

## Introduction

The STEVAL-L99MD01 is an evaluation board for multiple DC or stepper motors driving particularly designed to address automotive HVAC flap control.

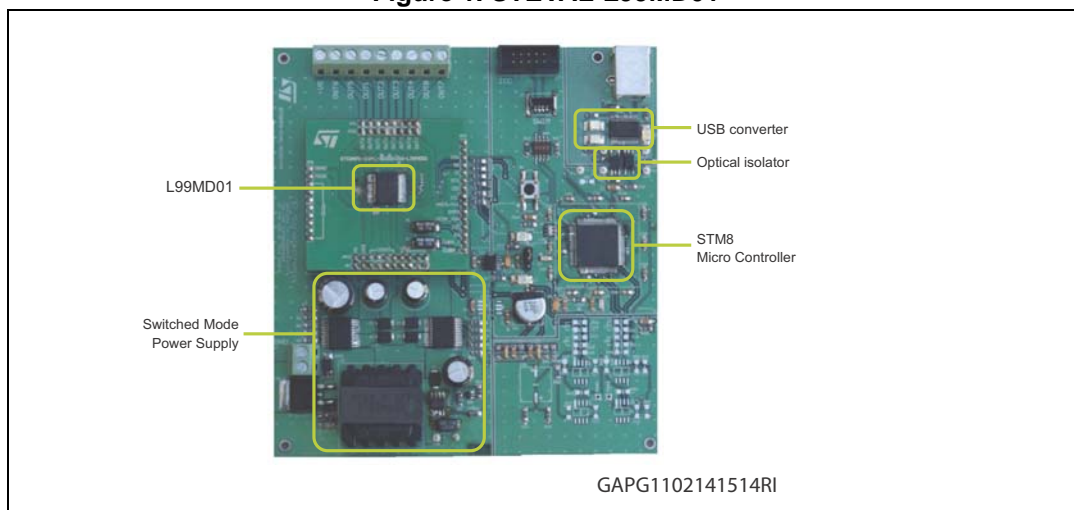
The evaluation board features both the control stage – based on STM8A microcontroller – and the power stage – based on L99MD01, the configurable multi half bridge drivers.

This evaluation board is composed by a mother board containing the controller, the USB interface and the power supply and a daughter board – assembled on top of the mother board – containing the motors driver.

The motherboard, based on STM8 microcontroller, provides the logic section for driving and monitoring the L99MD01 assembled on the daughter board.

With the aim of simplifying board usage and settings, ST provides dedicated and user-friendly software including a Graphic User Interface (GUI). The GUI allows setting L99MD01 parameters (PWM, Step rate...), while showing real time device diagnostic information, such as current output evolution, SPI registers, board temperature and much more. The GUI also allows changing settings for the embedded SMPS.

**Figure 1. STEVAL-L99MD01**



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# 1 Hardware description and setup

This section provides a description of the main components of this evaluation kit, giving instruction for a quick setup of the motor control system.

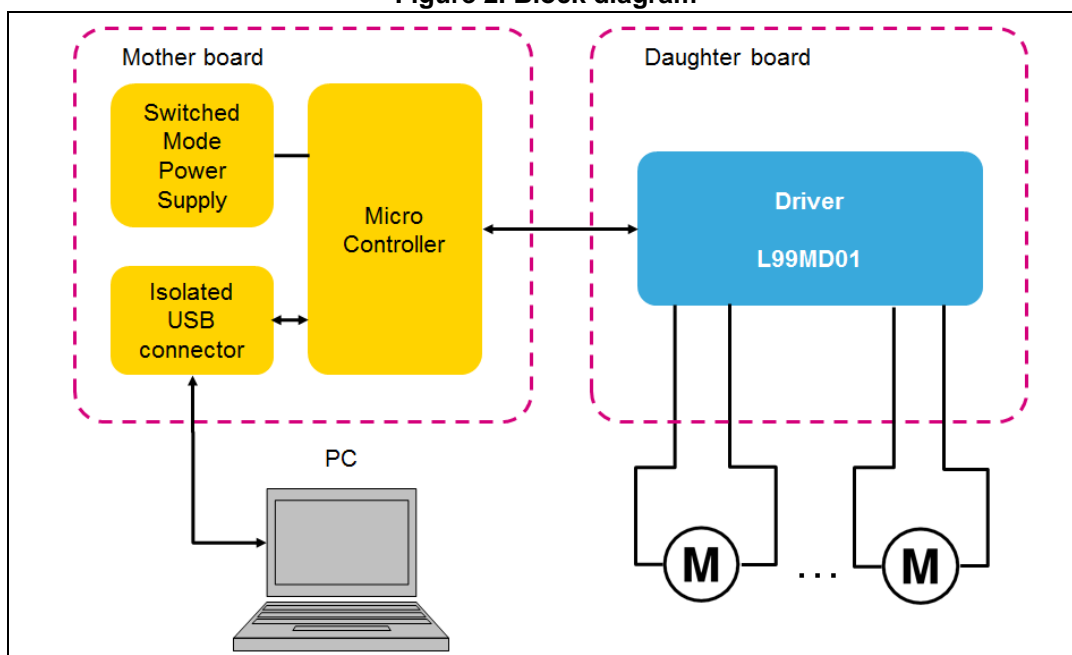
## 1.1 Components description

The evaluation kit consists of two main components:

- Mother board based on STM8A microcontroller, interfacing host PC with H-Bridge controller. The communication with the PC is established through isolated USB. The mother board also assembles a Switched Mode Power Supply and the DC motor connector.
- Daughterboard mounting L99MD01.

The daughterboard and the motherboard are provided already properly plugged.

