Quick Start Guide DAC1x08D + ECP3 demo board

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Quick Start Guide

Document information

Info	Content
Keywords	DAC1x08D, ECP3 FPGA
Abstract	NXP has designed a USB powered demo board, to demonstrate the interoperability of Lattice ECP3 FPGAs with NXP DAC over the JESD204A serial interface. This document describes the basic steps to operate this board driven by a Personal Computer.



Quick Start Guide DAC1x08D + ECP3 demo board DRAS

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Introduction 1.

1.1 Demoboard overview:



NXP has designed a USB powered demo board to demonstrate the interoperability of Lattice ECP3 FPGAs with NXP DAC over the JESD204A serial interface.

This board has 2 main modes of operation:

- 1. Using one single USB cable, it has to be configured so that only one DAC output is active, in order to keep the power below the USB limit (500mA). This is achieved thanks to the "1xDAC/2xDACs" jumper selector. At power-up, only the DAC output A is active; it can be changed to DAC output B later on thanks to the software running on a PC.
- 2. If the 2 outputs of the DAC (A & B) need to be used, it is necessary to properly configure the "1xDAC/2xDACs" jumper selector and to connect a second USB cable which is used for supply only.

In order to keep the demo set-up as simple as possible, an on-board 60MHz oscillator is used to clock the FPGA, the JESD204A link and to drive the Sampling clock of the DAC.

It is also possible to use an external clock, to have more freedom and better jitter performance. This is configured thanks to the Clock Ext/Int jumper selector. It is adviced to use the 2xDACs configuration (2 USB cables) when testing the external clock mode, since the power consumption is rising when increasing the frequency and the USB limit (500mA) might be crossed at high frequency.

The board has been successfully tested up to 200MHz. See Chapter 5 "5.Using an external clock reference" for more details.

Quick Start Guide DAC1x08D + ECP3 demo board



Fig 2. Picture of a typical demo set-up for 1xDAC

(Here the spectrum analyser displays the filtered DAC A output.)

The list of equipment needed is as follows:

- ✓ 1 PC
- ✓ 1 USB cable
- ✓ 1 SMA-SMA cable
- The NXP DAC1x08D650+ECP3-35EA demo board \checkmark
- ✓ 1 spectrum analyzer

1.3 Typical demonstration set-up : 2 USB cables, 2xDACs



Fig 3. Picture of a typical demo set-up for 2xDACs

Quick Start Guide DAC1x08D + ECP3 demo board

JRAFT DRAFT (Here the spectrum analyser displays the un-filtered DAC B output, where spurs are visible centered at the sampling frequency)

The list of equipment needed is as follows:

- ✓ 1 PC
- ✓ 2 USB cables
- ✓ 1 SMA-SMA cable
- ✓ The NXP DAC1x08D650+ECP3-35EA demo board
- ✓ 1 spectrum analyzer

In addition, a dedicated software is necessary to drive the FPGA & the DAC from the PC. This software has been developed thanks to LabView, which means that at least the LabView Runtime needs to be installed on the LapTop PC or the LabView environment itself (v8.6).

These software tools are delivered by NXP either on a CD-ROM or through an internetbased remote server.

!! Warning !!

Please read carefully the following instructions before you start plugging the demo board to the PC. It is especially necessary that you have the CD-ROM ready to install the USB driver when you first plug the demo board to the PC.

Installing the software tools 2.

2.1 LabView 8.6 Run-time environment:

Use the NXP CD-ROM to access the "LVRTE861STD.exe" file: open the folder named "LabView Runtime v8.6" and double click on the .exe file in order to install the LabView Runtime program.



LabVIEW 8.6 Run-time folder Fig 4.

2.2 USB drivers:

2.2.1 Step 1:

Connect the device to a USB port on your PC. Windows 'Found New Hardware Wizard' will be launched. Select 'No, not this time' from the options available and then click 'Next' to proceed with the installation.

Quick Start Guide DAC1x08D + ECP3 demo board DRAS

		DRak	0R4K, 0R4K, 0R4K, 0
	Found New Hardware Wiz	ard	
	Found New Hardware Wiz	Ard Welcome to the Found New Hardware Wizard Windows will search for current and updated software by looking on your computer, on the hardware installation CD, or on the Windows Update Web site (with your permission). Read our privacy policy Can Windows connect to Windows Update to search for software? Yes, this time only Yes, now and gvery time I connect a device No, not this time Click Next to continue.	T DRAFT DRAF
		< <u>B</u> ack <u>N</u> ext > Cancel	
Fig 5. New Hardwa	are Wizard starting page		

2.2.2 Step 2:

Select 'Install from a list or specific location (Advanced)' as shown below and then click 'Next'.

