10-inch Touch Display Kit Getting Started Guide

Version 1.0

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Contents

AVNET DESIGN KIT TECHNICAL SUPPORT FILES AND DOWNLOADS WEB ACCESS INSTRUCTIONS

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2 Introduction

This guide provides detailed information for getting started with the Avnet's 10-inch Touch Display Kit attached to ZedBoard, MicroZed (with a supported Carrier Card), or Zynq Mini-ITX platform. This kit provides engineers with everything needed to develop products with interactive GUIs and touchscreen capabilities. The kit combines a 1280 x 800 WXGA TFT-LCD display with a PCAP touch sensor overlay, I2C touch controller, LED backlight supply, haptic feedback driver, 3-axis accelerometer and all the necessary cables for connecting to a development board.

The 10-inch Touch Display Kit is supported by the www.microzed.org community website where users can download kit documentation and reference designs as well as collaborate with other engineers also working on Zynq designs.

This Getting Started Guide will proceed through the steps to setup the 10-inch Touch Display Kit attached to ZedBoard, MicroZed (with a supported Carrier Card), or Zynq Mini-ITX platform and run the out-of-box demonstration.

2.1 Additional Documentation

Additional information and documentation on Xilinx's Zynq®-7000 All Programmable SoCs can be found at www.xilinx.com/zynq. Additional information and documentation on ZedBoard can be found at www.zedboard.org. Additional information and documentation on MicroZed (with a supported Carrier Card) or Zynq Mini-ITX platform can be found at www.microzed.org.

2.2 What's Inside the Box

- 10-inch LCD Touch Display Assembly
  - Ampire LVDS 10.1 inch WXGA TFT-LCD with LED backlight
  - Integrated Projected Capacitive (PCAP) touch overlay
  - Integrated PCAP controller flex tail
- Samsung Linear Resonant Actuator (LRA) for haptics
- ZED LCD Interface Interposer Board
- Standard DisplayPort to Mini DisplayPort Cable
- 12V Power Supply
- Quick Start instructions

2.3 What's Available Online

- Development Kit Home Page - http://www.microzed.org
  - Reference Designs
  - Reference software and link to source code file repository
  - Schematics
  - BOMs
  - Technical Documentation
- Technical Support Forum - http://www.microzed.org

3 Getting Started

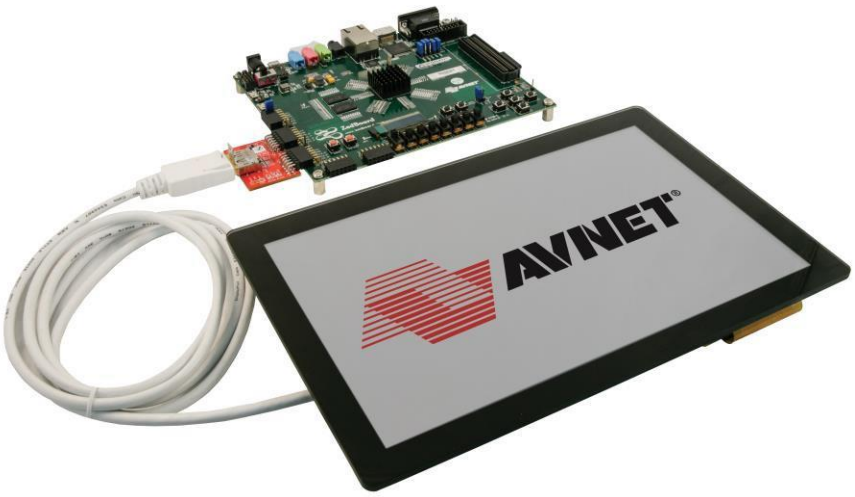
This 10-inch Touch Display Kit uses "Quick Start" demonstration applications for ZedBoard, MicroZed, or Zynq Mini-ITX targets, which is included in the Web download documentation package. You can run this demo by following the directions below for the appropriate target board.

3.1 Booting the 10-inch Touch Display Kit attached to ZedBoard™

1. Download the Quick Start Demo SD Image from the website http://www.zedboard.org.
2. Un-zip, copy and paste the /ZEDBOARD/BOOT.bin file onto your SD Card. Plug the SD Card into the SD card slot (J12) on ZedBoard.
3. If not previously done, use the instructions available on http://www.zedboard.org to download and install the Cypress CY7C64225 USB-to-UART driver.
4. Connect the UART port of ZedBoard (J14) to a PC using the MicroUSB cable.
5. Ensure the following ZedBoard jumper settings are set.

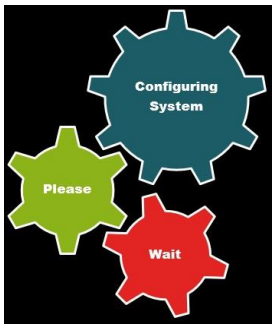
MIO6	MIO5	MIO4	MIO3	MIO2	VADJ	JP6	JP2	OTHERS
GND	3V3	3V3	GND	GND	1V8	SHORTED	SHORTED	OPEN

6. Attach the Zed LCD Interface into JC1 and JD1 on ZedBoard.
7. Attach the provided DisplayPort cable from the Zed LCD Interface to the ALI3 Ampire10 Adapter on the back of the LCD assembly.
8. Connect 12V power to the ALI3 Ampire10 Adapter on the back of the LCD assembly. Make sure the ZedBoard power switch (SW8) is off. Connect 12V power supply to ZedBoard.
9. Verify cable connections and jumper positions.



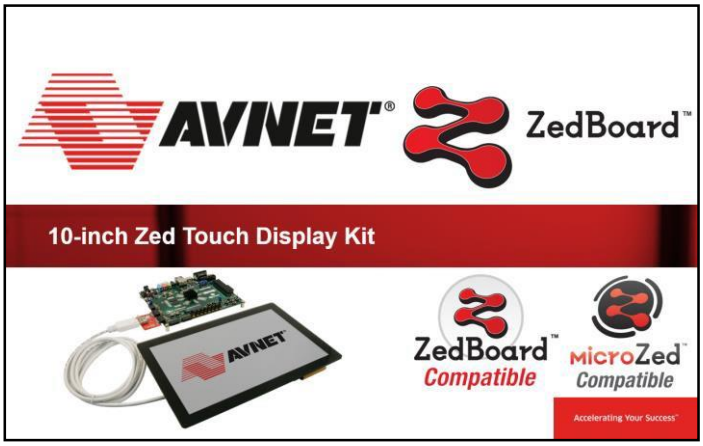
10. Turn ZedBoard power switch (SW8) ON. The green POWER LED (LD13) on ZedBoard should illuminate.

