

# PicoSDR 4x4 – 2<sup>nd</sup> Generation

## Quick Start Guide

Version 1.0 – September 2016 – Up to date for PicoSDR 4x4 – 2<sup>nd</sup> Generation release

Congratulations on the purchase of your new PicoSDR 4x4 – 2<sup>nd</sup> Generation!

### Box Contents

- **The PicoSDR 4x4 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 4x4 software tools USB dongle**
  - Windows 7 Installer (Host and FPGA development).
  - Linux Installer (Host development).
- **The PicoSDR 4x4 Quick Start Guide**
- **4G LTE Antennas with SMA - SSMB cables.**
  - 8 4G LTE Omni SMA (M) antennas
  - 8 SSMB (F) to SMA (F) cables of 39 inches
- **Other cables**
  - 1 Ethernet cable
  - 1 mini-USB cable
  - 4 SSMB (F) to SMA (M) cables of 24 inches
  - 1 USB type C to USB 3.0 type A 4-port hub (4x4-E only)
  - 1 mini Display Port to HDMI adapter (4x4-E only)
- **Other documents** (Terms of use and product policies)

### Enclosure Contents

#### PicoSDR 4x4

- A **Perseus6012** carrier board equipped with an SX315 Virtex6 FPGA in slot A.
- A **Radio640** FMC stack.
- A **backplane** board ensuring the Perseus and Radio640 operation.

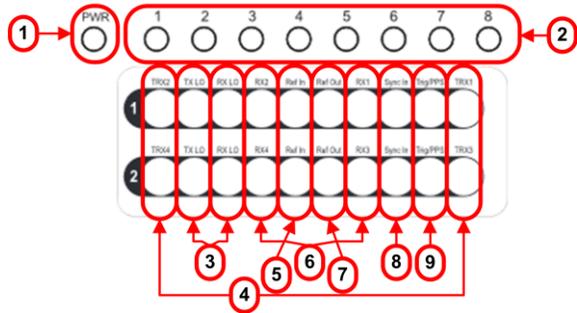
#### PicoSDR 4x4-E

- A **Perseus6012** carrier board equipped with an SX315 Virtex6 FPGA in slot A.
- A **Radio640** FMC stack.
- A **backplane** board ensuring the Perseus and Radio640 operation.
- An **AMC726** embedded computer in slot B

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

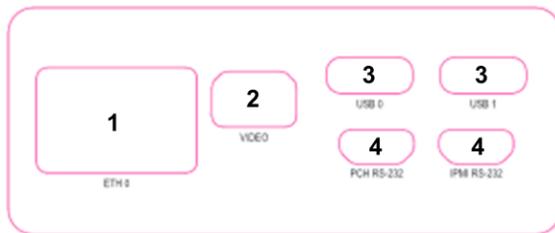
## PicoSDR 4x4 Front Panel

On all PicoSDR 4x4 models, the front panel gives access to the Radio640. The following diagram lists the important connectors and indicators.



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

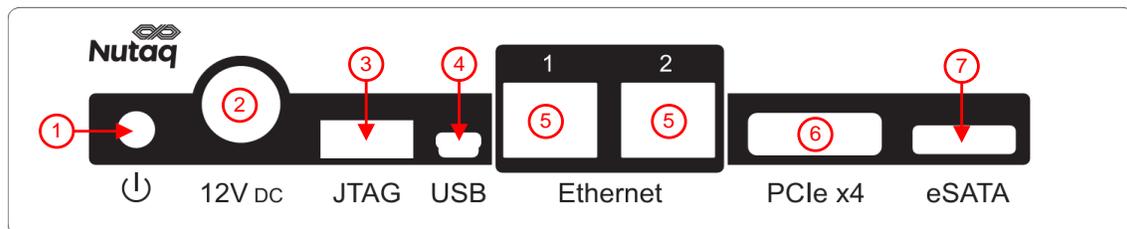
On the PicoSDR 4x4-E model, the front panel gives access to the embedded computer. The following diagram lists the important connectors and indicators.



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 4x4 models, the back panel 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.
7. External HDD eSATA connector (used only for PicoSDR 4x4-E).

## PicoSDR 4x4 Software Installation

The first step is to install the PicoSDR 4x4 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 4x4

To power up the PicoSDR 4x4, connect the power supply cable to the back panel 12V DC power connector, and then press the push-button once. You should hear the fans of the device start to turn. The PicoSDR 4x4 comes with a reference design FPGA bitstream in flash memory. As the Perseus FPGA loads its configuration and boots, the front panel power LED will turn solid green.

