



# Avnet UltraZed™ PCIe Carrier Card Getting Started Guide

Version 1.0

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# 1 About this Guide

This guide provides detailed information for getting started with the Avnet UltraZed PCIe Carrier Card. Follow the detailed instructions in this document to begin development right away.

## 1.1 Additional Documentation

Additional documents for the Xilinx Zynq® UltraScale+™ MPSoC devices are available for download at: [www.xilinx.com/products/silicon-devices/soc/zynq-ultrascale-mpsoc.html](http://www.xilinx.com/products/silicon-devices/soc/zynq-ultrascale-mpsoc.html)

## 1.2 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: [www.xilinx.com/support](http://www.xilinx.com/support)

## 2 Introduction

The UltraZed PCIe Carrier Card supports the UltraZed-EG™ System-on-Module (SOM), providing easy access to the full 180 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 2 Digilent Pmod™ compatible interfaces, FMC LPC slot, LVDS Touch Panel interface, push button switches, DIP switches, LEDs, Xilinx SYSMON, and clock oscillator.

The UltraZed PCIe 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 PCIe Carrier Card to implement the microSD card, PMOD, USB 2.0/3.0, Gigabit Ethernet, SATA host, Display Port, PCIe Endpoint interface, dual USB-UART, user LED and switch, and MAC Address device interfaces.

The PCIe 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 PCIe 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.

### 2.1 UltraZed PCIe Carrier Card Features

- Single UltraZed-EG SOM slot
- microSD card connector
- PS PMOD header
- Dual USB-UART
- Display port connector (x1)
- PCIe x1 Endpoint
- USB 2.0/3.0 connector
- SATA host interface
- RJ45 connector
- PL PMOD headers
- PL user 8-position DIP switch
- PL user push switches
- 8 PL user LEDs
- PS user LED
- 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)
  - PS GTR transceivers
  - 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



## 3 UltraZed PCIe Carrier Card Kit Contents

### 3.1 What's Inside the Box

- Hardware
  - UltraZed PCIe 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)
  - ATX-to-6P Mini-Fit adapter
  - PCIe bracket
- Software Tools
  - Voucher for Vivado Design Edition with ES1 License (device locked to the ZU3EG) shipped with SOM for SOMs with ES1 silicon
  - Webpack for SOMs with production silicon

### 3.2 What's Available Online

- License for Vivado Design Suite
  - [http://www.xilinx.com/support/licensing\\_solution\\_center.htm](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
  - <http://www.ultrazed.org/product/ultrazed-pcie-carrier-card>
- Technical Support
  - <http://xilinx.com/support>

## 4 Getting Started with UltraZed PCIe Carrier Card Kit

An Out of Box demo is posted to the <http://www.ultrazed.org/product/ultrazed-pcie-carrier-card> website for the UltraZed PCIe Carrier Card. The demo files can be downloaded and run on the PCIe Carrier by following a few simple instructions. Please refer to the following sections for more information.

### 4.1 Demo Hardware Requirements

The required hardware for running the demos are

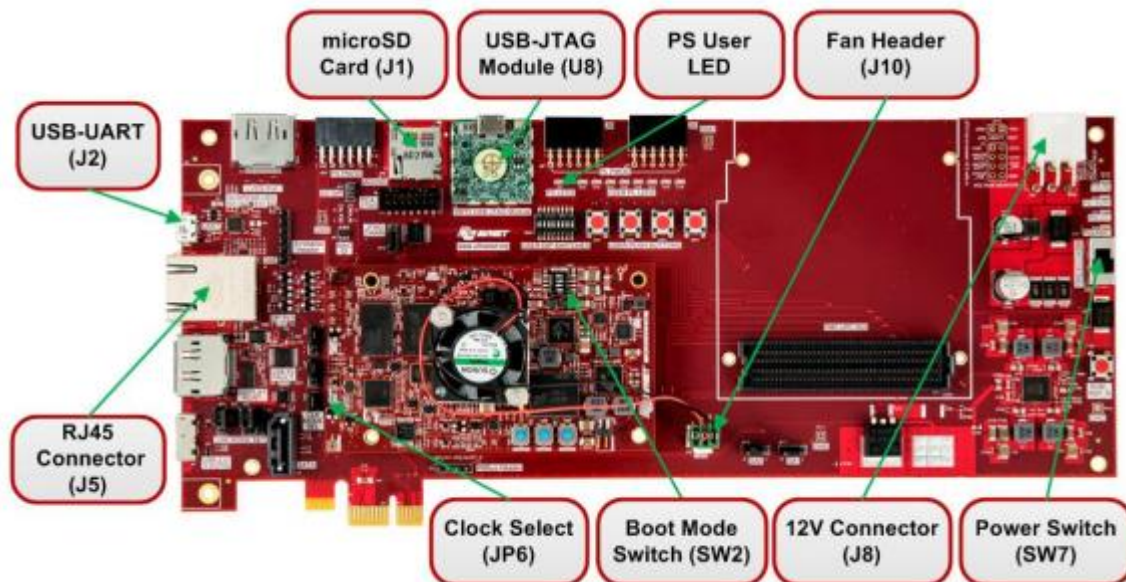
- Avnet UltraZed PCIe Carrier Card Kit
- UltraZed-EG SOM



