

ZCU111 System Controller – GUI Tutorial

May 2019



Revision History

Date	Version	Description
05/29/19	3.0	Updated for 2019.1.
02/21/19	2.1	Updated document format.
12/10/18	2.0	Updated for 2018.3.
09/17/18	1.2	Updated BoardUI to improve the si570 clock interface.
08/06/18	1.1	Minor Update.
07/09/18	1.0	Initial version.

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Overview

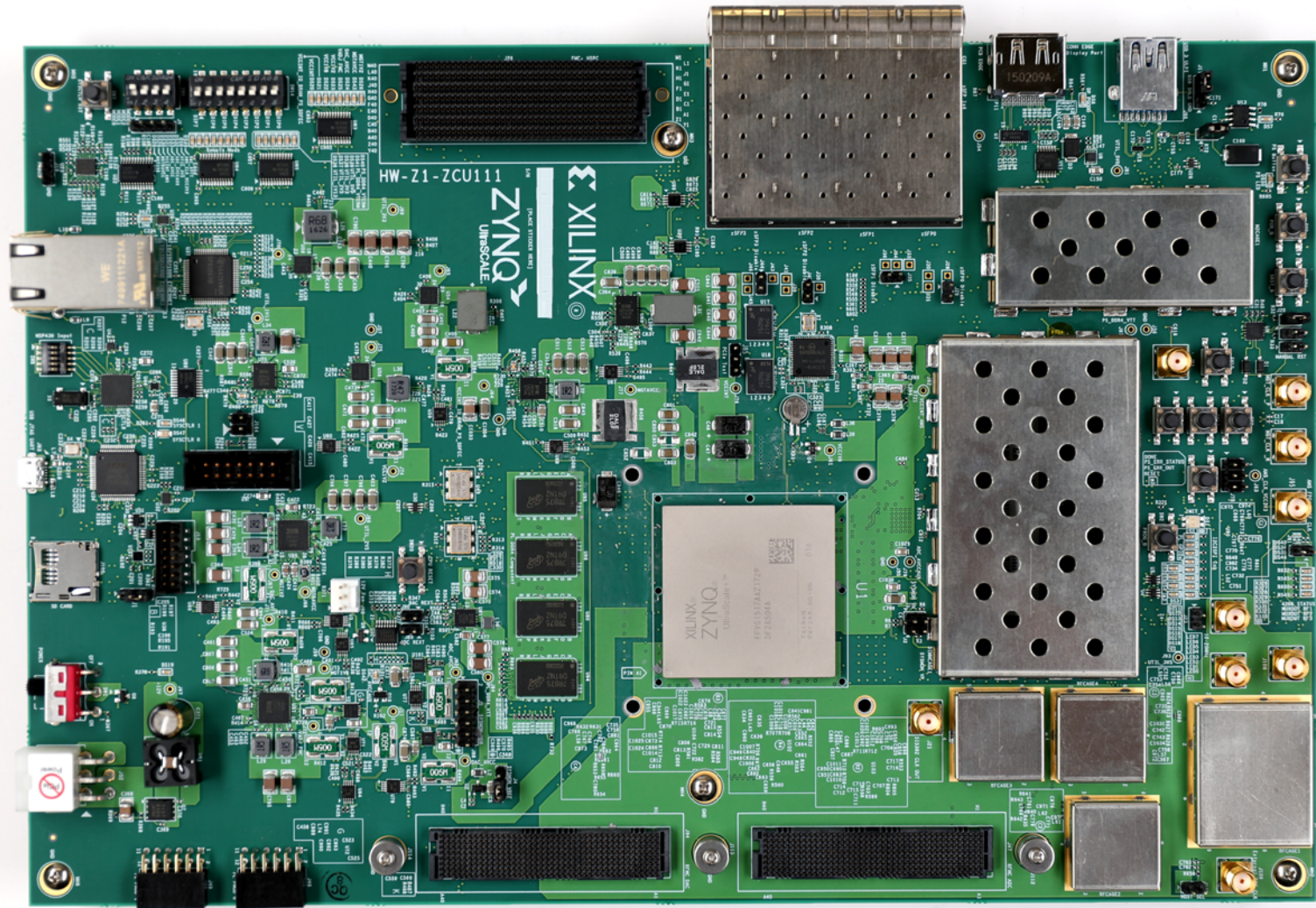
> Xilinx ZCU111 Board

> ZCU111 SCUI

- >> Running the System Controller GUI
- >> Clocks
- >> Voltages
- >> Power
- >> FMC
- >> EEPROM Data
- >> GPIO Commands
- >> About

> References

Xilinx ZCU111 Board



Note: Presentation applies to the ZCU111

ZCU111 Software Install and Board Setup

> Refer to XTP518 – ZCU111 Software Install and Board Setup for details on:

- >> Software Requirements
- >> ZCU111 Board Setup
- >> Balun board attachment
- >> UART Driver Install
- >> Ethernet Setup
- >> Optional Hardware Setup

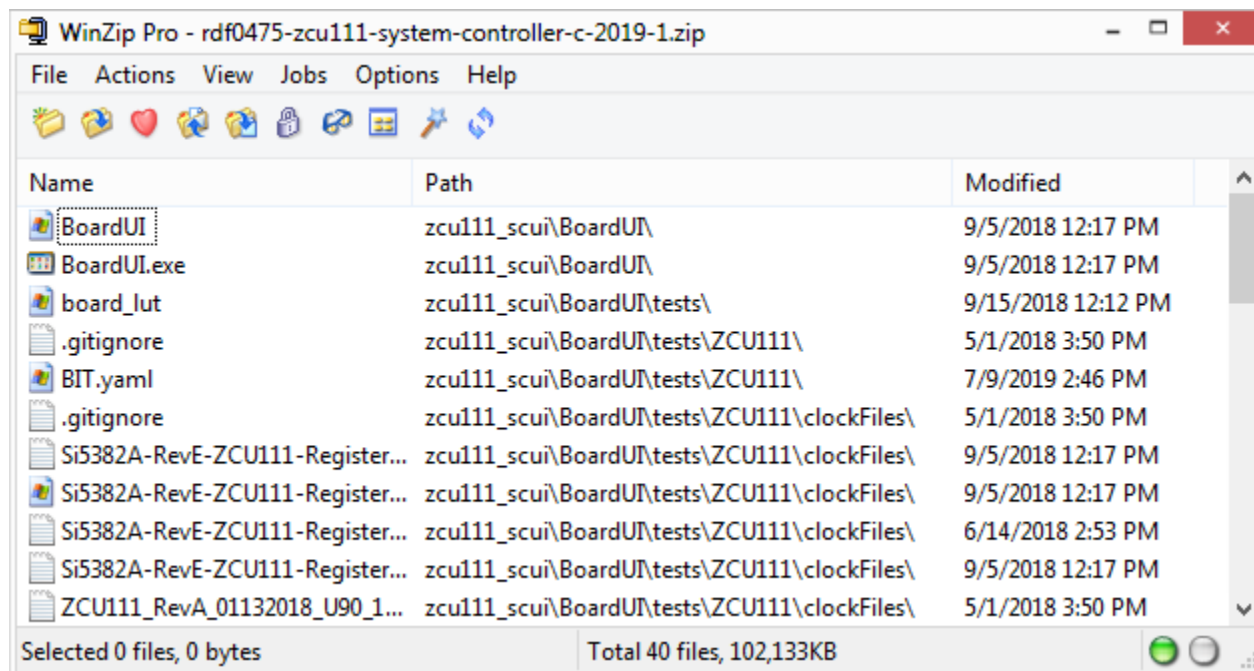


Note: Presentation applies to the ZCU111

ZCU111 System Controller

> Open the RDF0469 – ZCU111 System Controller GUI (2019.1 C) ZIP file

>> Extract these files to your C:\ drive



Running the System Controller GUI



Running the System Controller GUI

- > From C:\zcu111_scul, double click on BoardUI.exe
- > BoardUI will list the available serial numbers in a pull-down; select the desired board
- > Click OK



Enter Board Information

Board:	ZCU111
Revision:	1.0
Silicon:	prod
Mode:	default
Serial Number:	
MAC Address:	1280976B113

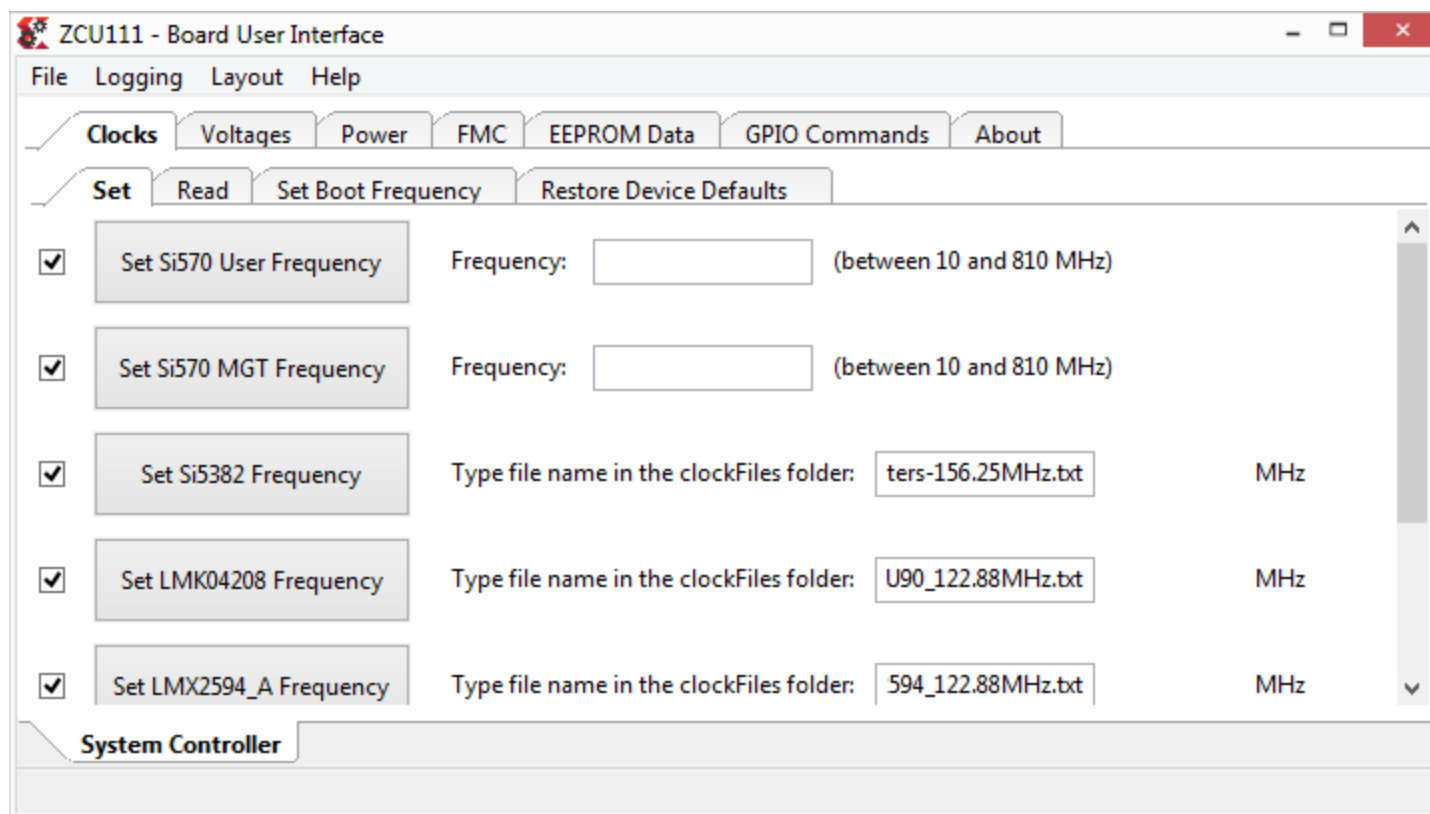
OK

Clocks



Setting the clocks

- > Select the Set tab underneath the Clocks tab
- > The Si5382 and LMK04208 and LMX2594_* Clocks are set via a Si Labs ClockBuilder scripts



