User's Guide
SLVUBA7–October 2017

BOOSTXL-DRV8304x EVM GUI User's Guide

This document is provided with the BOOSTXL-DRV8304x customer evaluation module (EVM) as a supplement to the *DRV8304 38-V Three-Phase Smart Gate Driver* data sheet. This user's guide details how to use the BOOSTXL-DRV8304x EVM GUI application.

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1 Hardware and Software Setup

The hardware (HW) and software (SW) tools that follow are required for the evaluation of BOOSTXL-DRV8304x:

- MSP430F5529 LaunchPad™ development kit
- BOOSTXL-DRV8304x EVM
- Three-phase BLDC motor
- Voltage supply from 6 V to 38 V
- Jumper wires (for connections)
- Code Composer Studio™ software V.5.4 and above
- BOOSTXL-DRV8304x EVM
- BOOSTXL-DRV8304x EVM reference software development package

For additional details on hardware connections refer to the *BOOSTXL-DRV8304x GUI User's Guide*.

This document only describes the installation and usage of the BOOSTXL-DRV8304x EVM GUI.

2 GUI Application

Figure 1 shows the launch page for the BOOSTXL-DRV8304x EVM GUI.

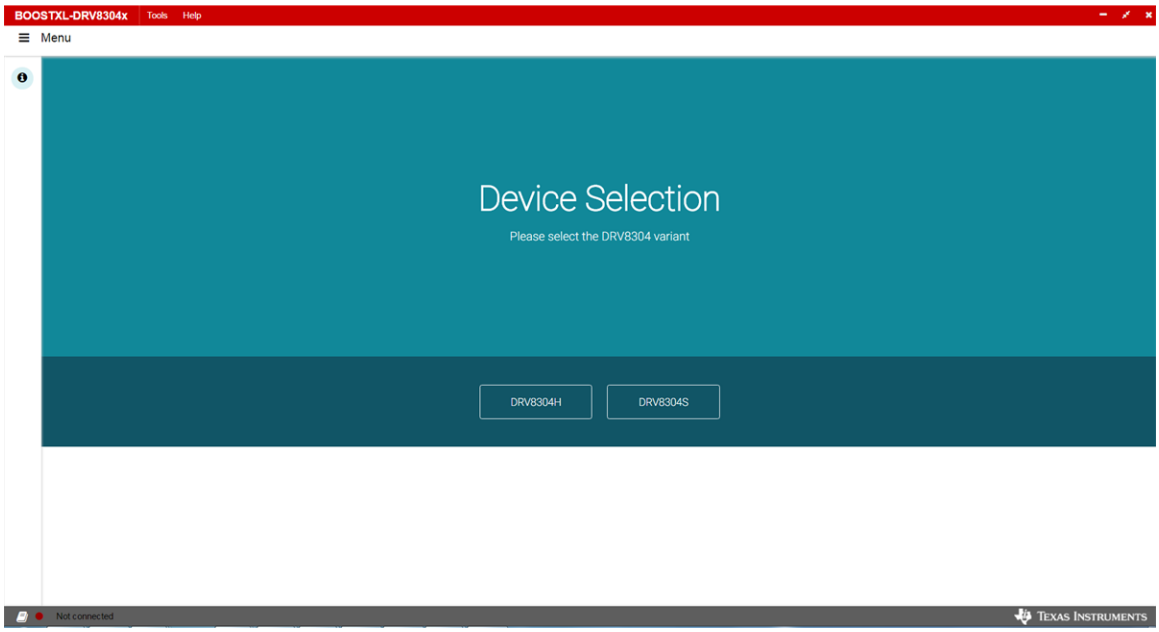

Figure 1. BOOSTXL-DRV8304x EVM GUI (Introduction Page)

2.1 Installation

Follow these steps to install the BOOSTXL-DRV8304 application:

Step 1. Install the GUI.

Download and run the *installer boostxldrv8304x-1.0.0_EVM_GUI.exe* file to install the GUI application.

Step 2. Install the COM port driver for *TI MSP430 USB* which is the firmware on the MSP430F5529 LaunchPad development kit.

This driver is installed automatically during the GUI installation process. Select the *Install* option when the pop-up shown in Figure 2 appears during the GUI installation. If this pop-up does not appear, the drivers are already installed.

