W-SPECTRA Monitoring System

Application Note

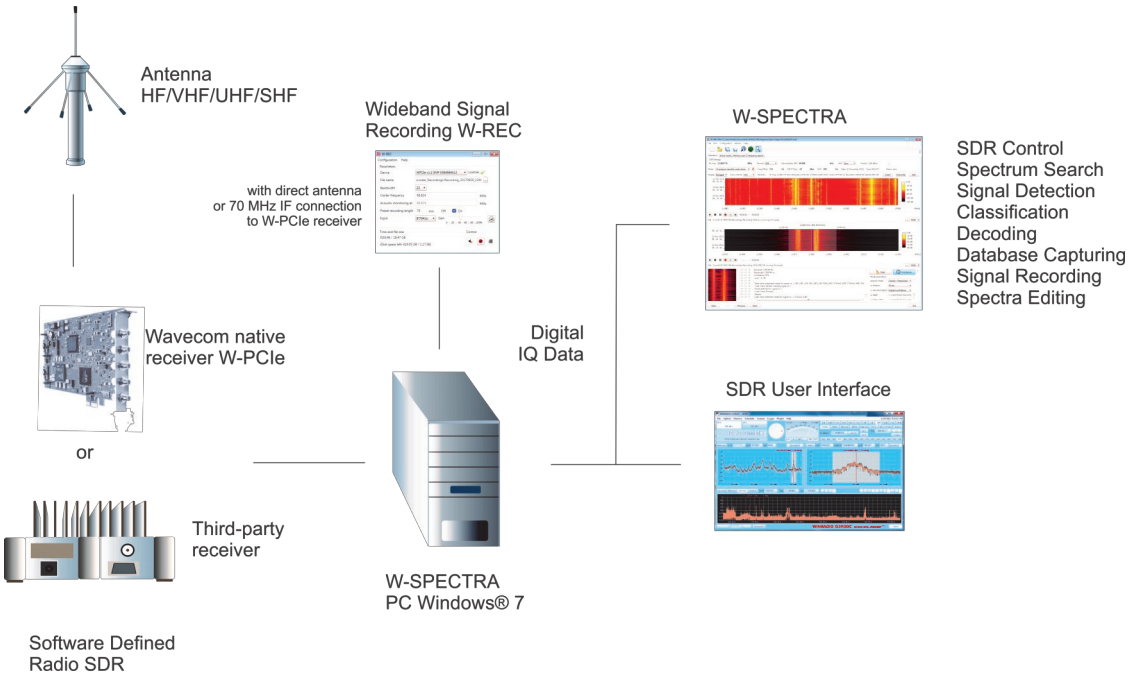
WAVECOM NACHRICHTENTECHNIK

Introduction

This application note provides a step by step guide to configure the Wavecom Monitoring System W-SPECTRA: connect a signal, set parameters and perform various online (real-time) decoding and frequency monitoring tasks in the HF, VHF/UHF and SHF bands:

- Direct receiver control: W-SPECTRA supports Wavecom native receiver W-PCIe and Winradio SDR G3xDDC
- Signal decoding (Direct mode)
- Frequency search
- Memory scan
- Database capturing
- Signal recording
- Edit a recorded signal spectrum (offline spectrum analysis)

System Configuration



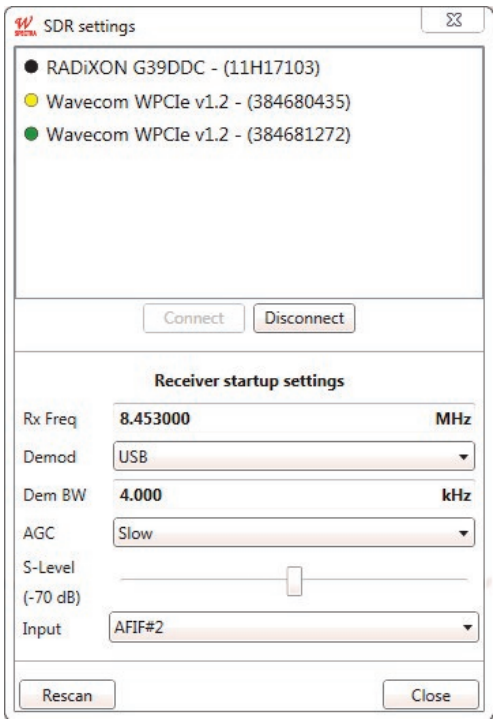
W-SPECTRA Works with Wavecom W-PCIe Receiver

W-SPECTRA supports Wavecom native receiver W-PCIe card and controls it in a direct way. The user may set all the receiver parameters and perform spectrum monitoring tasks in the W-SPECTRA GUI.

