Getting Started with the Avnet UltraZed-EG Starter Kit



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About this Guide

This guide provides detailed information for getting started with the Avnet UltraZed-EG™ Starter Kit powered by the Xilinx Zynq® UltraScale+™ MPSoC. Follow the detailed instructions in this document to begin development right away.

Additional Documentation

Additional documents for the Xilinx Zynq® UltraScale+™ MPSoC devices are available for download at

http://www.xilinx.com/products/silicon-devices/soc/zynq-ultrascale-mpsoc.html

Additional Support Resources

To search the database of silicon and software questions and answers or to create a technical support case in WebCase, see the Xilinx website at:

http://www.xilinx.com/support

Introduction

The UltraZed-EG™ Starter Kit consists of the UltraZed-EG System-on-Module (SOM) and IO Carrier Card bundled to provide a complete system for prototyping and evaluating systems based on the Xilinx powerful Zynq® UltraScale+™ MPSoC device family.

UltraZed-EG SOM

UltraZed-EG SOM is a highly flexible, rugged, System-On-Module (SOM) based on the Xilinx Zynq® UltraScale+™ MPSoC. Designed in a small form factor, the UltraZed-EG SOM packages all the necessary functions such as system memory, Ethernet, USB, and configuration memory needed for an embedded processing system. The UltraZed-EG provides easy access to 180 user I/O pins, 26 PS MIO pins, and 4 high-speed PS GTR transceivers along with 4 GTR reference clock inputs through three I/O connectors on the backside of the module.

Available with the Zynq UltraScale+ MPSoC ***XCZU3EG-SFVA625*** device, the UltraZed-EG SOM enables designers to build high-performance systems with confidence and ease. By simply plugging the off-the-shelf UltraZed-EG SOM into an application specific carrier card such as the Avnet IO Carrier Card, system bring-up and debug time can be cut in half, while overall system cost can be reduced by 20% or more verses a standard chip-down design.

UltraZed IO Carrier Card

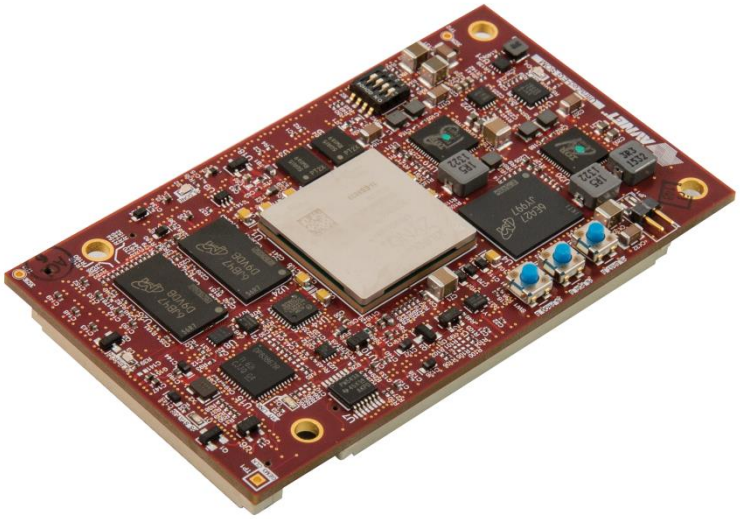
The UltraZed IO Carrier Card supports the UltraZed-EG System-on-Module (SOM), providing easy access to the full 180 PL user I/O, 26 PS MIO, and 4 PS GTR transceivers available from the UltraZed-EG SOM via three Micro Headers. Two 140-pin Micro Headers on the carrier card mate with the UltraZed-EG SOM, connecting 180 of the UltraZed-EG Programmable Logic (PL) I/O to 12 Digilent Pmod™ compatible interfaces, Arduino Shield, LVDS Touch Panel interface, push button switches, DIP switches, LEDs, Xilinx SYSMON, and clock oscillator.

The UltraZed IO Carrier Card also uses a 100-pin Micro Header to gain access to the UltraZed-EG SOM Processing System (PS) MIO and GTR transceiver pins as well as USB 2.0 and Gigabit Ethernet interfaces. The UltraZed-EG SOM PS MIO and GTR pins are used on the IO Carrier Card to implement the microSD card, PMOD, USB 2.0/3.0, Gigabit Ethernet, SATA host, Display Port, dual USB-UART, user LED and switch, and MAC Address device interfaces.

The IO Carrier Card also provides several power rails to the UltraZed-EG SOM including the 12V main input voltage, user selectable bank voltages for the PL I/O (VCCOs), and the necessary voltages for the GTR transceivers. The IO Carrier Card is a great vehicle for validating the UltraZed-EG SOM and provides an excellent starting point for creating your own UltraZed-EG custom carrier card.

