

## **DRV8343x-Q1EVM GUI User's Guide**

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This document is provided with the DRV8343H-Q1EVM and DRV8343S-Q1EVM (DRV8343x-Q1EVM) customer evaluation modules (EVMs) as a supplement to the [DRV8343-Q1 Automotive 5.5 to 60-V Three-Phase Smart Gate Driver With Three Integrated Current-Shunt Amplifiers data sheet](#). This user's guide details how to use the DRV8343x-Q1EVM 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 DRV8343x-Q1EVM:

- DRV8343x-Q1EVM
- Three-phase BLDC motor, single-phase brushed motors, or solenoid loads
- Voltage supply from 6 V to 60 V
- Jumper wires (for connections)
- DRV8343x-Q1EVM reference software development package
- Code Composer Studio™ software V.6.0 and above

For additional details on hardware connections refer to the [DRV8343H-Q1EVM and DRV8343S-Q1EVM User's Guide](#).

This document only describes the installation and usage of the DRV8343x-Q1EVM GUI.

## 2 GUI Application

### 2.1 Installation

Follow these steps to install the DRV8343x-Q1EVM application:

Step 1. Install the GUI.

Download and run the installer file, *DRV8343-Q1x-0.1.0\_EVM\_GUI.exe*, to install the GUI application.

Step 2. Download the latest FTDI drivers from <http://www.ftdichip.com/Drivers/VCP.htm> to enable the USB communication from the GUI to the DRV8343x-Q1 EVM board. From the FTDI webpage, obtain the latest VCP windows driver executable.

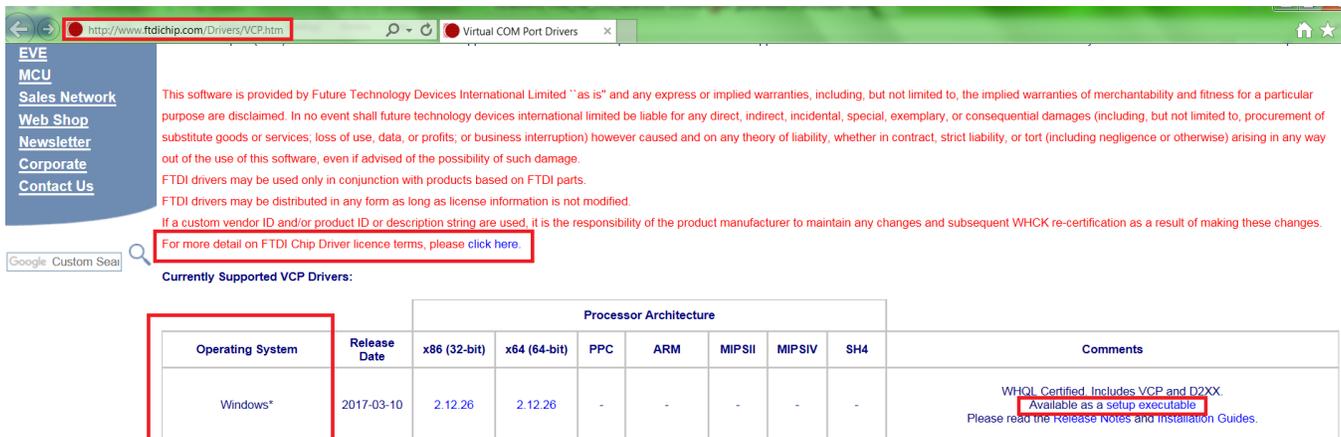


Figure 1. FTDI Driver Installation

### 2.2 Using DRV8343x-Q1EVM GUI

The DRV8343x-Q1EVM GUI along with DRV8343x-Q1EVM facilitates control of a three-phase brushless DC motor, multiple single-phase motors, or a combination of loads depending on the hardware setting of the EVM board and the corresponding firmware uploaded to the microcontroller unit (MCU) of the DRV8343x-Q1EVM.

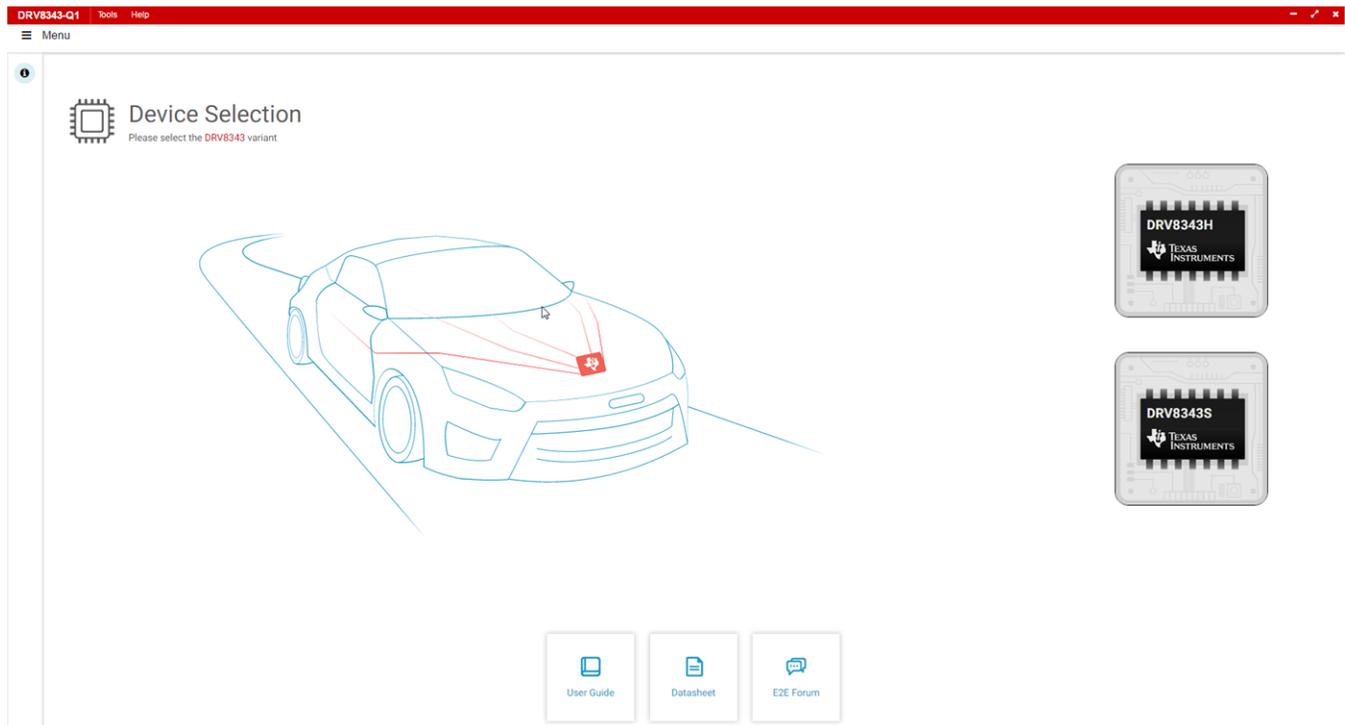
For each configuration of the DRV8343x-Q1EVM the loads are controlled using various widgets and settings. For example, the DRV8343x-Q1EVM GUI provides functionality for adjusting the speed and direction of the motor, adjusting various parameters such as voltage and current protection, monitoring the device fault status, and running diagnostics through the open-load detection architecture.

