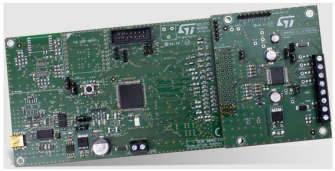

STMicroelectronics UM2860 EVAL-L99SM81V Evaluation Board User Manual

Contents

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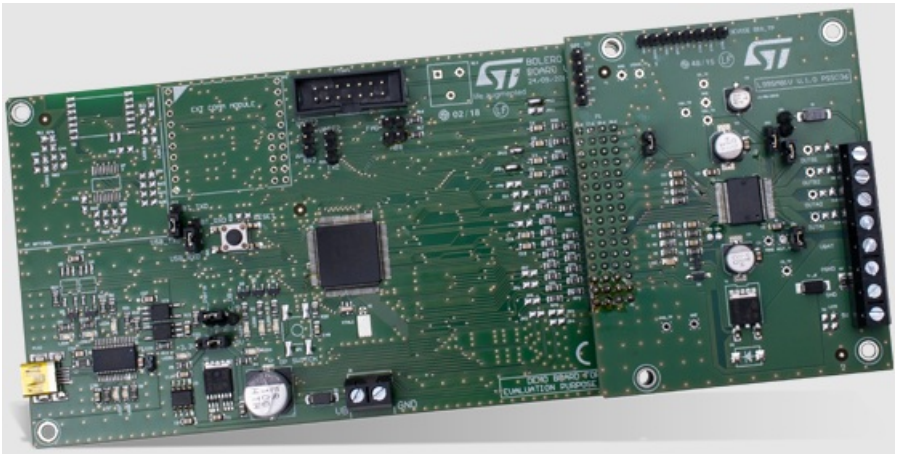
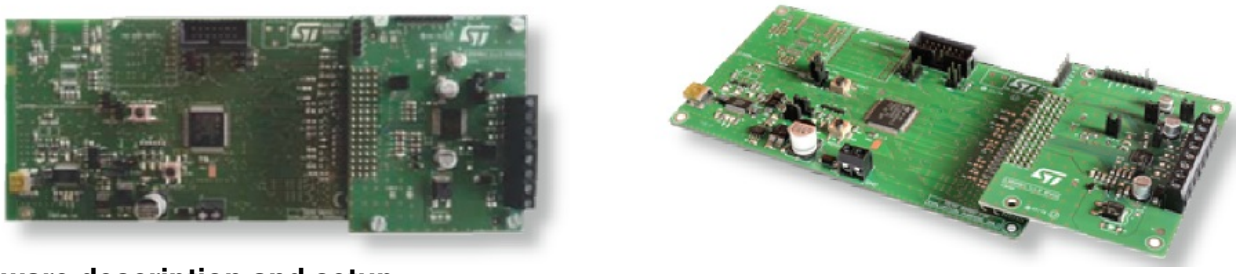


Introduction

EVAL-L99SM81VQ and EVAL-L99SM81VY are two evaluation boards designed to drive one bipolar stepper motor in micro-stepping mode together with coil voltage measurement for stall detection. The two evaluation boards are composed by a motherboard and a daughterboard on which is pre-assembled the L99SM81VQ6TR (EVAL-L99SM81VQ, QFN40L package) or the L99SM81VYTR (EVAL-L99SM81VY, PowerSSO-36 package). Both evaluation boards provide electronic control modules with enhanced power management and power supply functionalities including one standby mode.

The motherboard, based on SPC56 microcontroller, provides the logic section for monitoring and driving the L99SM81V assembled in the daughterboard.
STM provides a dedicated Graphic User Interface (GUI) in order to make the board usage and setting simpler. This enables the user to set L99SM81Vx parameters and at the same time it shows real time device information as voltage measurements, main power supply voltage, fault flags, device junction temperature and much more.

Figure 1. EVAL-L99SM81VY and EVAL-L99SM81VQ

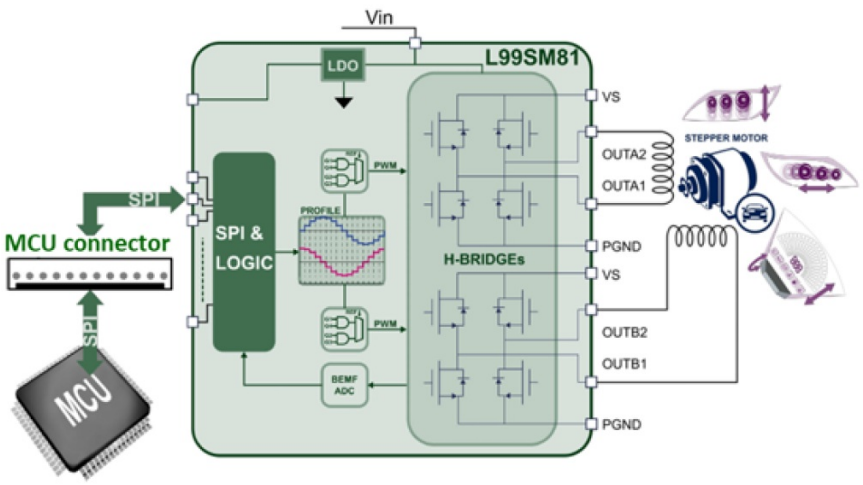


Hardware description and setup

This section provides a description of the main components of this evaluation kit, giving instruction for a quick setup of the system.
Components description
The evaluation kit consists of two main components:

- N.1 motherboard based on SPC56 microcontroller, interfacing host PC with daughterboard. The communication with the PC is established through isolated USB.
- N.1 daughterboard assembling L99SM81VQ or L99SM81VY.
  The daughterboards with L99SM81Vx and the motherboard are provided are provided already plugged.

