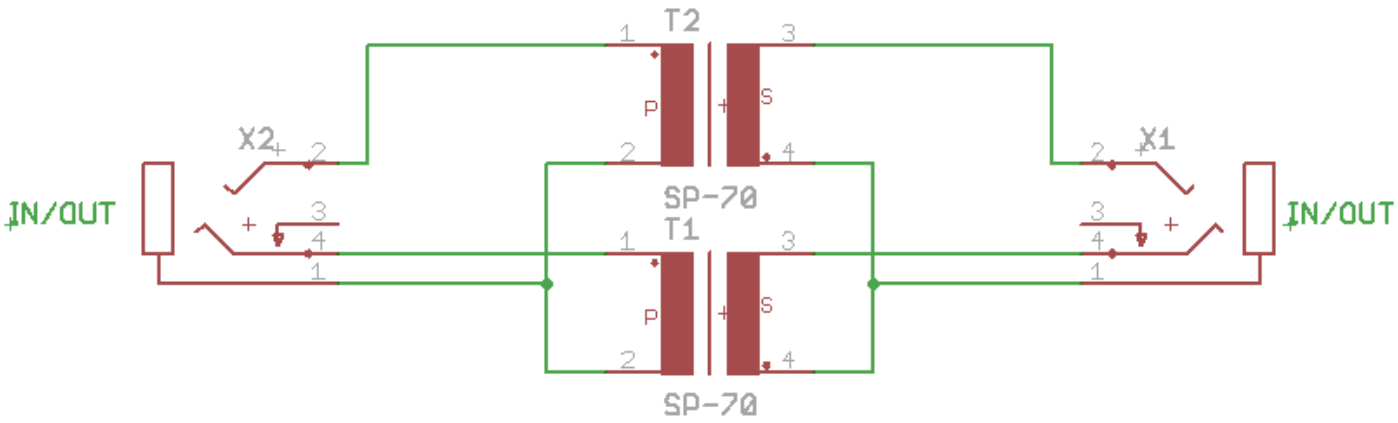
Audio galvanic isolator
For soundcards and SDR receivers
1. Principle

A ground loop through receivers between antenna or USB connection and soundcard input is very common for soundcard based SDR receivers, where the soundcard are used to sample the I/Q channels. This type of ground loop problem can be solved by using suitable galvanic isolation between the receiver I/Q output and the soundcard input:



The audio galvanic isolator is build by a couple of broadband audio transformers and have a symmetrical design. The input / output impedance is 600 Ohm (turn ratio = 1:1), therefore you can also invert the input and output connections.

