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HPUSB, USB, and HPPCI Emulators User's Guide

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Regulatory Compliance

The USB- and PCI-based emulators are designed to be used solely in a laboratory environment. The emulators are not intended for use as a consumer end product or as a portion of a consumer end product. The emulator board is an open system design which does not include a shielded enclosure and therefore may cause interference to other electrical devices in close proximity. This board should not be used in or near any medical equipment or RF devices.

The USB- and PCI-based emulators have been certified to comply with the essential requirements of the European EMC directive 2004/108/EC and therefore carries the “CE” mark.

The USB- and PCI-based emulators have been appended to Analog Devices, Inc. EMC Technical File (EMC TF) referenced **DSPTOOLS1**, issue 2, dated June 4, 2008 and were declared CE compliant by an appointed Notified Body (No.0673) as listed below.

Notified Body Statement of Compliance: Z600ANA1.015 and Z600ANA1.014 dated September 30, 2003.

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The USB- and PCI-based emulators contain ESD (electrostatic discharge) sensitive devices. Electrostatic charges readily accumulate on the human body and equipment and can discharge without detection. Permanent damage may occur on devices subjected to high-energy discharges. Proper ESD precautions are recommended to avoid performance degradation or loss of functionality. Store unused emulators in the protective shipping package.



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PREFACE

Thank you for purchasing an Analog Devices USB- or PCI-based JTAG emulator. The USB-based emulator family consists of the High-Performance USB JTAG emulator and the USB JTAG emulator.

The USB-based emulators are used in conjunction with the CrossCore[®] Embedded Studio and VisualDSP++[®] development environments to create, test, and debug advanced processor application software on Analog Devices fixed- and floating-point JTAG-based processors. The PCI-based emulators are used in conjunction with VisualDSP++.

The HPUSB-ICE system provides state-of-the-art support for JTAG-compliant Analog Devices processors. Key features of the HPUSB-ICE include:

- Plug-n-Play, USB 2.0 compliant
- High-speed USB device
- Windows[®] 2000, Windows XP, Windows Vista, or Windows 7 operation
- Multiple processor I/O voltage support
 - 1.8V, 2.5V, and 3.3V compliance
 - 5V tolerant in all ranges
- Multiprocessor support
- JTAG clock operation up to 50 MHz

The HPPCI-ICE system provides state-of-the-art support for JTAG-compliant Analog Devices processors. Key features of the HPPCI-ICE include:

- Plug-n-Play, PCI 2.2 compliant
- Windows 2000, Windows XP, Windows Vista, or Windows 7 operation
- Multiple processor I/O voltage support:
 - 1.8V, 2.5V, and 3.3V compliance
 - 5V tolerant in all ranges
- Multiprocessor support
- JTAG clock operation up to 50 MHz



The JTAG clock frequency is dependent on the delay characteristics of the JTAG interface and processor on the target board.

The USB-ICE system provides state-of-the-art support for selected processors. Key features of the USB-ICE include:

- Plug-n-Play, USB 2.0 compliant
- High-speed USB device
- Windows 2000, Windows XP, Windows Vista, or Windows 7 operation
- Multiple processor I/O voltage support:
 - 1.8V, 2.5V, and 3.3V compliance
 - 5V tolerant in all ranges
- Multiprocessor support
- JTAG clock operation up to 50 MHz

Analog Devices carries a wide range of in-circuit emulation products. To learn more about Analog Devices emulators, go to:
http://www.analog.com/en/processors-dsp/software-and-reference-designs/content/tools_product_overview/fca.html.

Purpose of This Manual

The *HPUSB, USB, and HPPCI Emulators User's Guide* provides directions for installing the high-performance USB-ICE, USB ICE, and high-performance HPPCI-ICE hardware and software on your PC. The manual also describes how to configure and use the components of the USB- and PCI-based emulators.

Intended Audience

This manual is intended to help the customer understand the features and operation of the HPUSB-ICE, HPPCI-ICE, and USB-ICE so they start using CrossCore Embedded Studio or VisualDSP++.

Manual Contents

The manual consists of:

- Chapter 1, “[Getting Started](#)” on page 1-1
Provides software and hardware installation procedures, PC system requirements, and basic board information.
- Chapter 2, “[Hardware Description](#)” on page 2-1
Provides information on hardware aspects of the USB-based emulators.