Setting the clocks

> The ClockBuilder files are included with RDF0469

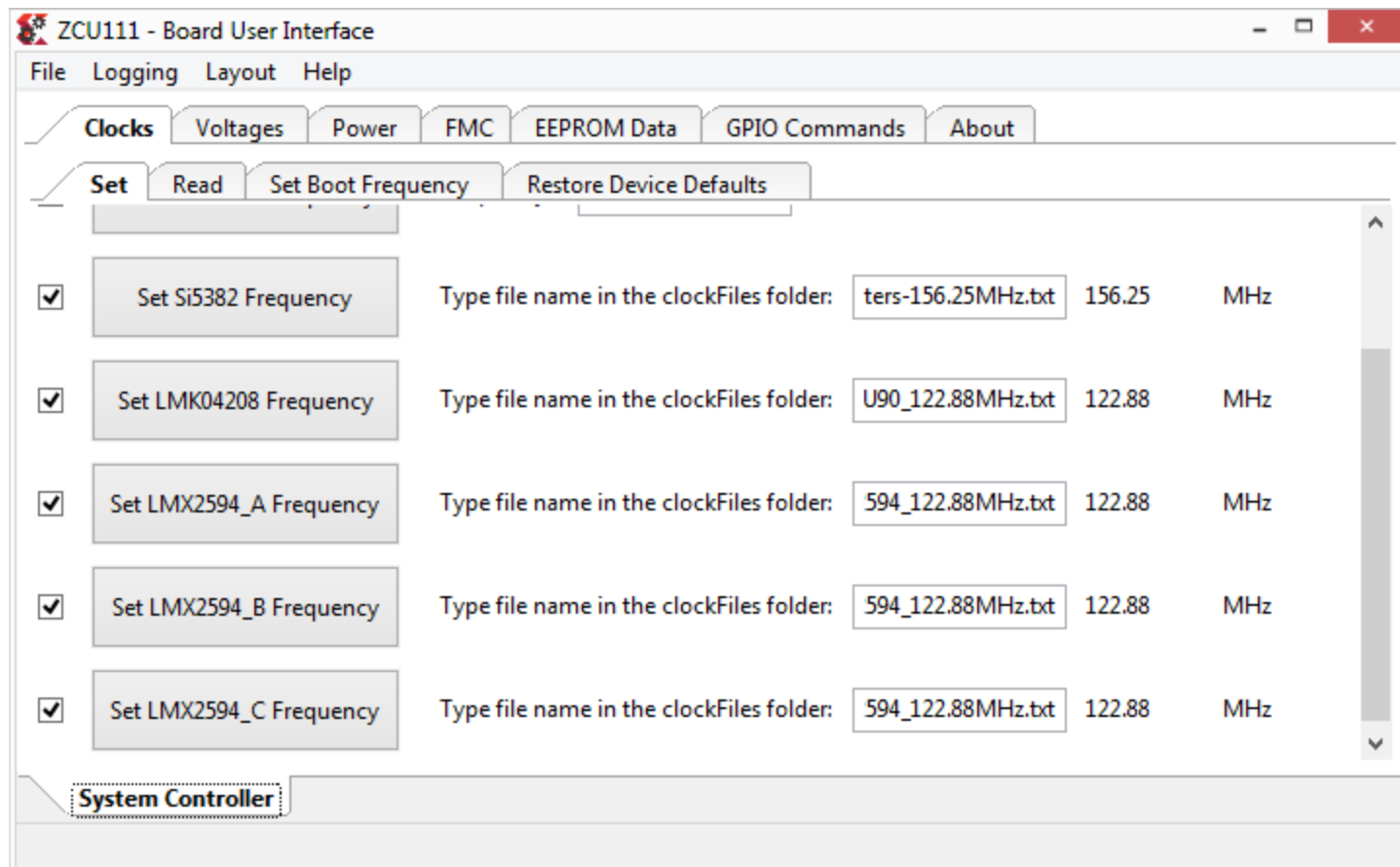
zcu111_scul	492 MB	9/5/2018 1:22:02 pm
BoardUI	97.1 ...	7/31/2018 5:57:43 pm
tests	332 KB	7/31/2018 5:58:02 pm
ZCU111	331 KB	9/7/2018 8:43:37 am
clockFiles	10,212	9/6/2018 9:55:29 am
.gitignore	53	5/1/2018 3:50:56 pm
Si5382A-RevE-ZCU111-Registers-156.25MHz.txt	8,278	9/5/2018 12:17:20 pm
ZCU111_RevA_01132018_U90_122.88MHz.txt	386	5/1/2018 3:50:56 pm
ZCU111_RevA_01152018_U102_103_104_LMX2594_122.88MHz.txt	1,495	5/1/2018 3:50:56 pm

Note: Requires the “MHz” in the name

Setting the clocks

> Enter the file names as shown below, and press the Set buttons

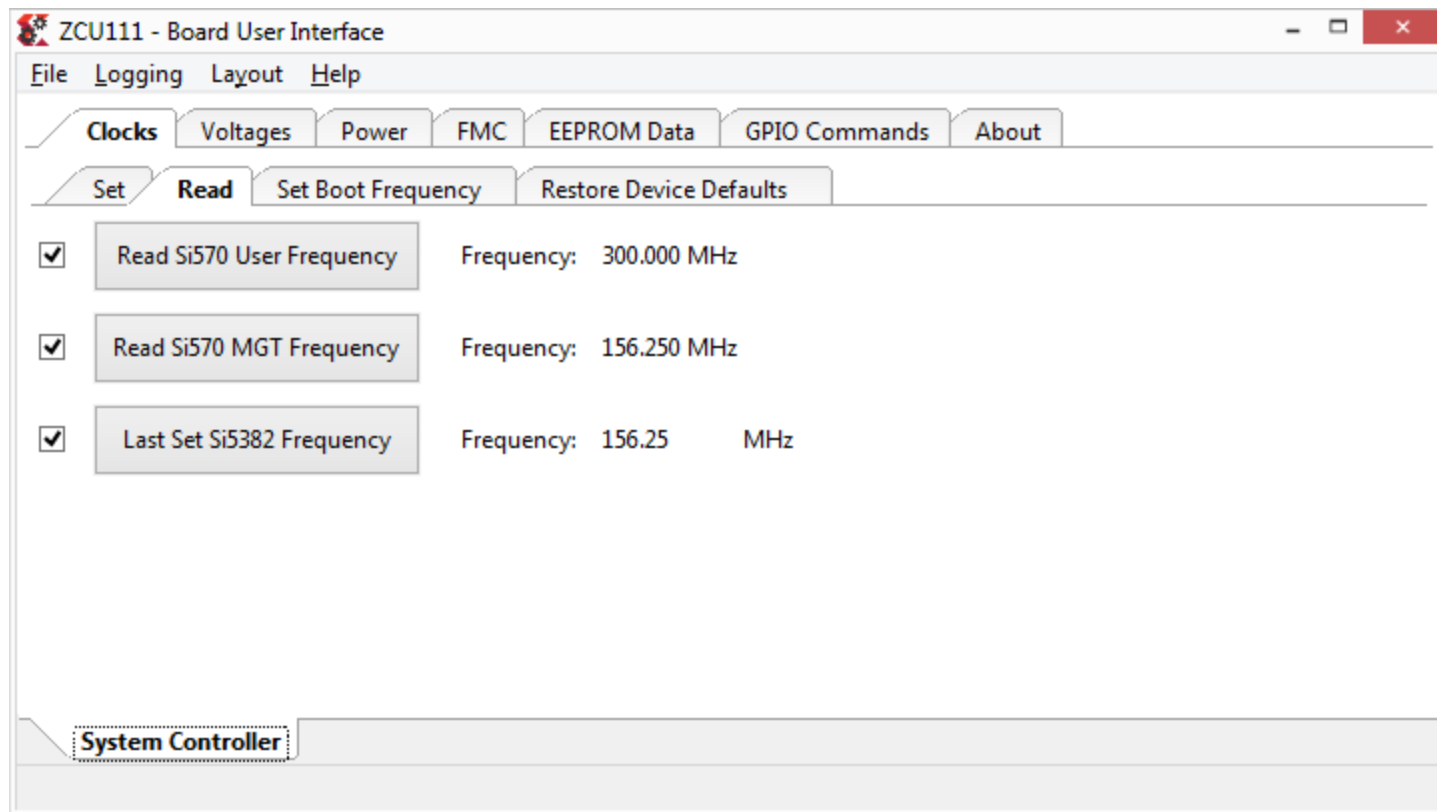
- >> Si5382A-RevE-ZCU111-Registers-156.25MHz.txt
- >> ZCU111_RevA_01132018_U90_122.88MHz.txt
- >> ZCU111_RevA_01152018_U102_103_104__LMX2594_122.88MHz.txt



Note: Shows the frequency after setting

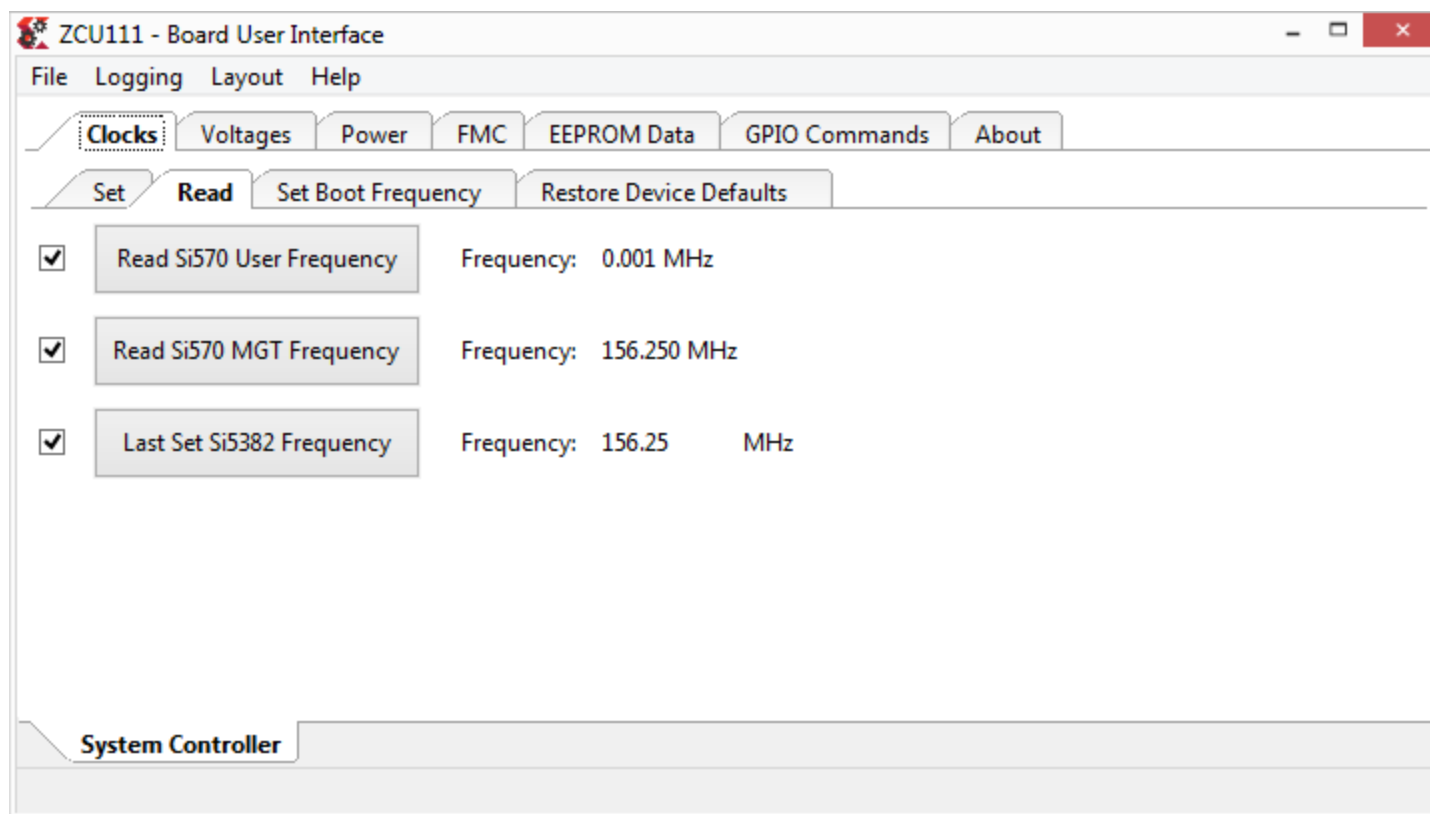
Reading the clocks

- > Select the Read tab
- > Click each of the Read buttons and verify the frequencies are set as shown



