DRV8703D-Q1 EVM User's Guide

1 DRV8703D-Q1-EVM

This user's guide is provided with the DRV8703D-Q1 customer evaluation module (EVM) as a supplement to the DRV8703D-Q1 data sheet. This document details the hardware implementation of the EVM and how to use DRV8703D-Q1 EVM GUI application.

1.1 Board Overview

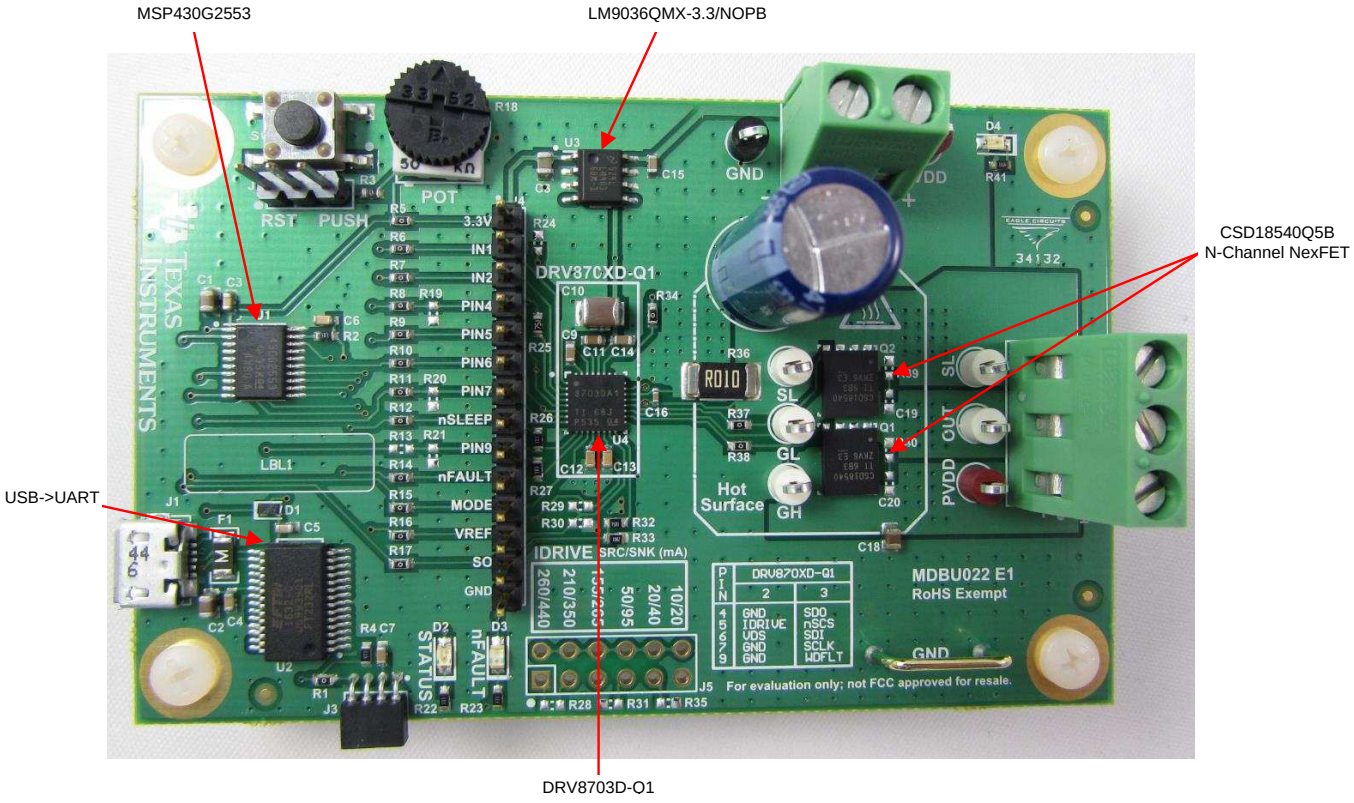

Figure 1. Board Components

WARNING

Hot surfaces include the power MOSFETs (Q1-Q2), power sense resistor R36, and areas around them.

