TwinRX Getting Started Guides

Contents

- TwinRX Daughterboard
- Two Front panel cables (1.4? SMA BH female to MMCX RA male)
- Two Front panel washer and bolts
- Two LO sharing cables (5? MMCX RA male to MMCX RA male)
- Screw kit
- Hardware installation guide
- Getting started guide

- USRP X300/X310

For complete step by step instructions to installing a daughterboard, please see the TwinRX Module Installation Guide, or the USRP X Series Quick Start (Daughterboard Installation) guide.

Note: LO sharing cables are not required for a single TwinRX setup. LO sharing cables are only required with two TwinRX daughterboards in a single USRP X300/X310.

Connector	Description	Min	Nominal	Damage
J1	LO2 Export	0 dBm	0 dBm	NA (Output)
J2	LO2 Input	0 dBm	+20dBm	
J3	LO1 Export	-12 dBm	+5 dBm	NA (Output)
J4	LO1 Input	-10 dBm	-5 dBm	+10dBm

TwinRX (A Slot)	TwinRX (B Slot)
J1 LO2 Export	J2 LO2 Input
J2 LO2 Input	J1 LO2 Export
J3 LO1 Export	J4 LO1 Input
J4 LO1 Input	J3 LO1 Export

- USRP Hardware Driver? (UHD): 3.10.0.0
- GNU Radio: 3.7.10

In order to use your TwinRX, you must have the software tools correctly installed and configured on your host computer. A step-by-step guide for doing this is available at the "Building and Installing the USRP Open-Source Toolchain (UHD and GNU Radio) on Linux, OS X and Windows" Application Notes. UHD Release 3.10.0.0 or later is required; it is recommended to use the latest stable version of UHD that is available. The minimum version supported by GNU Radio is 3.7.10.

The UHD driver includes several example programs, which may serve as test programs or the basis for your application program. These example programs are already included with the UHD driver installation, and the source code can be obtained from the UHD repository on GitHub at: https://github.com/EttusResearch/uhd/tree/master/host/examples Additional information on usage to verify the USRP operating is available at the Verifying the Operation of the USRP Using UHD and GNU Radio Application Note.

Once you have the UHD driver installed, you can quickly verify the operation of your TwinRX by running the `rx_ascii_art_dft` UHD example program. The `rx_ascii_art_dft` program is included with the UHD driver and is located in the `$install_prefix/lib/uhd/examples` folder.

The `rx_ascii_art_dft` utility is a simple console-based, real-time FFT display tool. It is not graphical in nature, so it can be easily run over an SSH connection within a terminal window, and does not need any graphical capability, such as X Windows, to be installed.

You can run a simple test of the TwinRX device by connecting an antenna to the RX1 port and observing the spectrum of a commercial FM radio station in real-time. Please follow the steps listed below.

1. Attach an antenna to the RX1 antenna port of the TwinRX.

2. At a terminal prompt, run:

```
/usr/local/lib/uhd/examples/rx_ascii_art_dft --freq 88.1e6 --rate 1e6 --gain 70 --ref-lvl -30 --subdev "A:0" --ant RX1
```

- This step assumes that the TwinRX is installed in daughterboard slot A.
- To test the RX2 channel, change the antenna flag to `RX2`, and change the subdev spec to `A:1`

3. Modify the command-line argument `--freq` above to specify a tuning frequency for a strong local FM radio station.

4. You should see a real-time FFT display of 1 MHz of spectrum, centered at the specified tuning frequency.

5. Type "`Q`" or `Ctrl-C` to stop the program and to return to the Linux command line.

6. You can adjust the size of your terminal window and then re-run the command to enlarge or shrink the FFT display.

7. You can run with the `--help` option to see a description of all available command-line options.

Once you have installed GNU Radio, you can run the graphical tool `uhd_fft` to provide a GUI based real time FFT tool. To run `uhd_fft`, run the command below in a terminal:

```
uhd_fft -s 1e6 -g 70 -f 88.1e6 --spec "A:0" -A RX1
```

- Modify the command-line argument `-f` above to specify a tuning frequency for a strong local FM radio station.
- This step assumes that the TwinRX is installed in daughterboard slot A.
- To test the RX2 channel, change the antenna flag to `RX2`, and change the subdev spec to `A:1`

All Ettus Research products are individually tested before shipment. The TwinRX is guaranteed to be functional at the time it is received by the customer. Improper use or handling of the TwinRX can easily cause the device to become non-functional. Listed below are some examples of actions which can prevent damage to the unit:

- Never allow metal objects to touch the circuit board while powered.
- Always handle the board with proper anti-static methods.
- Never allow the board to directly or indirectly come into contact with any voltage spikes.
- Never allow any water, or condensing moisture, to come into contact with the boards.
- Always use caution with FPGA, firmware, or software modifications.

⚠ Never apply more than +10 dBm of power into any RF input.

⚠ Always use at least 30dB attenuation if operating in loopback configuration

Technical support for USRP hardware is available through email only. If the product arrived in a non–functional state or you require technical assistance, please contact support@ettus.com. Please allow 24 to 48 hours for response by email, depending on holidays and weekends, although we are often able to reply more quickly than that.

We also recommend that you subscribe to the community mailing lists. The mailing lists have a responsive and knowledgeable community of hundreds of developers and technical users who are located around the world. When you join the community, you will be connected to this group of people who can help you learn about SDR and respond to your technical and specific questions. Often your question can be answered quickly on the mailing lists. Each mailing list also provides an archive of all past conversations and discussions going back many years. Your question or problem may have already been addressed before, and a relevant or helpful solution may already exist in the archive.

Discussions involving the USRP hardware and the UHD software itself are best addressed through the **u?srp–-users** ?mailing list at http://usrp-users.ettus.com.

Discussions involving the use of GNU Radio with USRP hardware and UHD software are best addressed through the **d?iscuss–-gnuradio**? mailing list at https://lists.gnu.org/mailman/listinfo/discuss–gnuradio?.

The support page on our website is located at https://www.ettus.com/support?. The Knowledge Base is located at ?https://kb.ettus.com?.

Every country has laws governing the reception of radio signals. Users are solely responsible for insuring they use their USRP system in compliance with all applicable laws and regulations. Before attempting to receive on any frequency, we recommend that you determine what licenses may be required and what restrictions may apply.

If you have any non–-technical questions related to your order, then please contact us by email at orders@ettus.com?, or by phone at +1–408–610–6399 (Monday-Friday, 8 AM - 5 PM, Pacific Time). Please be sure to include your order number and the serial number of your USRP.

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