
STSW-L99UDL01 Graphical User Interface

Introduction

This document describes the STSW-L99UDL01 Graphical User Interface (GUI) dedicated to run the EVAL-L99UDL01.

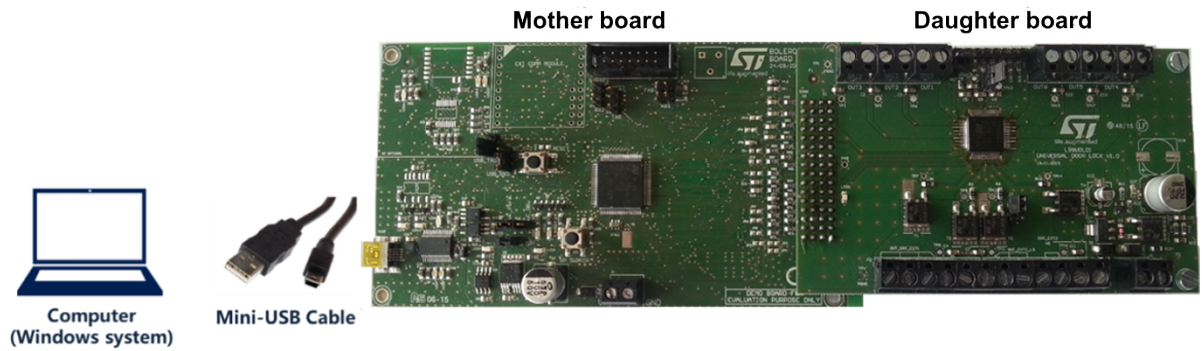
The EVAL-L99UDL01 evaluation board is designed for Automotive Door Lock application and it consists of a motherboard and a daughterboard on which the L99UDL01 device is assembled. Both the boards provide electronic control modules with enhanced power management functionalities including a standby mode. The evaluation board is designed to drive multiple brushed DC motors.

The STSW-L99UDL01 has been developed using C++ and it works with a motherboard based on SPC560B microcontroller programmed with dedicated firmware that drives the L99UDL01 assembled in the daughter board.

1 EVAL-L99UDL01 connection

The following figure shows how to connect the EVAL-L99UDL01 to the PC (refer to EVAL-L99UDL01 technical documentation for more information on the board).

