

ZUBoard 1CG Getting Started Guide

Version 1.0

Document Control

Document Version: 1.

Document Date: 15 April 2023

Prior Version History

Version	Date	Comment
0.1	21 March 2023	Initial ZUBoard 1CG Getting Started Guide
1.0	15 April 2023	Initial Public Release

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1 Getting Started with ZUBoard 1CG

The Avnet ZUBoard 1CG enables hardware and software developers to explore the capabilities of the Zynq™ UltraScale+ ZU1. Designers can create or evaluate designs for both the Zynq Processor Subsystem (PS) and the Programmable Logic (PL) fabric.

A ZUBoard 1CG image in its expected out-of-box configuration is shown below along with the locations of several key components.

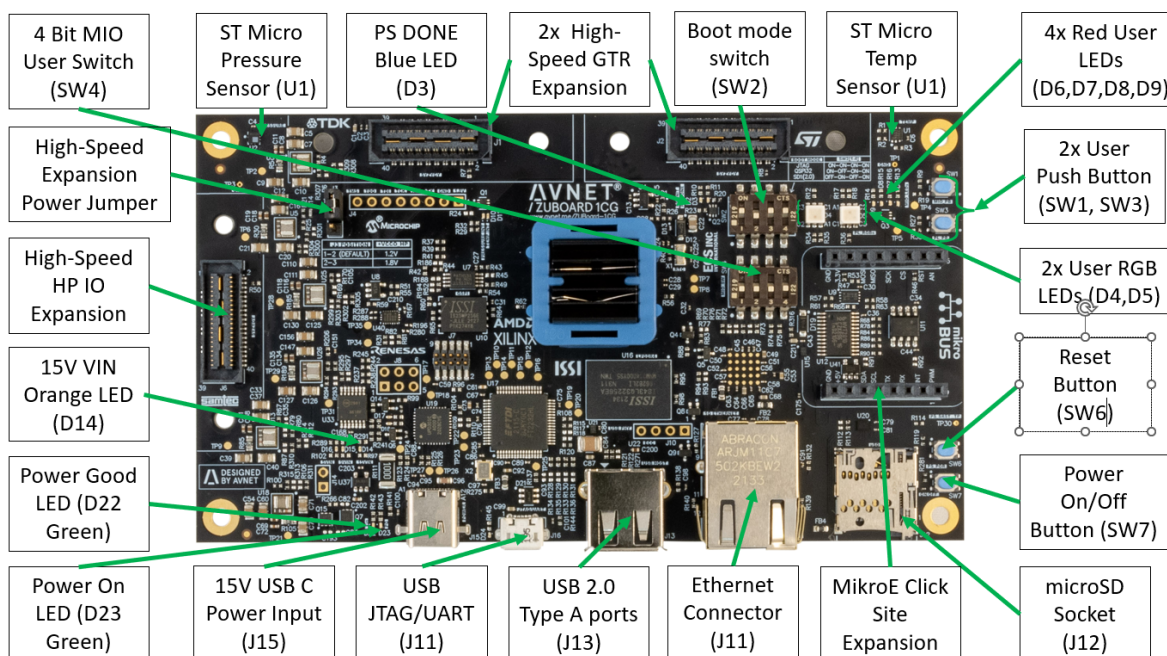


Figure 1 – ZUBoard 1CG

This Getting Started Guide will outline the steps to setup the ZUBoard 1CG hardware. It documents the procedure to run a PetaLinux design running on the ARM® Cortex™-A9 MPCore™ Processing System (PS).

2 What's Inside the Box?

- ZUBoard 1CG development board
- Quick Start Instruction card

2.1 Optional add-on items:

- High Speed Expansion Module
 - Display Port, Dual Cam, M.2
- Ethernet Cable
- MikroE Click Board

3 What's on the Web?

ZUBoard 1CG is a development kit, with materials being made available through the Avnet product page, element 14 and Hackster.io community websites.

- <http://avnet.me/zuboard-1cg>
- <http://avnet.me/zuboard-blog>
- [Hackster.io](https://hackster.io) - The community dedicated to learning hardware.