Reading the clocks

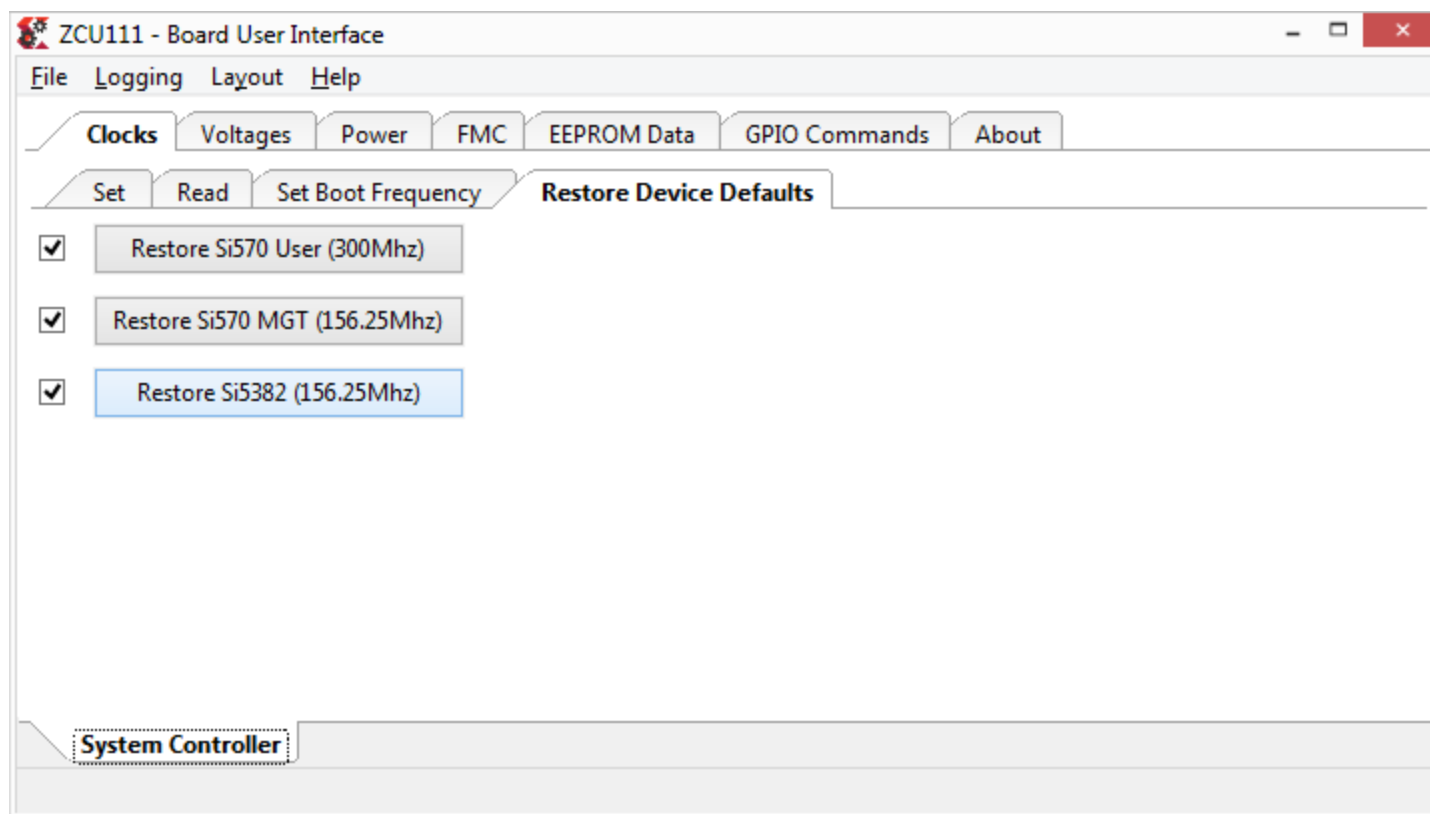
- > If some of the frequencies show up different, you will need to restore the defaults



Restore Default Clock settings

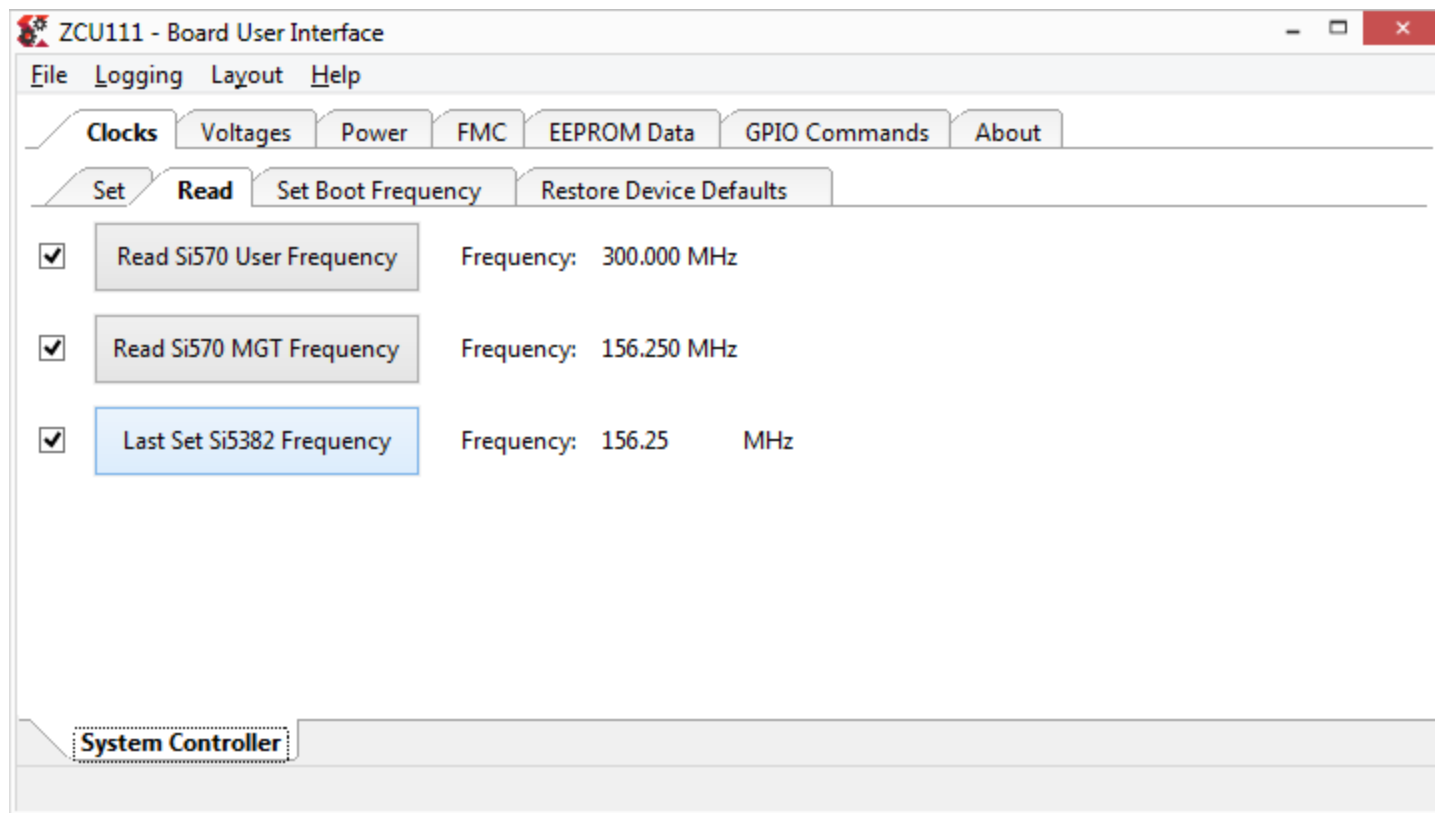
> Select the Restore Device Defaults tab

- >> Restore the defaults by clicking the button associated with the clock you want to restore (300 MHz, 156.25 MHz, and 156.25 MHz)



