LV8548MCSLDGEVB

Brush DC Motor Driver Module Solution Kit **Quick Start Guide**

Overview

The LV8548MCSLDGEVB is an ON Semiconductor motor driver module featuring the **LV8548MC**. This module is capable of easily driving 2 brushed DC motors.

Motor driving is made easy with Arduino Micro¹⁾ compatibility. The LV8548MCSLDGEVB comes with a Baseboard for facilitated plug-and-play connectivity with an Arduino Micro. GUI and Open-source API Functions are available for custom, user-specific motor driving programs.

Features:

- VCC_{max} = 20 V, IO_{max} = 1.0 A^{2} (Through OUT A-B and OUT C-D)
- <u>6~12 V System Applications</u> Recommended (VCC = 4~16V Max)
- Standby current consumption = 0

· Pulse Width Modulation (PWM) control, adjustable motor torque and speed

· Forward rotation, reverse rotation, and built in brake function

 Typical Applications: In-Home Appliances, Consumer Products, Industrial Products

For further product information, please visit: http://www.onsemi.com/PowerSolutions/product.do?id=LV8548MC

What you need

- PC (Windows 7, 64bit) Arduino IDE 1.8.4³ Installed User with an Administrator permission
- Power Supply

AC Adapter Output voltage : 4~16V Output current : ~2A Connector specification Polarization : Positive Center Inner diameter=2.1mm、outer diameter=5.5mm Recommended : WSU075-1000 (Triad Magnetics)

or stabilized DC power supply, dry cell battery, etc.



ON Semiconductor®

www.onsemi.com



LV8548MCSLDGEVB Board



ONBB4AMGEVB Board with Arduino Micro and LV8548MCSLDGEVB Board

¹⁾ Arduino / Genuino is Arduino AG are registered trademarks.

²⁾ Stress exceeding this voltage or current may risk damage to the device. Functionality and reliability may be hindered if the device exceeds these values. The maximum current value, IOmax, does not guarantee the module can handle that much current. If the device overheats, thermal shutdown will occur.

³⁾ Contents of kit may not be compatible with different versions. Please see the Appendix attached if specified version is not installed.

Contents of the Kit Hardware

- LV8548MCSLDGEVB : Motor driver module
- ONBB4AMGEVB : Baseboard
- Arduino Micro
- USB Cable (Micro B-A)
- USB Thumb Drive
- Flat-tip Screw Driver
- Brush DC Motor RC-260RA-18130 (MABUCHI motor) 1pc (Stepper motor 1pc)

<u>Software</u>(Included in USB Thumb Drive)



Software Setup

Please download

Software_Package_for LV8548_Module_Kit found on the provided USB flash drive to any preferred directory. (E.g. Libraries\Documents or Desktop)



The IDE will display the following message when the LV8548_DC_Program.ino file is opened for the first time. Click "OK" to continue.



This message will be displayed if the .ino file is not inside of a folder with the same name. (E.g. Sketch12345.ino must be in the Sketch12345 folder).

<u>API Library</u> Following process should be operated with the Arduino Micro disconnected.

Double click on the Arduino sketch
LV8548_DC_Program.ino
This will launch the Arduino IDE.
(Check the Appendix if the Arduino IDE is not installed)

(2) Include the API Library As shown below, navigate to Sketch→Include Library→Add .Zip Library

Ð	Verify/Compile	Ctrl+R	Add .ZIP Library
5.44	Upload	Ctrl+U	Arduino libraries
5341	Upload Using Programmer	Ctrl+Shift+U	Bridge
inc	Export compiled Binary	Ctrl+Alt+S	EEPROM
/ G	Show Sketch Folder	Ctrl+K	Esplora
	Include Library		Ethernet
.ib_	Add File		Firmata
void s	etup() {		HID
// p	ut your setup code here	to run onc	Keyboard
1,05	48 initlib():	1. 2222312.2112	Mouse

The following window will appear. Select the "LV8548_DC_APILibrary" folder, and open this folder as shown below.

