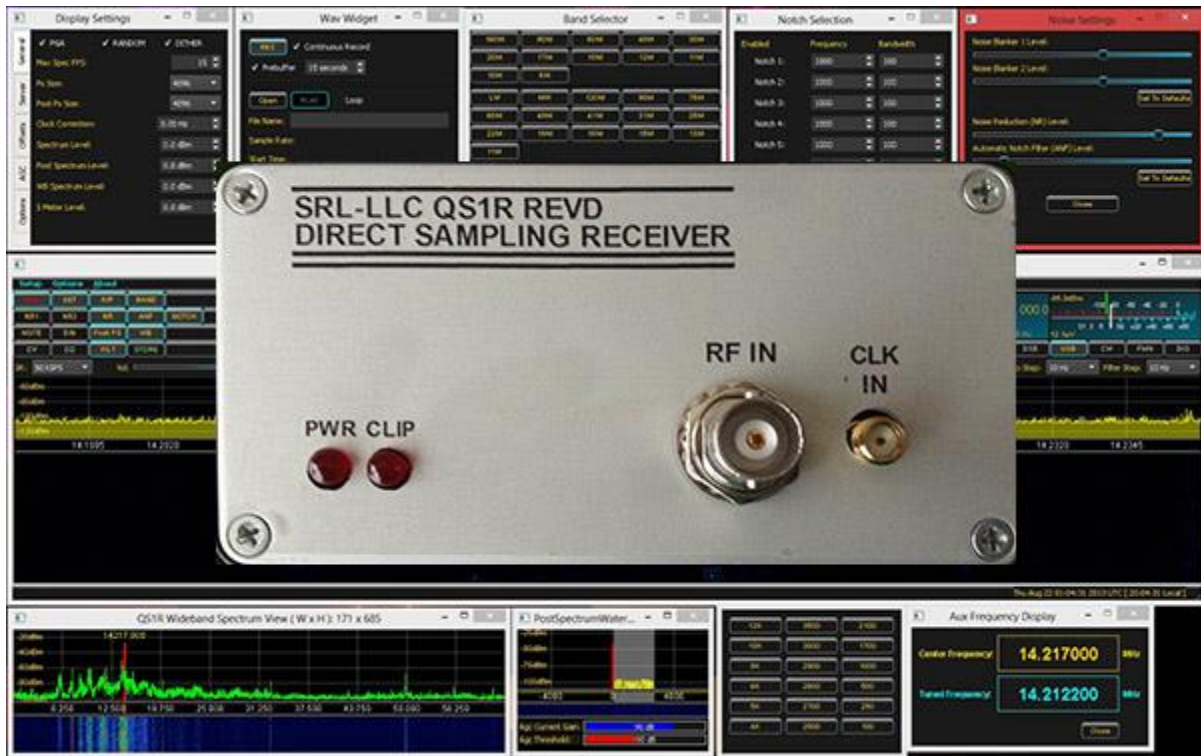


Zone QS1R Review



SDRZone



QS1R Review

September 23rd 2013

Reviewed by NI0Z

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QS1R SDR

Software Radio Laboratory LLC

Review Type = Mid-level

SDR Type = DDC SDR Receiver

Review Scope

The QS1R is a highly capable device, not only an SDR. Due to my own limitations to review the additional capabilities of the QS1R, I will only be reviewing it as an SDR Receiver.

Reviewer

NI0Z, Mark Abraham - Licensed as Extra 2011. You can read more about the reviewer's background using the link at the bottom of the review.

Ordering, Shipping & Receiving

While I did not order the radio per se' as it was graciously provided by Phil Covington for me to review, I do believe from having watched his video that he shipped it to me like any other customer.

Because Phil wanted me to have what I needed to review this fine SDR he provided me the Power Supply, and a USB cable. These are options on his site that I recommend you just add to your order.

I was notified by both Phil and USPS the SDR had shipped. The device came in a typical USPS shipping box well protected with popcorn and the hardware protected again via a plastic bag.

This was all fast and easy and there are no concerns on my part, shipping and receiving was first rate!



The packing box was a standard US Post Office Issue



There was ample packing materials to protect the radio.



Everything was sealed in plastic protecting it from any moisture.

Specs

The following excerpt is taken from the website:

The SRL QS1R Receiver features a high performance FPGA with plenty of extra capacity for future expansion. Two or four independent receiver chains sharing the ADC anywhere within the 15 kHz - 62 MHz range is one possibility. Unlike other DDC type Software Defined Radios that use a dedicated DDC chip or an inadequately sized FPGA, QS1R allows future expansion, room for experimentation, and upgrades because of its generous Cyclone III FPGA with many DSP resources. The firmware, software, and FPGA HDL for the QS1R Receiver is available for experimentation and writing your own custom application. You can view, change, improve, and experiment with the receiver's code. Since the majority of the QS1R's functionality is within the FPGA, a new, updated radio is just a download away.

SRL QS1R Features

- LTC2208 16 bit, 130 MSPS analog to digital converter (ADC)
- Altera Cyclone III EP3C25 FPGA
- Cypress CY7C68013A USB 2.0 Microcontroller
- I2C expansion bus
- SPI expansion bus
- RF expansion "VERB Bus"
- Firmware, verilog, and software user updatable via web download
- Secure Digital (SD) card connector for configuration memory (optional)
- TI PCM1771 24 bit DAC for optional audio output
- Low pass filtered (55 MHz) BNC input
- Direct input (15 kHz - 300 MHz) via RF expansion bus
- External encode clock (ADC clock) input via SMA connector
- Ultra low noise clock included as standard
- 160 x 100 mm (6.299" x 3.940") L x W
- Fused and reverse polarity protected 2.5 mm DC power input
- Power and ADC clipping LED indicators
- Four user programmable "debug" LEDs

QS1R Possible Uses

- Spectrum Analysis
- General Purpose ADC board w/ up to 4 MHz BW
- Software Defined Receiver
- Short Wave Listening (SWL)
- Amateur Radio HF Receiver
- Amateur Radio IF Receiver
- Panoramic Adapter for Communication Receivers (Any IF)
- FPGA based SDR Development Platform
- Ultrasound Receiver
- Radio Astronomy
- VLF Experimentation
- SDR Education
- Interferometer for passive RF signal location
- SIGINT
- COMINT
- TDOA

QS1R Specifications (Standard Receiver*)

- Frequency Range (BNC LPF Input): 15 kHz to 62 MHz
- Frequency Range (SMA direct input): 15 kHz to 300 MHz

- Input Impedance: 50 ohms
- Clipping RF Level: +9 dBm
- Maximum Bandwidth: 4 MHz
- ADC Sampling Clock: 125 MHz (1 - 130 MHz with external encode input)
- I/Q Image Rejection: >115 dB
- MDS (500 Hz): -122dBm @ 14.1 MHz
- BDR: 125 dB
- Voltage: 5 - 6 VDC, 2A fused, reverse polarity protected
- Current Draw: 500 mA (typ.)
- Connectors: BNC (RF IN LPF), SMA (EXT ENCODE CLOCK), USB Type "B", 2.1 mm DC Power
- LEDs: Power, Clipping, Debug (internal)
- Dimensions: 160 x 100 mm (3.299" x 3.940") (board size)

Radio Build

The build and finish of the SDR is nice. No scratches, chips, loose screws or surprises. The connectors are solid and the overall finish is professional. I think most would agree it's better not to have to pay for a designer case as we just want a highly functional SDR in a professional case and that is what I believe I received with the QS1R.

As you can see the radio is clean and proper flush. The serial number is hand written neatly on the back of the device.



