

## Introduction

The EVAL-L9942 is the evaluation board designed to provide the user a platform to evaluate the motor driver for bipolar stepper motors L9942.

The EVAL-L9942 board provides all the inputs and outputs capabilities necessary to drive a bipolar stepper motor and also to monitoring diagnostic functionalities.

The L9942 is a motor driver for bipolar stepper motors in automotive applications (throttle control, light levelling and bending light) as well as industrial application

The motor driver L9942 with micro-stepping and programmable current profile look-up-table allows a flexible adaptation of the motor characteristics and the intended operating conditions.

Different current profiles can be chosen depending on target criteria: minimize audible noise, reduce the vibrations, rotation speed or torque.

The decay mode used in PWM-current control circuit can be programmed to have slow, fast, mixed and auto-decay.

The programmable stall detection is useful to avoid running the motor for a time too long in stall position minimizing the noise.

---

# Contents

- 1      EVAL-L9942: board description ..... 5**
  - 1.1    EVAL-L9942: board description ..... 5
  - 1.2    Input connector ..... 6
  - 1.3    Supply voltages ..... 6
  - 1.4    Output connectors ..... 6
  
- 2      Connectors description ..... 7**
  - 2.1    Microcontroller connectors ..... 7
  
- 3      Test points description ..... 9**
  
- 4      Schematic diagram ..... 10**
  
- 5      PCB Layout ..... 11**
  
- Appendix A    General handling precautions ..... 12**
  
- Revision history ..... 13**

## List of tables

Table 1.	EVAL-L9942: Connectors description . . . . .	7
Table 2.	EVAL-L9942: Microcontroller connectors - description . . . . .	7
Table 3.	EVAL-L9942: Test points description . . . . .	9
Table 4.	Revision history . . . . .	13

## List of figures

Figure 1.	EVAL-L9942: board description . . . . .	5
Figure 2.	EVAL- L9942 - schematic diagram . . . . .	10
Figure 3.	EVAL-L9942: PCB layout - top side . . . . .	11
Figure 4.	EVAL-L9942: PCB layout - bottom side . . . . .	11