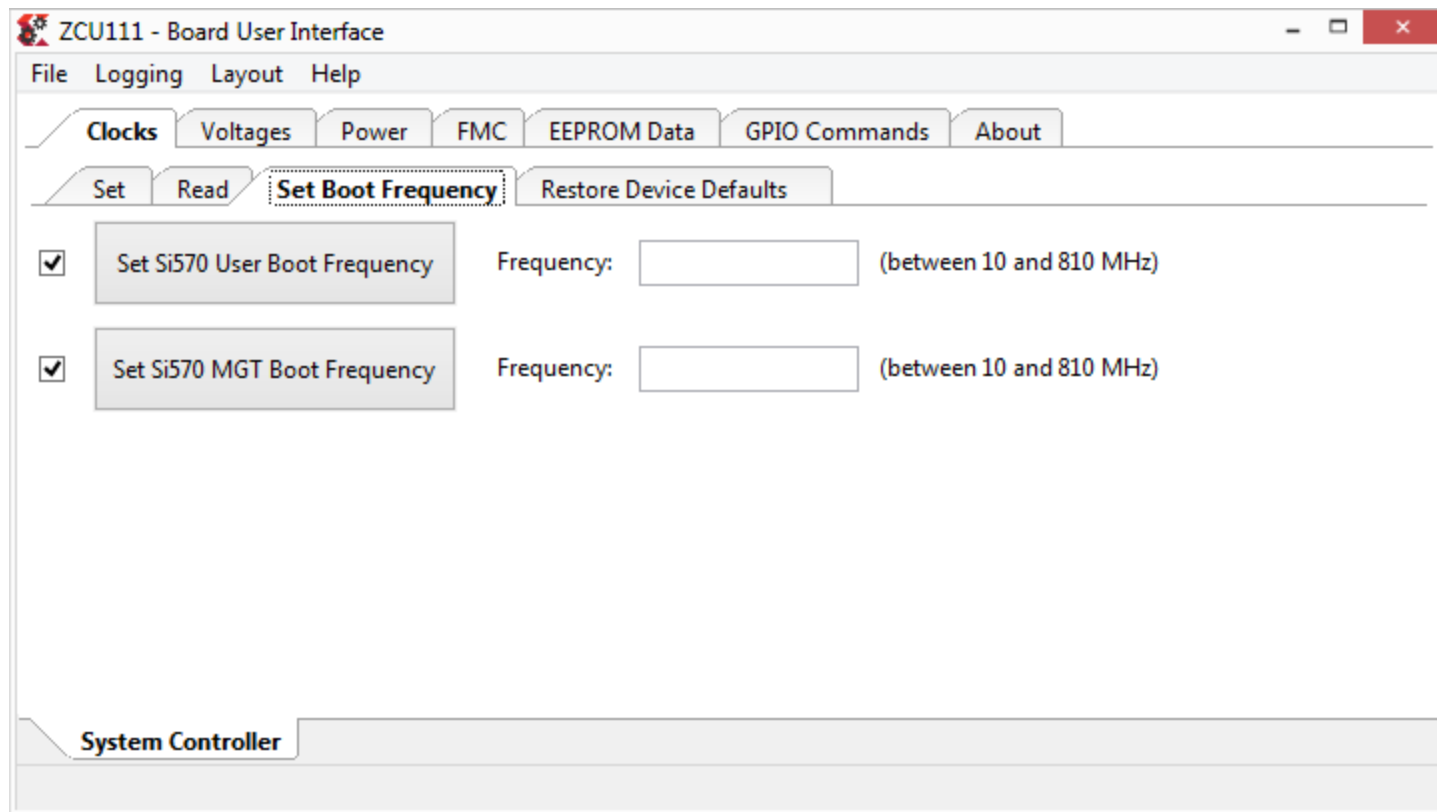
Restore Default Clock settings

- > Return to the Read tab and verify the settings are correct



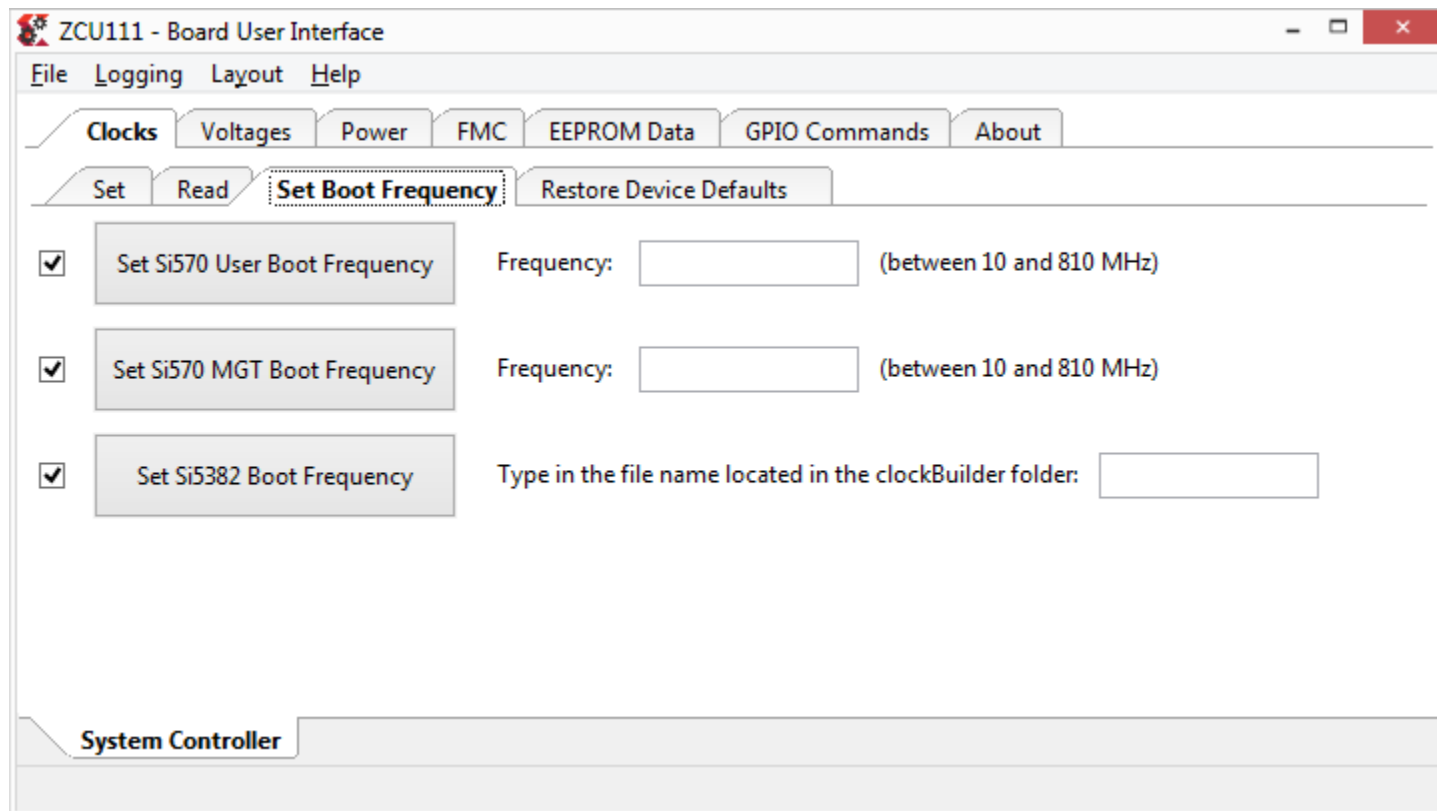
Setting Clock Boot Frequencies

- > Select the Set Boot Frequency tab
- > Type in your desired boot-up frequency and click the corresponding Set button



Setting Clock Boot Frequencies

- > **Note: The Set Boot Frequency settings will override the Restore Device Defaults at Bootup**
- > **The example designs, IBERT, IPI, MIG, etc., expect Si570 User set to 300 MHz, and Si570 MGT set to 156.25 MHz**

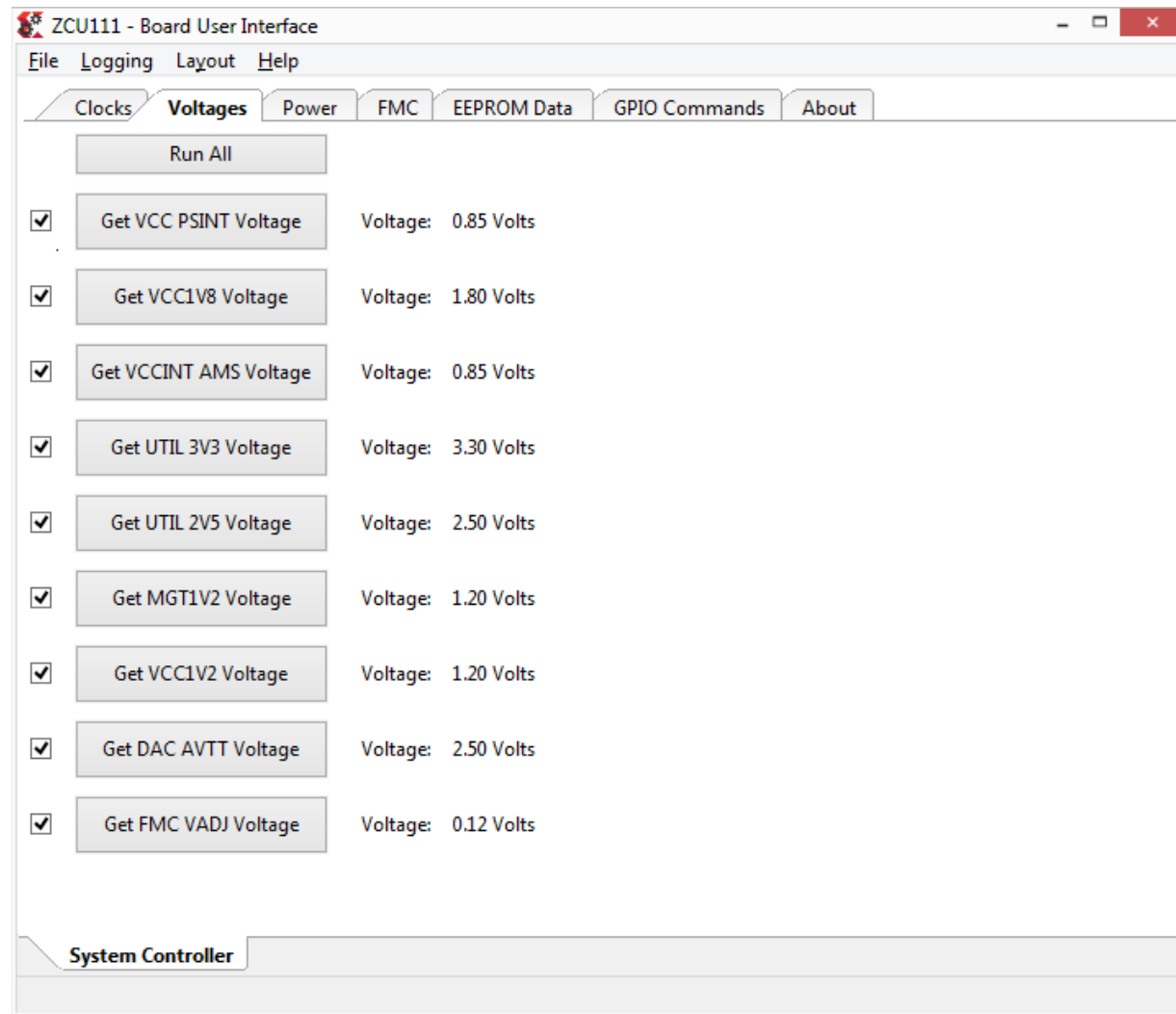


Voltages



Reading onboard ZCU111 voltages

- > Under the Voltages tab, click the Run All button
- > Observe the ZCU111 voltages
 - >> IF VADJ is not showing 1.8 V, refer to the FMC section



Power



Reading power values using default calibration

- > Select the Use Default Calibration tab underneath Power, click the Run All button

ZCU111 - Board User Interface

File Logging Layout Help

Clocks Voltages **Power** FMC EEPROM Data GPIO Commands About

Use Default Calibration Use Custom Calibration Get INA226 Registers Set INA226 Registers