The DRV8703D-Q1 EVM serves as an evaluation kit to demonstrate TI's DRV8703D-Q1 half-bridge gate driver in a 3.5-in × 2.2-in compact form factor. An MSP430G2553 device is used to control the speed and direction of the motor, while also monitoring the motor current from the DRV8703D-Q1 device. The power stage is created using the DRV8703D-Q1 half-bridge gate driver and the CSD18540Q5B N-channel NexFET™ power MOSFETs. The EVM is a high-performance, power-efficient, and cost-effective platform that speeds development for a quicker time to market.

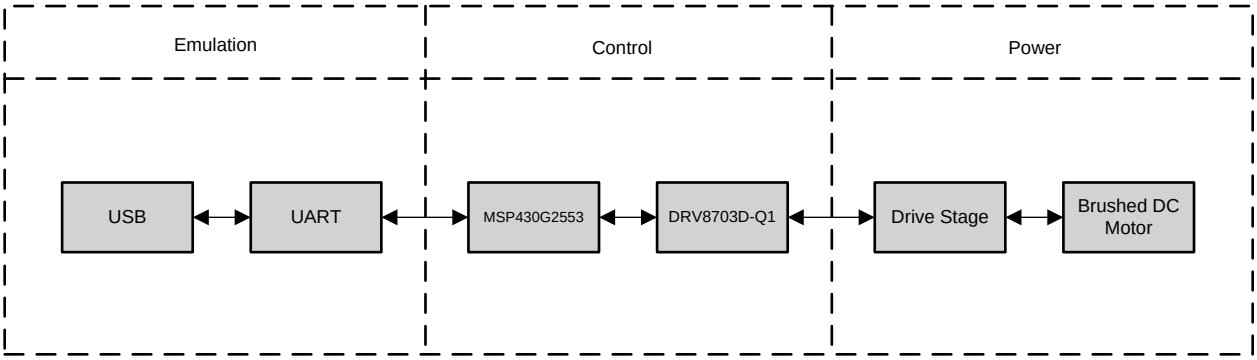

Figure 2. Block Diagram

1.2 Jumper Settings and Test Points

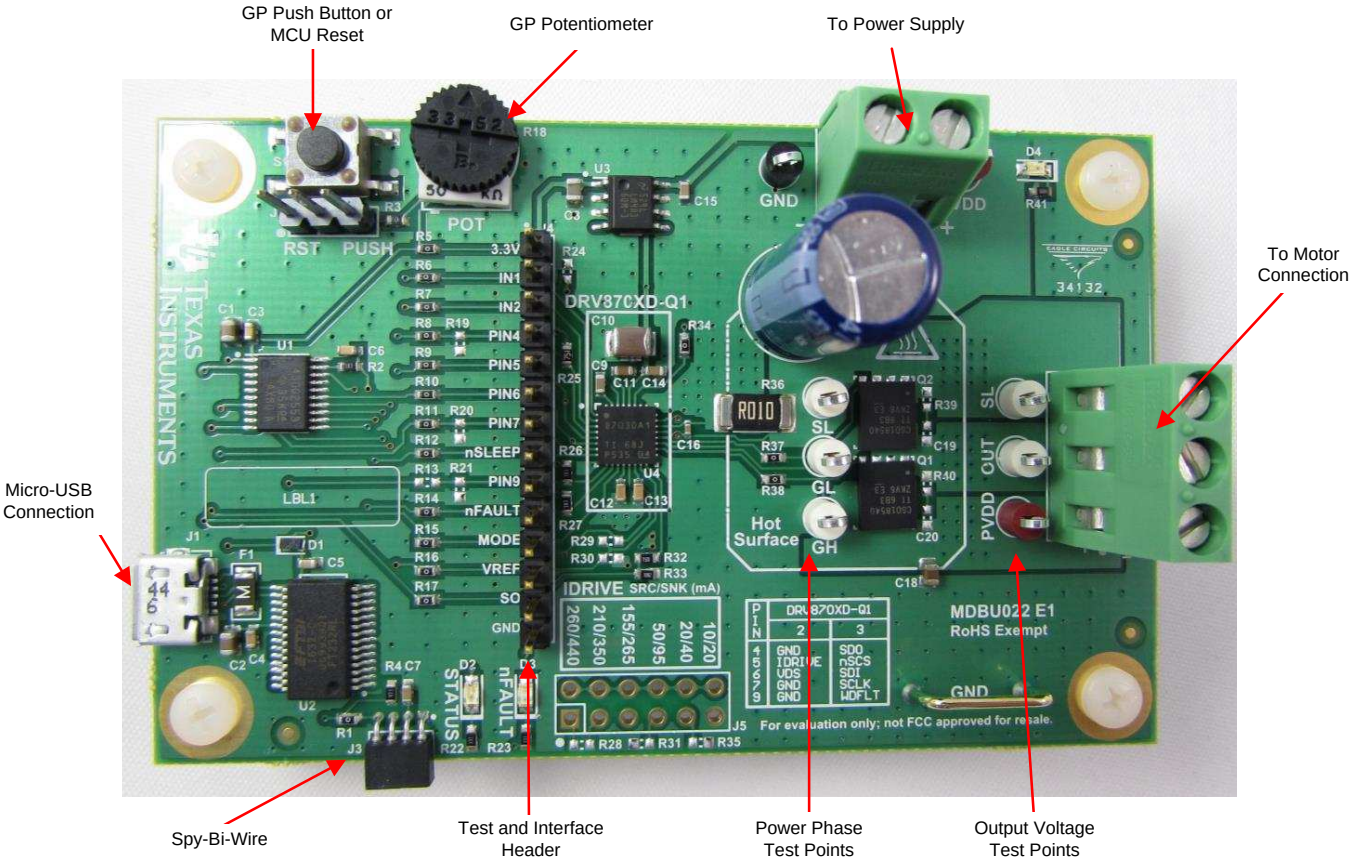

Figure 3. Board Jumpers and Test Points

The jumper settings and test points are as follows:

micro-USB (J1) — Use J1 to interface to a micro-USB cable used to download a program to the MSP430™ MCU memory and run it.

GP Push Button or MCU Reset (J2) — Set J2 to RESET for MCU reset functionality or PUSH for general-purpose input functionality.

Spy-Bi-Wire (J3) — J3 is for a serialized JTAG protocol used for MSP430 MCUs. J3 can connect an MSP430 Spy-Bi-Wire male header to this female header. It can be used to program the MSP430™ MCU on the EVM instead of using the USB-to-JTAG interfaces.

Test and Interface Header (J4) — J4 can be used to monitor input or output signals from the EVM or supply external control signals.

Power Phase Test Pinouts — These pinouts are used to measure the single H-bridge node voltages.

To Motor — Three-port bulk header to connect the brushed DC motor.

To Power Supply — Two-port power-supply bulk header. This header accepts supplies from 5.9 V to 45 V.