**Figure 2. Block diagram**



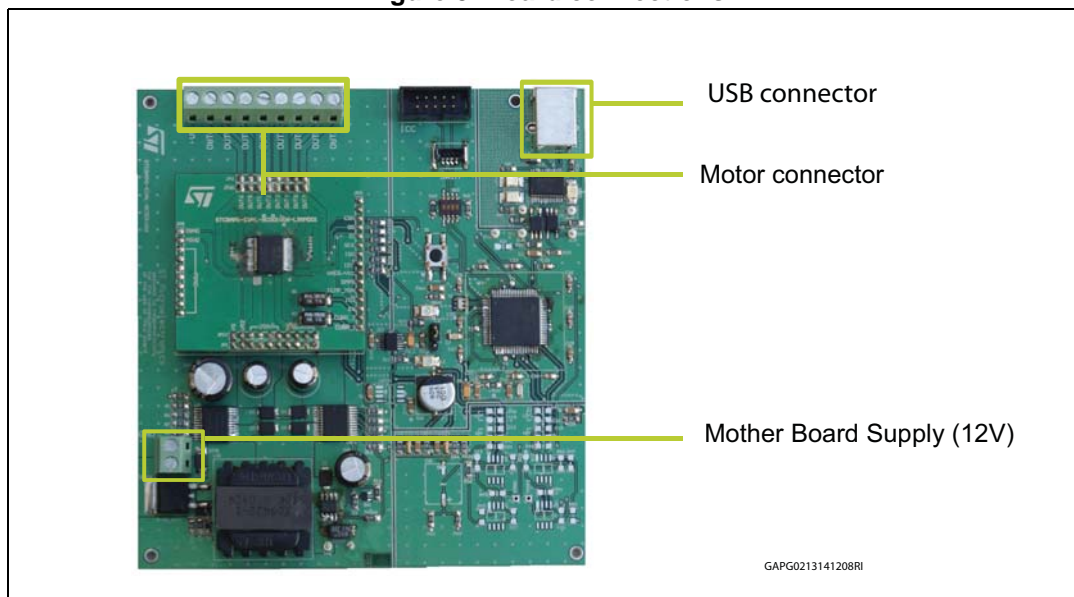
## 1.2 Board connections and setup

Below figure shows the placement of the connectors to be used for supplying the evaluation board, plugging the HVAC module and connecting with a host PC through USB cable.

### 1.3 Board connections and setup

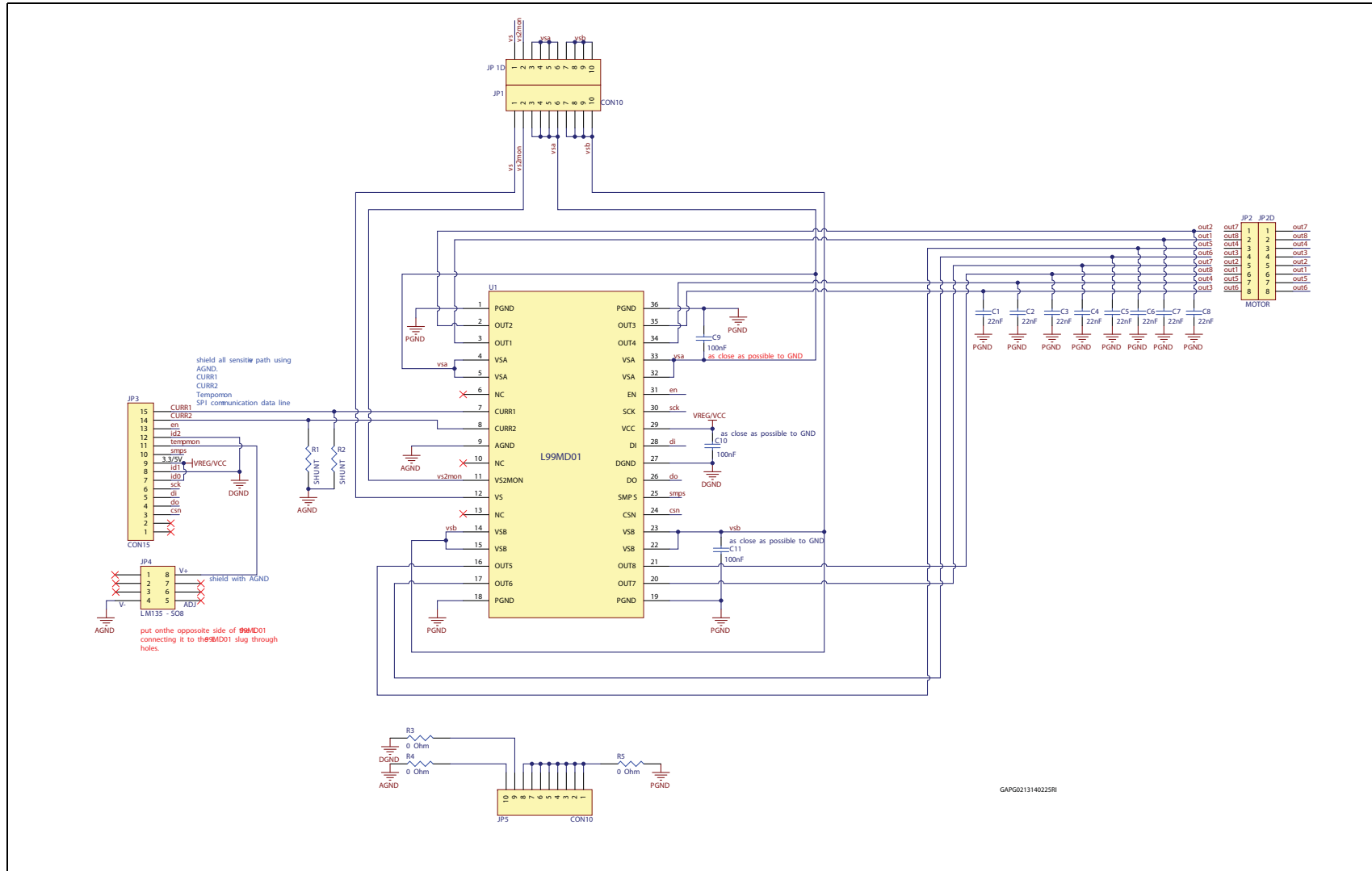
Below figure shows the placement of the connectors to be used for supplying the evaluation board, plugging the HVAC module and connecting with a host PC through USB cable.