11. After about 2 seconds, the blue DONE LED (LD12) on ZedBoard should illuminate and the "Configuring System Please Wait" screen should appear.



12. Wait approximately 10 seconds for the system configuration to complete and for the touch screen to calibrate its internal DAC.
13. When booting for the first time, you will be asked to calibrate the touch panel on the LCD Assembly. Calibration is performed by pressing on the sequence of three target images (shown below). The calibration data will be saved to QSPI flash on ZedBoard.

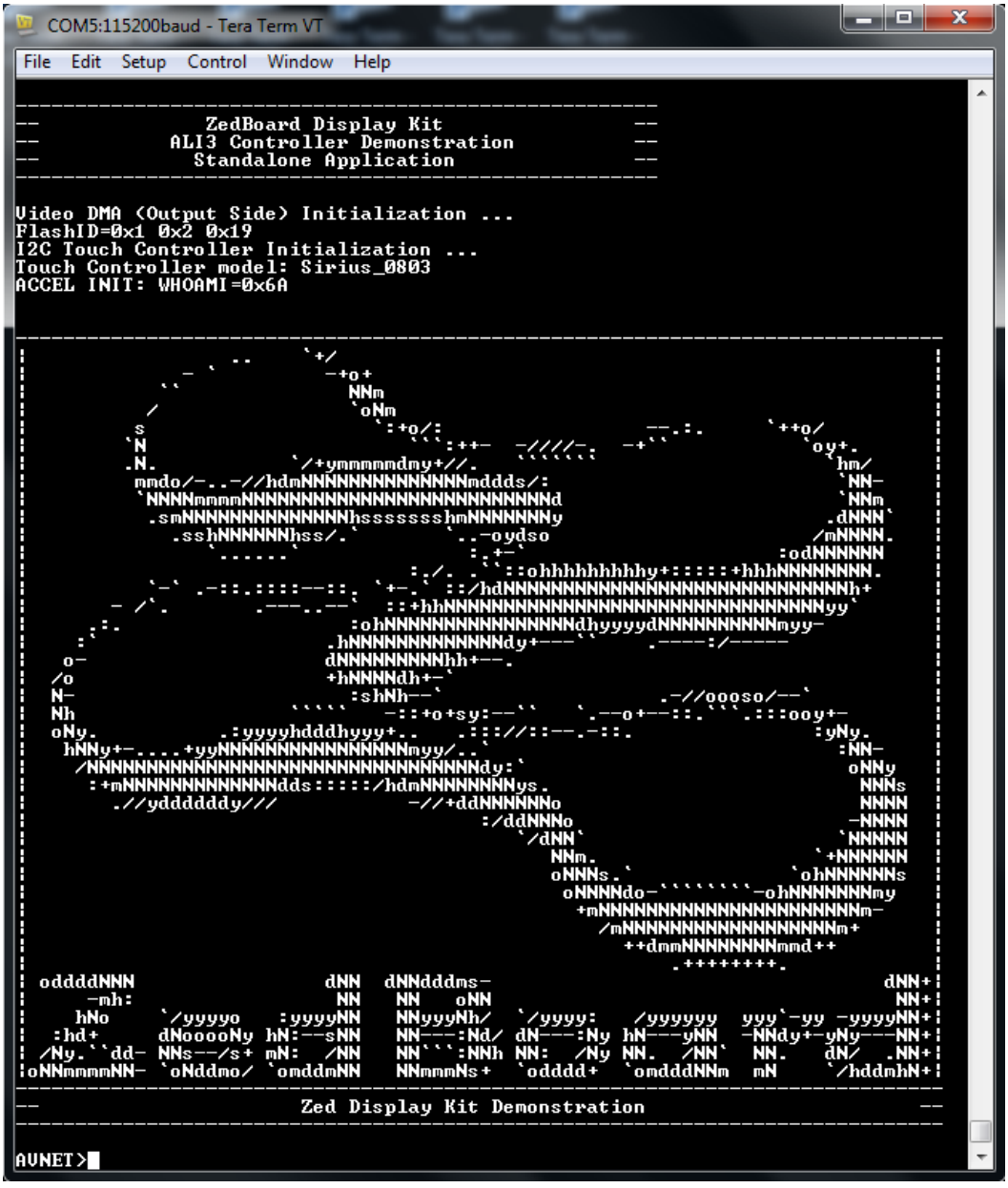
14. After calibration, the LCD Assembly should display this image.



15. You will be able to draw black dots on the panel by touching the LCD Assembly with your finger.

3.2 Running the Display Kit Demo on ZedBoard

1. Use Device Manager to determine the COM Port. Open a Terminal Program and configure to 115200/8/n/1/n.
2. Reset the Zynq SoC on ZedBoard by pressing and releasing the PS-RST button (BTN7).
3. In the Terminal Window, a simple standalone image (shown below) should boot with functionality that demonstrates the basic capabilities of the 10-inch Touch Display Kit attached to ZedBoard.



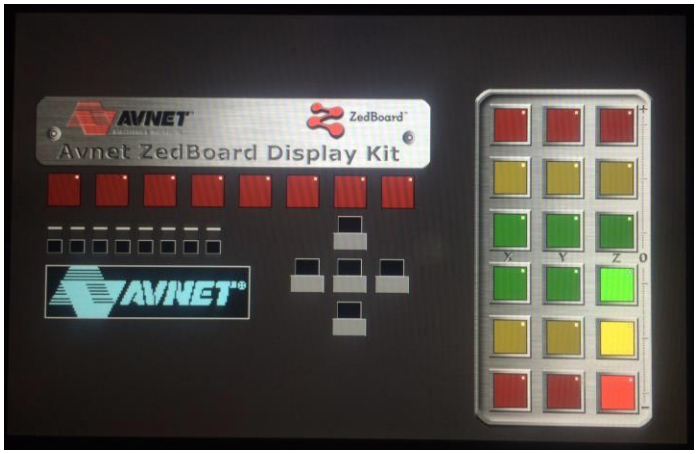
4. Type “help” to see the command options available. You should see this:

```
--------------------------------------------------------------------------------
--                        Text-based Console for                              --
--                    Zed Display Kit Demonstration                           --
--------------------------------------------------------------------------------
General Commands:
        colorbars   Display colorbars pattern to display
        control     Display control panel
        calibrate   Calibrate touch
        delay       Wait for specified delay
        help        Print the Top-Level menu Help Screen
        iic         IIC accesses on Zed Display Kit
        vdma        Display VDMA status
        logo        Display logo to display
        mem         Memory accesses
        quit        Exit console (if applicable)
        verbose     Toggle verbosity on/off

--------------------------------------------------------------------------------
AVNET>
```

5. Type the “colorbars” command. You should see this on the LCD Assembly.

6. Type the “logo” command. You should see the original image shown at startup.

7. Type the “control start” command. The image shown below allows the user to control the status of LED0-LED7 on ZedBoard while monitoring the status of SW0-SW7 and BTNU, BTNC, BTND, BTNR and BTNL on ZedBoard.