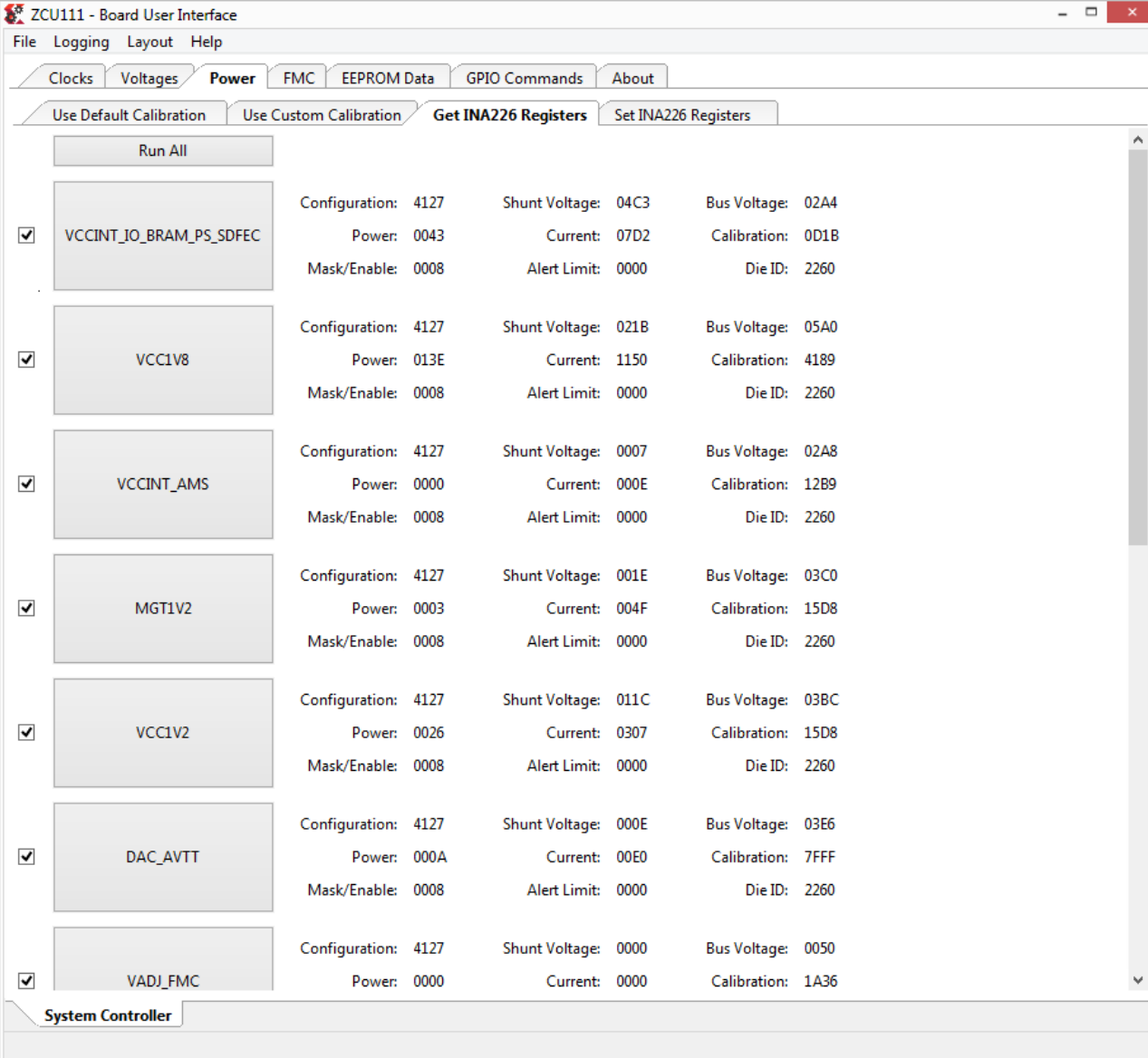
Run All

<input checked="" type="checkbox"/>	VCCINT_IO_BRAM_PS_SDFEC	Power: 0.51 Watts	Voltage (0.85): 0.84 Volts	Current (10 max): 0.61 Amps
<input checked="" type="checkbox"/>	VCC1V8	Power: 0.49 Watts	Voltage (1.8): 1.80 Volts	Current (2 max): 0.27 Amps
<input checked="" type="checkbox"/>	VCCINT_AMS	Power: 0.00 Watts	Voltage (0.85): 0.85 Volts	Current (7 max): 0.00 Amps
<input checked="" type="checkbox"/>	MGT1V2	Power: 0.01 Watts	Voltage (1.2): 1.20 Volts	Current (6 max): 0.02 Amps
<input checked="" type="checkbox"/>	VCC1V2	Power: 0.16 Watts	Voltage (1.2): 1.20 Volts	Current (6 max): 0.14 Amps
<input checked="" type="checkbox"/>	DAC_AVTT	Power: 0.01 Watts	Voltage (2.5 ÷ 2): 1.25 Volts	Current ((0.5 max): 0.01 Amps
<input checked="" type="checkbox"/>	VADJ_FMC	Power: 0.00 Watts	Voltage (1.8): 0.10 Volts	Current (5 max): 0.00 Amps
<input checked="" type="checkbox"/>	MGT1V8	Power: 0.01 Watts	Voltage (1.8): 1.80 Volts	Current (0.5 max): 0.00 Amps
<input checked="" type="checkbox"/>	VCCINT	Power: 0.37 Watts	Voltage (0.85): 0.85 Volts	Current (30 max): 0.42 Amps
<input checked="" type="checkbox"/>	MGTAVCC	Power: 0.02 Watts	Voltage (0.9): 0.90 Volts	Current (3 max): 0.02 Amps
<input checked="" type="checkbox"/>	DAC_AVCCAUX	Power: 0.00 Watts	Voltage (1.8): 1.81 Volts	Current (0.5 max): 0.00 Amps
<input checked="" type="checkbox"/>	ADC_AVCCAUX	Power: 0.08 Watts	Voltage (1.8): 1.81 Volts	Current (2 max): 0.04 Amps
<input checked="" type="checkbox"/>	ADC_AVCC	Power: 0.02 Watts	Voltage (0.925): 0.92 Volts	Current (2 max): 0.01 Amps
<input checked="" type="checkbox"/>	DAC_AVCC	Power: 0.00 Watts	Voltage (0.925): 0.92 Volts	Current (1 max): 0.01 Amps

System Controller

Read INA226 Registers

- > Select the Get INA226 Registers tab and click the Run All button
- > Observe the INA226 Registers settings



The screenshot shows the ZCU111 Board User Interface with the 'Get INA226 Registers' tab selected. The interface includes a 'Run All' button and a table of registers. The table columns are: Register Name, Configuration, Power, Mask/Enable, Shunt Voltage, Current, Alert Limit, Bus Voltage, Calibration, and Die ID.

Register Name	Configuration	Power	Mask/Enable	Shunt Voltage	Current	Alert Limit	Bus Voltage	Calibration	Die ID
VCCINT_IO_BRAM_PS_SDFEC	4127	0043	0008	04C3	07D2	0000	02A4	0D1B	2260
VCC1V8	4127	013E	0008	021B	1150	0000	05A0	4189	2260
VCCINT_AMS	4127	0000	0008	0007	000E	0000	02A8	12B9	2260
MGT1V2	4127	0003	0008	001E	004F	0000	03C0	15D8	2260
VCC1V2	4127	0026	0008	011C	0307	0000	03BC	15D8	2260
DAC_AVTT	4127	000A	0008	000E	00E0	0000	03E6	7FFF	2260
VADJ_FMC	4127	0000		0000	0000		0050	1A36	

Set INA226 Registers

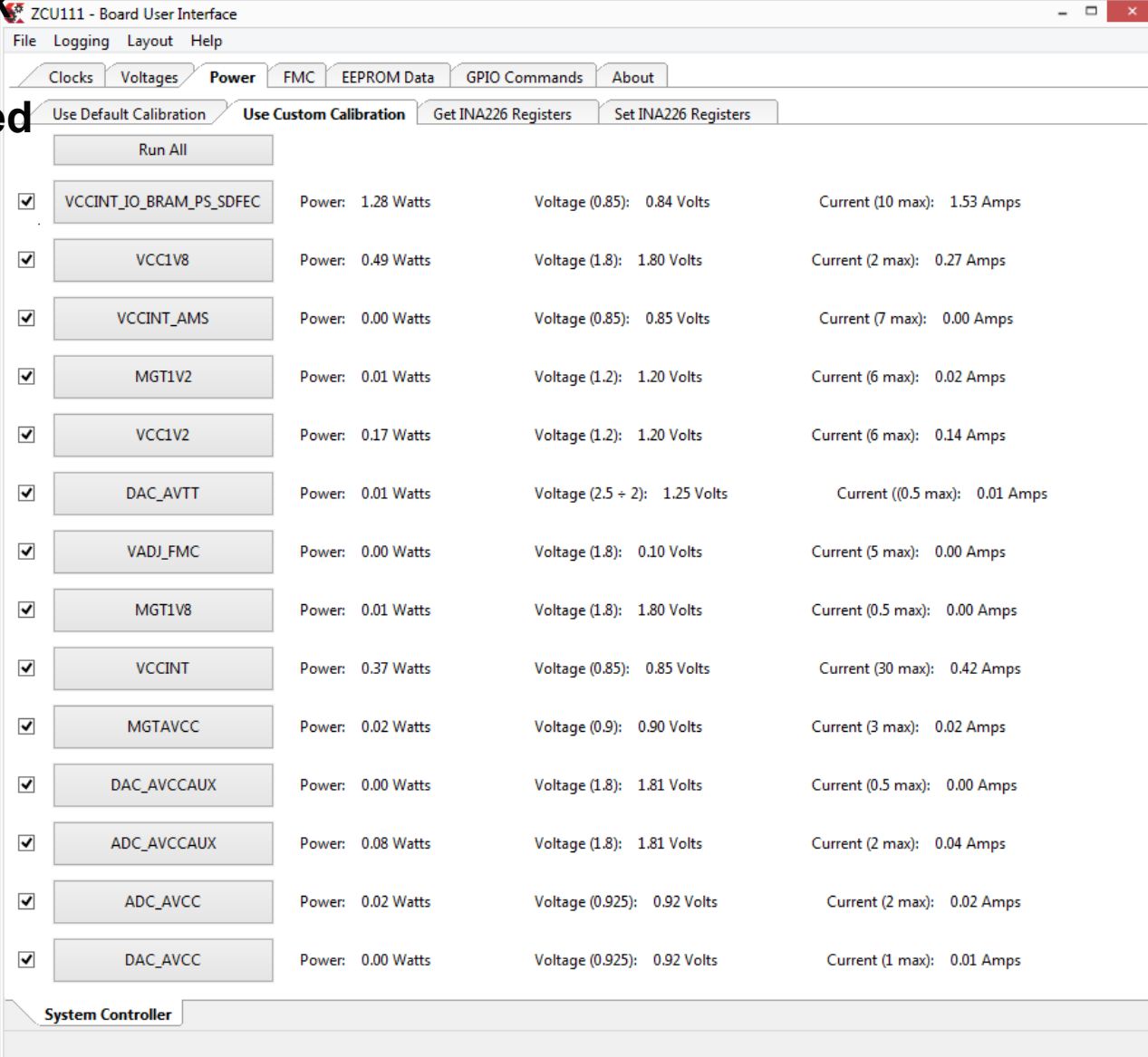
- > Select the Set INA226 Registers tab and set any desired calibrations
- > Review [TI INA226](#) documentation before making changes

The screenshot displays the ZCU111 Board User Interface, specifically the 'Set INA226 Registers' tab. The interface includes a menu bar with 'File', 'Logging', 'Layout', and 'Help'. Below the menu bar are tabs for 'Clocks', 'Voltages', 'Power', 'FMC', 'EEPROM Data', 'GPIO Commands', and 'About'. The 'Power' tab is active, and within it, the 'Set INA226 Registers' sub-tab is selected. A 'Run All' button is located at the top of the main content area. The main content area lists several power-related components, each with a checkbox, a name, and two sets of input fields for 'Configuration' and 'Calibration'. The components listed are VCCINT_IO_BRAM_PS_SDFEC, VCC1V8, VCCINT_AMS, MGT1V2, VCC1V2, DAC_AVTT, VADJ_FMC, and MGT1V0. The 'System Controller' tab is visible at the bottom of the interface.

Component	Configuration	Calibration
<input checked="" type="checkbox"/> VCCINT_IO_BRAM_PS_SDFEC	<input type="text"/>	<input type="text"/>
<input checked="" type="checkbox"/> VCC1V8	<input type="text"/>	<input type="text"/>
<input checked="" type="checkbox"/> VCCINT_AMS	<input type="text"/>	<input type="text"/>
<input checked="" type="checkbox"/> MGT1V2	<input type="text"/>	<input type="text"/>
<input checked="" type="checkbox"/> VCC1V2	<input type="text"/>	<input type="text"/>
<input checked="" type="checkbox"/> DAC_AVTT	<input type="text"/>	<input type="text"/>
<input checked="" type="checkbox"/> VADJ_FMC	<input type="text"/>	<input type="text"/>
<input checked="" type="checkbox"/> MGT1V0	<input type="text"/>	<input type="text"/>

Reading power values using custom calibration

- > Select the Use Custom Calibration tab and click the Run All button (no calibrations were entered in this example)



The screenshot shows the ZCU111 Board User Interface with the Power tab selected. The 'Use Custom Calibration' option is chosen, and the 'Run All' button is visible. The table below displays power values for various components.