Figure 1. EVAL-L99UDL01 connection



2 GUI installation

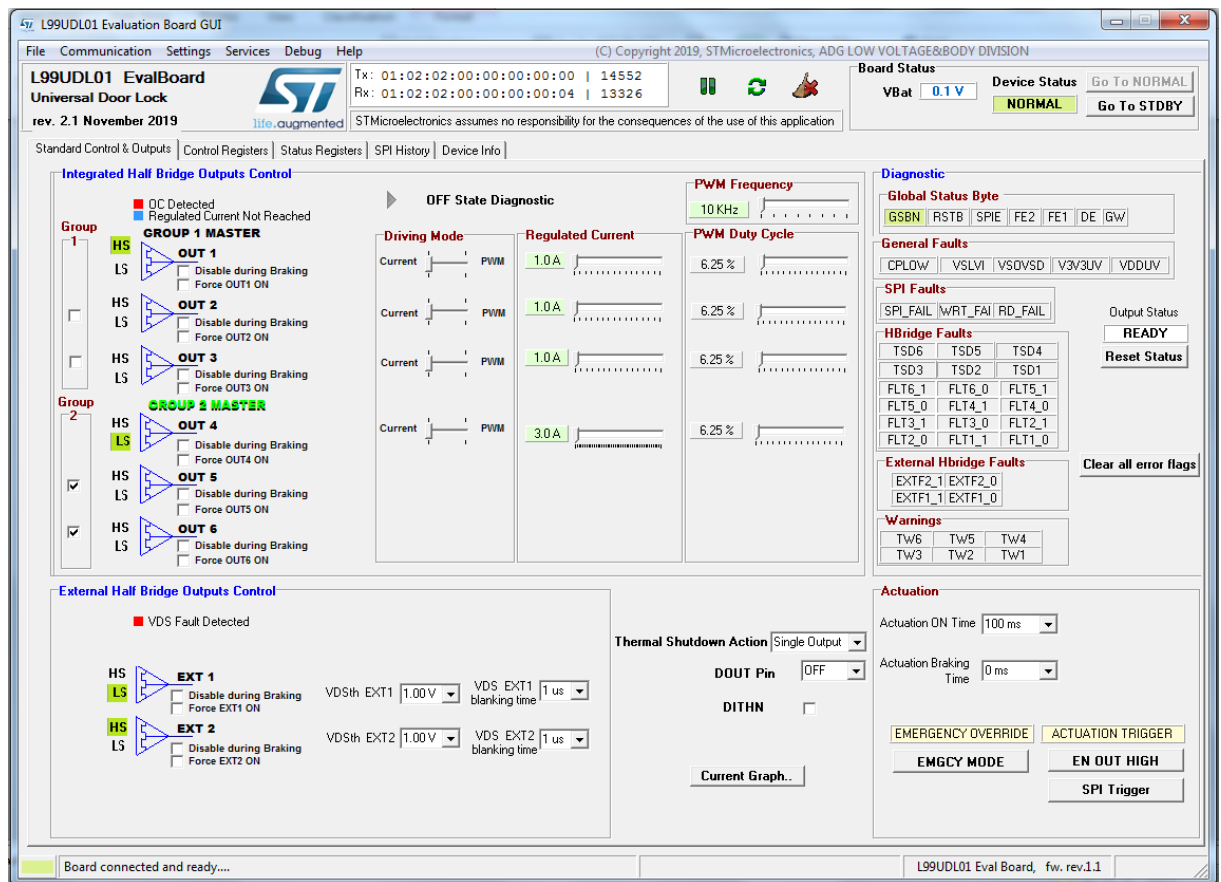
1. Install FTDI driver from supplier website (FTDI);
2. Complete the connection (see [Figure 1](#)), then Power on;
3. Run “**Setup_v2.1.exe**” and select the appropriate device from the list;
4. If you receive communication error message, please select the right serial port manually according to your configuration;
5. Once the right serial port is selected, the GUI will return the firmware version on the bottom right side of the GUI window.

3 Main GUI window

When the board is connected and the USB driver is installed the message “Board connected and ready” will be displayed on the bottom left part of the main window.

This User Manual provides the guidelines to actuate easily and quickly the device outputs. Therefore, it will focus just on the main panel “Standard Control & Outputs” of the GUI. For further and more accurate information about each device feature please refer to L99UDL01 datasheet.

Figure 2. Main GUI window



4 Standard control & Output panel

4.1 Group option

Starting from the left-hand side of the panel, the Group option allows grouping together from two to three outputs. For instance, in the configuration depicted in Figure 3, OUT1, OUT2 and OUT3 are left independent, while OUT4, OUT5 and OUT6 belong to the same group. All the outputs belonging to the same group (Group 2) will move together following the master output configuration (OUT4). The outputs belonging to the same group OUT4, OUT5 and OUT6 are meant to be connected to the same load terminal.

Figure 3. Group control

The screenshot displays the L99UDL01 Evaluation Board GUI. The main window is titled "L99UDL01 EvalBoard Universal Door Lock" and includes a menu bar (File, Communication, Settings, Services, Debug, Help) and a toolbar with various icons. The interface is divided into several functional areas:

- Board Status:** Shows VBat at 0.1 V and Device Status as NORMAL. Buttons for "Go To NORMAL" and "Go To STDBY" are present.
- Standard Control & Outputs:** This section is further divided into:
 - Integrated Half Bridge Outputs Control:** Features a "Group" selection on the left (Group 1 and Group 2). Group 1 includes OUT 1, OUT 2, and OUT 3. Group 2 includes OUT 4 (MASTER), OUT 5, and OUT 6. Each output has HS and LS control options and checkboxes for "Disable during Braking" and "Force [OUT] ON".
 - OFF State Diagnostic:** Displays "Driving Mode", "Regulated Current", and "PWM Frequency" (10 KHz). It shows current and PWM waveforms for each output, with regulated currents of 1.0 A for OUT 1-3 and 3.0 A for OUT 4.
 - PWM Duty Cycle:** Shows a duty cycle of 6.25% for all outputs.
- Diagnostic:** Includes a "Global Status Byte" (GSBN, RSTB, SPIE, FE2, FE1, DE, GW), "General Faults" (CPLW, VSLVI, VSOVSD, V3V3UV, VDDUV), "SPI Faults" (SPL_FAIL, WRT_FAIL, RD_FAIL), "Hbridge Faults" (TSD6-TSD1, FLT6_0-FLT6_1, FLT5_0-FLT5_1, FLT3_0-FLT3_1, FLT2_0-FLT2_1, FLT1_0-FLT1_1), "External Hbridge Faults" (EXTF2_1, EXTF2_0, EXTF1_1, EXTF1_0), and "Warnings" (TW6-TW1).
- Actuation:** Includes "Actuation ON Time" (100 ms), "Actuation Braking Time" (0 ms), "Thermal Shutdown Action" (Single Output), "DOUT Pin" (OFF), "DITHN" checkbox, and buttons for "EMERGENCY OVERRIDE", "ACTUATION TRIGGER", "EMGCY MODE", "EN OUT HIGH", and "SPI Trigger".
- External Half Bridge Outputs Control:** Shows "VDS Fault Detected" and controls for EXT 1 and EXT 2, including VDSth and blanking time settings.

The status bar at the bottom indicates "Board connected and ready..." and "L99UDL01 Eval Board, fw. rev.1.1".

4.2 HS/LS option

The HS/LS option of each output selects which MOSFET turn on during the actuating phase of each timed actuation. No selection means that the corresponding output will be staying in high impedance during the actuating phase. When both HS and LS of the same output are selected, the corresponding output will be staying in high impedance during the actuating phase of any timed actuation.

Connecting a load between OUT1 and EXT1 means that in order to drive it a diagonal should be closed (OUT1HS-EXT1LS or OUT1LS-EXT1HS). In the configuration depicted in Figure 4, OUT1HS, OUT4/5/6LS, EXT2HS and EXT1LS MOSFETs will be closed during the actuating phase (ON Time) of any timed actuation.

