

# DRV8848EVM Hardware and GUI User Guide

This document is provided with the DRV8848 customer evaluation module (EVM) as a supplement to the *DRV8848 Dual H-Bridge Motor Driver* data sheet. This document describes the hardware implementation of the EVM.

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### 1 DRV8848 EVM Overview

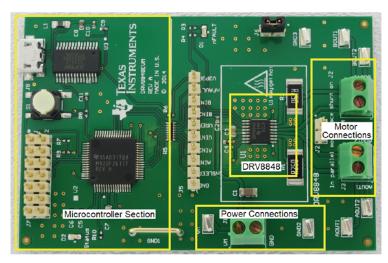


Figure 1. DRV8848 EVM

The DRV8848 customer EVM is a platform revolving around the DRV8848, a low voltage dual H-bridge driver and highly-configurable power stage. This device has been optimized to control one or two brushed DC motors, or a stepper motor. The DRV8848 can also be configured to drive a single brushed DC motor using both output stages in parallel mode to increase the drive current.

The EVM houses an MSP430 microcontroller and an USB interface chip. The USB chip allows for serial communications from a PC where a Microsoft® Windows® application is used to schedule serial commands. These commands can be used to control each of the device's signals, and drive the motors at the desired rate.

The microcontroller firmware outputs the control signals and PWM signals to move the motor. The firmware also monitors the nFAULT signal to alert the GUI that a FAULT has occurred. This document details the operation of the EVM, as well as the hardware reconfigurability of the evaluation module.

# 1.1 Connectors

The DRV8848EVM offers access to the VM (motor voltage) power rail via a terminal block (J1). A set of test clips in parallel with the terminal block allows for the monitoring of the input power rail. The VM must be applied according to the recommended parameters in the *DRV8848 Dual H-Bridge Motor Driver* data sheet.

**NOTE:** VDD for the microcontroller is derived from the micro USB connector.



**Figure 2. Connections** 



#### DRV8848 EVM Overview

### 1.2 Configuration Jumpers

A 0.100-inch pitch header connector (J5) is used to provide access to every device signal in the external event control of the DRV8848 if desired. To disconnect the internal MSP430<sup>™</sup> microcontroller, remove resistor pack R5 and resistor R6. Table 1 lists the connections available on the J5 header. Each header pin is labeled on the evaluation module and matches the pin of the DRV8848.

### Table 1. J5 Header Connections

Header Label	Description
GND	Ground
nSLEEP	Sleep mode input
AIN1	AIN1 input
AIN2	AIN2 input
VINT	Internal supply voltage of the DRV8848
VREF	Scale voltage to set IFS
BIN2	BIN2 input
BIN1	BIN1 input
nFAULT	Fault indication from DRV8848
V3P3R	3.3-V supply from FTDI FT232RL

# 1.3 Jumpers

There are two jumpers on the DRV8848EVM module. J2 is used to connect the two sense resistors in parallel. This allows the use of one brushed motor at higher current. J6 is used to hold the shunt when not in use.

### 1.4 Motor Output

Two motor connectors are provided. Connectors J3 and J4 are available as shown in Figure 2.

### 2 GUI Software Installation

The following section explains the location and the procedure for installing the software properly.

**NOTE:** Make sure that no USB connections are made to the EVM until the installation is complete. The installer also installs the GUI Composer V2 Runtime along with the GUI installation.

# 2.1 System Requirements

- Supported OS Windows 7 (32 Bit, 64 Bit)
- Recommended RAM memory 4 GB or higher
- Recommended CPU Operating Speed 3.3 GHz or higher

# 2.2 Installation Procedure

The following procedure will help you install the DRV8848 GUI.

Step 1. Double click on the GUIComposerApp-0.1.0.setup-win\_2.0.4 as shown in Figure 3.



🗸 🗢 💽 🗸 Librari	es 🕨 Documents 🕨		✓  Search D	ocuments	
Organize 👻 Share v	vith 🔻 New folder			::::	
☆ Favorites ■ Desktop	Documents library Includes: 2 locations			Arrange by:	Folder 🔻
Downloads	Name	Date modified	Туре	Size	
Recent Places DRV8xxx	SUIComposerApp-0.1.0.setup-win_2.0.4	23-11-2015 10:50	Application	5,942 KB	
JKV8XXX	Install_image_DRV8848_EVM	23-11-2015 10:50	WinRAR ZIP archive	3,648 KB	
🔚 Libraries					
Documents					
E Pictures					
🖳 Computer 🏭 Local Disk (C:)					
Eocal Disk (C.)					
🗣 Network					
2 items					
$\checkmark$					

# Figure 3. GUIComposerApp-0.1.0.setup-win\_2.0.4

A screen shown in Figure 4 will appear indicating installer initialization. Click Next button.