3.1 Official Documentation:

- Getting started guide
- Hardware user guide
- Schematics
- Bill of materials
- Mechanical drawing
- 3D Model
- Board definition files for Vivado integration
- Programmable logic (PL) master user constraints

3.2 Tutorials and Reference Designs:

- Introduction to Zynq Design Tutorials
- PetaLinux BSP
- Introduction to Accelerated Edge AI

3.3 Trainings and Videos:

- Introduction to ZUBoard 1CG
- Technical Training Course

3.4 Available through Avnet FAE:

- Altium source database for schematic and layout

4 ZUBoard 1CG Basic Setup and Operation

The functionality of the ZUBoard 1CG is determined by the application booted from the non-volatile memory – by default that is the QSPI. This *Getting Started Guide* allows system developers to exercise and demonstrate multiple circuits through FreeRTOS, including:

- RGB LEDs (2)
- Slide Switch (4)
- Red LEDs (4)
- Pressure Sensor
- Temperature Sensor

In addition to the items included in the kit, you will also need the following to complete the exercises in this tutorial.

- **External USB C 15V power supply 45W USB C cable (recommending Advantech PSA-A45WM-U)**
- **Router or open Ethernet Port on host Windows PC**
- **micro-USB cable**
- **Ethernet cable**

4.1 Example Design

The ZUBoard 1CG ships with an example FreeRTOS design stored in the QSPI. If the QSPI has been erased or reprogrammed, then use the *Restore QSPI Factory Images* tutorial available at Element 14 Avnet Boards Community to restore both the QSPI to the original factory images.

Note: The factory test results are located in QSPI and can be exported from the out of box example. Once the QSPI is erased or reprogrammed, this data is lost.

4.2 Hardware Setup

1. A terminal program is required. Tera Term was used in this example which can be downloaded from the Tera Term project on the SourceForge page: tssh2.sourceforge.jp
Install Tera Term or another terminal program of your choice to a host Windows PC.
2. When you Connect the ZUBoard 1CG micro-USB JTAG/UART port J16 to your host Windows PC. It should automatically install the proper drivers, giving you a confirmation as shown below. If installed correctly, skip to Step 6.

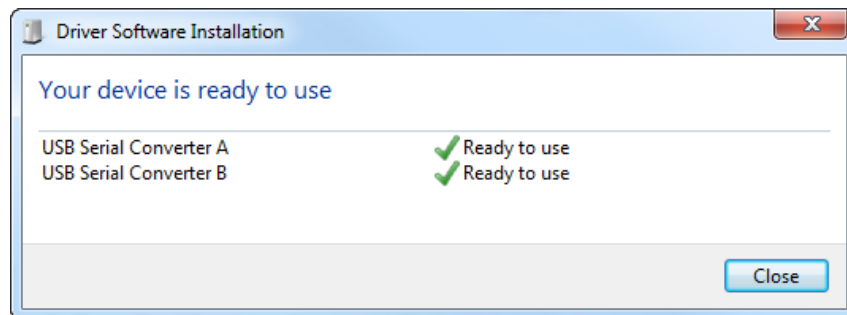


Figure 2 – ZUBoard 1CG USB-JTAG/UART Installed Correctly

3. In the rare circumstance that the drivers are not auto installed, then you must manually install the driver for the FTDI FT2232H device. Visit the FTDI website and download the appropriate driver for your operating system.

<http://www.ftdichip.com/Drivers/VCP.htm>

4. Make sure the ZUBoard 1CG is unplugged from the PC. Unzip and install the driver.
5. Reboot your PC then plug in the ZUBoard 1CG.
6. Ensure the BOOT MODE switch (SW2) is set to QSPI (On-OFF-ON-ON).