Figure 4. Internal and External half bridge outputs control

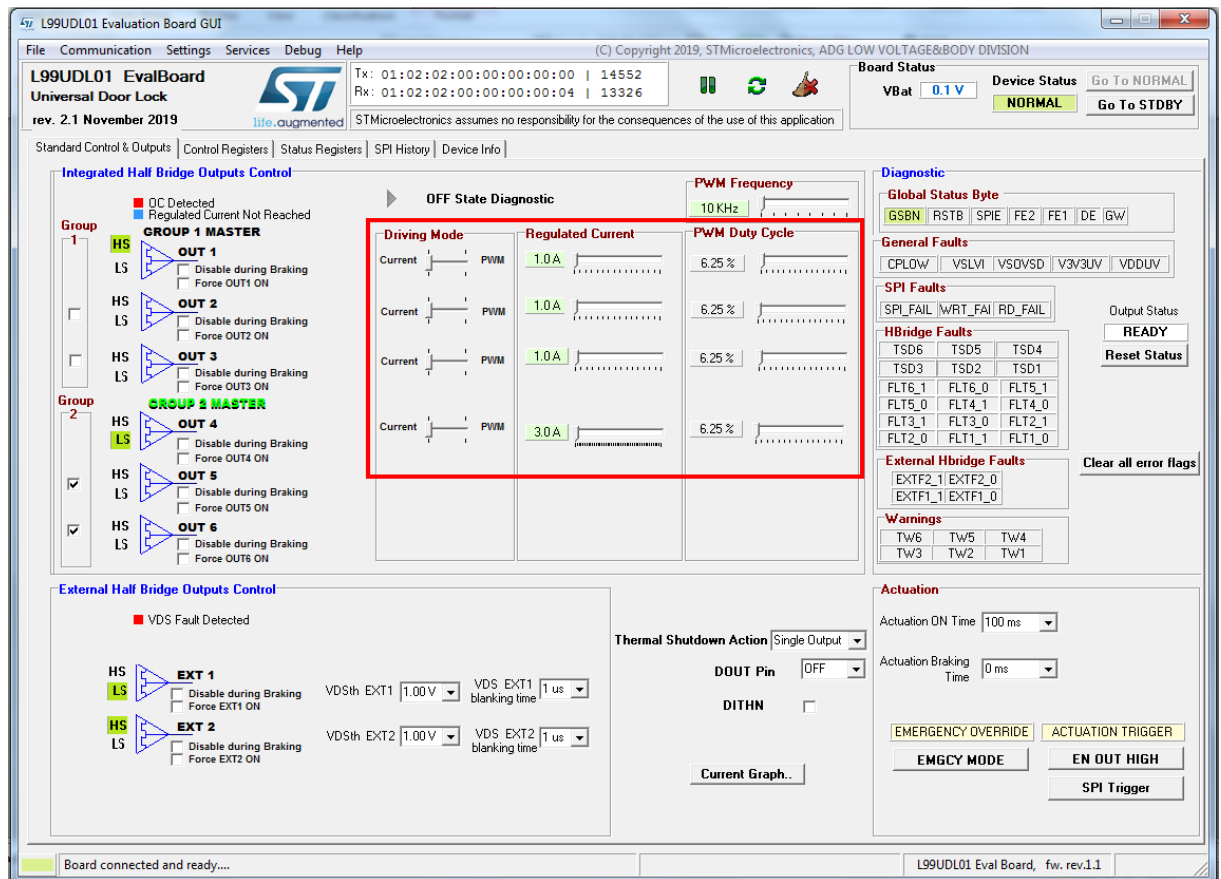
The screenshot displays the L99UDL01 Evaluation Board GUI. Key sections include:

- Integrated Half Bridge Outputs Control:** Shows two groups of outputs. Group 1 (MASTER) includes OUT 1, OUT 2, and OUT 3. Group 2 (MASTER) includes OUT 4, OUT 5, and OUT 6. For each output, HS and LS options are shown with checkboxes. In the image, the HS checkbox for OUT 1 and the LS checkboxes for OUT 4, OUT 5, and OUT 6 are highlighted with red boxes.
- External Half Bridge Outputs Control:** Shows EXT 1 and EXT 2 outputs. For each, HS and LS options are shown. In the image, the HS checkbox for EXT 1 and the LS checkbox for EXT 2 are highlighted with red boxes.
- OFF State Diagnostic:** Displays driving mode, regulated current (1.0A and 3.0A), and PWM duty cycle (6.25%) for each output.
- Diagnostic:** Shows global status byte (G|S|B|N), general faults (C|P|L|O|W, V|S|L|V|I, V|S|D|V|S|D, V|3|V|3|U|V, V|D|D|U|V), SPI faults (S|P|I|_|F|A|I|L, W|R|I|T|_|F|A|I|L, R|D|_|F|A|I|L), Hbridge faults (T|S|D|6, T|S|D|5, T|S|D|4, T|S|D|3, T|S|D|2, T|S|D|1, F|L|T|6|_|0, F|L|T|6|_|1, F|L|T|5|_|0, F|L|T|4|_|1, F|L|T|4|_|0, F|L|T|3|_|1, F|L|T|3|_|0, F|L|T|2|_|1, F|L|T|2|_|0, F|L|T|1|_|1, F|L|T|1|_|0), external Hbridge faults (E|X|T|F|2|_|1, E|X|T|F|2|_|0, E|X|T|F|1|_|1, E|X|T|F|1|_|0), and warnings (T|W|6, T|W|5, T|W|4, T|W|3, T|W|2, T|W|1).
- Actuation:** Shows actuation ON time (100 ms) and actuation braking time (0 ms). It includes buttons for EMERGENCY OVERRIDE, EMGCY MODE, ACTUATION TRIGGER, EN OUT HIGH, and SPI Trigger.

