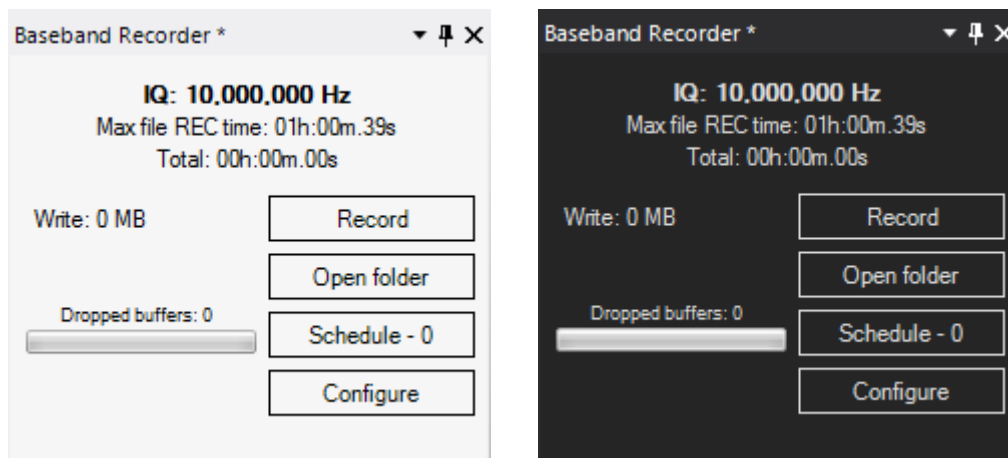


# Baseband Recorder – A SDR# plug-in

original by Vasili (TSSDR) - Modified/Updated plug-in and documentation by [thewraith2008](#) – March 2022



SDR# Side panel (light and dark theme)

## Menu

- [Description](#)
- [Features](#)
- [Installation](#)
- [Usage](#)
- [SDR# side panel – List of controls top to bottom](#)
- [Notes, bugs, limits or other things of possible interest](#)
- [Thanks](#)

## **Description**

The *Baseband Recorder* plug-in allows recording of the SDR# RawIQ data stream which is the full samplerate IQ data supplied from an SDR dongle (via frontend/driver). This is slightly larger than the seen SDR# visible spectrum.

Recordings can be started manually or via a simple scheduling.

The recording can be single or continuous which will record to the file format limit, a set limit or until there is no HDD space remaining. In the case of continuous recording, a new file will be created when the file format limit or set limit is reached and will continue until stopped or there is no HDD space remaining.

## **Features**

- Records the full SDR# IQ stream which is slightly larger than the SDR# visible spectrum.
- Can create file greater than 4 Gb (depends on the selected file format)
- Continuously record multiple files.
  - Each file size is limited by the selected file format or by a set limit.
  - Will continue until stopped or run out of HDD space
- Can record just a single file
  - File size is limited by the set limit.
- Record using a simple scheduling.
- Display the IQ samplerate used for recording.
- Display on going record duration and file size and number of files recorded (each session).
- Reports if available HDD space is getting low before recording is started.
- Will stop recording if HDD space runs out preventing loss of recording.
- Works with SDR# 1700-1854 (as of writing)
- Works with light and dark themes in SDR# 1717+ (Telerik UI)(Limited)

## **SDR# side panel controls and labels**

### **IQ: x (label)**

Shows the SDR# IQ bandwidth/samplerate that will be used to record to the IQ WAV file.

### **Max file Rec time: (label)**

Shows the maximum time that can be recorded to a file with the selected file format or set limit.

- If the selected file format limit or set limit is greater than available HDD space, then the MAX record time will be based on remaining HDD space.

**NOTE: If this label colour turns red, then HDD space is getting low.**

- Low HDD space will be indicated when HDD space is less than 2 GB
- Tool-tip for this label will show remaining HDD space (only when label is red)

### **Total: (label)**

Shows duration of current recording.

- If more than one file has been recorded then this will cycle approx. every 4 seconds between current file duration and total recording time (for all files).

### **Write: (label)**

Shows approx. size of WAV data written to the currently recorded to file.

- If multiple files are recorded in one session, then the number of files that have been recorded will be appended in brackets. e.g. "Write: 256 MB (x)"

### **Dropped buffers: (label)**

Shows number of dropped buffers that has occurred.

- Should remain at zero for good recordings.
- The bar shows amount of buffer used while recording.  
It will vary but should not get too high.

### **Record/Stop (button)**

Start or stop recording

- Left clicking will start sequential recording
  - Will create a new file each time the file format limit or set limit is reached.\*
- Right clicking will start single recording  
Only records one file to a maximum file size set by 'File length limit MB' \*
- \* Or until stopped or no HDD space remains.
- The Tooltip will show MAX file size to use for single (right click) recording.

NOTE: SDR# must be playing to enable record button.

NOTE: Will check for sufficient HDD space before recording starts.

NOTE: Stopping SDR# radio (playing) will also stop recording.