To learn more about the different modes of operation of the DRV8343x-Q1EVM along with the DRV8343x-Q1EVM GUI refer to the following documents:

- Texas Instruments, [DRV8343x-Q1 Sensored Software User's Guide](#)
- Texas Instruments, [DRV8343x-Q1 Sensoreless Software User's Guide](#)
- Texas Instruments, [DRV8343x-Q1 Independent Mode Software User's Guide](#)

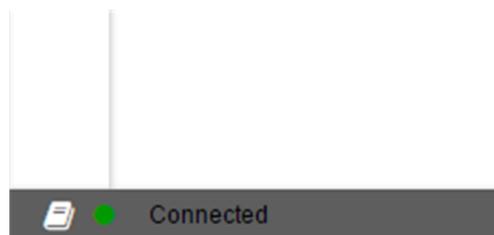
Use the steps that follow to get started with the GUI:

- Step 1. Attach the motor to the output connectors of the DRV8343x-Q1EVM.
- Step 2. Plug in the micro-USB cable to the PC.
- Step 3. Enable the motor power supply. For more information on hardware connections refer to the [DRV8343H-Q1EVM and DRV8343S-Q1EVM User's Guide](#).
- Step 4. Click on DRV8343x-Q1EVM GUI shortcut either on the desktop or from the start menu to run the GUI application.
- Step 5. Select the device variant to be used in the launch page shown in [Figure 2](#).



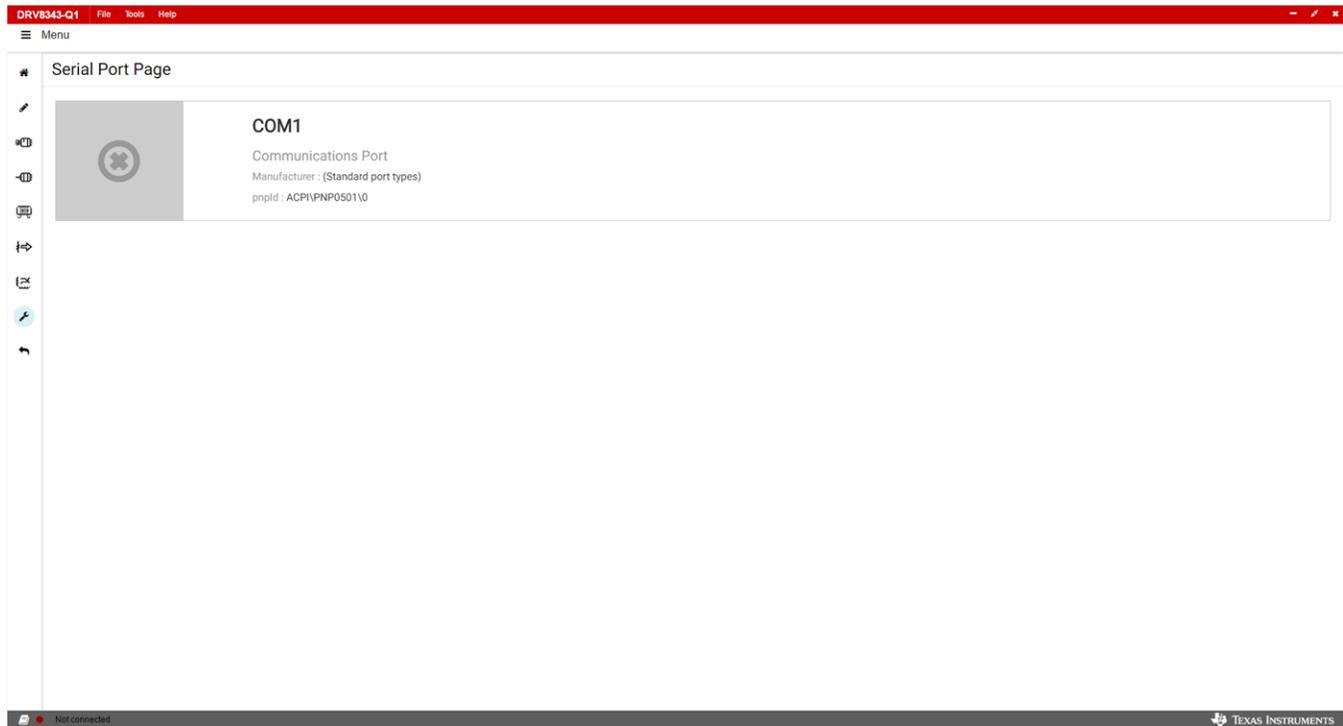
**Figure 2. DRV8343x-Q1EVM GUI (Launch Page)**

- Step 6. Make sure to launch the correct device that matches the target device.
- Step 7. The first matching device (device supported by the application for the selected device variant) that gets connected to the PC will be auto connected. If multiple devices are connected, go to the Serial Port page to manually select an available COM port.
- Step 8. When the GUI connects successfully, the status shown in [Figure 3](#) is displayed. The bottom-left corner of the status bar displays a green indicator to indicate the connection is successful.



**Figure 3. DRV8343x EVM GUI (Correct Connection)**

If the launched device does not match the target device on the DRV8343xQ1EVM, the serial port page will show the COM port disconnected as shown in [Figure 4](#).