4.3 Driving mode, Regulated current and PWM duty cycle controls

The Driving Mode and Regulated Current/PWM Duty Cycle controls allow configuring the driving mode of each output/group. The Force OUTx ON check box will force the corresponding selected HS/LS MOSFET to be always on (regardless of the actuation status). The Disable during Braking option allows disabling the corresponding Half Bridge during the actuation braking phase.

Figure 5. Driving mode, Regulated current and PWM duty cycle controls



4.4 Actuation ON Time and Braking Time setting

The Actuation ON Time and Actuation Braking Time allow programming the actuation duration and the braking duration respectively. Indeed, any timed actuation consists of an ON phase where only the selected MOSFETs (HS/LS) are turned on for the programmed time (Actuation ON Time) and of a braking phase where the LS MOSFETs of all the half bridges (internal and external, even the not programmed/selected ones, which means OUT2 and OUT3 looking at the below GUI screenshot) are turned on for the programmed Actuation Braking Time. The Disable during braking option check box can be used in this case to disable the corresponding half bridge during braking phase.

Figure 6. Actuation ON Time and Braking time setting

The screenshot displays the L99UDL01 Evaluation Board GUI. The interface is divided into several sections:

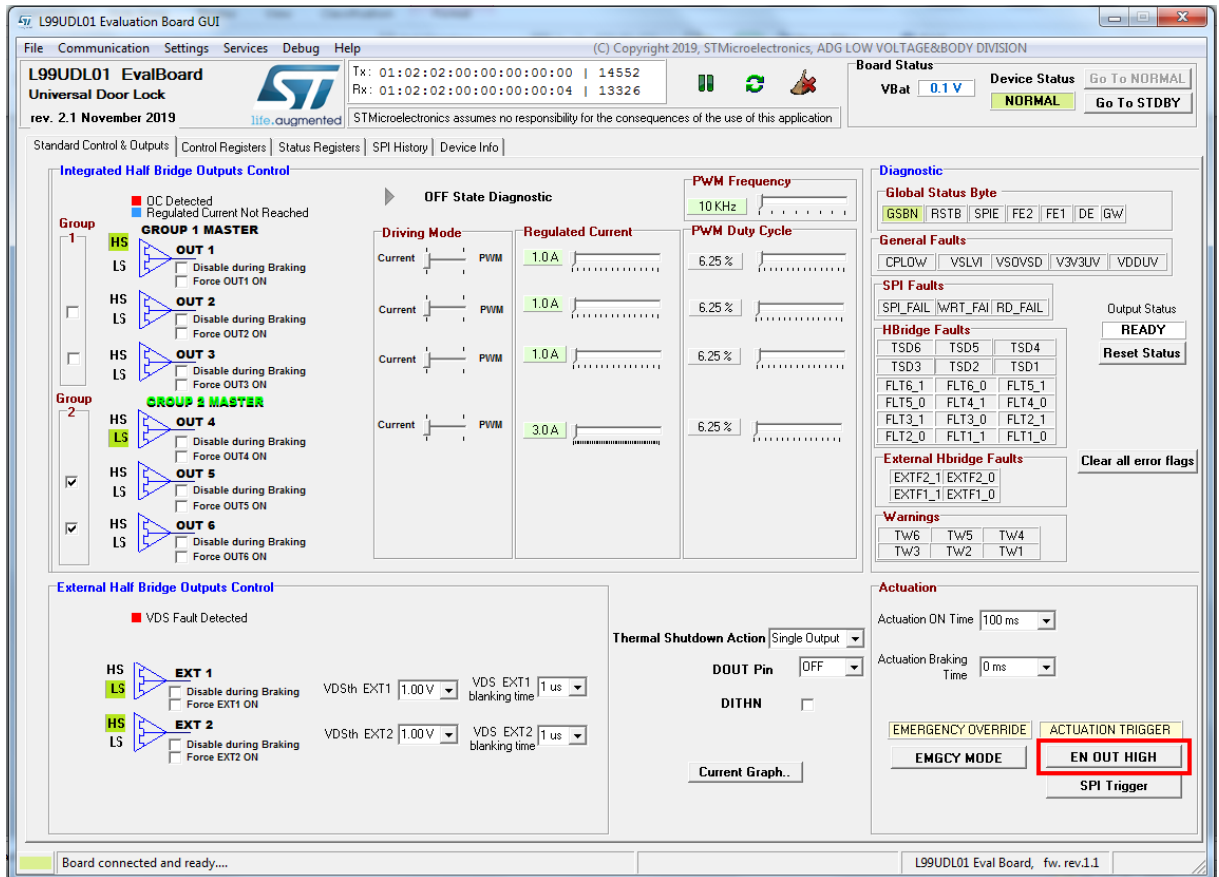
- Board Status:** Shows VBat at 0.1 V and Device Status as NORMAL. Buttons for 'Go To NORMAL' and 'Go To STDBY' are present.