8. Users can switch between the “control” and “colorbars” by pressing the following BTN8 or BTN9 on ZedBoard.
9. When you are done, run the command “quit” and then disconnect the USB cable from ZedBoard.

Congratulations!

You have now run the 10-inch Touch Display Kit reference design through ZedBoard to exercise the LCD Assembly’s capabilities. Using this fully functional standalone reference design, you can leverage the underlying low level design to accelerate your own Zynq application development.

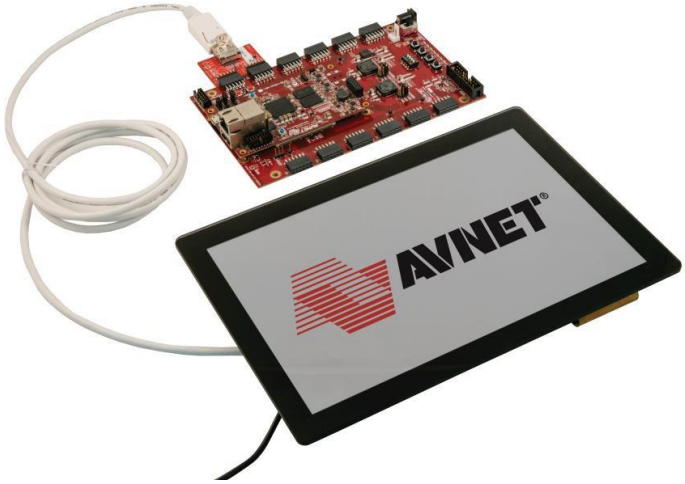
3.3 Booting the 10-inch Touch Display Kit with MicroZed with I/O Carrier

NOTE: Running the following demonstration requires attaching MicroZed to the I/O Carrier Card. More information on the I/O Carrier Card can be found at http://www.microzed.org*.*

1. Download the Quick Start Demo SD Image from the website http://www.microzed.org.
2. Un-zip, copy and paste the /MZ7010_IOCC/BOOT.bin file onto your microSD card. (If you are using the MicroZed 7020 SOM rather than the 7010 version, use the /MZ7020_IOCC/BOOT.bin file instead) Plug the microSD card into the microSD card slot (J6) on MicroZed.
3. Ensure the following MicroZed jumper settings are set for microSD booting.

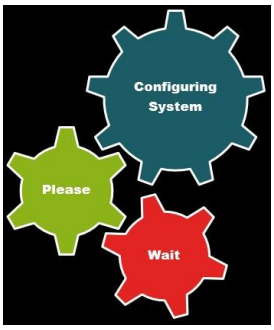
JP1	JP2	JP3
1-2	2-3	2-3

4. Attach the MicroZed to the I/O Carrier Card.
5. Set the I/O Carrier Card VADJ select jumper (CON4) to 1-2 position to select the 3.3V setting.
6. Attach the Zed LCD Interface into JA and JB on the I/O Carrier Card.
7. Attach the DisplayPort cable from the Zed LCD Interface to the ALI3 Ampire10 Adapter on the back of the LCD assembly.
8. Make sure the I/O Carrier Card power switch (SW5) is off. Connect the 5V power supply to the I/O Carrier Card.
9. Connect 12V power supply to the ALI3 Ampire10 Adapter (CON4) on the back of the LCD assembly.
10. Verify cable connections and jumper positions.



11. Turn I/O Carrier Card power switch (SW5) ON. The green Power Good LED (D5) on MicroZed and the green Power Good LED (LED10) should illuminate.

12. After about 2 seconds, the blue Done LED (D2) on MicroZed and the blue DONE LED (LED9) on the I/O Carrier Card should illuminate and the “Configuring System Please Wait” screen should appear.



13. Wait approximately 10 seconds for the system configuration to complete and for the touch screen to calibrate its internal DAC.
14. When booting for the first time, you will be asked to calibrate the touch panel on the LCD Assembly. Calibration is performed by pressing on the sequence of three target images (shown below). The calibration data will be saved to the MicroZed’s QSPI flash.

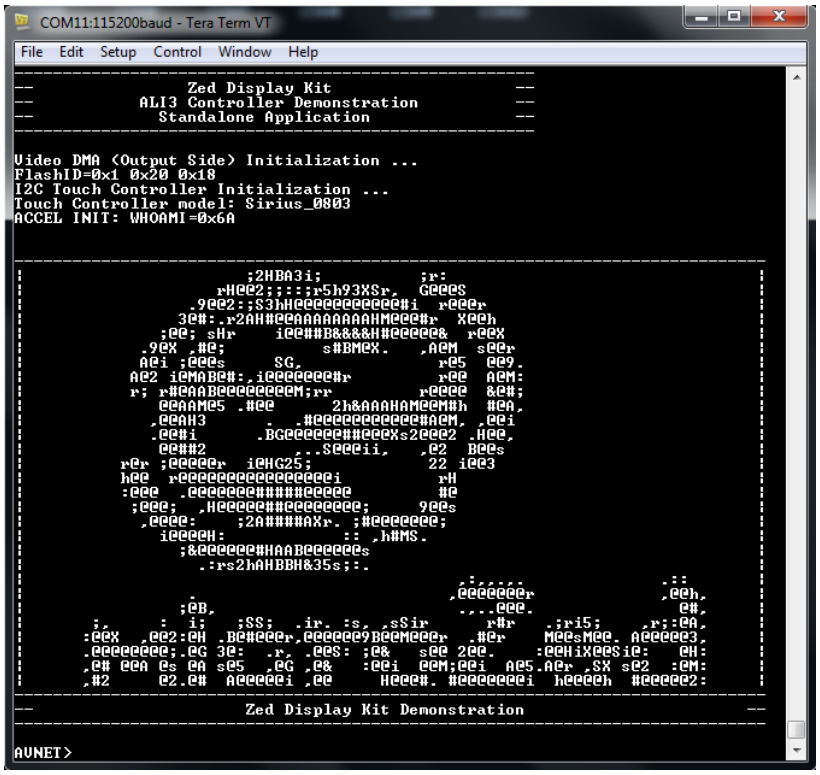
15. After calibration, the LCD Assembly should display this image.