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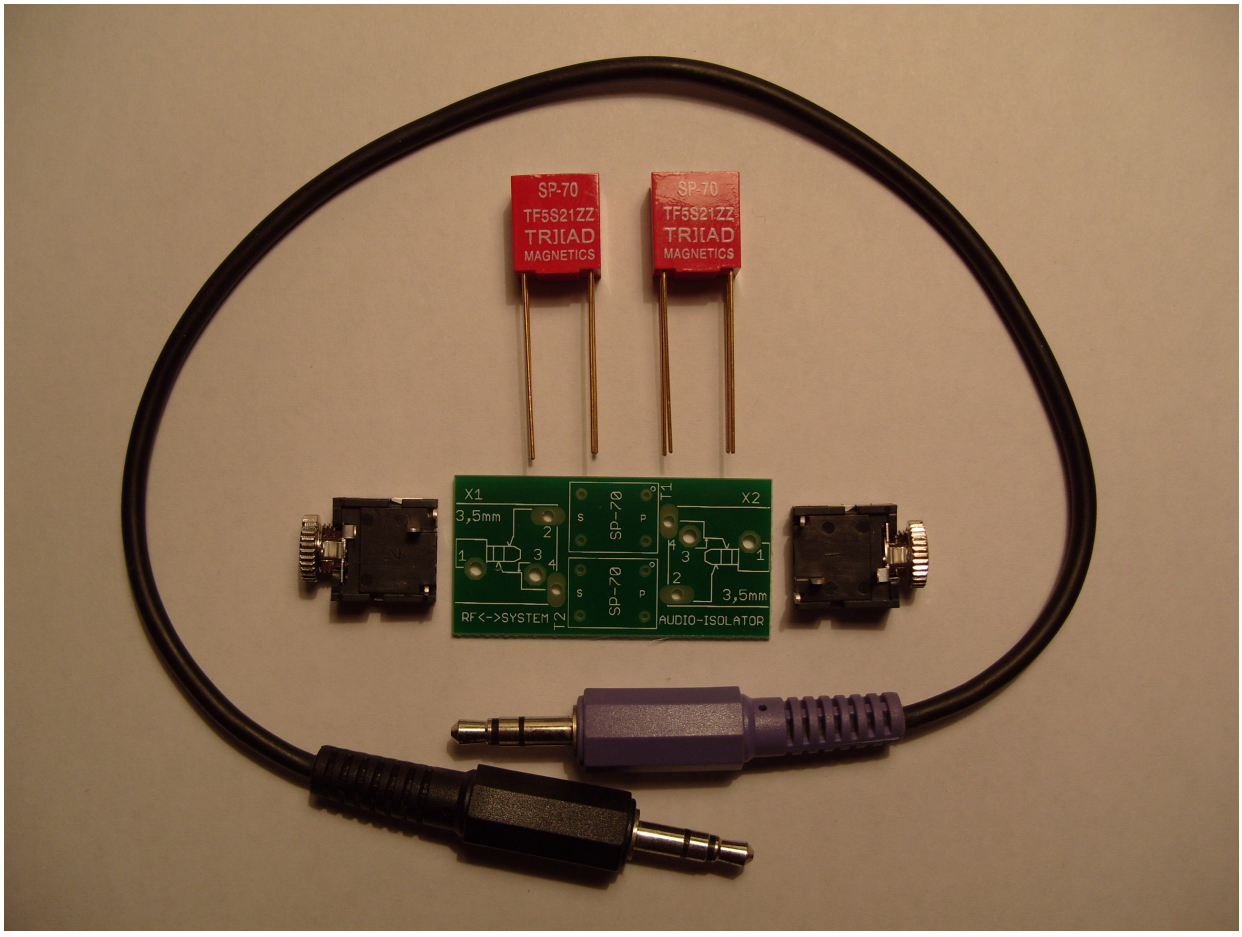
2. Kit parts

The kit include:

- 1 PCB board 37x19mm , single layer
- 2 pcs. 3,5mm Jack - Female stereo connectors
- 1 3,5mm Jack – Jack Male stereo cable (30cm)
- 2 pcs. high reliability, MIL STD broadband audio transformer TRIAD MAGNETICS SP-70
- 1 enclosure kit (white POM)