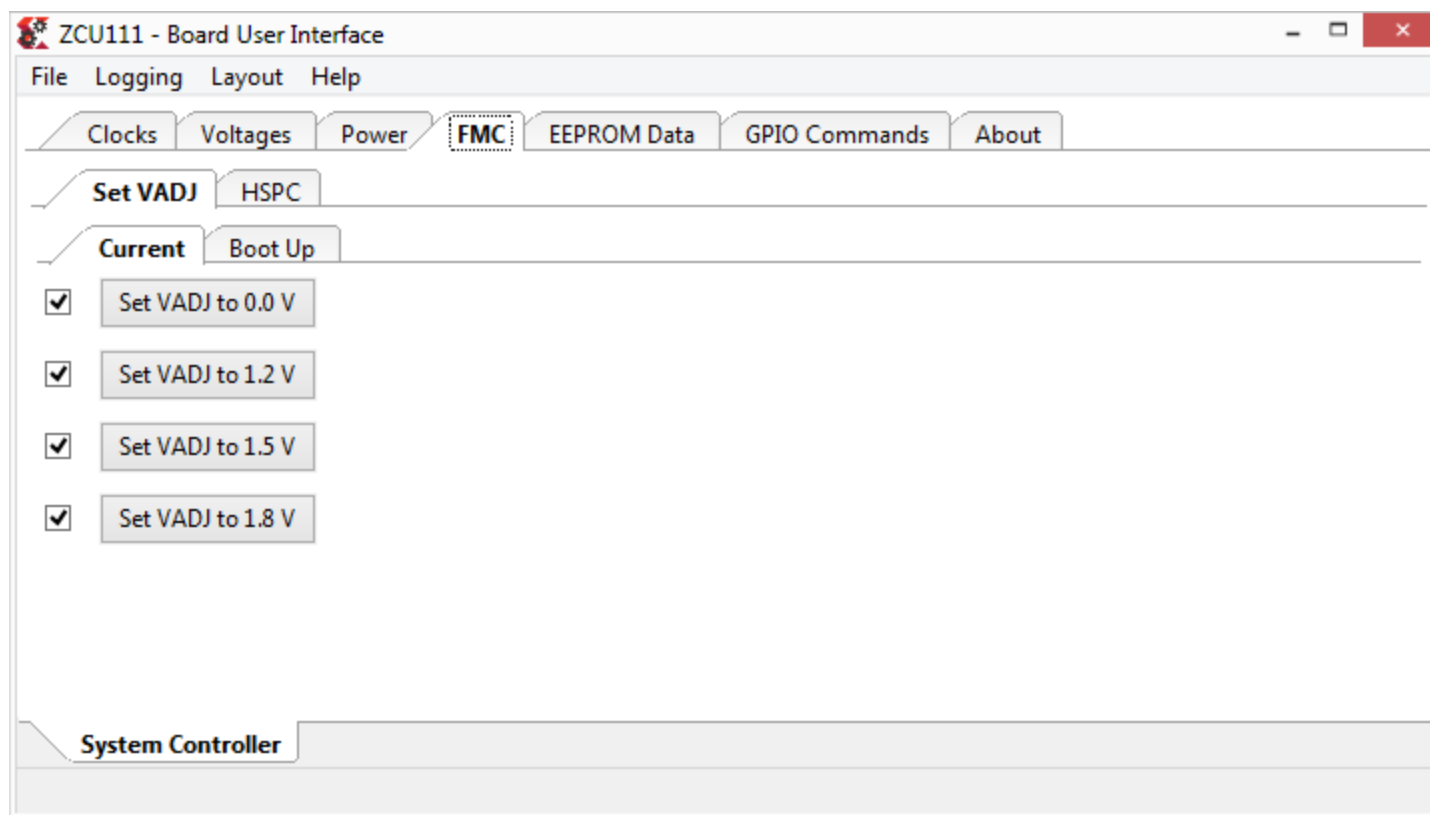
Component	Power	Voltage	Current
VCCINT_IO_BRAM_PS_SDFEC	1.28 Watts	0.84 Volts (0.85)	1.53 Amps (10 max)
VCC1V8	0.49 Watts	1.80 Volts (1.8)	0.27 Amps (2 max)
VCCINT_AMS	0.00 Watts	0.85 Volts (0.85)	0.00 Amps (7 max)
MGT1V2	0.01 Watts	1.20 Volts (1.2)	0.02 Amps (6 max)
VCC1V2	0.17 Watts	1.20 Volts (1.2)	0.14 Amps (6 max)
DAC_AVTT	0.01 Watts	1.25 Volts (2.5 ÷ 2)	0.01 Amps ((0.5 max))
VADJ_FMC	0.00 Watts	0.10 Volts (1.8)	0.00 Amps (5 max)
MGT1V8	0.01 Watts	1.80 Volts (1.8)	0.00 Amps (0.5 max)
VCCINT	0.37 Watts	0.85 Volts (0.85)	0.42 Amps (30 max)
MGTAVCC	0.02 Watts	0.90 Volts (0.9)	0.02 Amps (3 max)
DAC_AVCCAUX	0.00 Watts	1.81 Volts (1.8)	0.00 Amps (0.5 max)
ADC_AVCCAUX	0.08 Watts	1.81 Volts (1.8)	0.04 Amps (2 max)
ADC_AVCC	0.02 Watts	0.92 Volts (0.925)	0.02 Amps (2 max)
DAC_AVCC	0.00 Watts	0.92 Volts (0.925)	0.01 Amps (1 max)

FMC



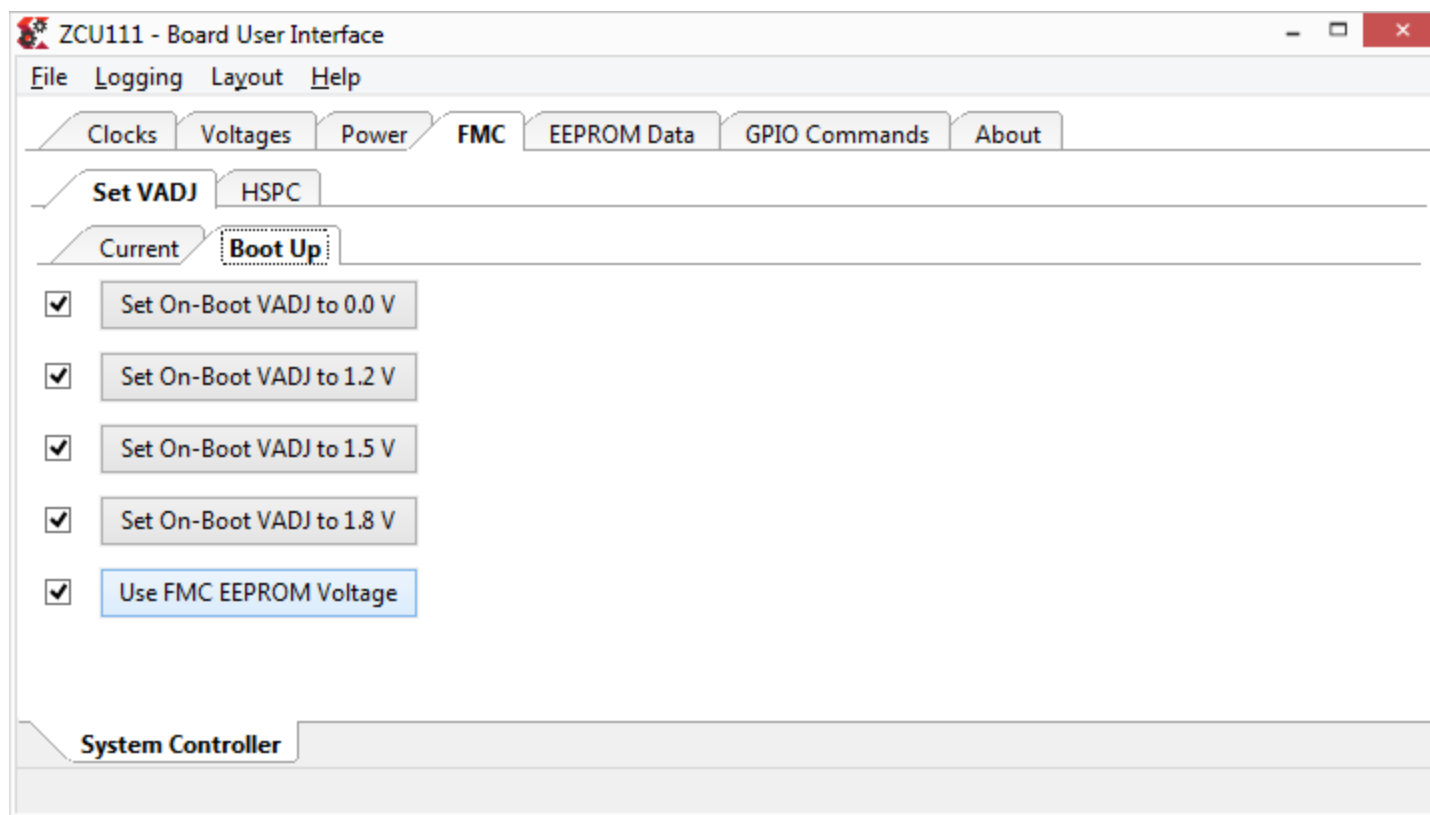
Set VADJ

- > Select the Set VADJ tab underneath the FMC tab
- > Under the Current tab, select the desired VADJ voltage
- > Some BIT tests expect 1.8 V



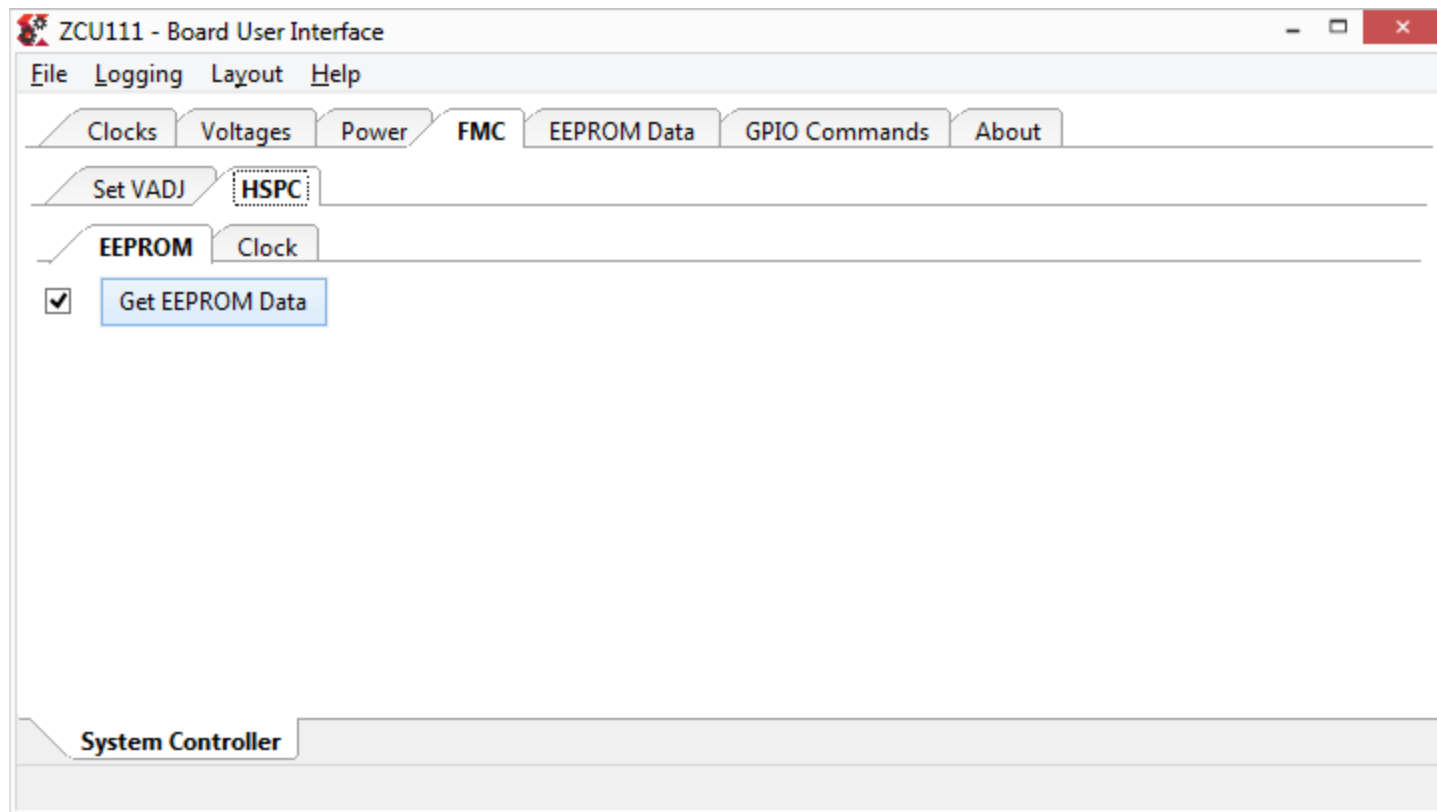
Set Boot-Up VADJ

- > Select the Boot-up tab and choose the desired power-on voltage
- > The default, Use FMC EEPROM Voltage, will set 1.8 V unless you attach an FMC card with a different setting



Reading FMC EEPROM

- > With an optional FMC+ card attached, select the HSPC tab
- > Click the Get EEPROM Data button