Figure 2. EVAL-L99SM81Vx block diagram



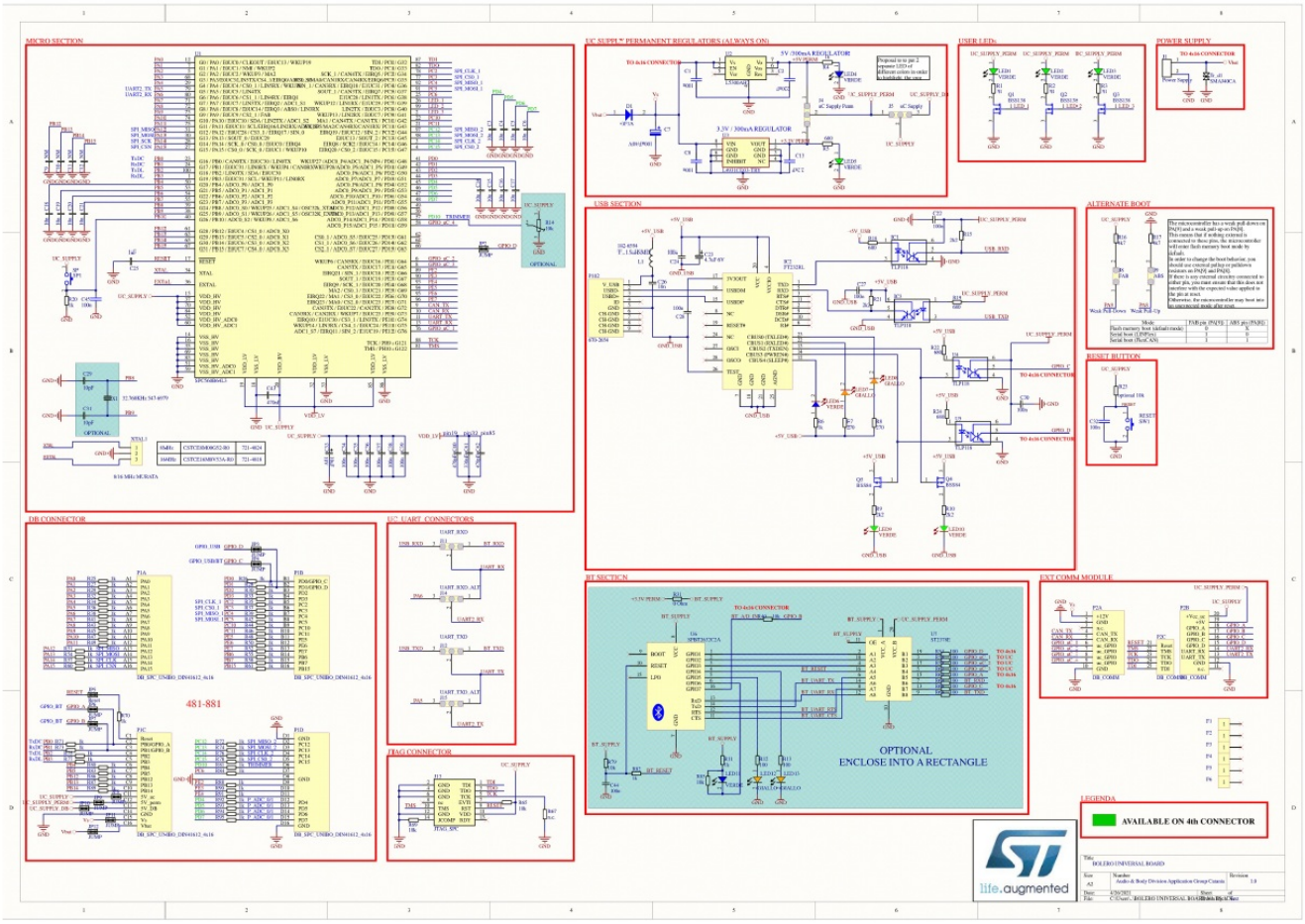
Motherboard schematic

An universal motherboard is used to control and drive the daughterboards containing the L99SM81Vx. The motherboard has the following functions:

1. USB-to-UART conversion: a FT232RL USB to serial UART interface is used to convert the data from the GUI, in the PC, in commands that are processed by the microcontroller.
2. SPC560B64L3 microcontroller: it is used to convert the commands from the GUI in control signals for the L99SM81Vx in the daughterboards. Also it process the data received from the L99SM81Vx and return the results to the GUI by the USB.
3. L5300AH7 and L4931CD33 LDOs: these LDOs are used to convert the +12 V used to supply the motherboard to a +5 V (L5300AH7) or +3.3 V (L4931CD33) supply voltage used to supply the microcontroller and the L99SM81Vx in the daughterboards.
4. JTAG and UART connectors.
5. Connectors to plug the daughterboard.

   Motherboard schematic is shown in Figure 3. EVAL-L99SM81V motherboard schematic.
   Schematic and BOM of the motherboard can be found on the ST website.

Figure 3. EVAL-L99SM81V motherboard schematic



Daughterboards schematic

Figure 4. EVAL-L99SM81VQ daughterboard schematic and Figure 5. EVAL-L99SM81VY daughterboard schematic show the schematic of the daughterboards.
In the daughterboard the following sections are present:

1. N. 1 L99SM81Vx and the components necessary for its functionality
2. Connectors to the motherboard
3. N. 1 power supply part: two connectors are foreseen

4. N. 1 SPI connector
5. N. 1 reverse battery protection circuitry

   Schematic and BOM of the two daughterboards can be found on the ST website.