To configure the system and connect the signal the user needs to

- Insert the W-PCIe card into the PC
- Install Wavecom Virtual Audio Cable (W-VAC)
- Install W-SPECTRA software on the same PC
- Connect the HF antenna to the W-PCIe receiver input (AFIF#1 or AFIF#2) directly
- Turn on the PC, make sure that W-PCIe card is not running as a decoder. Stop the tray icon "WAVECOM Server - W-PCIe" when necessary
- Start W-SPECTRA by clicking the desktop icon
- W-SPECTRA will connect to the W-PCIe receiver automatically. Otherwise the user may use the "SDR settings" GUI via the menu "Configuration" to connect
- In the "SDR Settings" part of the Operation tab the user may set the receiver frequency (Rx Freq), the Demodulator (usually set to ISB), the Demodulator BW and the antenna Input

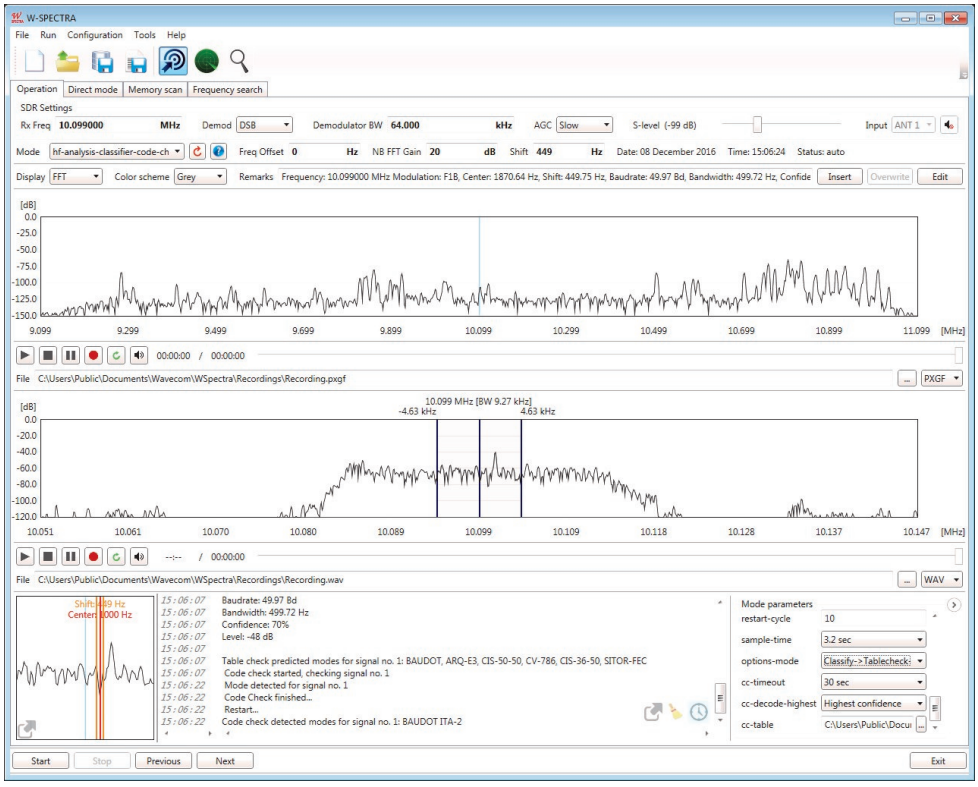
  The AGC and Squelch-Level parameters do not apply to the W-PCIe receiver. They are disabled.
- Turning on the "Speaker" button, the demodulated signal is output to the speaker for acoustic monitoring purpose.