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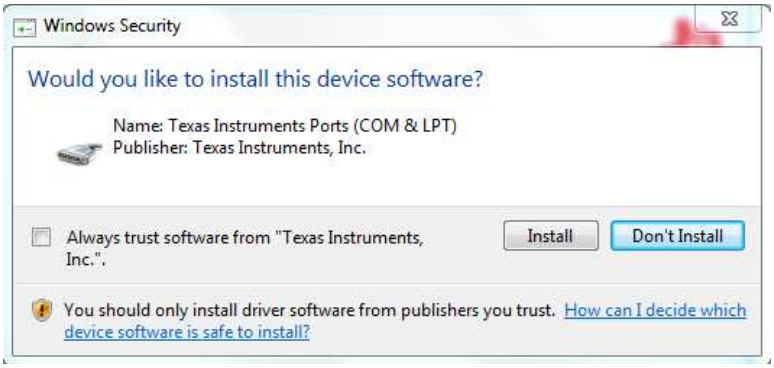

Figure 2. Windows Security Pop-Up Window

If the automatic driver installation fails for some reason or the *Don't Install* option was selected from the pop-up in Figure 2, the drivers must be installed manually using the steps that follow:

Step 1. Locate the driver INF file (msp430_ti_signed.inf) in the following folder path: C:\Program Files (x86)\Texas Instruments\BOOSTXL-DRV832X\TI MSP430 USB Driver.

Step 2. Right click on the INF file and select the *Install* option.

Step 3. Follow the installation instructions to successfully install the driver.

If any issues still occur during the driver installation steps or to learn more about the process, download and extract the *MSP430 USB Developers Package* file from http://www.ti.com/tool/msp430usbdevpack and refer to sections 2.5.2 (Windows 7) and 2.5.3 (Windows 8) in the *Examples_Guide_MSP430_USB.pdf* document. This document can be found under *MSP430USBDevelopersPackage_5_10_00_17\MSP430_USB_Software\Documentation* directory of the extracted *MSP430 USB Developers Package* file.

2.2 Using BOOSTXL-DRV8304x EVM GUI

The BOOSTXL-DRV8304x EVM GUI along with BOOSTXL-DRV8304x EVM facilitates control of a brushless DC motor and change of various settings. The BOOSTXL-DRV8304x EVM GUI provides functionality for adjusting the speed and direction of the motor, adjusting parameters of the motor-control algorithm and monitoring the device status. Use the steps that follow to get started with the GUI:

Step 1. Attach the brushless DC motor.

Step 2. Plug in the micro-USB cable to the PC.

Step 3. Enable the motor power supply. For additional details on hardware connections refer to the *BOOSTXL-DRV8304x GUI User's Guide*.

Step 4. Click on BOOSTXL-DRV8304x EVM GUI shortcut either on the desktop or from the start menu to run the GUI application.

Step 5. Go to the *Serial Port* page to manually select an available COM port.

The *Serial Port* page displays the list of COM ports available for opening the connection as shown in Figure 3. If nothing is physically connected to the PC, the COM list in the drop-down menu displays -- *No Device Connected* --.

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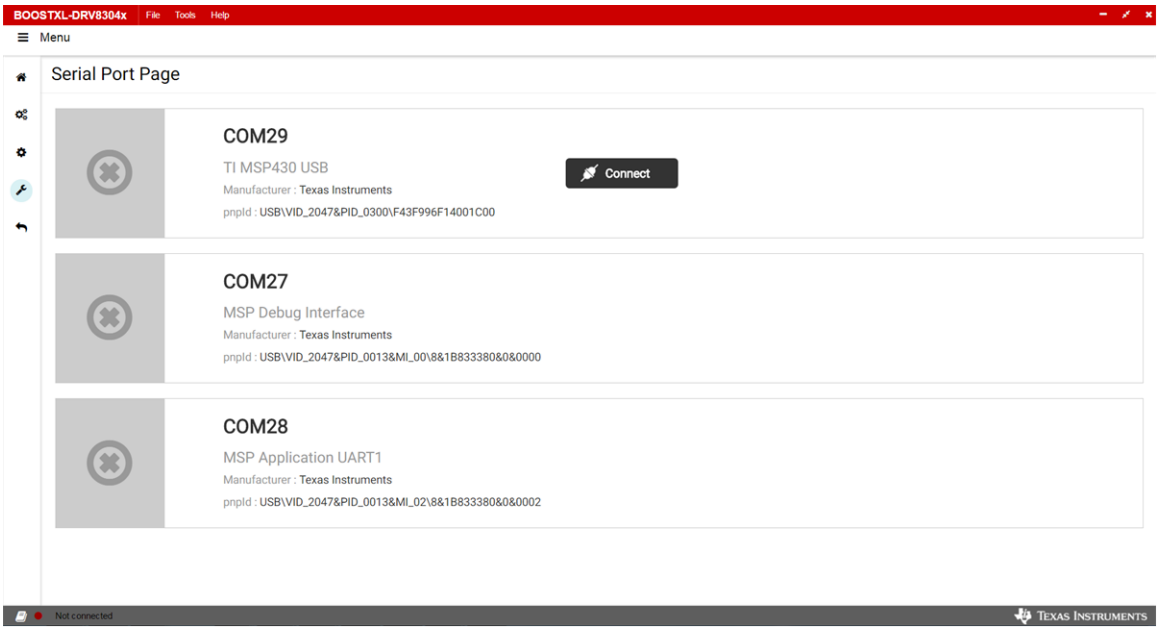