Professional Case and Labeling

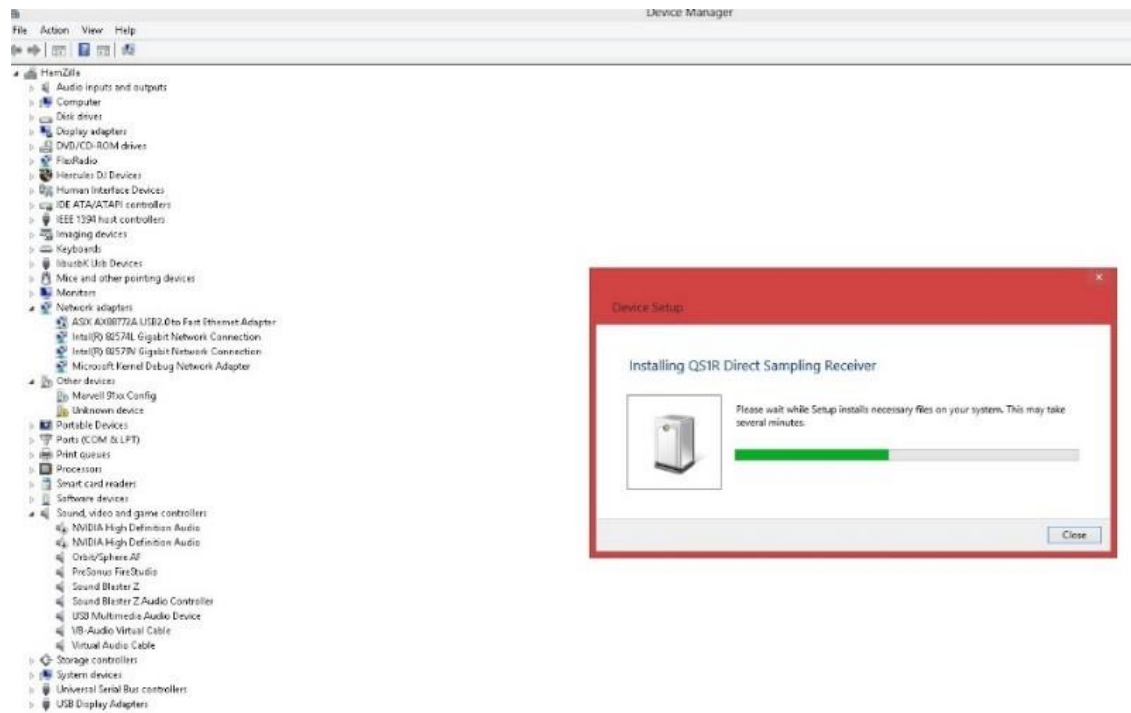


Solid professional connectors

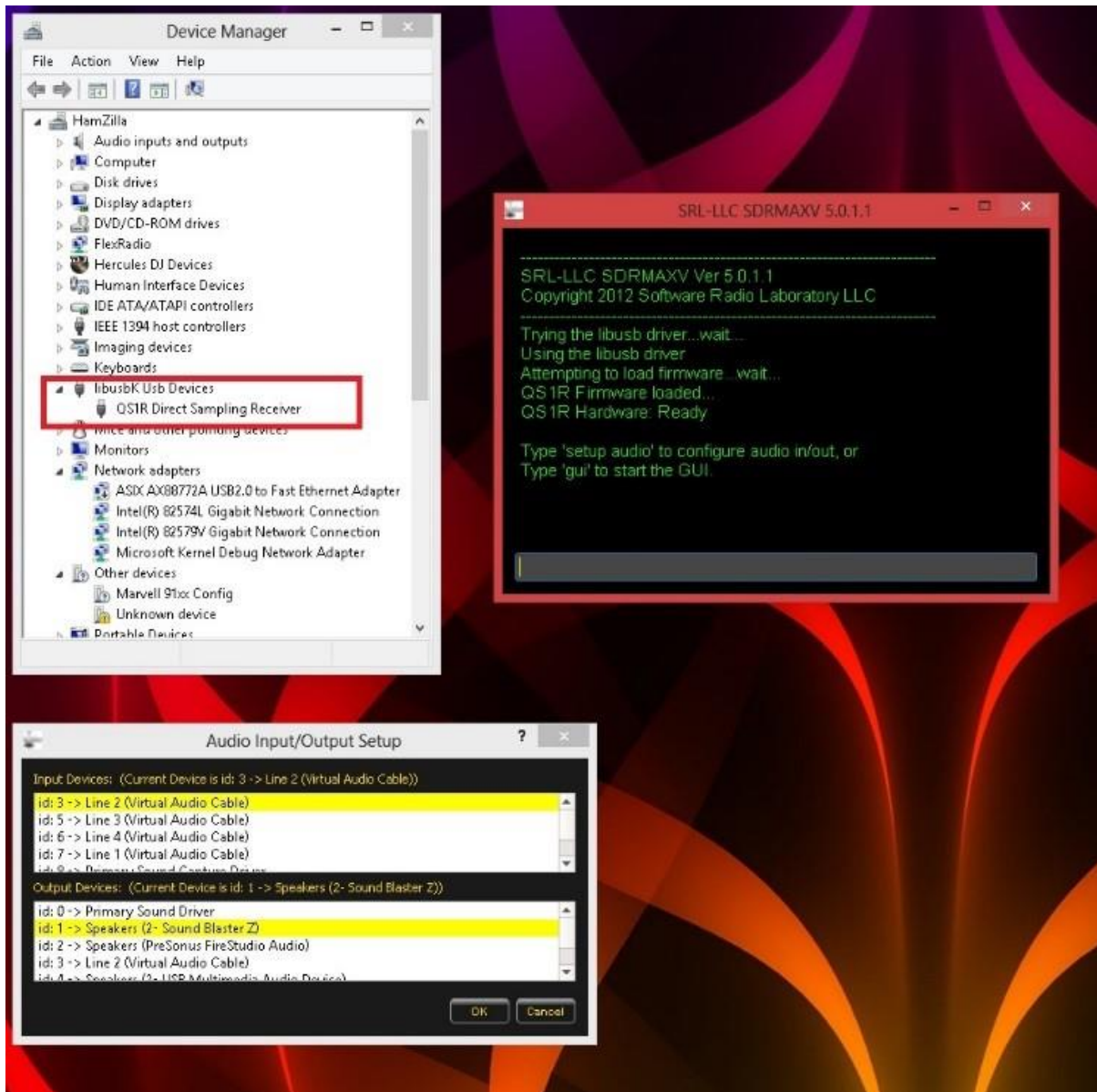
Setup

Software is a breeze. Instructions are provided on where to download the software and the download is fast and seamless. The installer is a straight windows installer and requires few responses to complete the install.

Hardware setup is a breeze as well. After the software (SDRMax V and USB Driver) is installed you simply connect the radio via USB and the Power Supply and RF Source.