**Figure 3. Board connections**



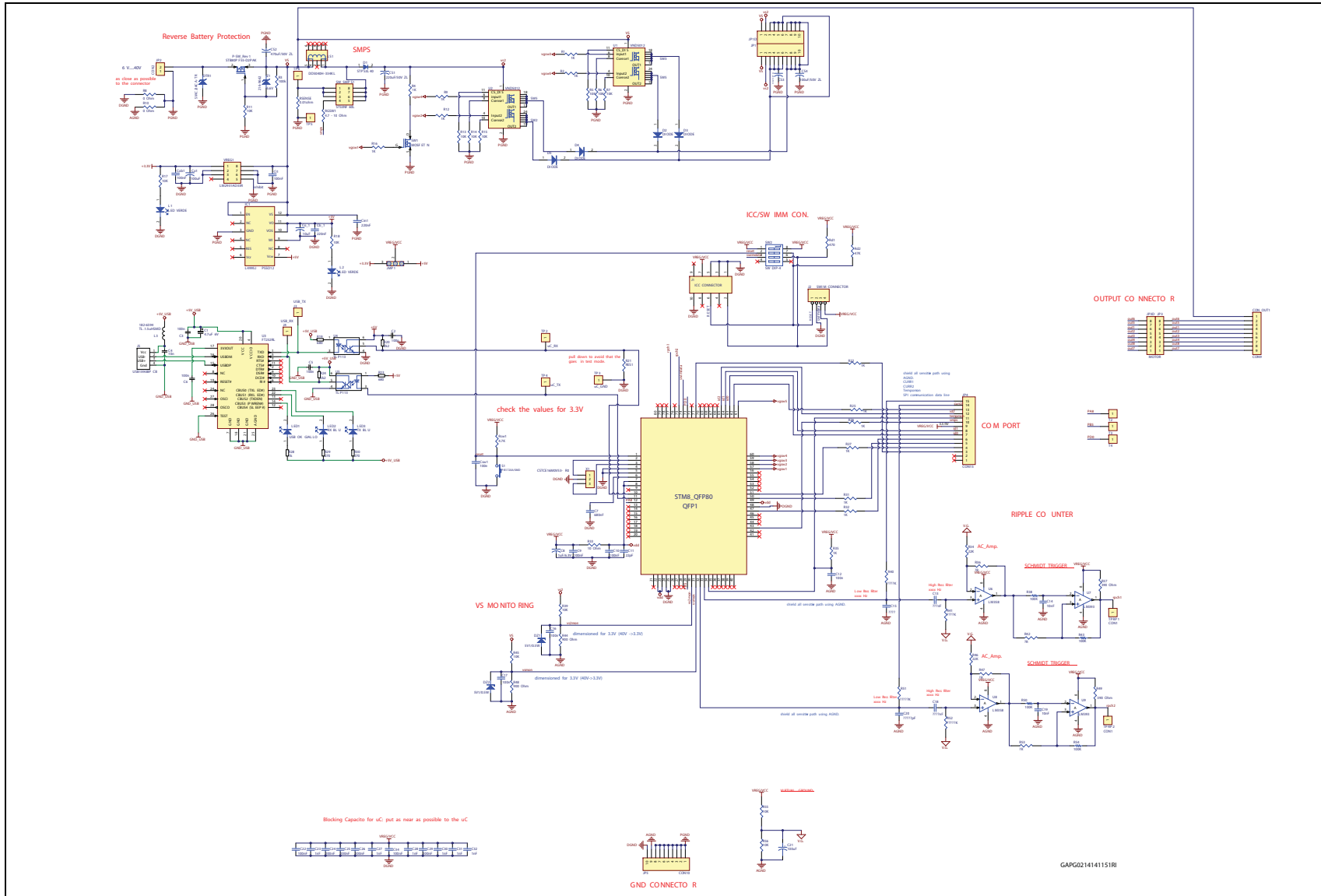
## 1.4 Board schematic

Figure 4. Daughterboard schematic



GAPG0213140225R1

Figure 5. Motherboard schematic



## 2 Example motor configurations

Figure 6. Driving 4 stepper motors simultaneously