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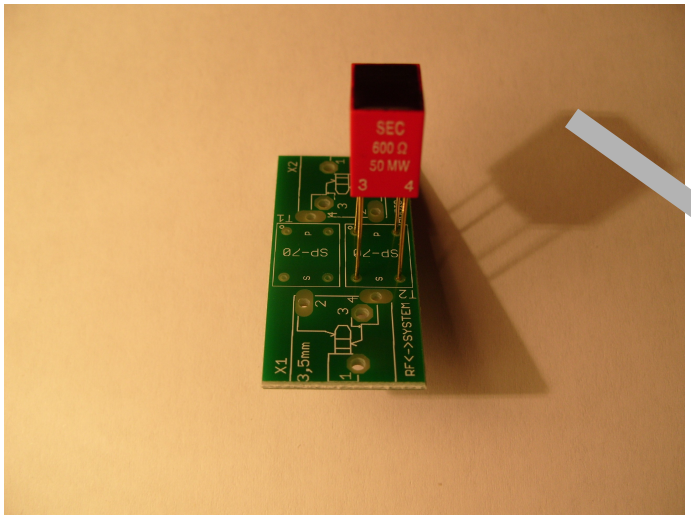
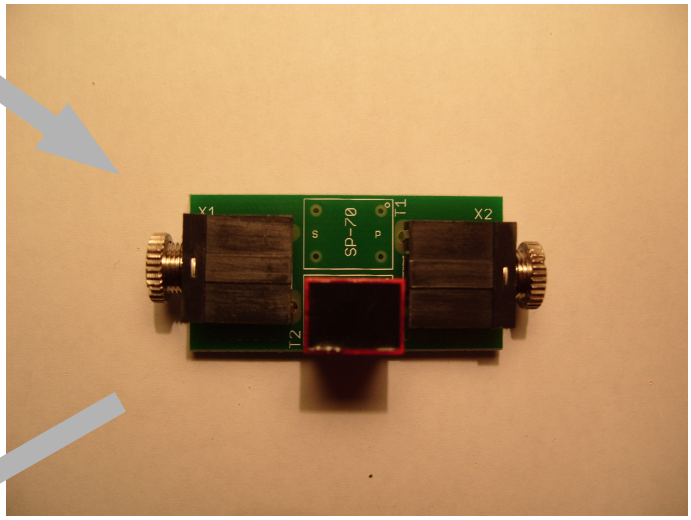
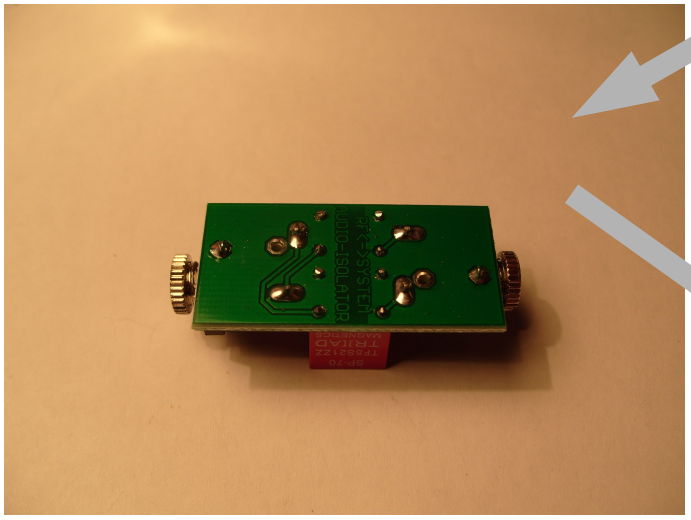
3. Assembly

Solder the transformers and the connectors:

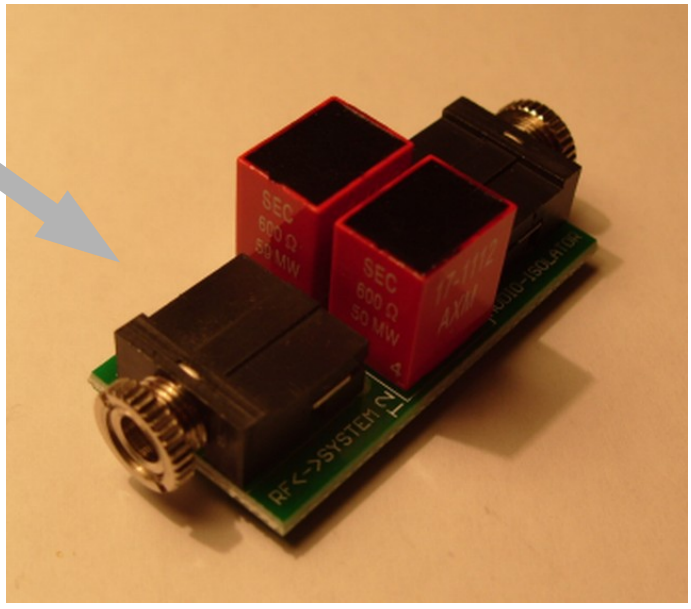


Place transformers and connectors





Sold all pads



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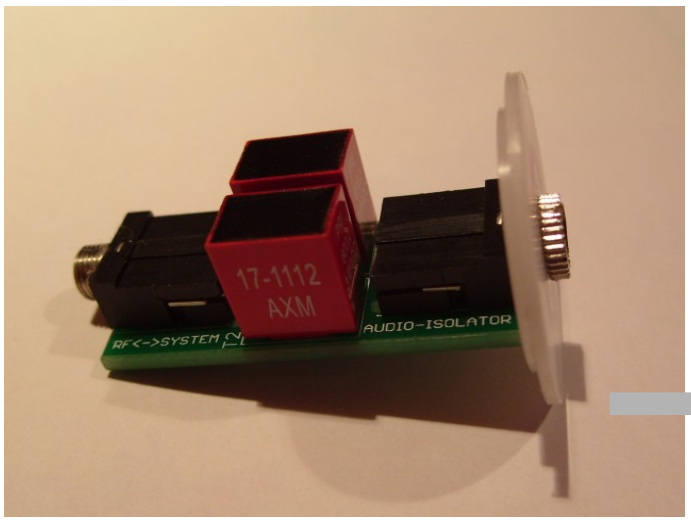
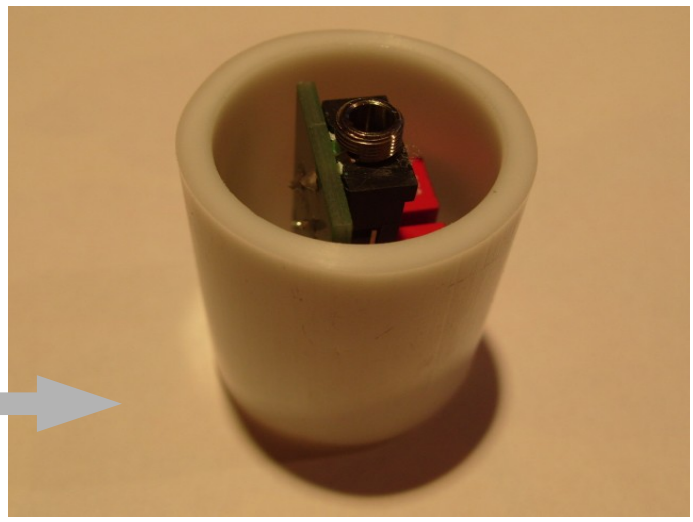
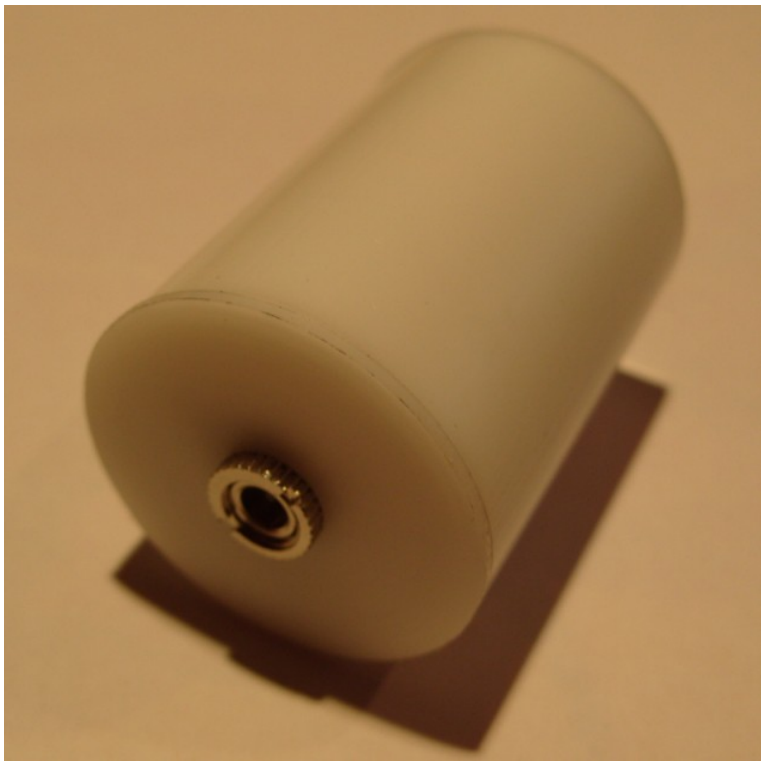
Put the pcb in the enclosure kit:







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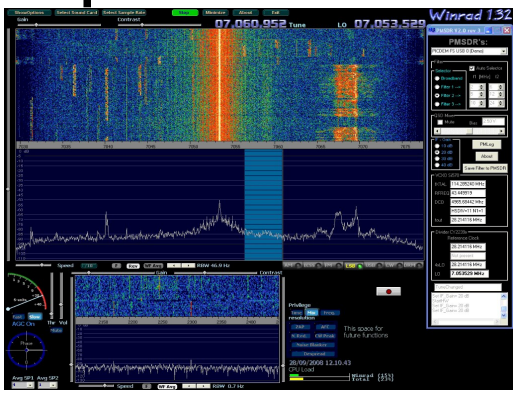
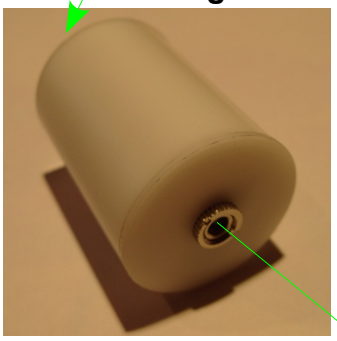
4. A usage example

Antenna



Antenna galvanic isolator

Audio galvanic isolator



Soundcard Line In

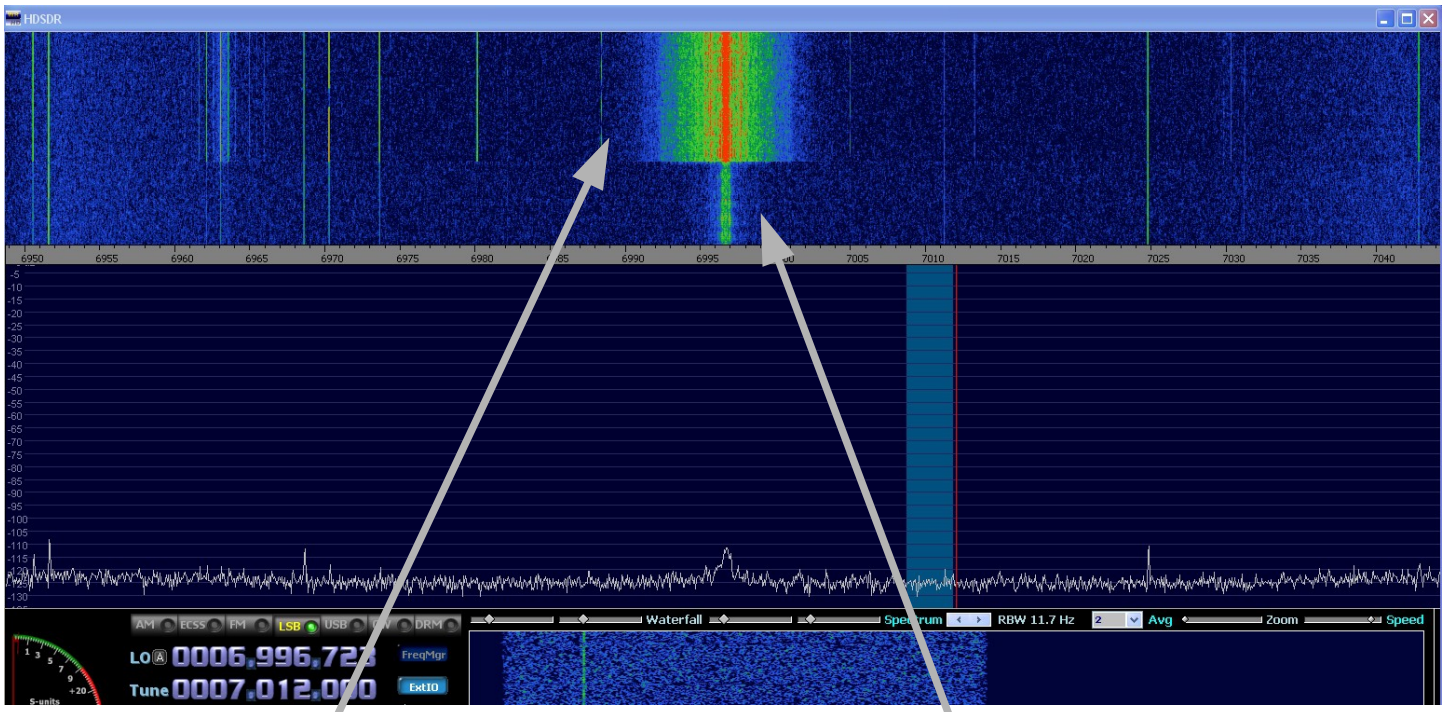
USB

Audio galvanic isolator for receivers

5. Results

Here some comparisons on systems with different soundcards.