Figure 3. BOOSTXL-DRV8304x EVM GUI (Serial Port Page Showing the Required Friendly Name)

Step 6. After the GUI connects, the status shown in Figure 4 is displayed.

The bottom-left corner of the status bar displays a green indicator to indicate the connection with the opened COM and device mentioned in brackets.

Figure 4. BOOSTXL-DRV8304x EVM GUI (COM Opened)

Step 7. Click on the hamburger button for the menu on the top-left corner of the GUI to open a side-bar menu.

Step 8. Use the side-bar menu to navigate to the following pages or sub-pages at any time. The pages that follow are in context to the launched device:

- Introduction
  - Device
  - EVM
- Registers
- Motor Control - Sensored
- Motor Control - Sensorless
- Serial Port

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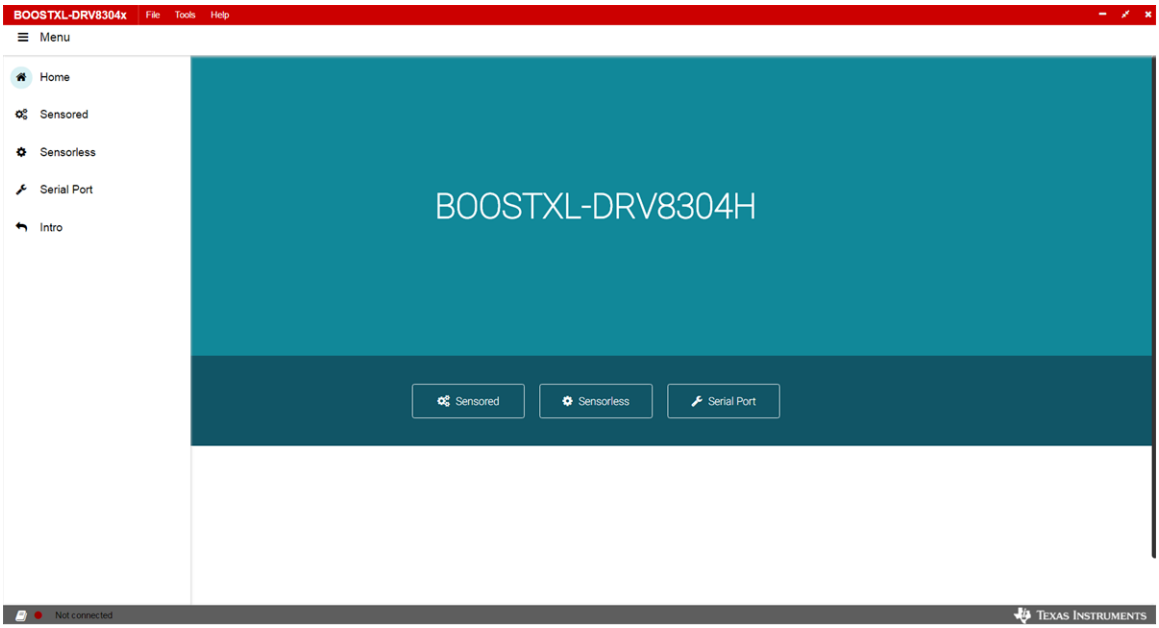

Figure 5. BOOSTXL-DRV8304x EVM GUI (Menu)

Step 9. Introduction page

The Introduction page has the general information about the BOOSTXL-DRV8304x EVM device. The sub-pages *Device* and *EVM* under the *Introduction* page have the detailed description about the device and corresponding EVM, respectively.

