Stepper motor driver evaluation board based on the L6482

Introduction

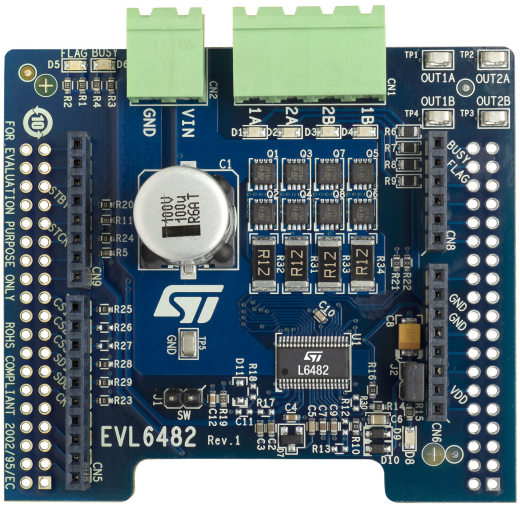
The EVL6482 is a stepper motor driver evaluation board based on the L6482.

It provides an affordable and easy-to-use solution to drive a stepper motor in your application.

The L6482 device, created using analog mixed signal technology, is an advanced fully integrated solution suitable for driving two-phase bipolar stepper motors with microstepping. It integrates a dual full bridge gate driver for N-channel MOSFET power stages with embedded non dissipative overcurrent protection. Thanks to a new current control, a 1/16 microstepping is achieved through an adaptive decay mode which outperforms traditional implementations. The digital control core can generate user-defined motion profiles with acceleration, deceleration, speed or target position easily programmed through a dedicated set of registers. All application commands and data registers, including those used to set analog values (that is: current protection trip point, deadtime, PWM frequency, etc.) are sent through a standard 5-Mbit/s SPI. A complete set of protections (thermal, low bus voltage, overcurrent and motor stall) makes the L6482 device fully protected, as required by the most demanding motor control applications.

The EVL6482 is compatible with the Arduino® UNO R3 connector and supports the addition of other boards which can be stacked to drive up to three stepper motors.

Figure 1. EVL6482 board



1 Getting started

The EVL6482 evaluation board is a stepper motor driver covering a wide range of applications which can be used with supply voltages ranging from 7.5 V to 85 V.

Follow this procedure to start your evaluation:

1. Check the setting of the jumpers based on your configuration as described in Section 2 Hardware description and configuration
2. Connect the board with the STM32 Nucleo board through Arduino UNO R3
3. Supply the board through input 2 (VS) and 1 (ground) of the connector CN2
4. The power OK (green) and fault (red) LEDs turn on

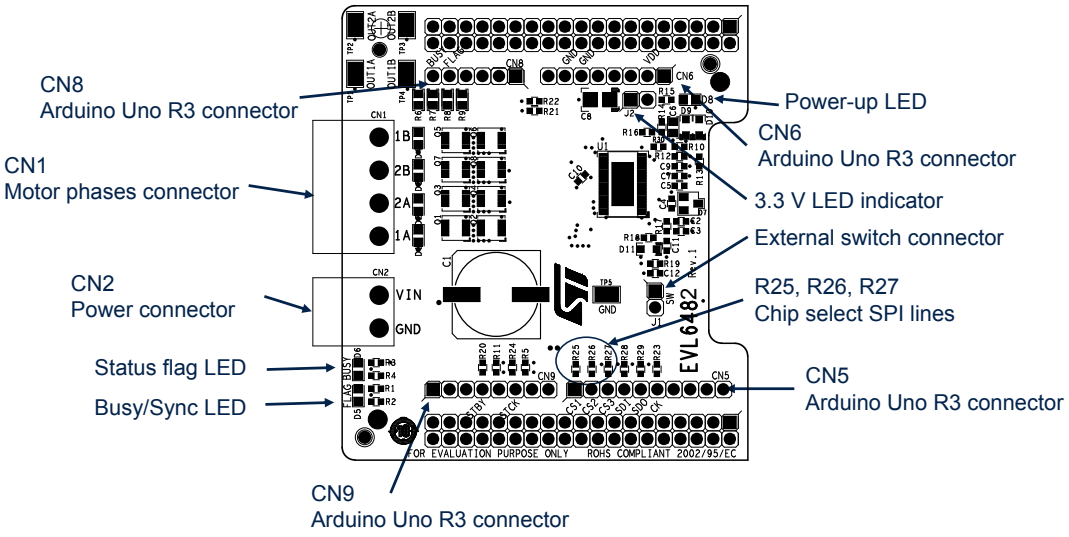
In order to use the EVL6482 in conjunction with the STSPIN Studio, please visit www.st.com.

