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Understanding EVAL-CONTROL BRD2Z/EVAL-CONTROL BRD3Z PC Interface Issues

INTRODUCTION

As PCs continue to evolve, differences become evident among the manufactures of peripheral interfaces. This user guide details some issues regarding the EVAL-CONTROL BRD2Z/EVAL-CONTROL BRD3Z (ECB) and the parallel port (LPT*n*) of the PC and providesguidelines for configuring and testing the port(s) for compatibility.

LPT INTERFACE

When PCs were introduced, line printer (LPT) capabilities were developed for Centronics-style dot matrix printers. In this topology, the LPT was a basic, byte-wide, transmit-only interface. As the industry evolved, the LPT was used for more interfaces, such as tablets, scanners, and external tape drives. Recently, more control has been adopted, and bidirectional mode has been introduced. Unfortunately, manufacturers veered away from the standards because a definitive standard was never clearly established.

USING ECBS WITH THE ADC EVALUATION BOARDS

Analog Devices, Inc., offers many analog-to-digital converter (ADC) evaluation boards that use the ECB to capture data and transfer it to the PC host. The basic methodology is as follows:

- 1. PC software invokes a command to capture a packet of converted results.
- 2. The ADC evaluation board parses requests and sends a burst of conversion results to the ECB where the DSP microcontroller packetizes and stores it on the local SRAM.
- 3. The DSP generates a ready status to upload the SRAM contents to the PC host.
- 4. Conversion results are then massaged in data arrays and displayed via the evaluation board software, such as LabVIEW by National Instruments.

USING ECBS WITH PULSAR ADC EVALUATION BOARDS

Following the previous guidelines , the evaluation boards specific to the PulSAR high resolution SAR ADCs, mostly falling under the EVAL-AD76xxCBZ (some EVAL-AD79xxCBZ), use this interface with the exception of a dedicated driver, GIVEIO.exe. The evaluation software for these ADCs was developed with the National Instruments LabVIEW graphical programming environment.

ECB SYSTEM REQUIREMENTS

For the PulSAR evaluation software, the ECB requires at least one parallel port set in bidirectional mode. Note that this must be a native port either on a laptop docking station, or for desktops, one directly coming from the PC motherboard or PCI peripheral expansion. The use of USB-to-LPT dongles is not allowed because the GIVEIO driver needs a legacy LPT, preferably a 0x378, or, more commonly, a LPT1.

Port type can be verified in the following two ways:

- The Windows[®] 2000/XP Operating Systems (Win OS) Device Manager
- The basic input/output system (BIOS) of the PC

Check both to validate the installation and to minimize any problems that can be encountered when attempting to use the software.

Windows OS LPT Port Settings

To check the PC port settings, right-click on the **My Computer** icon on your desktop, click **Properties**, and then click **Hardware**. The dialog box shown in Figure 1 appears.

System Properties		? 🛛		
Advanced	Automatic Updates	Remote		
General	Computer Name	Hardware 🔫		
Device Manager				
on your co properties	e Manager lists all the hardware omputer. Use the Device Manage of any device.	devices installed er to change the		
	Dev	ice Manager		
Drivers Driver Sign compatible how Wind	ning lets you make sure that insta with Windows. Windows Updat ows connects to Windows Upda	Illed drivers are e lets you set up te for drivers.		
Dri	Driver Signing Windows Update			
Hardware Profiles				
Hardware different h	profiles provide a way for you to a ardware configurations.	set up and store		
	Hard	ware Profiles		
	ОКС	ancel Apply		

Figure 1. Hardware Tab

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Next, click the **Device Manager** button. The dialog box shown in Figure 2 appears.

📕 Device Manager	
File Action View Help	
$\leftarrow \rightarrow \blacksquare \textcircled{2}$	
PNCLAB25-D01	
🗄 🖳 😼 Computer	
🕀 🐋 Disk drives	
🖅 💆 Display adapters	
E WD/CD-ROM drives	
Human Interface Devices	
IDE ATA/ATAPI controllers	
🕀 🧼 Keyboards	
Mice and other pointing devices	
Honitors	
National Instruments GPIB Interfaces	
H Barta (COM & LDT)	
Drassesses	
Sound, video and game controllers	
🐨 🦉 System devices	
	1-002
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Figure 2. Device Manager Screen	

Expand **Ports (COM & LPT)** and click **ECP Printer Port (LPT1)** (see Figure 3), or if it is set from the BIOS, click **EPP**.



