device 0	Options Help	
	List All Devices	
	/ Insura Uluka an Community Departs	

then select **Fobos SDR** item in the drop-down list and pres this big button named **"Replace Driver"** or **"Reinstall Driver"**.

Finally press Ok in the message box appearing/

Driver In	stallation	E
1	The driver was installed successfully.	
		Close

After successful driver installation your device manager should look something like this

🚔 Device Manager	x
<u>File Action View H</u> elp	
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Ports (COM & LPT)	*
Processors	
Sound, video and game controllers	
Storage controllers	
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Fobos SDR	
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If any issues or errors occur during driver setup, please double check the hardware setup and operating system configuration.

Otherwise jump to software installation and configuration section.

Software installation and configuration

RigExpert[®] Fobos SDR is completely new product, thus supported software list is quite small. The most popular and convenient software to support the RigExpert[®] Fobos SDR are:

- SDR# via SDRSharp.FobosSDR.dll plugin.
- HDSDR and other ExtIO_*.dll compatible software via ExtIO_FobosSDR.dll plugin.
- uSDR via native Fobos SDR API.

None pure installed of them except uSDR could not work with RigExpert[®] Fobos SDR. Compatibility is provided via specific plugins and configurations.

SDR-Sharp installation and configuration. The Easy Way.



You can try and evaluate RigExpert[®] Fobos SDR with your favorite SDR# software without any boring installation and configuration procedures. Just follow a few easy steps:

- Make sure you have .Net framework v.4.6 installed on your OS.
 Otherwise download it from Microsoft web site and install on your OS.
- 1. Visit <u>https://rigexpert.com/downloads/</u>

and in **"Fobos SDR"** section download **"SDR# Fobos SDR pack"**. It contains portable version of SDR# software with all the stuff needed to connect and operate Fobos SDR.

- 2. Unpack downloaded zip archive to any directory.
- 3. Run SDRSharp.exe
- 4. Select Fobos SDR item in source drop down list.

🔗 SDR# v1.0.0.1716 - Fobos SDR		or really on incompletions)	
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Source: Folios SDR Solar S	Fobos SDR Controller X Device Febos SDR #0 000000000X API Ib v2.0.1 dv Ibude Board Bv2.0.1 dv Ibude Board Sample Rate S0 MSpS Direct sampling External clock LNA Gain Close 	110.000 M 120.000 M	Zoom

- 5. Click gear button to configure specific parameters of Fobos SDR frontend.
- 6. Enjoy using RigExpert© Fobos SDR with SDR# software.
 - If you are not so familiar with SDR# but still want to master it please visit <u>https://airspy.com</u> download/ and download **SDR# Big Book** the greatest SDR# user guide ever.

SDR-Sharp configuration for Fobos SDR. Advanced.

If you're an experienced SDR (Software-Defined Radio) user and have already set up SDR# with your preferred plugins, frontends, and dependencies, you can manually install the **SDRSharp**. **FobosSDR** plugin into your existing system.

0. Make sure you have SDR# v.1.0.0.1716 with all dependencies installed.

- 1. Visit <u>https://rigexpert.com/downloads/</u> and in **"Fobos SDR"** section download **"SDR# Fobos SDR pack"**.
- 2. Unpack downloaded zip archive to any directory.
- 3. Copy SDRSharp.FobosSDR.dll and fobos.dll from unpacked archive to your SDR# directory.
- 4. Open FrontEnds.xml in your SDR# directory with any text editor.
- 5. Add the magic line

<add key="Fobos SDR" value="SDRSharp.FobosSDR.FobosSDRIO,SDRSharp.FobosSDR" />

Finally, FrontEnds.xml file should look like this

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- 6. Close and save FrontEnds.xml file.
- 7. Run SDRSharp.exe.
- 8. Select Fobos SDR item in source drop down list and enjoy using RigExpert[®] Fobos SDR with SDR# software.

SDR-Sharp and for Fobos SDR plugin. Very advanced.

Unfortunately, SDR# developers radically changed the software architecture and plugins paradigm since revision 1919 (2023-07-28). If you consider yourself very advanced SDR user and upper-middle level C# developer, If you are ardent fan of SDR# and familiar with SDR# SDK for Plugin Developers you can try to build and install SDRSharp. FobosSDR plugin from sources. Just few easy steps:

- 1. Clone SDRSharp.FobosSDR plugin sources from https://github.com/rigexpert/SDRSharp-FobosSDR-pluginrepository
- 2. Port the sources to the new SDR# SDK
- 3. Build it
- 4. Have a fun
- 5. Fill free to commit and push back your work

HDSDR installation and configuration for Fobos SDR. The Easy Way.



There is an easy way to evaluate RigExpert© Fobos SDR with old-school and state-of-art HDSDR software.