**Figure 4. DRV8343x-Q1EVM GUI (Serial Port Page Showing the Required Friendly Name)**

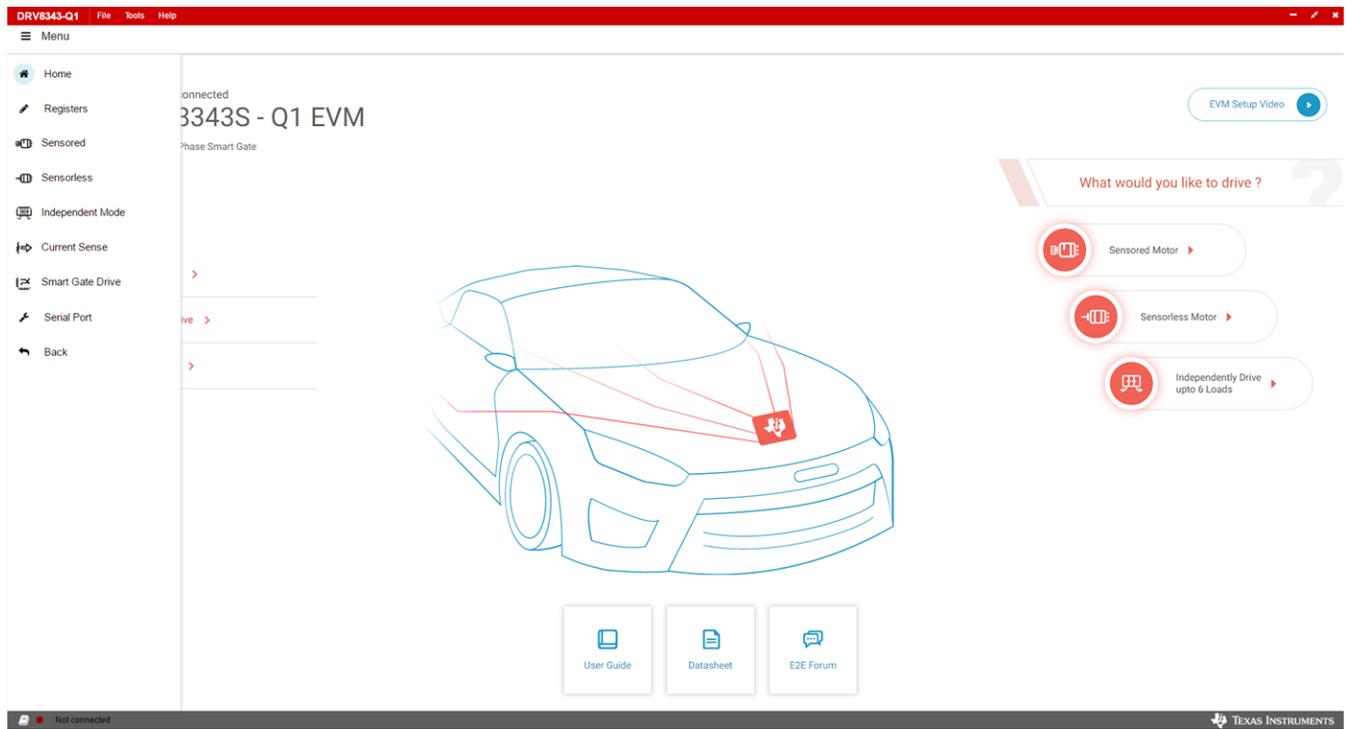
If nothing is physically connected to the PC, -- *No Device Connected* -- will be displayed.

Step 9. Click on the menu button on the top-left corner of the GUI to open the side-bar menu.

Step 10. 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
- Registers
- Sensored
- Sensorless
- Independent Mode
- Current Sense (Only for S variant)
- Smart Gate Drive (Only for S variant)
- Serial Port
- Back

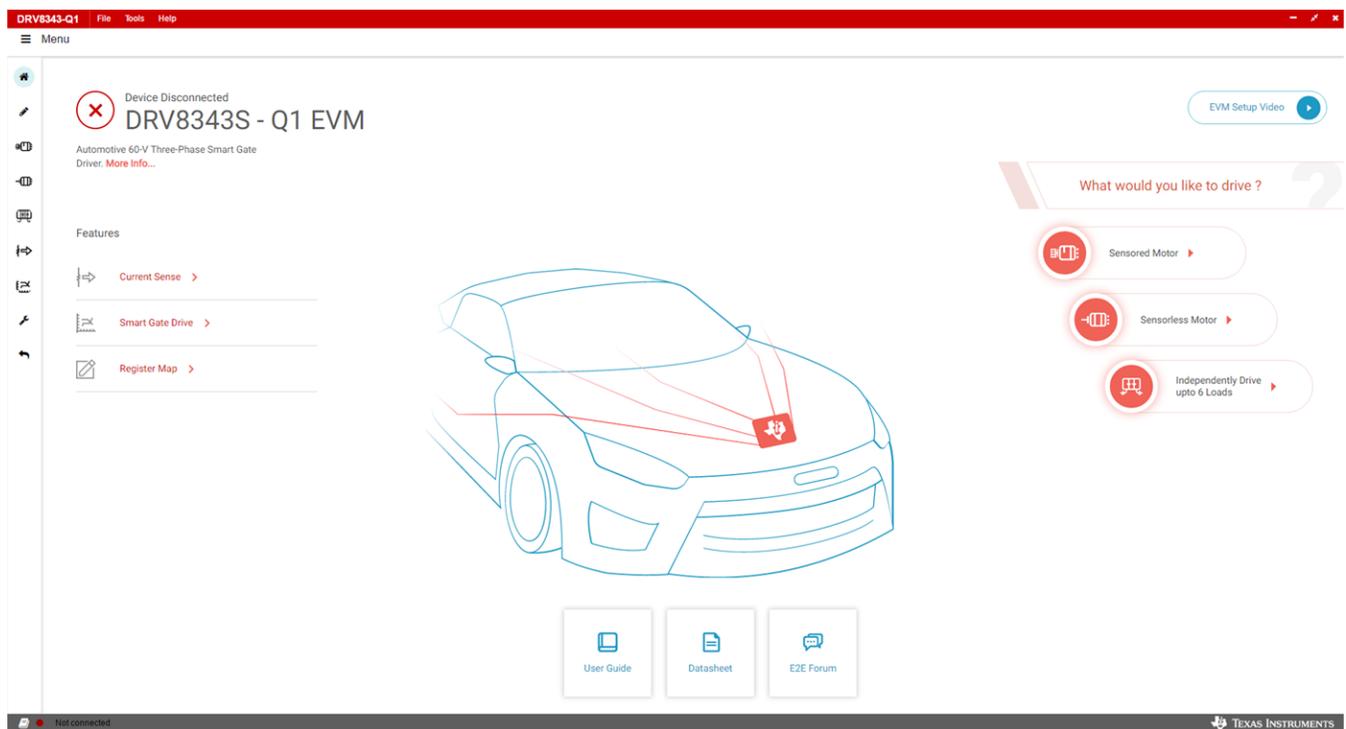
When the microcontroller is flashed with one of three provided firmware, only the options corresponded to that particular firmware appear in the menu.



**Figure 5. DRV8343x-Q1EVM GUI (Menu)**

Step 11. Introduction page

Click the home icon to go to the Introduction page.