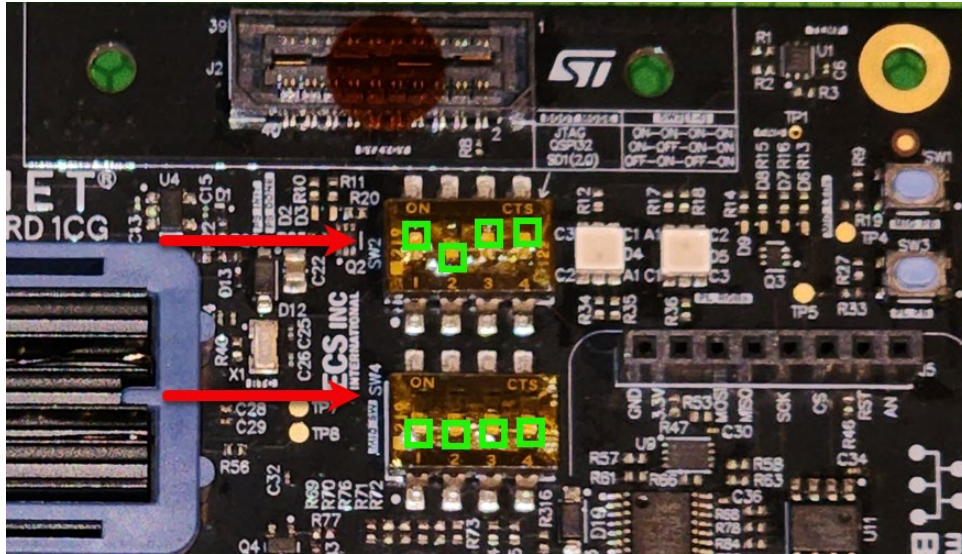


Figure 3 – ZUBoard 1CG Switch Location

5 Boot FreeRTOS

7. If previously disconnected, plug in the micro-USB cable to the USB-JTAG/UART port.
8. Connect 15V USB C compliant power supply to USB C connector (J15) using USB C cable. The Power LEDs will illuminate, but the board is not powered on.
 - LED D22 (Green) VIN
 - LED D16 (Orange) 5V Present
 - LED D15 (Orange) 9V Present
 - LED D14 (Orange) 15V Present
 - LED D17 (Orange) EN SINK

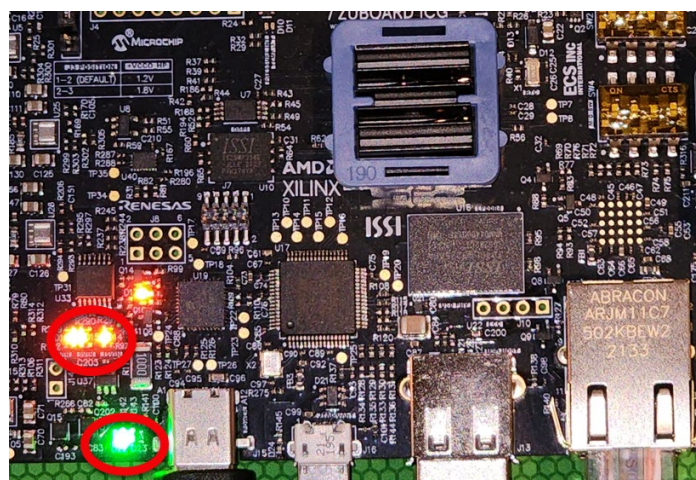


Figure 4 – ZUBoard 1CG Good Power LEDs

9. Once VIN is established press the Power Switch (SW7) to turn the board ON. The green LED (D23) will illuminate to indicate Power Good.

Note: When the micro-USB is connected to the Host Windows PC an Orange LED (D24 – JTAG/UART) will illuminate showing communication to the host PC.

10. Connect Ethernet cable to connector (J11). And then to either the host Windows PC or Router attached to host Windows PC.
11. Launch the Tera Term Application, open SETUP menu, select SERIAL PORT, select Port assigned to ZUBoard 1CG (typically the largest number) and ensure the other settings match shown below. Press the **RESET** button (SW6) to reset the board so you can see the boot sequence.

