SPIDERPLUSMB_EVAL Mother board

User guide

About this document

SPIDER+ is an automotive grade family of enhanced relay control with SPI communication. They have several configurations that meet customers' needs. These devices contain low-side, high-side, or configurable N-MOS switches especially designed for driving relays, LEDs, and small motors. Protection and diagnostic features such as reverse battery, short or over/open load are present in all models.

SPIDER+ LED is a specific family especially designed for driving LEDs and bulbs, fully compatible with SPIDER+ family. In addition to all SPIDER+ features, SPIDER+ LED devices are also equipped with a PWM engine for dimming and a "bulb inrush mode" to operate incandescent light bulbs.

Scope and purpose

The scope of this user manual is to provide instructions for using SPIDERPLUSMB_EVAL mother board and its daughter boards with specific devices.

Intended audience

This document is intended for engineers who need to perform measurements and check the performance of SPIDERPLUSMB_EVAL mother board and its daughter boards with specific devices.

Table of contents

1 Description

SPIDERPLUSMB_EVAL mother board is used for testing devices of the SPIDER+ and SPIDER+ LED families. Most devices of these families are available on daughter boards that can be plugged into the mother board. This feature allows the testing of several device types (see Table 1) with the same mother board by merely configuring its channels.
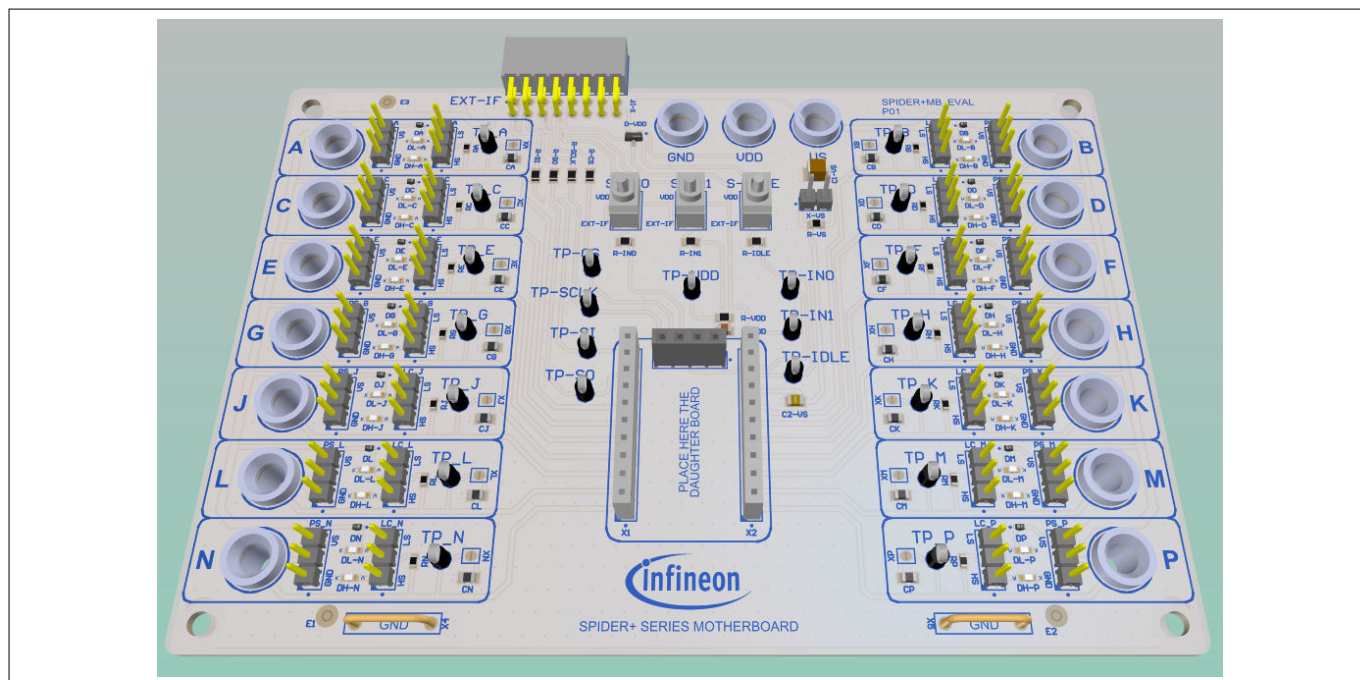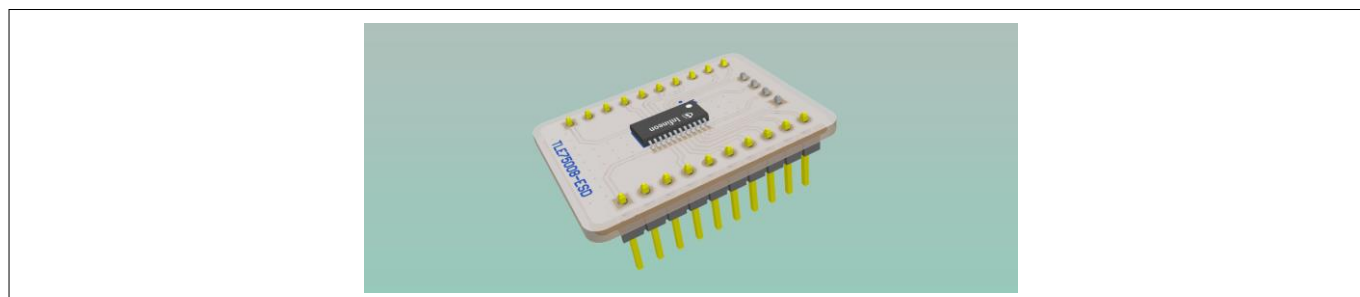