The follow example show the spectrum with a Soundblaster X-Fi Extreme PCI at 96kHz samplingrate on a PMSDR:



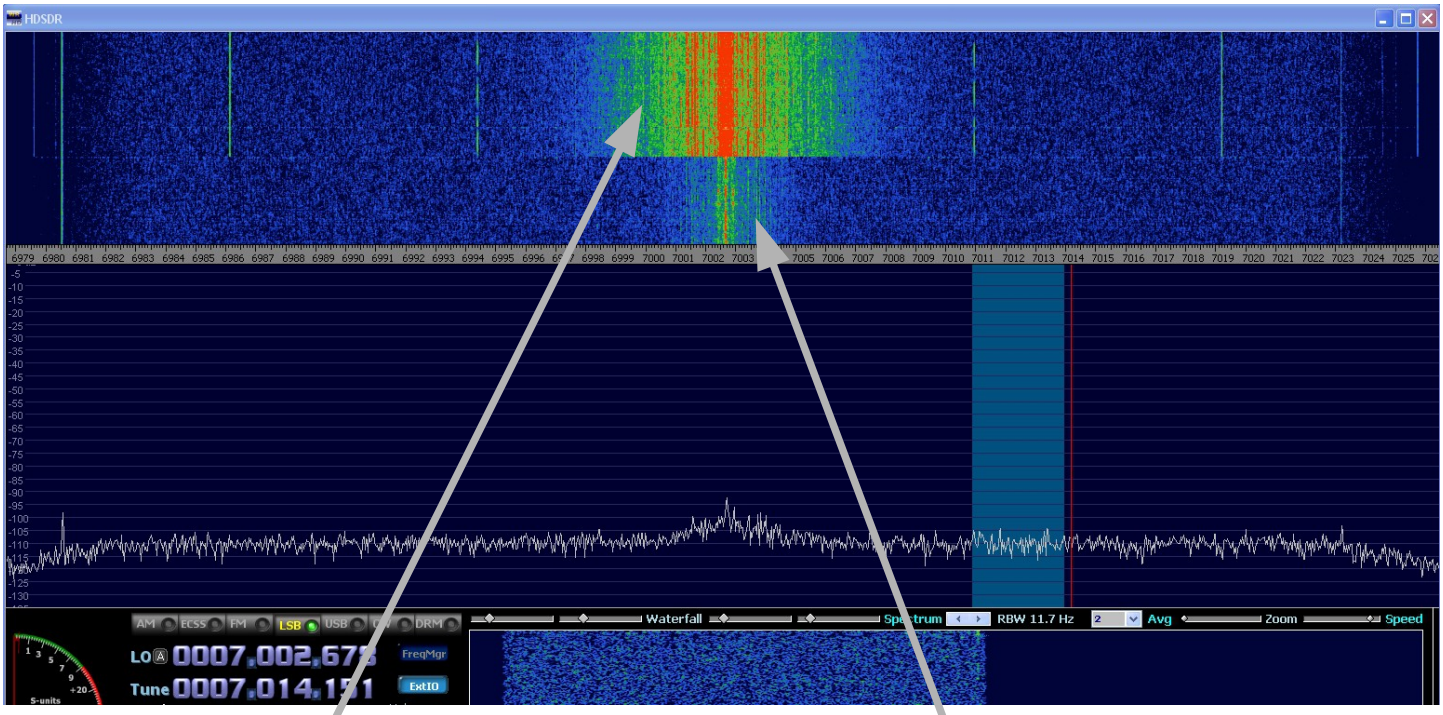
I/Q Output directly connected to the Line-IN of the soundcard without galvanic isolator