## 4.2 Setting Up the Hardware

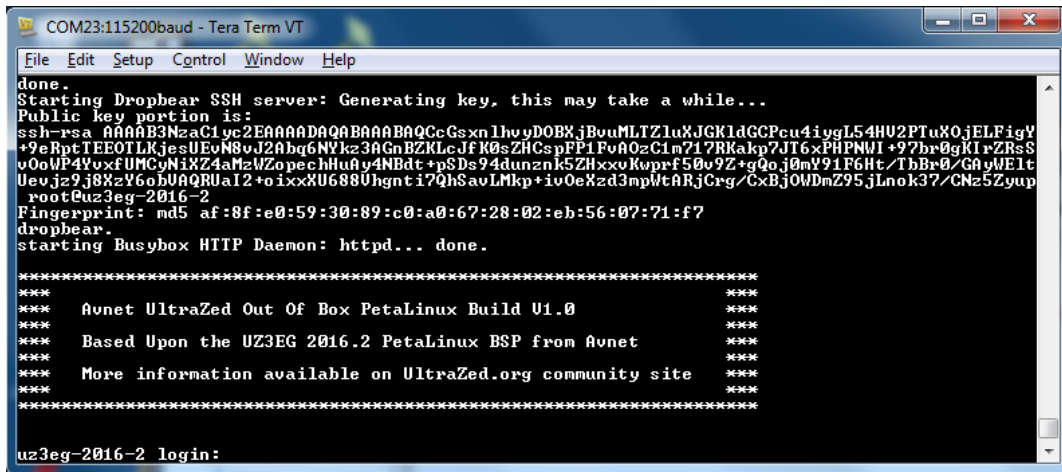
Please perform the following steps to setup the UltraZed PCIe Carrier Card Kit and install the serial port driver.

- Plug the UltraZed-EG SOM onto the PCIe Carrier Card via JX1/JX2/JX3 connectors connect the fan to the fan header (J10) on the PCIe Carrier Card.
- Set the UltraZed-EG SOM SW2 Boot Mode switch (MODE[3:0] = SW2[4:1]) to ON, ON, ON, and ON positions (Boot Mode set to JTAG, MODE[3:0] = 0x0).
- Install a jumper on the PCIe Carrier Card JP6.
- Connect the USB A-mini-B cable to J2 on the PCIe Carrier Card and the USB port of the PC. This will provide USB-UART connection to the board.
- Connect 12V power supply to J8 on the PCIe 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).
- Slide the SW7 power switch to the OFF position on the PCIe Carrier Card