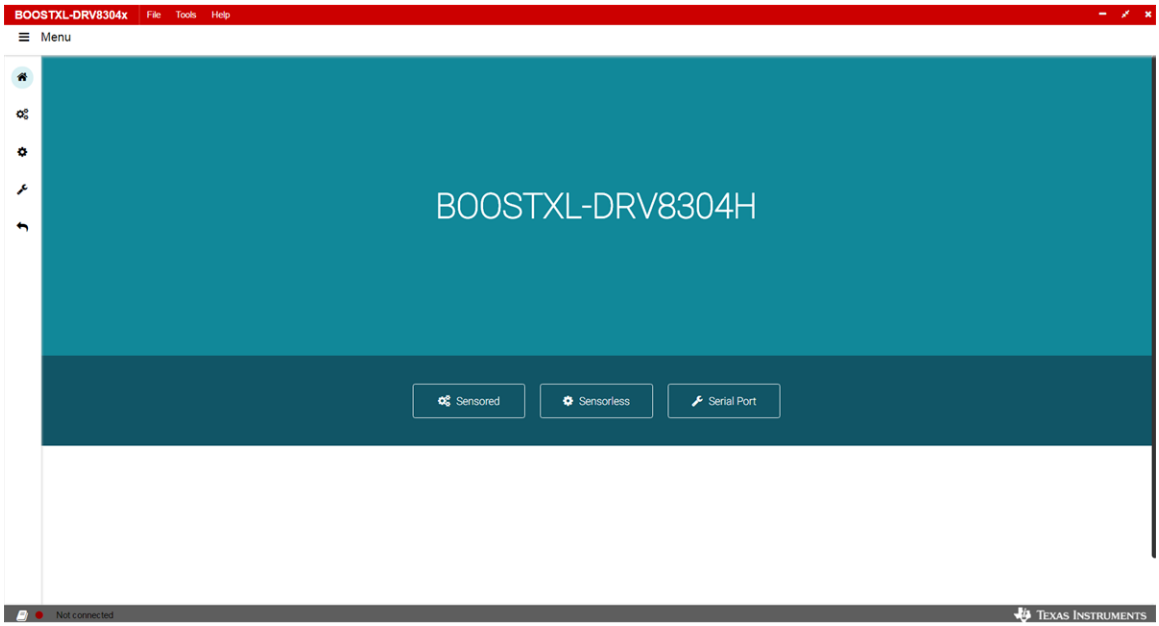

Figure 6. BOOSTXL-DRV8304x EVM GUI (Introduction Page)

Step 10. Registers page

This page shows all the registers and their fields present on the DRV8304 device. The page allows reading and writing any register, field, or bit. Click on the question mark icon on any register or field to get in-place data sheet help.

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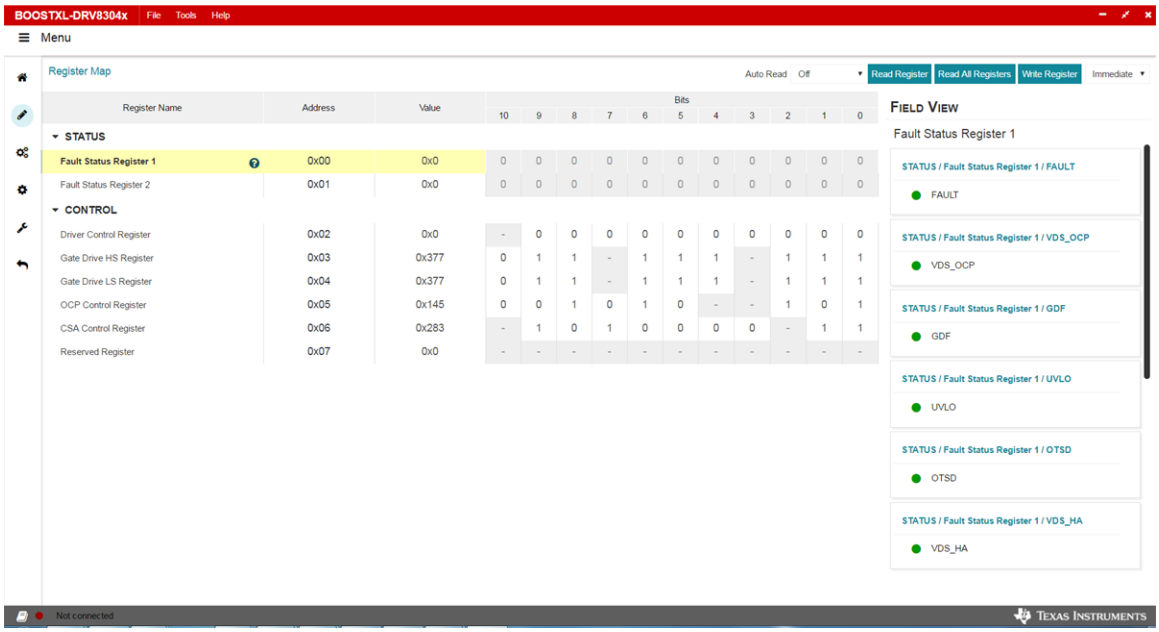