Set the port settings similar to the settings shown in Figure 4 and Figure 5, noting the **Use this device (enable)** and **Never use an interrupt** settings. When a setting for using an interrupt is selected, the PC can timeout indefinitely and it may need to be rebooted; therefore, we do not recommended using an interrupt.

ECP Printer Port (LPT1) Properties			
General Port Settings Driver Details Resources			
ECP Printer Port (LPT1)			
Device type: Ports (COM & LPT)			
Manufacturer: (Standard port types)			
Location: on Intel(R) ICH9DO LPC Interface Controller - :			
Device status This device is working properly. If you are having problems with this device, click Troubleshoot to start the troubleshooter.			
Troubleshoot			
Use this device (enable)			
Use this device (enable)			
Do not use this device (disable)			

Figure 4. ECP General Settings Tab

ECP Printer Port (LPT1) Properties
General Port Settings Driver Details Resources
Try not to use an interrupt Never use an interrupt
O Use any interrupt assigned to the port
Enable legacy Plug and Play detection
LPT Port Number:
OK Cancel

Figure 5. ECP Port Settings Tab

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For the **Resources** tab, note the I/O space assignments and make sure **Use automatic settings** is selected. If any device conflicts are present, select another port.

CP Printer Port (LPT1) Properties				
General Port Settin	ngs Driver Details Resources			
ECP Prin	ter Port (LPT1)			
Resource type	Setting			
I/O Range	0378 - 037F 0778 - 077F			
Setting based on:	Current configuration			
	✓ Use automatic settings Change Setting			
Conflicting device	ist:			
No conflicts.				
	OK Cancel			

Figure 6. ECP Resources

PC BIOS LPT Port Configuration

The second method for confirming your port settings is to check the basic input/output system (BIOS) of the PC. Note that LPT ports of most PCs come configured in ECP mode from the factory. However, BIOS settings can be checked and/or modified without actually saving changes. To check BIOS settings, reboot the PC and invoke the BIOS setup, which varies from manufacturer to manufacturer. Some manufacturers use the **Esc** key, some use the **DEL** key, and others use a function key (**F1** to **F12**). For most Dell PCs, **F2** invokes the BIOS setup screen. Click **F2** after the PC is powered up. Sometimes an audible beep sounds noting that the user setup is starting. When the setup screen is invoked, it should appear similar to Figure 7.



Figure 7. Dell BIOS Setup Screen

To check the LPT settings, scroll-down to **Onboard Devices** and expand (usually with the **Enter** key), as shown Figure 9.



Figure 8. Onboard Devices Menu (Collapsed)

The LPT port settings are shown in Figure 9 through Figure 11. The mode should be set to **Extended Capability Protocol (ECP)**. If the PC does not have **ECP** (bidirectional) mode available, the **Enhanced Parallel Port protocol (EPP)** mode can also be used.



Figure 9. LPT Port Mode

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Figure 11. ECP Mode

When the LPT mode is configured properly, save the BIOS (if changes were made) and exit. Exit is usually done with a sequence of **Esc**, scrollbars, and **Enter** strokes, as shown in the BIOS on-screen instructions for the system. After you exit the setup, Windows starts.

PulSAR Evaluation Board Software Installation

This user guide is only intended for the ECB versions of the software. The software for evaluating the Analog Devices PulSAR* ADCs is included in the evaluation board box on the enclosed CD or via download from the website (www.analog.com). Consult the appropriate document for installing the software and follow the instructions on the screen. Note that the user installing the software must have full system administrator privileges because the **Giveio** driver needs to overwrite some of the Windows OS LPT configurations.

When prompted to install the **Giveio** driver, click **Yes** (see Figure 12).



Figure 12. Giveio Installation Window

Note that the PC must be manually rebooted for the driver to take effect (see Figure 13).

Giveio	
٩	Your machine need to be reboot to have this driver taking effect
	ОК

Figure 13. Reboot Notice Screen

After installing the software and rebooting the PC reboot, run the software by selecting **C:\Program Files\Analog Devices\ High Res ADCs\ADC.exe** (or a similar executable). If downloading the compressed version from the Analog Devices website, extract the files first and then run **setup.exe**. If a correct LPT port is found, you will hear a series of audible clicks from the ECB followed by a flashing LED. On the PulSAR evaluation board, a green LED is usually lit, indicating that the ADC is busy converting. If the green LED is lit, the evaluation board software can be used as described in the appropriate evaluation board data sheet.