Figure 4. EVAL-L99SM81VQ daughterboard schematic

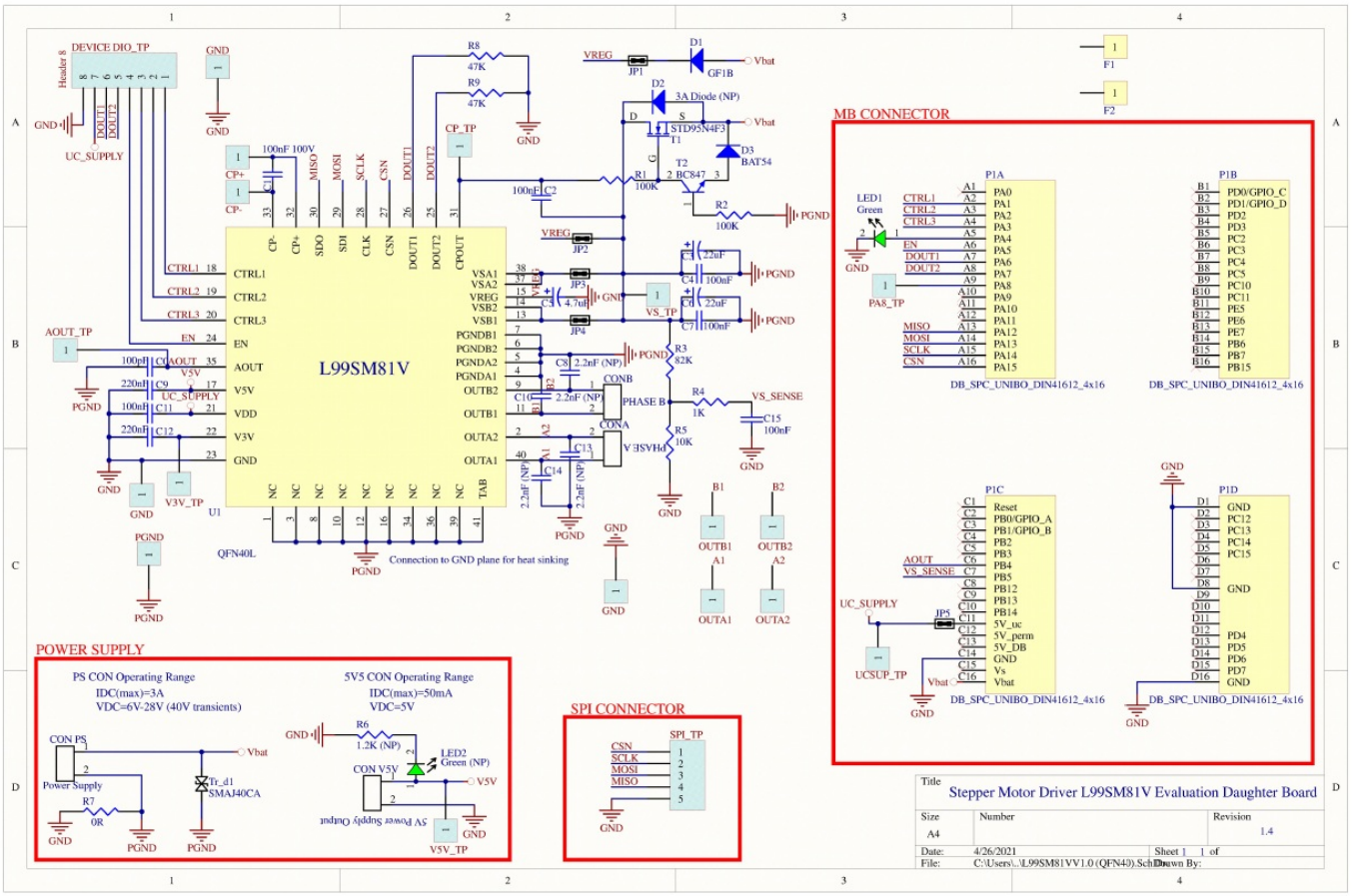
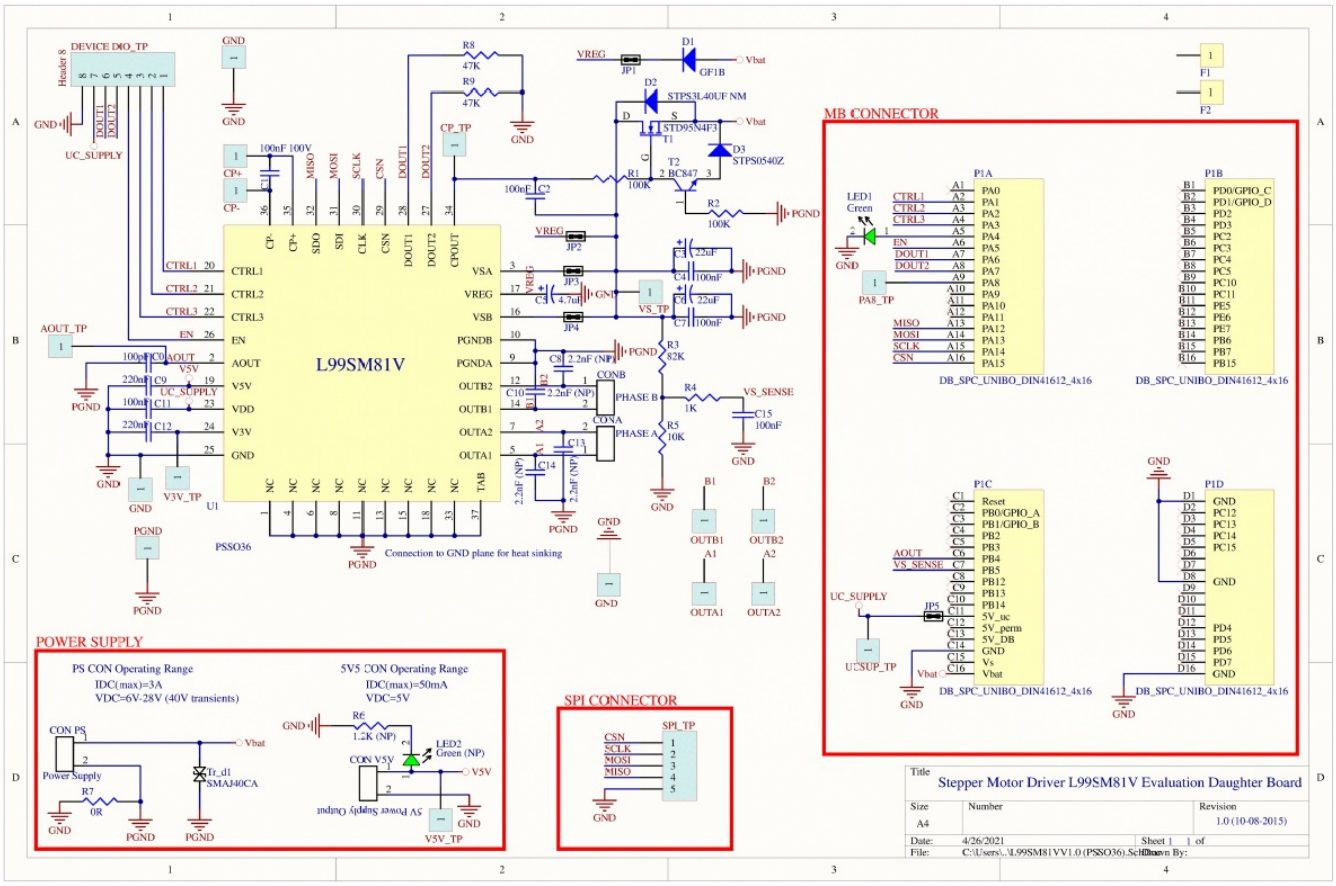


Figure 5. EVAL-L99SM81VY daughterboard schematic



Motherboard layout

The EVAL-L99SM81Vx motherboard was designed in a 2 layers board.