- Go to the <u>https://rigexpert.com/downloads/</u> and download the "HDSDR Fobos SDR pack" from the "Fobos SDR" section. This pack includes HDSDR executables ver.2.70 and ver.2.80, an ExtlO_FobosSDR.dll plugin, and all necessary libraries.
- **2.** Unpack downloaded zip archive to any directory.
- 3. Run HDSDR_270.exe or HDSDR_280.exe running HDSDR ver.2.70 and ver.2.80 respectively.
- 4. Hit Options[F7] → Select input → Fobos SDR to select or configure the device

-125	Select Input	•		WAV file			
and an and a second	Visualization	+		Sound Card			Spec
9 7 5 3 S-units	Input Channel Mode for RX Output Channel Mode for RX		0	Fobos SDR MME (16-bit) (Drivers		
-1 Squelch	Swap I and Q Channel for RX Input		AG	C Thresh.	xer	_	
Soundcard [F5] Bandwidth [F5] Options [F7] Help / Update [F1] Full Screen [F11]	Misc Options Mouse Wheel RF Front-End + Calibration Recording Settings/Scheduler DDE to HDSDR CAT to Radio (Omni-Rin)	•		-2 -2 -	и ав 25 50	1000	2000
Start [F2]	CAT to HDSDR TX	+			75 100 125		
Minimize [F3] Exit [F4]	2024-03-29 15:01:19 CPU HDSDR: 0% CPU Total: 6%			1	*		Wate

5. In HDSDR ver.2.80 and later hit SDR Device [F8] to configure specific options in popup dialog.



6. Use other HDSDR GUI controls in casual way.

HDSDR configuration for RigExpert[®] Fobos SDR.

If you have your own version of HDSDR installed a configured you can add the RigExpert[®] Fobos SDR support in a such steps:

- 1. Visit https://rigexpert.com/downloads/ and download "HDSDR Fobos SDR pack" in "Fobos SDR" section.
- 2. Unpack downloaded zip archive to any directory
- **3.** Copy three files **ExtIO_FobosSDR.dll**, **fobos.dll** and **libusb-1.0.dll** from unpacked directory to your HDSDR directory.
- **4.** Hit Options[F7] \rightarrow Select input \rightarrow Fobos SDR to select or configure the device

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	ExtIO_FobosSDR.dll	2024-03-28 08:53	Application extens	117 KB	
🔰 Libraries	Strio_LimeSDR.dll	2017-07-19 23:38	Application extens	1493 KB	
Documents	Strio_LimeSDR_1.04.dll	2018-04-22 19:08	Application extens	489 KB	
J Music	ExtIO_RTL2832.dll	2014-05-08 14:58	Application extens	239 KB	
Pictures	Strio_USRP.dll	2012-04-07 09:42	Application extens	231 KB	
Videos					
& Homearoup *					
File	name: ExtIO_FobosSDR.dll		✓ Exter	nal IO HW driver (E)LL)
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- **5.** Configure Fobos SDR in the popup dialog (SDR Device [F8]) and use other your favorite HDSDR GUI controls in casual way.
 - If you are not familiar with HDSDR please visit http://hdsdr.de/index.html and feel free to read FAQ section.

uSDR software and Fobos SDR API setup



uSDR is a general-purpose multimode software defined radio receiver Windows application. "u" (µ) means micro because of lightweight binaries distributive, simple and compact user interface, highly optimized digital signal processing routines to minimize CPU usage. The software supports a long list of SDR devices and interfaces:

• RTL-SDR (USB)

AirSpy HF+ Discovery

- RTL-SDR (TCP)
- AirSpy SDR

- HackRF One
- LimeSDR

Since v.0.1.7.0 Fobos SDR API native support was added. To evaluate all the features just follow these steps:

- 1. Navigate to https://sourceforge.net/projects/u-sdr/files/
- 2. Download uSDR_0.1.7.0.zip or late release archive
- 3. Unpack the archive to any directory
- 4. Run uSDR.release.exe
- 5. Hit on the "Hand" button and select Fobos SDR device item

- BladeRF
- SDRPlay
- ExtIO_*.dll compatible devices

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					IQ TCP Server	
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	LimeSDR				Audio	V
	BladeRF				CTCSS Decoder	V
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	Fobos SDR	•	#0 RigExpert(C) Fobos SDR A1D#PROTO#00		Markers (99/100)	V
					Band plan	~
					Application	

On successful connection the main form caption becomes informative and gray triangle button becomes green

6. Hit the green triangle button to start Rx streaming

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90	95		100		110	Input interface	
						Display	
-80						▶ FFT	
-100						Baseband recorder	

Streaming should start immediately; the spectrum and waterfall should look like follows.



7. Set the specific device parameters in a popup window under the "gear" button.



8. Zoom the spectrum with the mouse wheel, navigate by dragging the spectrum or waterfall, tune to frequency by dragging the band, demodulate it and use all the features of uSDR.

uSDR also supports ExtIO_*.dll interface and can deal with the Fobos SDR via ExtIO_FobosSDR.dll as well.



Acknowledgments

We would like to extend our deepest gratitude to the **SDR# developers**, for their exceptional work in advancing the field of software-defined radio. Their dedication and expertise have been instrumental in the creation of this guide. A special thanks goes to Youssef Touil, whose vision and leadership have undoubtedly paved the way for countless innovations within the SDR community.

Furthermore, our appreciation goes out to the team behind **HDSDR**. Their contributions have significantly enriched the user experience for radio enthusiasts worldwide. We are particularly grateful to **Alberto di Bene (I2PHD)**, whose technical prowess and commitment to excellence have been a driving force in the project.

Without the hard work and passion of these individuals and all contributors to both SDR# and HDSDR, this Quick Start

Guide would not have been possible. We are truly grateful for your collaboration and support.

The RigExpert Team