Figure 1   **Mother board**

Figure 2   **Daughter board (example of TLE75008-ESD DB)**

Table 1   **Available daughter boards**

Family	Device	Daughter board name	Part No.
SPIDER+	TLE75008-ESD	TLE75008-ESD DB	TLE75008ESDDBTOBO1
SPIDER+ LED	TLE75080-ESH	TLE75080-ESH DB	TLE75080ESHDBTOBO1
SPIDER+ LED	TLE75242-ESH	TLE75242-ESH DB	TLE75242ESHDBTOBO1
SPIDER+ LED	TLE75602-ESH	TLE75602-ESH DB	TLE75602ESHDBTOBO1
SPIDER+ LED	TLE75620-EST	TLE75620-EST DB	TLE75620ESTDBTOBO1

2 Electrical characteristics

Table 2 **Electrical characteristics**

Parameter	Symbol	Values			Unit	Note or Test Condition
		Min.	**Typ.**	**Max.**		
Supply voltage range	V_S	5[1]	–	28	V	These limits refer to the mother board characteristics. Device limits may be different. Check the datasheets for the limits of the device being tested.
Peak supply voltage	$V_{S(MAX)}$	–	–	42	V	
Load current per channel	I_{CH}	–	–	500	mA	
Logic supply voltage	V_{DD}	3	–	5.5	V	
Supply low pass filter cut frequency	$f_{LP(VS)}$	–	230	–	kHz	Selectable by jumper
Logic supply low pass filter cut frequency	$f_{LP(VDD)}$	–	34	–	kHz	–
Dampening channel capacitance	C_{OUT}	–	10	–	nF	Selectable by solder jumper

