

# PicoSDR

## Quick Start Guide

Version 3.0 – October 2015

Congratulations on the purchase of your new PicoSDR!

### Box Contents

- **The PicoSDR 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 BAS software tools USB dongle**
  - Windows 7 Installer (Host and FPGA development).
  - Linux Installer (Host development).
- **The PicoSDR Quick Start Guide**
- **The PicoSDR OFDM Demonstration Guide**
- **UHF Antennas with SMA - MMCX cables.**
  - 8 antennas for the PicoSDR4x4
  - 4 antennas for the PicoSDR2x2 and PicoSDR2x2E
- **MMCX – MMXC cables**
  - 3 cables for the PicoSDR4x4
  - 1 cable for the PicoSDR2x2 and PicoSDR2x2E
- **An Ethernet cable**
- **A mini-USB cable**
- **Other documents** (Terms of use and product policies)

### Enclosure Contents

#### PicoSDR2x2

- A **Perseus601x** carrier board equipped with a Virtex6 FPGA in slot A.
- A **Radio420m** 2.5V FMC stack.
- A **back plane** board ensuring the Perseus and Radio420m operation.

#### PicoSDR2x2E

- A **Perseus601x** carrier board equipped with a Virtex6 FPGA in slot A.
- A **Radio420m** 2.5V FMC stack.
- A **back plane** board ensuring the Perseus and Radio420m operation.
- A **SAMC-514** embedded CPU in slot B

#### PicoSDR4x4

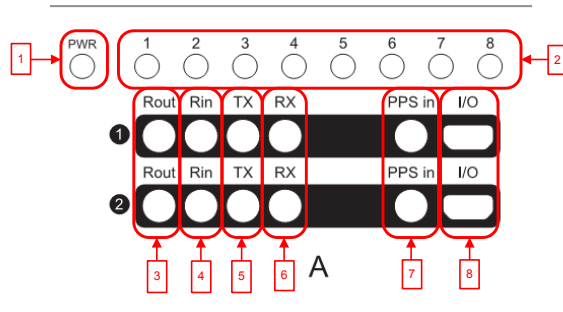
- Two **Perseus601x** carrier boards equipped with a Virtex6 FPGA in slots A and B.
- Two **Radio420m** 2.5V FMC stacks.
- A **back plane** board ensuring both Perseus and Radio420m operation.

#### SAMC-514 Linux passwords

User	nutaq	superuser (su)
Password	nutaq	nutaqrd

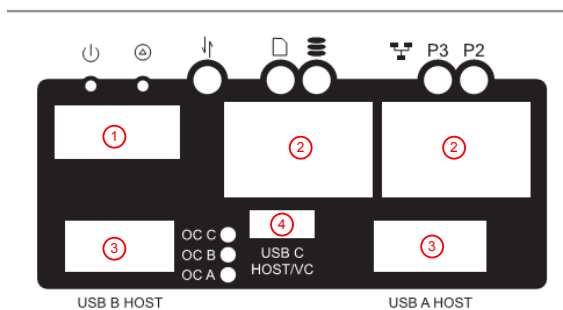
## PicoSDR Front Panel

On all PicoSDR models, the front panel gives access to the Radio420. The following diagram lists the important connectors and indicators.



1. Perseus Power-On LED
2. Perseus User LED
3. Radio420m Reference Out connectors
4. Radio420m Reference In connectors
5. Radio420m TX Connectors
6. Radio420m RX Connectors
7. Radio420m PPS signal input connectors.
8. Radio420m Custom IO MicroHDMI connectors.

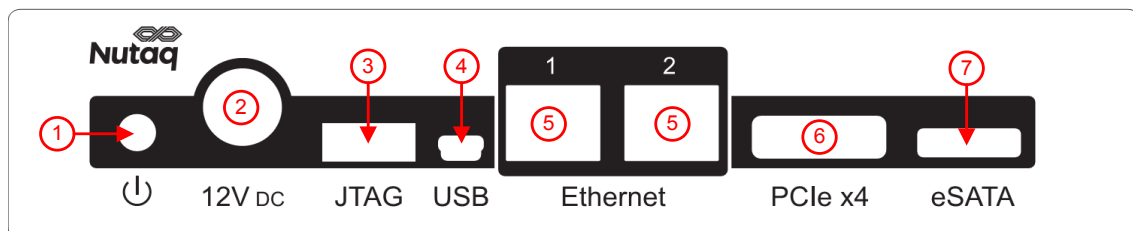
On the PicoSDR2x2E model, the front panel gives access to the embedded CPU. The following diagram lists the important connectors and indicators.



1. HDMI connector for video monitor
2. Ethernet connectors
3. USB connectors (mouse and keyboard)
4. Mini-USB connector

## PicoSDR Back Panel

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



1. Power push-button.
2. 12V DC power supply connector.
3. FPGA JTAG connector for the Perseus Virtex-6 FPGA.
4. Mini-USB connector. Access the Perseus embedded Linux console.

5. Gigabit Ethernet connectors.
6. PCI Express x4 connector (optional).
7. External HDD eSATA connector (Present only on PicoSDR2x2E).

## Powering up the PicoSDR

To power up the PicoSDR, insert the power supply cable into the back panel 12V DC power outlet, then press the push-button once. You should hear the device's fans start to turn. The PicoSDR comes with the OFDM reference design FPGA bitstream in flash. As the Perseus FPGA loads its configuration and boots, the front panel power LED will turn solid blue.

## Operating the PicoSDR push-button

The basic functionalities of the PicoSDR push button are:

- Power up: When the PicoSDR is in shutdown, press the button once to power-up the device.
- Power cycle: While the PicoSDR is running, click once to power cycle slot A on the PicoSDR2x2 or slot B on the PicoSDR2x2E and PicoSDR4x4. To power cycle both slots (2x2E and 4x4) click the push-button twice.
- Shutdown: Hold the button down for more than 3 seconds.

