One Technology Way • P.O. Box 9106 • Norwood, MA 02062-9106, U.S.A. • Tel: 781.329.4700 • Fax: 781.461.3113 • www.analog.com

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 (LPTn) 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.
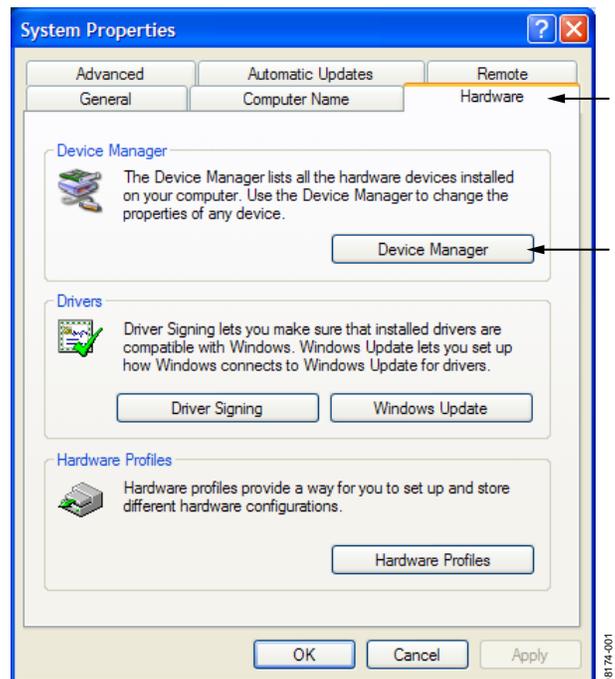
Figure 1. Hardware Tab

TABLE OF CONTENTS

REVISION HISTORY

6/09—Revision 0: Initial Version

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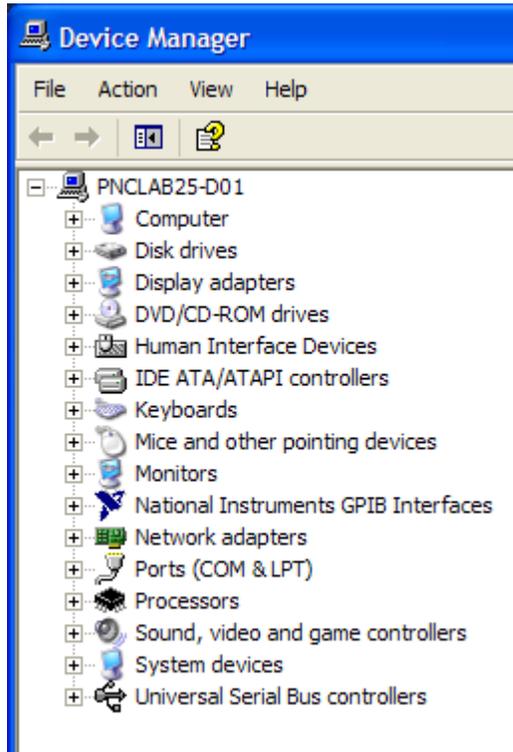
Figure 2. Device Manager Screen

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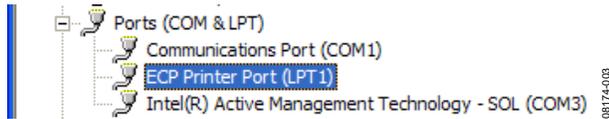
Figure 3. ECP Printer Port (LPT1) Screen