### 4.3 Running the Out of Box Demo

- Please go to <http://www.ultrazed.org/product/ultrazed-pcie-carrier-card> and download the PCIe Carrier Card 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.
- Insert the microSD card into J1 microSD card slot on the PCIe 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 SW7 power switch to the ON position on the PCIe Carrier Card to boot from the microSD card and run the Out of Box demo. 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.



```
COM23:115200baud - Tera Term VT
File Edit Setup Control Window Help
done.
Starting Dropbear SSH server: Generating key, this may take a while...
Public key portion is:
ssh-rsa AAAAB3NzaC1ue2EAAAADAQABAAQCAgxn1huoDOBXjBvuMLTZluXJGKldGCPcu4iYgL54HU2PTuX0jELFigY
+9eRptIER0TLKjesUEvN8vJ2Abg6NWkz3AGnBZKLeJfK0sZHCspFP1FoA0zCim717RKakp7JT6xPHPMUJ+97hr0gkI+ZBsS
v0eUP4YuxfUMCyNixZ4aHzWZopechhuay4NBdt+psDs94dunznk5ZHXxuKwprf50v9Z+g0o j0m91EGHt/TbBp0/GayWElt
Uevjz9j8XzY6obU0QRUa12+oixx8U688Uhgnt17QhSavLMkp+iv0eXzd3mpItARjCrg/CxBj0WDMZ95jLnok37/CNz5Zyup
root@uz3eg-2016-2
Fingerprint: md5 af:8f:e0:59:30:89:c0:a0:67:28:02:eb:56:07:71:f7
dropbear.
starting Busybox HTTP Daemon: httpd... done.

*****
***      Avnet UltraZed Out Of Box PetaLinux Build U1.0      ***
***      Based Upon the UZ3EG 2016.2 PetaLinux BSP from Avnet  ***
***      More information available on UltraZed.org community site  ***
***      *****      ***
uz3eg-2016-2 login:
```

Please go to [www.ultrazed.org/product/ultrazed-pcie-carrier-card](http://www.ultrazed.org/product/ultrazed-pcie-carrier-card) to download files for the Out of Box design as well as other reference designs and tutorials.



## 5 Next Steps

Now that you have run through the demos, you are ready to create custom systems for the UltraZed PCIe Carrier Card Kit. You can start by downloading various reference designs for this board from the Avnet website at [www.ultrazed.org/product/ultrazed-pcie-carrier-card](http://www.ultrazed.org/product/ultrazed-pcie-carrier-card).

## 6 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](mailto:isscs_cases@xilinx.com)

Europe, Middle East, and Africa - [eucases@xilinx.com](mailto:eucases@xilinx.com)

Asia Pacific including Japan - [apaccase@xilinx.com](mailto:apaccase@xilinx.com)

For technical support including the installation and use of your product license file you may contact Xilinx Online Technical Support at [www.xilinx.com/support](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 PCIe Carrier Card Kit reference designs or kit hardware .

[www.ultrazed.org/product/ultrazed-pcie-carrier-card](http://www.ultrazed.org/product/ultrazed-pcie-carrier-card)