2 GUI Application

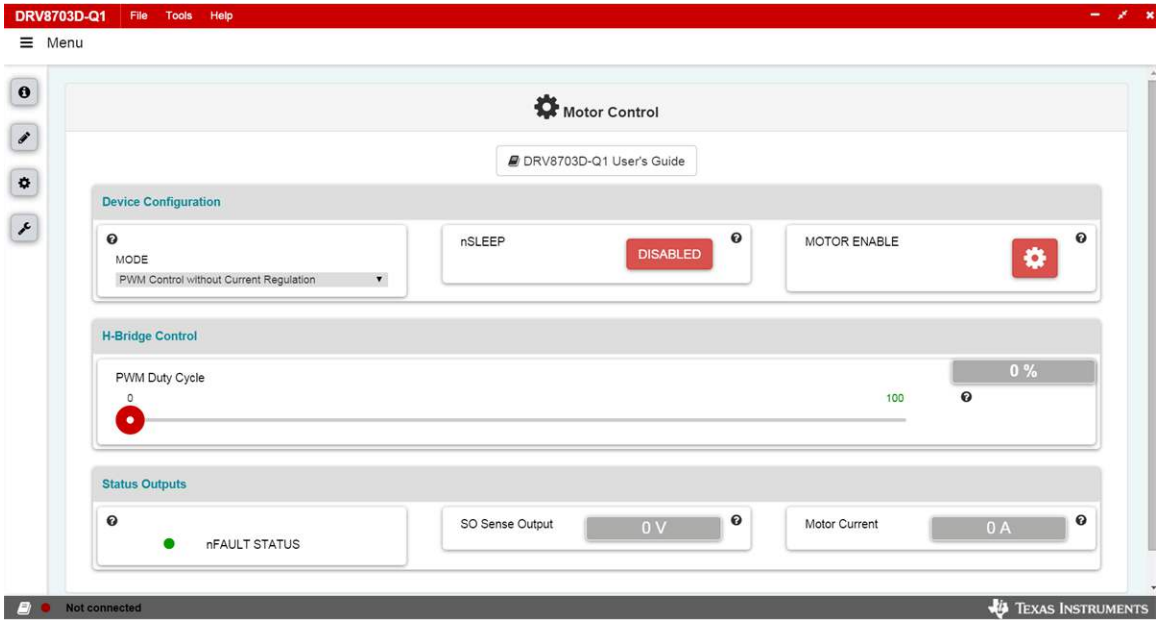

Figure 4. DRV8703D-Q1-EVM GUI (Motor Control Page)

2.1 Installation

Follow these steps to get started:

Step 1. Install the GUI.

Download and run the installer, *Setup_DRV8703DQ1EVM-1.x.x_EVM.exe*, to install the GUI application.

Step 2. Install the FTDI device driver.

The FTDI USB device driver must be installed manually. The device driver setup can be found in the C:\Program Files (x86)\Texas Instruments\DRV8703D-Q1\FTDI_USB_DRIVER folder after successfully completing the installation in Step 1. Run the *CDM21216_Setup.exe* file in this folder and follow the installation instructions.

2.2 Hardware Setup

The hardware required to run the motor control is a micro-USB cable, the DRV8703D-Q1 EVM, and a power supply with a DC output from 5.9 to 45 V. First the brushed DC motor is connected to the motor terminal block on the DRV8703D-Q1 EVM. Next the micro-USB cable is connected to the PC and to the DRV8703D-Q1 EVM. Finally the power supply is connected to the DRV8703D-Q1 EVM. Verify any faults by testing the nFAULT pin voltage to be 3.3V (pulled logic low if a fault condition exists).

2.3 DRV8703D-Q1 EVM GUI

The DRV8703D-Q1 EVM_GUI is provided with the DRV8703D-Q1 EVM to control a brushed DC motor and manipulate various settings. The GUI provides functionality for adjusting the speed and direction of the motor, adjusting the current-regulation limit, observing the measured drive current, and monitoring the device status.

Use these steps to control the DRV8703D-Q1 EVM through the GUI application:

Step 1. Attach the brushed DC motor

Step 2. Plug in the micro-USB cable.

Step 3. Enable the motor power supply (see Section 2.3).

Step 4. Click on the DRV8703D-Q1 EVM shortcut either on the desktop or from the start menu to run

the GUI application.

Step 5. The GUI will redirect to the *Serial Port* page for a manual connection of COM port out of the available for connection as shown in Figure 5. If nothing is physically connected to the PC, the COM drop-down list displays
-- No Ports --.