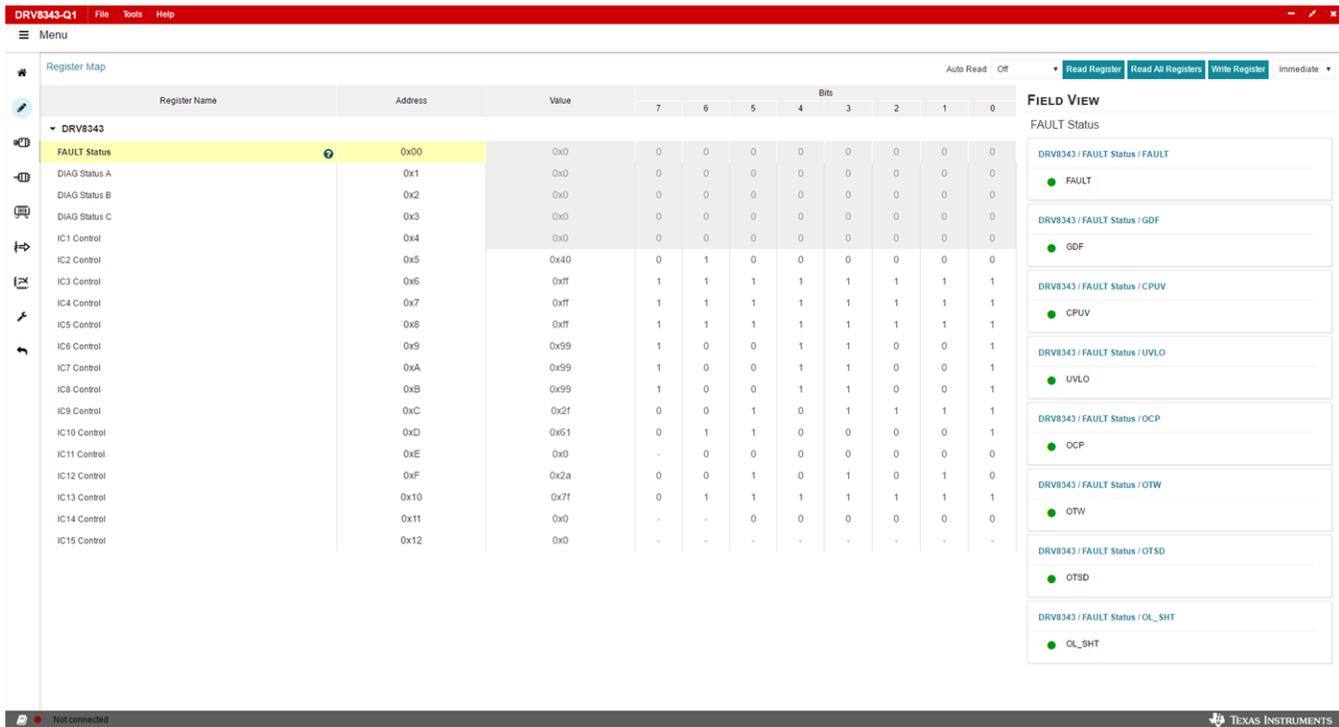
**Figure 6. DRV8343x-Q1EVM GUI (Introduction Page)**

The Introduction page has the general information about the DRV8343x-Q1EVM device and links for their collaterals.

### Step 12. Registers page

The Registers page shows all the registers and their fields present on the DRV8343-Q1 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.

**NOTE:** The H device variants do not have the Register Page



**Figure 7. DRV8343x-Q1EVM GUI (Registers Page)**

### Step 13. Motor Control pages

Three pages for motor control are available. The appropriate page is automatically selected based on whether the reference firmware on the DRV8343x-Q1EVM is sensed, sensorless, or independent mode algorithm. The pages have different widget controls for controlling and tuning the motor and setting parameters.

- Hall Sensored 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 *DRV8343x-Q1EVM 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 the Hall sensed algorithm:

1. Follow the steps in [Section 2.1](#) and the DRV8343x-Q1EVM user's guide to correctly install the sensed project to the microcontroller.
2. When the GUI is on the Sensored Control page, enable the driver by following these steps:
  1. Click on the *ENABLE DRIVER* 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.

3. 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.

4. Start the motor.

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

5. Use the widgets under *Sensored Tuning* 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 microcontroller.

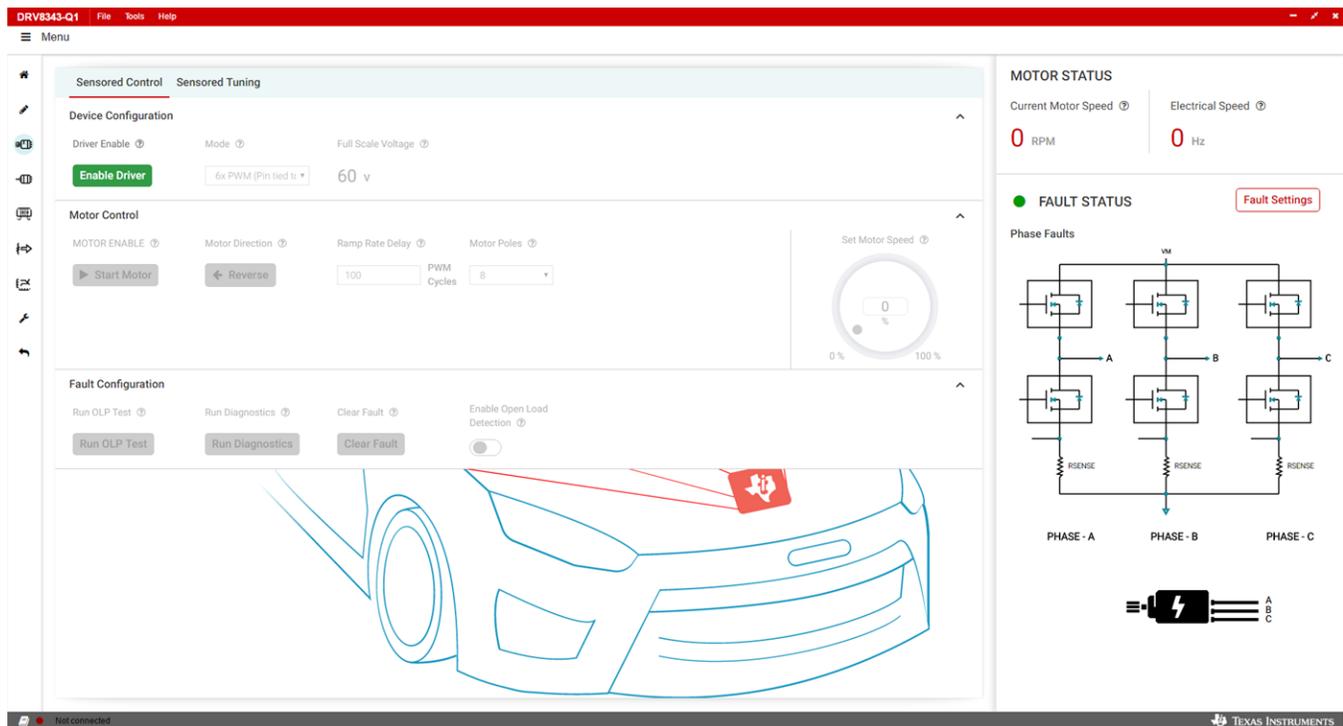
6. Monitor the right side panel *MOTOR STATUS* and *FAULT STATUS* to monitor the electrical speed, current motor speed, and any faults present.

- If any fault is present, the motor stops spinning and the corresponding fault is reported under the *FAULT STATUS* section.
- Perform the required actions to come out of the fault. For example, change the motor parameter values related to the fault.
- For most cases, monitoring the *Phase Faults* diagram locates the actual error.

7. To run the open load diagnostics, click the *Run OLP Test* button.

8. Click the *Run Diagnostics* button to update the status in the *Phase Faults* diagram.

9. Click the *Clear Fault* button to make the firmware try clearing a fault.



**Figure 8. DRV8343x-Q1EVM 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 *DRV8343x-Q1EVM 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 with the sensorless algorithm:

1. Follow the steps in [Section 2.1](#) and the DRV8343x-Q1EVM user's guide to correctly install the sensed project to the microcontroller.
2. When the GUI is on the Sensorless Control page, enable the driver by following these steps:
  1. Click on the *ENABLE DRIVER* button to turn it green.
  2. If necessary, write appropriate values to the registers from the *Register Page*.

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

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3. 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.