UltraZed-EG SOM Features

- Xilinx XCZU3EG-1SFVA625 device
- DDR4 SDRAM (2GB, in x32 configuration)
- Dual QSPI Flash (64MB)
- I2C EEPROM (2Kb)
- eMMC Flash (8GB, in x8 configuration)
- USB 2.0 ULPI PHY
- Gigabit Ethernet PHY
- I2C 8-bit I/O expander
- 2-channel I2C switch/mux
- PS reference clock input
- On-board voltage regulators
- Power-On Reset (POR) circuit
- 4-position boot mode DIP switch
- Linux BSP and reference designs
- 3 JX micro-header connectors (2 x 140-pin, 1 x 100-pin) providing the following connections to the Carrier Cards
  - 180 user PL I/O pins
  - 26 user PS MIO pins (one full MIO bank)
  - 4 PS GTR transceivers
  - 4 PS GTR reference clock inputs
  - PS JTAG interface
  - PL SYSMON interface
  - USB 2.0 connector interface
  - Gigabit Ethernet RJ45 connector interface
  - PMBus interface
  - SOM PS VBATT battery input
  - Carrier Card I2C interface
  - SOM Reset input
  - Carrier Card interrupt input
  - Carrier Card Reset output
  - Power Good output
  - SOM to Carrier Card ground pins
  - SOM input voltages and output sense pins



UltraZed IO Carrier Card Features

- Single UltraZed-EG SOM slot
- microSD card connector
- PS PMOD header
- Dual USB-UART
- Display port connector (x2)
- USB 2.0/3.0 connector
- SATA host interface
- RJ45 connector
- 12 PL PMOD headers
- Arduino connectors
- PL user DIP and Push switches
- 8 PL user LEDs
- PS user LED and push switch
- PMBus header
- PS VBATT battery
- SOM reset switch
- Differential clock generator
- Digilent USB-JTAG module
- PC4 JTAG header
- SYSMON header
- I2C MAC Address device
- LVDS Touch Panel interface
- USB connector (for dual USB-UART)
- 3 JX micro connectors (2 x 140-pin, 1 x 100-pin) providing the following connections to the UltraZed-EG SOM:
  - 180 user PL I/O pins
  - 26 user PS MIO pins (one full MIO bank)
  - 4 PS GTR transceivers
  - 4 PS GTR reference clock inputs
  - PS JTAG interface
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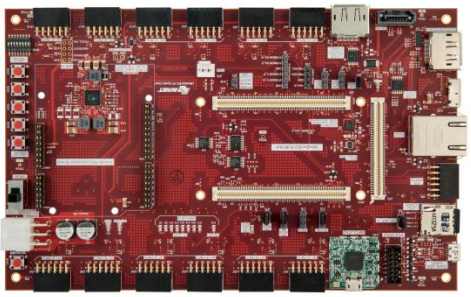


UltraZed-EG Starter Kit Contents

What's Inside the Box

- **Hardware**
  - UltraZed-EG SOM
  - UltraZed IO Carrier Card
  - One Ethernet and two USB A-micro-B Cables
  - 12V Power Supply (US/UK/Euro AC cords)
  - UltraZed-EG SOM Mounting Hardware
  - microSD Card (8GB)

- **Software Tools**
  - Voucher for Vivado Design Edition with ES1 License (device locked to the ZU3EG) for SOMs with ES1 silicon
  - Webpack for SOMs with production silicon

What's available online

- License for Vivado Design Suite
  - http://www.xilinx.com/support/licensing_solution_center.htm
  - http://www.xilinx.com/tools/faq.htm
- Development Kit home page with Documentation and Reference Designs
  - www.ultrazed.org/product/ultrazed-eg-starter-kit
- Technical Support
  - http://xilinx.com/support

Getting Started with UltraZed-EG Starter Kit

The UltraZed-EG Starter kit is shipped with a simple demo stored in the SOM's QSPI and eMMC Flash devices. You can run this demo by simply setting up the board and turning the power on.