Motherboard TOP and BOTTOM layers are shown in and Figure 6. Motherboard TOP layer and Figure 7. Motherboard BOTTOM layer.

Gerber files of the motherboard can be found in the ST website.

Figure 6. Motherboard TOP layer

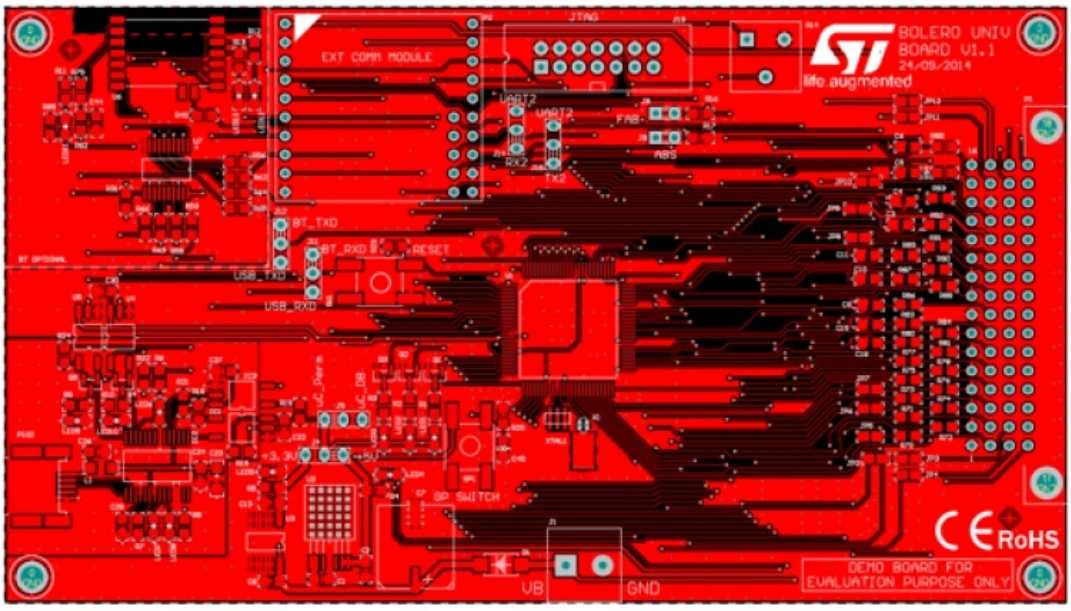
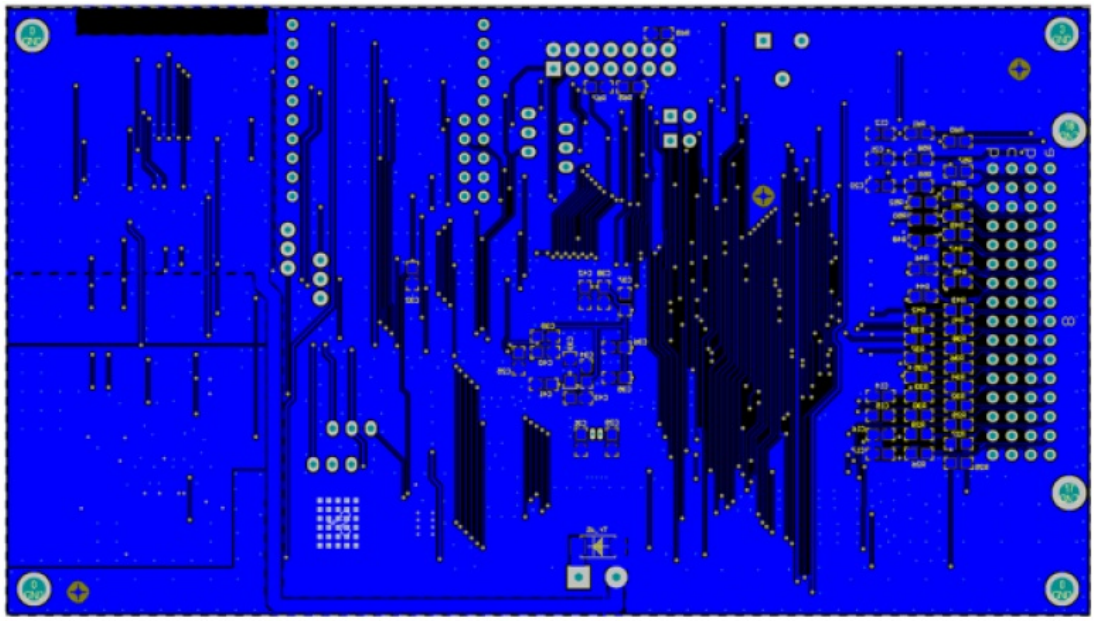


Figure 7. Motherboard BOTTOM layer



Daughterboard layout

Different choice regarding the number of the layers can be used. A two-layers or an N-layers (where N can be 3 or 4) application board can be used to develop the board for the L99SM81Vx application.

EVAL-L99SM81VQ and EVAL-L99SM81VY daughterboards were designed in a 4 layers board.

The layers of the two application boards are shown respectively from to Figure 8. EVAL-L99SM81VY TOP layer to Figure 15. EVAL-L99SM81VQ BOTTOM layer .

Gerber files of the two daughterboards can be found in the ST website.