Device Driver Installed as seen in Device Manager and Audio Setup Screen after you type "Setup Audio"



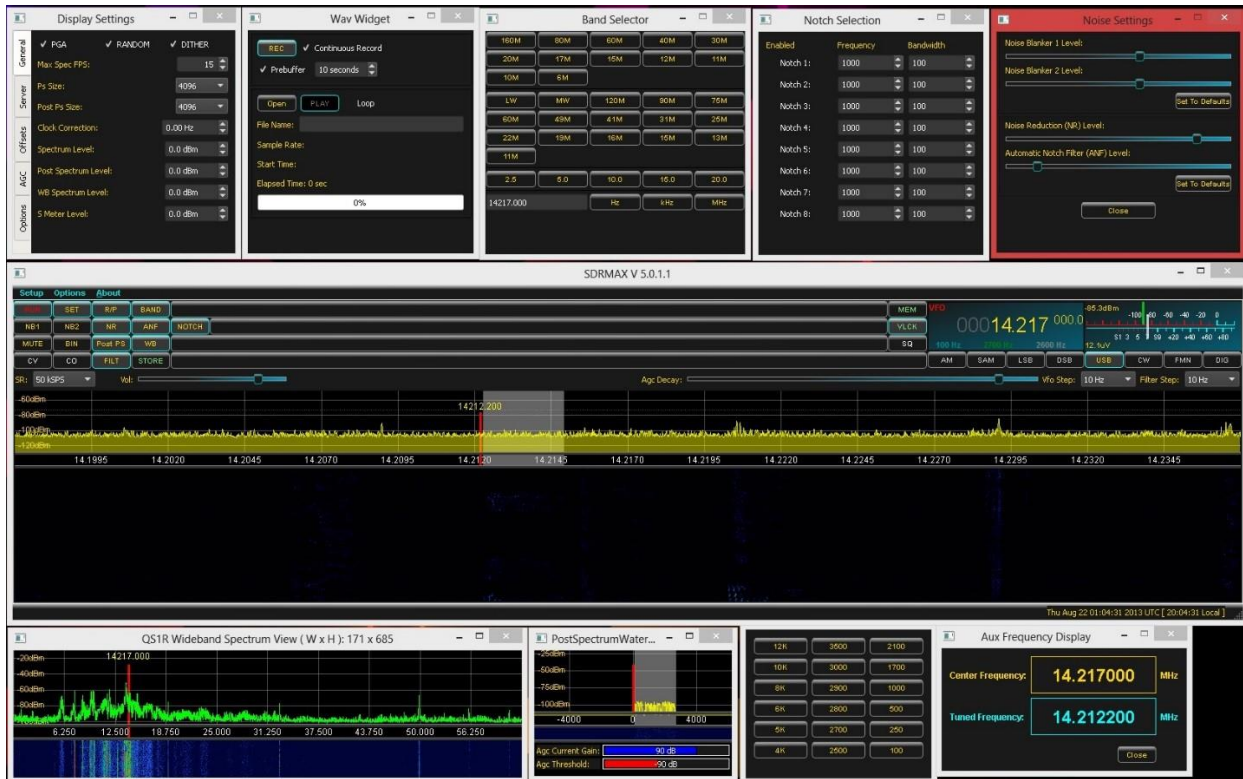
Overall setup is straight forward and simple per the instructions.

Operation

It always takes a little bit of getting used to a new software package. Because SDRMax has been leveraged by others using Phil's code I was not all together a stranger to it. Besides, I cheated and watch Phil's YouTube video that provides a wonderful tour of SDRMax V.

SDRMax V is a very well thought out piece of Software that obviously shows the elegance of maturity having distilled its way to version 5.

The controls are all laid out nicely and the user can expose band, filters, notch filters and recording controls and a full spectrum view on an as needed or permanent basis.



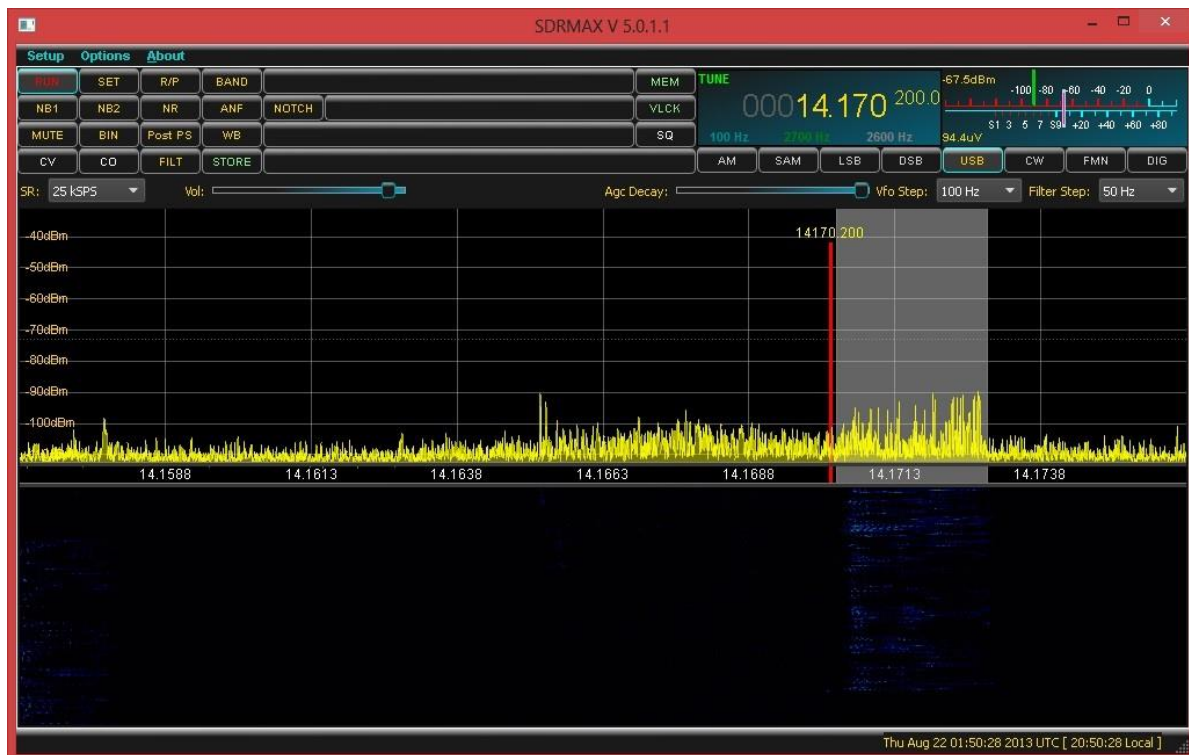
In this view I have deliberately opened a majority of the screens available in SDRMax V

I particularly like the SMeter, it has a very realistic liquid movement.

There are even controls built into the meter display allowing you to use it for tuning or for tracking click tuning.



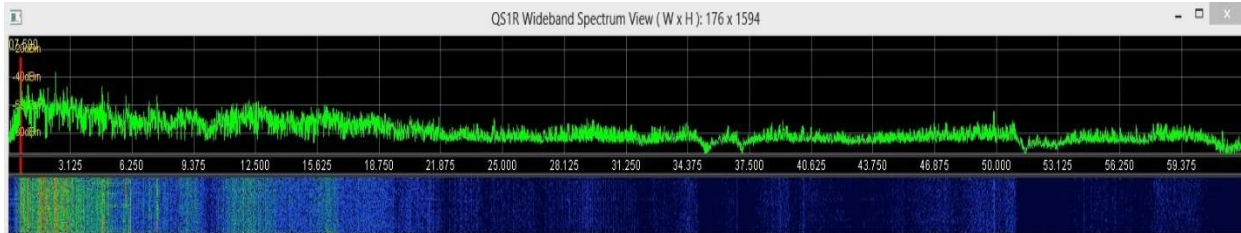
Tuning is easy enough, you can point and click and fine tune with the mouse. No surprises here. You can control step size, easily using the controls on SDRMax to allow for course or fine tuning.



Phil Covington – “ *If you have a Griffin PowerMate knob <<http://store.griffintechology.com/powermate>>, SDRMAX V directly supports it to use as a VFO knob. It does not have the focus issue since I wrote a driver to directly talk to the knob, bypassing Windows HID driver. You can be working in another application, and the Griffin Knob always controls the VFO of SDRMAX V.*”

I really enjoy having a knob with PowerSDR using the Hercules Controls and wish I had a knob to use with SDRMax. It would be super nice for fine tuning verses the mouse wheel which pales in comparison.