Technical Support

- Chapter 3, “Support” on page 3-1
Provides technical support contact information.
- Chapter 4, “References” on page 4-1
Provides information about different resources available for developing an application based on an Analog Devices processor.

Technical Support

You can reach Analog Devices processors and DSP technical support in the following ways:

- Post your questions in the processors and DSP support community at EngineerZone[®]:
<http://ez.analog.com/community/dsp>
- Submit your questions to technical support directly at:
<http://www.analog.com/support>
- E-mail your questions about processors, DSPs, and tools development software from **CrossCore Embedded Studio** or **VisualDSP++[®]**:

Choose **Help > Email Support**. This creates an e-mail to processor.tools.support@analog.com and automatically attaches your **CrossCore Embedded Studio** or **VisualDSP++** version information and `license.dat` file.

- E-mail your questions about processors and processor applications to:
processor.support@analog.com or
processor.china@analog.com (Greater China support)
- In the **USA only**, call **1-800-ANALOGD** (1-800-262-5643)

- Contact your Analog Devices sales office or authorized distributor.
Locate one at:
www.analog.com/adi-sales
- Send questions by mail to:
Processors and DSP Technical Support
Analog Devices, Inc.
Three Technology Way
P.O. Box 9106
Norwood, MA 02062-9106
USA

Product Information

Product information can be obtained from the Analog Devices Web site and the CCES online help.

Analog Devices Web Site

The Analog Devices Web site, www.analog.com, provides information about a broad range of products—analogue integrated circuits, amplifiers, converters, and digital signal processors.

To access a complete technical library for each processor family, go to http://www.analog.com/processors/technical_library. The manuals selection opens a list of current manuals related to the product as well as a link to the previous revisions of the manuals. When locating your manual title, note a possible errata check mark next to the title that leads to the current correction report against the manual.

Also note, [myAnalog](#) is a free feature of the Analog Devices Web site that allows customization of a Web page to display only the latest information about products you are interested in. You can choose to receive weekly e-mail notifications containing updates to the Web pages that meet your

Notation Conventions

interests, including documentation errata against all manuals. [myAnalog](#) provides access to books, application notes, data sheets, code examples, and more.

Visit [myAnalog](#) to sign up. If you are a registered user, just log on. Your user name is your e-mail address.

EngineerZone

EngineerZone is a technical support forum from Analog Devices. It allows you direct access to ADI technical support engineers. You can search FAQs and technical information to get quick answers to your embedded processing and DSP design questions.

Use EngineerZone to connect with other DSP developers who face similar design challenges. You can also use this open forum to share knowledge and collaborate with the ADI support team and your peers. Visit <http://ez.analog.com> to sign up.

Notation Conventions

Text conventions used in this manual are identified and described as follows.

Example	Description
Close command (File menu)	Titles in in bold style reference sections indicate the location of an item within the CrossCore Embedded Studio's menu system (for example, the Close command appears on the File menu).
{this that}	Alternative required items in syntax descriptions appear within curly brackets and separated by vertical bars; read the example as <i>this</i> or <i>that</i> . One or the other is required.
[this that]	Optional items in syntax descriptions appear within brackets and separated by vertical bars; read the example as an optional <i>this</i> or <i>that</i> .

Example	Description
[this,...]	Optional item lists in syntax descriptions appear within brackets delimited by commas and terminated with an ellipsis; read the example as an optional comma-separated list of <i>this</i> .
.SECTION	Commands, directives, keywords, and feature names are in text with <i>letter gothic font</i> .
<i>filename</i>	Non-keyword placeholders appear in text with italic style format.
	<p>Note: For correct operation, ...</p> <p>A Note provides supplementary information on a related topic. In the online version of this book, the word Note appears instead of this symbol.</p>
	<p>Caution: Incorrect device operation may result if ...</p> <p>Caution: Device damage may result if ...</p> <p>A Caution identifies conditions or inappropriate usage of the product that could lead to undesirable results or product damage. In the online version of this book, the word Caution appears instead of this symbol.</p>
	<p>Warning: Injury to device users may result if ...</p> <p>A Warning identifies conditions or inappropriate usage of the product that could lead to conditions that are potentially hazardous for devices users. In the online version of this book, the word Warning appears instead of this symbol.</p>

Notation Conventions

1 GETTING STARTED

This chapter provides the information needed to begin using Analog Devices USB- and PCI-based emulators.