Figure 7. BOOSTXL-DRV8304x EVM GUI (Registers Page)

Step 11. Motor Control pages

Three pages for motor control are available. The appropriate page is automatically selected based on whether the reference firmware is of a Hall sensored or sensorless algorithm. The pages have different widget controls to control the motor and tune the parameters.

- Hall Sensor Page (Motor Control And Tuning)

  This page has different widget controls to control the motor and tune the parameters using the Hall sensored algorithm as shown in Figure 8.

  – Click on the BOOSTXL-DRV8304x EVM Sensored Software User's Guide document link on the top of this page to understand Hall Sensored operation and get details on each of the parameters on this page.

  – Click on the question mark icon available on each of the controls in the GUI to understand operation and range of input values of that particular widget.

  Follow these steps to run the motor with a Hall sensored algorithm (assuming the Hall sensored firmware is downloaded on the LaunchPad™ development kit):

  1. Enable the driver
     1. Click on the *DRIVER ENABLE* button to turn it green.
     2. If necessary, write appropriate values to the registers from the *Register Page*.

     NOTE: When the driver is disabled, the register read-write (R/W) operations are not allowed.

  2. Set the appropriate motor speed.

     Change the percentage of duty cycle value using the *Set Motor Speed* slider. Make sure the set value is greater than or equal to the *Minimum Duty Cycle* value.

  3. Start the motor.

     Click on the *MOTOR ENABLE* button to turn it green.

  4. Use the widgets under *System parameter Controls* to tune the motor.

     When the value of a particular parameter is changed from GUI (by editing the value in any widget by sliding the slider or other editing means), the corresponding change is written to the firmware running on the Launchpad development kit.

  5. Monitor the *Status Report Panel* (FAULT STATUS INDICATOR, Electrical Speed, Current Motor Speed)

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- If any fault is present, the motor stops spinning and the corresponding fault is reported under *FAULT STATUS INDICATOR*.
- Perform necessary actions to come out of the fault. For example, change the motor parameter values related to the fault.