You can also point and click from the Wide Spectrum display to quickly hop up and down the bands. This is very handy and makes surfing the spectrum fun and very easy!



SSB

The audio is quieter than some of the other SDRs I have used and rather smooth and overall easy on the ears. This is not only noticeable in SDRMax, I observed it in Studio 1 as well.

I compared the QS1r to the Anan and to the Afedri. I could hear and see some observable difference between the Afedri and Qs1r, however, I did not hear much between the Anan and QS1r. I would say the QS1r audio is noticeably superior to the Afedri in Studio 1 as it should be based on the difference in the ADC and components.

Readers may not realize the historic importance of the QS1R as it was one of the earlier DDC Receivers and still a leader in terms of its chipset and performance capabilities. Phil Covington is one of the forefathers of DDC receivers for us in the SDR community. The ADC in the QS1R is really no less capable performance wise than those in the Anan and Flex 6K series when it comes to receiver performance.

If one considers this and that Phil is still actively engaged in FPGA development the QS1R comes up extremely high on the value to performance ratings. In fact, I am told that apart from the added filters and transmitter circuitry that other SDR's are based off of Phil's original design.

PSK31

The short answer is that it works fine and there are no surprises here. Side by side against the Anan 100D I could see no difference in performance. You can use a Virtual Audio Cable to route the audio out of SDRMax V to your Digital Modes Software such as DM780 with ease. No fussing or surprises here, you just simply set your output in the SDRMax Audio Setup. I should note that while the QS1R does not have the filters that the Anan 100D does, I did not turn off the Alex Filters in the Anan 100D in my comparison videos. As an operator looking at relatively weaker signals I did

not see any real difference in normal operations. It should be noticed that I did not experience any strong signal conditions that would cause clipping and so attenuation did not come into play in my limited usage and testing. Keep in mind that this is real world testing and not lab testing and so my observations in theory could be flawed. It should be noted that based on my observations that DM780 became more of a limiting factor than the QS1R as far as weak signal work is concerned.

CW

I had no surprises routing CW to DM780 either and the side by side against the Anan 100D showed no major differences.

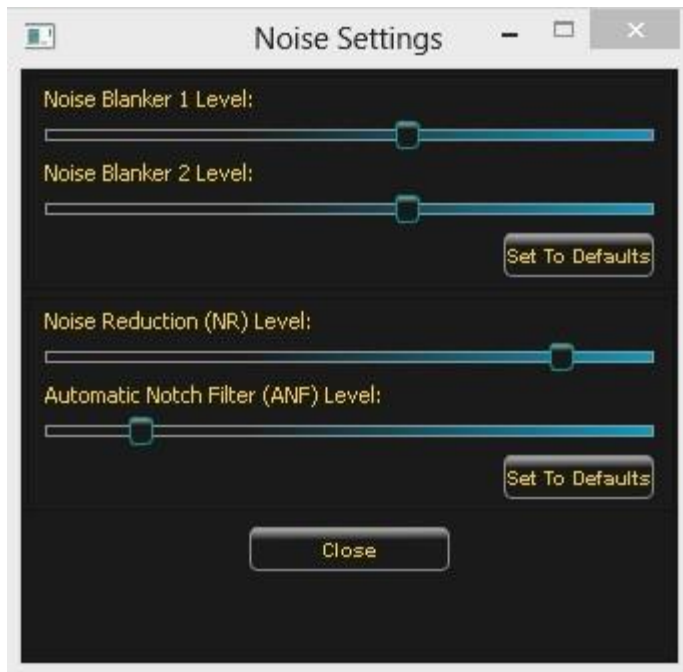
I came to learn in the CW Discussion on the Zone forums here that Phil as actually added FPGA code to better handle CW and that for all practical purposes as far as latency goes, if you are a CW operator that the PC and not the SDR would be the limiting factor as far as latency issues go. This is quite impressive and just more evidence that there is so much more that can be done now with the current crop of FPGA DDC Receivers.

Please note that these were very unscientific comparisons and while I did try to set each SDR as close to the other, its not exact, they use different DLLs and neither was using its native software. These are just high-level comparisons and you can see them on my profile under videos here in the zone.

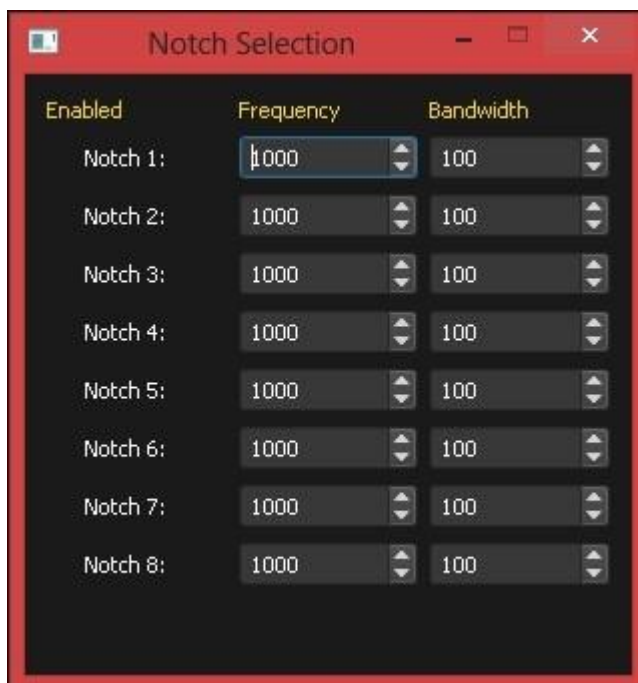
SDRMaxV

As far as SDR software goes, I like SDRMax. It has all the features you would expect and can cater to both Shortwave Listeners and Hams as well as other types of users. The controls are all intuitive so learning the package is not difficult.

The noise Reduction controls are nice as they allow for detailed control of the noise reduction.



If I had some criticism for SDRMax it is the notch filter controls, however, Phil is still working on those and I am sure they will be nice when he is done given the rest of the work that has been done in this software.