## Operating the PicoSDR Push Button

The basic functionalities of the PicoSDR 4x4 push button are:

- **Power Up**
  - When the PicoSDR 4x4 is off, press the button once to power-up the device.
- **Power Cycle**
  - While the PicoSDR 4x4 is running, click once to power cycle slot A on the PicoSDR 4x4 or slot B on the PicoSDR 4x4-E. To power cycle both slots of the PicoSDR 4x4-E, click the push button twice.
- **Shutdown**
  - Hold the push button down for more than 3 seconds.

For full details on the push button functionalities, please refer to the PicoSDR 4x4 User's Guide.

## Operating the PicoSDR Back Panel Serial Connection

The PicoSDR 4x4 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, two virtual com ports are created.

### Linux Console Menu

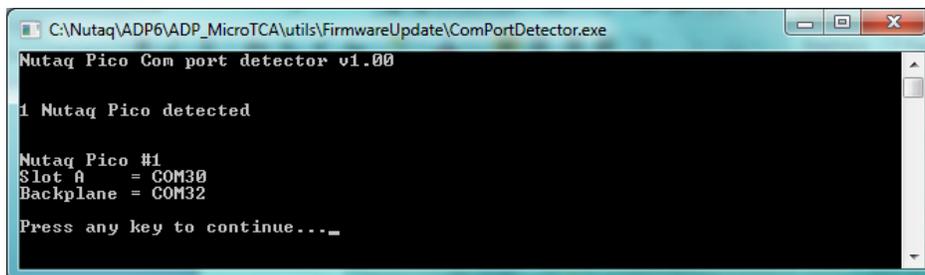
To view the port list on a Linux system, execute the following command: `#ls /dev/ | grep ttyUSB`

### Windows Console Menu

On a Windows computer, 2 COM ports will be added upon the PicoSDR USB connection.

A tool called ComPortsDetector is available in the PicoSDR 4x4 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 4x4. 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 4x4 backplane menu, connect to its COM port using the serial configuration presented above. The following is a representation of the menu of the PicoSDR 4x4-E:

```
NUTAQ 2nd Gen 4x4-E SX315T
Serial Number : NTQ1234567
Hardware Revision : RevC
Firmware Version : 3.01
Option : SSD onboard installed
```

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

```
+ - Increase the fan velocity
- - Decrease the fan velocity
   Fan velocity set to 16%
   Minimum fan velocity is 16%
```

Choice :

## 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 embedded Linux bootup sequence. Once the boot is completed, you have access to the embedded Linux distribution. To login, enter

- username: root
- password: root

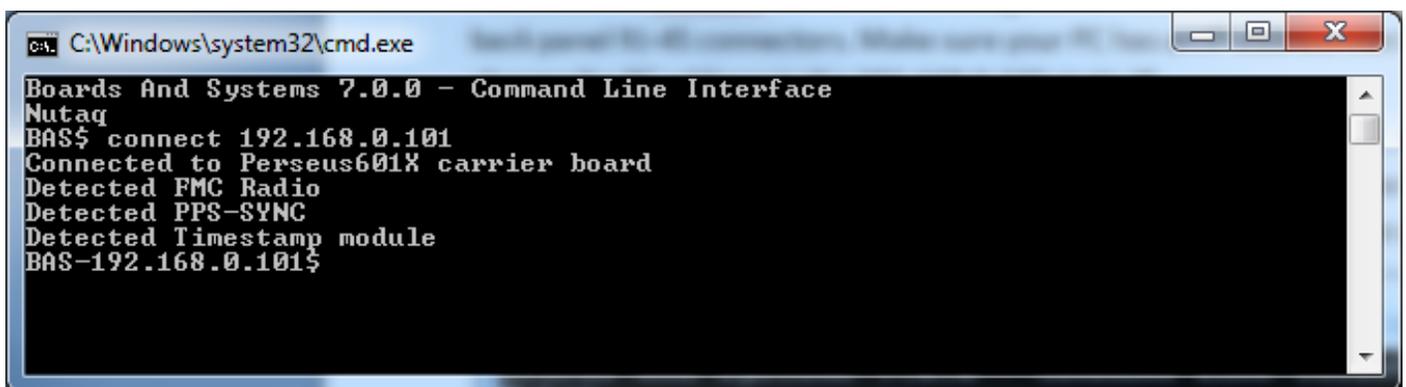
## Validating the PicoSDR 4x4 Ethernet

The PicoSDR 4x4 ships 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 4x4 from the host PC through Ethernet, first connect an Ethernet cable between the PC and one of the PicoSDR 4x4 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 4x4 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 4x4. The next step in validating the hardware and the Nutaq tools is to execute the default reference design demonstration. Please refer to the Radio640 examples document to continue (in `bas/doc/fmc/Radio640`)