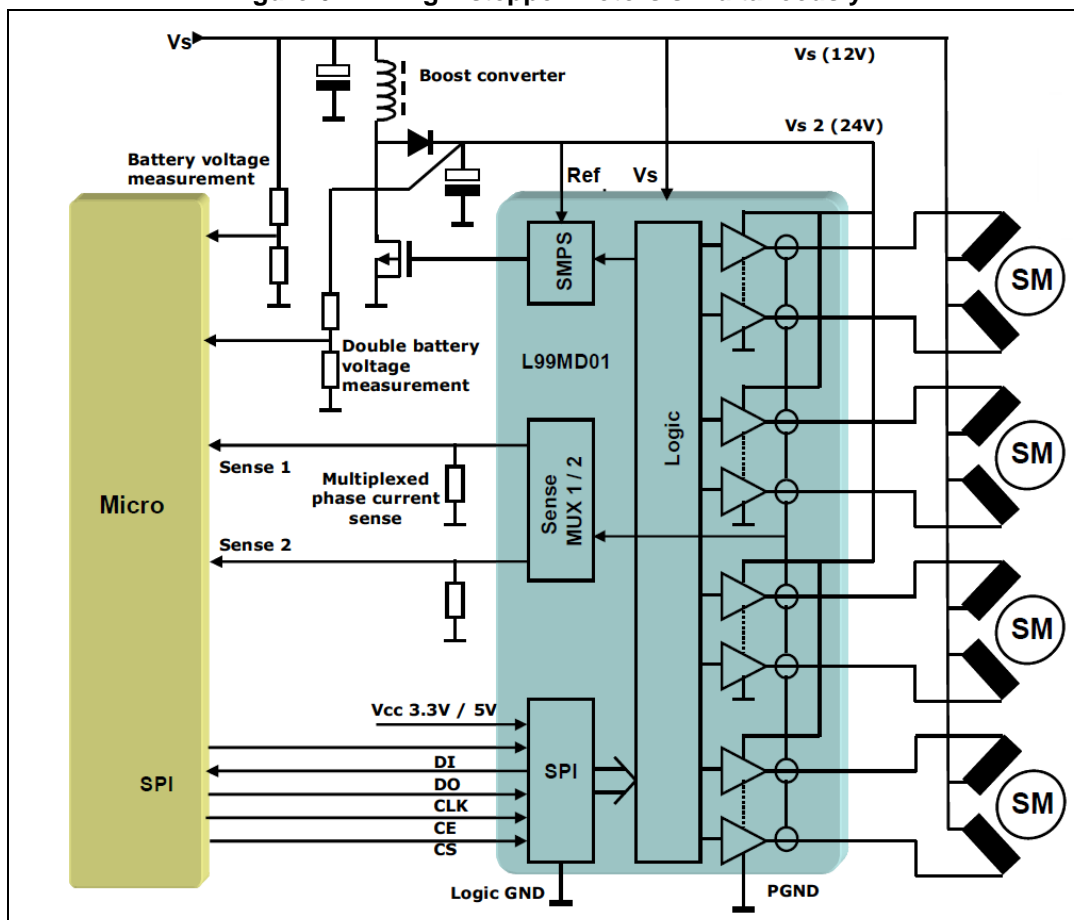




Figure 7. Driving 2 Stepper Motors simultaneously &amp; 3 DC-Motors sequentially

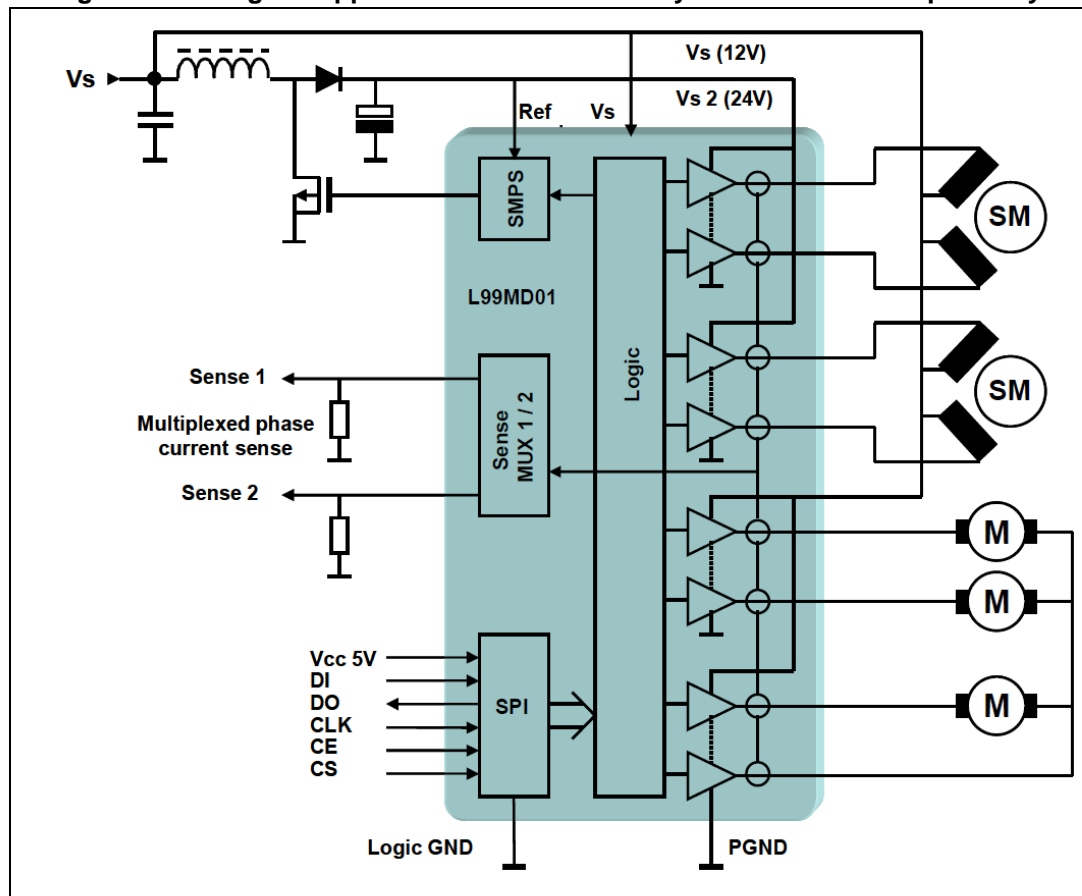


Figure 8. Driving 2 DC- Motors Simultaneously and 4 Sequentially

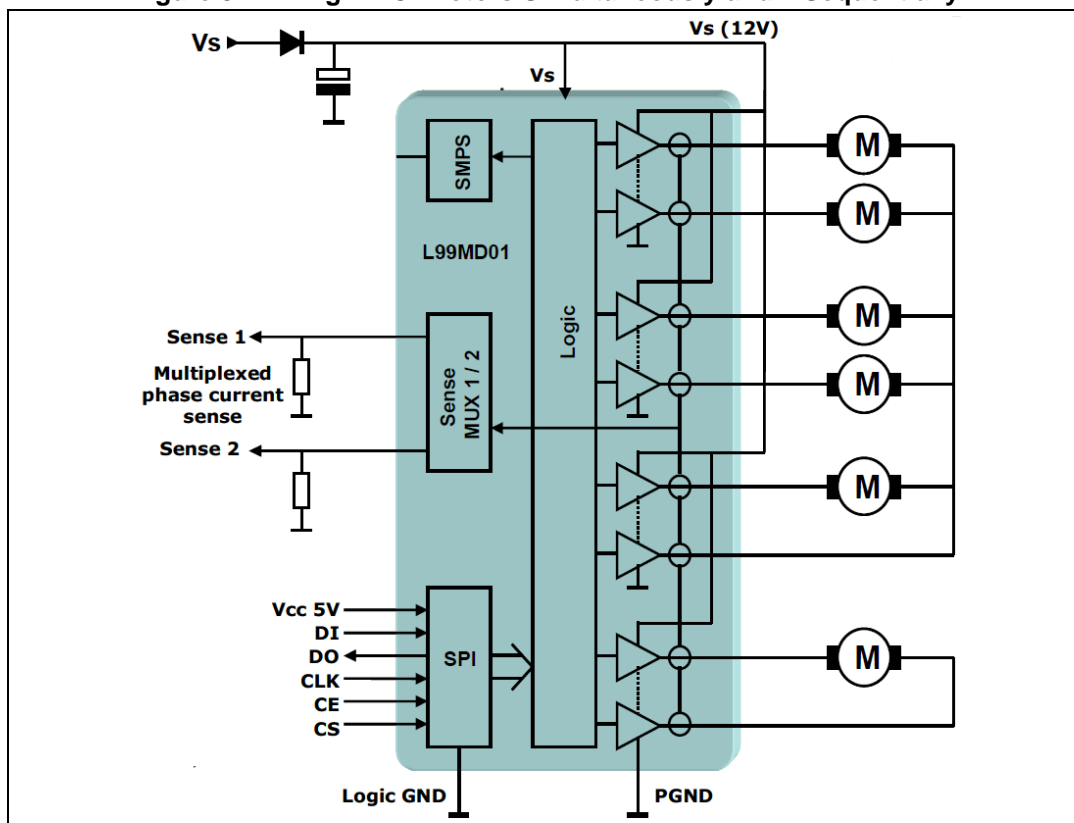
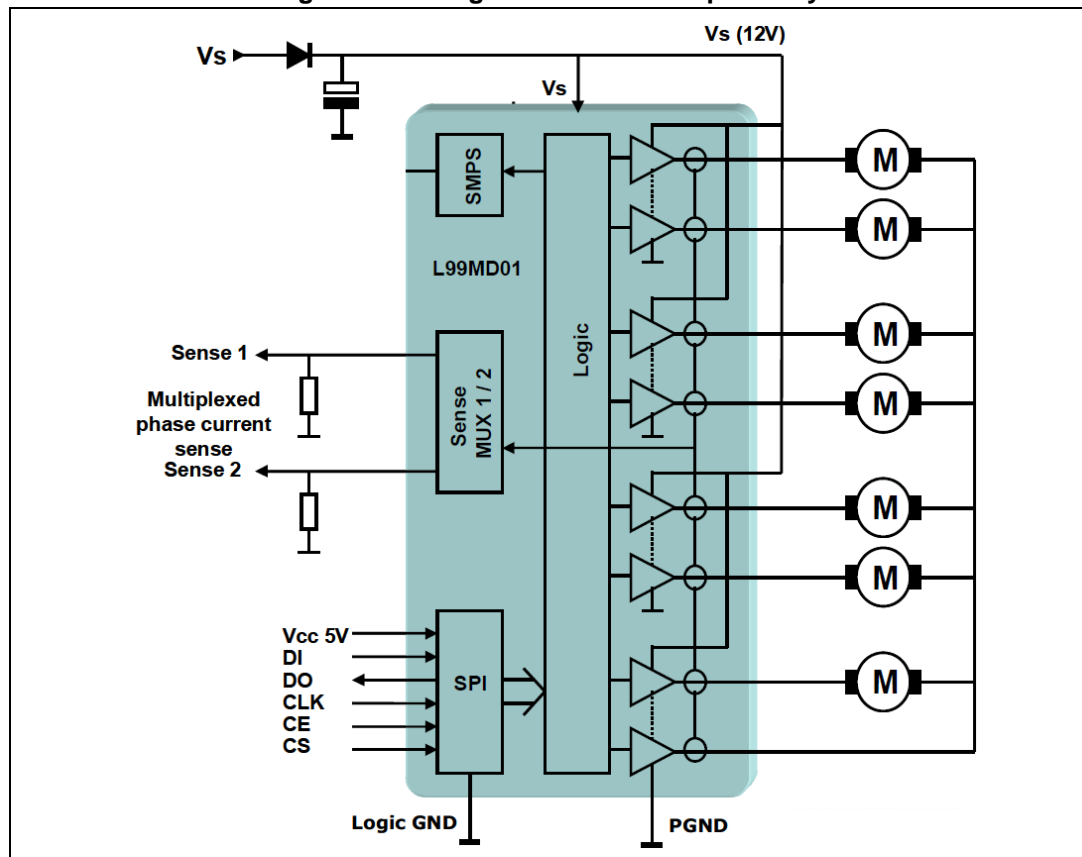