1) V_S can be lower than minimum limit but signaling LEDs may not light up when the channel is active.
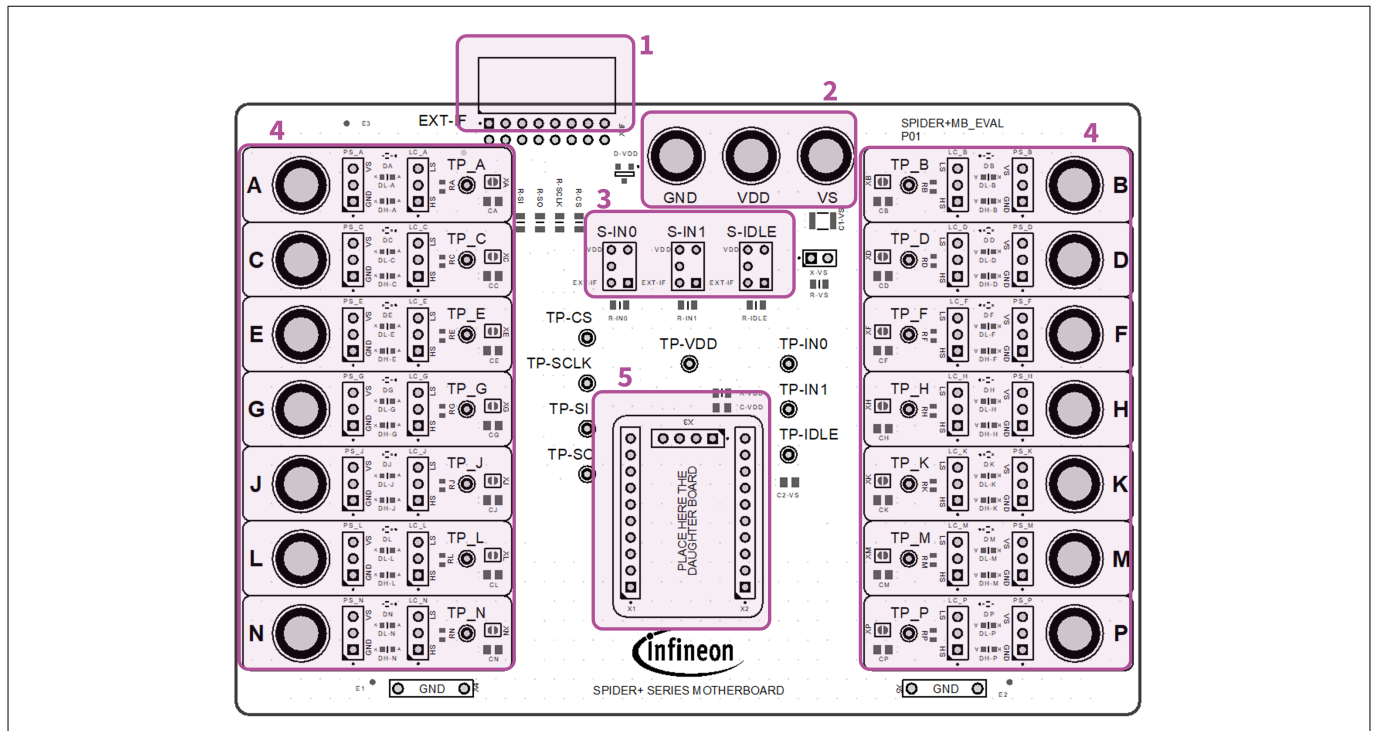
3 Layout sections

Figure 3 Layout sections

Table 3 Layout sections

Section number	Section name	Description
1	External interface connector	Used to communicate with device on the daughter board. It manages SPI signals (CS, SCLK, SO, SI) and control signals (IN0, IN1, IDLE). It can also be used to supply V_S, V_{DD}, and GND.
2	Power supply connectors	Used to supply V_S , V_{DD}, and GND. Voltage levels must be chosen according to Table 2.
3	Control switches	Allow a manual control of signals IN0, IN1, and IDLE.
4	Input/Output channels	Directly connected to the input/output of the device on the daughter board. They must be configured according to the device characteristics.
5	Daughter board socket	Insert one of the daughter boards as indicated in Table 1.

4 Channel setup

This mother board features 14 fully configurable channels, labeled from A to P (except letters I and O). These channels are connected to the input/output pins of the device mounted on the daughter board.