16. You will be able to draw black dots on the panel by pressing the LCD Assembly with your finger.

3.4 Running the Display Kit Demo on MicroZed with I/O Carrier

NOTE: Running the following demonstration requires attaching MicroZed to the I/O Carrier Card. More information on the I/O Carrier Card can be found at http://www.microzed.org*.*

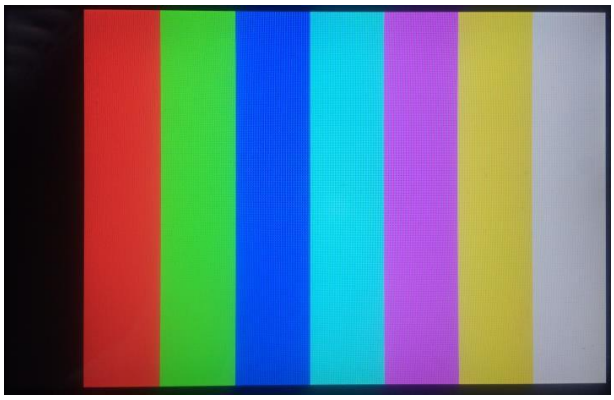
1. If not previously done, use the instructions available on http://www.microzed.org to download and install the Silicon Labs CP2104 USB-to-UART driver.
2. Connect the UART port of MicroZed (J2) to a PC using the MicroUSB cable.
3. Use Device Manager to determine the COM Port. Open a Terminal Program and configure to 115200/8/n/1/n.
4. Reset the Zynq SoC on MicroZed by pressing and releasing the RST button (SW2) on the MicroZed SOM.
5. In the Terminal Window, a simple standalone image (shown below) should boot with functionality that demonstrates the basic capabilities of the 10-inch Touch Display Kit attached to MicroZed (with I/O Carrier Card).



6. Type “help” to see the command options available. You should see this:

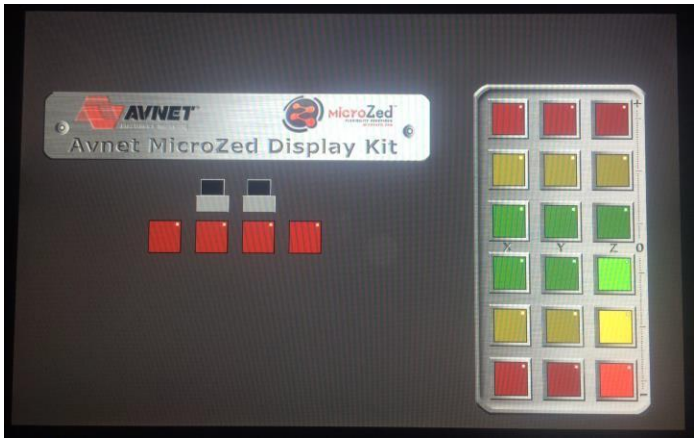
```
--------------------------------------------------------------------------------
--                        Text-based Console for                              --
--                     Zed Display Kit Demonstration                          --
--------------------------------------------------------------------------------
General Commands:
        colorbars   Display colorbars pattern to display
        control     Display control panel
        calibrate   Calibrate touch
        delay       Wait for specified delay
        help        Print the Top-Level menu Help Screen
        iic         IIC accesses on Zed Display Kit
        vdma        Display VDMA status
        logo        Display logo to display
        mem         Memory accesses
        quit        Exit console (if applicable)
        verbose     Toggle verbosity on/off

--------------------------------------------------------------------------------

AVNET>
```

7. Type the “colorbars” command. You should see this on the LCD Assembly.



8. Type the “logo” command. You should see the original image shown at startup

9. Type the “control start” command. The image shown below allows the user to control the status of LED1-LED8 on the I/O Carrier Card while monitoring the status of SW1 and BTN1-BTN4 on the I/O Carrier Card.



10. Users can switch between the “control” and “colorbars” by pressing SW1 button on MicroZed SOM.
11. When you are done, run the command “quit” and then disconnect the USB cable from MicroZed. Turn power off

Congratulations!

You have now run the 10-inch Touch Display Kit reference design through MicroZed (with I/O Carrier Card) to exercise the LCD Assembly’s capabilities. Using this fully functional standalone reference design, you can leverage the underlying low level design to accelerate your own Zynq application development.

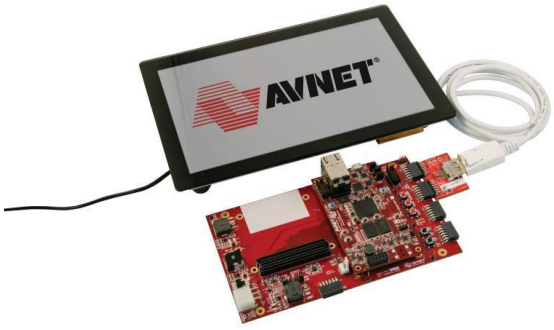
3.5 Booting the 10-inch Touch Display Kit with MicroZed with FMC Carrier

NOTE: Running the following demonstration requires attaching MicroZed to the FMC Carrier Card. More information on the FMC Carrier Card can be found at http://www.microzed.org*.*

1. Download the Quick Start Demo SD Image from the website http://www.microzed.org.
2. Un-zip, copy and paste the **/MZ7010_FMCCC/BOOT.bin** file onto your microSD card. (If you are using the MicroZed 7020 SOM rather than the 7010 version, use the /MZ7020_FMCCC/BOOT.bin file instead) Plug the microSD card into the microSD card slot (J6) on MicroZed.
3. Ensure the following MicroZed jumper settings are set for microSD booting.

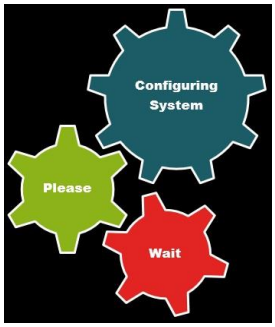
JP1	JP2	JP3
1-2	2-3	2-3

4. Attach the MicroZed to the FMC Carrier Card.
5. Set the FMC Carrier Card VADJ select jumper (J6) to 1-2 position to select the 3.3V setting.
6. Attach the Zed LCD Interface into JA and JB on the FMC Carrier Card.
7. Attach the DisplayPort cable from the Zed LCD Interface to the ALI3 Ampire10 Adapter on the back of the LCD assembly.
8. Make sure the FMC Carrier Card power switch (SW3) is off. Connect the 12V power supply to the FMC Carrier Card.
9. Connect 12V power supply to the ALI3 Ampire10 Adapter (CON4) on the back of the LCD assembly.
10. Verify cable connections and jumper positions.