## 7 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 PCIe Carrier Card Kit.

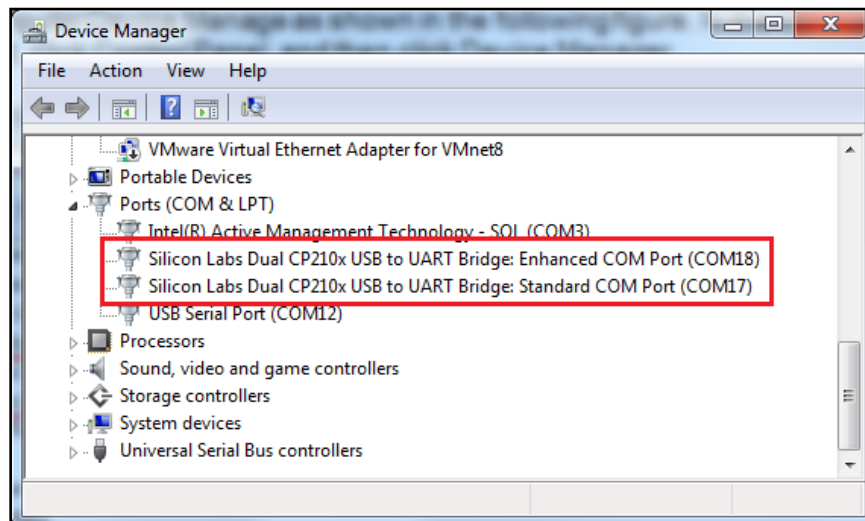
### 7.1 Install the USB UART Drivers

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

### 7.2 Configure the Host Computer COM Port

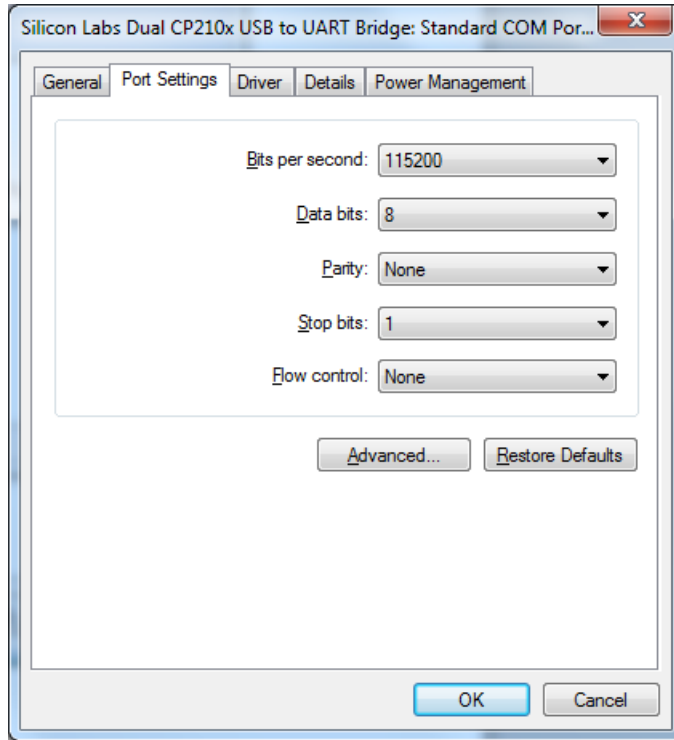
The Reference designs use a terminal program to communicate between the host computer and the UltraZed PCIe Carrier Card Kit. To configure the host computer COM port for this purpose:

- Connect the UltraZed PCIe Carrier Card to the host computer via the PCIe Carrier Card J2 USB-UART port and power up the board.
- Open the host computer Device Manager as shown in the following figure. In the Windows task bar, click Start, click Control Panel, and then click Device Manager.

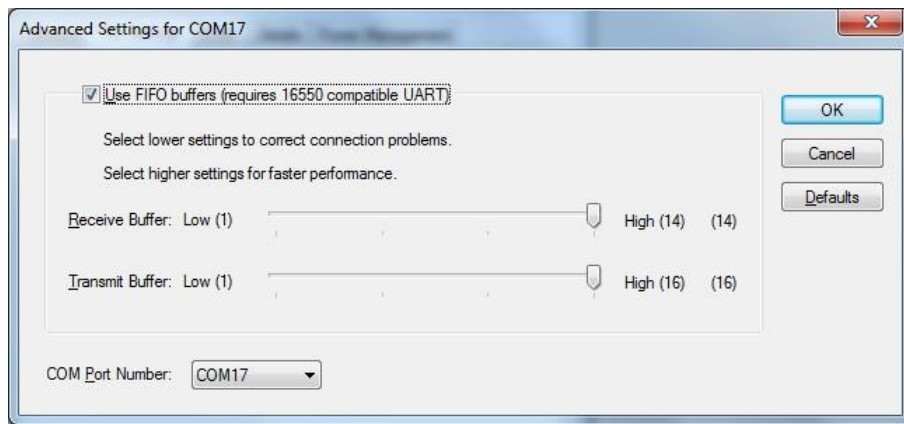


- Open UART properties. Expand Ports (COM & LPT), right-click on Silicon Labs Dual CP210x USB to UART Bridge: Enhanced COM Port (COM17), and then click Properties. COM17 will be connected to the PS UART0 and COM18 will be connected to the PS UART1. In this tutorial, we will be using the PS UART0 as STDOUT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

### 7.3 Install the Terminal Program

Download and install the TeraTerm Pro terminal program on the host computer. TeraTerm Pro is available for download at <http://tssh2.sourceforge.jp/index.html.en>. To communicate with the UltraZed PCIe Carrier Card 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.