Figure 8. EVAL-L99SM81VY TOP layer

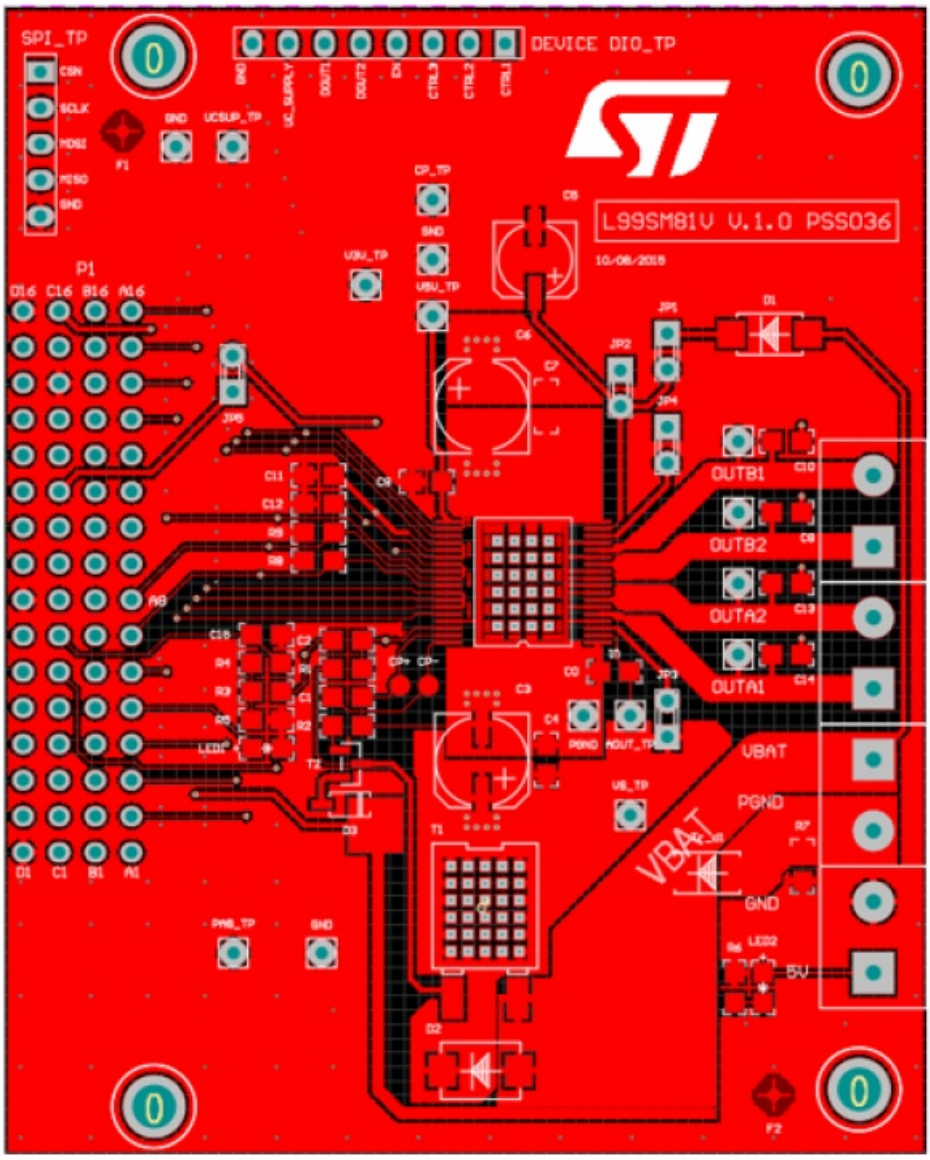


Figure 9. EVAL-L99SM81VY Signal1 layer

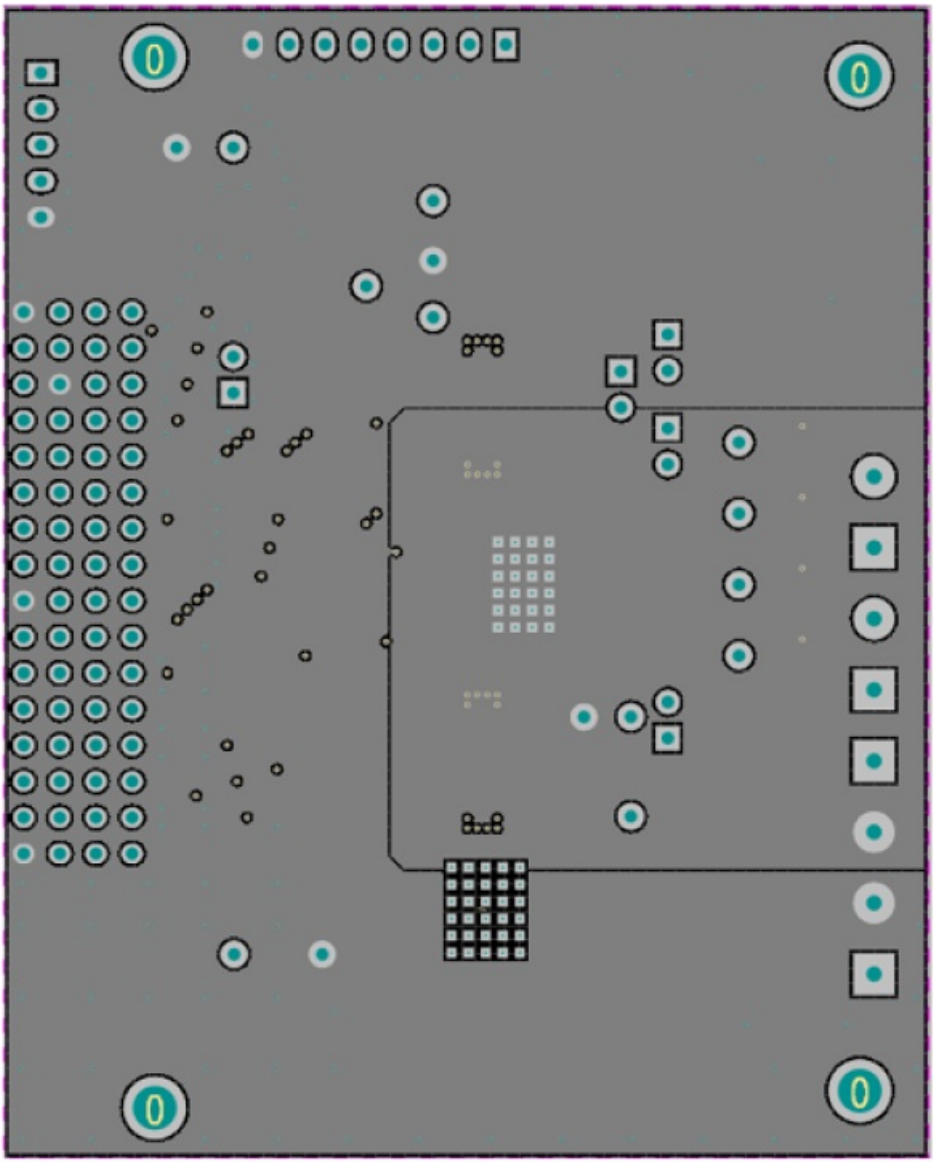


Figure 10. EVAL-L99SM81VY Signal2 layer