11. Turn FMC Carrier Card power switch (SW3) ON. The green Power Good LED (D5) on MicroZed and the green Power Good LED (LED6) should illuminate.

12. After about 2 seconds, the blue Done LED (D2) on MicroZed and the blue Done LED (LED5) on the FMC Carrier Card should illuminate and the “Configuring System Please Wait” screen should appear.



13. Wait approximately 10 seconds for the system configuration to complete and for the touch screen to calibrate its internal DAC.
14. When booting for the first time, you will be asked to calibrate the touch panel on the LCD Assembly. Calibration is performed by pressing on the sequence of three target images (shown below). The calibration data will be saved to the MicroZed’s QSPI flash.

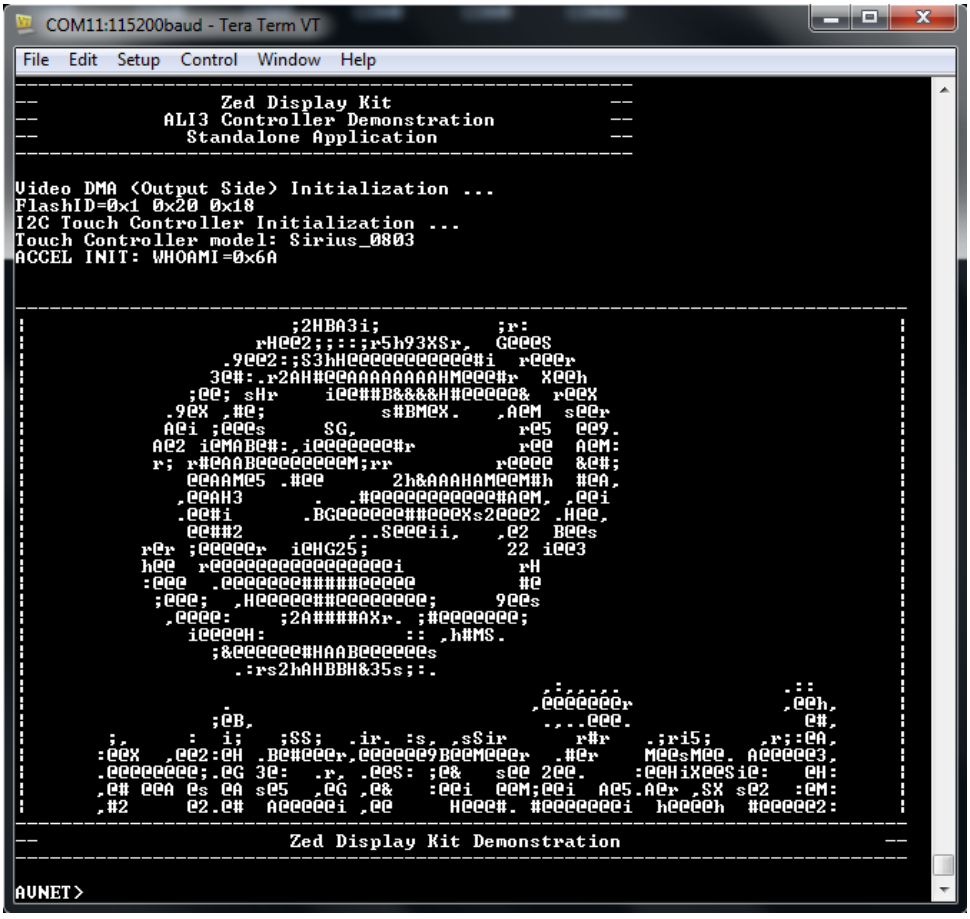
15. After calibration, the LCD Assembly should display this image.

16. You will be able to draw black dots on the panel by pressing the LCD Assembly with your finger.

3.6 Running the Display Kit Demo on MicroZed with FMC Carrier

NOTE: Running the following demonstration requires attaching MicroZed to the FMC Carrier Card. More information on the FMC Carrier Card can be found at http://www.microzed.org*.*

1. If not previously done, use the instructions available on http://www.microzed.org to download and install the Silicon Labs CP2104 USB-to-UART driver.
2. Connect the UART port of MicroZed (J2) to a PC using the MicroUSB cable.
3. Use Device Manager to determine the COM Port. Open a Terminal Program and configure to 115200/8/n/1/n.
4. Reset the Zynq SoC on MicroZed by pressing and releasing the RST button (SW2) on the MicroZed SOM.
5. In the Terminal Window, a simple standalone image (shown below) should boot with functionality that demonstrates the basic capabilities of the 10-inch Touch Display Kit attached to MicroZed (with FMC Carrier Card).

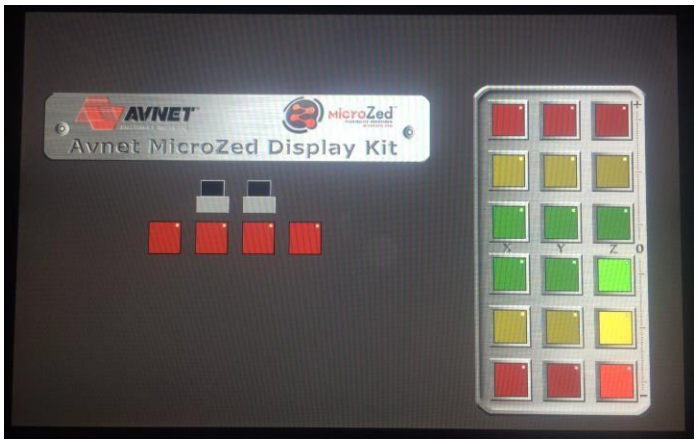


6. Type “help” to see the command options available. You should see this:

7. Type the “colorbars” command. You should see this on the LCD Assembly.

8. Type the “logo” command. You should see the original image shown at startup

9. Type the “control start” command. The image shown below allows the user to control the status of LED1-LED4 while monitoring the status of BTN1-BTN2 on the FMC Carrier Card.



10. Users can switch between the “control” and “colorbars” by pressing SW1 button on MicroZed SOM.
11. When you are done, run the command “quit” and then disconnect the USB cable from MicroZed. Turn power off.

Congratulations!

You have now run the 10-inch Touch Display Kit reference design through MicroZed (with FMC Carrier Card) to exercise the LCD Assembly’s capabilities. Using this fully functional standalone reference design, you can leverage the underlying low level design to accelerate your own Zynq application development.

