

ARM DS-5 Tools and Avnet ZED Series

#1

Connecting the DSTREAM Debugger to Avnet ZedBoard or MicroZed



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ARM DS-5 Tools and Avnet ZED Series

This tutorial is one in a series of step by step instruction manuals. Together they document the procedures necessary to utilize the ARM Development Studio 5 (DS-5™) Software Suite and the DSTREAM Debugging tools with the Avnet Zynq Evaluation and Development (ZED) boards. These tutorials can be used on their own, or in combination with Avnet online videos and OnRamp Technical Session™.

The ARM software and hardware tools provide a powerful debugging suite for processor-based systems built around the dual Cortex-A9 cores present in the Xilinx Zynq SoC, at the heart of the Avnet ZED boards. A Linux software developer can simultaneously debug applications and kernel module code, with separate control over each thread. You can step through Linux boot code, first stage bare metal boot code, and bare metal applications. When used in concert with the Xilinx Vivado tools for FPGA fabric development, the ARM debugger and Internal Logic Analyzer (ILA) IP can be cross-triggered to stop on software and hardware breakpoints, or when a hardware event occurs. For difficult-to-isolate intermittent faults, DS-5 provides access to the Cortex-A9 on-chip Trace facility. Once your embedded system is running correctly, DS-5 uses Streamline, a graphical system profiler, to identify performance bottlenecks in your design to ensure top-shelf operation.

This tutorial series begins with the most basic tool configuration and board connection. It takes you all the way through to the most complex aspects of hardware/software co-debugging to root out design errors that are otherwise apparent only in very complex use cases, or worse, after a product is released. Together the ARM DS-5 tools, Xilinx Vivado and Avnet ZED boards provide an unparalleled combination to compress design timelines, cut project costs and optimize your product for the marketplace.

Required Installations

Software

The recommended software for this tutorial series is:

- ARM Development Studio 5 (Exact version used is 5.14, build 1702)
- Xilinx ISE WebPACK 14.5 (Free license and download from Xilinx website)
- Cypress CY7C64225 USB-to-UART Bridge Driver (for ZedBoard serial output)
- Silicon Labs CP2104 USB-to-UART Bridge Driver (for MicroZed serial output)
- Tera Term (Exact version used is V4.75)
- Xilinx Software Development Kit, version 14.5
- For hardware/software co-debugging, Xilinx Vivado 2013.2

Hardware

The targeted hardware consists of the following:

- PC workstation with at least 5 GB RAM, 30GB free hard disk space, Windows 7 64-bit operating system, and a wired GB Ethernet connection
- Available SD card slot on PC or external USB-based SD card reader
- One of:
 - Avnet ZedBoard Kit (**AES-Z7EV-7Z020-G**)
 - USB cable (Type A to Micro-USB Type B)
 - 4GB SD card
 - 12v Power supply
 - Avnet MicroZed Kit (**AES-Z7MB-7Z010-G**)
 - USB cable (Type A to Micro-USB Type B)
 - 4GB SD card
- Avnet ZedBoard Debug Adapter Kit (**AES-ZBDB-ADPT-G**)
 - 14-pin Xilinx PC4 ribbon cable
- ARM DSTREAM unit and Keil pod with wide cable connector
 - 20-pin JTAG ribbon cable
 - USB cable (Type A to Printer)
 - 5v Power supply
- CAT-5 Ethernet cable

Technical Support

For technical support with any of the instructions, please contact your local Avnet/Silica FAE or visit the support forums:

<http://www.zedboard.org/forum>

<http://www.microzed.org/forum>

Additional technical support resources are listed below.

ZedBoard Kit/MicroZed Kit support page with Documentation and Reference Designs

<http://www.zedboard.org/content/support>

<http://www.microzed.org/content/support>

For Xilinx technical support, you may contact your local Avnet/Silica FAE or Xilinx Online Technical Support at www.support.xilinx.com . On this site you will also find the following resources for assistance:

- Software, IP, and Documentation Updates
- Access to Technical Support Web Tools
- Searchable Answer Database with Over 4,000 Solutions
- User Forums
- Training - Select instructor-led classes and recorded e-learning options

Contact your Avnet/Silica FAE or Avnet Support for any additional questions regarding the reference designs, kit hardware, or if you are interested in designing any of the kit devices into your next design.

<http://www.em.avnet.com/techsupport>

For ARM technical support, you may contact your local Avnet/Silica FAE or ARM Online Technical Support at www.arm.com/support .

Connect DSTREAM Unit to Debug Adapter Board

1. Connect the DSTREAM unit to the Keil Pod using the wide ribbon cable supplied by ARM.



ARM DSTREAM Hardware

2. Connect the ARM JTAG 20-Pin ribbon cable from DSTREAM pod to the 20-Pin ARM DSTREAM Header (CON1) on the ZedBoard Processor Debug Adapter board. The keyed receiver will only allow the connector to be inserted one way.