W-SPECTRA Works with Winradio G3xDDC Receiver

W-SPECTRA also supports Winradio SDR G3xDDC and controls the receiver in a direct way. The user may do all operations in the W-SPECTRA GUI to perform spectrum monitoring. To configure the system and connect the signal the user needs to:

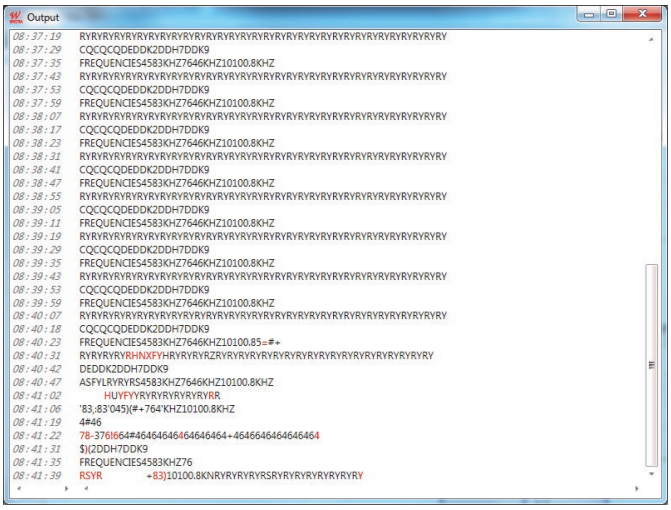
- Install G3xDDC software and Winradio Virtual Sound Card (VSC) on the PC
- Install W-SPECTRA software on the same PC
- Connect the antenna to the receiver G3xDDC input and turn on the receiver
- Start G3xDDC software (in the following example we use G33DDC software)
- Make sure that the “VSC IF” is turned on
- Set the “DDC BW” of G33DDC to 2 MHz or more
- Start the desktop icon W-SPECTRA
- Choose the “Operation” tab
- In the Operation tab set the receiver frequency (Rx Freq), Demod to “DSB” (for “Double Side Band”), Demodulator BW to 32 kHz, AGC to “Slow” and Squelch-level to a proper value, e.g., -102 dB
- The user can set the SDR parameters in the G33DDC GUI as well. These will be synchronized to W-SPECTRA



W-SPECTRA Direct Mode

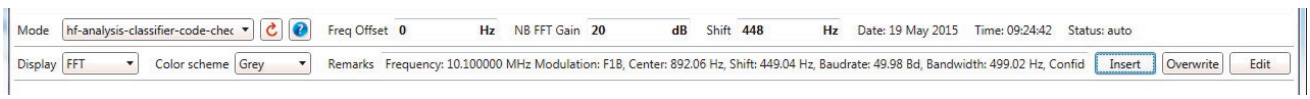
After the receiver parameters are set the user can

- View the wideband (2 MHz) spectrum display. The user can directly click into the spectrum to set another Rx Freq to the middle
- View the narrowband (max. 96 kHz) spectrum display
- Use “NB FFT Gain” so that the signal can be displayed properly in the narrowband spectrum
- Choose a proper decoder from the “Mode” list, e.g., BAUDOT
- Use the middle cursor of the narrowband spectrum to locate the signal to decode. This sets the “Freq Offset”
- Use the two cursors in the lower left part FFT to measure the signal parameters: center, shift etc. The user can also set the parameters in the right panel
- The decoding result will be displayed in the result window
- The user can open a separate bigger window to display the result by clicking the “Window” button



When running Classifier or Classifier Code Check the result will be displayed additionally in the “Remarks” field.
The user can “*Insert*” the result into a database.

The user can “*Overwrite*” and “*Edit*” a database entry. The database structure can be configured by the user.