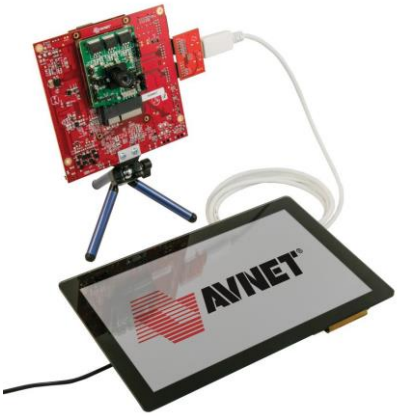
3.7 Booting the 10-inch Touch Display Kit with MicroZed with EMBV Carrier

NOTE: Running the following demonstration requires attaching MicroZed to the Embedded Vision (EMBV) Carrier Card. More information on the EMBV Carrier Card can be found at http://www.microzed.org*.*

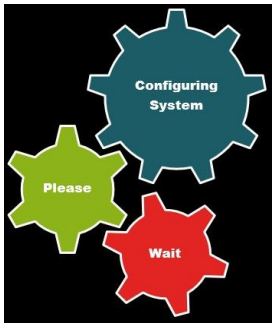
1. Download the Quick Start Demo SD Image from the website http://www.microzed.org.
2. Un-zip, copy and paste the /MZ7010_EMBV/BOOT.bin file onto your microSD card. (If you are using the MicroZed 7020 SOM rather than the 7010 version, use the /MZ7020_EMBV/BOOT.bin file instead) Plug the microSD card into the microSD card slot (J6) on MicroZed.
3. Ensure the following MicroZed jumper settings are set for microSD booting.

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

4. Attach the MicroZed to the EMBV Carrier Card.
5. Attach the Zed LCD Interface into JD and JC on the EMBV Carrier Card.
6. Attach the DisplayPort cable from the Zed LCD Interface to the ALI3 Ampire10 Adapter on the back of the LCD assembly.
7. Make sure the EMBV Carrier Card power switch (SW2) is off. Connect the 5V power supply or POE power to the EMBV Carrier Card.
8. Connect 12V power supply to the ALI3 Ampire10 Adapter (CON4) on the back of the LCD assembly.
9. Verify cable connections and jumper positions.



10. Turn FMC Carrier Card power switch (SW2) ON. The green Power Good LED (D5) and the green Power Good LED (LED6) should illuminate.
11. After about 2 seconds, the blue Done LED (D2) on MicroZed and the blue Done LED (LED2) on the EMBV Carrier Card should illuminate and the “Configuring System Please Wait” screen should appear.



12. Wait approximately 10 seconds for the system configuration to complete and for the touch screen to calibrate its internal DAC.
13. When booting for the first time, you will be asked to calibrate the touch panel on the LCD Assembly. Calibration is performed by pressing on the sequence of three target images (shown below). The calibration data will be saved to the MicroZed’s QSPI flash.

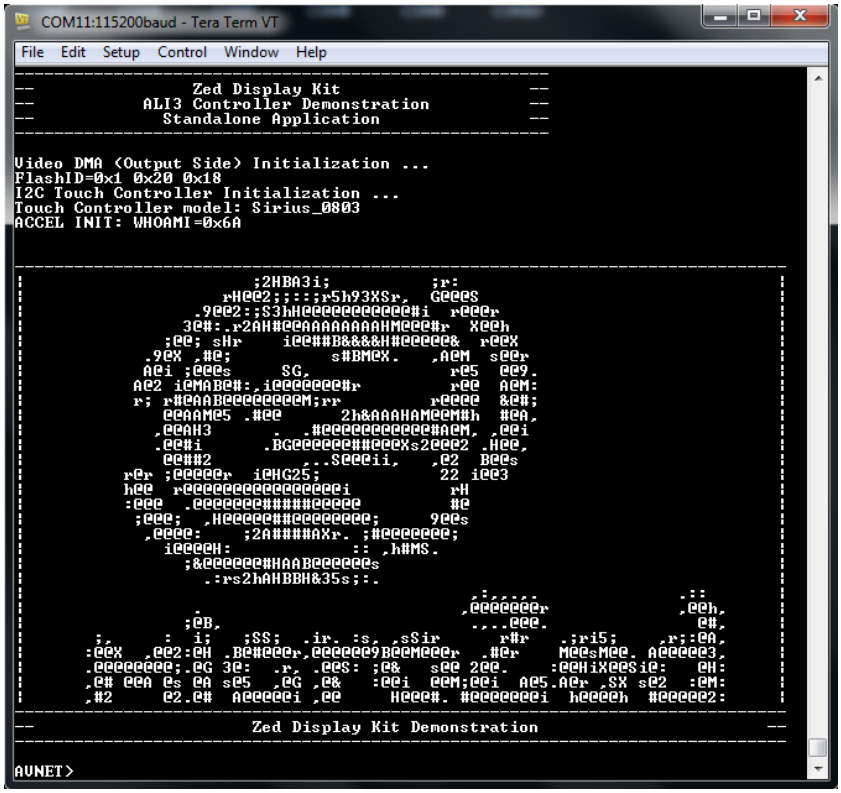
14. After calibration, the LCD Assembly should display this image.

15. You will be able to draw black dots on the panel by pressing the LCD Assembly with your finger.

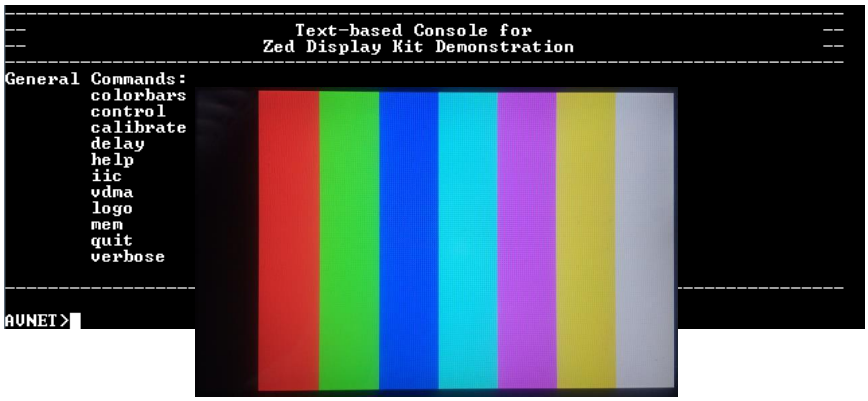
3.8 Running the Display Kit Demo on MicroZed with EMBV Carrier

NOTE: Running the following demonstration requires attaching MicroZed to the Embedded Vision (EMBV) Carrier Card. More information on the EMBV Carrier Card can be found at http://www.microzed.org.