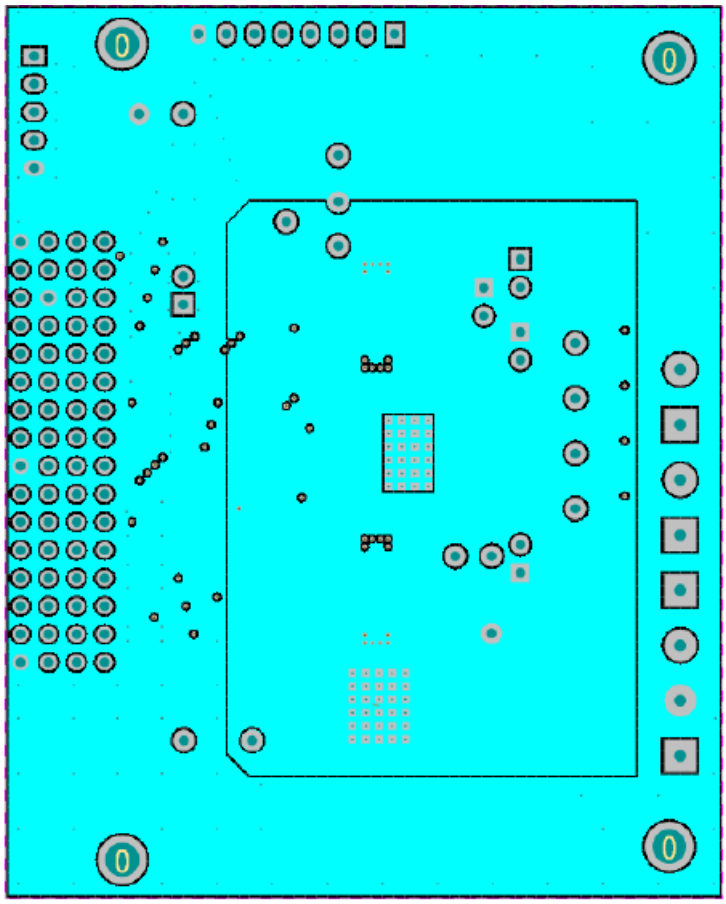


Figure 11. EVAL-L99SM81VY BOTTOM layer

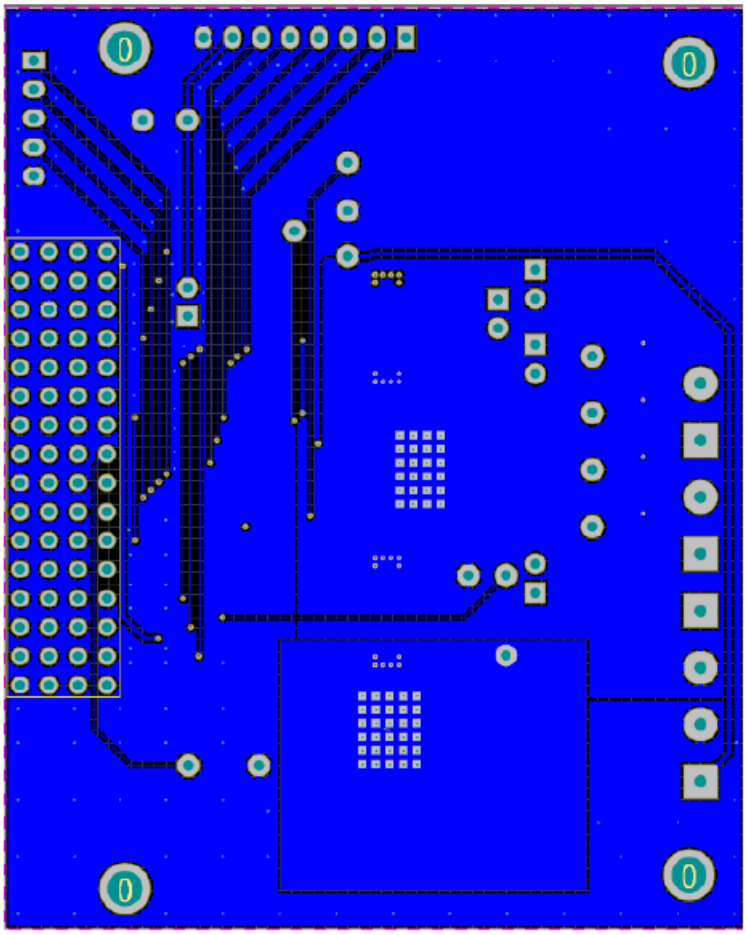


Figure 12. EVAL-L99SM81VQ TOP layer

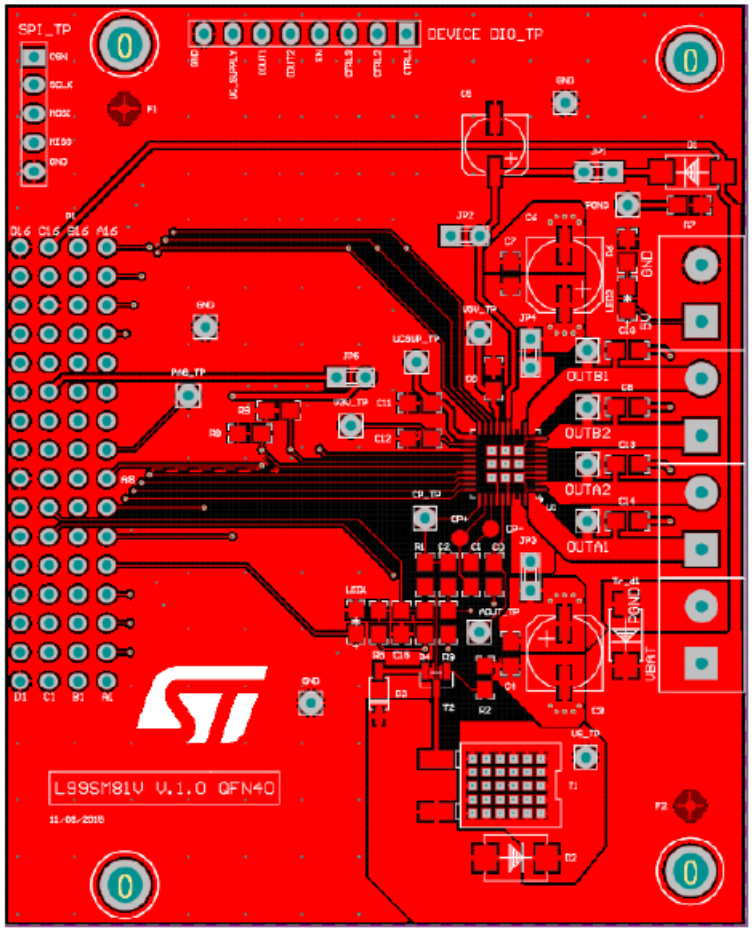