# 1 EVAL-L9942: board description

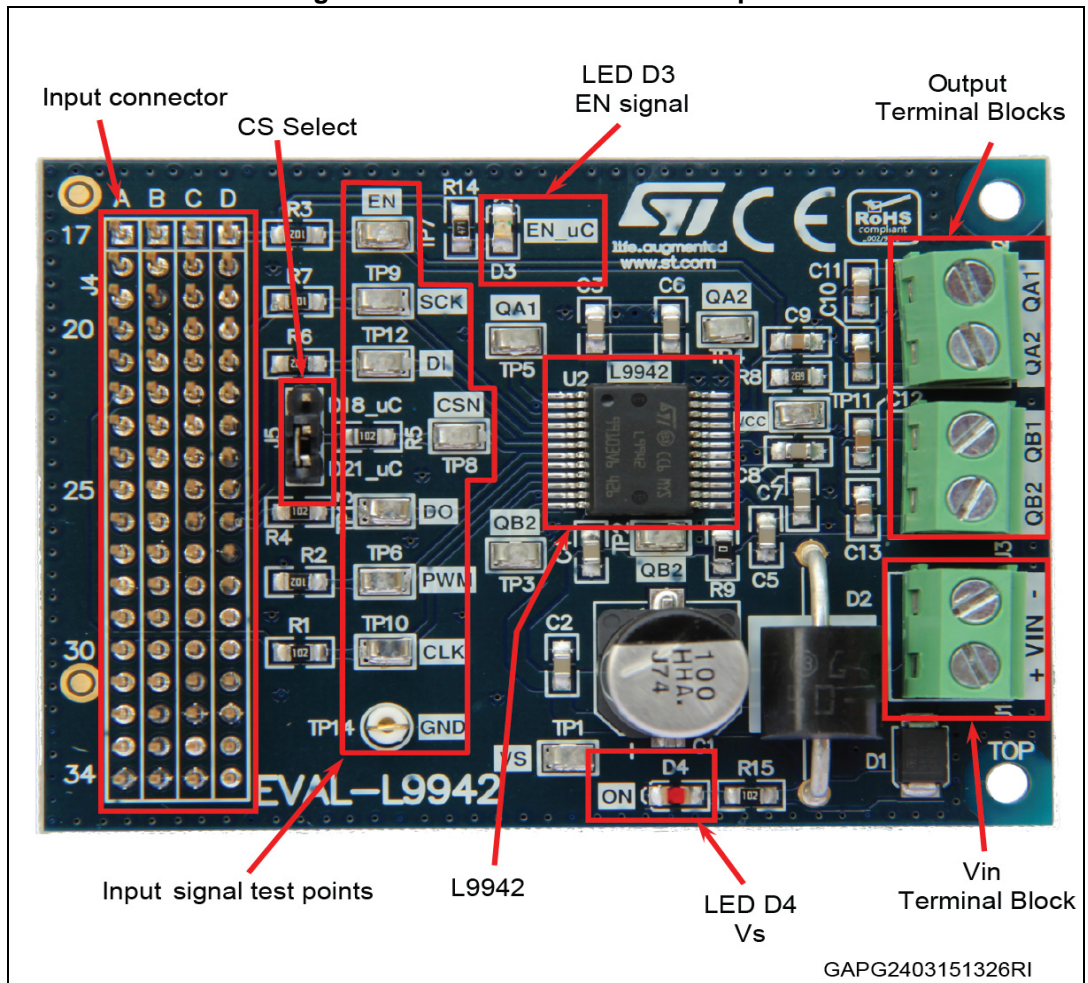
## 1.1 EVAL-L9942: board description

Figure 1 shows the EVAL-L9942 evaluation board.

The evaluation board size is 74 mm x 54 mm, with PCB 2 copper layers and FR4 glass epoxy support.

The PCB and all components assembled meet the requirements of the applicable RoHS directives.

Figure 1. EVAL-L9942: board description



## 1.2 Input connector

The L9942 is driven by a microcontroller via SPI (DO, DI, CLK, and CSN), STEP and EN signals. The entire input signals and +5V supply voltage ( $V_{CC}$ ) are connected to J4 connector (4 x17, 0.1" pin arrays). LED D3 is turned on when the EN signal is high. The LED brightness can be increased modifying R14 value<sup>(a)</sup>.

The connector is fully compatible with the SPC56 discovery boards<sup>(b)</sup>.

Jumper J5 (CS Select) allows to connect CSN signal to the pin D18 or D21.

## 1.3 Supply voltages

The device L9942 needs two voltage supplies:  $V_{CC}$  and  $V_S$ .  $V_{CC}$  is connected to J4 input connector (+5 V) while  $V_S$  is connected to J1 "V<sub>IN</sub>" terminal block.

To measure the power absorption from  $V_{IN}$ , the resistor R15 must be removed (LED D4 not supplied).

## 1.4 Output connectors

The outputs are connected to two terminal blocks (J2 and J3); four test points allow to monitor the output of the power bridges (QA1, QA2, QB1 and QB2).

---

a. R14 must be selected also considering the voltage drop on R3; the EN pin must be driven with signal amplitude (high level) compatible with the levels reported in the data sheet.

b. SPC56L-Discovery, SPC563M-DISP, SPC564A-DISP, SPC560P-DISP

## 2 Connectors description

**Table 1. EVAL-L9942: Connectors description**

Name	Description	Type
J1 (V <sub>S</sub> )	Supply voltage (V <sub>S</sub> ) GND	Screw terminal
J2	Output Connector QA <sub>n</sub> output	Screw terminal
J3	Output Connector QB <sub>n</sub> output	Screw terminal
J4	Microcontroller connector SPI, Input signal, V <sub>CC</sub>	4 x 17 pin array 100mil
J5	CS selector	Jumper 2 positions

### 2.1 Microcontroller connectors

**Table 2. EVAL-L9942: Microcontroller connectors - description**

Pin Name	Description	Type
D26	SDO	Pin
C26	SDI	Pin
D25	SCK	Pin
D18 D21	CSN	Pin
D17	EN	Pin
C17	PWM	Pin
A22	StepCLK	Pin

Table 2. EVAL-L9942: Microcontroller connectors - description (continued)

Pin Name	Description	Type
C33 D33 D34	+5 V ( $V_{CC}$ )	Pin
A34 B34 C34 C32 D32	GND	Pin