1. If not previously done, use the instructions available on http://www.microzed.org to download and install the Silicon Labs CP2104 USB-to-UART driver.
2. Connect the UART port of MicroZed (J2) to a PC using the MicroUSB cable.
3. Use Device Manager to determine the COM Port. Open a Terminal Program and configure to 115200/8/n/1/n.
4. Reset the Zynq SoC on MicroZed by pressing and releasing the RST button (SW2) on the MicroZed SOM.
5. In the Terminal Window, a simple standalone image (shown below) should boot with functionality that demonstrates the basic capabilities of the 10-inch Touch Display Kit attached to MicroZed (with EMBV Carrier Card).



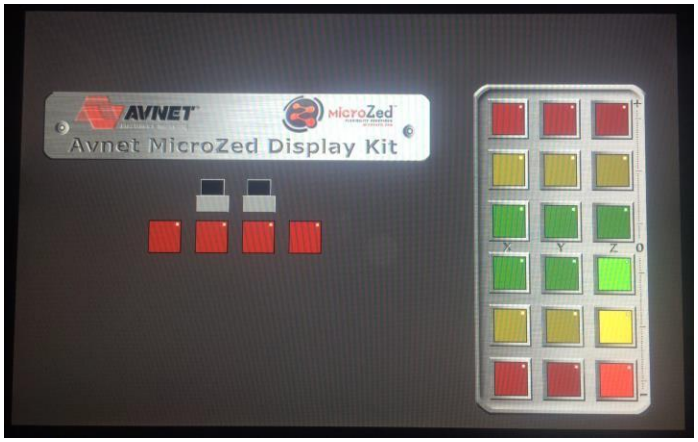
6. Type “help” to see the command options available. You should see this:



7. Type the “colorbars” command. You should see this on the LCD Assembly.

8. Type the “logo” command. You should see the original image shown at startup

9. Type the “control start” command. The image shown below allows the user to control the status of LED0-LED1 while monitoring the status of BTN0-BTN1 on the EMBV Carrier Card.



10. Users can switch between the “control” and “colorbars” by pressing SW1 button on MicroZed SOM.
11. When you are done, run the command “quit” and then disconnect the USB cable from MicroZed. Turn power off.

Congratulations!

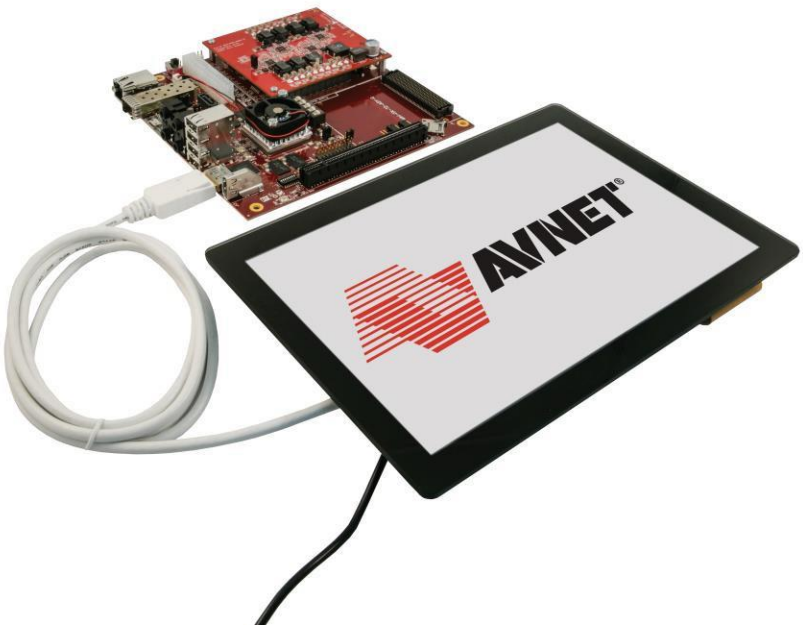
You have now run the 10-inch Touch Display Kit reference design through MicroZed (with EMBV Carrier Card) to exercise the LCD Assembly’s capabilities. Using this fully functional standalone reference design, you can leverage the underlying low level design to accelerate your own Zynq application development.

3.9 Booting the 10-inch Touch Display Kit with Zynq Mini-ITX

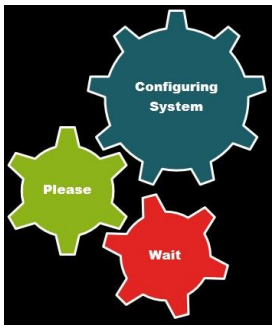
1. Download the Quick Start Demo SD Image from the website http://www.microzed.org.
2. Un-zip, copy and paste the /MITXZ7045/BOOT.bin file onto your microSD card. (If you are using the Zynq Mini- ITX 7Z100 rather than the 7Z045 version, use the /MITXZ7100/BOOT.bin file instead) Plug the microSD card into the microSD card slot (J6) on Zynq Mini-ITX.
3. Ensure the following Mini-ITX jumper settings are set for microSD booting.

SW7_1	SW7_2	SW7_3	SW7_4	SW7_5
OFF	OFF	ON	ON	OFF

4. Set I2C mode select jumper (JP12) to 1-2 position which selects Programmable Logic I2C master mode.
5. Set the VADJ select jumper (JP7) to 3-4 position to select the 2.5V setting.
6. Attach the DisplayPort cable to the ALI3 display connector (P3) connector on Zynq Mini-ITX.
7. Attach the other end of the DisplayPort cable to the ALI3 Ampire10 Adapter on the back of the LCD assembly.
8. Make sure the Zynq Mini-ITX power switch (SW12) is off. Connect the ITX power supply to the Zynq Mini-ITX platform.
9. Connect 12V power supply to the ALI3 Ampire10 Adapter (CON4) on the back of the LCD assembly.



10. Turn the Zynq Mini-ITX power switch (SW12) ON. The green power rail LEDs (D18-D25) should illuminate.
11. After about 2 seconds, the blue Done LED (D3) on Zynq Mini-ITX should illuminate and the "Configuring System Please Wait" screen should appear.