Figure 13. EVAL-L99SM81VQ Signal1 layer

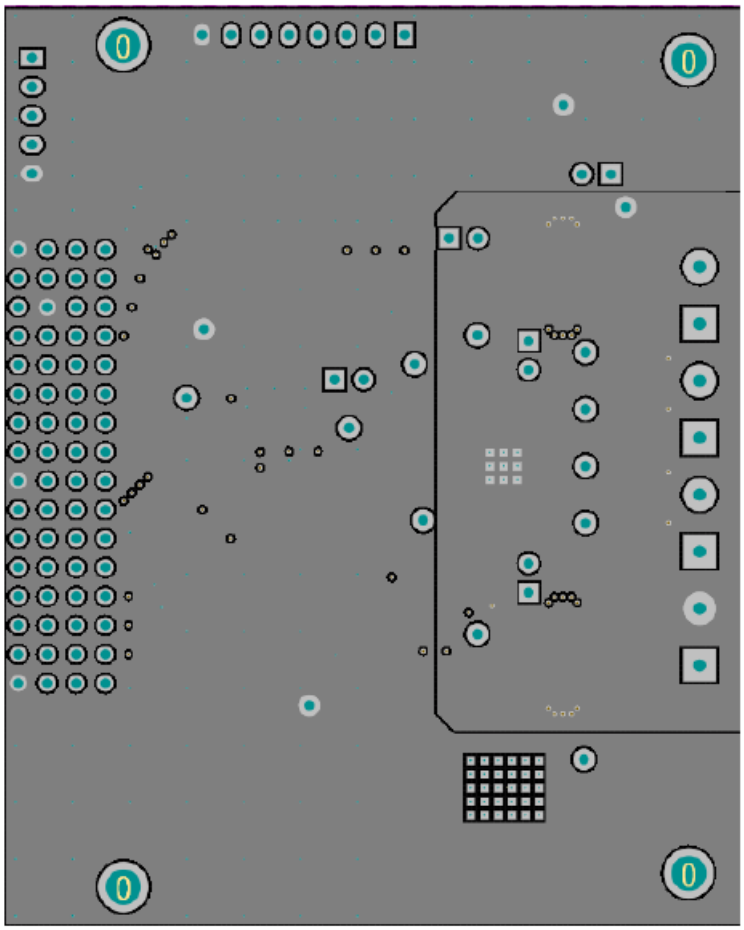


Figure 14. EVAL-L99SM81VQ Signal2 layer

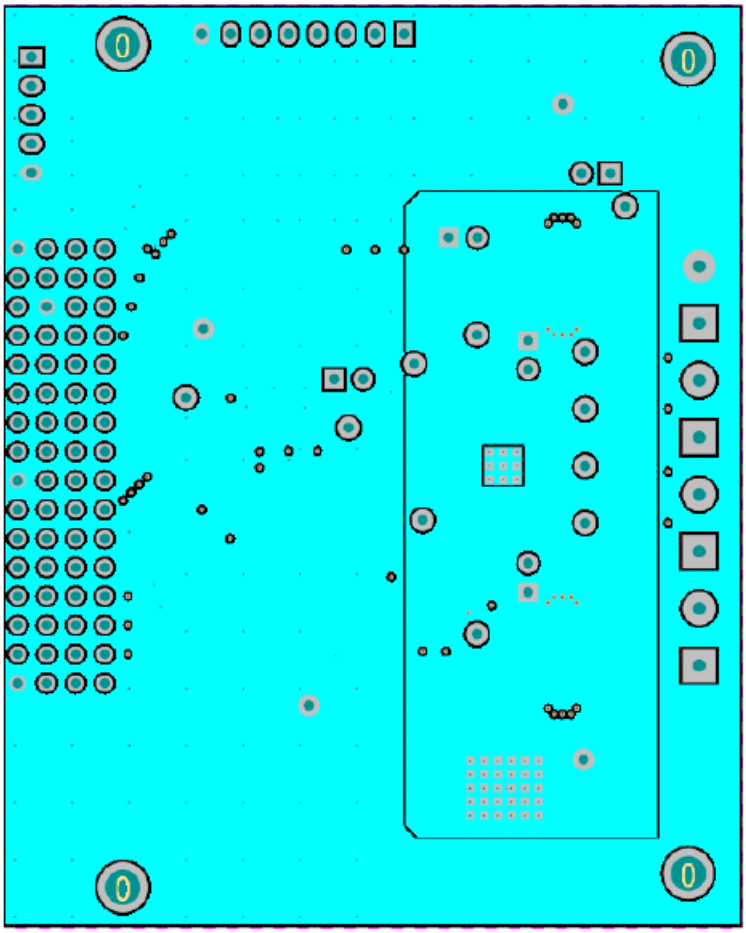
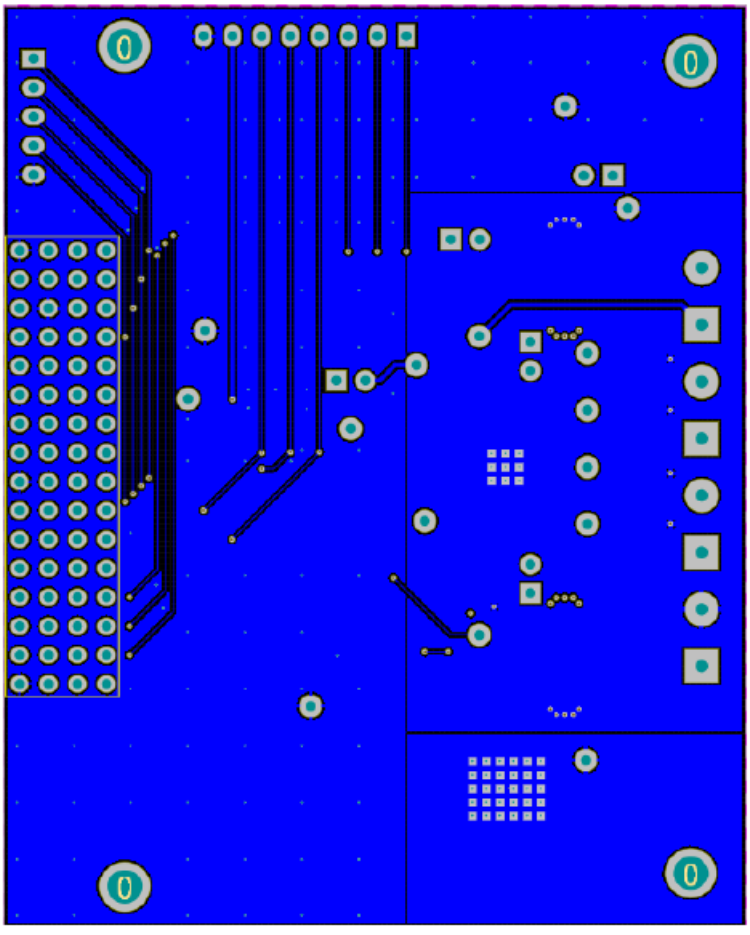