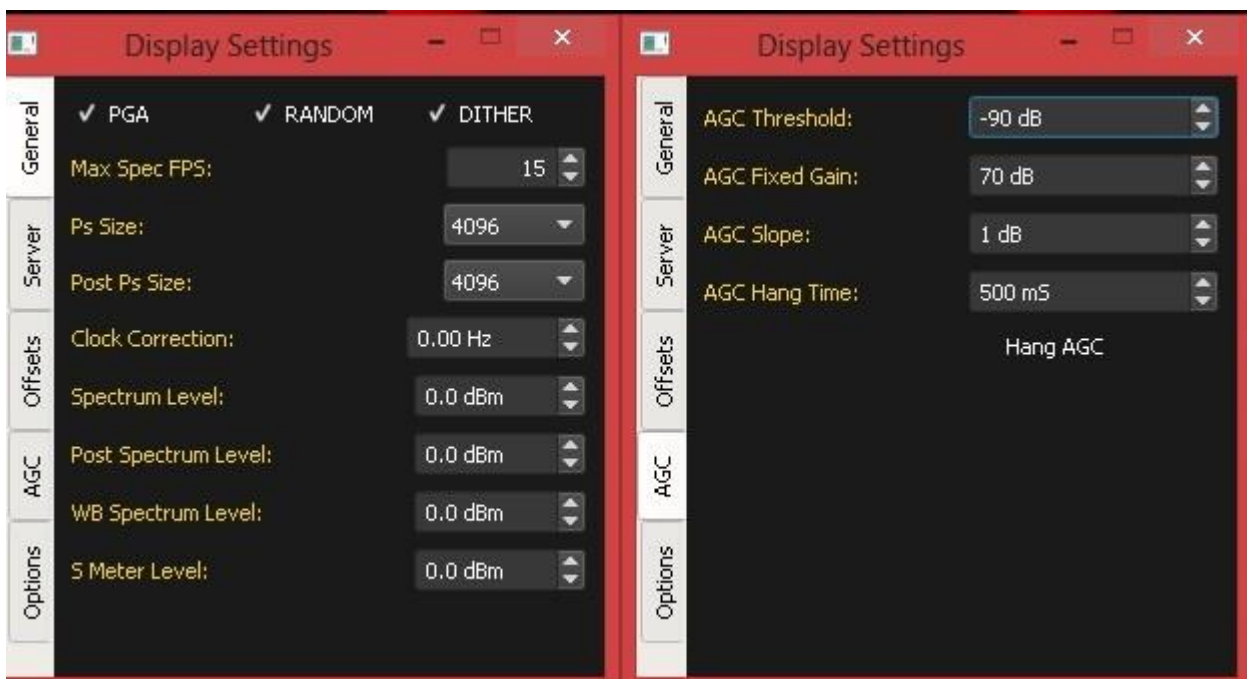


Band Controls

The Band selection controls are very straight forward with the added bonus of the SW Bands and WWW Presets.



You can see a few of the main setting controls below, very straight forward!



You can change the color scheme, however, there is not a setting to change the text colors, otherwise, one could really change the schemes to their liking. I would like to see the text colors available for change and theme saving. This should also save window positions as well so if you are like me and want to open up additional windows you won't have to keep doing it on each use.



Mac Support

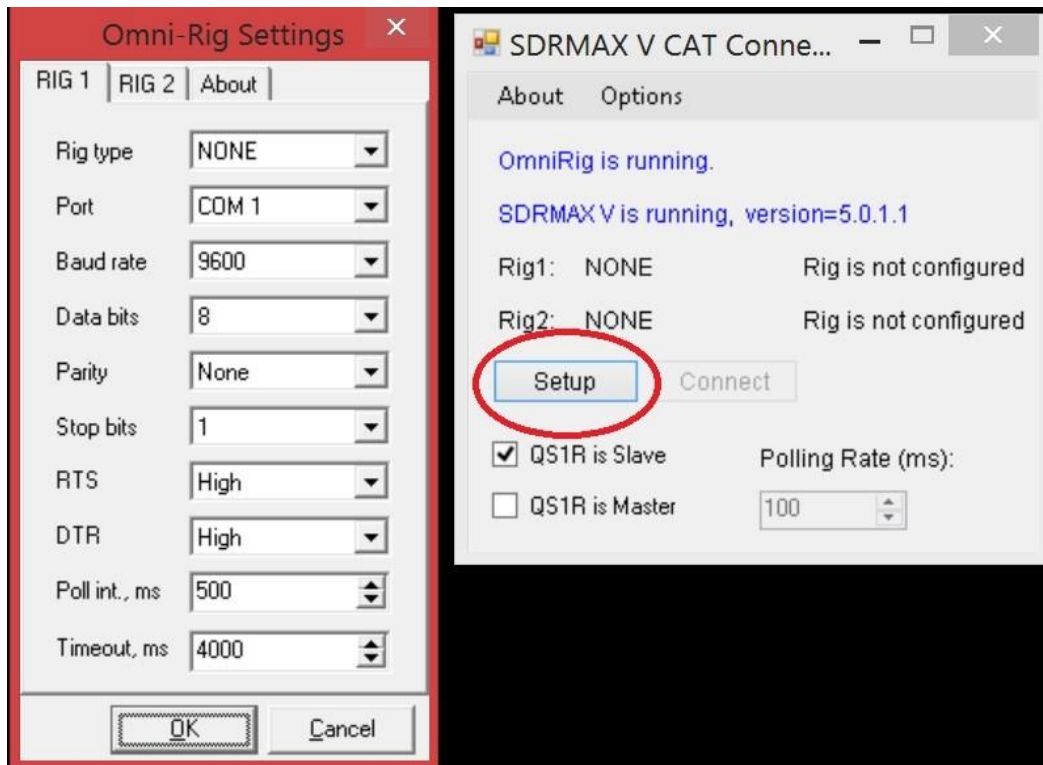
Rarely have I seen such a complete straight translation of software on a PC running on a Mac. There seems to be absolutely zero difference between the PC and Mac version, including look and feel. I ran the QS1R through its paces on the Mac and the only issue I could really see is that perhaps my older Macbook Pro, circa 2009 is a little too slow to keep up with the higher sampling rates on the QS1r.

Linux Support

I did not setup the QS1R on Linux. Phil can provide source code with a signed NDA so users can compile the code on Linux. This would allow one to compile it on their version of Unix. This opens up a score of possibilities to further tap into the power of the QS1R.

CAT Control

SDRMax comes with QSCatConnection which allows the end user to start the program and config cat control with Ominrig to sync their QSR1 with another radio or use it with HRD.