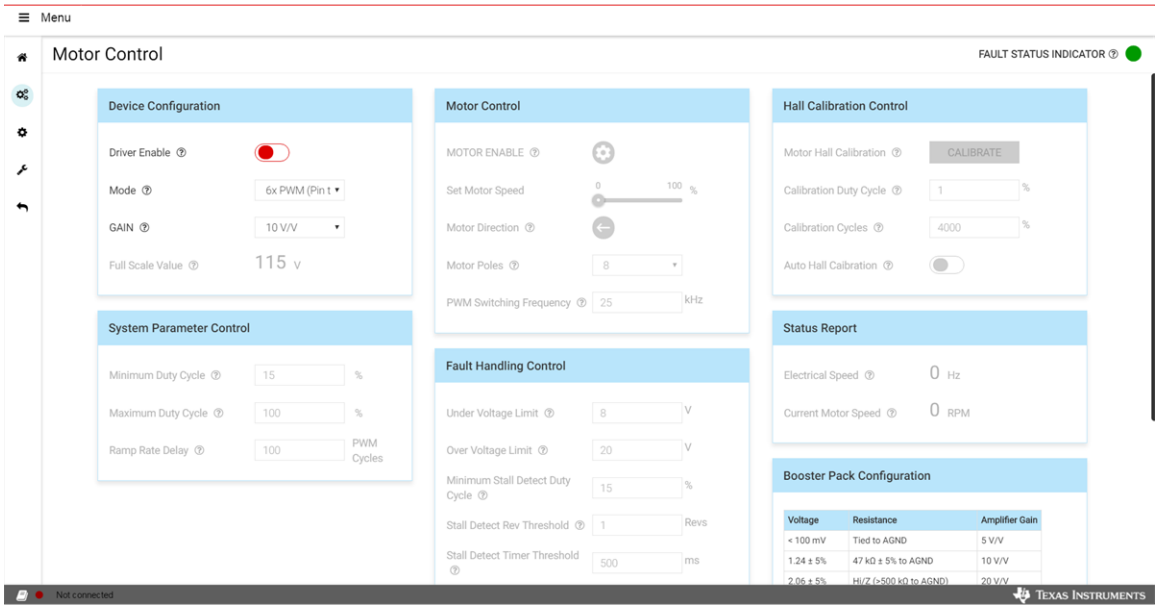

Figure 8. BOOSTXL-DRV8304x EVM GUI - Hall Sensor Page (Motor Control and Tuning)

- Sensorless Page (Motor Control and Tuning)

  This page has different widget controls to control the motor and tune the parameters using the *Sensorless* algorithm as shown in Figure 9.

  – Click on the *BOOSTXL-DRV8304x EVM Sensorless Software User's Guide* document link on the top of this page to understand *Sensorless* operation and get details on each of the parameters on this page.

  – Click on the question mark icon available on each of the controls to understand operation of that particular widget.

  Follow these steps to run the motor using a sensorless algorithm (assuming the sensorless firmware is downloaded on the Launchpad development kit):

  1. Enable the driver
     1. Click on the *DRIVER ENABLE* button to turn it green.
     2. If necessary, write appropriate values to the registers from the *Register Page*.

     NOTE: When the driver is disabled, the register read-write (R/W) operations are not allowed.

  2. Set the appropriate motor speed.

     Change the percentage of duty cycle value using the *Set Motor Speed* slider. Make sure the set value is greater than or equal to the *Minimum Duty Cycle* value.

  3. Start the motor.

     Click on the *MOTOR ENABLE* button to turn it green.

  4. Use the widgets under *System parameter Controls, ISC Control, Motor Align, Open Loop Acceleration Control* and other sections to tune the motor.

     When the value of a particular parameter is changed from the EVM GUI (by editing the value in any widget by sliding the slider or other editing means), the corresponding change is written to the firmware running on the Launchpad development kit.

  5. Monitor the *Status Report Panel* (FAULT STATUS INDICATOR, Electrical Speed, Current

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Motor Speed)

- If any fault is present, the motor stops spinning and the corresponding fault is reported under *FAULT STATUS INDICATOR*.
- Perform necessary actions to come out of the fault. For example, change the motor parameter values related to the fault.