 Analog Devices emulators are not intended to be used in a production environment.

This chapter includes the following sections.

- [“Contents of Emulator Package” on page 1-2](#)
Provides a list of components shipped with USB- and PCI-based emulators.
- [“PC Configuration” on page 1-2](#)
Describes the minimal PC requirements.
- [“USB- and PCI-based Emulator Installation Tasks” on page 1-3](#)
Provides a step-by-step procedure for setting up the emulator hardware and software.
- [“Configurator Software” on page 1-7](#)
Describes the target configurator utility.
- [“JTAG Frequency Selection” on page 1-8](#)
Provides information on JTAG frequency limitations.

Contents of Emulator Package

- [“HPPCI JTAG I/O Voltage Detection” on page 1-11](#)
Describes the JTAG I/O voltage detection feature of HPPCI emulators.
- [“Troubleshooting and Warranty” on page 1-16](#)
Points to an Engineer-to-Engineer Note for troubleshooting advice and warranty information.

Contents of Emulator Package

Your USB-based emulator package contains the following items.

- HPUSB-ICE or USB-ICE assembly
- 5-volt power supply
- 3-meter USB type-A to mini-B cable

Your High-Performance PCI emulator package contains the following items.

- HPPCI-ICE or JTAG daughter card
- HPPCI-ICE pod assembly

PC Configuration

For correct operation of a USB- or PCI-based emulator, your PC must meet the minimum requirements.

PC Configuration	USB-Based Emulators	PCI-Based Emulators
Operating system	Windows 2000, Windows XP SP2, Windows Vista, or Windows 7	
Development software	CrossCore Embedded Studio (CCES) or VisualDSP++	VisualDSP++
I/O port	One available USB full- or high-speed port	One available PCI slot

USB- and PCI-based Emulator Installation Tasks

Perform the following tasks to install your USB- or PCI-based emulator safely. Follow the instructions in presented order to ensure correct operation of your software and hardware.

1. [Installing a USB-Based Emulator](#) or [Installing a PCI-Based Emulator](#)
2. [Verifying Driver Installation and Attaching to an Emulation Target](#)
3. [Applying Power to the Emulator](#)

Installing a USB-Based Emulator

1. Install CCES or VisualDSP++ on your computer. The installation includes a USB driver required for your USB-based emulator.

If CCES or VisualDSP++ is installed already, you do not need to install it again.

USB- and PCI-based Emulator Installation Tasks

Note: If you connect the emulator first (before installing CCES or VisualDSP++) to the PC, the Windows driver wizard will not find the drivers for the emulator.

2. Connect one side of the provided USB cable to the USB assembly of the emulator and the other side to an open USB port of your computer.

[Verifying Driver Installation and Attaching to an Emulation Target](#) is next.

Installing a PCI-Based Emulator



The driver must be installed before you start the HPPCI-ICE for the first time.

1. Install the HPPCI-ICE hardware. For instructions on installing a PCI card into your computer, consult documentation provided by the computer manufacturer.
2. Install VisualDSP++. VisualDSP++ includes the HPPCI driver needed for your PCI emulation hardware. Refer to the *VisualDSP++ Installation Quick Reference Card* for details.

[Verifying Driver Installation and Attaching to an Emulation Target](#) is next.

Verifying Driver Installation and Attaching to an Emulation Target

Before using your USB- or PCI-based emulator, verify that the driver software is installed properly.

1. Open the Windows **Device Manager** and verify that the HPUSB-ICE, HPPCI-ICE or USB-ICE appears under **ADI Development Tools** as shown in [Figure 1-1](#).



Figure 1-1. Verifying Driver Installation

2. Connect the 14-pin header side of the pod cable to the target board via the debug interface. The 14-pin connector is keyed at pin 3 on the pod cable to ensure that the cable sits correctly on the 14-pin target emulation header. The target board should also have pin 3 keyed.