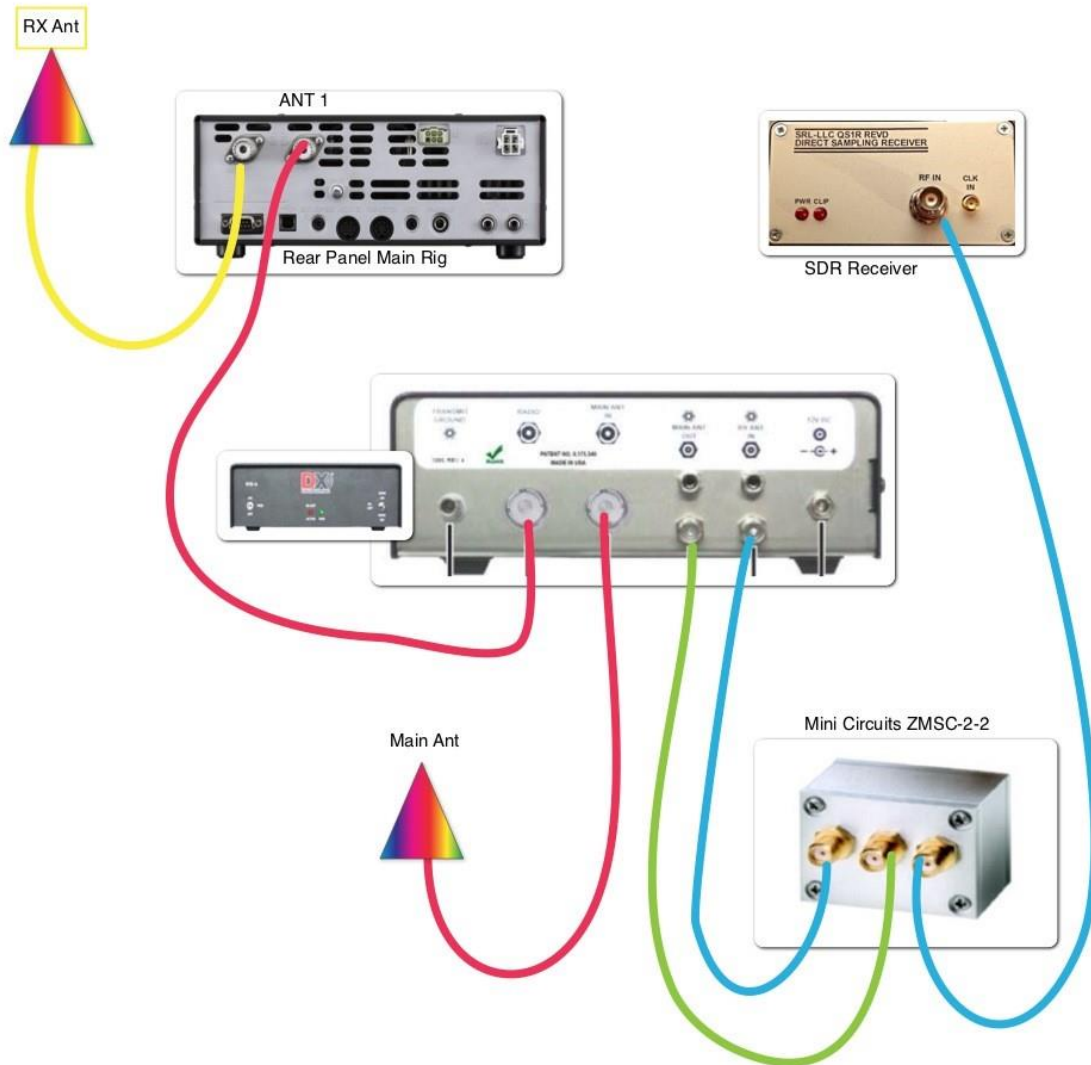


I tried this with the KX3 and this worked very well.

Dedicated Receiver Usage for Panascope

Its worth noting that I also configured the QS1R as a dedicated Panascope with the KX3. Below is a Splitter Setup Diagram [Actually created using TS-590 Rear Panel View that one could use in conjunction with the aforementioned CAT Control setup and their radio to get an very nice Panascope.

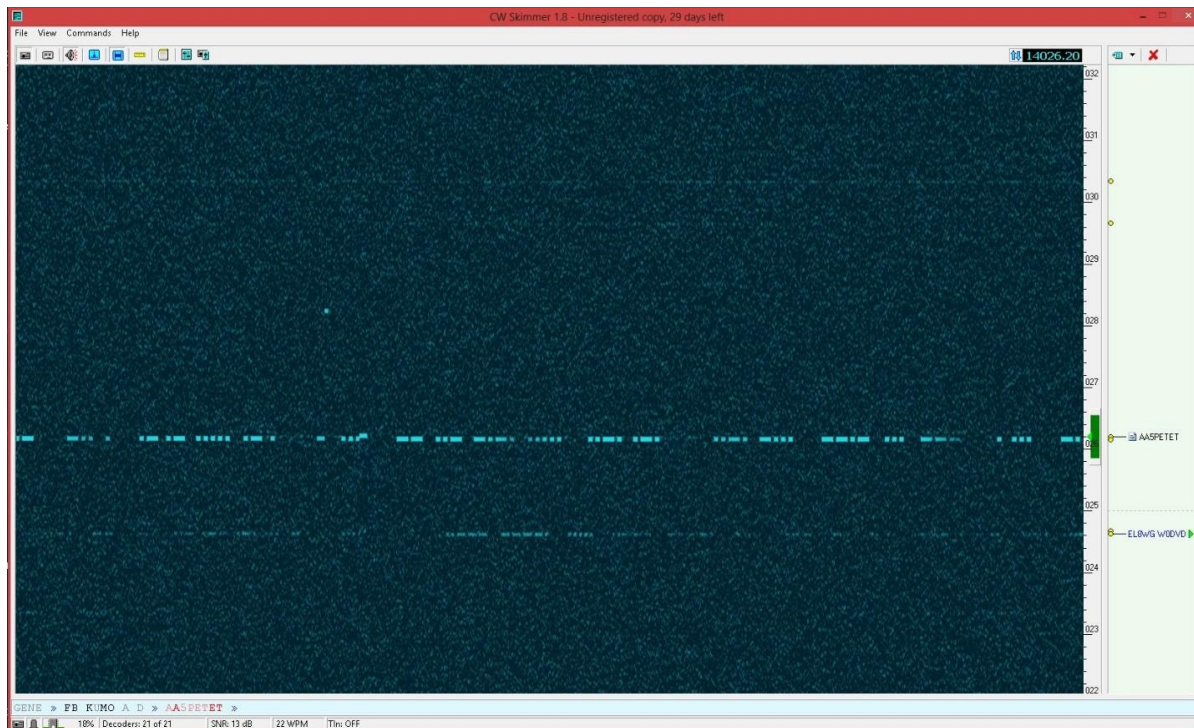
TR Splitter Setup



This setup would provide a knobbed radio user with a superb SDR Receiver/Panascope with the capability to receive on both the knobbed radio and the SDR. There would be some latency between the two and therefore one would mute the audio on one or the other if they were used in sync.

Skimmer

I had limited time to try Skimmer. It was simple enough to get installed and get it running with the QS1R. It's actually pretty cool to watch it quickly log calls signs!



This utility can feed clusters and with the QS1R you can skim 7 bands all at once. I did not try the latter activity, however, if I get more time someday and have another SDR that works with it, it might be fun!

Every once in a while you end up at the right place at the right time. Such was the case this morning as I had already finalized this review the night before and was getting ready to convert it for publishing to the Zone. I don't work 2M much, however, occasionally I will flip on the radio in the truck and announce myself. This morning I stumbled into K0RU on the air, Rob Underwood, and fell into a conversation about SDRs. Wouldn't you know it, Rob is a QS1R user and big time CW contester.

Rob confirmed a few things I had read about and educated me on some things I hadn't put all the pieces together for with regards to Skimmer, the QS1R and contesting. So what follows is my recollection or mental very summarized notes if you will on how things can work for those that are curious.

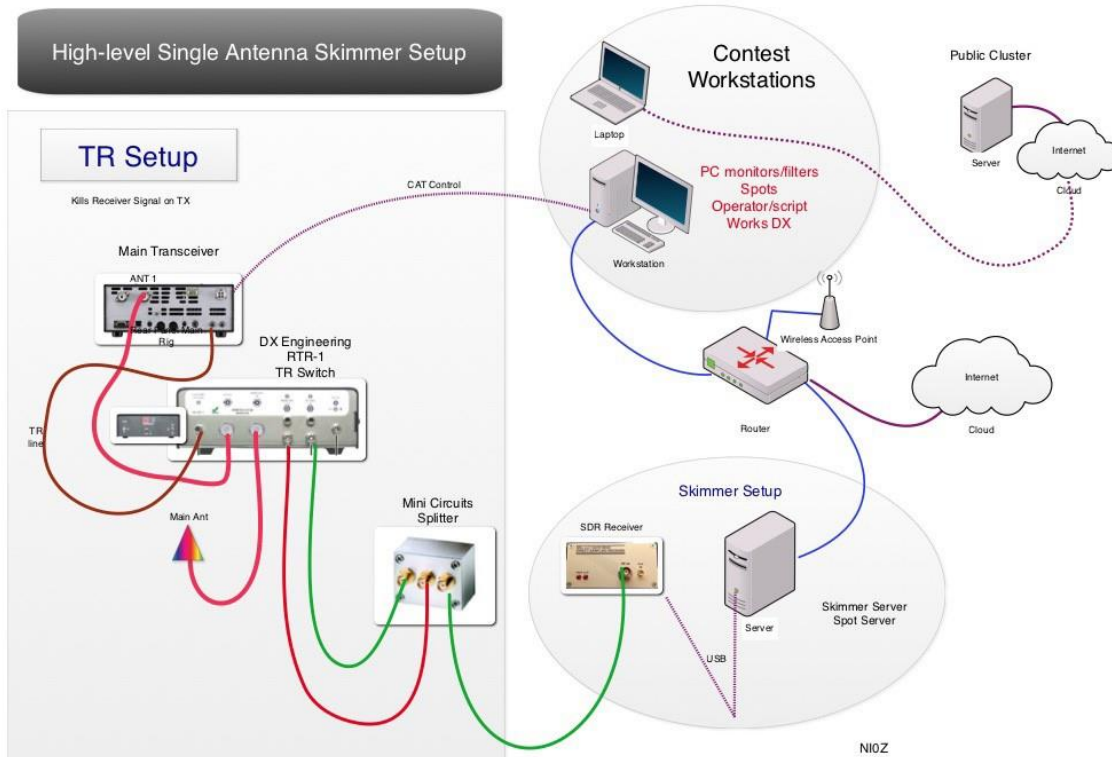
I already said Skimmer can run and monitor CW on 7 bands and feed the results to a spot server. One can set all that up on their own network and feed their own spot server. This would allow X number of stations on one's own private network to monitor the spotter for the more valuable stations to work, IE multipliers, ect. One can then set their stations to point to heir own spot server to script work the contacts. In this scenario the station can see the spot, switch to the band and work the contact through scripting and log it. My apologies if this isn't as perfect as the description I received from Rob, I am again recalling from memory. I do recall stumbling into the skimmer server software and already know people script work contest contacts so it all makes sense to me at a high-level.