- Standard Control & Outputs:** Includes tabs for Control Registers, Status Registers, SPI History, and Device Info.
- Integrated Half Bridge Outputs Control:**
 - GROUP 1 MASTER:** Contains OUT 1, OUT 2, and OUT 3. Each has HS and LS MOSFET controls with checkboxes for 'Disable during Braking' and 'Force [OUT] ON'.
 - GROUP 2 MASTER:** Contains OUT 4, OUT 5, and OUT 6. Similar to Group 1, but OUT 5 and OUT 6 have their 'Disable during Braking' checkboxes checked.
- OFF State Diagnostic:** Shows Driving Mode, Regulated Current (1.0 A), and PWM Duty Cycle (6.25 %) for each output.
- Diagnostic:**
 - Global Status Byte:** IGSBN, RSTB, SPIE, FE2, FE1, DE, GW.
 - General Faults:** CPLow, VSLVI, VSOVSD, V3V3UV, VDDUV.
 - SPI Faults:** SPI_FAIL, WRT_FAIL, RD_FAIL.
 - HBridge Faults:** TSD6-TSD4, FLT6_0-FLT6_1, FLT5_0-FLT5_1, FLT4_0-FLT4_1, FLT3_0-FLT3_1, FLT2_0-FLT2_1, FLT1_0-FLT1_1.
 - External Hbridge Faults:** EXTF2_1, EXTF2_0, EXTF1_1, EXTF1_0.
 - Warnings:** Tw6-Tw4, Tw3-Tw2, Tw1.
- External Half Bridge Outputs Control:**
 - EXT 1:** VDSth EXT1 1.00 V, VDS EXT1 blanking time 1 us.
 - EXT 2:** VDSth EXT2 1.00 V, VDS EXT2 blanking time 1 us.
- Thermal Shutdown Action:** Single Output.
- DOUT Pin:** OFF.
- DITHN:** Unchecked.
- Actuation (highlighted in red):**
 - Actuation ON Time: 100 ms
 - Actuation Braking Time: 0 ms
- Emergency/Trigger Buttons:** EMERGENCY OVERRIDE, EMGCY MODE, ACTUATION TRIGGER, EN OUT HIGH, SPI Trigger.

At the bottom, a status bar indicates 'Board connected and ready...' and 'L99UDL01 Eval Board, fw. rev.1.1'.