USB- and PCI-based Emulator Installation Tasks

-  Do not connect or disconnect a USB emulator JTAG header, whether powered up or not, to/from a powered target.

[Applying Power to the Emulator](#) is next.

Applying Power to the Emulator

The final step is to power up the emulator.

The following procedures apply to HP-USB and USB emulators only.

Powering up a USB-based emulator:

1. Apply power to target board.
2. Apply power to the emulator
3. If the emulator is not connected to the PC, connect the devices with the USB cable as described in [Verifying Driver Installation and Attaching to an Emulation Target](#).
4. Invoke CrossCore Embedded Studio or VisualDSP++.

Powering down a USB-based emulator:

1. Shut down (exit) CrossCore Embedded Studio or VisualDSP++.
 2. Disconnect the USB cable from the emulator and PC.
 3. Power down the emulator.
 4. Power down the target board.
-  If the emulator has an “Enable/Power” LED, the power LED lights green when power is applied. The power LED lights amber when connected to a session or when the ICE Test utility is used. If the emulator has an “Enable” LED only, the LED lights amber

when connected to a session or when the ICE Test utility is used.

At all other times, the LED should be off.

For custom processor boards still in design, refer to the Engineer-to-Engineer Note, *Analog Devices JTAG Emulation Technical Reference (EE-68)*, available from the Analog Devices Web site. This document is a technical reference for implementing the JTAG interface on your target.

Now the emulator hardware is ready to be used in conjunction with CCES or VisualDSP++ to debug a processor target system. See [“Configurator Software”](#).

Configurator Software

CrossCore Embedded Studio and VisualDSP++ development software require a description of your *platform* (JTAG chain). The platform definition is necessary for the software to communicate with the hardware through the emulator.

The VisualDSP++ and CCES include the target configurator utility to configure and test your emulator hardware. The target configurator provides emulator detection, JTAG I/O voltage selection, and JTAG frequency selection. Use the ICE Test (part of the target configurator) to test the target. If any errors are encountered, the errors are reported immediately and the test ends. Each error message recommends a solution to the problem.

Refer to the online help for information about “target configurator”, “JTAG frequency”, and “ICE test”.

JTAG Frequency Selection

USB-ICE emulators, high-performance PCI-ICE, and high-performance USB-ICE emulators support a JTAG clock operation up to 50 MHz.

 Not all frequencies listed above are supported for all processor families. The displayed frequencies depend upon the processor family.

There is a relationship between the JTAG frequency and core clock frequency of the processor. Typically, the core clock runs at a frequency that is more than 2x the JTAG clock's frequency. On newer Analog Devices processors, the core clock is a variable that sometimes is set by switches or software.

 If the core/JTAG clock relation is not followed, scan failures can prevent the emulator from connecting to the processor.

Use the **JTAG Frequency Selection** dialog box to test and change the rate at which the JTAG Test Clock signal (TCK) runs. To access the dialog box:

- CrossCore Embedded Studio users choose **Target > Settings > JTAG Frequency Selection** after launching a debug configuration.
- VisualDSP++ users choose **Settings > JTAG Frequency Selection** after creating a debug session.

Figure 1-2 and Figure 1-3 show the JTAG Frequency Selection dialog box.