Demo Hardware Requirements

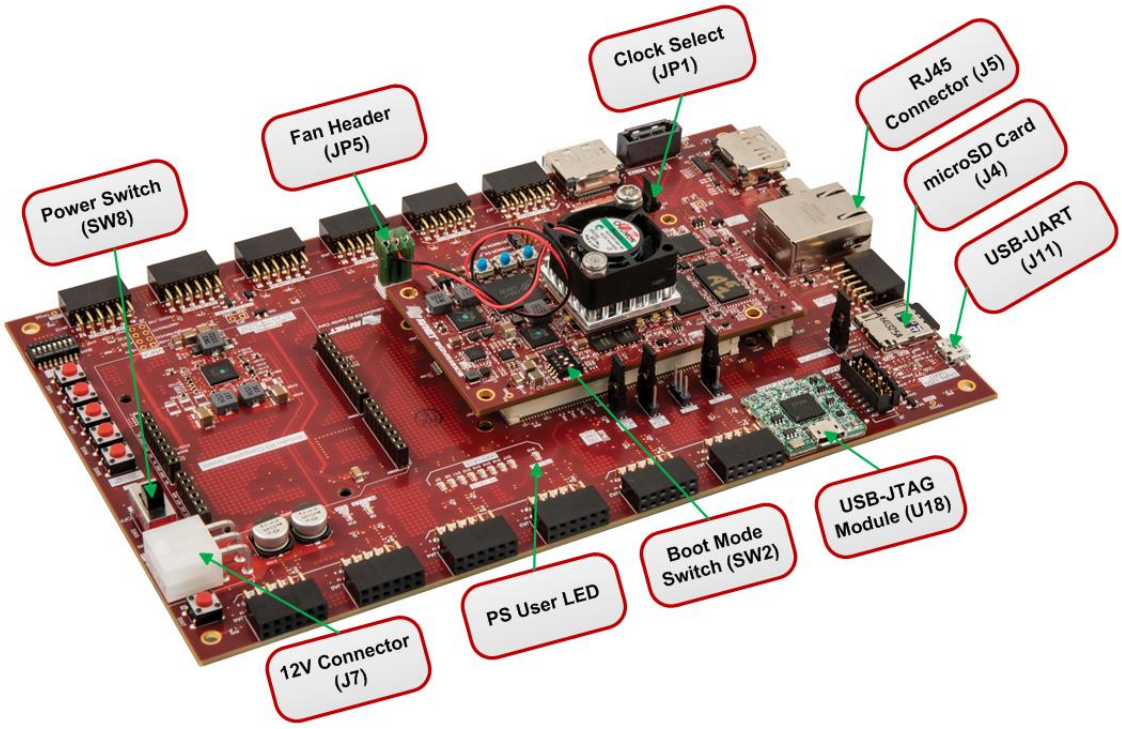
The required hardware for running the demos are

- Avnet UltraZed-EG Starter Kit

Setting up the Hardware

Please perform the following steps to setup the UltraZed-EG Starter Kit and install the serial port driver.

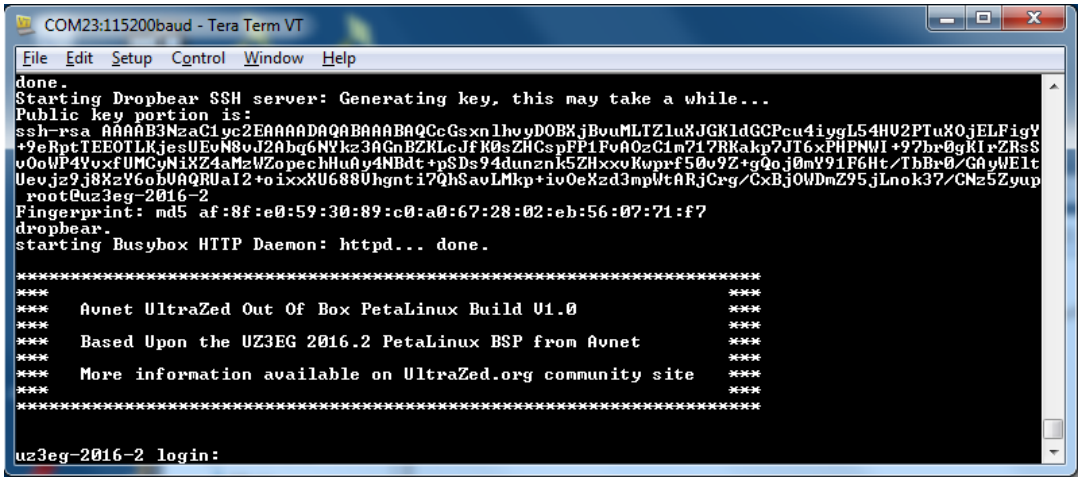
- Plug the UltraZed-EG SOM onto the IO Carrier Card via JX1/JX2/JX3 connectors and connect the fan to the fan header (JP5) on the IO Carrier Card.
- Set the UltraZed-EG SOM SW2 Boot Mode switch (MODE[3:0] = SW2[4:1]) to ON, ON, ON, and OFF positions (Boot Mode set to QSPI, MODE[3:0] = 0x1).
- Install a jumper on the IO Carrier Card JP1.
- Connect the USB A-mini-B cable to J11 on the IO Carrier Card and the USB port of the PC. This will provide USB-UART connection to the board.
- Connect 12V power supply to J7 on the IO Carrier Card.
- Start a Tera Term session and set the serial port parameters to 115200 baud rate, 8 bits, 1 stop bit, no parity and no flow control (please refer to the **Setting up the Host PC** section at the end of this document for installing the software driver for the USB-UART port and setting up the UART).