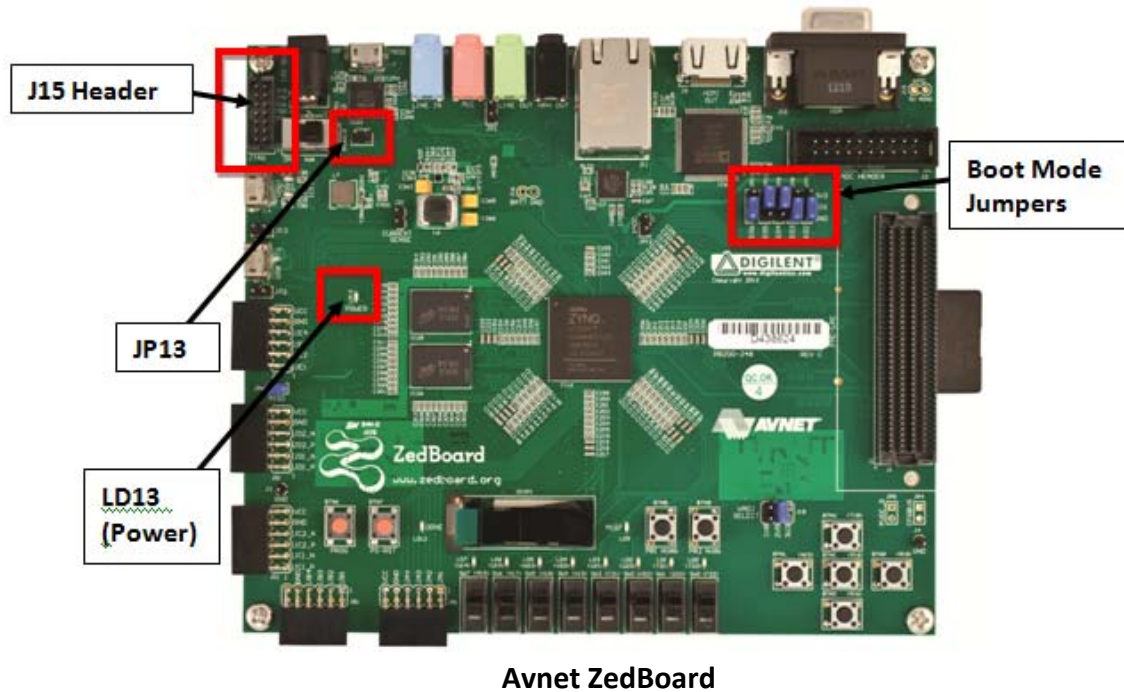


Avnet ZedBoard Debug Adapter for DSTREAM

3. Connect one end of the 14-Pin Xilinx PC4 ribbon cable (included in the ZedBoard Adapter Kit) to the Xilinx PC4 Header (CON2) on the ZedBoard Debug Adapter board.

Connect Debug Adapter Board to ZedBoard

1. Connect the other end of the 14-Pin Xilinx PC4 ribbon cable to the Xilinx PC4 Header (J15) on your ZedBoard target, located adjacent to the power switch.



2. If you plan to download a bitstream to the ZedBoard, set the ZedBoard Boot Mode to JTAG only using jumpers JP7 to JP11 set to the following:

	JP11	JP10	JP9	JP8	JP7
Position	SIG-GND	SIG-GND	SIG-GND	SIG-GND	SIG-GND

If you plan to boot ZedBoard from an SD card, set the ZedBoard Boot Mode to SD boot (shown in the photo above):

	JP11	JP10	JP9	JP8	JP7
Position	SIG-GND	SIG-3V3	SIG-3V3	SIG-GND	SIG-GND

3. Set the ZedBoard JTAG Reset Select Jumper (JP13) to 1-2 position. Please note that this jumper is not placed in the ZedBoard photo.
4. Power the DSTREAM and connect the DSTREAM USB to your ARM DS-5 development workstation.

WARNING

Be very careful to use the correct ARM power block with the DSTREAM unit. If you accidentally connect 12v ZedBoard power into the DSTREAM, irreparable damage to the unit will occur.

You will see the DSTREAM logo on the top of the unit illuminate in blue, the Status light will glow green, and the Power light on the pod will glow blue.