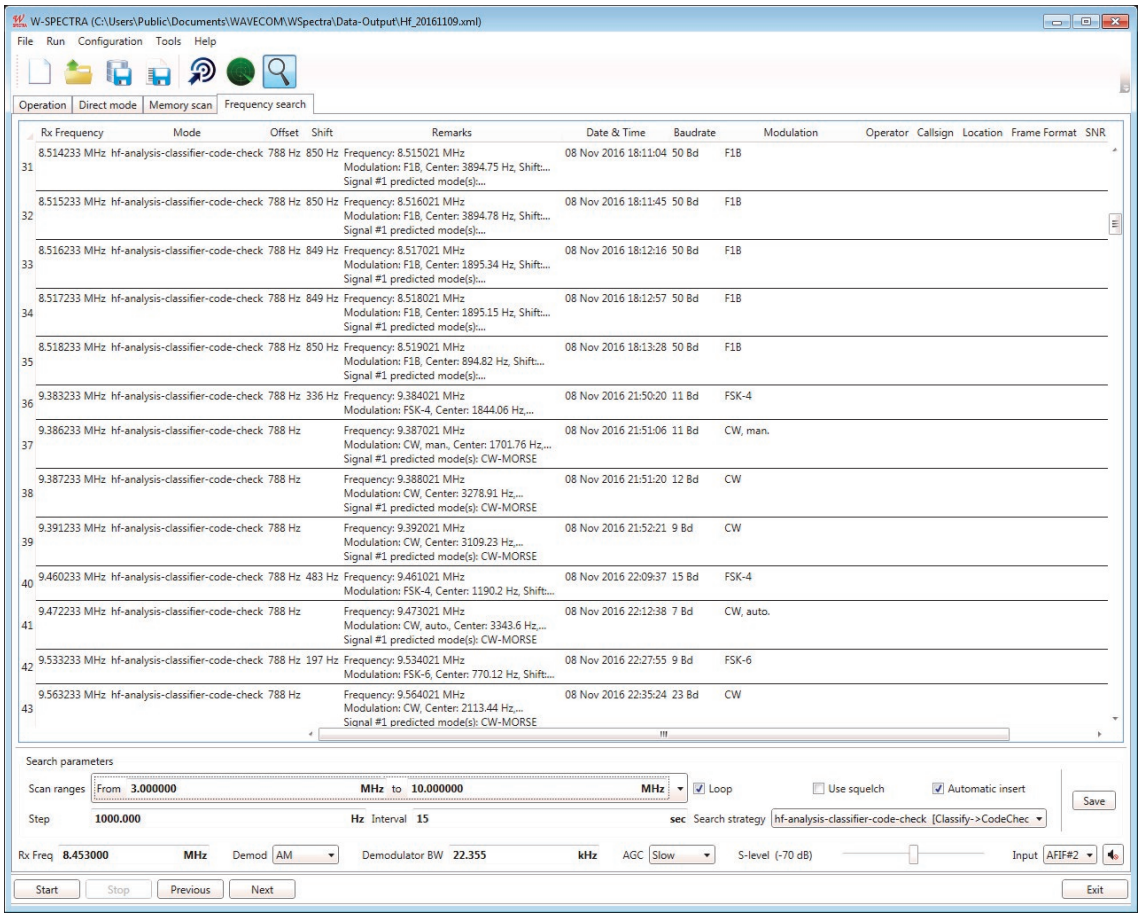


W-SPECTRA Frequency Search

W-SPECTRA fulfills a main task in radio frequency monitoring: the automatic frequency search.
To do this, the user chooses the “Frequency Search” tab and set the following search parameters:

- “From” and “to” frequency
- “Step” frequency for each jump
- “Interval”: how long should the system stay at one frequency and search (classify) the signal
- Loop: means whether the search will loop to the “From” frequency again after completing one round
- “Use squelch”: when it is checked a signal result will be inserted into the database when the signal strength is over the threshold
- “Automatic insert” means whether the result will be automatically inserted into the database. Usually this box is checked
- “Search strategy”: choose a Classifier or Classifier Code Check to run the frequency search

The user can save these search parameters and “Start” the automatic search process by clicking the button.
W-SPECTRA will tune the receiver and classify the signal accordingly and insert the result into the database automatically.