### 3 Test points description

Table 3. EVAL-L9942: Test points description

Test Point Name		Description	Function (I/O Type)
TP13	SDO	SDO	Pin
TP12	SDI	SDI	Pin
TP9	SCK	SCK	Pin
TP8	CSN	CSN	Pin
TP7	EN	EN	Pin
TP6	PWM	PWM	Pin
TP10	StepCLK	StepCLK	Pin
TP11	+5 V ( $V_{CC}$ )	+5V ( $V_{CC}$ )	Pin
TP14	GND	GND	Pin
TP5		QA1	Pin
TP4		QA2	Pin
TP3		QB1	Pin
TP2		QB2	Pin
TP1	Vs	Vs	Pin



# 5 PCB Layout

Figure 3. EVAL-L9942: PCB layout - top side

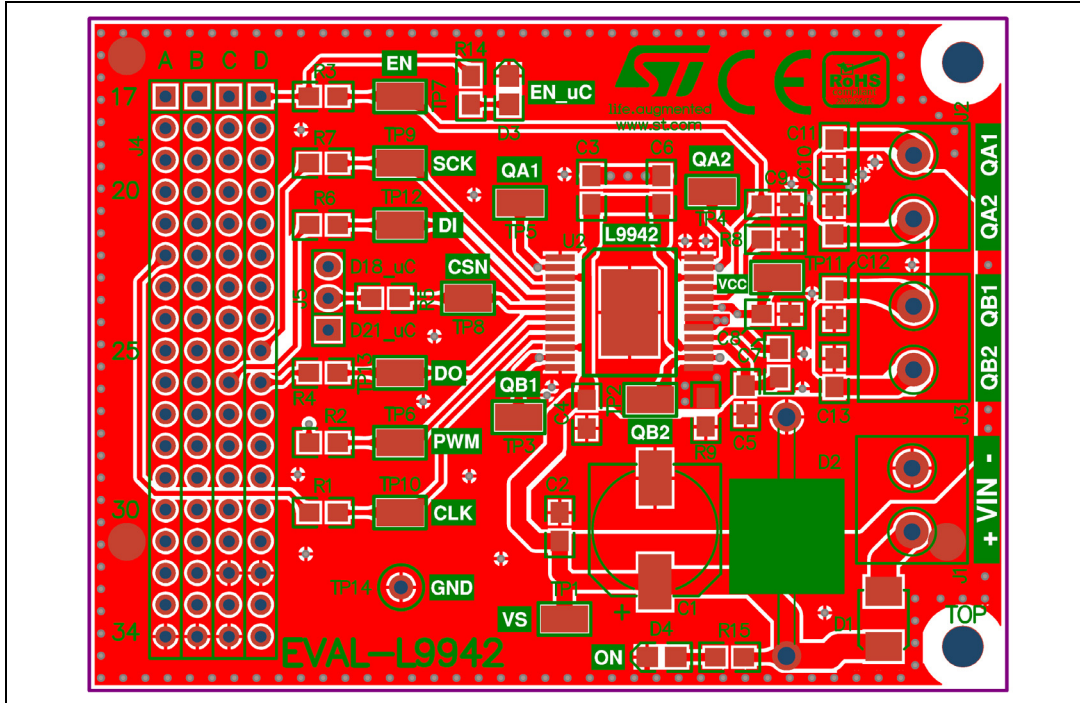
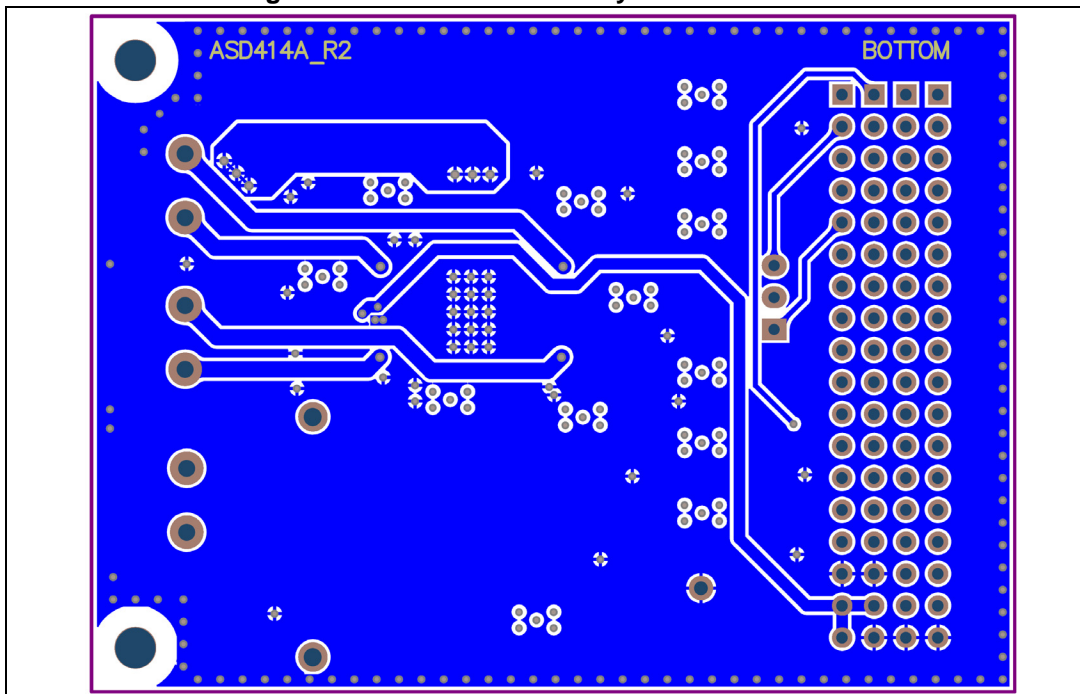


