

PicoDigitizer125

Quick Start Guide

Version 1.4 – October 2014 – Updated for Software Tools Release 6.6

Congratulations on the purchase of your new PicoDigitizer125!

Box Contents

In the PicoDigitizer125 box, you will find:

- **The PicoDigitizer125 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 ADP software tools DVD**
 - Windows 7 Installer (Host and FPGA development).
 - Linux Fedora 20 and Ubuntu 12.04 LTS Installer (Host development).
- **The PicoDigitizer125 Quick Start Guide**
- **License sticker for the software tools** (in the ADP software tools DVD case).
 - ADP software activation code
- **An Ethernet cable**
- **A mini-USB cable**
- **Other documents** (Terms of use and product policies)

Enclosure Contents

PicoDigitizer125/16(E)

- A **Perseus601x** carrier board equipped with a Virtex6 FPGA.
- A **MI125** FMC (16 ADC channels).
- A **back plane** board ensuring the Perseus and MI125 operation.
- A **SAMC-514** embedded CPU in the PicoDigitizer125/16E.

PicoDigitizer125/32(E)

- A **Perseus601x** carrier board equipped with a Virtex6 FPGA.
- A **MI125** FMC stack (32 ADC channels).
- A **back plane** board ensuring the Perseus and MI125 operation.
- A **SAMC-514** embedded CPU in the PicoDigitizer125/32E.

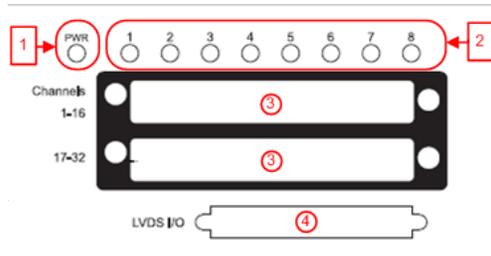
PicoDigitizer125/64

- Two **Perseus601x** carrier board each equipped with a Virtex6 FPGA.
- Two **MI125** FMC stacks (64 ADC channels).
- A **back plane** board ensuring the Perseus and MI125 operation.

SAMC-514 Linux passwords			
User	nutaq	admin (sudo)	superuser (su)
Password	nutaq	nutaq	nutaqrd

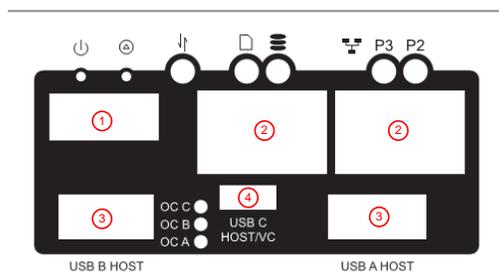
PicoDigitizer125 Front Panel

Depending on your PicoDigitizer125/X models, the front panel gives access to 1, 2 or 4 MI125. The following diagram lists the important connectors and indicators.



1. Perseus Power-On LED
2. Perseus User LED
3. MI125 Connector
4. Mestor LVDS Connector

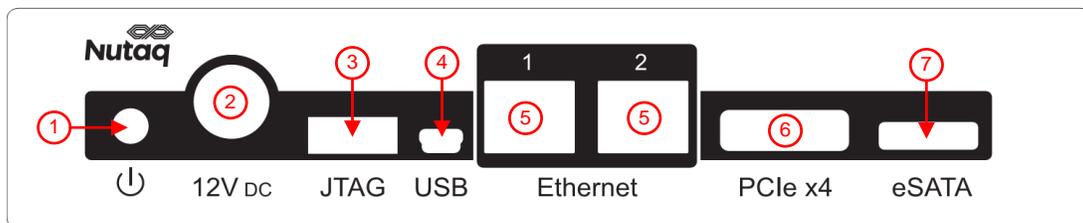
On the PicoDigitizer125/16E, PicoDigitizer125/32E models, the front panel gives access to the embedded CPU. The following diagram lists the important connectors and indicators.



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

PicoDigitizer125 Back Panel

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



1. Power button.
Power up: When the power cable has been connected or the PicoDigitizer is in shutdown, press once to power up the unit.
Power cycle: When the PicoDigitizer is running, press once to power cycle slot B, and press twice to power cycle slots A and B.
Shutdown: When the PicoDigitizer is running, press and hold the button for three seconds to shutdown the unit.
 For full power button operation details, please consult the PicoDigitizer User's Guide.
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 on PicoDigitizer125/16E, PicoDigitizer125/32E)

Setting Up the PicoDigitizer125

The following procedure will guide you through the PicoDigitizer125 setup to run the Record example.