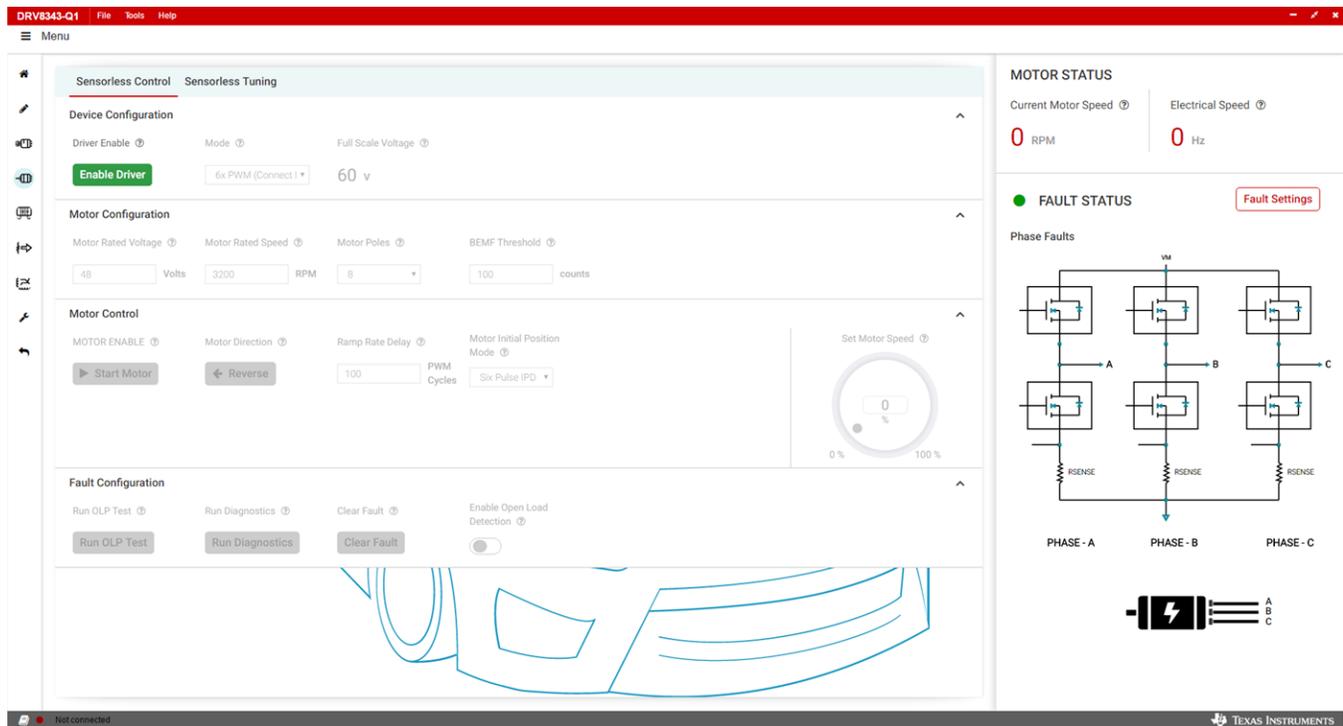
4. Start the motor.

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

5. Under the *Sensorless Tuning* page, use the widgets under *System parameter Controls*, *IPD Control*, *Open Loop Acceleration Control*, and *Closed Loop Acceleration Control* 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 microcontroller.

6. Monitor the right side panel *MOTOR STATUS* and *FAULT STATUS* to monitor the electrical speed, current motor speed and any faults present.
  - If any fault is present, the motor stops spinning and the corresponding fault is reported under *FAULT STATUS* section.
  - Perform the required actions to come out of the fault. For example, change the motor parameter values related to the fault.
  - For most cases, monitoring the *Phase Faults* diagram locates the actual error.
7. To run the open load diagnostics, click the *Run OLP Test* button.
8. Click the *Run Diagnostics* button to update the status in *Phase Faults* diagram.
9. Click the *Clear Fault* button to make the firmware try clearing a fault.



**Figure 9. DRV8343x-Q1EVM GUI - Sensorless Page (Motor Control and Tuning)**

#### Step 14. Independent Mode Page

This page has different widget controls to control one or more motors or loads such as solenoids using the independent mode algorithm as shown in [Figure 10](#).

- Click on the DRV8343x-Q1EVM Independent Software User's Guide document link on the top of this page to understand independent mode 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 required load or loads using Independent Mode algorithm:

1. Follow the steps in [Section 2.1](#) and the DRV8343x-Q1EVM user's guide to correctly install the independent mode project to the microcontroller.
2. Select the appropriate mode. Depending on the required mode, modification to the DRV8343x-Q1EVM board will be required. Refer to the [DRV8343x-Q1EVM Independent Mode software User's Guide](#) to understand all the configurations and controls available.
3. Configure the hardware based on the instruction provided in the following pages for all the phases.
4. When the hardware is configured for all the phases the high level control pages will appear.
5. When the GUI is on the Independent Mode Control page, enable the driver by following these steps:
  1. Click on the *ENABLE DRIVER* button to turn it green.
  2. If necessary, write appropriate values to the registers from the *Register Page*.

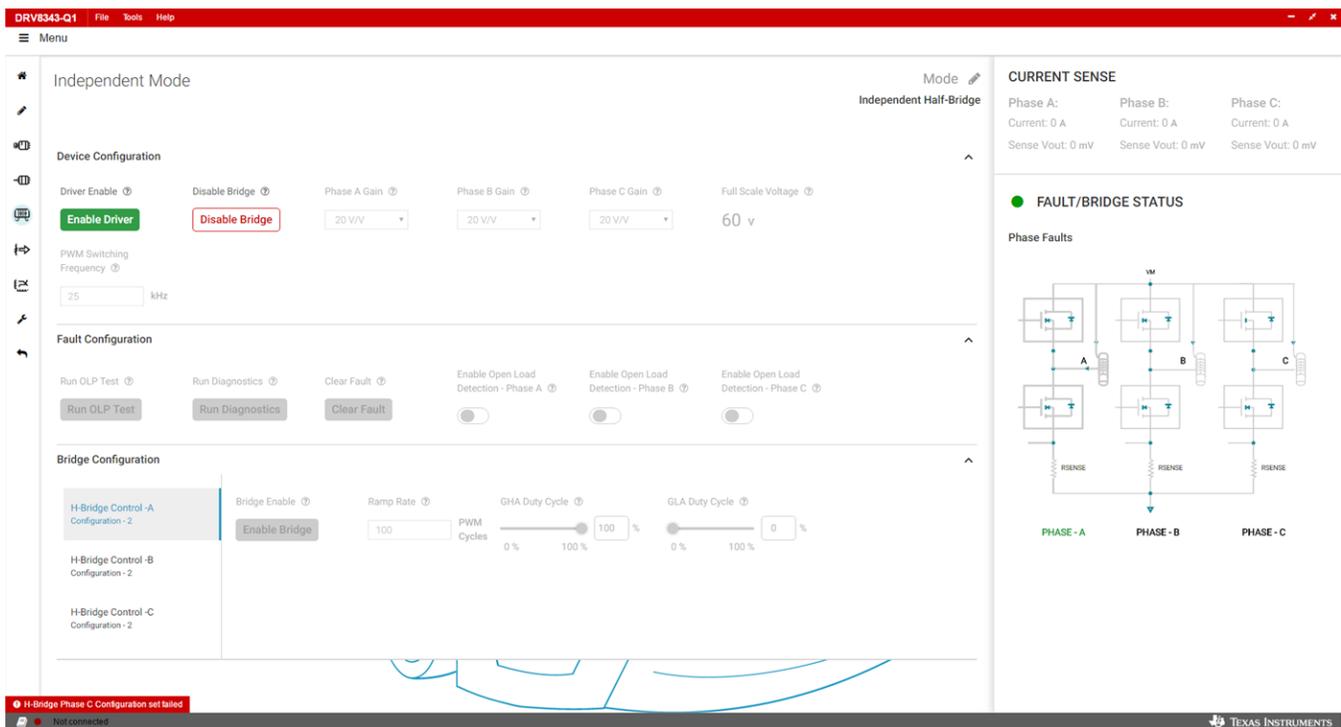
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**NOTE:** When the driver is disabled, the register read-write (R/W) operations are not allowed.