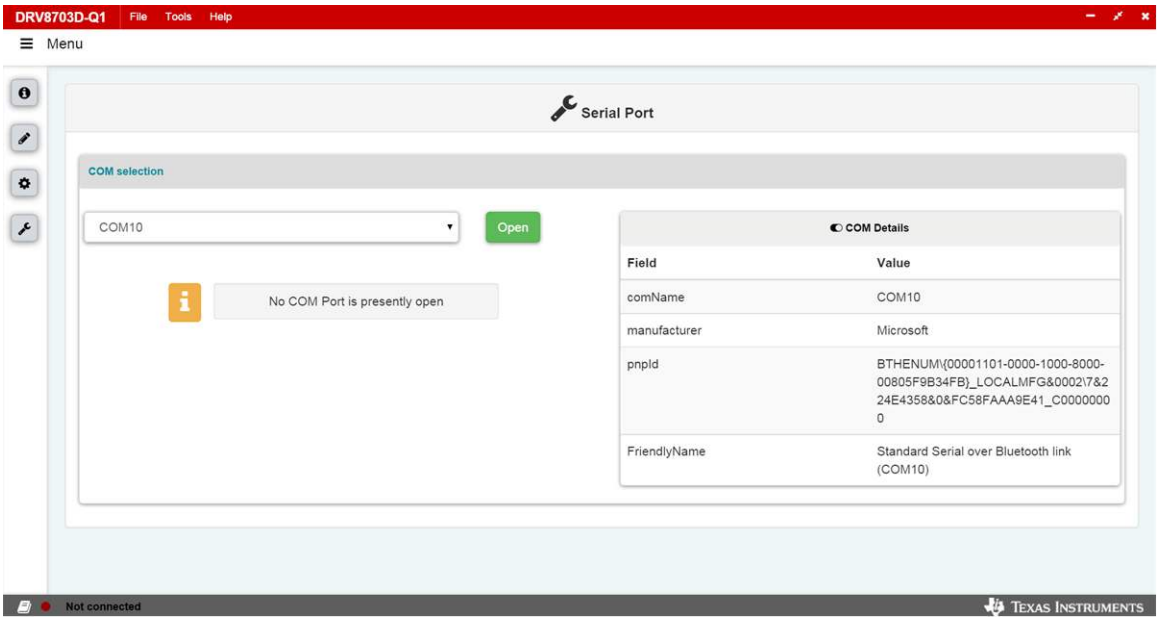

Figure 5. DRV8703D-Q1-EVM GUI (List COM ports)

Step 6. Select the relevant COM (USB Serial Port) from the drop-down list and click on the *Open* button.

Step 7. After the GUI connects, the window in Figure 6 is displayed. Verify that the COM port name (COM port number may differ), and baud rate match what is shown in Figure 6. The bottom left corner of the status bar shows a green indicator to indicate the connection with the opened COM port number and connected device's name mentioned in the bracket.

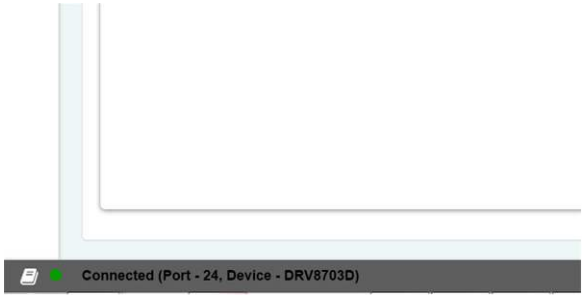

Figure 6. DRV8703D-Q1-EVM GUI (COM Opened)

Step 8. Click on the *Menu* icon in the top-left corner of the GUI to open a side-bar menu. Using the side-bar menu, navigate to the following pages or sub-pages at any time:

- Introduction
  - General
  - Device
  - EVM
- Registers
- Motor Control
- Serial Port

2.3.1 Introduction Page

The *Introduction* page has the general information about the DRV8703D-Q1 device. The sub-pages, *Device* and *EVM*, under the *Introduction* page have a detailed description about the device and EVM respectively as shown in Figure 7.

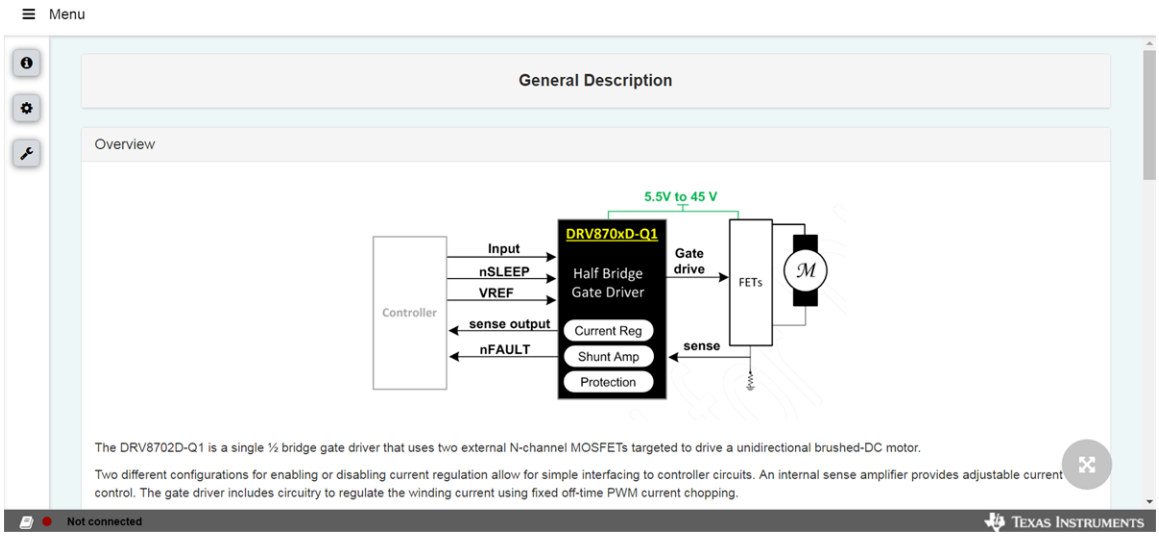

Figure 7. DRV8703D-Q1-EVM GUI (Introduction Page)

2.3.2 Registers Page

This page shows all the registers and register fields present on the DRV8703D-Q1. The page allows reading, writing, or both to any register, register field, or bit as shown in Figure 8.

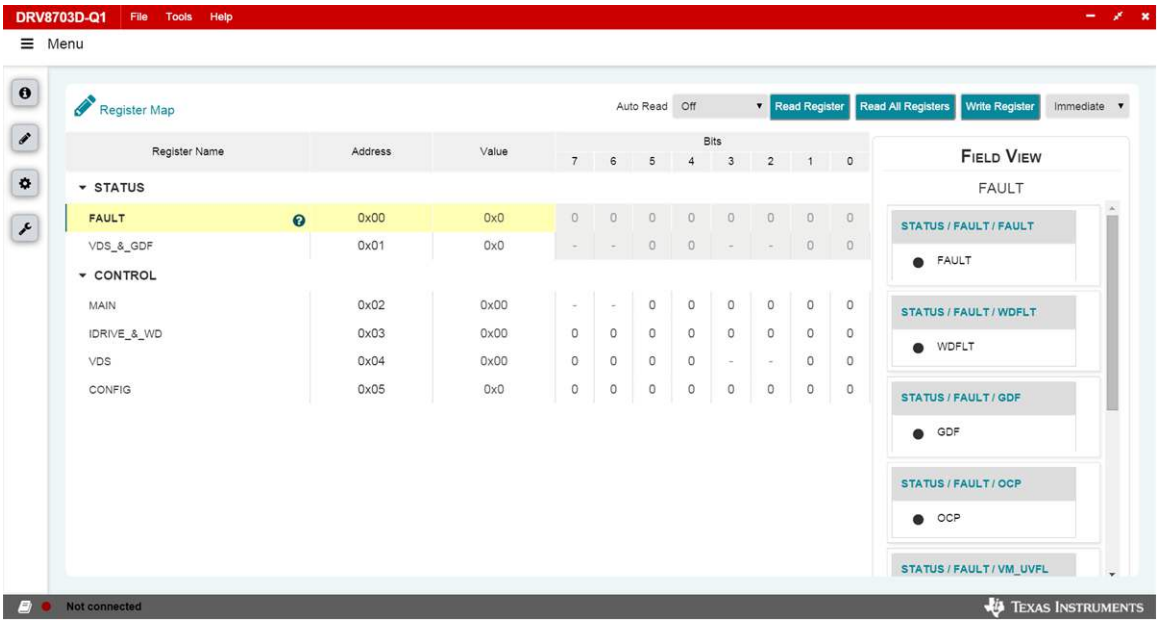

Figure 8. DRV8703D-Q1 EVM GUI (Register Page)

2.3.3 Motor Control Page

This page has different widget controls to control the motor as shown in Figure 9.