Requirements

- PicoDigitizer box content
- A PC with Windows 7 64-bits and 10 GB of RAM.
 - Gigabit Ethernet network card with jumbo frame capability
- Visual Studio 2008 SP1
- An Ethernet cable
- A 10-MHz signal generator
- At least 1 Edge Rate Contact™ breakout SMA cables purchased from Nutaq or a custom cable to input a signal on the PicoDigitizer125

Procedure

1. Install the ADP software tools on the Windows PC. Follow the instructions available in the *ADP uTCA edition – Software Installation Guide.pdf* document in the *Install documentation* folder of the installation DVD.
2. Connect the PC to the PicoDigitizer125 with the Ethernet cable. Use the Ethernet port 1 on the PicoDigitizer125 backplane.
3. Connect the Edge Rate Contact breakout SMA cable(s) to the PicoDigitizer125 front panel connector(s) labeled 1 to 16 and 17 to 32.
4. Connect a 1-Vpp (4 dBm) sine at 10 MHz to each channels.

The channel inputs must be less than 2 Vpp in amplitude to avoid the risk of damaging the hardware. If you are unable to connect a signal to all the channels, connect signals to as many as possible, and then change the connections to test all the channels. If you have only one Edge Rate Contact breakout SMA cables, start testing channels 1 to 16 and then connect it to channels 17 to 32.

5. Power up the PicoDigitizer125 by plugging in the power supply and by clicking once on the backplane reset button.
6. The Perseus will boot and configure itself with the MI125 Record example bitstream previously written in Flash memory.
7. The PicoDigitizer125 Perseus is configured to use a static IP upon startup. The Perseus default IP address is 192.168.0.101
8. Start Microsoft Visual Studio.
9. On the **File** menu, point to **Open** and click **Project/Solution**.
10. Browse to the `[ADPROOT]/examples_perseus6010/perseus6010_mi125_record_playback/host/prj_win/` folder and select the file named `perseus6010_mi125_record_playback.sln`.

The host software project opens and you see the hierarchy of the project on the **Solution Explorer** tab. If you do not see the **Solution Explorer** tab, on the **View** menu, click **Solution Explorer**.

11. Select the build configuration Release x64.
12. On the **Build** menu, click **Build Solution**.
13. There are two batch files in the folder
 - `Launch_mi125_16ch_record.bat`: Use to execute a 16 channel record on a MI125-16 FMC.
 - `Launch_mi125_32ch_record.bat`: Use to execute a 32 channel record on a MI125-32 FMC stack.
14. Open a batch file with a text editor.

There are three necessary application parameters for the host software and the IP address parameters.

Parameters	Values: description
CHANNELSMODE	1: bottom, channel 1 to 16 (default) 2: top, channel 17 to 32 3: top and bottom, channel 1 to 32
CLKSRC	0: internal clock(default) 1: external clock
TRIGSRC	0: internal trigger(default) 1: external trigger
IP_ADDR_PERSEUS	192.168.0.101(default)

The `IP_ADDR_PERSEUS` parameter must contain the IP address of the Perseus port 0 (for example, 192.168.0.101). The bytes of this address must be separated by periods.

For the example values above, the combined arguments would be:

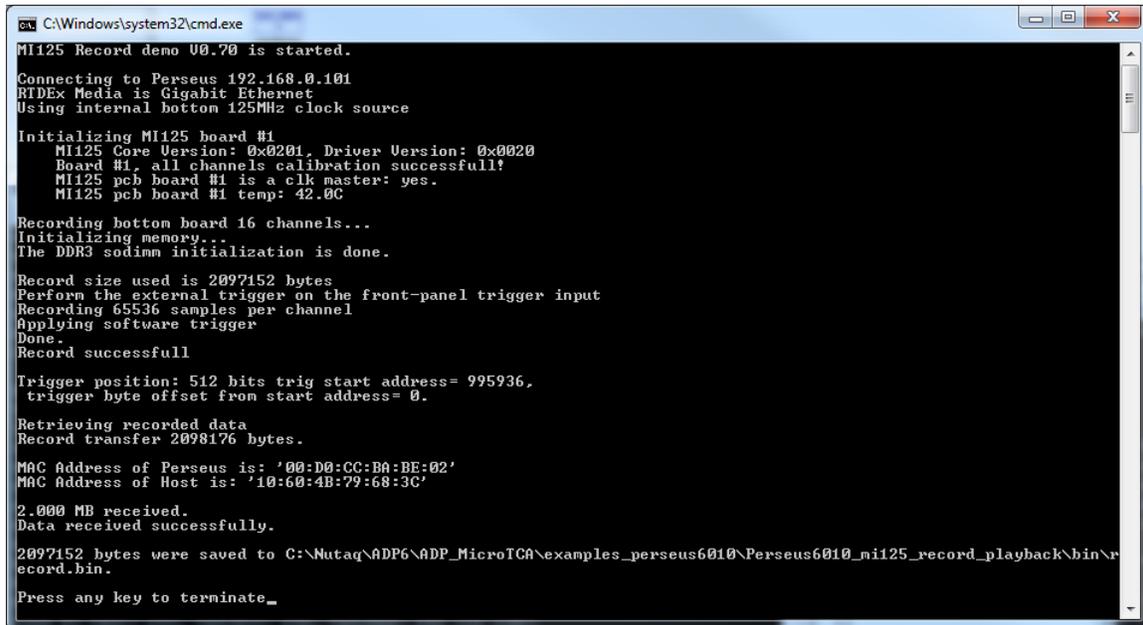
```
SET IP_ADDR_PERSEUS=192.168.0.101
```