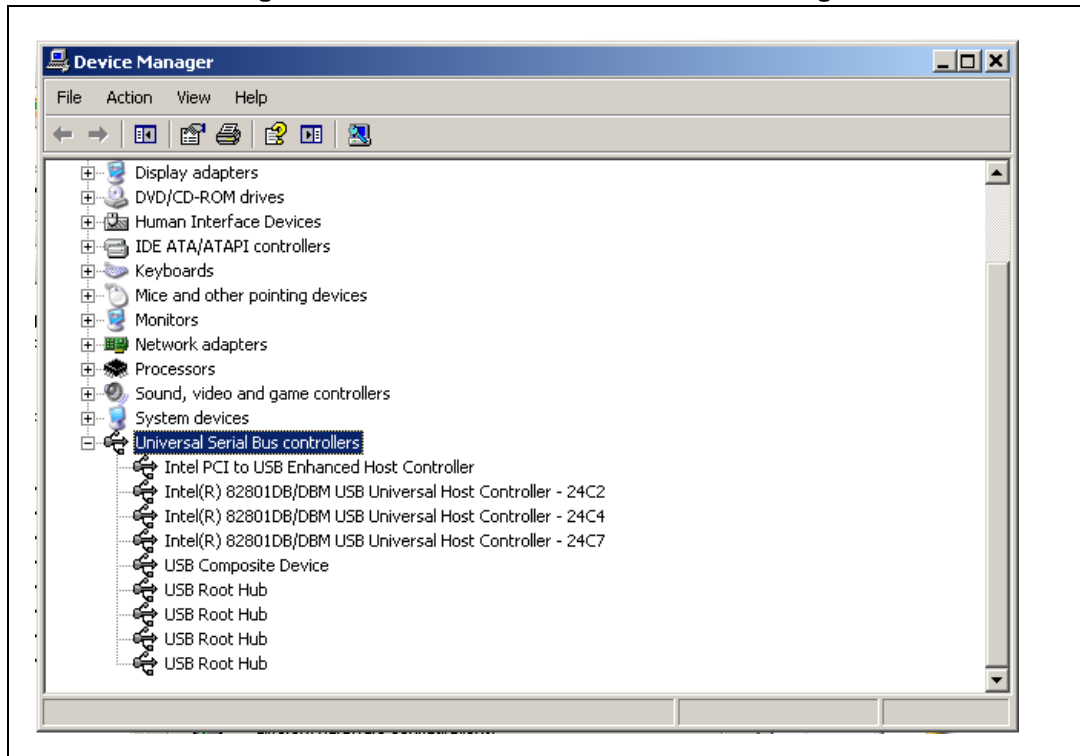
Figure 9. Driving 7 DC- Motors Sequentially



### 3 Software installation

After plugging the evaluation board to the host PC, it will be recognized as an USB device, see [Figure 10: Installation - Windows Device Manager](#).