All SPIDER+ and SPIDER+ LED devices feature a package with 12+12 pins (except TLE75004). Pins 6 to 19 are connected to the embedded switches or must be connected to a power source (V_S or GND).

Once a daughter board is plugged into the mother board socket, channels on the left side of the mother board (A, C, E, G, J, L, N) are connected to the device pins 6 to 12; whereas channels on the right side of the mother board (B, D, F, H, K, M, P) are connected to the device pins 13 to 19.

See Figure 4 for a graphical example with TLE75242 pin out.
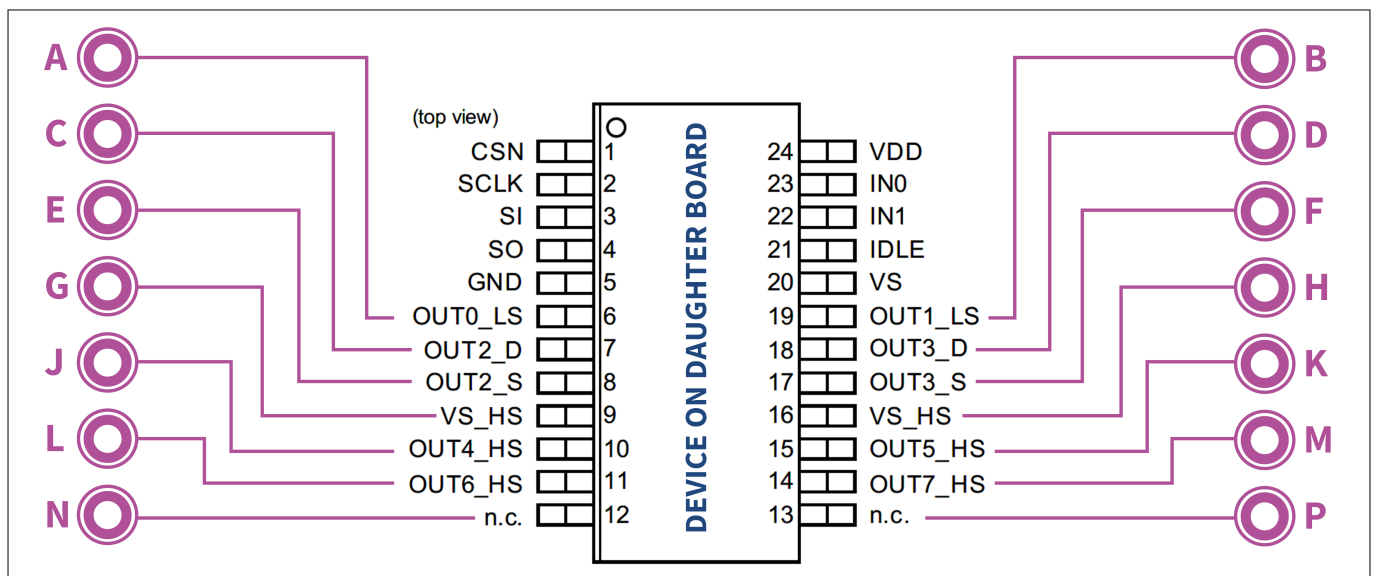
Figure 4   **Channels to device on daughter board connection**