🧃 Setup	- • •
👋 Texas Instruments	Setup - DRV8848 EVM
	Welcome to the DRV8848 EVM Setup Wizard.
	< Back Next > Cancel

# Figure 4. Installation Initialization

Step 2. The License Agreements will appear.

• A Screen as shown in Figure 5 will appear, displaying the license agreement of DRV8848 EVM GUI. Please read through the agreement carefully and enable the "I Accept the License Agreement" radio button and press the Next button.



7

🧃 Setup			
License Agreement		-	
Please read the following Lic continuing with the installat	ense Agreement. You must accep ion.	ot the terms of this agr	reement before
GUI Composer Software	License Agreement		*
A LEGALLY BINDING AGRE WILL BE ASKED WHETHER AGREEMENT. DO NOT CLI ACCEPT AND AGREE TO TH	D THE FOLLOWING LICENSE A EMENT. AFTER YOU READ TH YOU ACCEPT AND AGREE TO T CK "I ACCEPT" UNLESS: (1 IE TERMS OF THIS LICENSE A ANY: AND (2) YOU INTEND T	IIS LICENSE AGREEN HE TERMS OF THIS ) YOU ARE AUTHOR: GREEMENT ON BEHAN	MENT, YOU LICENSE IZED TO LF OF
December 1997	I accept the agreement		
Do you accept this license?	💿 I do not accept the agreeme	int	
InstallBuilder			
		< Back Next >	Cancel

### Figure 5. License Agreement

Step 3. Set the default directory for the GUI installation and press the Next button.

🥶 Setup		- • •
Select Installation Folders		
Application Directory		
C:\Program Files (x86)\Texas Instruments	<b>1</b>	
Runtime Directory		
C:\Users\edalab\guicomposer\runtime	12	
InstallBuilder		
	< Back Next	> Cancel

# Figure 6. Installation Directory

NOTE: It is highly recommended to keep the default values as provided in the installer.	
---	--

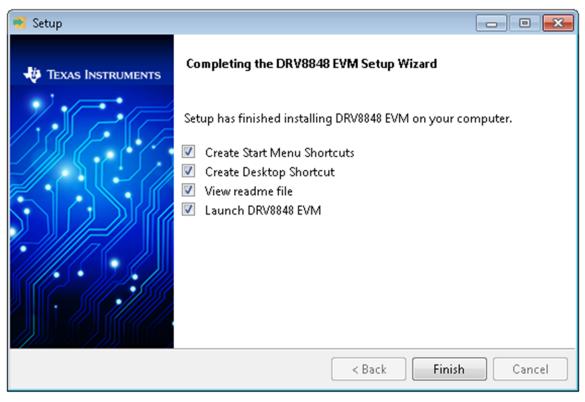
- Step 4. At this point, a few options may appear. If the GUI Composer Runtime v.2.0.6 has not been previously installed, select *Install from File* radio button and download the runtime from the following link, GC Runtime v2.0.6. Click the Search button to the right of the text box next to *Install from File* and select the downloaded runtime v.2.0.6 file. Click *Next* to continue.
- Step 5. The installer will begin self-extraction of GUI Composer component and proceed with the installation.
- Step 6. After the self-extraction of GUI Composer component, the installer will proceed with the installation as shown in Figure 7.

🗃 Setup	- • •
Installing	
Please wait while Setup installs DRV8848 EVM on your co	mputer.
Installing	
Extracting compressed[]RV8848_EVM\comp	oonents\core-item\metadata.html
InstallBuilder	
	< Back Next > Cancel

# Figure 7. Installation in Progress

Step 7. When the installation is complete, the final page will be displayed.





### Figure 8. Setup Completion

Step 8. A Readme window as shown in Figure 9 will appear displaying the link for LV 2014 RTE.