<u>Click the folder only once and push "Open" button.</u> Do not double click the folder.

Look in:	For_DCm	otor	- 👌 🖻 🕻	
Sacart Home	↓ LV8548_D	C_APILibrary		
Ay Documents				
Computer				
	File <u>n</u> ame:	LV8548_DC_APILibrary]	Open

Unless updating the function library, including the API function library only needs to be done once.

Writing and Compiling with the Arduino IDE

 Select the Arduino board to upload to by navigating to

"Tools→Board→Arduino/Genuino Micro"



② Write an Arduino sketch and navigate to "Sketch→Verify/Compile" when finished writing

ne cuit	Sketch roois help	
00	Verify/Compile	Ctrl+R
	Upload	Ctrl+U
LV854	Upload Using Programmer	Ctrl+Shift+U
1 #ind 2	Export compiled Binary	Ctrl+Alt+S
3 // (Show Sketch Folder	Ctrl+K
4	Include Library	•
5 Lib	Add File	

The IDE will display "Done compiling" after a successful compile has been verified.



④ Upload the sketch by clicking "Sketch→Upload" or by pressing the → button

File Edit Sk	etch Tools Help	
	Verify/Compile	Ctrl+R
	Upload	Ctrl+U
LV854	Upload Using Programmer	Ctrl+Shift+U
1 #inc	Export compiled Binary	Ctrl+Alt+S
2 3 // C	Show Sketch Folder	Ctrl+K
4	Include Library	
6	Add File	

The IDE will display "Done uploading" after a successful upload to the Arduino



Sketches written to the Arduino will not be erased unless rewritten.

If the uploading of the program fails confirm the details in step 1 check board name and step 3 check serial port connection.

Rewrite the Arduino Program

In the case of (1) or (2) below, please rewrite the program to the Arduino

- (1) When updating the API Function library
 - Delete the existing API function library by navigating to Documents\Arduino\libraries and deleting the LV8548_DC_APILibrary folder.
 - Include the latest API function library. Please save the latest API function library in your preferred directory on your PC. (See Page 2, "Software Setup")

Include the latest API function library. (See Page 2 "API Library")

- Compile and write the program to the Arduino (See Page 3, "Writing and Compiling with the Arduino IDE")
- When evaluating the LV8548 Stepper and other motor driver modules (Assuming other motor driver module libraries have already been included)
 - Compile and write the program to the Arduino (See Page 3, "Writing and Compiling with the Arduino IDE")

If you are testing the LV8548 Stepper module library or any other motor driver module library for the first time, please operate according to their corresponding manual.

GUI Installation

 In the BON_MD Module Kit_GUI folder, double click and run statution stallation file.

*If a previous version of ON_MD_Module_Kit_GUI has already been installed, please uninstall and reinstall the GUI

(2) If .NET Framework4.6.1 is not installed, click Accept to install.

Setup	X
For the following components:	
Microsoft .NET Framework 4.6.1 (x86 and x64)	
Please read the following license agreement. Press the page down key to a the rest of the agreement.	see
MICROSOFT SOFTWARE SUPPLEMENTAL LICENSE TERMS	*
.NET FRAMEWORK AND ASSOCIATED LANGUAGE PACKS FOR MICROSOFT WINDOWS OPERATING SYSTEM	
Microsoft Corporation (or based on where you live, one of its affiliates) licenses this supplement to you. If you are licensed to use Microsoft Windows operating system software (the "coffuser", you may not use this cumplement. You may not use it if	*
View EULA for printing	
Do you accept the terms of the pending License Agreement?	
If you choose Don't Accept, install will close. To install you must accept th agreement.	nis
Accept Don't Accept	

The following window shows the installation in progress. (This may take several minutes)

	Setup	×
-0-	Installing Microsoft INE Framework 4.0.1 (X80 and X04)	

If the installation requires a reboot to complete, a message will appear on the screen. Please press "Yes" to reboot.

Once rebooted, run 📚 setup.exe installation file again.