NOTE: Changing some SDR# options during recording can negatively affect the recording

NOTE: Changing the radio samplerate during recording is not recommended.

- There is no way to block the user from doing this so be careful
- Recording will be stopped to avoid mixing of samplerates in WAV file. (which is invalid)

Continued...

**Open Folder (button)**

Open the folder location where WAVs are saved too.

- Default is to use the SDR# path if path has not been set yet.
- May open to IQ sub folder if no recordings have occurred yet. (and only if IQ folder has already been created)
- Will open to the last daily sub folder if any recordings have occurred.
- The selected path is shown in the tooltip for button

**Schedule - X (button)**

Opens a window where schedules can be added or existing ones modified or removed.

The "X" value on the button label indicates number of schedules pending.

Defined schedules will be saved and will be reloaded on next SDR# start.

- If schedules have already expired on SDR# start, they will be removed.

These schedules are only simple and only suitable for one shot recordings.

- NOTE: It's possible to create overlapping schedules.  
Conflicting schedules will be ignored (only one recording allowed at a time)  
A conflicting schedule will be removed during recording when seen.
- Once a schedule is completed, it will be removed from list.
- When a schedule is active, it will show as a flashing "schedule recording" to the left of the "Configure" button in the SDR# side panel.
- Schedules will record using the currently selected plug-in options.
- Schedule will record to the duration so long as there is enough HDD space otherwise it will stop. (it's up to you to make sure enough HDD space exists)
- SDR# must be playing for a schedule to start recording.  
If SDR# is not playing, then the schedule will be ignored and removed when it triggers.

When adding a new schedule entry, the default entry will have the current time +10 minutes for start and +15 minutes for end times. (You must edit these times before you can save it)

**Configure (button)**

Opens window with plug-in options for recording. (see below)

## **Configure Window**

### **(WAV) File format (dropdown)**

Selects the WAV file format to record with:

- *WAV SDR# Compatible* – For files limited to 2 Gb.
- *WAV FULL* – For files limited to 4 Gb.
- *WAV RF64* – For files limited to 1 Tb (imposed limit and not a file system limitation)

Only difference between *WAV SDR# Compatible* and *WAV FULL* is the maximum file size

- The WAV file structure is same

### **Maximum (imposed) file length (label)**

Shows the limit of the file that can be recorded. This depends on the selected *File Format*.

### **File length limit MB (checkbox + value)**

When enabled, will override the file format file size limit (see above) with the specified value.

NOTE: The maximum value available will depend on the selected *File Format*.

- Value should not be over the value shown in the *Maximum (imposed) file length* label
- You will see a message if this is wrong (and window won't close)

NOTE: The value is also used for the maximum file size limit for a single file recording (right click)

- State of checkbox is not used/applicable for single file recording (right click)

### **(WAV) Sample format (dropdown)**

Selects the WAV sample format to record with:

- *8 bit PCM IQ* – May not be suitable for digital modes
- *16 bit PCM IQ* – Can be suitable for digital modes (maybe some limits as to which types)
- *32 bit IEEE Float IQ* – Best and is direct copy of SDR# IQ (float) data stream but is twice size of the 16 bit PCM IQ.

This option affects the quality of the IQ data.

### **Base Folder select (button)**

Sets the base folder location where to save the recorded IQ WAV files too.

When recording, a sub folder "IQ" is created for recordings created by the *Baseband Recorder* plug-in. In that folder, each recording will be stored in a daily folder. (e.g. C:\IQ\2018\_08\_18)

NOTE:

The "IF" folder is created (by *IF Recorder* plug-in) to separate IF IQ recordings from Baseband IQ recordings.

NOTE: The selected path is shown in a label under the button

- If path is long, not all the path text maybe seen.  
You can resize window down to expose the rest of path text

## **Installation**

This plug-in should work with SDR# 1700-1716 and v1856+

- Maybe some versions earlier (<1699) or later (v1717-1855) but these are not tested.
- Versions between v1717-1855 are not considered unstable and therefore not supported.

### **SDR# 1700-1716**

Copy the following files to you SDR# folder:

- ***SDRSharp.BasebandRecorder***
- ***SDRSharp.PluginsCom.dll***

Update the file '***Plugins.xml***' (using notepad) with the following line (if it has not been done):

```
<add key="BasebandRecorder" value="SDRSharp.BasebandRecorder.BasebandRecorderPlugin,SDRSharp.BasebandRecorder" />
```

### **SDR# 1800+ (v1856 at time of writing)**

Copy the following files to you SDR# "Plugins" folder:

- ***SDRSharp.BasebandRecorder***
- ***SDRSharp.PluginsCom.dll***

No need to edit '***Plugins.xml***'

NOTE: It should be noted that not all SDR# plug-ins may work together very well.

If issues seen or if in doubt, then set-up a fresh SDR# with only this plug-in installed.

- This is the recommended way. (Don't use the *SDR# community installer*)

## **Initial testing of plug-in**

Start SDR#

Check if plug-in is visible in SDR# side panel or hamburger menu (as "Baseband Recorder")

If present, then you are ready to start using plug-in.