Running the Out of Box Demo

The UltraZed-EG Starter kit is shipped with a simple demo stored in the SOM's QSPI and eMMC Flash devices. To run this demo, set up the hardware as described in the previous section and then:

- Slide the SW8 power switch to the **ON** position on the IO Carrier Card.
- The out-of-box design will run and you will see the following on the UART terminal (please allow time for Linux to boot). You should also see the PS on-board user Red LED flashing.
- You may login as root with password root.



Please go to www.ultrazed.org/product/ultrazed-EG to download files for the Out of Box design as well as other reference designs and tutorials.

You may also run the Out of Box design from the microSD card located on the UltraZed IO Carrier Card.

- Please go to www.ultrazed.org/product/ultrazed-EG and download the Out of Box boot image files as well as the README file.
- Follow the instructions in the README file to copy the boot image onto the Avnet supplied microSD card.
- Slide the SW8 power switch to the **OFF** position on the IO Carrier Card.
- Insert the microSD card into J4 microSD card slot on the IO Carrier Card.
- Set the UltraZed-EG SOM SW2 Boot Mode switch (MODE[3:0] = SW2[4:1]) to ON, OFF, ON, and OFF positions (Boot Mode set to SD Card, MODE[3:0] = 0x5).
- Slide the SW8 power switch to the **ON** position on the IO Carrier Card to boot from the microSD card and run the Out of Box demo.

Next Steps

Now that you have run through the demos, you are ready to create custom systems for the UltraZed-EG Starter Kit. You can start by downloading various reference designs for this kit from the Avnet website at www.ultrazed.org/product/ultrazed-EG.

Getting Help and Support

For questions regarding products within your Product Entitlement Account, send an e-mail message to your regional customer services representative

- Canada, USA and South America - isscs_cases@xilinx.com
- Europe, Middle East, and Africa - eucases@xilinx.com
- Asia Pacific including Japan - apaccase@xilinx.com

For technical support including the installation and use of your product license file you may contact Xilinx Online Technical Support at http://www.xilinx.com/support. 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 Avnet Support for any questions regarding the UltraZed-EG Starter Kit reference designs or kit hardware

www.ultrazed.org/product/ultrazed-eg-starter-kit

Setting up the Host PC

This section describes how to install the USB drivers on the host PC for the USB-UART connection to the UltraZed-EG Starter Kit.

Install the USB UART Drivers

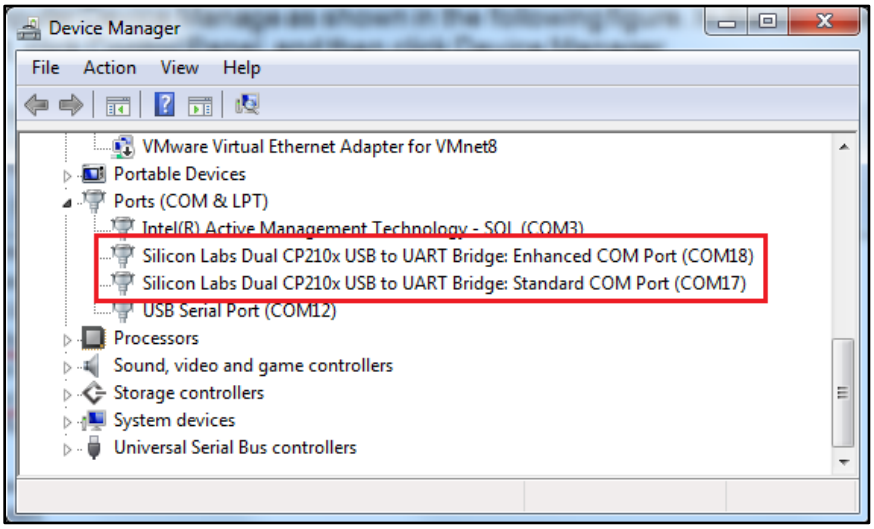
Download and install the Silicon Laboratories CP210x VCP drivers on the host computer from the http://www.silabs.com/products/mcu/Pages/USBtoUARTBridgeVCPDrivers.aspx website.