4.5 EN OUT HIGH and SPI Trigger buttons

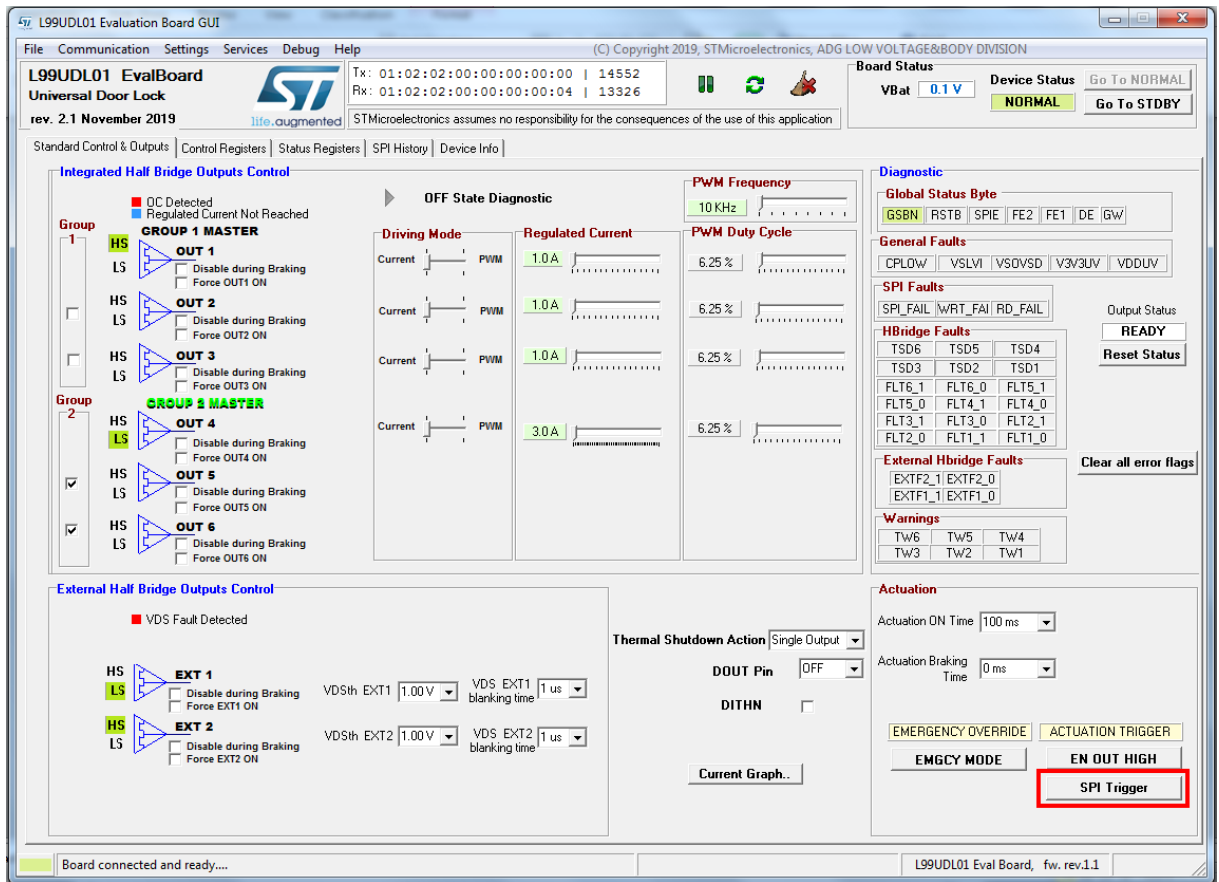
Any actuation can be triggered either by any EN OUT rising edge that can be achieved by pressing the EN OUT HIGH push button, or either via SPI by pushing the SPI Trigger button. This latter triggering source will be active just for EN OUT HIGH already pressed. For the emergency mode description, please refer to the L99UDL01 datasheet.

Figure 7. EN OUT HIGH button



Every rising edge at the EN OUT input pin will trigger a new timed actuation. The actuation will linger for the programmed actuation ON time and the programmed actuation braking time or until the EN OUT HIGH button is pressed.

Figure 8. SPI Trigger button



Every SPI frame sent by pushing this button will trigger a timed actuation as long as the EN OUT HIGH button is pressed and the previous timed actuation is over.

Revision history

Table 1. Document revision history

Date	Version	Changes
24-Mar-2020	1	Initial release.

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