Each channel is equipped with the features shown in Figure 5.
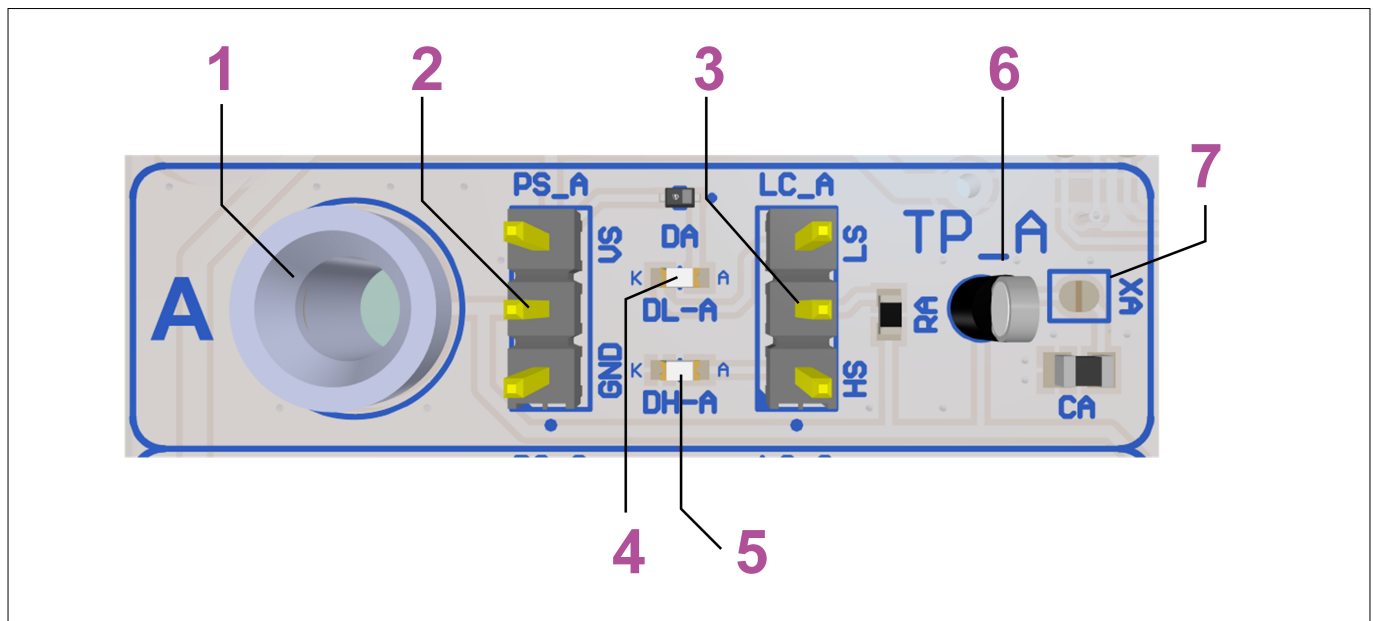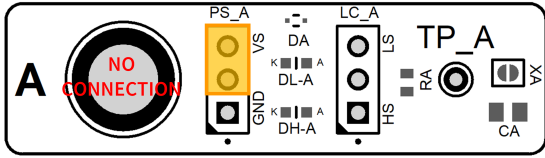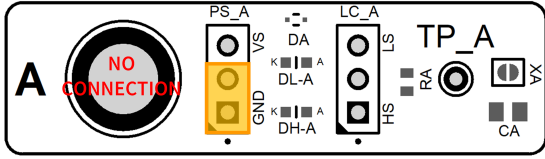

Figure 5   **Channel features**

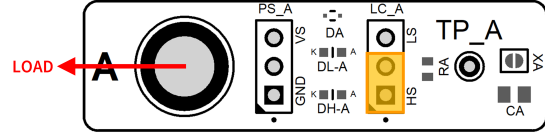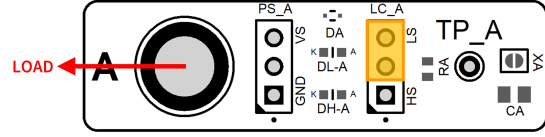**Table 4**   **Channel feature description**

Number	Description
1	Output connector. Connect here the load to be switched
2	Power supply selector. It connects the channel to V_S or GND. Use it when the pin of the device under test needs to be connected to V_S or GND
3	Signaling LED selector. It is used to properly connect a signaling LED that lights up when the channel is active
4	Low-side signaling LED. If selector 3 is correctly set, this LED turns on when the low-side switch of the device under test connected to the channel is active
5	High-side signaling LED. If selector 3 is correctly set, this LED turns on when the high-side switch of the device under test connected to the channel is active
6	Test point to monitor the voltage on the channel
7	Solder jumper to connect a 10 nF capacitor between the channel output and GND. It helps to protect the device against electro-static discharge (ESD) and bulk current injection (BCI)

Attention: ***The channels must be configured according to the device being tested.***

Table 5 explains how to place jumpers on each channel according to the pin type to which they are connected.