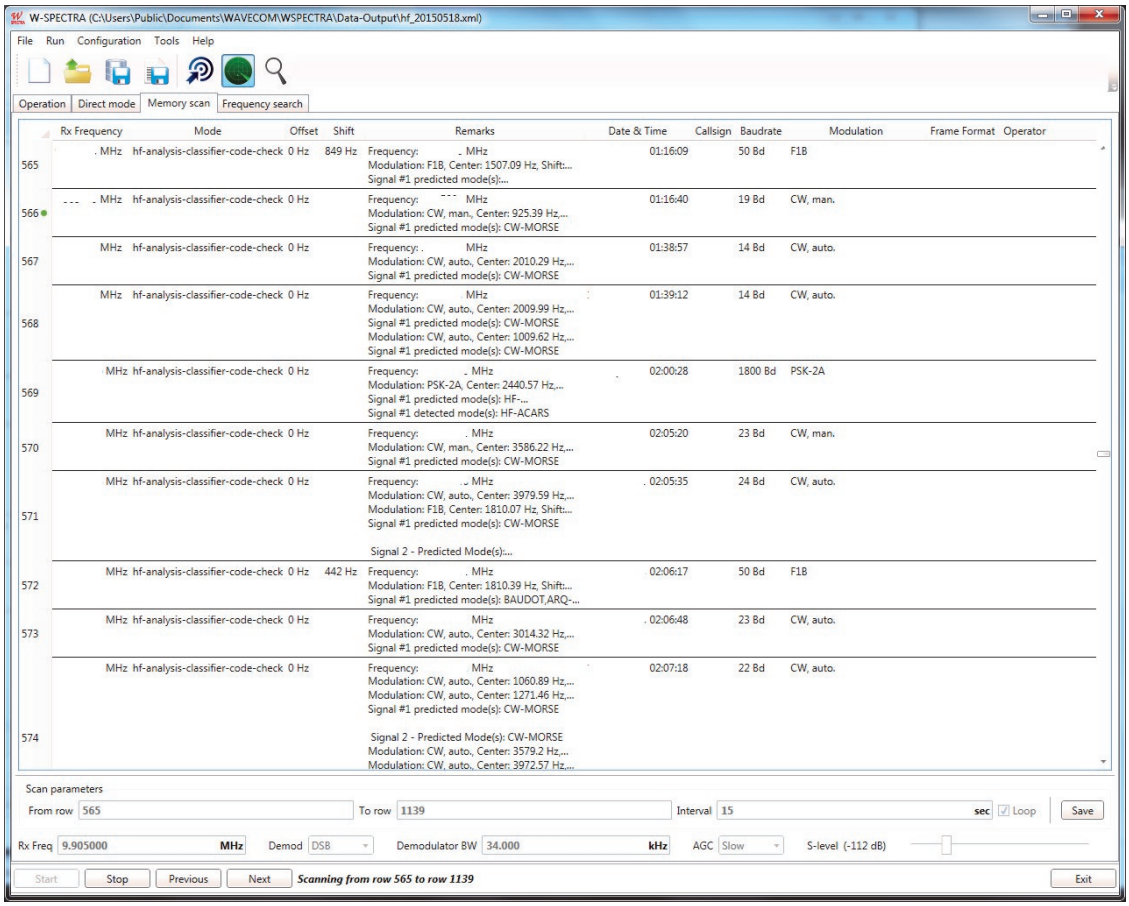
W-SPECTRA Memory Scan Mode

W-SPECTRA can run in Memory Scan mode, revisits and verifies the captured database entries.

Choose the “Memory Scan” tab and set the scan parameters:

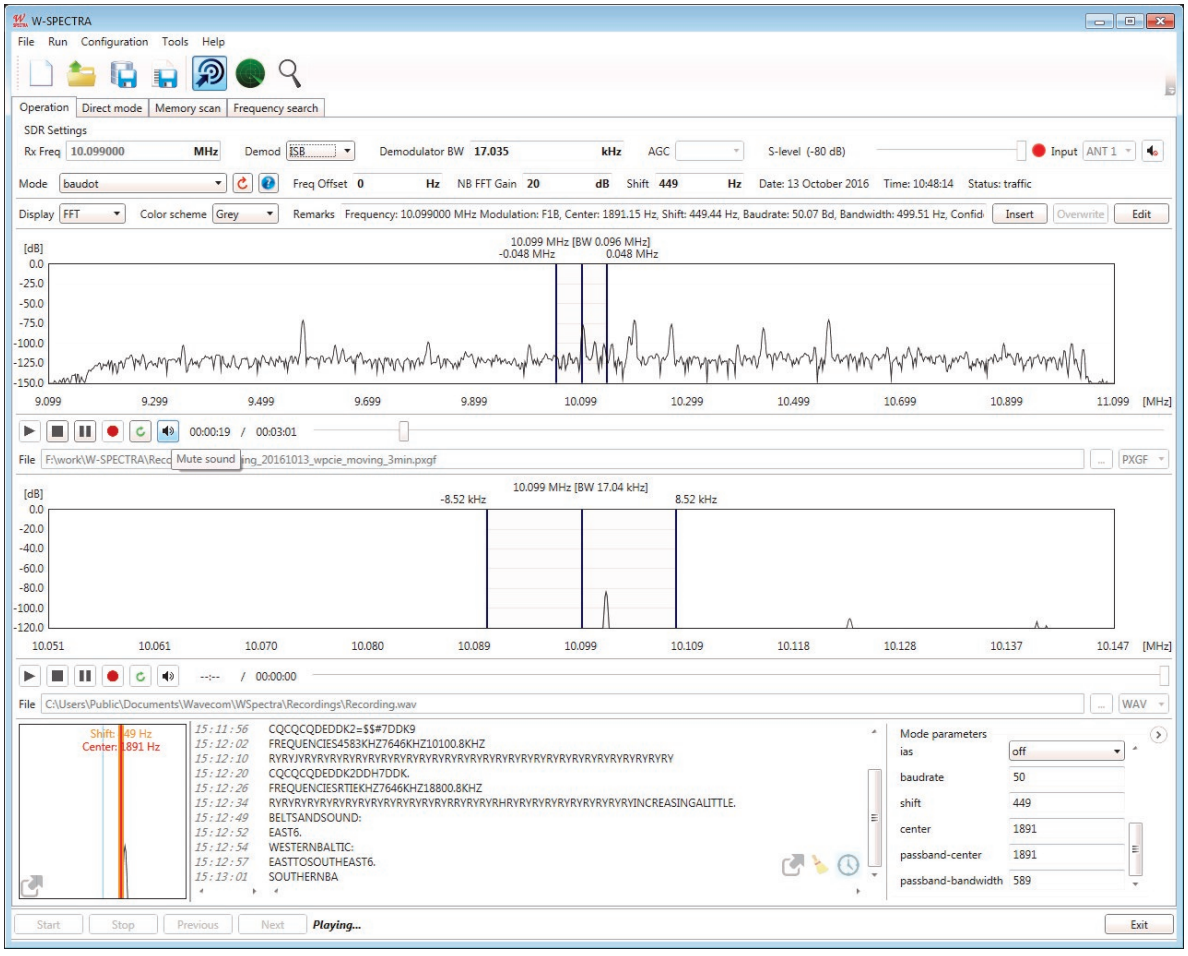
- “From row” and “To row”
- “Interval”: how long should W-SPECTRA stay at this frequency and verify the signal
- “Loop” check box: whether the scan should loop to the “From row” when one round is complete

The user can “Start” the frequency revisit process by pressing the button. W-SPECTRA will set the receiver to the frequency according to the database entry and verify the signal. W-SPECTRA may deliver a different result than in the database, the user can “Insert” the new result into the database or “Overwrite” the old result.



Wideband Signal Recording and Offline Analysis

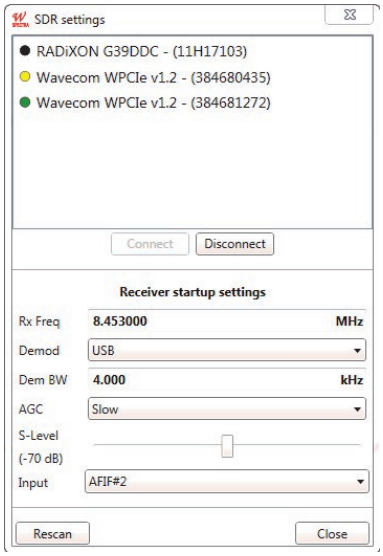
There are two signal recorders and players in W-SPECTRA: one wideband with 2 MHz and one narrowband with 96 kHz.
With both recorders the user can record signals in baseband IQ with various on-the-fly side-information (Rx freq and timestamp).
The user can playback a recording, select an interesting signal in the 2 MHz wide spectrum using the middle tuning cursor and make decoding or other analysis.
During playback the side-information are displayed in their fields as well. The classifier result is displayed in the “Remarks” field. The user can “Insert” or “Overwrite” a result into a database. The user can “Edit” a result as well.