Evaluation Software Port Problems

The three most common LPT issues encountered include the following:

- Multiple ports detected
- LPT Port(s) present but not in ECP (bidirectional) mode
- No LPT ports present

Multiple Ports Detected

This is a simple issue because the software just needs to know which LPT the ECB is connected to. When there are multiple LPT ports, a message similar to the one shown in Figure 14 displays.



Figure 14. Port List

Note that the PC used for this user guide only had one LPT port; therefore, only the 0x378 port was identified. When multiple LPT ports are present and detected, a list of ports appears in the grey drop-down box.

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Following the steps outlined in the Evaluation Software Port Problems and Multiple Ports Detected sections should aid in alleviating this issue.

LPT Port Present But Not in ECP (Bidirectional) Mode

If some ports exist but are not set to ECP (bidirectional) mode, the message shown in Figure 15 appears.



Figure 15. Port Not Set to Bidirectional Mode Screen

Following the steps outlined in the previous sections should aid in alleviating this issue.

No LPT Ports Present

If no ports are detected, the dialog box shown in Figure 16 appears.



The steps outlined in the previous sections should aid in alleviating this issue.

PortTest.exe

A simple program to test the LPT ports is available on the CD, under the ECB subdirectory, and on the Analog Devices website. Download the compressed (zipped) file and extract the contents to a temporary directory. Run **setup.exe** and follow the instructions onscreen. If the PulSAR evaluation board software or the **Giveio** driver was previously installed, then the PC does not need to be rebooted.

When the installation is complete, run the C:**Program Files**\ **Analog Devices****PulSAR ADC Evaluation Tools****PortTest.exe** program.

🖸 paralle	el port test	with error	handling.v	i		
<u>File E</u> dit	Operate T	ools <u>W</u> indow	<u>H</u> elp			3.6
ſ	수 🕹 🔘					X
P	PC Port LPT1 LPT2 LPT3	Port address 378 278 38C 208 218 228 238 248 258 268 318 338	Diagnostic D 4 4 4 4 4 4 4 4 4 4 4 4 4	0 means port is valid for bidirectionnal com 1 means port exists but can't run bidirectionnal com 2 means port exists but failed 4 means port doesn't exist error in (no error) status code source source	Valid Port?	
<		358 398 A868	4 4 4			>

Figure 17. Port Test Program

This program executes automatically and displays data similar to Figure 17, noting the nomenclature for the valid and invalid settings. This program can stay open while you reconfigure the LPT port settings in the **Windows Device Manager**. To check if the updated setting works, simply click the right arrow to run the program.

WHEN ALL ELSE FAILS

Sometimes, the LPT port of a PC is not configurable for the PulSAR evaluation software. The port settings may show LPT1 or ECP mode, and the software can still not work. If this occurs, try using another PC.

RAM TEST FAILURE

In addition, a RAM test failure can occur; however, this error is not related to the LPT port problems. If a RAM test failure occurs, it can usually be corrected by returning the ECB to where it was purchased in exchange for another one.



Figure 18. RAM Test Failure Screen

CONCLUSION

This document describes the LPT port of the PC and provides some configuration options for use with the EVAL-CONTROL BRDZ2/EVAL-CONTRL BRDZ3 when used as a data capture board for the Analog Devices high resolution, PulSAR ADC evaluation boards. This user guide discusses some of the challenges that tools developers and applications engineers have uncovered for a variety of hardware, firmware, and software configurations. The USB-based EVAL-CED1Z data capture board drivers are now readily available for the PulSAR ADCs.

ESD CAUTION



ESD (electrostatic discharge) sensitive device. Charged devices and circuit boards can discharge without detection. Although this product features patented or proprietary protection circuitry, damage may occur on devices subjected to high energy ESD. Therefore, proper ESD precautions should be taken to avoid performance degradation or loss of functionality.

NOTES

Evaluation boards are only intended for device evaluation and not for production purposes. Evaluation boards are supplied "as is" and without warranties of any kind, express, implied, or statutory including, but not limited to, any implied warranty of merchantability or fitness for a particular purpose. No license is granted by implication or otherwise under any patents or other intellectual property by application or use of evaluation boards. Information furnished by Analog Devices is believed to be accurate and reliable. However, no responsibility is assumed by Analog Devices for its use, nor for any infringements of patents or other rights of third parties that may result from its use. Analog Devices reserves the right to change devices or specifications at any time without notice. Trademarks and registered trademarks are the property of their respective owners. Evaluation boards are not authorized to be used in life support devices or systems.

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