**Figure 10. Installation - Windows Device Manager**



You will find the Evaluation Board as an USB Device without drivers installed, marked 

Right click, then select Update Driver

Figure 11. Installation part 1

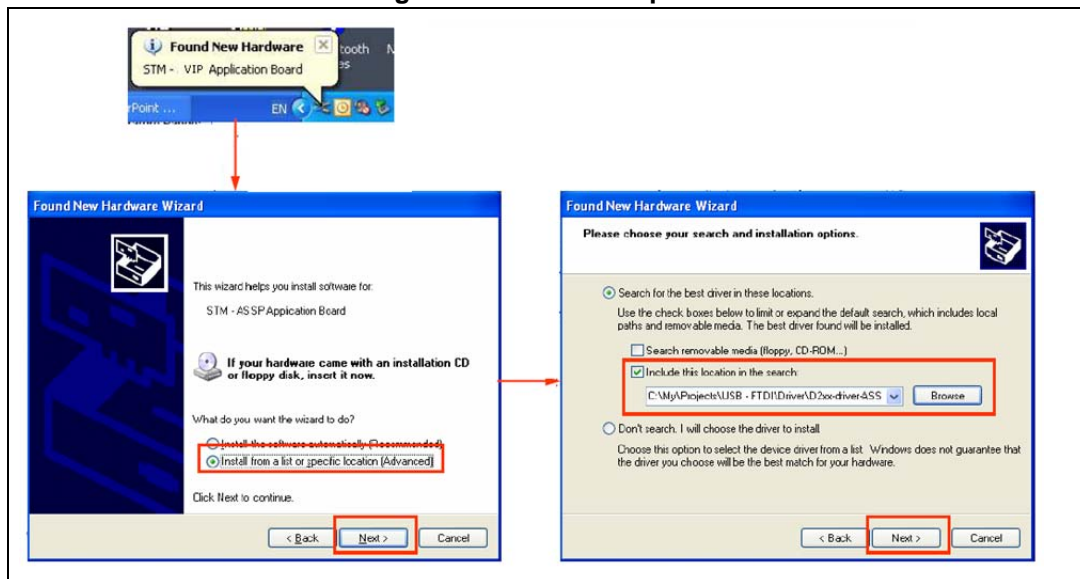
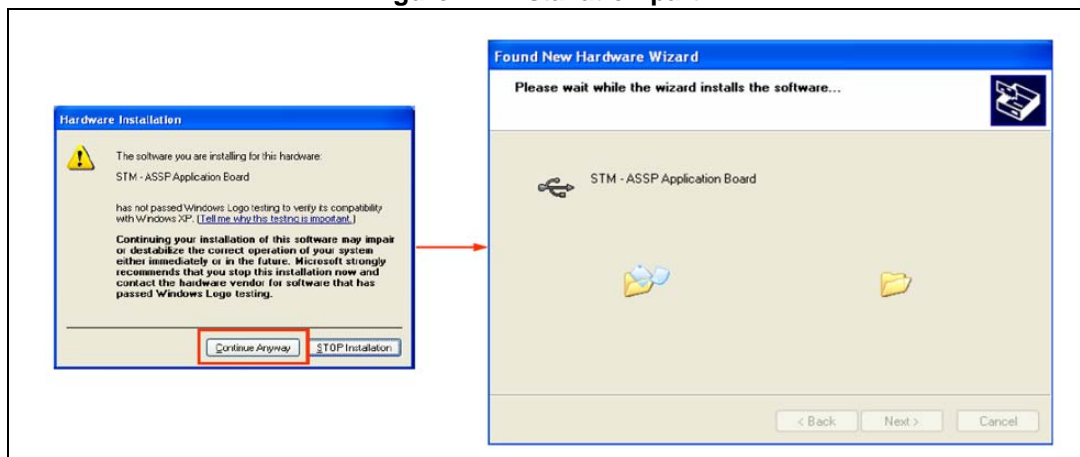