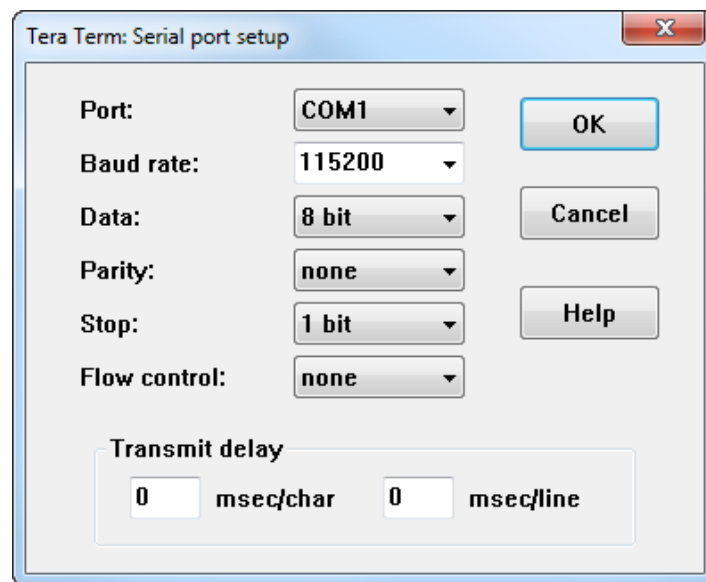


Figure 5 – COM Port Settings for USB-UART Terminal

```
COM5 - Tera Term VT
File Edit Setup Control Window Help

*****
***  Avnet ZUBoard-1CG FreeRTOS "Out of the Box" Example  ***
*****
Start PHY autonegotiation
Waiting for PHY to complete autonegotiation.
autonegotiation complete
link speed for phy address 7: 1000
DHCP request success
Board IP:      10.203.189.137
Netmask :     255.255.255.0
Gateway :     10.203.189.39

stts22htr: Temp Sensor Detected
stts22htr: Setup Complete
lps22hhtr: Pressure Sensor Detected
lps22hhtr: Setup Complete
qspi: FlashID=0x9D 0x70 0x19
qspi: Setup Complete
http server is running on port 80
Please point your web browser to http://10.203.189.137

ls /:
css/
favicon.ico
images/
index.html
js/
pdfs/
yui/
factest_results.html

<found 3 files, 5 directories>

http GET: index.html
http GET: css/main.css
http GET: images/Avnet_logo_tagline_rgb.png
http GET: yui/yahoo.js
http GET: yui/don.js
http GET: yui/event.js
http GET: yui/conn.js
http GET: yui/anim.js
http GET: js/main.js
http GET: images/zui.png
http GET: factest_results.html
http POST: switch state: 1
http GET: favicon.ico
```

Figure 6 – FreeRTOS Boot on ZUBoard 1CG

When ZUBoard 1CG connects with the network it will obtain an IP address and report it in the Tera Term window as below.

```
Start PHY autonegotiation
Waiting for PHY to complete autonegotiation.
autonegotiation complete
link speed for phy address 7: 1000
DHCP request success
Board IP:      10.203.189.137
Netmask :     255.255.255.0
Gateway :     10.203.189.39

stts22htr: Temp Sensor Detected
stts22htr: Setup Complete
lps22hhtr: Pressure Sensor Detected
lps22hhtr: Setup Complete
qspi: FlashID=0x9D 0x70 0x19
qspi: Setup Complete
http server is running on port 80
Please point your web browser to http://10.203.189.137
```

Figure 7 – FreeRTOS IP Address

12. **First, make sure your PC is on the same network as ZUBoard 1CG.** Also, turn off any VPN or firewall that may prevent communication across the network. Open a browser window. Then enter the IP you discovered for ZUBoard 1CG in the previous step.
13. **If the ZUBoard 1CG is connected directly to the host PC's ethernet, the PC's ethernet properties will need to be changed to match Netmask, Gateway, and Board IP.**

Results are then displayed in browser window, as shown below.