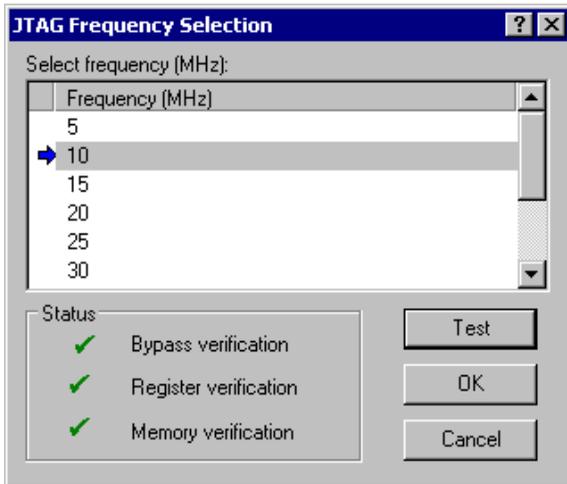


Figure 1-2. HPUSB-ICE JTAG Frequency Selection Dialog Box

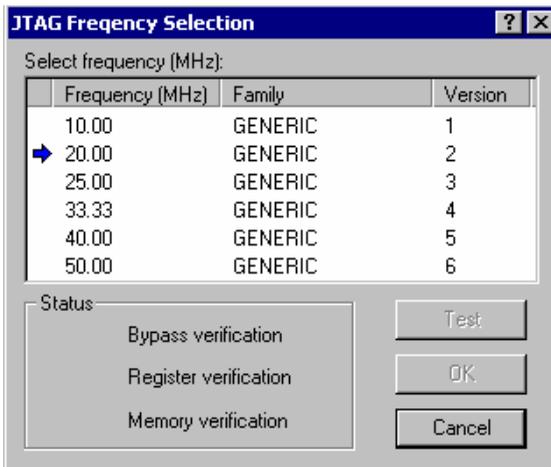


Figure 1-3. HPPCI-ICE JTAG Frequency Selection Dialog Box

JTAG Frequency Selection

The tests listed in the **Status** box are run when you click **Test** in the **JTAG Frequency Selection** dialog box. The blue arrow points to the current frequency. The arrow does not change after you run the tests because **Cancel** goes back to using the frequency pointed to by the blue arrow. To use a different frequency, select the appropriate frequency from the list and click **Test**. Click **OK** to use the frequency that is highlighted and tested already.

Table 1-1 describes the **JTAG Frequency Selection** dialog box.

Table 1-1. JTAG Frequency Selection Dialog Box

Item	Description
Select frequency (MHz)	Selects the frequency to run TCK.
Status	Updates status of the tests indicated within the test group. The test status indicator can show a “running” icon, “not running” icon, “pass” icon, or “fail” icon, depending on the test status.
Test	Tests the selected frequency by running the tests in the Status group. NOTE: If tests fail, you may have to shut down the IDE and restart your session.
OK	Saves the selected frequency. This should only be highlighted if all the tests have passed.
Cancel	Continues using the frequency pointed to by the blue arrow.

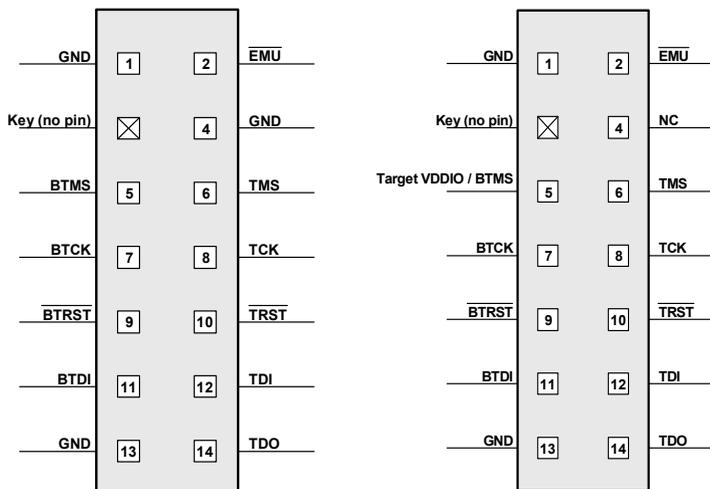


If you encounter a problem launching the CCES or VisualDSP++ at a certain frequency, delete your debug configuration/session and create a new debug configuration/session. This sets TCK back to the default value.

HPPCI JTAG I/O Voltage Detection

The mode of operation supported by the PCI emulator is dependent on the connection method used for the 14-pin JTAG header on your target. [Table 1-2](#) shows how the target JTAG header connects for legacy and auto detection modes.

Table 1-2. HPPCI JTAG Legacy and Auto Detection Modes



HPPCI JTAG I/O -- Legacy Pinout HPPCI JTAG I/O -- Auto Detection Pinout

HPUSB/USB Legacy Mode

Legacy mode is used for older targets that do not provide a target VDDIO input for automatic voltage detection by the emulator. In this mode, the voltage at which the JTAG signals run is set manually through the Configurator utility. The configurator utility provides a voltage selection setting when configuring the target.



HPUSB-ICE and USB-ICE emulators do not support auto voltage detection mode.