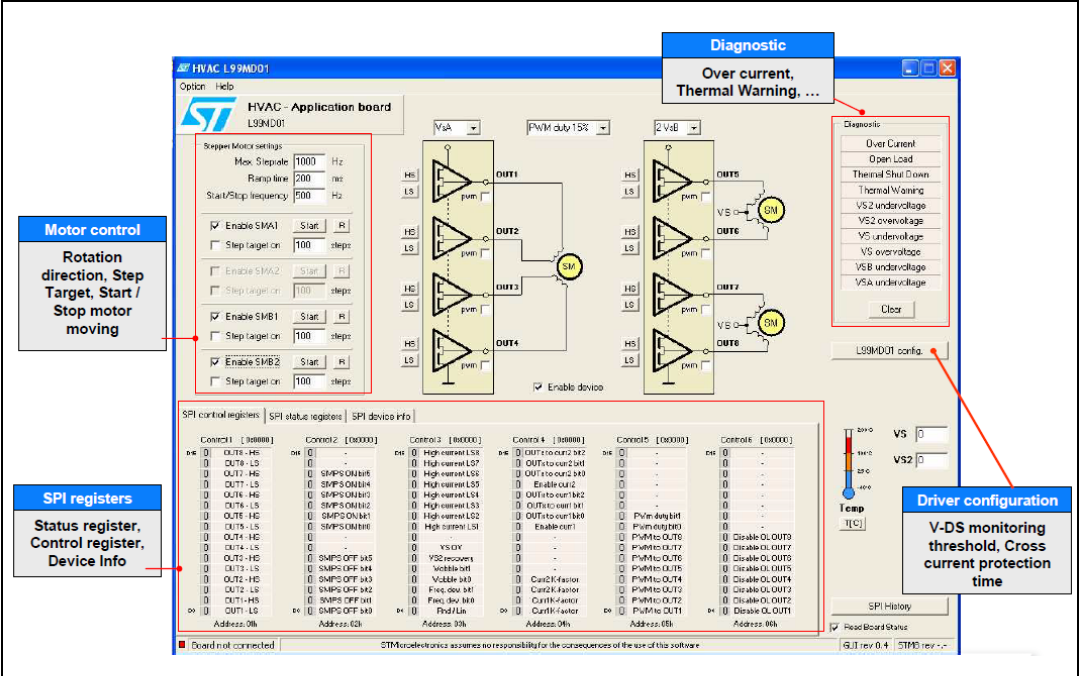
Figure 12. Installation part 2



# 4 Graphical User Interface

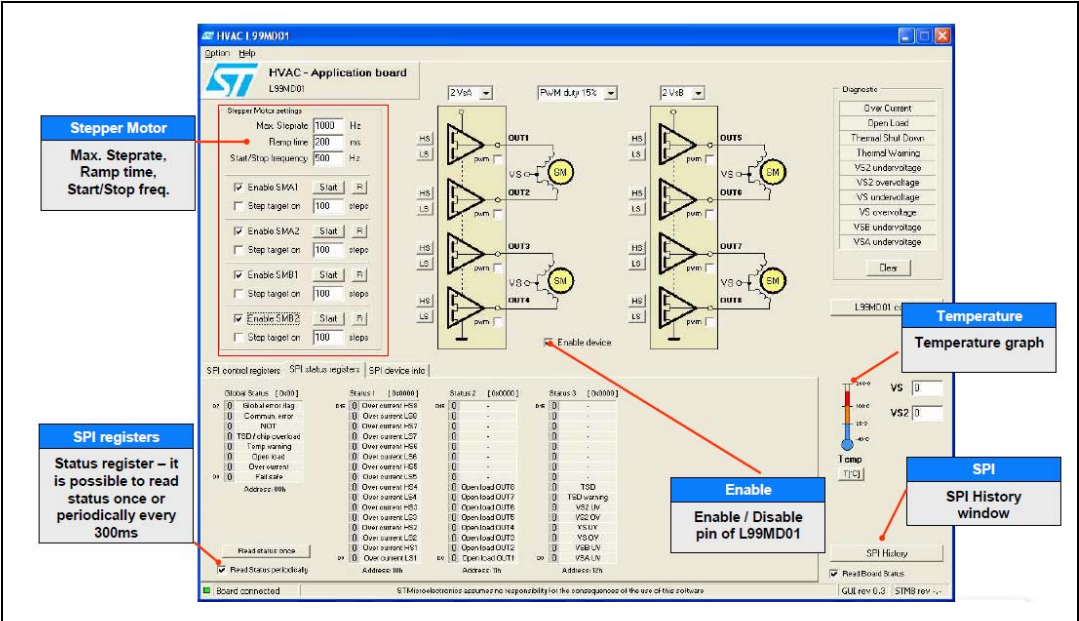
Main Window (1/2)

Figure 13. GUI Main Window



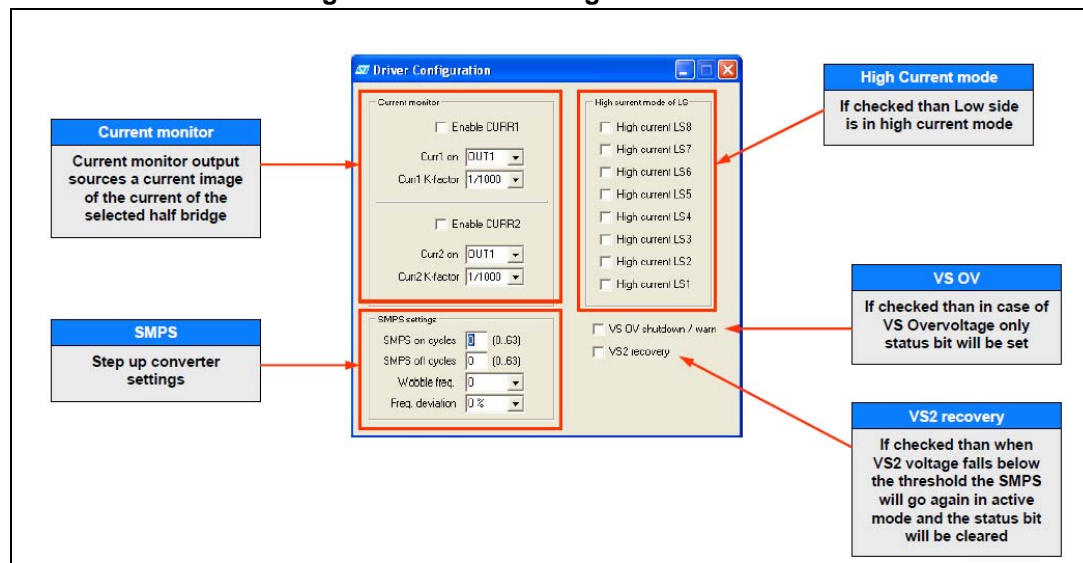
Main Window (2/2)