This is the nice thing sometimes about using a more established SDR as one finds a broader and more diverse set of tools that work with it.

One will need some receiver protection to protect the QS1R high end receiver as not to overload it. In this example the QS1R runs on its own small dedicated receive antenna away from the main transmitting station. An attenuator is kicked in for the QS1R receiver when the main station is transmitting.

Many thanks to Rob for the QSO and education! If memory serves me right, I have run into Robs profile before and he has quite the shack!

For added Interest I am including an untested high-level diagram to illustrate how this might be setup. There is great value even for a non contestor in running such a setup to find band openings and even help others measure their signal strength by uploading data to a public cluster.



Well, I am squeezing this update in after the wire, none the less its there for future readers.

Skimmer Server is extremely easy to setup. I recommend trying skimmer first to make sure you can skim and then moving on to server. The main reason for this is that you won't see the server version skim other than if you telnet to it.

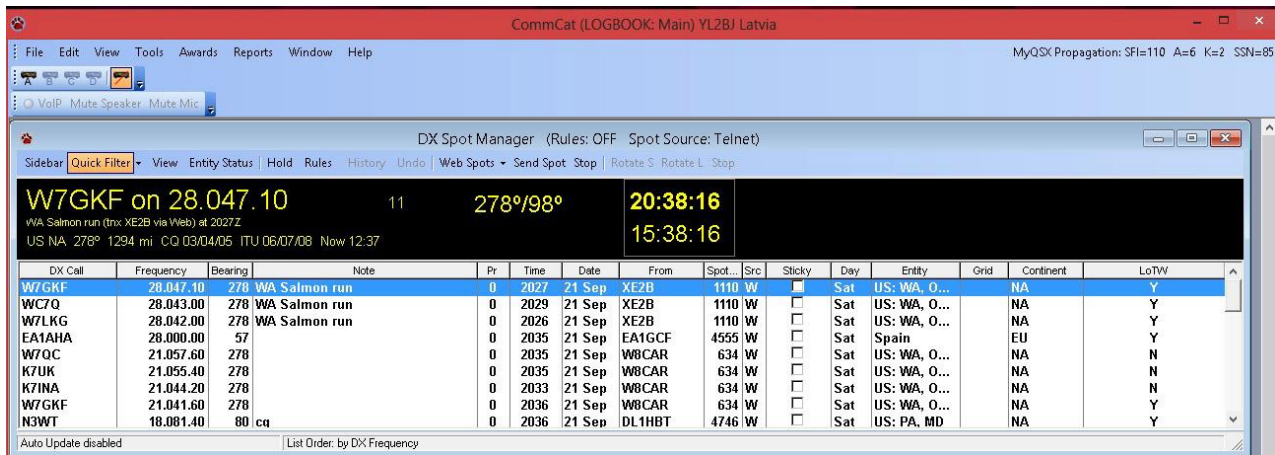
Skimmer server is almost too easy to setup. Download, launch, fill in a few fields of information and telnet into the server to view your spots!

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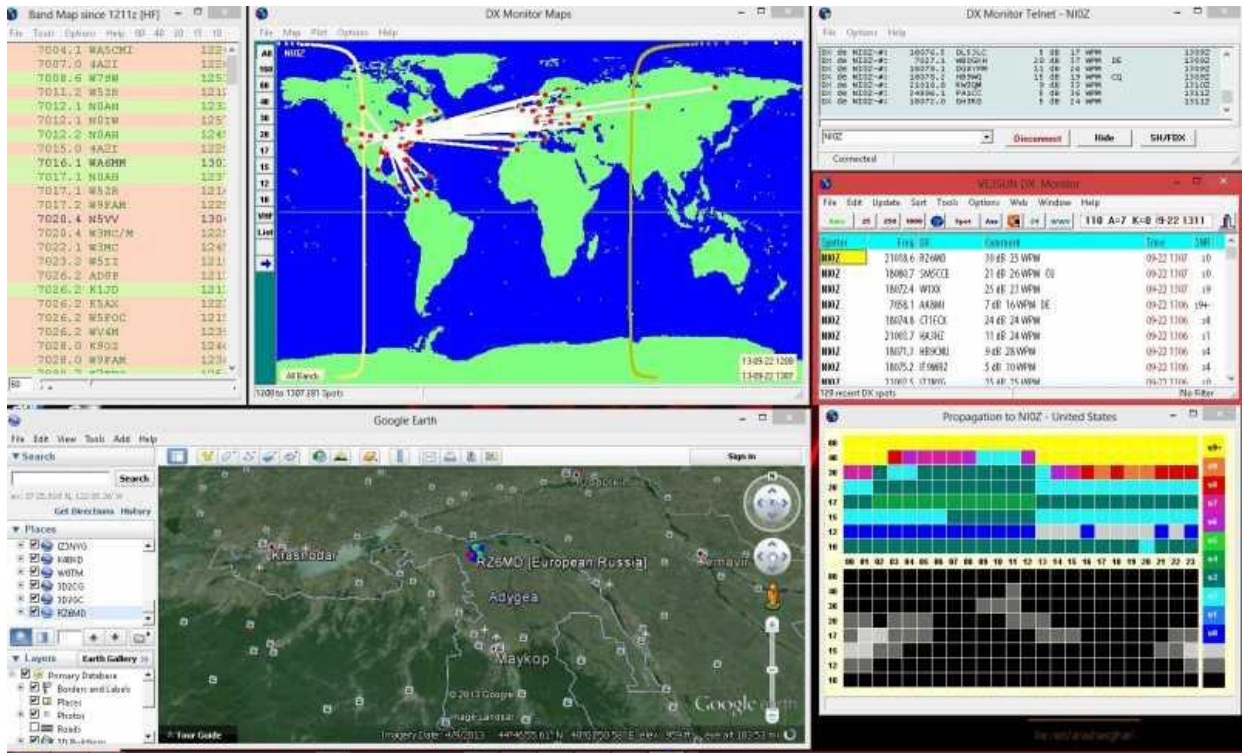
NI0Z de SKIMMER 2013-09-21 20:20Z CuSkimmer >
DX de NI0Z-#: 14033.8 K8SJP 16 dB 28 WPM 2020Z
DX de NI0Z-#: 14031.4 N3EN 24 dB 27 WPM 2021Z
DX de NI0Z-#: 14010.7 N3RS 21 dB 27 WPM 2021Z
DX de NI0Z-#: 14035.3 N4DA 21 dB 31 WPM 2021Z
DX de NI0Z-#: 14045.1 DK2CF 13 dB 23 WPM 2021Z
DX de NI0Z-#: 14038.1 W9EVG 6 dB 24 WPM 2021Z
DX de NI0Z-#: 21040.7 N7RO 25 dB 25 WPM CQ 2021Z
DX de NI0Z-#: 14035.5 OH8L 6 dB 28 WPM CQ 2021Z
DX de NI0Z-#: 14035.4 K8SJP 14 dB 28 WPM 2021Z
DX de NI0Z-#: 14011.0 NR4M 23 dB 29 WPM DE 2022Z
DX de NI0Z-#: 21044.5 K7INA 22 dB 25 WPM CQ 2022Z
DX de NI0Z-#: 14013.4 AJ2Y 29 dB 25 WPM 2022Z
DX de NI0Z-#: 14014.8 K8ZI 34 dB 28 WPM 2023Z
DX de NI0Z-#: 14040.2 W8UE 20 dB 24 WPM 2023Z
DX de NI0Z-#: 14020.3 W6NU 7 dB 28 WPM 2023Z
DX de NI0Z-#: 14038.2 K3RV 21 dB 28 WPM 2023Z
DX de NI0Z-#: 14043.6 UE3IAE 26 dB 22 WPM 2023Z
DX de NI0Z-#: 14038.3 K8FZY 25 dB 17 WPM 2023Z
DX de NI0Z-#: 14023.2 SM7GIB 22 dB 30 WPM CQ 2023Z
DX de NI0Z-#: 14018.3 S53M 24 dB 30 WPM 2023Z