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.
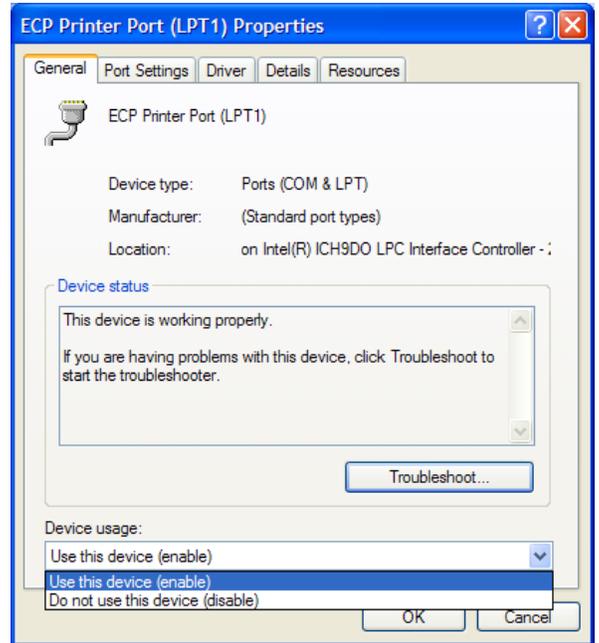
Figure 4. ECP General Settings Tab
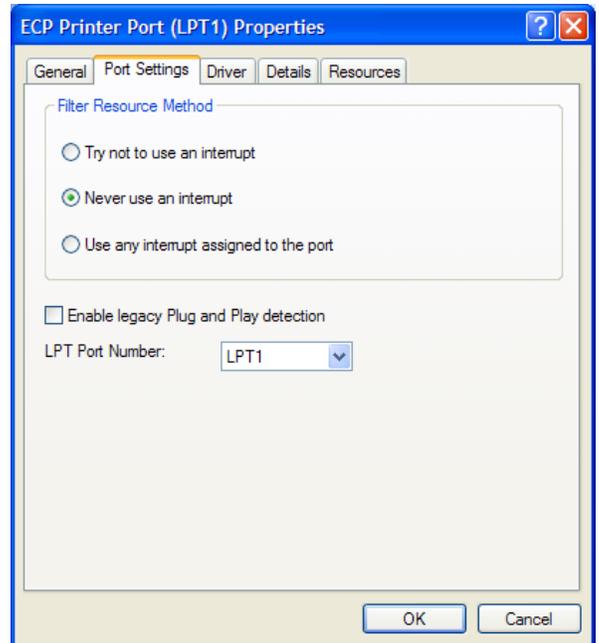
Figure 5. ECP Port Settings Tab

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.
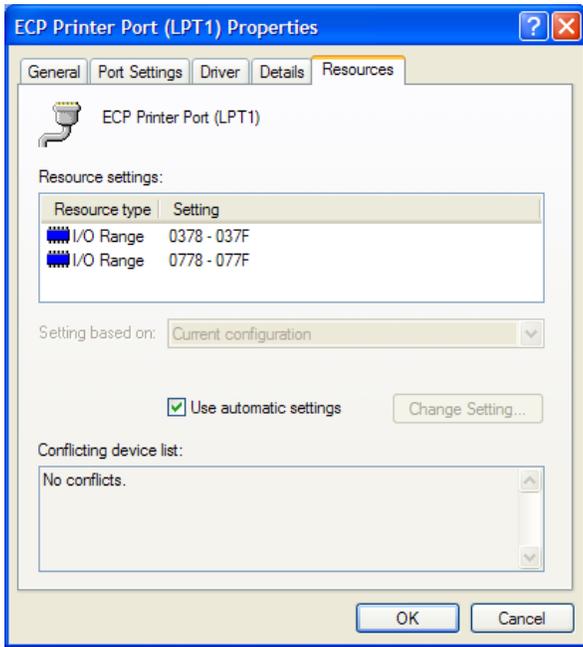
Figure 6. ECP Resources

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.
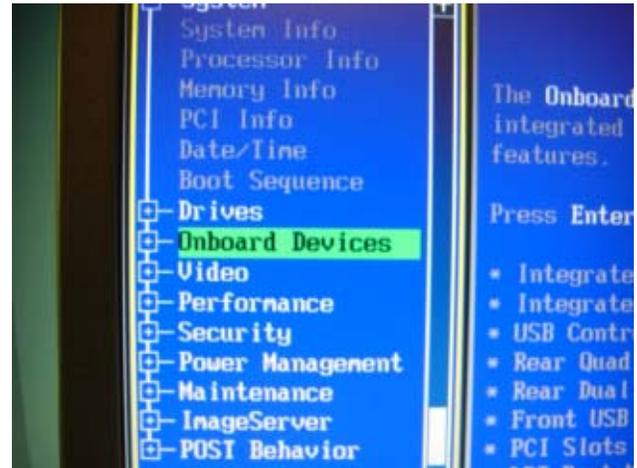
Figure 8. Onboard Devices Menu (Collapsed)