Configure the Host Computer COM Port

The Reference designs use a terminal program to communicate between the host computer and the UltraZed-EG Starter Kit. To configure the host computer COM port for this purpose:

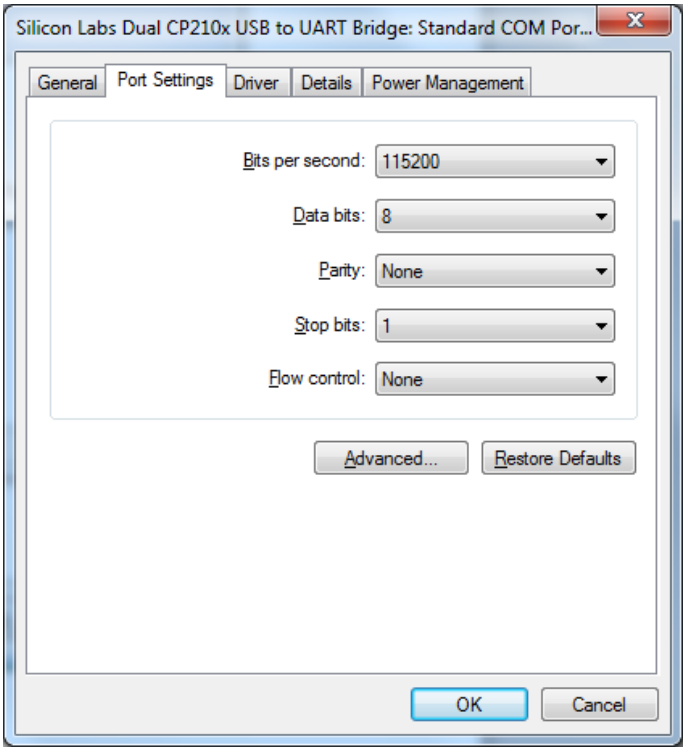
- Connect the UltraZed-EG Starter Kit to the host computer via the IO Carrier Card J11 USB-UART port and power up the board.

- Open the host computer Device Manage as shown in the following figure. In the Windows task bar, click Start, click Control Panel, and then click Device Manager.

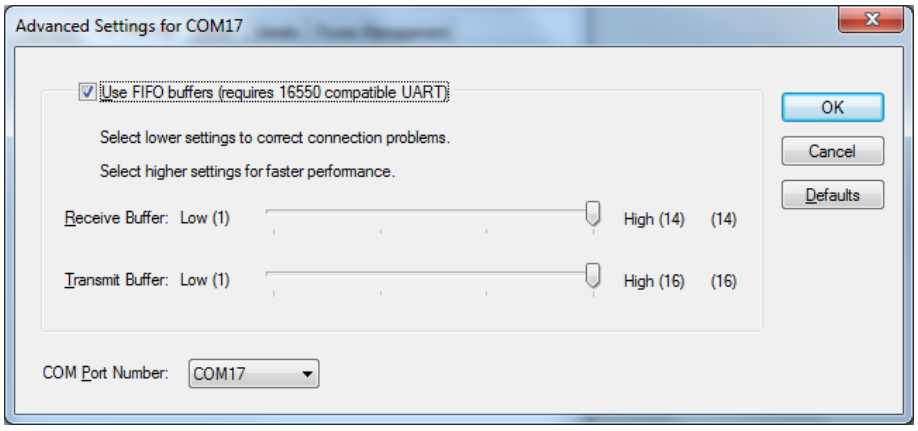


- Open UART properties. Expand Ports (COM & LPT), right-click on Silicon Labs Dual CP210x USB to UART Bridge: Enhanced COM Port (COM17), and then click Properties. CPM17 will be connected to the PS UART0 and COM18 will be connected to the PS UART1. In this tutorial, we will be using the PS UART0 as STDOUT and STDIN.

- In the properties window, select the Port Settings tab; verify the settings match the values shown in the following figure. Click on the **Advanced** button to continue.



- Select an unused COM Port Number and then click **OK**. The following figure shows COM17 as the selected COM port number.



- Click **OK** in the properties window, close the Device Manager and the Control Panel.

Install the Terminal Program

Download and install the TeraTerm Pro terminal program on the host computer. TeraTerm Pro is available for download at http://ttssh2.sourceforge.jp/index.html.en. To communicate with the UltraZed-EG Starter Kit, configure the New Connection and Serial Port settings as shown in the following figure. These settings must match the host computer COM port settings shown in the previous section.