5. Connect 12V power to the ZedBoard at the barrel jack (J20) and power on the ZedBoard with switch SW8.

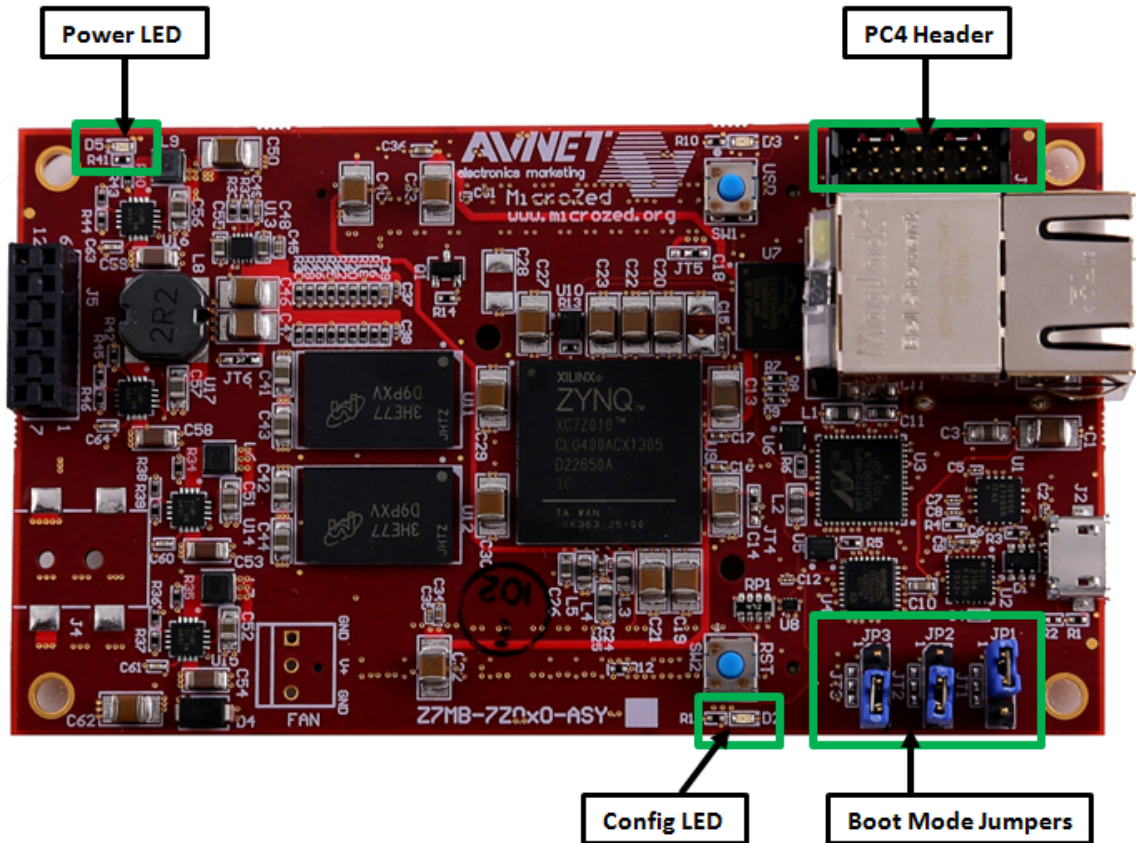
The Target light on the DSTREAM unit and the VTREFA light on the pod will both illuminate, indicating a good connection with the ZedBoard.

6. With power applied, the ZedBoard POWER indicator at LD13 should illuminate.

This completes the initial hardware setup for connecting the DSTREAM debugging tools to the ZedBoard. . If you are using ARM DS-5, version 5.14 or earlier, the ZedBoard is not included as a board selection in the default target configurations within the ARM DS-5 environment. If you have not already done so the next step is to add a ZedBoard configuration. To do this, see Tutorial #2 in this series.

Connect Debug Adapter Board to MicroZed

1. Connect the other end of the 14-Pin Xilinx PC4 ribbon cable to the Xilinx PC4 Header on your MicroZed target, located adjacent to the Ethernet connector.



Avnet MicroZed

2. If you plan to download a bitstream to the MicroZed, set the MicroZed Boot Mode to JTAG only using jumpers JP3to JP1 set to the following:

	JP3	JP2	JP1
Position	1-2	1-2	1-2

If you plan to boot MicroZed from an SD card, set the MicroZed Boot Mode to SD boot (shown in the photo above):

	JP3	JP2	JP1
Position	2-3	2-3	1-2

3. Power the DSTREAM and connect the DSTREAM USB to your ARM DS-5 development workstation. You will see the DSTREAM logo on the top of the unit illuminate in blue, the Status light will glow green, and the Power light on the pod will glow blue.
4. Plug the USB-A to USB Micro-B cable between the MicroZed and any available USB port on your host. The MicroZed will receive power through the cable, and the Power LED will illuminate.

The Target light on the DSTREAM unit and the VTREFA light on the pod will both illuminate, indicating a good connection with the MicroZed.

This completes the initial hardware setup for connecting the DSTREAM debugging tools to the MicroZed. Within DS-5, MicroZed uses the ZedBoard target configurations for board connection. If you are using ARM DS-5, version 5.14 or earlier, the ZedBoard is not included as a board selection in the default target configurations within the ARM DS-5 environment. If you have not already done so the next step is to add a ZedBoard configuration. To do this, see Tutorial #2 in this series.

Revision History

Date	Version	Revision
13 May 13	00	Initial Draft
20 Aug 13	01	MicroZed Added + Release
20 Sept 13	02	Release

Resources

<http://www.zedboard.org>

<http://www.microzed.org>

<http://www.xilinx.com/zyng>

<http://www.arm.com/products/tools/software-tools/ds-5/index.php>