Table 5   **Pin type and jumper position**

Pin type	Jumper position
V_S connection	
GND Connection	
High-side switch output	
Low-side switch output	

5 Configuration example

The relevant daughter board, such as TLE75242-ESH DB , is tested whilst slotted into the mother board. The different loads are connected as shown in Figure 6.
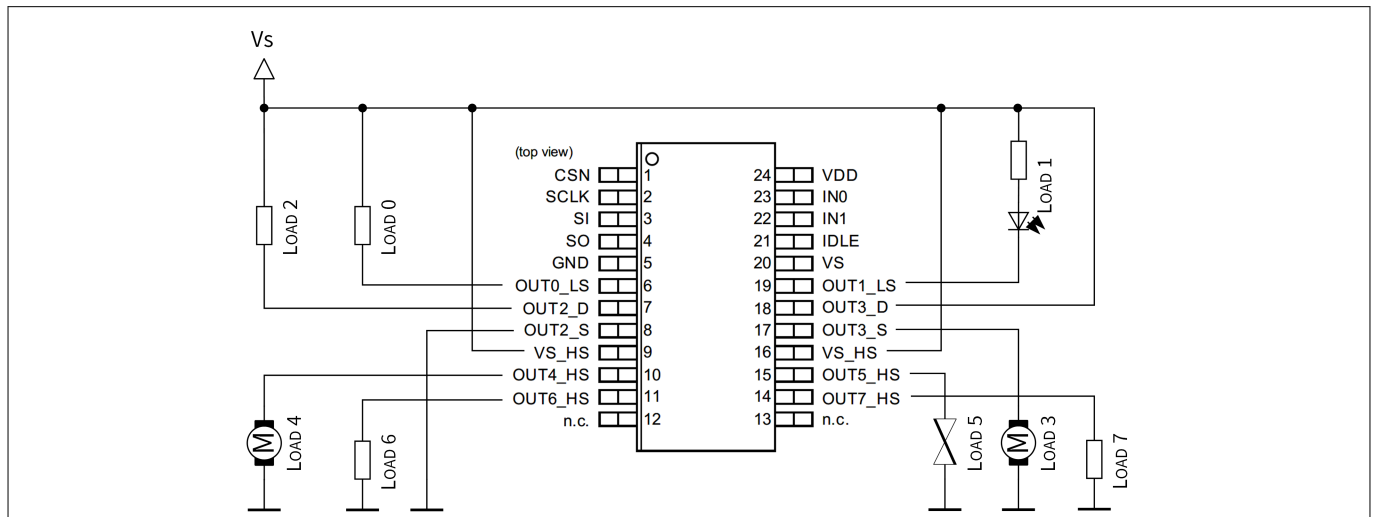