With Audio galvanic isolator

Audio galvanic isolator for receivers

5. Results

The follow example show the spectrum with a built-in RealtekHD at 48kHz samplingrate on a PMSDR:



I/Q Output directly connected to the Line-IN of the soundcard without galvanic isolator

With Audio galvanic isolator

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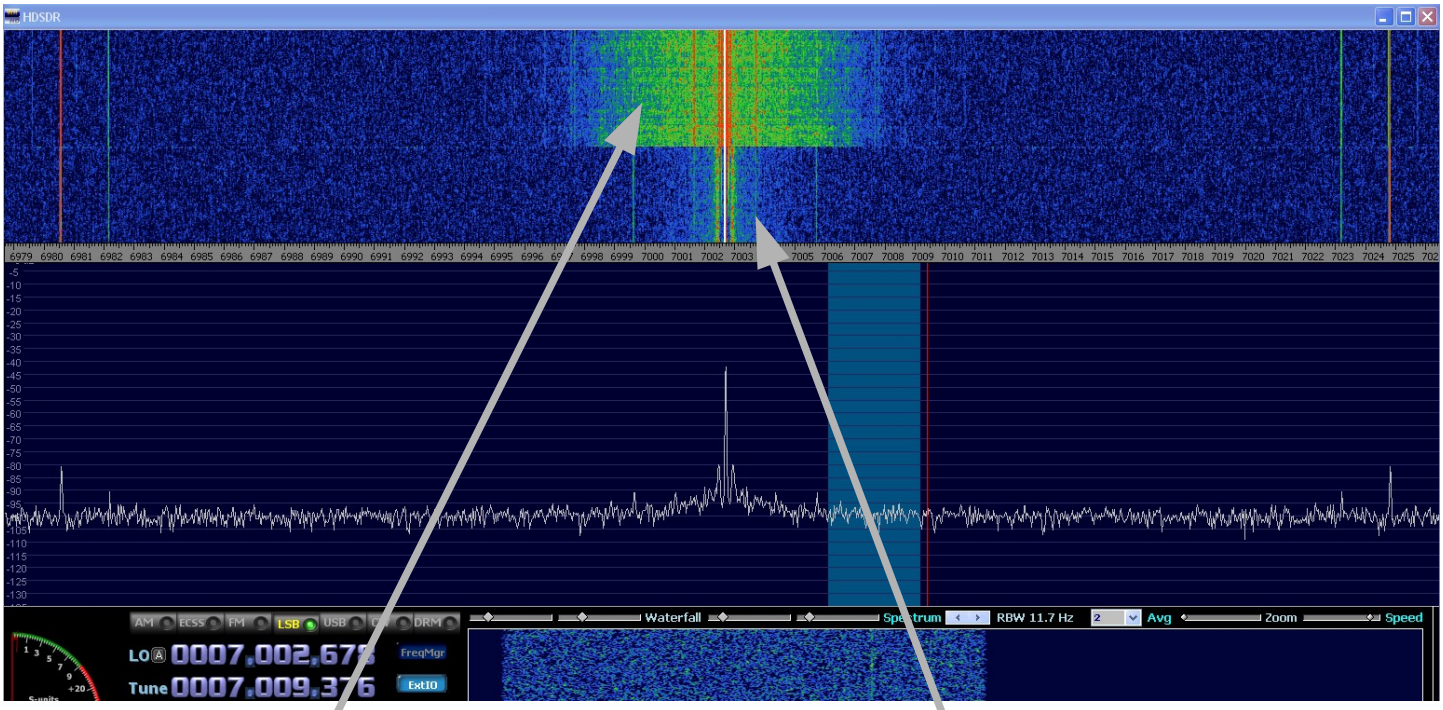
5. Results

The follow example show the spectrum with a low cost USB-Stick soundcard at 48kHz samplingrate on a PMSDR:



I/Q Output directly connected to the Line-IN of the soundcard without galvanic isolator