Figure 14. GUI Main Window



## Driver Configuration Window

Figure 15. Driver Configuration Window



## Motor settings

Figure 16. Motor settings

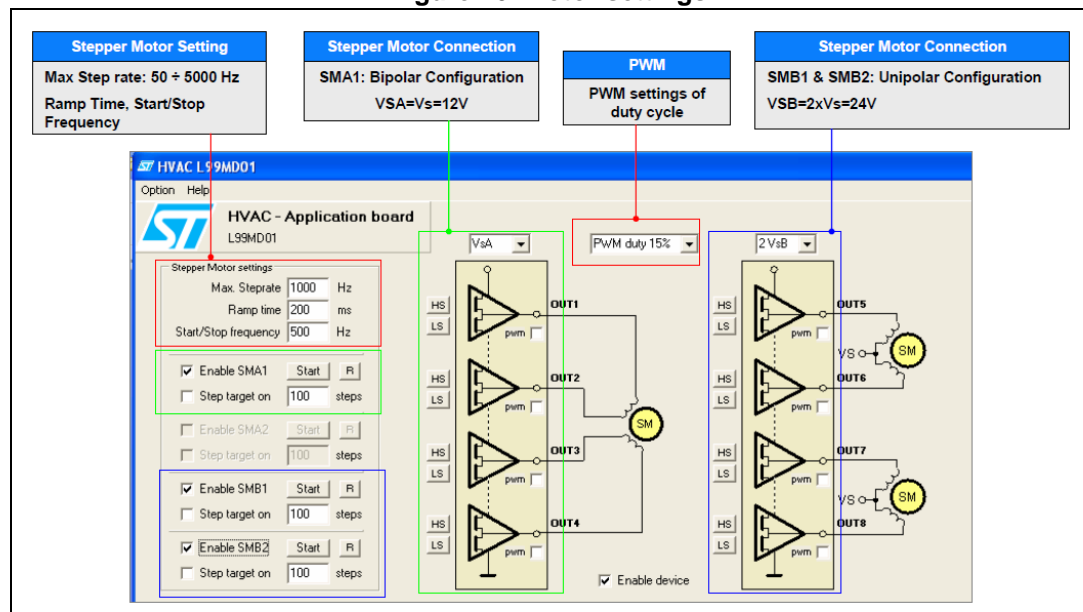
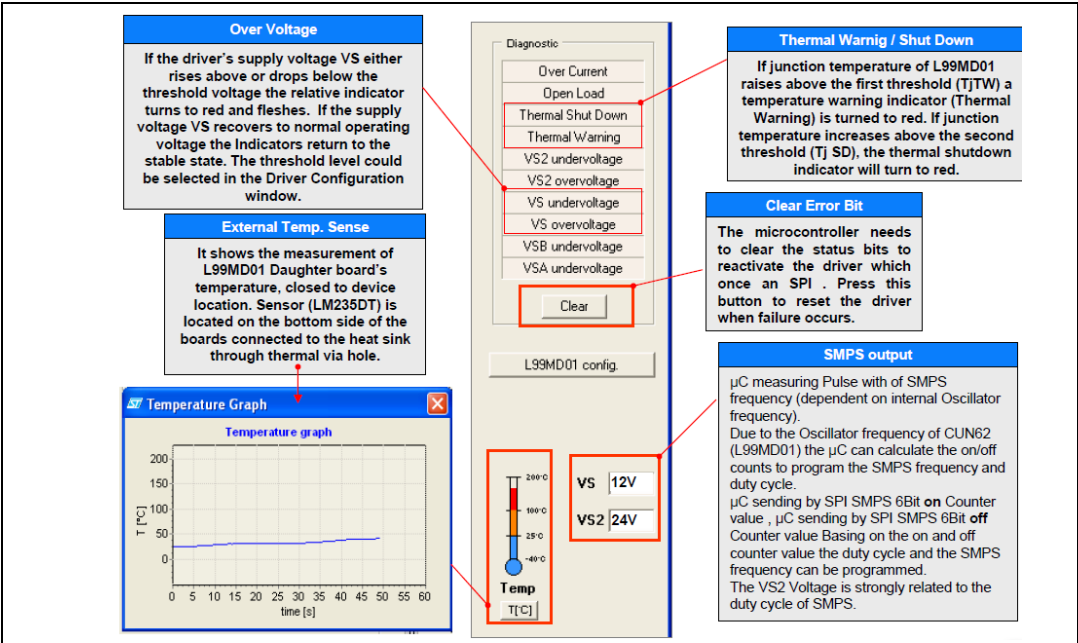
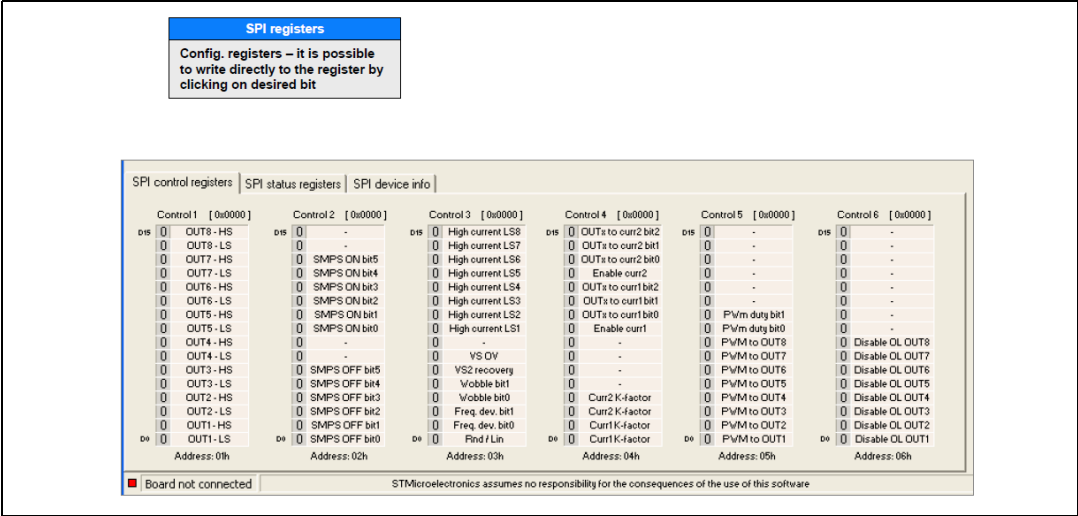


Figure 17. Diagnostic



SPI Registers (1/3) - Control Registers

Figure 18. SPI Control Registers



SPI Registers (2/3) - Status Registers



### Figure 19. SPI Status Registers

**SPI registers**

**Status register – it is possible to read status once or periodically every 300ms**

SPI control registers: **SPI status registers** SPI device info

Global Status [0x00]		Status 1 [0x0000]		Status 2 [0x0000]		Status 3 [0x0000]	
D7	0 Global error flag	D15	0 Over current HS8	D15	0 -	D15	0 -
	0 Commun. error		0 Over current LS8		0 -		0 -
	0 NDI		0 Over current HS7		0 -		0 -
	0 TSD / chip overload		0 Over current LS7		0 -		0 -
	0 Temp warning		0 Over current HS6		0 -		0 -
	0 Open load		0 Over current LS6		0 -		0 -
	0 Over current		0 Over current HS5		0 -		0 -
D6	0 Fail safe		0 Over current LS5		0 -		0 -
Address: 00h			0 Over current HS4		0 Open load OUT8		0 TSD
			0 Over current LS4		0 Open load OUT7		0 TSD warning
			0 Over current HS3		0 Open load OUT6		0 VS2 UV
			0 Over current LS3		0 Open load OUT5		0 VS2 OV
			0 Over current HS2		0 Open load OUT4		0 VS UV
			0 Over current LS2		0 Open load OUT3		0 VS OV
			0 Over current HS1		0 Open load OUT2		0 VSB UV
		D0	0 Over current LS1	D0	0 Open load OUT1	D0	0 VSA UV
Address: 10h		Address: 11h		Address: 12h			

☒ Read Status periodically

☐ Board not connected

## SPI Registers (3/3) - Device Information

### Figure 20. SPI Device Information

The screenshot shows the 'SPI registers' window with the 'SPI device info' tab selected. The 'Device information' section displays the following data:

Register Name	Address	D7	D6
ID Header [0x00]	00h	0	-
Version [0x00]	01h	0	-
ProductCode1 [0x00]	02h	0	-
ProductCode2 [0x00]	03h	0	-
Fuses [0x00]	3Dh	0	-
SPI-Frame ID [0x00]	3Eh	0	-

At the bottom left, there is a red square icon and the text 'Board not connected'. At the bottom right, a disclaimer states: 'STMicroelectronics assumes no responsibility for the consequences of the use of this software'.

## 5 Revision history

**Table 1. Revision history**

<b>Date</b>	<b>Revision</b>	<b>Changes</b>
12-Mar-2014	1	Initial release.

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