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6. Enable the half-bridge or independent FET as required.
7. Configure the ramp rate and duty cycles for the half-bridge or independent FET as necessary.
8. Monitor the phase current and phase sense voltage of each phase in the *Current Sense* panel.
9. Monitor the right side panel, *FAULT/BRIDGE STATUS*, for any faults present.

- If any fault is present, the motors or loads will stop driving and the corresponding fault is reported under the *FAULT STATUS* section.
  - Perform the required actions to come out of the fault. For example, change the motor parameter values related to the fault.
  - For most cases, monitoring the *Phase Faults* diagram locates the actual error.
10. To run the open load diagnostics, click the *Run OLP Test* button
    1. The *Phase Faults* diagram may show some false fault under independent mode.
    2. Refer to the DRV8343x-Q1 data sheet to understand under what modes the diagnostics of this part are not supported.
  11. Click the *Run Diagnostics* button to update the status in the *Phase Faults* diagram.
  12. Click the *Clear Fault* button to make the firmware try clearing a fault.



**Figure 10. DRV8343x-Q1EVM GUI – Independent Mode Page**

**Step 15. Current Sense Page**

The DRV8343x-Q1EVM monitors the current through three integrated low-side current sense amplifiers. All three amplifiers can be used to sense the current in each of the half-bridge sides. Through the GUI Current Sense page, the gain, offset calibration, unidirectional or bidirectional current sense can be controlled as shown in [Figure 11](#).

- Click on the question mark icon available on each of the controls to understand operation of that particular widget.
  1. Select between unidirectional and bidirectional mode.
  2. Configurations can be done in the *Current Sense Settings* panel.
  3. Monitor the phase current and phase sense volt of each phase in the *Current Sense* panel when independent mode is selected.

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**NOTE:** This panel will be visible only if the connected device is in independent mode.

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4. Monitor the *Fault Status* panel.
  1. If any fault is present, the motor stops spinning and the corresponding fault is reported under the *FAULT STATUS* section.

2. Perform the required actions to come out of the fault. For example, change the motor parameter values related to the fault.
5. To run the open load diagnostics, click the *Run OLP Test* button.
6. Click the *Run Diagnostics* button to update the status in the *Phase Faults* diagram.
7. Click the *Clear Fault* button to make the firmware try to clear the fault.

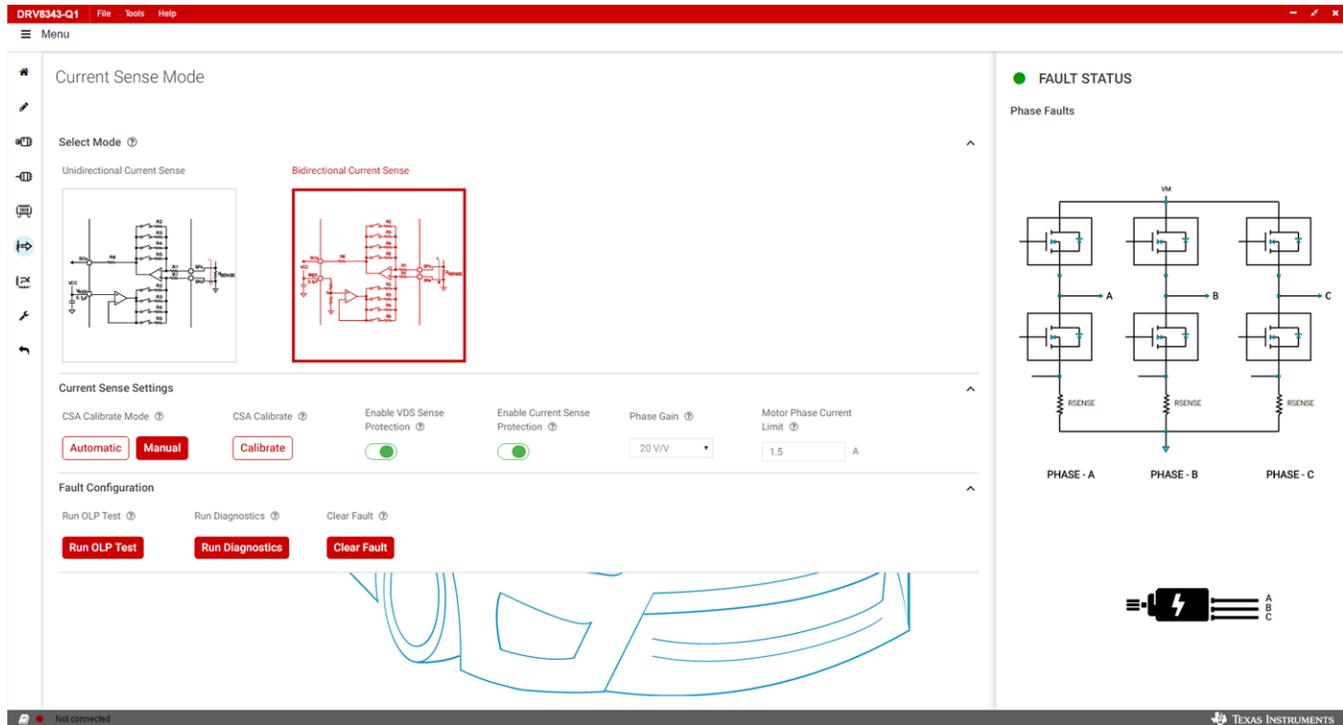


Figure 11. DRV8343x-Q1EVM GUI – Current Sense Mode Page

### Step 16. Smart Gate Drive Page

The DRV8343x-Q1EVM Smart Gate Drive architecture supports up to 1-A source and 2-A sink peak gate drive current capability. The Smart Gate Drive GUI page provides the ability to dynamically adjust the output gate-drive current strength allowing for the gate drivers to control the power MOSFET VDS switching speed. Through the GUI Smart Gate Drive page, the IDRIVE, TDRIVE, and dead time settings can be adjusted for all three half-bridges as shown in Figure 12.