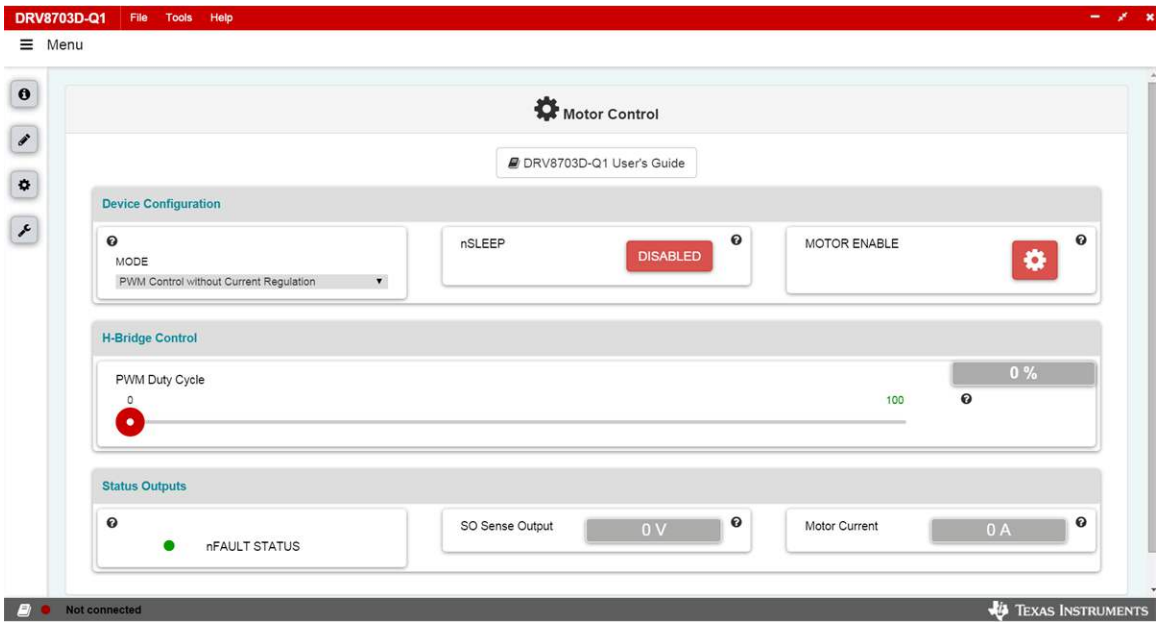

Figure 9. DRV8703D-Q1-EVM GUI (Motor Control Page)

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      3.1.1 *Notice applicable to EVMs not FCC-Approved:*

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      3.1.2 *For EVMs annotated as FCC – FEDERAL COMMUNICATIONS COMMISSION Part 15 Compliant:*

      CAUTION

      This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

      Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

      FCC Interference Statement for Class A EVM devices

      NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

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- *Reorient or relocate the receiving antenna.*
- *Increase the separation between the equipment and receiver.*
- *Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.*
- *Consult the dealer or an experienced radio/TV technician for help.*

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3.2.1 *For EVMs issued with an Industry Canada Certificate of Conformance to RSS-210 or RSS-247*

Concerning EVMs Including Radio Transmitters:

This device complies with Industry Canada license-exempt RSSs. Operation is subject to the following two conditions:

(1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Concernant les EVMs avec appareils radio:

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes: (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Concerning EVMs Including Detachable Antennas:

Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication. This radio transmitter has been approved by Industry Canada to operate with the antenna types listed in the user guide with the maximum permissible gain and required antenna impedance for each antenna type indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

Concernant les EVMs avec antennes détachables

Conformément à la réglementation d'Industrie Canada, le présent émetteur radio peut fonctionner avec une antenne d'un type et d'un gain maximal (ou inférieur) approuvé pour l'émetteur par Industrie Canada. Dans le but de réduire les risques de brouillage radioélectrique à l'intention des autres utilisateurs, il faut choisir le type d'antenne et son gain de sorte que la puissance isotrope rayonnée équivalente (p.i.r.e.) ne dépasse pas l'intensité nécessaire à l'établissement d'une communication satisfaisante. Le présent émetteur radio a été approuvé par Industrie Canada pour fonctionner avec les types d'antenne énumérés dans le manuel d'usage et ayant un gain admissible maximal et l'impédance requise pour chaque type d'antenne. Les types d'antenne non inclus dans cette liste, ou dont le gain est supérieur au gain maximal indiqué, sont strictement interdits pour l'exploitation de l'émetteur

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2. Use EVMs only after User obtains the license of Test Radio Station as provided in Radio Law of Japan with respect to EVMs, or
3. Use of EVMs only after User obtains the Technical Regulations Conformity Certification as provided in Radio Law of Japan with respect to EVMs. Also, do not transfer EVMs, unless User gives the same notice above to the transferee. Please note that if User does not follow the instructions above, User will be subject to penalties of Radio Law of Japan.

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Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265