	Found New Hardware Wiz	ard	
		This wizard helps you install software for: EVAL232 Board USB <-> Serial If your hardware came with an installation CD or floppy disk, insert it now. What do you want the wizard to do? Install the software automatically [Recommended] Install from a list or specific location (Advanced) Click Next to continue. < Back Next > Cancel	
Fig 6. New Hardw	are Wizard: configure		

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2.2.3 Step 3:

	Quick Start Guide DAC1x08D + ECP3 demo board
2.2.3	Step 3:
	Select 'Search for the best driver in these locations' and enter the file path of the
	folder : \USB Driver \driver_d2xx ' in the combo-box or browse to it by clicking the browse button.
	Once the file path has been entered in the box, click ' next ' to proceed.
	Found New Hardware Wizard
	Please choose your search and installation options.
	O Search for the best driver in these locations.
	Use the check boxes below to limit or expand the default search, which includes local paths and removable media. The best driver found will be installed.
	Use the check boxes below to limit or expand the default search, which includes local paths and removable media. The best driver found will be installed. Search removable media (floppy, CD-ROM)
	Use the check boxes below to limit or expand the default search, which includes local paths and removable media. The best driver found will be installed. Search removable media (floppy, CD-ROM) Include this location in the search:
	Use the check boxes below to limit or expand the default search, which includes local paths and removable media. The best driver found will be installed. Search removable media (floppy, CD-RDM) Include this location in the search: D:\ USB_Driver\driver_d2xx Browse
	Use the check boxes below to limit or expand the default search, which includes local paths and removable media. The best driver found will be installed. Search removable <u>m</u> edia (floppy, CD-ROM) Include this location in the search: D:\USB_Driver\driver_d2xx Browse Don't search. I will choose the driver to install.
	Use the check boxes below to limit or expand the default search, which includes local paths and removable media. The best driver found will be installed. Search removable <u>m</u> edia (floppy, CD-ROM) Include this location in the search: D:\USB_Driver\driver_d2xx Browse O pon't search. I will choose the driver to install. Choose this option to select the device driver from a list. Windows does not guarantee that the driver you choose will be the best match for your hardware.
	Use the check boxes below to limit or expand the default search, which includes local paths and removable media. The best driver found will be installed. Search removable <u>media</u> (floppy, CD-RDM) Include this location in the search: D:\USB_Driver\driver_d2xx Browse O pon't search. I will choose the driver to install. Choose this option to select the device driver from a list. Windows does not guarantee that the driver you choose will be the best match for your hardware.
	Use the check boxes below to limit or expand the default search, which includes local paths and removable media. The best driver found will be installed. Search removable media (floppy, CD-ROM) Include this location in the search: D:\USB_Driver\driver_d2xx Browse O Don't search. I will choose the driver to install. Choose this option to select the device driver from a list. Windows does not guarantee that the driver you choose will be the best match for your hardware. (Back Next) Cancel

2.2.4 Step 4:

Windows should then display a message indicating that the installation was successful. Click 'Finish' to complete the installation for the first port of the device.



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2.3 NXP DAC1x08D control application:

08D + ECP3 den... Using again the CD-ROM delivered by NXP, open now the folder "SingleBoard_DAC1x08D650_ECP3-35EA", then the folder "DAC1x08D650_ECP3-35EA "



Application software folder Fig 9.

The following files are now accessible:

	Carlo data Patterns_60Msps Settings Application.aliases Application.exe Application.ini	
Fig 10. Application software rea	uired files	

There is no additional software to install here: double clicking on "Application.exe" will directly start the application. You can alternatively copy the whole folder on your PC if you don't want to keep the CD-ROM.

Quick Start Guide DAC1x08D + ECP3 demo board

Demo set-up connection 3.

3.1 1xDAC Connection diagram:

You are now ready to complete the demo set up connection. Please follow the connections diagram as defined below:



3.2 1xDAC Jumpers setting:

Looking at the demo board, the jumpers have to be positioned exactly as displayed on the picture: they configure the board for 1xDAC only, clocked by the on-board 60MHz oscillator.



Quick Start Guide DAC1x08D + ECP3 demo board

3.3 1xDAC LED status when powered-up:

 Quick Start Guide DACTXUOD + ECT & domestic

 1xDAC LED status when powered-up:

 Once connected to the PC, and once the USB driver is installed, the LED status should



3.4 2xDACs Connection diagram:

You are now ready to complete the demo set up connection. Please follow the connections diagram as defined below:



3.5 2xDACs Jumpers setting:

Looking at the demo board, the jumpers have to be positioned exactly as displayed on the picture. they configure the board for 2xDACs, clocked by the on-board 60MHz osc.

Quick Start Guide DAC1x08D + ECP3 demo board



3.6 2xDACs LED status when powered-up:

The LED status will depend here on the USB connection:

If only 1 USB cable is plugged on the main USB connector, the LED status is as follows:



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Once you have connected the 2nd USB cable, the LED status is as follows:



NXP_DAC1x08D application user guide 4.

4.1 Front panel:

NXP Semiconductors	QSG DAC1x08D+ECP3 DB
	Quick Start Guide DAC1x08D + ECP3 demo board
4. NXP DAC1x08D application user	
4.1 Front panel:	m = file explorer (see 82.3)
The following window pops-up:	
MainLattice.vi	
Fig 18. LabView start window	

Click on the white arrow in order to launch the ADC_Run application.