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If you want you can point your spotter program to your server and look at your spots that way, here is my fav program CommCat with the spotter pointed to skimmer.



I read you need a 2Amp Power Supply if you want to skim all 7 bands, and feed a program like DX Monitor.



Upon reflecting on the power of this setup, I decided to buy a QS1R. If you think about some of the reasons some of us our buying high-powered multi receiver SDR's and the band monitoring aspects of them, one could argue that they are a waste if what you really want to know is when bands are coming up. This would be particularly true for CW Ops as the QS1R and Skimmer can let you know everything you need to know in a spotter or telnet view. Perhaps the harder aspect of this to swallow is that Hams like K0RU have been using this for years already. This is why we need coverage of SDR's at this level so we can be on the bleeding edge instead of 5 years late to the game!

For more information you can get started by visiting these links.

Presentation on RBN and Skimmer

http://contestuniversity.com/attachments/CW_skimmers_DX_cluster_RBN.ppsx

Skimmer Server

<http://www.dxatlas.com/SkimServer/>

Reviewer Notes

The radio is extremely lightweight. Very deceptive as its appearance and construction is rock solid.

This SDR can virtually operate anywhere as far as I can see. There are no heat issues at all!

SSB Connection is fast and clean! I experienced no issues in the 10 plus hours of hands on operation I had with the QS1R.

Power Supply is solid and no hassle. I recommend just getting the Power Supply Phil offers on his site.

The instructions are simple and concise. Phil's website is concise and the help is clear and helpful.

An optional Exciter module can be added to the QS1R. This would allow the possibility for very low power transmit capabilities. One could in theory add an Amplifier and Filter board to build a full transceiver. This would be one of the experimental possibilities one could explore with the QS1R. This can be built in at the factory or added by the end user themselves with some soldering and disassembly and reassembly.

Phil has videos for the setup and for the software controls. I highly recommend viewing them as well as a few of the comparison videos I made here with the QS1R. They will help give you a better sense of the overall unit.

I was able to operate the QS1R on Studio 1 and HPSPDR without issues. I enjoyed using the QS1R on Studio 1 and even made a video you can find here on the site or my YouTube channel.

Scoring

Criteria	*Score 1-10 10 is high	Weighting	Weighted Score	Notes
Order/Ship	10	0.07	0.7	Good Communication and Packaging
Build Quality	9	0.12	1.1	Very solid Professional Build
Design Quality	9	0.12	1.1	Very Clever Design
Ease of Setup	8.5	0.06	0.5	Was very easy to setup
Documentation	8.5	0.05	0.4	Easy to locate and follow, simple effective
Expandability	9	0.10	0.9	There is lots of room to add on and experiment
Operating Experience	8.5	0.10	0.9	Software is very robust and mature
Performance	9	0.15	1.4	Very clean receive audio, good on weak sigs
Support	10	0.08	0.8	Phil has answered an endless number of questions from me with poise and patience
Value	9.5	0.15	1.4	Cost as compared to specs and other SDRs
	91			
Overall Score (Average)	9.1	1.0	9.1	Excellent

8-10 = best in class, 5-7 Above Average, 3-4 Below Average, 2 Poor, 0-1 Unacceptable

Pros

- Inexpensive representing a tremendous value
- Beginner SDR User friendly! Easy to setup and use!
- Exceptional Receiver Performance!
- Expandable – Add Exciter and then other 3rd Party add-ons
- Very low CPU and PC requirements
- Cross Platform Support
- Several Packages Support the QS1R
- EXTIO.dll support for additional compatibility!
- Also can be used for other purposes in the shack or on the bench.
- Can be setup to be server based to serve up RF over a network
- Source code available upon request
- Excellent Support

Cons

- Does not have built in filters – I didn't seem to miss them though
- Cannot yet save desktop window positions or change text colors
- Is not supported by SDR-Radio
- Does not have Ethernet support without using Server.
- Shipping cost seems a little high (Insurance?)

Summary

I had a great time testing and using the QS1R. So much so that after playing with it more, learning more about skimmer and reverse beacons I opted to purchase the review unit. I have plans to use it in my future testing videos and reviews.

I personally think that this would make a great first SDR Receiver for both the new and experienced ham. If you are a shortwave listener and have not made the SDR jump yet, this is a wonderful way to get a world class receiver for listening!

If you are an advanced Amateur wanting to play with FPGA's or use the QS1R as an experimental platform you should be pleased!

I was very impressed with the QS1R and everything folks had told me was true about its performance! The receiver is simply stellar!

Additional Thoughts

Using the QS1R and seeing the brilliant mix of FPGA and software code demonstrating how the two can play over a USB interface was enlightening. It is very much proof of my theory that hardware is way ahead of Software. If you look at when Phil built and released the QS1R you can see he still has a leading design and that software developers are still far behind in exploiting the potential of the hardware.

You may be concerned about purchasing one of these receivers, however, it is still more than relevant and I believe Phil is actively engaged in **NEW** FPGA development. Phil has also mentioned that a better EXTIO.dll for Studio 1 support is in development.

Despite numerous stupid lazy questions Phil put up with and answered most of my questions. I applaud him for his patience! I have little doubt about the quality of support you'll get if you purchase one of these units.

As far as performance goes, if you have followed the discussion and posts on the Anan 100D test report from Adam Farson on SDRZone, you can get an idea how well we would expect the QS1R to test out as a receiver. Phil has indicated that he will try to find Adam a unit to test so we can see if the theory pans out as I would expect it to.

Please feel free to post your questions in the new reviews forum.

Many thanks to Phil Covington for lending SDRZone the QS1R for review and his time in answering questions to help ensure the review contained correct information.

About the Reviewer

You can learn more about Mark [N10Z] on the site at the link below.

https://sdrzone.com/index.php?option=com_content&view=category&layout=blog&id=24&Itemid=506

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