Figure 4. EVAL-L9942: PCB layout - bottom side



## Appendix A General handling precautions

The following precautions are recommended when using the EVAL-L9942 evaluation board:

- Do not modify or manipulate the board when the board is powered and connected to the microcontroller or control board.
- Do not supply the board with a DC source higher than the device maximum voltage.
- The connectors and cables must be plugged and removed when the board is not supplied.
- Any equipment or tool used for any manipulation of the semiconductor devices or board modification should be connected to ground to avoid ESD.
- It is recommended to use antistatic tools.

## Revision history

**Table 4. Revision history**

Date	Revision	Changes
17-Dec-2013	1	Initial release.
31-Mar-2015	2	Updated <a href="#">Figure 1: EVAL-L9942: board description</a> . Updated <a href="#">Section 1.2: Input connector</a> , added SPC560P-DISP in <a href="#">b</a> .in <a href="#">Section 1.2: Input connector</a> . Updated <a href="#">Section 1.3: Supply voltages</a> Updated <a href="#">Table 1: EVAL-L9942: Connectors description</a> , <a href="#">Table 2: EVAL-L9942: Microcontroller connectors - description</a> , <a href="#">Table 3: EVAL-L9942: Test points description</a> . Updated <a href="#">Figure 2: EVAL- L9942 - schematic diagram</a> , <a href="#">Figure 3: EVAL-L9942: PCB layout - top side</a> , <a href="#">Figure 4: EVAL-L9942: PCB layout - bottom side</a> . Updated <a href="#">Section Appendix A: General handling precautions</a> .
21-Apr-2016	3	Updated <a href="#">Introduction</a> .

**IMPORTANT NOTICE – PLEASE READ CAREFULLY**

STMicroelectronics NV and its subsidiaries ("ST") reserve the right to make changes, corrections, enhancements, modifications, and improvements to ST products and/or to this document at any time without notice. Purchasers should obtain the latest relevant information on ST products before placing orders. ST products are sold pursuant to ST's terms and conditions of sale in place at the time of order acknowledgement.

Purchasers are solely responsible for the choice, selection, and use of ST products and ST assumes no liability for application assistance or the design of Purchasers' products.

No license, express or implied, to any intellectual property right is granted by ST herein.

Resale of ST products with provisions different from the information set forth herein shall void any warranty granted by ST for such product.

ST and the ST logo are trademarks of ST. All other product or service names are the property of their respective owners.

Information in this document supersedes and replaces information previously supplied in any prior versions of this document.

© 2016 STMicroelectronics – All rights reserved