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.
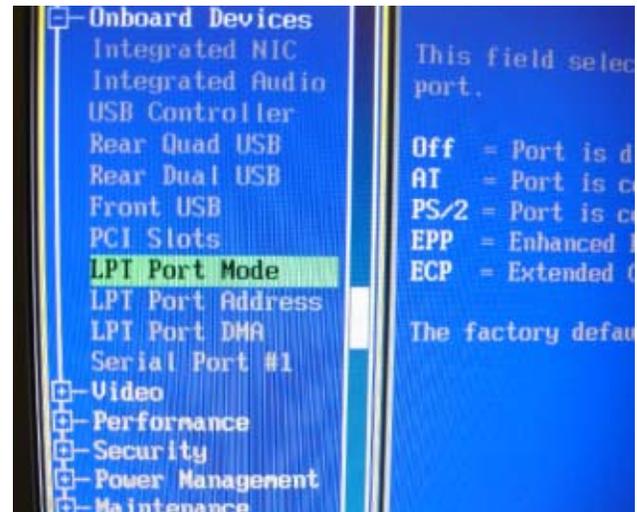
Figure 9. LPT Port Mode

Figure 10. Settings
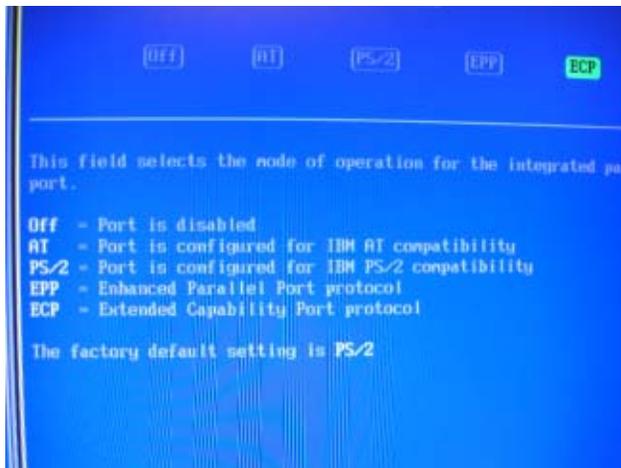
Figure 11. ECP Mode

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).
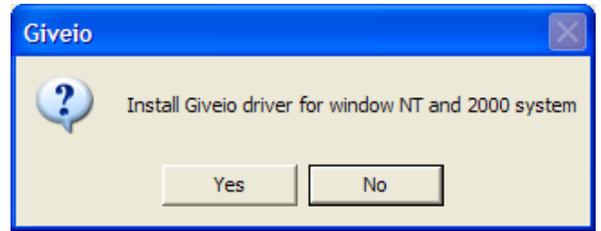
Figure 12. Giveio Installation Window

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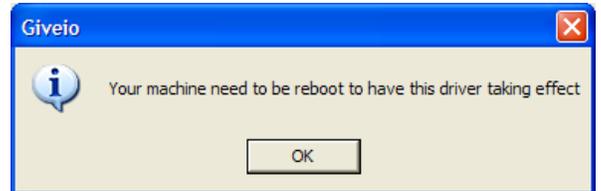
Figure 13. Reboot Notice Screen

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.
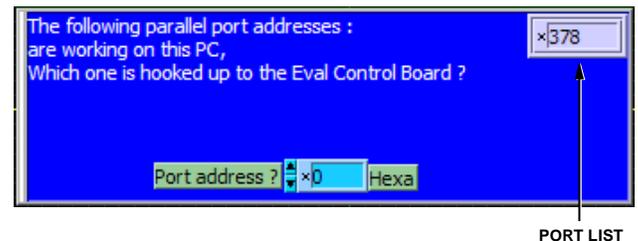
PORT LIST

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.

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.
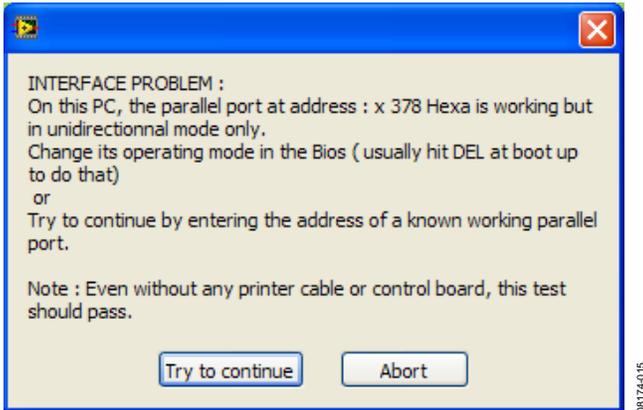
Figure 15. Port Not Set to Bidirectional Mode Screen