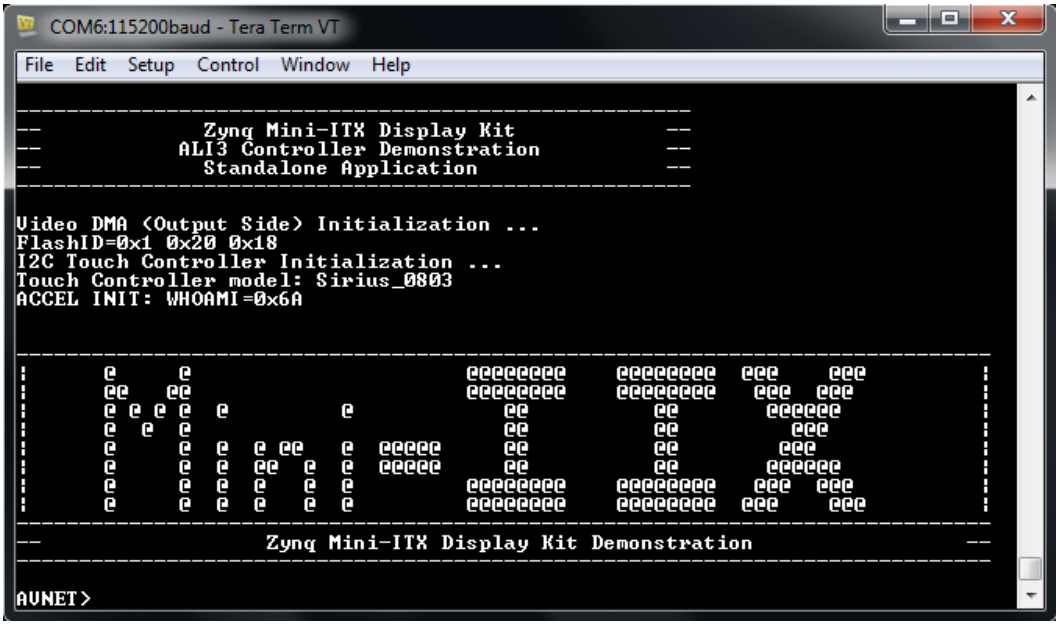
12. Wait approximately 10 seconds for the system configuration to complete and for the touch screen to calibrate its internal DAC.
13. When booting for the first time, you will be asked to calibrate the touch panel on the LCD Assembly. Calibration is performed by pressing on the sequence of three target images (shown below). The calibration data will be saved to the Zynq Mini-ITX QSPI flash.

14. After calibration, the LCD Assembly should display this image.

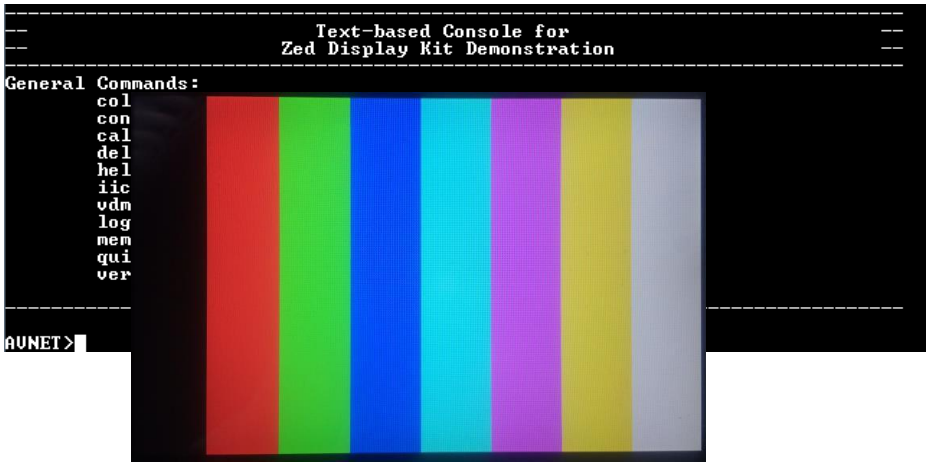
15. You will be able to draw black dots on the panel by pressing the LCD Assembly with your finger.

3.10 Running the Display Kit Demo on Mini-ITX

1. If not previously done, use the instructions available on http://www.microzed.org to download and install the Silicon Labs CP2104 USB-to-UART driver.
2. Connect the UART port of Zynq Mini-ITX (J7) to a PC using the MicroUSB cable.
3. Use Device Manager to determine the COM Port. Open a Terminal Program and configure to 115200/8/n/1/n.
4. Reset the Zynq SoC on Mini-ITX by pressing and releasing the PS_POR# button (SW8).
5. In the Terminal Window, a simple standalone application (shown below) should boot with functionality that demonstrates the basic capabilities of the 10-inch Touch Display Kit attached to Zynq Mini-ITX.



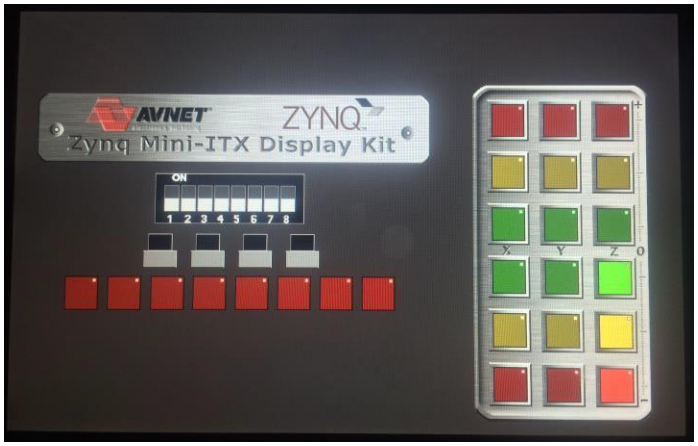
6. Type “help” to see the command options available. You should see this:



7. Type the “colorbars” command. You should see this on the LCD Assembly.

8. Type the “logo” command. You should see the original image shown at startup

9. Type the “control start” command. The image shown below allows the user to control the user LEDs D4- D11 while monitoring the status of SW3-SW6 buttons and SW2 switch on the Zynq Mini-ITX.



10. When you are done, run the command “quit” and then disconnect the USB cable from Zynq Mini-ITX. Turn power off.

Congratulations!

You have now run the 10-inch Touch Display Kit reference design using the Zynq Mini-ITX platform to exercise the LCD Assembly’s capabilities. Using this fully functional standalone reference design, you can leverage the underlying low level design to accelerate your own Zynq application development.

4 Getting Help and Support

Contact Avnet Support for any questions regarding the Avnet 10-inch Touch Display Kit reference design or kit hardware at http://www.microzed.org.

The latest source files for the Quick Start Demo SD Image targeting the Xilinx Vivado Design Suite are available on the Avnet Github repository. For instructions on how to obtain the source code for a particular Reference Design/Tutorial, please see the PDF documentation included with the Reference Design/Tutorial archive downloaded from the http://www.microzed.org Reference Design/Tutorial page.