For full details on the push-button functionalities, please refer to the PicoSDR User's Guide.

## Operating the PicoSDR back panel serial connection

The PicoSDR RS-232 menu and Perseus console are available through the back panel USB connector. On a Linux computer, four RS232 ports appear upon the USB connection. For a Windows computer, the user sees two (PicoSDR 2x2 and 2x2E) or three (PicoSDR 4x4) virtual com ports created.

### Linux Console Menu

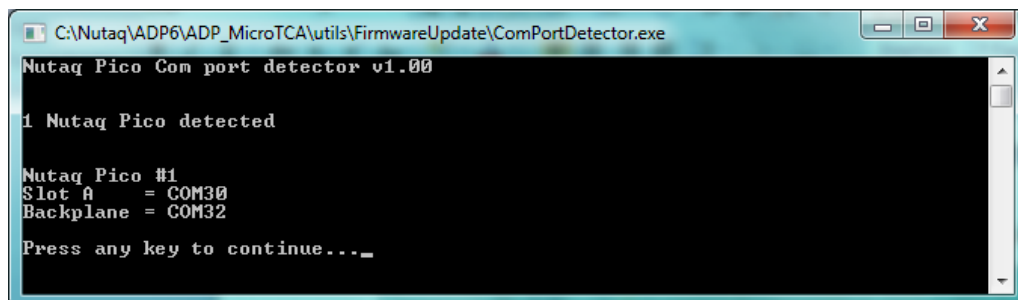
On Linux, to view the port list, execute the following command: `#ls /dev/ | grep ttyUSB`

### Windows Console Menu

On a Windows computer, 2 or 3 virtual com ports will be added upon the PicoSDR USB connection depending on the PicoSDR setup.

A tool to detect and list the currently used Virtual COM ports is available in the BAS software installation, under the `%BASROOT%/tools/support/script` path. To execute it, run the ComPortsDetector executable.

The following is an example of the expected results on a PicoSDR2x2. The *Slot A* entry indicates the Perseus COM port and the *Backplane* entry indicates the PicoSDR backplane COM port.



```
C:\Nutaq\ADP6\ADP_MicroTCA\utils\FirmwareUpdate\ComPortDetector.exe
Nutaq Pico Com port detector v1.00

1 Nutaq Pico detected

Nutaq Pico #1
Slot A      = COM30
Backplane  = COM32

Press any key to continue..._
```

### 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 backplane menu, connect to its COM port using the serial configuration listed above. The following is a representation of the menu of the PicoSDR 4x4:

```
NUTAQ PicoSDR 4x4 LX240T
Serial Number : NTQ0098049
Hardware Revision : RevB
Firmware Version : 2.01
```

```
A - Power cycle SLOT A
B - Power cycle SLOT B
C - Power cycle SLOT A & SLOT B
D - Shutdown SLOT A & SLOT B (menu will still be available)
S - Toggle Autostart mode (Status : OFF)
```

## Perseus Console Description

To access the Perseus console, connect to its COM port using the serial configuration listed 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 Ethernet

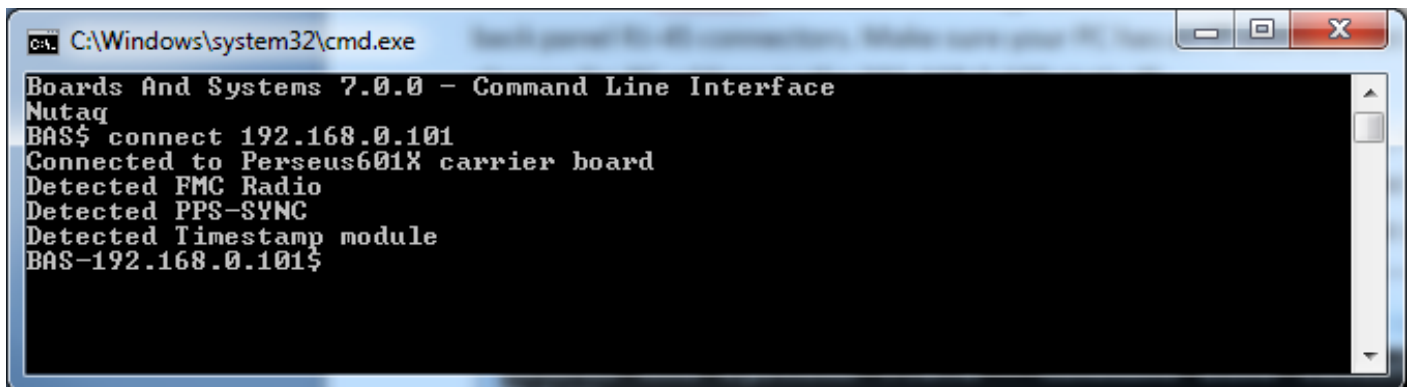
The PicoSDR is shipped with the following default static IP addresses. The Site B address is used in the PicoSDR2x2E and the PicoSDR4x4.

	Perseus	Site A	Site B
Default IP address		192.168.0.101	192.168.0.102

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

To access the PicoSDR from the PC through Ethernet, first connect an Ethernet cable between the PC and one of the PicoSDR 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 192.168.0.100 static IP.

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 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:



```
C:\Windows\system32\cmd.exe
Boards And Systems 7.0.0 - Command Line Interface
Nutaq
BAS$ connect 192.168.0.101
Connected to Perseus601X carrier board
Detected FMC Radio
Detected PPS-SYNC
Detected Timestamp module
BAS-192.168.0.101$
```

## Next steps

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