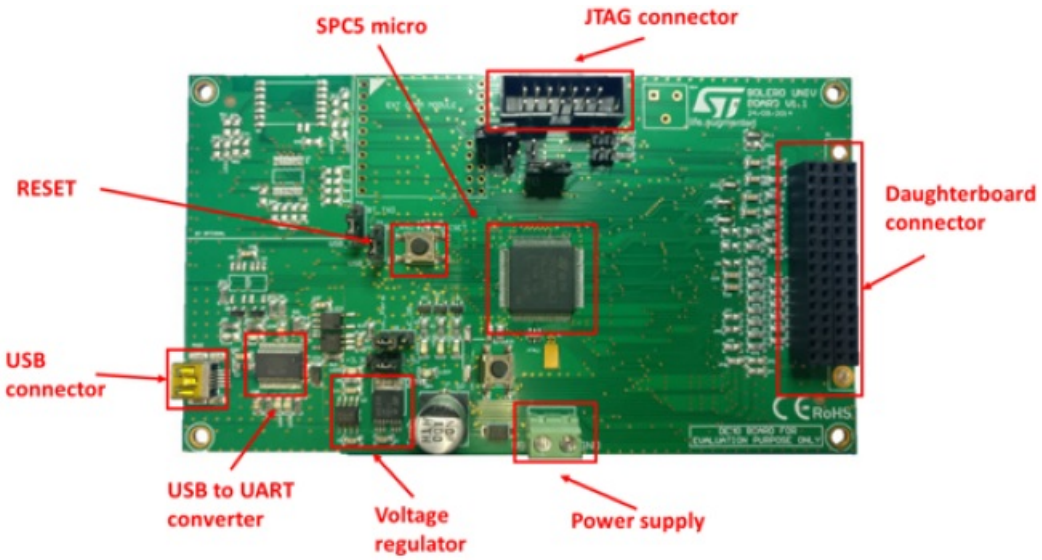
Figure 15. EVAL-L99SM81VQ BOTTOM layer



Board connection and setup

Figure 16. Motherboard section shows the placement of the components on the motherboard. Also, the placement of the connectors to be used for supplying the evaluation board and connecting with a host PC through USB cable are shown.

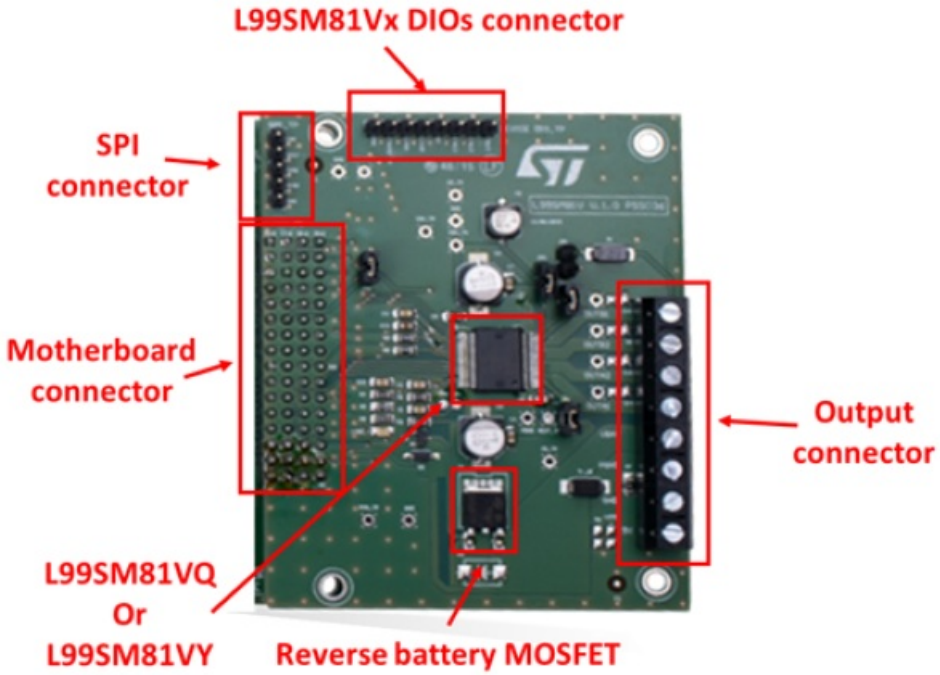
Figure 16. Motherboard section



The placement of the components of the daughterboard is shown in Figure 17. Daughterboard section. The main components of the daughterboard are:

1. L99SM81VY or L99SM81VQ.
2. Reverse battery MOSFET.
3. Connector to the motor.
4. Connector to the motherboard.
5. Connector to the SPI.
6. Connector to the device DIOs.

Figure 17. Daughterboard section



Revision history

Table 1. Document revision history

Date	Version	Changes
19-Jul-2021	1	Initial release.

Documents / Resources

	STMicroelectronics UM2860 EVAL-L99SM81V Evaluation Board [pdf] User Manual EVAL-L99SM81V Evaluation Board

References

- STMicroelectronics: Our technology starts with you
- STMicroelectronics Trademark List - STMicroelectronics
- EVAL-L99SM81VQ - EVALUATION BOARD FOR L99SM81VQ (VFQFPN 6X6) - STMicroelectronics
- EVAL-L99SM81VY - EVALUATION BOARD FORL99SM81VY (PowerSSO 36) - STMicroelectronics