Up to three evaluation boards can be stacked on the same STM32 Nucleo board, as described in Section 2.2 Multi-motor configuration.

Further support material is available on the respective product pages on www.st.com.

2 Hardware description and configuration

Figure 2. **EVL6482 board overview**



The following table provides the detailed pinout of the Arduino UNO R3.

Table 1. **Arduino UNO R3 connector table**

Connector	Pin(1)	Signal	Remarks
CN5	1	SPI chip select 1	See Section 2.2 Multi-motor configuration
	2	SPI chip select 2	See Section 2.2 Multi-motor configuration
	3	SPI chip select 3	See Section 2.2 Multi-motor configuration
	4	SPI MOSI	See Section 2.1 Selecting the chip select line of the SPI
	5	SPI MISO	
	6	SPI SCK	See Section 2.2 Multi-motor configuration
	7	Ground	
CN9	4	STBY\RESET	
	6	STCK	Step-clock input
CN8	5	FLAG	
	6	BUSY\SYNC	
CN6	2	VDD	
	6	Ground	
	7	Ground	

1. *All non-listed pins are not connected.*

2.1 Selecting the chip select line of the SPI

The chip select line of the SPI interface can be selected through dedicated resistors as indicated in Table 2: "Chip select line selection".

Table 2. Chip select line selection table

R25	R26	R27	CS line
0R	Not mounted	Not mounted	CN5 pin 1 (default)
Not mounted	0R	Not mounted	CN5 pin 2
Not mounted	Not mounted	0R	CN5 pin 3

2.2 Multi-motor configuration

The evaluation boards can be stacked on a single STM32 Nucleo board to drive up to three stepper motors (one for each motor).

By default, the stepper driver board is configured for a motor driven by chip select line 1 of the SPI, so the board configuration for multi-motor setups must be changed in accordance with Table 2 before stacking the boards on the STM32 Nucleo.

The stacked boards exploit the same step-clock signal and share the same fault and busy pins.

2.3 External switch connection

An external switch can be connected to J1 to stop the motor movement when the switch status changes. For proper management of this additional feature of the L6482 device, refer to section “External switch (SW pin)” of the related datasheet (see www.st.com).

2.4 Supply management and voltage regulators

The EVL6482 integrates a supply circuitry to allow a flexible supply management of the device.

By default, the gate driver supply (VCC) is obtained by the internal voltage regulator connected to the external VS and the logic supply (VREG) is obtained from the STM32 Nucleo (VDD).

However the user can change this configuration by acting on the resistors R10, R12, R13, R14, and R16 as indicated in Table 3. For further details, refer to section “Supply management and internal voltage regulators” of the related datasheet.

It must be noted that, as the 3.3 V regulator of the EVL6482 devices is not designed to supply external components, the J2 jumper must be removed in case the logic supply is internally obtained.

Table 3. Board supply management

	Externally provided	Internally generated
Gate driver supply (VCC)	• R10 not mounted • R12 mounted	*Default configuration* • R12 not mounted • R10 mounted
Logic supply (VREG)	*Default configuration* • R13 not mounted • R14 and R16 mounted • J2 closed	• R14 and R16 not mounted • R13 mounted • J2 open

3 Safety precautions

Warning: ***Some of the components mounted on the board could reach hazardous temperature during operation.***

While using the board, the following precautions must be observed:

- Do not touch the components or the heatsink.
- Do not cover the board.
- Do not put the board in contact with flammable materials or with materials releasing smoke when heated.
- After operation, allow the board to cool down before touching it.