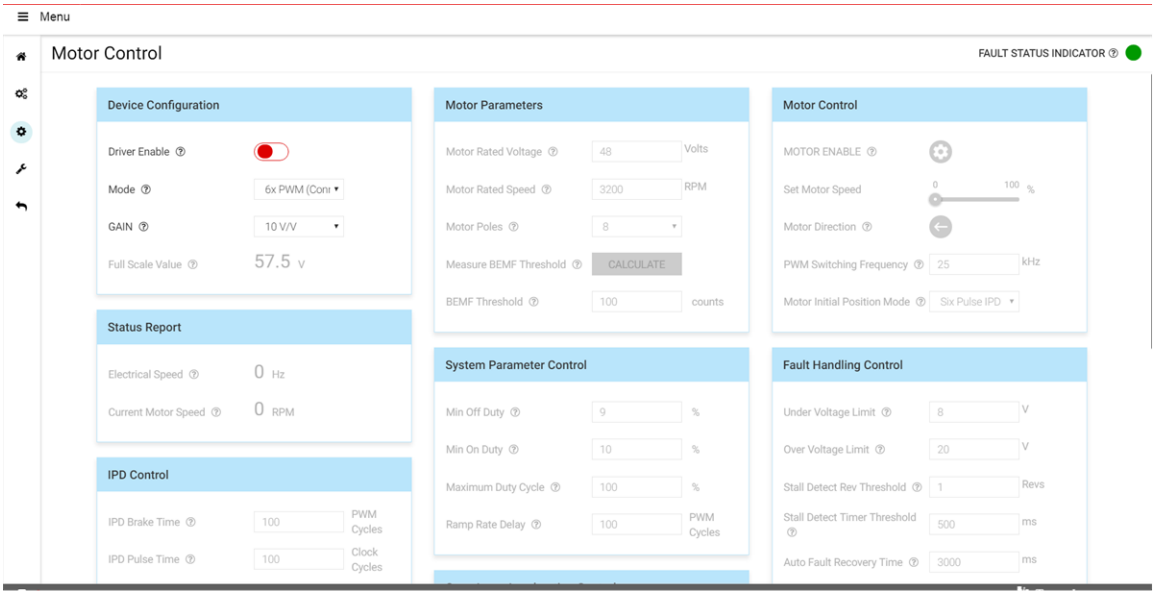

Figure 9. BOOSTXL-DRV8304x EVM GUI - Sensorless Page (Motor Control and Tuning)

Step 12. Toolbar options

The following toolbar options are available on the top of the GUI.

- File—Different options in this menu are available to load and save from and to a JSON file respectively: the register values on the register page, sensored motor control settings, and sensorless motor control settings

NOTE: The user can save (and load) a particular configuration of the registers and the *Motor Control* parameters (as set on the *Motor Control* pages). This feature can also be used when no actual EVM is connected to the computer.

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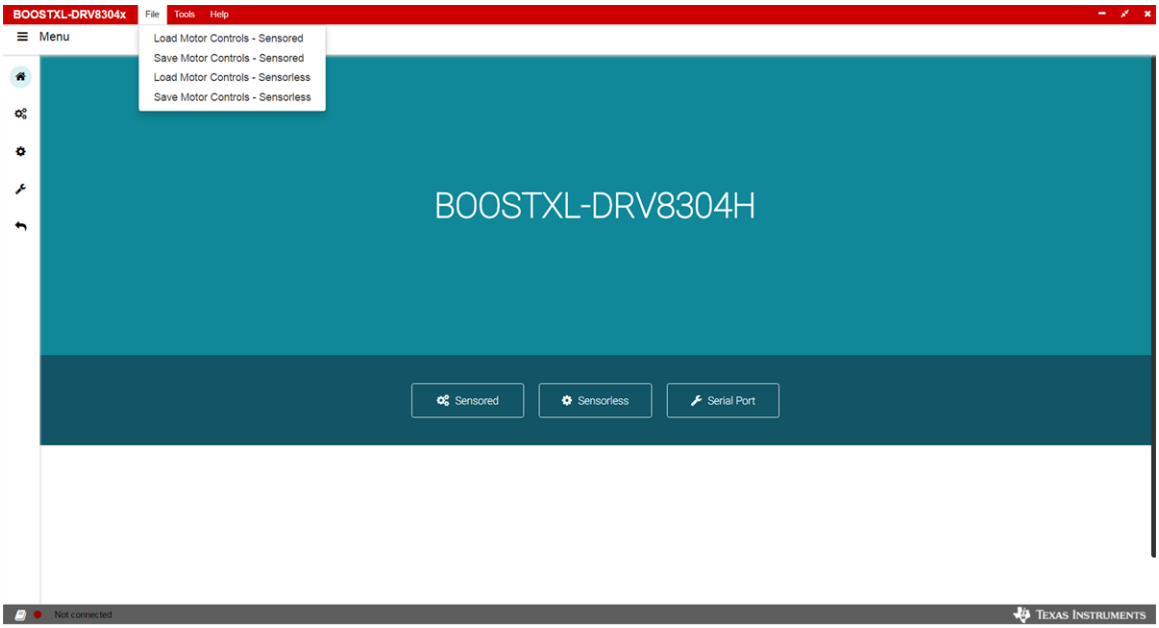

Figure 10. BOOSTXL-DRV8304x EVM GUI (File Toolbar Menu)

- Tools—The only available option in this menu is to open a log page at the bottom of the GUI which shows different logs: information, warning, error, debug.

