PicoSDR 8x8 – 2ⁿᵈ Generation

Quick Start Guide

Version 1.0 – November 2016 – Up to date for PicoSDR 8x8 – 2nd Generation release

Congratulations on the purchase of your new PicoSDR 8x8!

Box Contents

➢ **The PicoSDR 8x8 enclosure**

➢ **A universal power supply with a power cord**.
- Maximum output power: 150 Watts
- Output voltage: 12 VDC
- Input voltage: 100 to 240 VAC
- Frequency: 50 to 60 Hz
- Operation temperature: 0 to 40°C

➢ **The PicoSDR 8x8 software tools USB dongle**
- Windows 7 Installer (Host and FPGA development).
- Linux Installer (Host development).

➢ **The PicoSDR 8x8 Quick Start Guide**

➢ **4G LTE Antennas with SMA - SSMB cables**.
- 16 4G LTE Omni SMA (M) antennas
- 16 SSMB (F) to SMA (F) cables of 39 inches

➢ **SSMB - SSMB cable**
- 1 cable for synchronizing baseband clocks between two Radio640 stacks

➢ **Other cables**
- 1 ethernet cable
- 1 mini-USB cable
- 8 SSMB (F) to SMA (M) cables of 24 inches
- 1 USB type C to USB 3.0 type A 4-port hub (8x8-E only)
- 1 mini Display Port to HDMI adapter (8x8-E only)

➢ **Other documents** (Terms of use and product policies)

Enclosure Contents

PicoSDR 8x8

➢ A **Perseus6113** carrier board equipped with an SX475 Virtex6 FPGA.
➢ Two **Radio640** FMC stack.
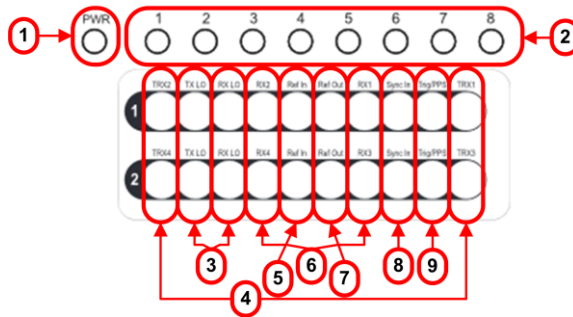➢ A **backplane** board ensuring the Perseus and Radio640 operation.

PicoSDR 8x8-E

➢ A **Perseus6113** carrier board equipped with an SX475 Virtex6 FPGA.
➢ Two **Radio640** FMC stack.
➢ A **backplane** board ensuring the Perseus and Radio640 operation.
➢ An **AMC726** embedded computer in slot A

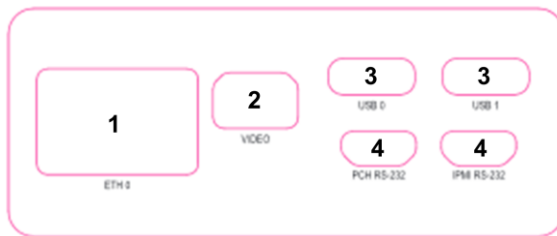| AMC726 Linux passwords		
User	nutaq	superuser (su)
Password	nutaq	nutaqrd

PicoSDR 8x8 Front Panel

On all PicoSDR 8x8 models, the front panel gives access to the Radio640s on both sites. The following diagram lists the important connectors and indicators.