You now get the following front panel:

Quick Start Guide DAC1x08D + ECP3 demo board

Using an external clock reference 5.

5.1 Configuring the board:

You have to configure the 2 jumpers as defined on the following picture:



The board is now configured for 2xDACs active (=> 2 USB cables required) and an external clock is required.

You might face initialization issues at power-up, depending on the supply/clock sequence. Simply plug/unplug one of the USB cables once the clock is applied on the board and the initialization of the board will restart.

Please keep the input frequency below 200MHz and make sure that the sampling frequency of the DAC is below 650MSPS, so properly configure the interpolation ratio (x2, x4 or x8).

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Fig 33.

Fig 34.

Fig 35.

Fig 36.

Fig 37.

Fig 38.

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Quick Start Guide DAC1x08D + ECP3 demo board

Activating the zoom feature Erreur ! Signet non

Estimating the SFDR..... Erreur ! Signet non

Demo set-up using an external clock Erreur !

Enabling the coherence mode & selecting which frequency is the basis for the calculation **Erreur** !

Coherence results: SFDR is now automatically

calculated (relevant for 1 single tone only)Erreur ! Signet non défini.

7. List of figures

Fig 1.	Demo Board top view3
Fig 2.	Picture of a typical demo set-up for 1xDAC: A output, filtered
Fig 3.	Picture of a typical demo set-up for 2xDACs: B output, NOT filtered: spurs visible @ x8 the sampling frequency since the x8 interpolation mode is activated
Fig 4.	LabVIEW 8.6 Run-time folder5
Fig 5.	New Hardware Wizard starting page6
Fig 6.	New Hardware Wizard: configure6
Fig 7.	New Hardware Wizard: select driver location7
Fig 8.	New Hardware Wizard: completion7
Fig 9.	Application software folder8
Fig 10.	Application software required files8
Fig 11.	Demo set-up connection diagram9
Fig 12.	Jumpers positions9
Fig 13.	LEDs status at power-up10
Fig 14.	Demo set-up connection diagram10
Fig 15.	Jumpers positions11
Fig 16.	LEDs status at power-up11
Fig 17.	LEDs status at power-up12
Fig 18.	LabView start window13
Fig 19.	ADC_Run front panel Erreur ! Signet non défini.
Fig 20.	Click on "folder" icon Erreur ! Signet non défini.
Fig 21.	Select the right ADC settings file Erreur ! Signet non défini.
Fig 22.	Sending the proper configuration to the ADC Erreur ! Signet non défini.
Fig 23.	LEDs status: JESD04A link aligned Erreur ! Signet non défini.
Fig 24.	Default input & sampling parameters Erreur ! Signet non défini.
Fig 25.	Default input & sampling parameters Erreur ! Signet non défini.
Fig 26.	Appropriate input & sampling parameters Erreur ! Signet non défini.
Fig 27.	Appropriate input & sampling parameters Erreur ! Signet non défini.
Fig 28.	Launch the data acquisition Erreur ! Signet non défini.
Fig 29.	FFT of 8KWords ADC samples Erreur ! Signet non défini.
Fig 30.	Appropriate plot scale Erreur ! Signet non défini.
Fig 31.	Check the input level magnitude (Full Scale) Erreur ! Signet non défini.
Fig 32.	Dynamic parameters display (SNR, SINAD, THD, ENOB) Erreur ! Signet non défini.

Quick	Start	Guide	

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Contents 8.

1.	Introduction3
1.1	Demoboard overview:
1.2	Typical demonstration set-up : 1 USB cable => 1xDAC4
1.3	Typical demonstration set-up : 2 USB cables, 2xDACs4
2.	Installing the software tools
2.1	LabView 8.6 Run-time environment:
2.2	USB drivers:5
2.2.1	Step 1:5
2.2.2	Step 2:
2.2.3	Step 3:7
2.2.4	Step 4:7
2.3	NXP ADC_Run application:8
3.	Demo set-up connection9
3.1	1xDAC Connection diagram:9
3.2	1xDAC Jumpers setting:9
3.3	1xDAC LED status when powered-up:10
3.4	2xDACs Connection diagram:
3.5	2xDACs Jumpers setting:10
3.6	2xDACs LED status when powered-up:11
4.	NXP_DAC1x08D application user guide13
4.1	Front panel:
4.2	Load the ADC configuration: Erreur ! Signet non défini.
4.3	Prepare the Data acquisition/analysis: Erreur ! Signet non défini.
5.	Using an external clock reference14
5.1	Configuring the board:14
5.2	New demo set-up: Erreur ! Signet non défini.
5.3	Using coherence settings in ADC_Run application: Erreur ! Signet non défini.
6.	Legal information15
6.1	Definitions15
6.2	Disclaimers15
6.3	Licenses15
6.4	Patents15
6.5	Trademarks15
7.	List of figures16
8.	Contents17

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