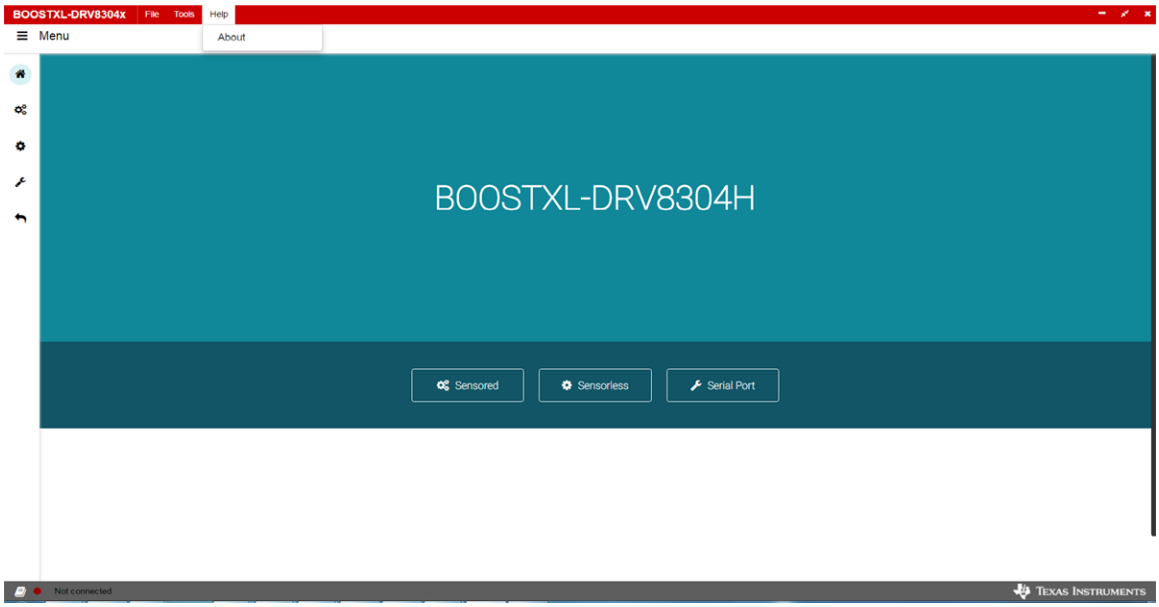

Figure 11. BOOSTXL-DRV8304x EVM GUI (Tools Toolbar Menu)

- Help—This menu shows the information on this GUI application under the *About* option.

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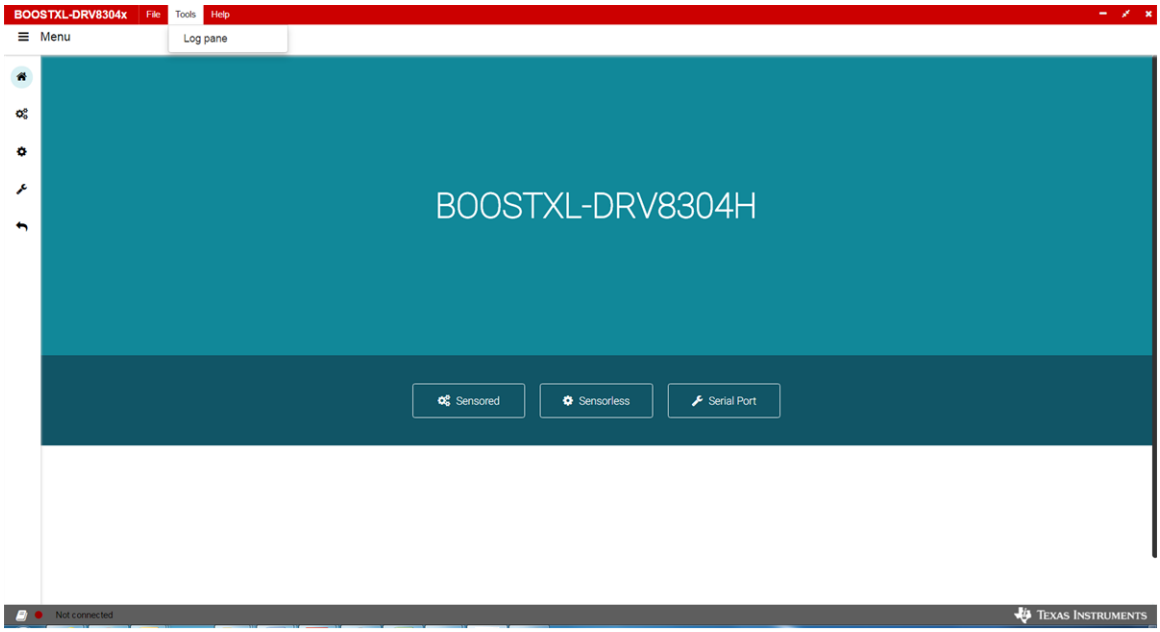

Figure 12. BOOSTXL-DRV8304x EVM GUI (Help Toolbar Menu)

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