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.
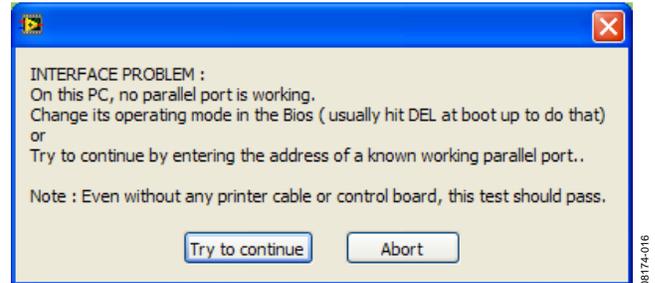
Figure 16. No Ports Detected Screen

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.
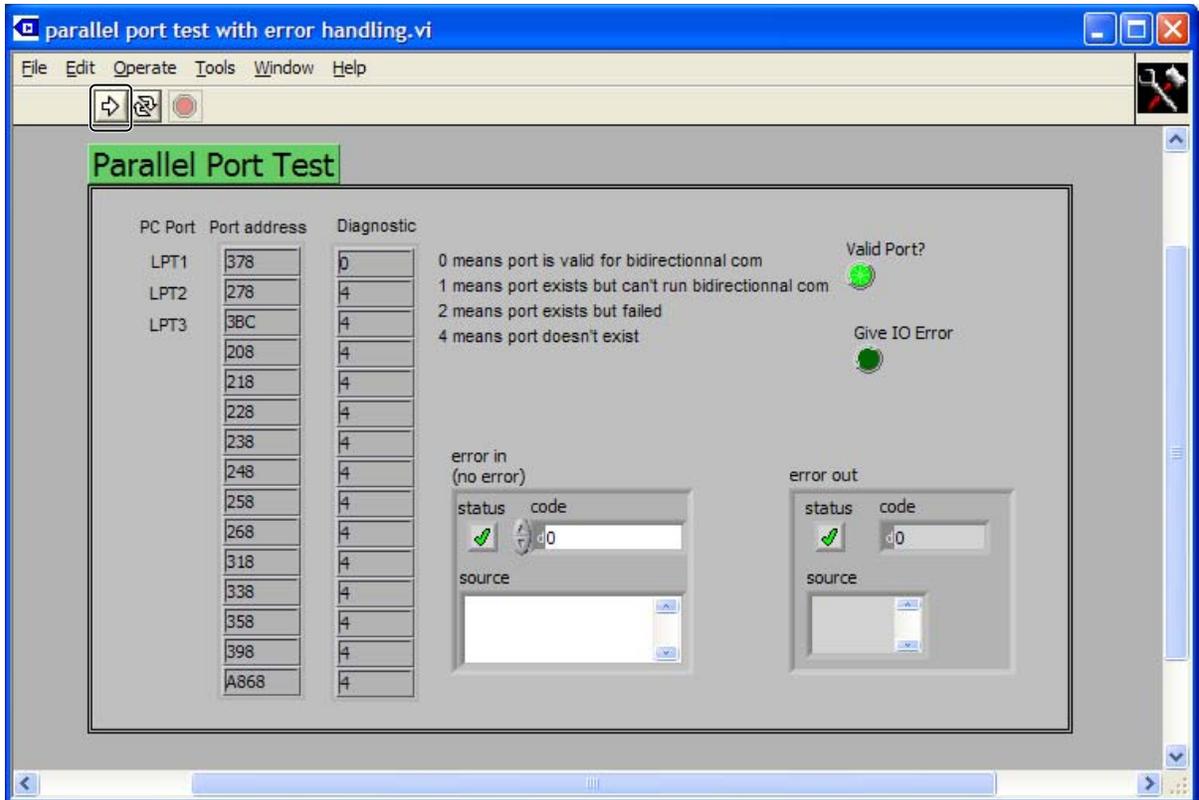
Figure 17. Port Test Program

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.
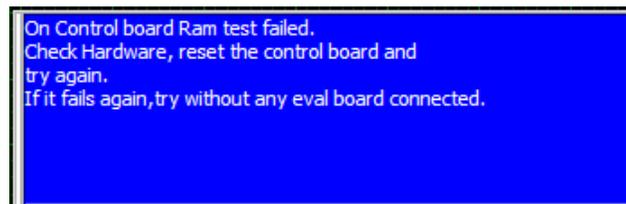
Figure 18. RAM Test Failure Screen

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

ANALOG DEVICES

www.analog.com