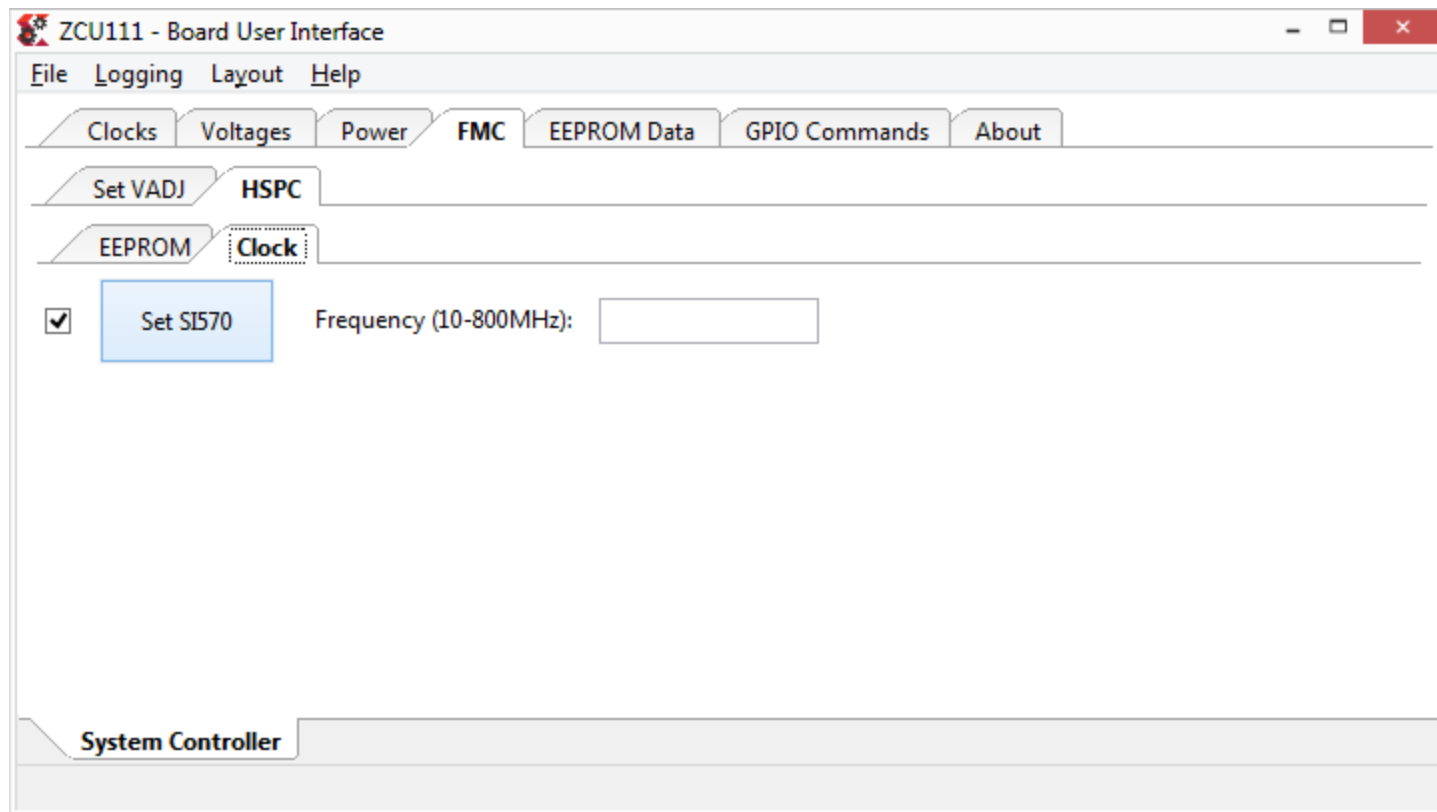
Reading FMC EEPROM

- > The EEPROM data will be displayed in a separate window (Samtec HSPC card data shown)

```
data.dump - Simple Hexadecimal Viewer
01 00 00 01 00 0a 00 f4 01 09 00 40 ec 87 c6 53  [] [] [] [] [] [] [] [] [] [] @ [] [] S
61 6d 74 65 63 cd 46 4d 43 2b 20 4c 6f 6f 70 62 amtec [] FMC+ Loopb
61 63 6b c0 ce 50 43 42 41 2d 31 39 34 31 39 35 ack [] [] PCBA-194195
2d 30 31 da 32 30 31 36 2d 31 31 2d 30 39 20 31 -01 [] 2016-11-09 1
39 3a 33 36 3a 32 31 2e 36 39 35 33 36 36 c1 a7 9:36:21.695366 [] []
02 02 0d b0 3f 02 b0 04 74 04 ec 04 32 00 00 00 [] [] [] ? [] [] t [] [] [] 2 [] [] []
00 00 02 02 0d 10 df 01 4a 01 3b 01 5e 01 32 00 [] [] [] [] [] [] [] J [] ; [] ^ [] 2 []
00 00 d0 07 02 02 0d 30 bf 00 fa 00 6e 00 5e 01 [] [] [] [] [] [] [] 0 [] [] [] [] n [] ^ []
32 00 00 00 d0 07 01 02 0d fb f5 05 00 00 00 00 2 [] [] [] [] [] [] [] [] [] [] [] [] [] []
00 00 00 00 00 00 00 00 01 02 0d fc f4 04 00 00 [] [] [] [] [] [] [] [] [] [] [] [] [] []
00 00 00 00 00 00 00 00 00 00 01 02 0d 82 6e 03 [] [] [] [] [] [] [] [] [] [] [] [] [] n []
fa 00 6e 00 5e 01 32 00 00 00 7e 04 fa 82 0b b4 [] [] n [] ^ [] 2 [] [] [] ~ [] [] [] [] []
c5 a2 12 00 00 1c 70 2c 00 00 60 80 00 00 00 00 [] [] [] [] [] p, [] [] ` [] [] [] []
ff ff ff ff ff ff ff ff ff ff ff ff ff ff [] [] [] [] [] [] [] [] [] [] [] [] [] []
ff ff ff ff ff ff ff ff ff ff ff ff ff ff [] [] [] [] [] [] [] [] [] [] [] [] [] []
```

Setting FMC HPC clocks

- > Select the Clock tab and set the HSPC clock as desired
- > The default frequency is 156.25 MHz
- > Any changes must be repeated after a power cycle



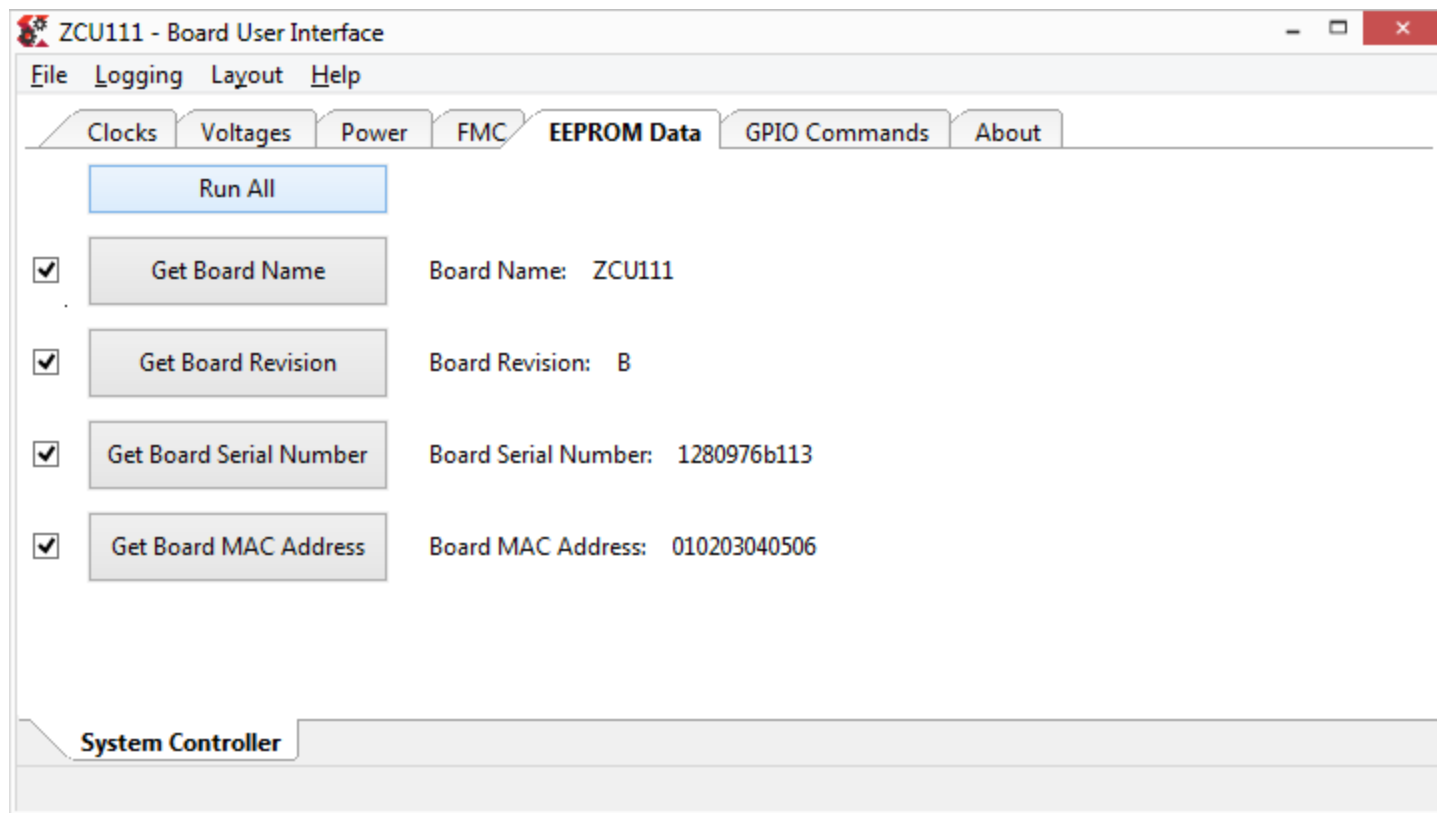
Note: IBERT uses the default clock of 156.25 MHz