4 Bill of material

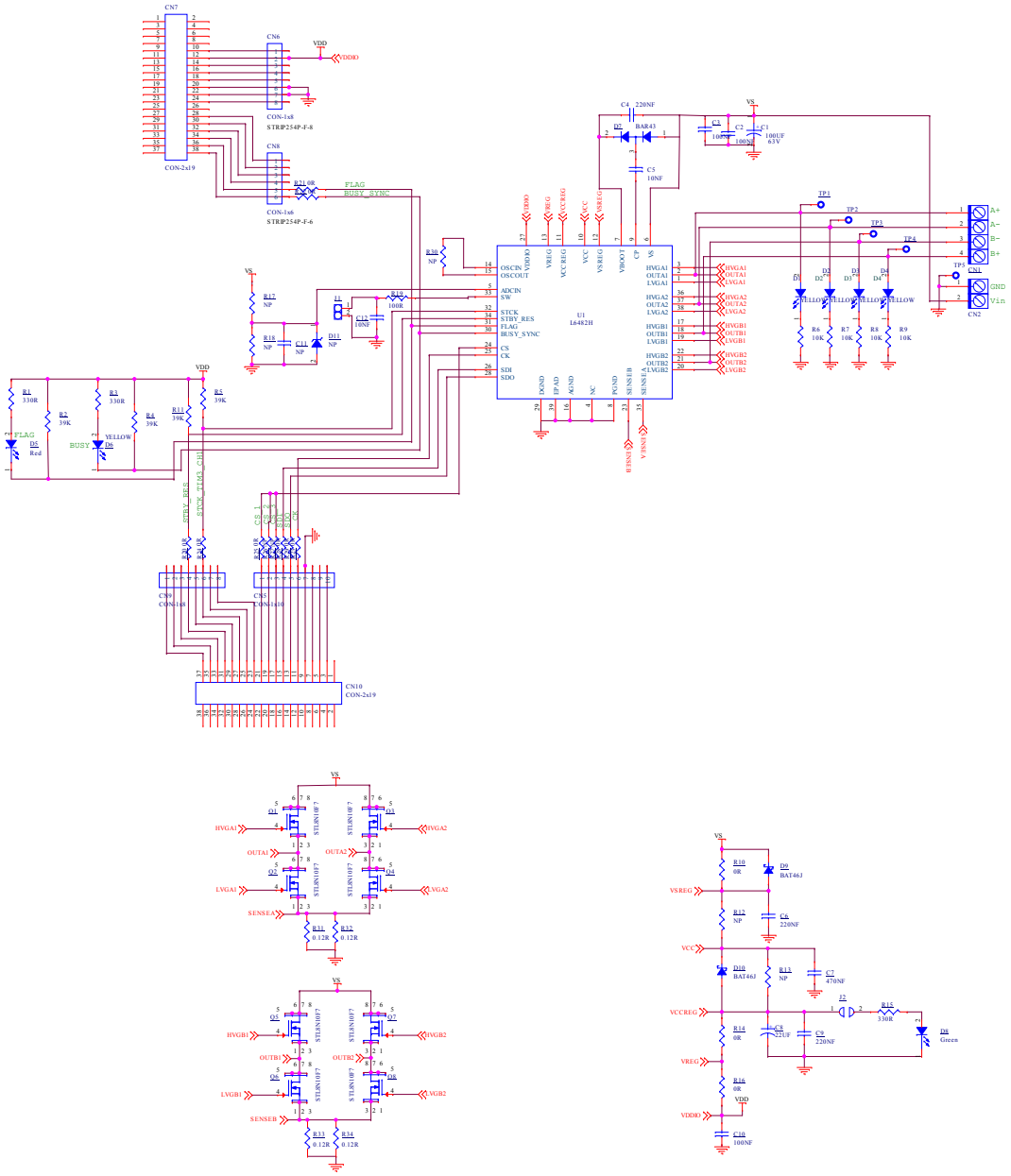
Table 4. **EVL6482 bill of material**

Item	Q.ty	Ref.	Part/Value	Description	Manufact.	Order code
1	1	CN1	Connector 5.08 mm Close vertical	CON-1x4	Wurth Elektronik	691312510004 or equivalent
2	1	CN2	Connector 5.08 mm Close vertical	CON-1x2	Wurth Elektronik	691312510002 or equivalent
3	1	CN5	Connector through-hole-pitch 2.54	CON-1x10	Samtec	SSQ-110-04-F-S or equivalent
4	2	CN6,CN9	Connector through-hole-pitch 2.54	CON-1x8	Samtec	SSQ-108-04-F-S or equivalent
5	2	CN7,CN10	Connector through-hole-pitch 2.54	N.M.		
6	1	CN8	Connector through-hole-pitch 2.54	CON-1x6	Samtec	SSQ-106-04-F-S or equivalent
7	1	C1	SMT aluminum elect. capacitor	100uF/100V	Vishay	MAL214699906E3 or equivalent
8	2	C2,C3	SMT ceramic capacitor	100nF/100V		
9	2	C4,C9	SMT ceramic capacitor	220nF/35V		
10	1	C5	SMT ceramic capacitor	10nF/100V		
11	1	C6	SMT ceramic capacitor	220nF/100V		
12	1	C7	SMT ceramic capacitor	470nF/35V		
13	1	C8	Tantalum SMD capacitor	22uF/16V		
14	1	C10	SMT ceramic capacitor	100nF/35V		
15	1	C11	SMT ceramic capacitor	N.M.		
16	1	C12	SMT ceramic capacitor	10nF/35V		
17	5	D1,D2,D3,D4,D6	Yellow LED	YELLOW		
18	1	D5	Red LED	RED		
19	1	D7	Double diode high speed switching diode	BAR43	STMicroelectronics	BAR43SFILM
20	1	D8	Green LED	GREEN		