It is important that you use the addresses specific to your hardware; the values presented here are for example purposes only.

15. Save and close the file.
16. Double-click the edited batch file to start the application.

The test starts automatically.

17. The following illustrates a successful MI125-Record test on a PicoDigitizer125-16.



```
C:\Windows\system32\cmd.exe
MI125 Record demo U0.70 is started.
Connecting to Perseus 192.168.0.101
RtDEx Media is Gigabit Ethernet
Using internal bottom 125MHz clock source

Initializing MI125 board #1
MI125 Core Version: 0x0201. Driver Version: 0x0020
Board #1, all channels calibration successfull!
MI125 pcb board #1 is a clk master: yes.
MI125 pcb board #1 temp: 42.0C

Recording bottom board 16 channels...
Initializing memory...
The DDR3 sodimm initialization is done.

Record size used is 2097152 bytes
Perform the external trigger on the front-panel trigger input
Recording 65536 samples per channel
Applying software trigger
Done.
Record successfull

Trigger position: 512 bits trig start address= 995936.
trigger byte offset from start address= 0.

Retrieving recorded data
Record transfer 2098176 bytes.

MAC Address of Perseus is: '00:D0:CC:BA:BE:02'
MAC Address of Host is: '10:60:4B:79:60:3C'

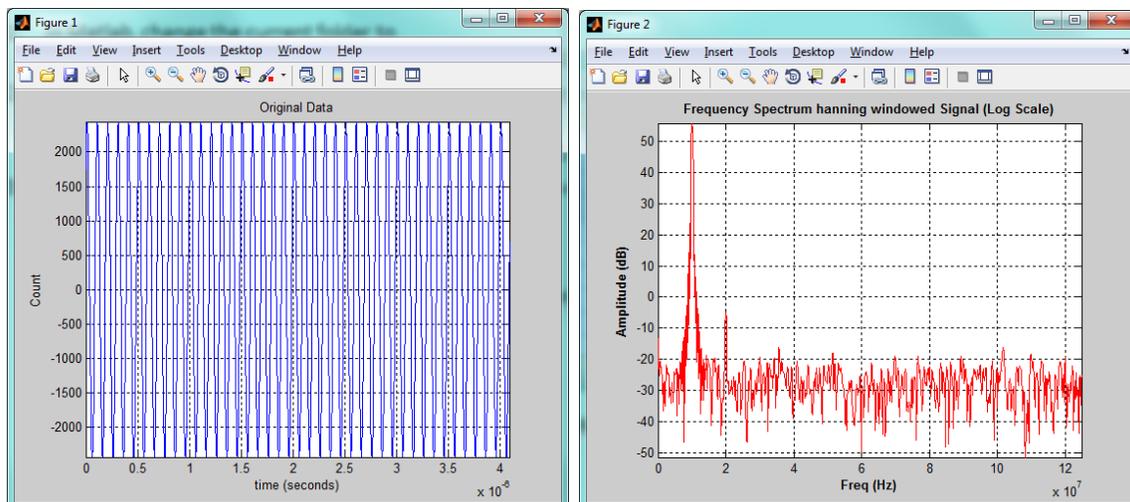
2.000 MB received.
Data received successfully.
2097152 bytes were saved to C:\Nutaq\ADP6\ADP_MicroTGA\examples_perseus6010\Perseus6010_mi125_record_playback\bin\record.bin.
Press any key to terminate_
```

18. The data recorded is then saved at the following location:

[ADPROOT]/examples_perseus6010/perseus6010_mi125_record_playback/bin/record.bin

19. Plot the recorded data using Matlab

- In Matlab, change the current folder to *ADPROOT\examples_perseus6010\perseus6010_mi125_record_playback\bin*.
- Run this command: `binfft('filename', num_of_channels_to_plot, 'int16', number_of_samples, acquisition_frequency);`
For example: `binfft('record.bin', 2, 'int16', 1024, 125e6);`
- Matlab will plot the received data and the FFT for each channel.



In the figures above, we clearly see the 10MHz tone in the time spectrum plot and the frequency spectrum FFT plot.