3 Press "Next"



④ Specify installation folder, or just click "next" to continue with the installation

谩 ON_MD_Module_Kit_GUI	- • •
Select Installation Folder	
The installer will install ON_MD_Module_Kit_GUI to the following folder.	
To install in this folder, click "Next". To install to a different folder, enter it be	low or click "Browse".
Eolder: C#Program Files (x86)#OnSemiconductor#ON_MD_Module_Kit_G(Browse Disk Cost
Install ON_MD_Module_Kit_GUI for yourself, or for anyone who uses this	computer:
○ <u>E</u> veryone	
Just me	
Cancel < <u>B</u> ack	Next >

Please press "next".



If a User Account Control dialog box appears, please select "Yes."

The following screen will be displayed after a successful installation.

岁 ON_MD_Module_Kit_GUI	
Installation Complete	
ON_MD_Module_Kit_GUI has been successfully installed. Click "Close" to exit.	
Please use Windows Update to check for any critical updates to the .NET Frame	work.
Cancel (<u>B</u> ack	Close

Make sure the GUI shortcut icon is created on the desktop as shown below and that the program has been added to the Windows start menu.

ON_MD_Mod ue_Kit_GUI	ut	
Start Menu		
Microsoft Excel 2010	20	\sim
Microsoft Word 2010	٠	
ON_MD_Module_Kit_GUI		
Visual Studio 2015	٠	
Arduino	8 1	

Hardware Setup

- (1) Connect the LV8548MCSLDGEVB (Motor Driver Module) to the ONBB4AMGEVB (Motor Driver Baseboard). Insert the module into the baseboard, while being careful not to bend the header pins
- (2) Connect the Arduino/Genuino Micro to the baseboard, as seen in the figure below. The USB connection port should be labeled on the baseboard "€USB" to dictate the orientation of the Arduino



③ Plug in the motor wires (Insulation between 5mm – 10mm) into the output terminals on the baseboard – OUT_A/B/C/D. Refer to the table below for motor connectivity:

OUT_A	Motor1+
OUT_B	Motor1 —
OUT_C	Motor2+
OUT_D	Motor2-

(Double check the motor wires, + and -, to ensure correct rotation direction)

- ④ Connect the Arduino to a PC using a USB cable.
- (5) Insert the AC Power adapter into the DC Jack on the baseboard. Be sure that a <u>Center positive type</u> adapter is being used with an <u>output voltage of 4-16V.</u>



If using power supply cables, please connect the positive terminal to VCC and the negative terminal to GND in the CN6 connector. The power supply terminals +/- at CN6 are polarity sensitive.(VCC=+, GND=-)

How to use the GUI

7 8 9 10 V8548DC Function Library Text GUI Language ToolTipMode Help Exit - Serial Port Settings	
Arduino Micro (COM18)	SAVE Generate Program CLEAR
LV8714 LV8548DC LV8548Step LV8907 LV8121 LV8702	Startup LV8548DC Test GUI log Connect COM18 BR:19200 LV8548DC_Ver1.00
0.977 • kHz	
PWM mode	
On Duty (5)	
ter en	
Start Brake Open Start Brake Open	
	Language:: English ToolTip:: API Exit ON

1 Double-click the GUI shortcut and connect the COM serial port.

Language ToolTi	pMode Help			
Serial Port Sett	ings			
Arduino Micro (C	OM3)	~ 1920	0 V None	Connect
Arduino Micro (C	OM3)			
LV8714 LV8548	BDC LV854	8Step LV8	907 LV8121 LV8	3702

Available COM ports will appear in the drop-down box.

If the Arduino is connected correctly to the PC, an option for "Arduino Micro (COMx)" will be available (where x is the number associated with the port); select that COM port and click "Connect".

- (2) The GUI will automatically navigate to the LV8548DC tab after the Arduino installed the firmware is connected.
- 3 Specify the desired frequency for PWM



④ Set the PWM mode for each motor (Ch1 & Ch2)



If the motor is running, it is recommended to press the "Brake" or "Open" button before switching the direction of rotation.

Please see the Appendix for characteristics regarding the PWM frequency and PWM mode.

(5) Change the On Duty ratio for each motor (10-20% is recommended)



⑥ Press the "Start" button to begin motor function

Adjusting the duty ratio while the motors are rotating is recommended Be sure to adjust the duty ratio gradually. <u>For</u> <u>safety reasons</u>, please initiate the motors at a lower duty ratio and increase gradually.

The <u>Brake</u> function sets the potential at both leads of the motor to ground and instantly stops the motor.

The <u>Open</u> function sets both leads of the motor to an open circuit, which decelerates the motor to a complete stop.

For additional details, please see the attached Appendix.

For more details on the following features, please refer to the attached Appendix:

- ⑦ GUI Language configuration
- (8) GUI Tool Tip display
- 9 Help function

When finished, exit the GUI by pressing the "Exit" button at the bottom right of the screen or by clicking "Exit" item at the top menu bar.

The following popup message will be displayed when exiting the GUI.

ON_MD_Module_Kit_GUI
Are you sure you want to Exit?
(はい(Y) いいえ(<u>N</u>)

Select "Yes" to quit the GUI.

Select "No" to cancel the exit and return to the main screen.

If the GUI is closed while the motor is still running, the motor will be stopped and the window will close.

For more details on the following features, refer to the next section on How to use the GUI Log:

- 11 Saving the GUI log
- 12 Clear the GUI log
- 13 Program generation

How to use the GUI Log

The log screen in the GUI shows the serial data sent to Arduino to control its API functions.

Q LV8548DC Function Library Test GUI	
Language ToolTipMode Help Exit	
Serial Port Settings	
Arduino Micro (COM18)	SAVE Generate Program CLEAR
LV8714 LV8548DC LV8548 i. Set Frequency 2	Startup LV8548DC Test GUI log Connect COM18 BR:19200 LV8548DC_Ver.1.00 setPVMFrequency(1) Executed
PWM Frequency ii. Set PWM mode	setRotation(0, 0) setCtIVoltage(0, 20) setStartFlag(0, 1) ii. Set PWM
Ch1 Motor PWM mode Forward<->Open/Standl	iii. Set Duty Ratio Executed
On Duty	iv. Start/Stop Executed
-10 \checkmark 20 \checkmark iv. Toggle Start/Stop 0 \checkmark \blacktriangleright +10 $\%$	
Start Brake Open Start Brake Open	
	Language:: English ToolTip:: API Exit ON

(1) Saving the GUI Log

By pressing the "SAVE" button, the content displayed on the work log can be saved as a .txt file or a .csv file.

理 ▼ 新しいフォル	ダー			855 👻 (
Subversion ^	名前	更新日時	種類	サイズ
🔋 ドキュメント	For DCmotor	2017/10/05 13:04	ファイル フォル	
📔 ピクチャ	For_Stepper	2017/10/05 10:37	ファイル フォル…	
ビデオ 🚽	Motor_test_20171128_174833	2017/11/28 17:48	ファイル フォル…	
♪ ミュージック	Motor_test_20171128_175652	2017/11/28 19:18	ファイル フォル	
=	ON_MD_Module_Kit_GUI	2017/10/05 11:52	ファイル フォル	
コンピューター	Readme.txt	2017/10/05 10:37	テキスト ドキュ	0 KB
🏭 ローカル ディス				
🚽 share (¥¥10.3.€ 🛨				
ファイル名(N): Motor	_test_20180105_104401.txt			
ァイルの種類(T): Text	Files (*.txt)			
Tout	Files (* tyt)			

12 Clear GUI Log

By pressing the "CLEAR" button, the content displayed on the work log will be erased.

(13) Program Generation

Pressing the "Generate Program" will output the executed API functions on the work log into a .ino program file that can be uploaded directly with Arduino. By writing the output of the .ino file to Arduino, motor control can be executed automatically through standalone operation according to the procedure generated through the GUI Log.

For more details regarding the Arduino program generation function, refer to the attached Appendix under ③ Arduino Program Automatic Generation.