With Audio galvanic isolator

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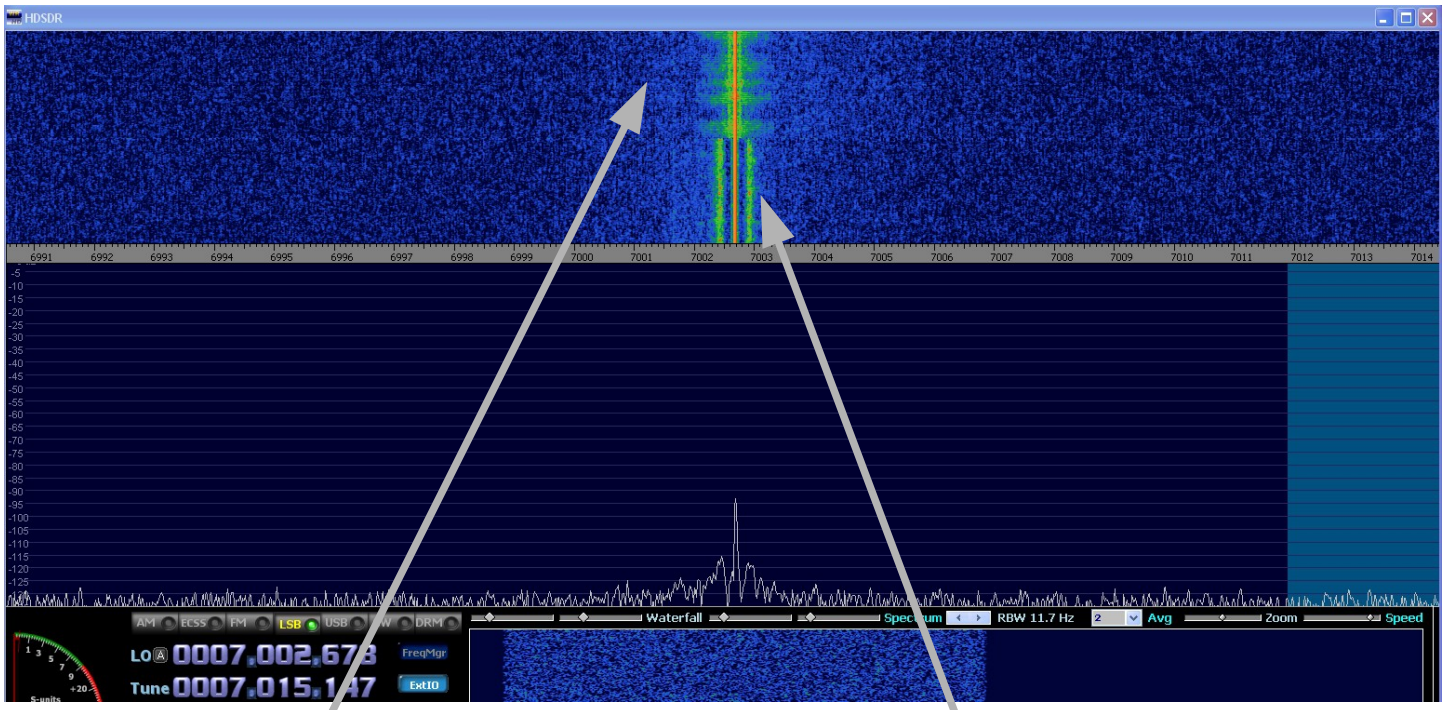
5. Results

There are also cases, where are present a very narrow center peak also without a galvanic isolator. In this case no galvanic isolation are neccessary. Here a zoomed portion of 24 kHz spectrum with a Creativ E-MU 0202 external USB soundcard at 192kHz samplingrate on a PMSDR as example:



I/Q Output directly connected to the Line-IN of the soundcard without galvanic isolator

With Audio galvanic isolator

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6. Technical specifications

- Input/output impedance : 600 Ohm (1:1 turn ratio)
- Frequency response: +-2.0dB, from 30Hz to 100kHz
- Maximum Power level : 50mW
- Number of Channels: 2 / stereo

Here a comparison between two measurments of frequency response: with (green) and without (white) galvanic isolator on a EMU0202 soundcard: