

Radio Spectrum Processor

Using HDSDR with the SDRplay Module



Overview

The SDRplay Radio combines together the Mirics flexible tuner front-end and USB Bridge to produce a SDR platform capable of being used for a wide range of worldwide radio and TV standards. This document provides an overview of the HDSDR installation process and operation of SDRplay plug-in. The document covers installation of the SDRplay device drivers, HDSDR, the SDRplay plug-in, basic usage of the HDSDR interface is also covered.

Contents

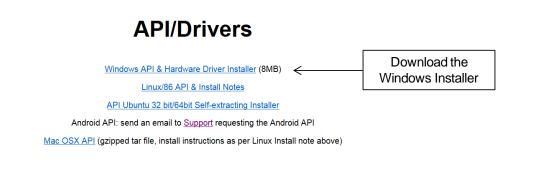
1.	Installation of the SDRplay Device Driver	. 2
2.	Installation of HDSDR	. 5
3.	Installation of the SDRplay ExtIO Plug-in	. 9
4.	Using HDSDR with the SDRplay module	12
5.	Legal Information	15

SDRplay PSP

1. Installation of the SDRplay Device Driver

The first step in getting the SDRplay module installed is to download the SDRplay device driver from the SDRplay website. The device driver comes in an installation package with the Mirics API. The API provides the user with a DLL and associated documentation such that the SDRplay module can be controlled from within a software program.

• Firstly ensure the SDRplay module is disconnected from the PC. Then download the *Windows API and Hardware Driver installer* from the SDRplay download section of the website.



When prompted to do so select run



• You might be warned that the publisher could not be verified, in this case click run.

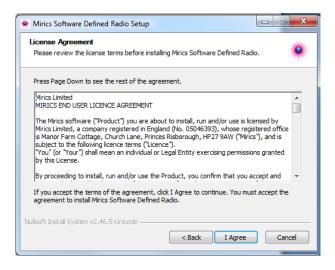
~	The publisher of MiricsSDRAPIInstaller_1.0.1.exe couldn't be verified. Are you sure you want to run the program?			×
8	The publisher of MiricsSDKAPIInstaller_1.0.1.exe couldn't be verified. Are you sure you want to run the program? Learn more	Run	View downloads	
				_

• The installation will process will begin click next and follow the onscreen instructions.

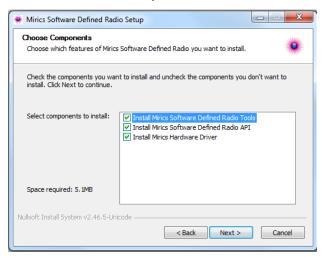
🔅 Mirics Software Defined Rad	dio Setup
	Welcome to the Mirics Software Defined Radio Setup
	Setup will guide you through the installation of Mirics Software Defined Radio.
	It is recommended that you dose all other applications before starting Setup. This will make it possible to update relevant system files without having to reboot your computer. Click Next to continue.
	Next > Cancel



Click I agree to accept the license agreement



Ensure that all three components are selected and then select next

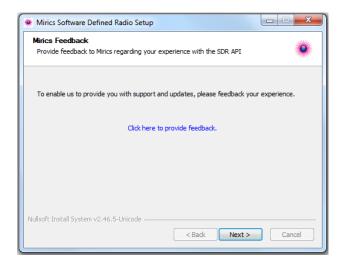


• Select a directory in which to install the software. A default directory is proposed.

Mirics Software Defined Radio Setup	
Choose Install Location Choose the folder in which to install Mirics Software Defined Radio.	
Setup will install Mirics Software Defined Radio in the following folder. To instal folder, click Browse and select another folder. Click Install to start the installat	
Destination Folder	owse
Space required: 5.1MB Space available: 851.9GB	
Nullsoft Install System v2.46.5-Unicode	Cancel



• The installation of the driver will begin, after installation is complete there is an option to provide feedback



• Finally when the installation process is complete click finish

Mirics Software Defined Rad	io Setup
	Completing the Mirics Software Defined Radio Setup Mirics Software Defined Radio has been installed on your computer. Click Finish to dose Setup.
	<back cancel<="" einish="" td=""></back>

• Finally plug in the SDRplay module into one of the USB ports. You should be presented by a pop up box in the lower right hand icon tray telling you the driver has been installed correctly.

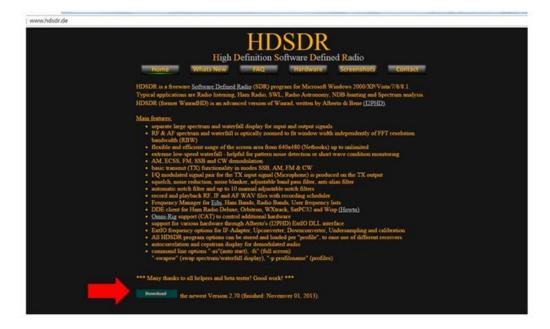


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2. Installation of HDSDR

HDSDR is a third party SDR radio interface that can be used in conjunction with the SDRplay module to receive various different signals. To use this software there are two installations that need to be followed. Firstly HDSDR software needs to be downloaded and installed. Secondly the SDRplay ExtlO plug-in needs to be installed. The first step in the process is to download the HDSDR software and install it on the local machine

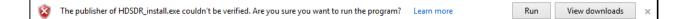
• The HDSDR software can be found from http://www.hdsdr.de/. Click the download button



• Once the download button is clicked you will be prompted to download the HDSDR installation program. Click Run to begin the installation process.



• You might be warned that the publisher could not be verified, in this case click Run.

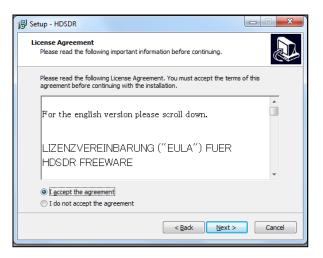


SDRplay RSP

Once the installer begins click next to continue



• Accept the license agreement and then click Next to proceed



 Make a careful note of where the software ends up being installed on your PC and then click Next

弱 Setup - HDSDR	
Select Destination Location Where should HDSDR be installed?	
Setup will install HDSDR into the following folder.	
To continue, click Next. If you would like to select a different folder, clic	k Browse.
C:\Program Files (x86)\HDSDR	Browse
At least 5.9 MB of free disk space is required.	
< Back Next >	Cancel



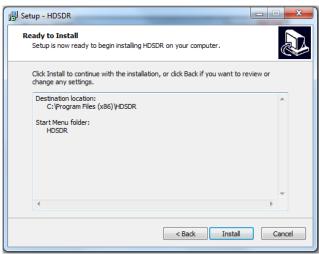
• HDSDR will provide an option to change the default shortcut in the start menu

😼 Setup - HDSDR	
Select Start Menu Folder Where should Setup place the program's shortcuts?	
Setup will create the program's shortcuts in the following Star	t Menu folder.
To continue, click Next. If you would like to select a different folder, cli	ck Browse.
HDSDR	Browse
Don't create a Start Menu folder	
<back next=""></back>	Cancel

An option to create a desktop shortcut or quick launch icon is presented. Select the desired options then Click Next

🔂 Setup - HDSDR
Select Additional Tasks Which additional tasks should be performed?
Select the additional tasks you would like Setup to perform while installing HDSDR, then dick Next.
Additional icons:
Create a desktop icon
Create a Quick Launch icon
< Back Next > Cancel

• To complete the installation click Install





• To complete the installation click Finish. Before HDSDR will recognise the SDRplay module the SDRplay ExtIO plug in must be installed.





3. Installation of the SDRplay ExtlO Plug-in

The final step is to install the SDRplay EXTIO plug-in. This is the module that will allow HDSDR to communicate with the SDRplay module.

• Download the SDRplay ExtIO plug-in from the SDRplay downloads section of the website. The plug-in can be found under Downloads/Plug-ins.

5DRpla <u>u</u>	7							
Home Down	loads Community	Purchase	Reviews	Blog	FAQ	About Us	Contact	f У ៉
✤ Plugins	Supported sof	ware plugins and	d libraries					🖷 / downloads / plugins
	nstaller (V2.1) - Release Jugin will work on HDSD (github)		compatible SE	DR applicati	ons		- ExtlO	Plug In

• When prompted click run to begin the installation of the SDRplay ExtlO plug-in.



• You might be warned that the publisher could not be verified, in this case click run.

-	The publisher of SDRplay_SDRSharp_Plugin_v1.3.exe couldn't be verified. Are you sure you want to run the program?			. ×
Ø	Learn more	Run	View downloads	



• The initialisation of the SDRplay ExtIO plug-in will begin, click Next to continue



• In order to install the plug-in the installer needs to know the location of the HDSDR program. To do this click browse.

j 🔂 Setup - SDRplay EXTIO Installer
Select Directory in which to Installer the EXTIO File
Browse to directory where your SDR Software is installed, then click Next.
Location of SDR SOftware Browse
< Back Next > Cancel

• Navigate to the HDSDR installation directory, then click on the HDSDR.exe and then click Open to identify to the correct path to the installation program.

Organize 🔻 New fold						
🔛 Recent Places 🔺	Name	Date modified	Туре	Size		
HDSDR	🔗 SDRSharp.exe	27/12/2014 16:10	Application	172 KB		
Code Projects Projectlocker						
J Projectiocker						
🔁 Libraries						
Documents						
J Music						
E Pictures						
😸 Videos						
🗟 Homegroup						
& Dan (DELL-ZINO)						
_						
Computer						
🌉 OS (C:)						
🕞 FREECOM HDD (🛫						
					Sharp project exec	



• After Open has been clicked you should see the path presented in the installation dialog box, Click Next.

j号 Setup - SDRplay SDRSharp Plugin						
Select SDRSharp.exe location Where is SDRSharp.exe installed ?						
Select where SDRSharp.exe is located, then click Next. Location of SDRSharp.exe:						
C:\Program Files (x86)\sdr-install\sdrsharp\SDRSharp.exe Browse						
< Back Next >	Cancel					

• The installation of the plug-in will commence when completed the Install button is clicked.

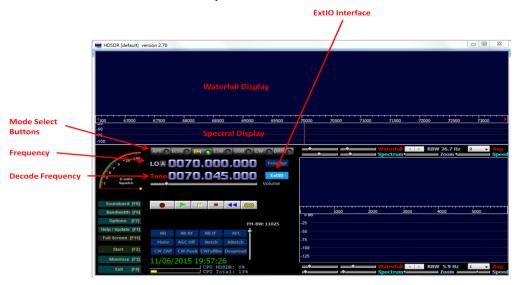
😼 Setup - SDRplay EXTIO Installer	×
Ready to Install Setup is now ready to begin installing SDRplay EXTIO Installer on your computer.	
Click Install to continue with the installation.	
< Back Install Co	ancel

• This completes all the steps that are necessary to get SDRplay working with the HDSDR software interface.

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4. Using HDSDR with the SDRplay module

When HDSDR has been started for the first time you will see the main screen as shown below.



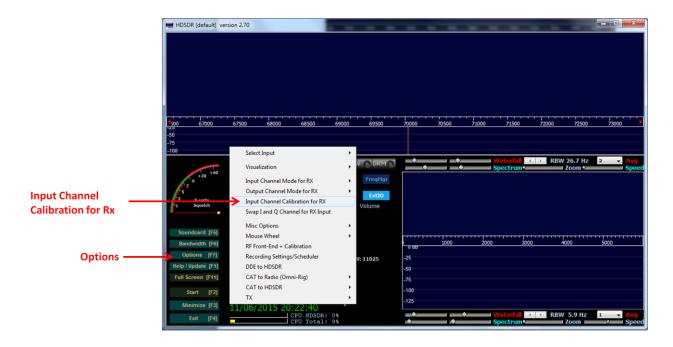
- Mode Select buttons Used to select the required modulation format. Select either AM, FM, lower sideband (LSB), upper sideband (USB) or CW
- **Frequency** Used to select the desired frequency of the tuner. This will be the frequency to which the centre of the display will be set.
- **Decode Frequency** This sets the position of the red line and represents the frequency at which signals will be decoded within the pass band.
- ExtIO Interface Select this button to bring up the SDRplay specific interface for controlling the radio.



The HDSDR *bandwidth* button controls output sampling rate. The default setting is 12,000Hz. For WFM (wide band FM) you need to move this to 192000Hz



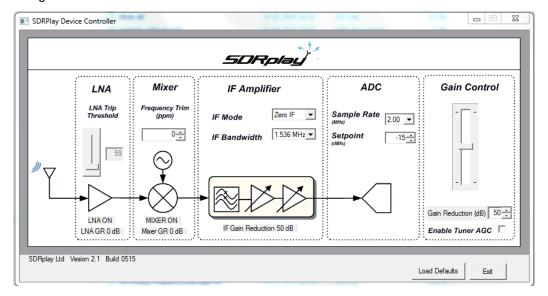
Selecting the **Options** button and then **Input Channel Calibration for Rx** will allow the user to calibrate the IQ offset. This will be important when operating in zero IF mode. If you are experiencing strong image signals you will need to adjust the amplitude and phase sliders to achieve optimum image rejection. Initially the raw sliders should be set for course tuning. The fine sliders can then be used to fine tune the settings and achieve maximum image rejection. In addition **the Rx DC removal mode** should be set to Auto to remove any unwanted DC components from the system.



ſ	Channel Adjustment Panel (RX)						
	Raw Fine	1 to 4 samples delay	RX DC Remove	al Mode: Auto	Bandwidth		
		Left: 0 💿 Right: 0 🕒	Left: -0.0011737	Right: -0.1475388	25 [Hz]		
	T T	To compensate for this s approximately +10 kHz from the By using the Amplitude and F response. The controls interac adjustment. You should be the image signals. Move the	ss digitized with one cha y the other channel and ram like HDSDR, that n t the I and Q channels, kew, please feed an I/Q he band center, and obs Phase (raw and fine) slid is somewhat, so you will able to get 70 dB of difi	annel are delivered to so d also with some amplitu eeds a precise phase a when working in 1/Q mo l strong, steady carrier, serve an image respons lers, slowly try to minimiz have to repeat two or t ference between the de hen done, click on the 1	oftware sooner ide unbalance. nd amplitude offset by e at -10 kHz. e this image hree times the ssired and		
		Raw					
		Fine	Phase: -0.7	'62 Deg			
	Amplitude: 1.008		Reset	to 0	Cancel		



To configure SDR play specific settings click ExtIO interface button on the main HDSDR display. The display gives an overview of the SDR play receiver architecture coupled with the different parameters that can be configured.



LNA Trip Threshold – The point at which the LNA turns on/off within the gain reduction range can be controlled by value in the LNA Trip Threshold. By lowering the value the LNA will turn off closer to maximum gain. Increasing the value means that the LNA will stay on for longer thus providing better noise performance but at the added risk of overload.

Frequency Trim – The SDRplay uses a crystal as its reference and as such there will be some inherent frequency offset. The frequency trim allows trimming of the reference crystal frequency to adjust errors in absolute frequency.

IF Mode – Sets the tuner into either Zero IF mode or Low IF mode. There are three different IF modes available 450kHz, 1.62MHz and 2.048MHz. The IF bandwidth drop down menu will automatically update with the appropriate selection of IF filter bandwidths.

IF Bandwidth – Sets the bandwidth of the IF filter. The selections available will depend on the IF mode selected. For the full range of IF bandwidths selections then the tuner must be operating in ZIF mode.

Sample Rate – Sets the sampling frequency of the ADC.

Setpoint – Sets the target level power at which AGC routine will attempt adjust the power on the ADC input. A larger value will position the signal near the top of the ADC range. A lower value will reduce the signal power and hence levels at the ADC input.

Gain Control Slider – The gain control slider can be used to set the gain of the receiver. Maximum gain occurs at the top of the slider, minimum gain at the bottom of the slider.

Gain Reduction – The gain reduction value controls the amount of gain, in dB, that the maximum tuner gain will be reduced by. For example a gain reduction of 50 represents 50dB below maximum receiver gain. This value is tied to the gain control slider.

Enable Tuner AGC – This enables a software AGC leveling routine within the plug-in that attempts to change the gain reduction value to achieve a specified signal power at the ADC input. The level which the routine will adjust the ADC input power towards is defined in the Setpoint control box. In this mode it is not possible to adjust the tuner gain reduction manually.

Load Defaults – This button loads a predefined set of defaults back into the receiver.

Exit - Close the SDRplay control dialog box.

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For more information contact support@sdrplay.com

5. Legal Information

SDRPlay modules use a Mirics chipset and software. The information supplied hereunder is provided to you by SDRPlay under license from Mirics. Mirics hereby grants you a perpetual, worldwide, royalty free license to use the information herein for the purpose of designing software that utilizes SDRPlay modules, under the following conditions:

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