- Click on the question mark icon available on each of the controls to understand operation of that particular widget.
- For a demonstration of Smart Gate Drive operation, see the Smart Gate Drive video provided with the GUI.
- For more information on Smart Gate Drive architecture refer to the introduction page explanation.
  1. Select the *Device Configuration* panel.
  2. The graph will change according to the values set for the above controls.
  3. Monitor the *Fault Status* panel.
    1. If any fault is present, the motor stops spinning and the corresponding fault is reported under the *FAULT STATUS* section.
    2. Perform the required actions to come out of the fault. For example, change the motor parameter values related to the fault.
  4. To run the open load diagnostics, click the *Run OLP Test* button.
  5. Click the *Run Diagnostics* button to update the status in the *Phase Faults* diagram.
  6. Click the *Clear Fault* button to make the firmware try to clear the fault.

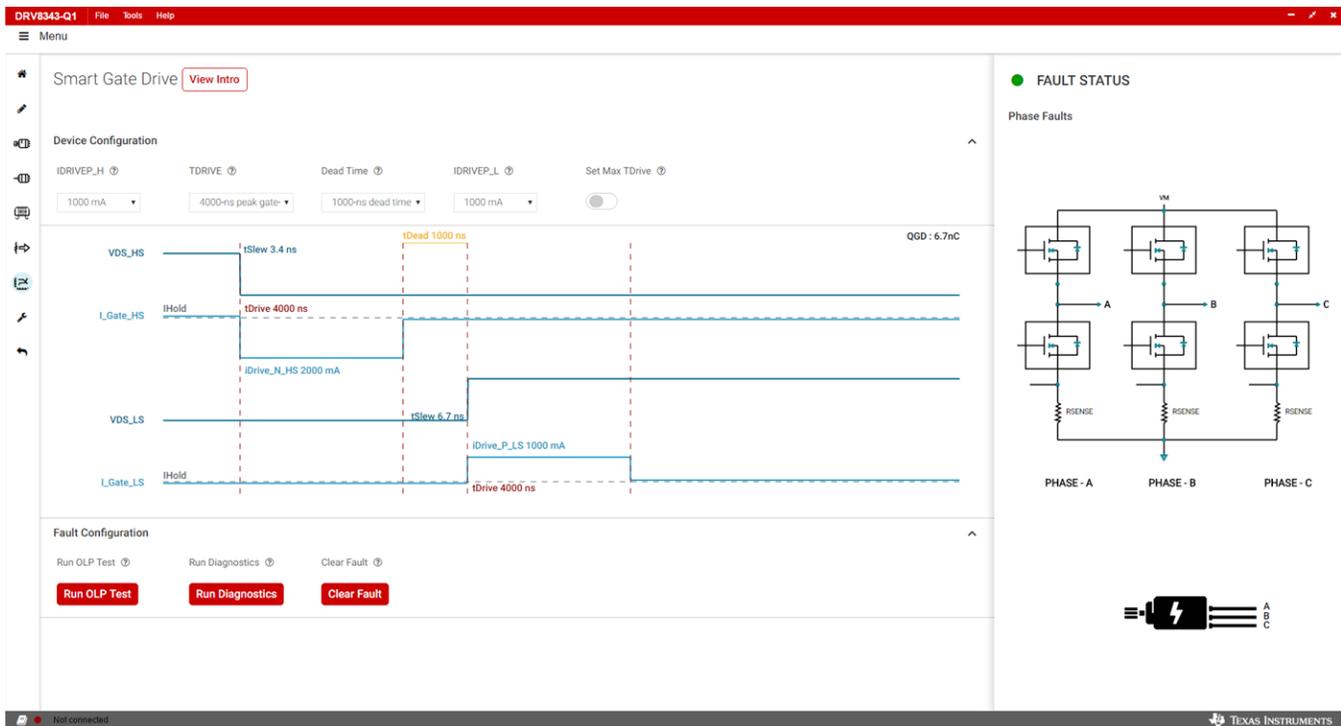


Figure 12. DRV8343x-Q1EVM GUI – Smart Gate Drive Page

Step 17. 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, sensed motor control settings, sensorless motor control settings, and independent mode motor control settings as shown in Figure 13.

**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.

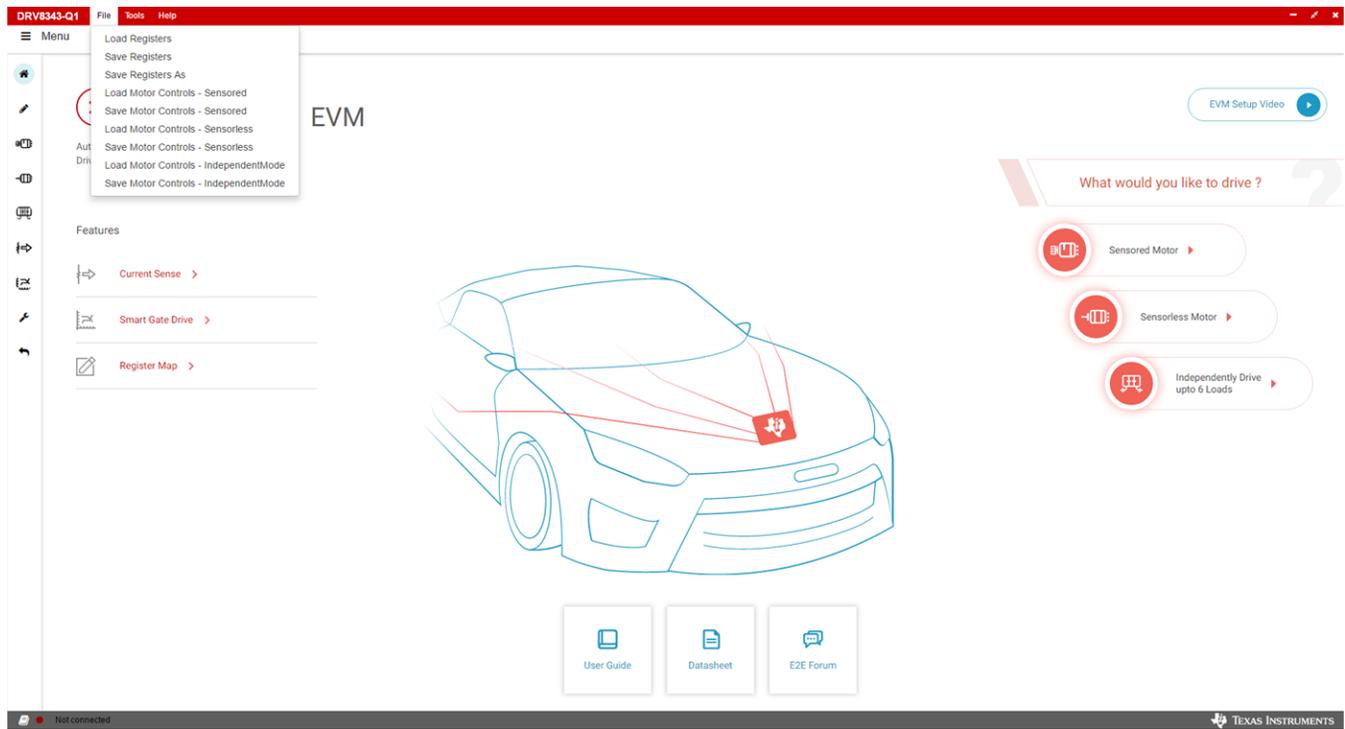


Figure 13. DRV8343x-Q1EVM GUI (File Toolbar Menu)

- 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.