ſ	🖷 README 📃 📼 💌
	Readme file for DRV8848 EVM: ( DRV8848_EVM) Copyright 2015. Texas Instruments Incorporated. All rights reserved.
	This application has been configured to work with the MSP430F2617 device
	For help, please see http://processors.wiki.ti.com/index.php/Main_Page
	ОК

### Figure 9. Readme Window

**NOTE:** The DRV8848 EVM GUI requires the GUI Composer Runtime V2 to be installed before the GUI is executed.

# 3 DRV8848 EVM GUI

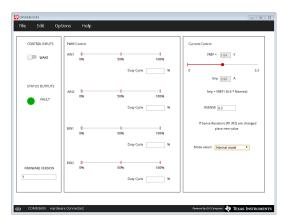


Figure 10. DRV8848 EVM GUI

# 3.1 Operate the EVM

Operate the EVM with the following:

- 1. Install the drivers and GUI.
- 2. Connect the wires of the one or two brushed motors to terminals AOUT1, AOUT2, BOUT1, and BOUT2. Alternately, plug in a stepper motor to terminals AOUT1, AOUT2, BOUT1, and BOUT2.
- 3. Connect the VM power supply but do not apply power at this step.
- 4. Connect the USB cable between the PC and the EVM. Once the USB is connected to the EVM, the status LED will begin to blink.
- 5. Open the GUI by selecting the launcher.exe file. It may take up to 30 seconds to establish a connection.
- 6. Apply 12 V to the VM and GND connections.
- 7. Configure the current setting using the VREF slider. If the sense resistors have been changed, enter the new value of RISENSE.
  - The current is calculated using the VREF slider, and the Sense resistor value using Equation 1.
     VREF

$$I_{FS} = \frac{1}{6.6 \times RISENSE}$$

(1)

(2)

The 12-bit DAC channel 0 is connected to the DRV8848 analog input VREF. Changing the DAC digital value from 0 to 4092 in steps of 4 changes the analog voltage at the VREF pin from 0V to VINT V. See Equation 2.

$$VREF = \frac{VINT}{4095} \times (VREF\_slider \times 4)$$

- 8. Wake the device for operation.
  - After setting the desired chopping current for the DRV8848, enable the DRV8848 by pressing the WAKE button. When the WAKE button is pressed, the circle to the left of the button toggles from red to green.
  - If the WAKE button is pressed during motor operation, the motor is immediately stopped, and the motor control signals from the microcontroller are reset.
- 9. The DRV8848 EVM is now awake and can be commanded to turn the motor. The motor is turned by sliding the AINx or BINx sliders.
  - For slow decay mode, decreasing xIN1 while holding xIN2 at 100% causes the brushed motor to run in one direction. Decreasing xIN2 while holding xIN1 at 100% causes the brushed motor to move in the opposite direction.
  - For fast decay mode, increasing xIN1 while holding xIN2 at 0% will cause the brushed motor to move in one direction. Increasing xIN2 while holding xIN1 at 0% will cause the brushed motor to

move in the opposite direction.

10. As an extra precaution, the motor can be stopped by selecting the WAKE button. Once selected, the motor is stopped. To re-enable the motor, re-select the WAKE button.

# 3.2 Normal Mode Operation

CONTROL INPUTS	PWM	Control				Current Control	
WAKE	AIN1	0%	50%		100%	VREF = 1.64	v
				Duty Cycle	96	0	3.3
						ltrip 0.99	A
STATUS OUTPUTS	AIN2	0				Itrip = VREF / [6	.6 * Risense)
FAULT		096	50%		100%		
•				Duty Cycle	96	RSENSE 0.3	
						If Sense Resistors (R	1 (57)
	BIN1	096	50%		100%	place nev	
		046	2046		100%		
				Duty Cycle	96	Mode select Normal I	node 🔻
FIRMWARE VERSION	BIN2	0%	50%		100%		
1				Duty Cycle			
				., [			

Figure 11. Normal Mode Operation

By default, Normal mode operation is selected. This configuration allows connection of one or two brushed motors for evaluation. If transitioning from either Parallel mode or Stepper mode, the following actions occur:

- 1. The AINx sliders will re-appear.
- 2. The chopping current is recalculated.

# 3.3 Parallel Mode Operation

A feature of the DRV8848 is the ability to operate a single motor in parallel mode, effectively doubling the current capability. When using Parallel mode, the motor must be connected across both AOUT1/BOUT1 and AOUT2/BOUT2. This requires a small jumper wire to connect the two outputs at connectors J3 and J4.

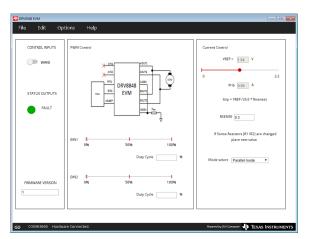


Figure 12. Parallel Mode Operation

To use this feature, set the Mode select pulldown to Parallel mode. When the parallel mode is activated, the following actions occur:

- 1. The AINx sliders will disappear.
- 2. The chopping current will be recalculated.

- 3. A message describing how to connect the motor appears. The message also instructs the user to place the shunt on J2.
  - **NOTE:** The shunt on J2 is only used for parallel mode, it should be placed on J6 for all other operations.

The parallel mode can now be controlled using the BINx sliders. The operation is the same as normal mode.

- a. For slow decay mode, decreasing BIN1 while holding BIN2 at 100% causes the brushed motor to run in one direction. Decreasing BIN2 while holding BIN1 at 100% causes the brushed motor to run in the opposite direction.
- b. For fast decay mode, increasing BIN1 while holding BIN2 at 0% causes the brushed motor to run in one direction. Increasing BIN2 while holding BIN1 at 0% causes the brushed motor to move in the opposite direction.

### 3.4 Stepper Mode Operation

The DRV8848 EVM provides the ability to operate a stepper motor in full step mode. The firmware provides the necessary timing pulses on the INAx/INBx input signals to drive the stepper at the desired speed and direction.

😫 DRV5343 EVM 👘 🐨 📼				
File Edit Options Help				
CONTROL INPUTS Stepper Control	Current Control			
wake	VREF = 1.84 V			
	• · · · · · · · · · · · · · · · · · · ·			
Stepper Speed	0 3.3			
40 1000 2000	Itrip 0.99 A			
STATUS OUTPUTS 200	ltrip = VREF / [6.6 * Risense]			
FAULT				
C) RUN	RSENSE 0.3			
Dir.				
	If Sense Resistors (R1 /R2) are changed place new value			
	Mode select Stepper mode V			
FIRMWARE VERSION				
G COM8:9600 Hardware Connected.	Powered by GUT Composer 💠 TEXAS INSTRUMENTS			

Figure 13. Stepper Mode Operation

To use the stepper feature, set the Mode select pulldown to Stepper mode.

Set the desired stepper step and direction, and then select RUN. The stepper speed and direction can be changed as the motor is running but may cause the motor to stall.

### 3.5 Menu Options

### 3.5.1 File

The File menu contains the options as shown in Figure 14. This section describes each of the options.





Figure 14. File Menu

# 3.5.1.1 Load Settings

If this option is clicked, it loads the configuration file which was saved earlier to bring the device to a known state.

**NOTE:** Load Config will overwrite the existing data in registers with the value specified in the .json file loaded.

### 3.5.1.2 Save Settings

If this option is clicked, the current register configuration will be saved into a file which can be later loaded into the GUI using the Load option.

### 3.5.2 Edit

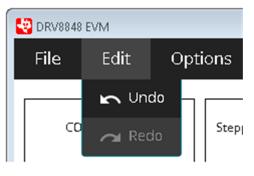


Figure 15. Edit Menu

This is used to Undo and Redo the changes done in the GUI.

# 3.5.3 Options

The Options menu is to configure the Serial Port and connect to the serial port.



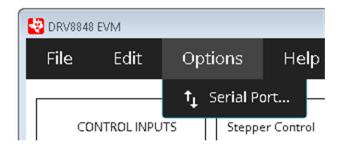


Figure 16. Options Menu

3.5.4 Help

	Help	
-	? Help	
эре	2 E2E Support Forum	
	i About	

Figure 17. Help Menu

# 3.5.4.1 Help

The Help connects to the E2E forum.

# 3.5.4.2 E2E Support Forum

The Help connects to the E2E forum.

# 3.5.4.3 About

This gives the information about the GUI.



About DRV8848_EV	M	
EVM		
DRV8848		
Version 0.1.0.0		
© Copyright 201 Visit <u>http://www</u> nstalled Software	.ti.com	ments Incorporated. All rights reserved.
Name	Version	More Info
nw.js	v0.12.1	https://github.com/nwjs/nw.js/blob/master/CHANGELOG
io.js	v1.2.0	https://iojs.org/api/index.html
chromium	v41.0.2272.76	https://www.chromestatus.com/features
polymer	√0.5.5	https://www.polymer-
		project.org/0.5/docs/polymer/polymer.html
GUI Composer Runtime	√2.0.4.0	
For a complete list	, please see <u>docs</u> ,	/Software Manifest.pdf
		Texas Instruments

Figure 18. About Page

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