1. Perseus Power-On LED
2. Perseus User LEDs
3. Radio640 Local Oscillator connector
4. Radio640 TRX RF connectors
5. Radio640 Reference In connector
6. Radio640 RX connectors
7. Radio640 Reference Out connector
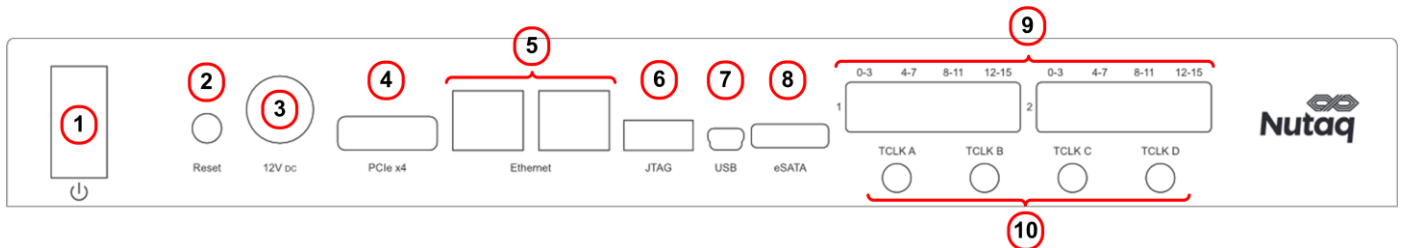8. Radio640 Synch Signal connector
9. Radio640 Trigger/PPS connector

On the PicoSDR 8x8-E model, the front panel gives access to the embedded computer. The following diagram lists the important connectors and indicators.

1. Gigabit Ethernet connector
2. Mini Display Port connector for video monitor
3. USB type C connectors (for peripherals)
4. Mini-USB connectors for IPMI and PCH debug

PicoSDR Back Panel

On all PicoSDR 8x8 models, the back panel gives access to the Perseus debug, control and data streaming ports.

1. Power switch.
2. Reset button.
3. 12V DC power supply connector.
4. External PCI Express 4x connector.
5. Gigabit Ethernet connectors.
6. FPGA JTAG.
7. Mini-USB connector.
8. eSATA connector (used for PicoSDR 8x8-E only).
9. Mini-SAS/RTM connectors.
10. TCLK connectors (see User's Guide for mapping information).

PicoSDR 8x8 Software Installation

The first step is to install the PicoSDR 8x8 software suite on the Windows or Linux PC. To do this, please follow the procedure found in the root directory of the provided USB dongle.

Powering Up the PicoSDR 8x8

To power up the PicoSDR 8x8, connect the power supply cable to the back panel 12V DC power connector, and then place the power switch in the ON position. In the default configuration, the fans of the device start to turn. The PicoSDR 8x8 comes with a reference design FPGA bitstream in flash. As the Perseus FPGA loads its configuration and boots, the front panel power LED will turn solid green.

Operating the PicoSDR Back Panel Serial Connection

The PicoSDR 8x8 RS-232 menu and Perseus console are available through the USB connector of the back panel. On a Linux computer, four RS-232 ports appear upon the USB connection. For a Windows computer, four virtual com ports are created.
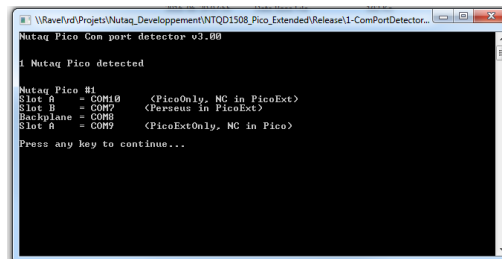
Linux Console Menu

To view the port list on a Linux system, execute the following command: #ls /dev/ | grep ttyUSB

Windows Console Menu

On a Windows computer, 4 COM ports will be added upon the PicoSDR USB connection.

A tool called ComPortsDetector is available in the PicoSDR 8x8 software installation package to detect and list the currently used Virtual COM ports. It can be found in the *%BASROOT%/tools/support/script* directory.

The capture below shows the result of executing the ComPortsDetector tool on a PicoSDR 8x8. The *Slot* B entry indicates the Perseus COM port for the PicoSDR 8x8 and the *Backplane* entry indicates the PicoSDR backplane COM port.