EEPROM Data



Reading the Board EEPROM Data

- > Select the EEPROM Data tab
- > Click the Run All button

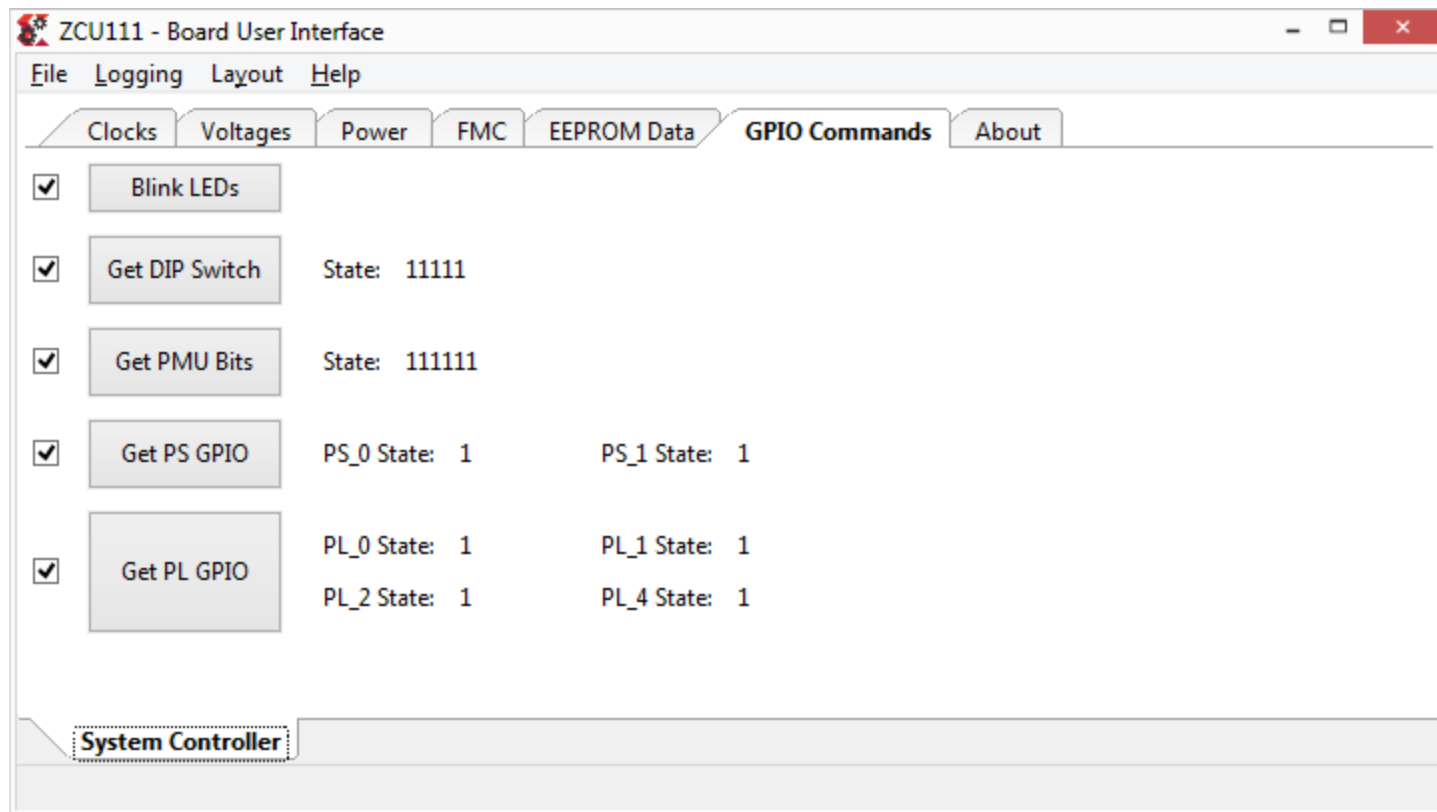


GPIO Commands



Set GPIOs

- > Select the GPIO Commands tab
- > Click the button for the operation you would like to perform.

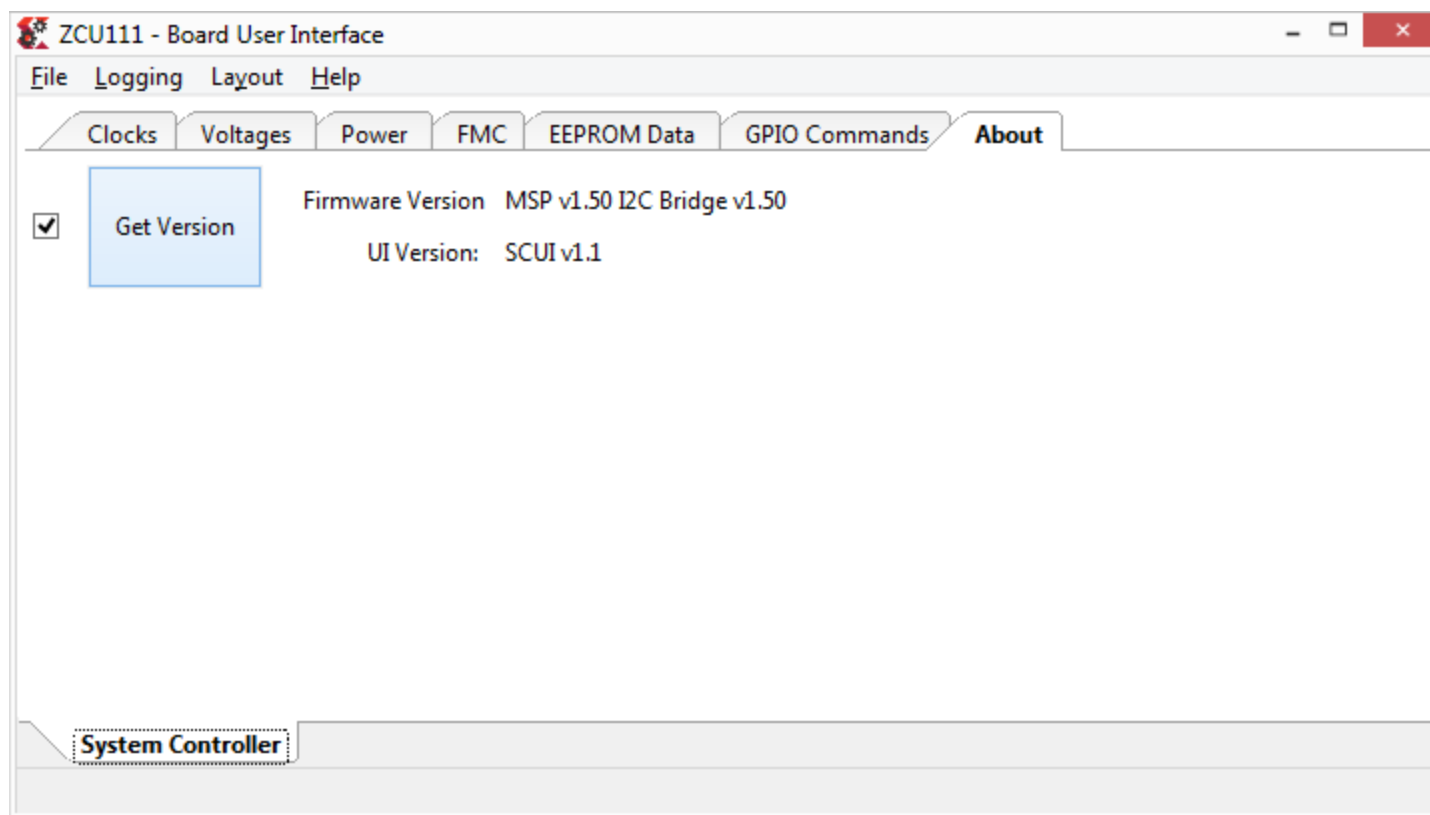


About



Reading version information

- > Select the About tab
- > Click the Get Version button to get System Controller Firmware version

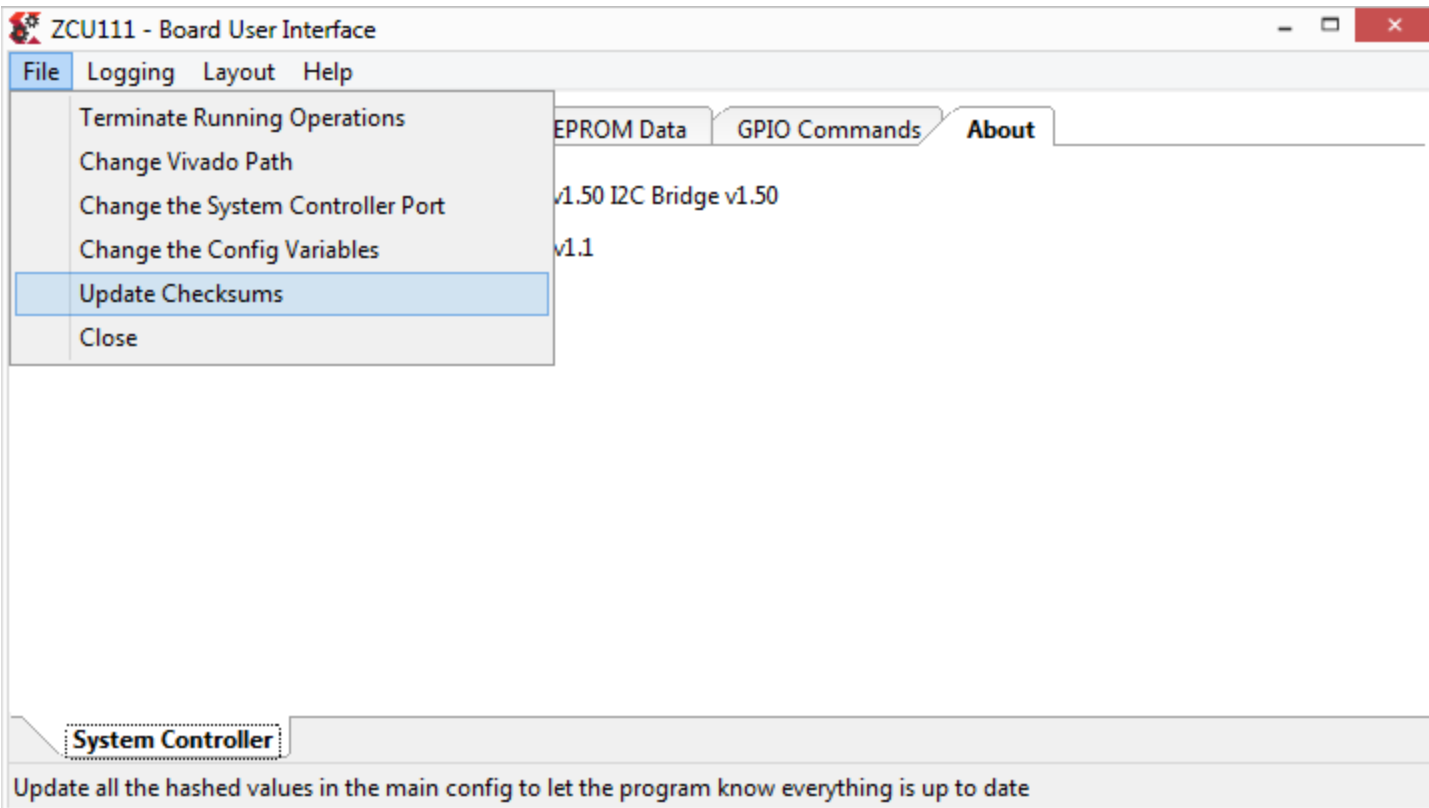
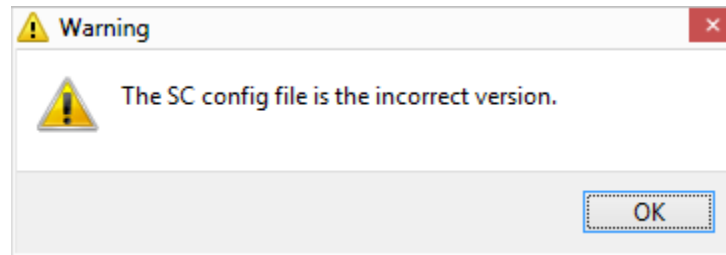


File Changes



File changes

- > If you make changes some of the *.yaml files, you may get this warning. Select Update Checksums to resolve.



References



References

> Vivado Release Notes

- >> Vivado Design Suite User Guide - Release Notes – UG973
 - https://www.xilinx.com/support/documentation/sw_manuals/xilinx2019_1/ug973-vivado-release-notes-install-license.pdf
- >> Vivado Design Suite 2019 - Vivado Known Issues
 - <https://www.xilinx.com/support/answers/72162.html>

> Vivado Programming and Debugging

- >> Vivado Design Suite Programming and Debugging User Guide – UG908
 - https://www.xilinx.com/support/documentation/sw_manuals/xilinx2019_1/ug908-vivado-programming-debugging.pdf

Documentation



Documentation

> Zynq UltraScale+

>> Zynq UltraScale+ RFSoc

- <https://www.xilinx.com/products/silicon-devices/soc/rfsoc.html>

> ZCU111 Documentation

>> Xilinx Zynq UltraScale+ RFSoc ZCU111 Evaluation Kit

- <https://www.xilinx.com/products/boards-and-kits/zcu111.html>

>> ZCU111 Board User Guide – UG1271

- https://www.xilinx.com/support/documentation/boards_and_kits/zcu111/ug1271-zcu111-eval-bd.pdf

>> ZCU111 Evaluation Kit Quick Start Guide User Guide – XTP490

- https://www.xilinx.com/support/documentation/boards_and_kits/zcu111/xtp490-zcu111-quickstart.pdf

>> ZCU111 - Known Issues Master Answer Record

- <https://www.xilinx.com/support/answers/70958.html>