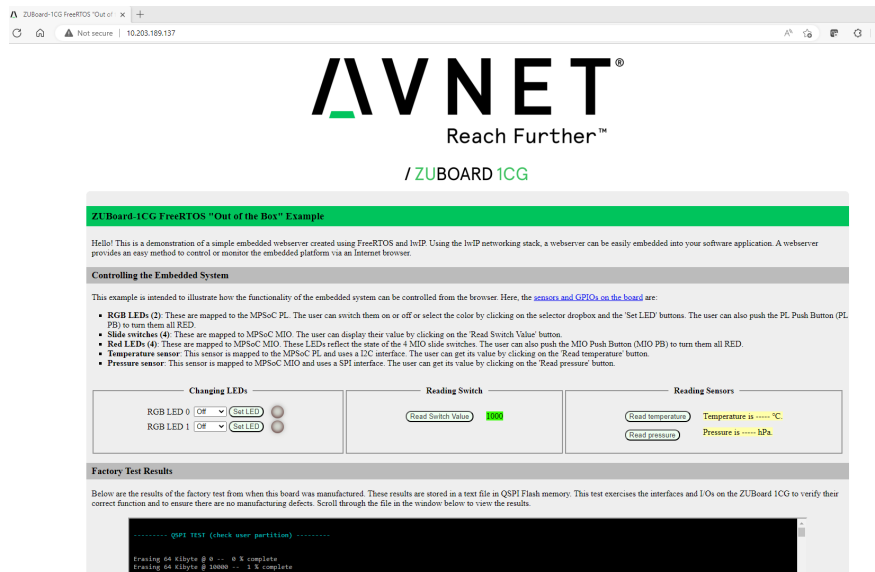


Figure 8 – Out of the Box example results on ZUBoard 1CG

14. Review the results and interact with ZUBoard 1CG FreeRTOS "Out of the Box" Example.

6 Power off

When you are finished experimenting with FreeRTOS on ZUBoard 1CG, you should shut FreeRTOS down by pressing the Power ON/OFF (SW7) for 10 second, or you may remove power by unplugging the USB C cable.

7 Getting Help and Support

7.1 Avnet Support

The ZUBoard 1CG is a versatile development kit that allows evaluation of the Zynq SoC, which can help you adopt Zynq into your next design. All technical support is offered by your local Avnet resource or through element 14 Avnet Boards Forum <http://avnet.me/zuboard-1cg-forum>. ZUBoard 1CG users are encouraged to participate in the forums and offer help to others when possible.

<http://avnet.me/zuboard-1cg-forum>

To access the most current collateral for ZUBoard 1CG please visit the community support page at:

<http://avnet.me/zuboard-blog>

7.2 AMD Support

For questions regarding products within the Product Entitlement Account, send an e-mail message to the Customer Service Representative in your region:

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 the product license file, contact Xilinx Online Technical Support at www.xilinx.com/support. The following assistance resources are also available on the website:

- Software, IP, and documentation updates
- Access to technical support web tools
- Searchable answer database with over 4,000 solutions
- User forums

8 Installing and Licensing AMD Software

8.1 Install Vivado™ ML Standard Edition

The Zynq device on the ZUBoard 1CG is supported in Vivado Design Suite ML Standard Edition. Version 2021.2.1 or later is required for the on-board USB-JTAG/UART circuit to work. See

<https://www.xilinx.com/products/design-tools/vivado.html>

This software can be downloaded online at:

www.xilinx.com/support/download/index.htm

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

If a full seat of Vivado Standard or Enterprise Edition has already been installed, then no further software will be needed. Please check online for any updates at:

www.xilinx.com/support/download/index.htm

For detailed instructions on installing and licensing the AMD tools, please refer to the latest version of **Vivado Design Suite User Guide Release Notes, Installation, and Licensing (UG973)**. The 2022.2 version is available on the AMD Xilinx website at:

<https://docs.xilinx.com/r/en-US/ug973-vivado-release-notes-install-license>

9 Certification Disclaimer

CE certification is necessary for system level products in those countries governed by this regulatory bodies.

Because Avnet boards are intended for evaluation kits only and destined for professionals (you) to be used solely at research and development facilities for such purposes, they are considered exempt from the EU product directives and normally are not tested for CE or FCC compliance.

If you choose to use your board to transmit using an antenna, it is your responsibility to make sure that you are in compliance with all laws for the country, frequency, and power levels in which the device is used. Additionally, some countries regulate reception in certain frequency bands. Again, it is the responsibility of the user to maintain compliance with all local laws and regulations.

10 Regulatory Compliance Information

WEEE statement:



Correct Disposal of this product. This marking indicates that this product should not be disposed with other household wastes throughout the EU. To prevent possible harm to the environment or human health from uncontrolled waste disposal, recycle it responsibly to promote the sustainable reuse of material resources. To return your used device, please use the return and collection systems or contact the retailer where the product was purchased. They can take this product for environmentally safe recycling.

11 Safety Warnings

This product shall only be connected to an external power supply rated at 15V DC that provides a minimum current of 3.0A. Any external power supply used with ZUBoard 1CG shall comply with relevant regulations and standards applicable in the country of intended use.

Only compatible plug-in modules shall be connected to ZUBoard 1CG. The connection of incompatible devices may affect compliance or result in damage to the unit and void the warranty.

This product shall be operated in a well-ventilated environment. If a case is used, it shall have adequate ventilation. Use caution when handling the board when powered, it's typical for the board to see 40C+ when left idle and no load at the expansion connectors.