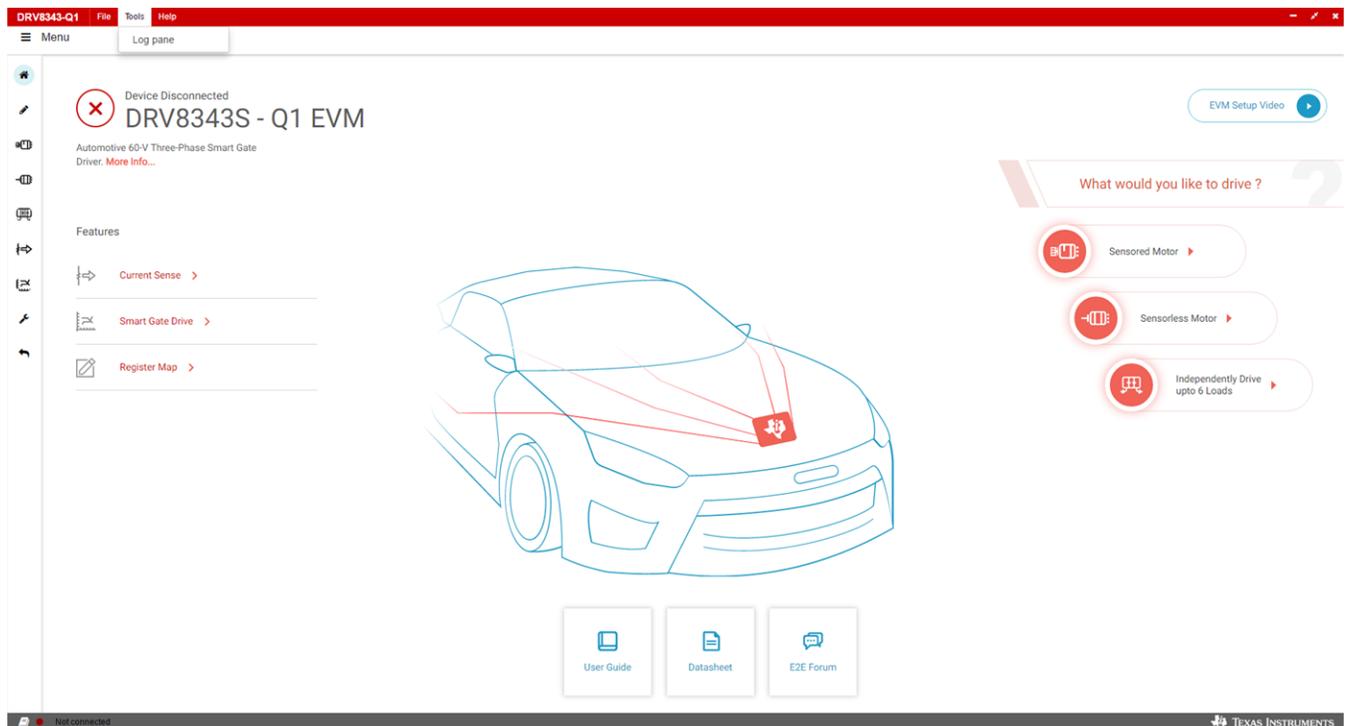


Figure 14. DRV8343x-Q1EVM GUI (Tools Toolbar Menu)

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

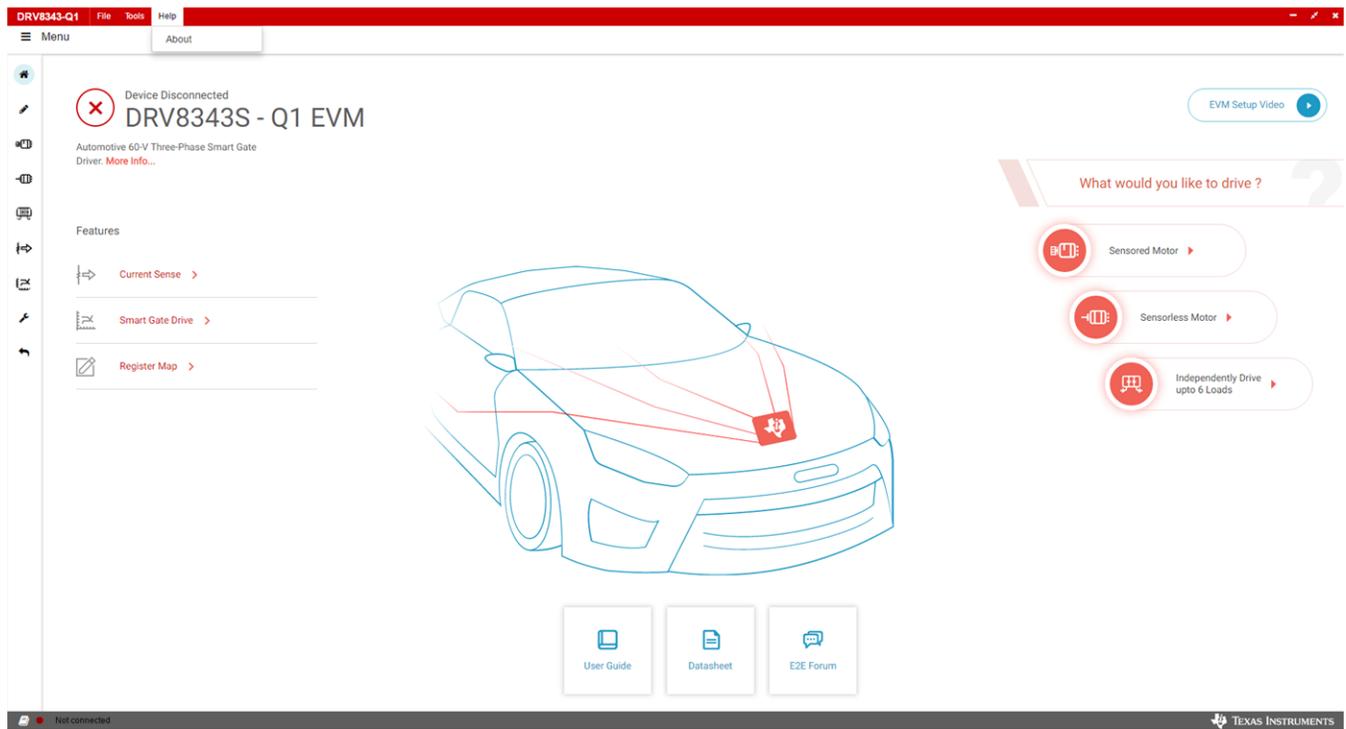


Figure 15. DRV8343x-Q1EVM GUI (Help Toolbar Menu)

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