Only make recordings on a built-in storage medium (e.g., built-in harddisk or SSD). Don‘t use external USB harddisk, nor over the network, because the max. speed of external devices may be insufficient for the wideband recording and the recording may loose data.

Receiver Configuration and Database Configuration

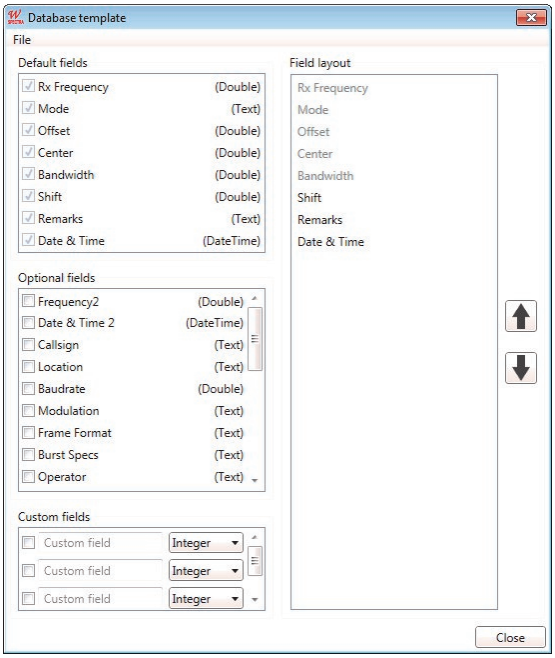
There are various tools to configure components in W-SPECTRA. Two of them are receiver configuration and database configuration.



In W-SPECTRA GUI the user can open the menu *Configuration -> SDR settings*.
All running SDRs on the PC are listed. The user can choose one receiver, connect or disconnect it.
The user can change the receiver settings:

- Rx Freq
- Demodulator
- Demodulator Bandwidth
- AGC
- Squelch Level and
- (Antenna) Input

These parameters will be saved when the user closes the window and take effect when W-SPECTRA starts next time.



The user can configure a database structure by the menu *Configuration -> Customize a database*.
The database structure consists of 8 mandatory fields. The user can add more fields from the “Optional fields” and define custom fields (name and data type). The user can save the database structure as a template and use it later, e.g., *File -> New from template*.

Since more than thirty years Wavecom Elektronik AG has developed, manufactured and distributed high quality devices and software for the decoding and retrieval of information from wireless data communication in all frequency bands. The nature of the data communication may be arbitrary, but commonly contains text, images and voice. The company is internationally established within this industry and maintains a longstanding, world-wide network of distributors and business partners.

Product Information

Products	http://www.wavecom.ch/product-summary.php
Datasheets	http://www.wavecom.ch/brochures.php
Specifications	http://www.wavecom.ch/product-specifications.php
Documentation	http://www.wavecom.ch/manuals.php
Online help	http://www.wavecom.ch/content/ext/MonitoingSystemOnlineHelp/default.htm
Software warranty	One year free releases and bug fixes, update by DVD
Hardware warranty	Two years hardware warranty
Prices	http://www.wavecom.ch/contact-us.php

System Requirements and Ordering Information

	Minimum	*Recommended*
CPU	Core i7 3.2 GHz	Core i7-6700 3.4 GHz
Memory	12 GB RAM	16 - 32 GB RAM
OS	Windows 7 32-bit or 64-bit	Windows 10 32-bit or 64-bit

Product Code	Description
WSPECSYS	Complete automatic spectrum monitoring system, including a native Wavecom W-PCIe receiver.
WSPECTRA	Complete automatic spectrum monitoring system. Wavecom receiving device (W-PCIe) not included.
WSA	Spectrum analysis tool (96 kHz bandwidth). Option to W-SPECTRA.
WCLWB	Wideband signal classifier (96 kHz bandwidth). Option to W-SPECTRA.

Distributors and Regional Contacts

You will find a list of distributors and regional contacts at http://www.wavecom.ch/distributors.php

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