21	2	D9,D10	Small signal Schottky diode	BAT46J	STMicroelectronics	BAT46JFILM
22	1	D11	3.3V Zener diode	N.M.		BZX84J-B3V6 or equivalent
23	1	J1	Strip connector 2 pos, 2.54 mm	OPEN	Wurth Elektronik	61300211121 or equivalent

Item	Q.ty	Ref.	Part/Value	Description	Manufact.	Order code
24	1	J2	Strip connector 2 pos, 2.54 mm	CLOSED	Wurth Elektronik	61300211121 or equivalent
25	8	Q1,Q2,Q3,Q4,Q5,Q6,Q7,Q8	N-channel 100V, 17mohm power MOSFET	STL8N10F7	STMicroelectronics	STL8N10F7
26	3	R1,R3,R15	SMT resistor	330R		
27	4	R2,R4,R5,R11	SMT resistor	39K		
28	4	R6,R7,R8,R9	SMT resistor	10K-1/2W		
29	11	R10,R14,R16,R20,R21,R22,R23,R24,R25,R28,R29	SMT resistor	0R		
30	7	R12,R13,R17,R18,R26,R27,R30	SMT resistor	N.M.		
31	1	R19	SMT resistor	100R		
32	5	TP1,TP2,TP3,TP4,TP5	SMT test point -1.6mm	TESTPOINT	Harwin	S1751-46R or equivalent
33	1	U1	Microstepping motor controller	L6482H	STMicroelectronics	L6482
34	1		Connector 5.08 mm horizontal with kook on wire side	CON-1x4	Wurth Elektronik	691351500004 or equivalent
35	1		Connector 5.08 mm horizontal with hook on wire side	CON-1x2	Wurth Elektronik	691351500002 or equivalent

5 Schematic diagram

Figure 3. **EVL6482 schematic diagram**



Revision history

Table 5. **Document revision history**

Date	Version	Changes
18-Mar-2024	1	Initial release.

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