If plug-in is not present, then check installation instructions again.

## Usage:

**Initial plugin set-up:** (change later to suit you needs)

Set *File Format*: “**WAV SDR# compatible**”

Set *Sample format*: “**16 Bit PCM IQ**”

Set a *Base folder*:

- Default is the SDR# folder.
- This is the base folder where the recordings will be saved too.  
e.g. If you set the folder to **C:\WAVs**, then plug-in will also create a sub-folder called “IQ” in the base folder path for the daily recording folders to be created at record time.  
(e.g. folder name: C:\WAVs\IQ\2018\_08\_12)

### **Preset SDR# options for recording:**

Start SDR# radio by pressing “play” and centre the spectrum on the area to you wish to record

- For best results, offset any frequency of interest from centre by at least the filtered bandwidth. This may help avoid any DC offset that exists

Select the various SDR# options if you wish to monitor the spectrum during recording

- While most options do not affect the IQ recording data directly, they may cause the centre frequency to shift which will throw out to frequency on playback.  
Other unforeseen issues may arise from fiddling with options during recording.
- Do not change SDR# options once recording has started.

Press “Record” to manually record or use the schedules and let it control recording (start/stop).

- Left clicking will start sequential recording
  - Will create a new file each time the file format limit or set limit is reached.\*
- Right clicking will start single recording.  
Only records one file to a maximum file size set by 'File length limit MB' \*
- \* Or until no HDD space remains

If manually recording, record for X amount of time then press 'Stop'.

- If you leave recording, when the file size hits the file format limit or set limit, the plug-in will start recording to a new file and this will continue until you stop it or run out of HDD space.
- If single file recording, when the file size hits the file format limit or set limit, the plug-in will stop recording. (or until you stop it)

The recorded IQ WAV can be replayed with “**File player**” SDR# plug-in.

- While this plug-in can record across multiple files, “**File player**” plug-in can only play one file at a time.



## **Notes, bugs, limits or other things of possible interest**

### **NOTE:**

**Not all aspects of this plug-in, whether it be it's usage, features, options, bugs, issues, problems or any other unforeseeable things maybe covered by this documentation.**

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Changing radio samplerate during recording is not recommended.

Changing detector type during recording is not recommended.

Changing Step size during recording is not recommended.

Changing Snap to Grid during recording is not recommended.

The some above options may cause the centre frequency to shift cause expected results.

The samplerate of the recording will depend on the SDR used.

The size of the file created in addition to the duration, is dependant on the samplerate used as well as the selected sample format of the recording (i.e. 8, 16 and 32 bits).

As a result, an IQ recorded file can get large quickly and the maximum file size maybe limited by the selection of the WAV file format.

WAV SDR# Compatible = 2 Gb

WAV FULL = 4 Gb

WAV RF64 = 1 Tb imposed limit (not file system limitation)

Recording large files may be problematic or slow processing with some software.

The sample format used (8, 16, 32 bits) for the SDR# IQ data is scaled down to the appropriate data type before it's saved to file with exception of the 32 bit format which is a direct copy of the SDR# IF IQ data stream. It should be noted that the 8 and 16 bit formats are not without some loss of the resolution of the signal and their selection/usage may depend on the signal been recorded. (analogue or digital)

The IQ bandwidth used for recording is determined by SDR# and the SDR frontend/driver

NOTE: File-names are create with timestamp and frequency (19-25-39\_418100kHz.wav)

These files will be created in daily folders from the base folder. (C:\IQ\2022\_01\_10)

The "IQ" folder is created to separate Baseband recordings from IF recordings (which uses "IF")

Theme matching does not 100% match all colours used by controls

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### **BUGs:**

None observed

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This modified version and documentation by thewraith2008 started in 2021 see ***Changelog.txt*** for more details about changes and fixes.

**Support forum here:**

<https://forums.radioreference.com/forums/software-defined-radio.193/>

NOTE: Support is not guaranteed. Especially if the answers are contained in the documentation or on forum.

Special thanks to the creators of the following software:

**SDRSharp (SDR#)** by Youssef Touil

- <https://airspy.com/>
- The Baseband Recorder plug-in utilises code from the SDR# plug-in API.  
As such, that code used by the plug-in is the property of Youssef Touil (Airspy).

**Baseband Recorder** (this original SDR# Plug-in) by Vasili (TSSDR)

- <http://rtl-sdr.ru>
- Thanks Vasili for allowing me to update this plug-in.

### **Necessary Disclaimer:**

- This program is "as is"
- This program most probably contains errors, bugs or whatever and that it may crash itself, SDR#, the plug-ins, windows or your car. You accept that you use it at your own risk.
- I make no promises to update it or support it.
- I'm under no obligation to implement anything.
- The creator of SDR# has the right to change their code as they see fit. Because of this, this program/plugin can and probably will break.
- Not reading the read-me/set-up and usage documentation files may cause you issues.