Serial Configuration

The configuration of all RS-232 ports is the same:

- Baud rate: 115200 bps
- Data bits: 8
- Parity: none
- Stop bits: 1
- Flow control: none

Backplane Menu Description

To access the PicoSDR 8x8 backplane menu, connect to its COM port using the serial configuration presented above. The following is a representation of the menu of the PicoSDR 8x8-E:

> *PicoSDR8x8E*
> *Serial Number   : NTQ0127xxx*
> *Hardware Revision : RevA*
> *Firmware Version : 1.05*
>
> *A - Power cycle CPU*
> *B - Power cycle Perseus*
> *C - Power cycle System*
> *D - Shutdown (menu will still be available)*
> *S - Toggle Autostart mode (Status : ON)*

+ - Increase the fan velocity
- - Decrease the fan velocity
   Fan velocity set to 70%
   Minimum fan velocity is 70%

Perseus Console Description

To access the Perseus console, connect to its COM port using the serial configuration presented above. As the Perseus boots, it will print its U-Boot and Linux bootup sequence. Once the boot is completed, you have access to the embedded Linux distribution. To login, enter

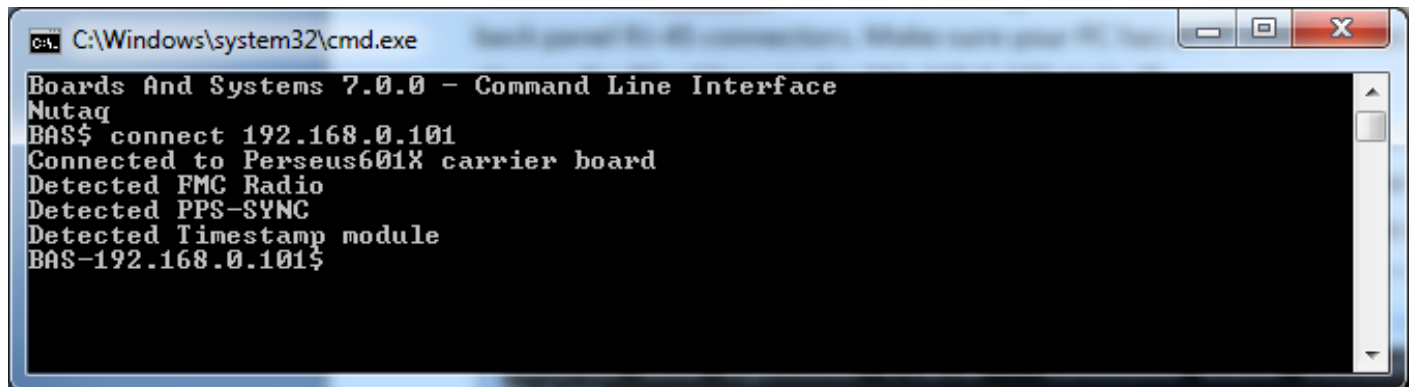- username: root
- password: root

Validating the PicoSDR 8x8 Ethernet

The PicoSDR 8x8 is shipped with the default static IP address *192.168.0.101*.

To validate the IP address, log to the Perseus console and enter the *ifconfig* command.

To access the PicoSDR 8x8 from the host PC through Ethernet, first connect an Ethernet cable between the PC and one of the PicoSDR 8x8 back panel RJ-45 connectors. Make sure your PC has an IP address that allows it to communicate with the Perseus. For example, change the PC address to the static IP address *192.168.0.100*.

To validate the connection, you can ping the Perseus from the host PC, or the PC from the Perseus. You can also connect to the PicoSDR 8x8 using the Command Line Interface (CLI). To load the CLI, in the Windows Start menu, browse to All Programs->Nutaq-> *BAS CLI*. On the command line, enter connect and the IP of the Perseus you wish to connect to. The result should be:

Next Steps

You are now ready to operate your PicoSDR 8x8. The next step in validating the hardware and the Nutaq tools is to execute the default reference design demonstration. Please refer to the PicoSDR 8x8 examples document to continue.