Figure 6   **Configuration example: schematic**

According to Table 5, jumpers and connections on the mother board must be configured as in Figure 7. The LED that turns on when the channel is active is highlighted in blue.
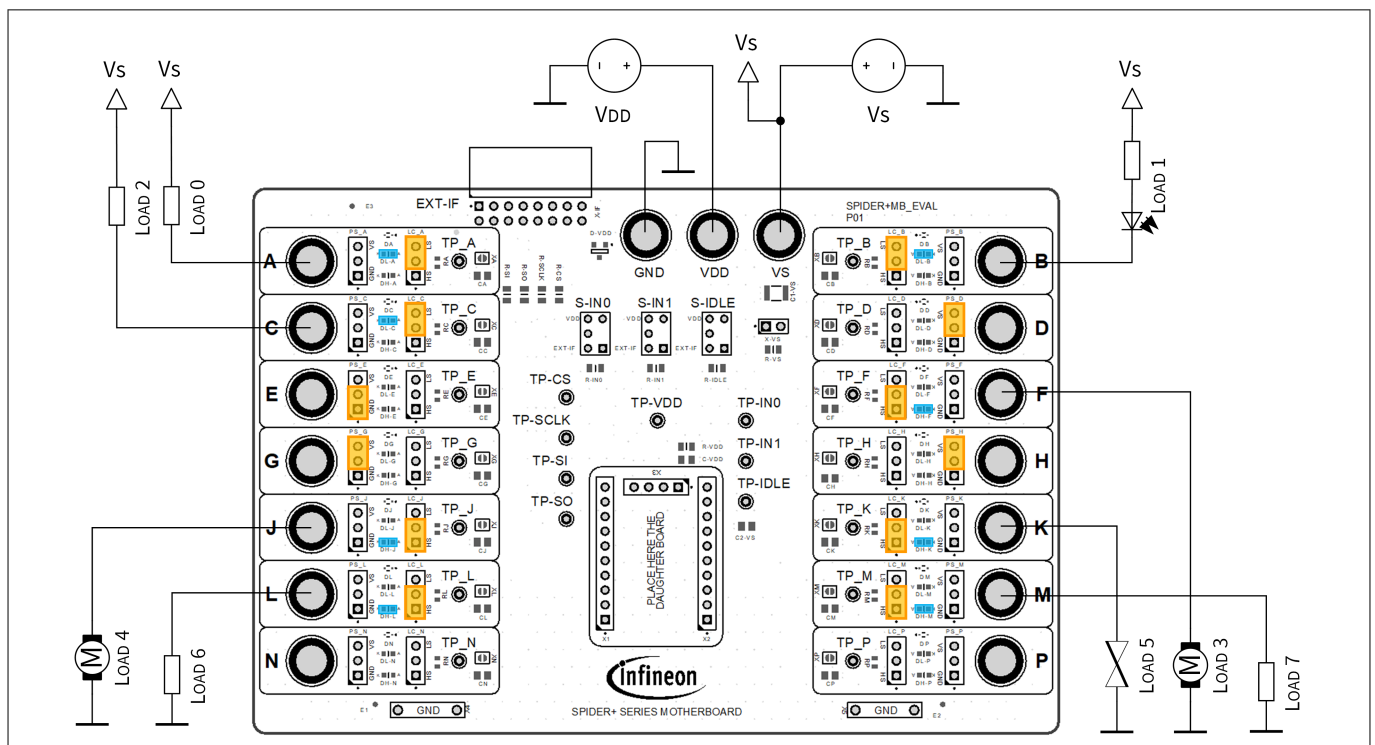

Figure 7   **Configuration example: jumper position and connections**

6   External interface (EXT-IF) connector

This connector provides an external connection to:

- SPI interface signals (CS, SCLK, SO, SI)
- Control signals (IN0, IN1, IDLE)
- Supply rails (V_S, V_{DD}, and GND)
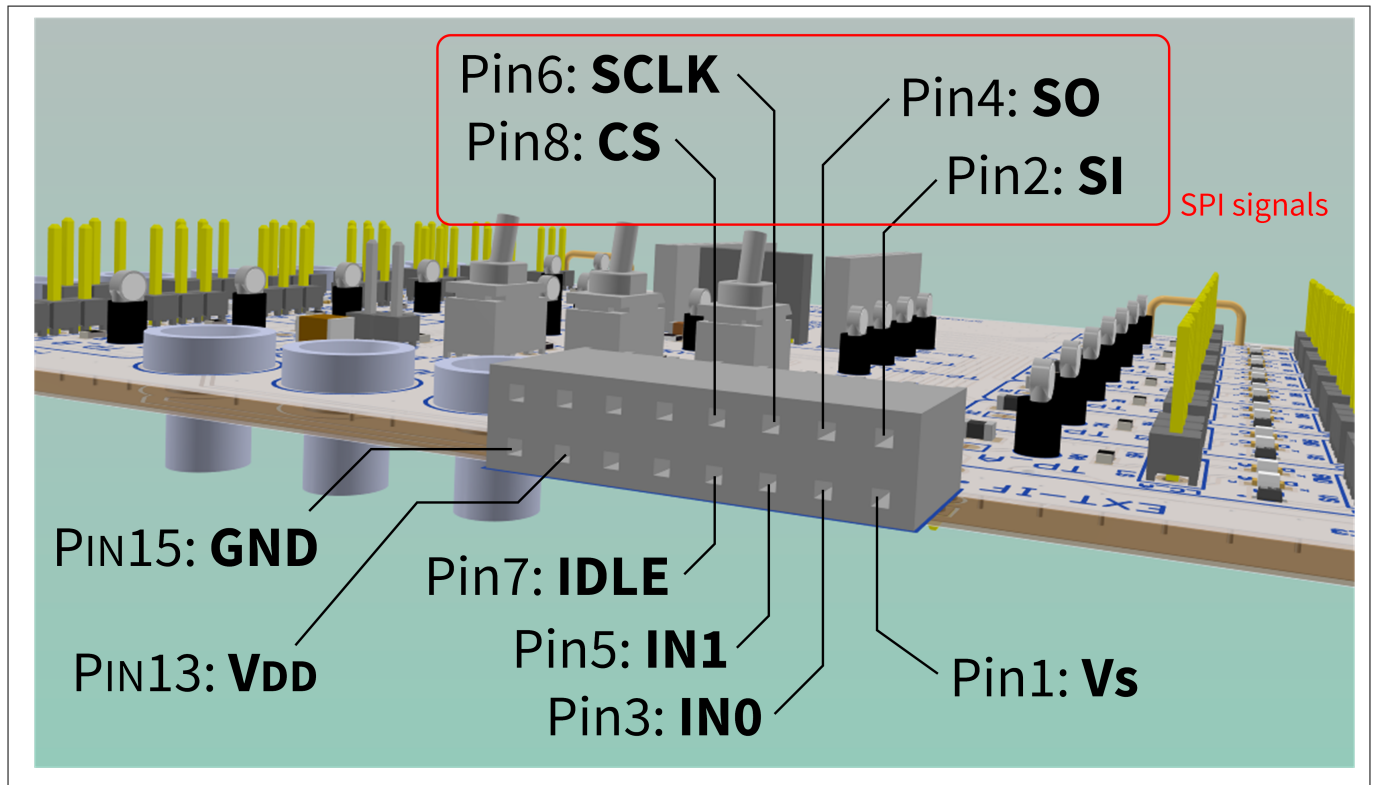
Figure 8   EXT-IF connector pin-out

Note: *If the current is higher than 0.5 A, avoid supplying V_S through pin 1 of the EXT-IF connector . A banana connector is always preferable.*

7 Control switches

The devices of SPIDER+/SPIDER+LED series have three pins (IN0, IN1, and IDLE) to control the device directly without using SPI. The board is equipped with three switches that enable a manual control of these signals (see section 3 of Figure 3).

Switches apply to the control pins IN0, IN1, and IDLE:

• A logic level "high", when set in VDD position
• The signal present on the corresponding pin of the EXT-IF connector, when set in the EXT-IF position

Table 6 gives a brief description of control signals managed by switches. For more information, refer to the device datasheets [1].

Table 6 **Pin names and descriptions**

Pin name	Description
IN0	Controls channel 2 by default when set to logic level "high". Input mapping register **MAPIN0** can be programmed to connect additional or different channels to each input pin
IN1	Controls channel 3 by default when set to logic level "high". Input mapping register **MAPIN1** can be programmed to connect additional or different channels to each input pin
IDLE	The IDLE pin is used to bring the device into Sleep mode operation when is set to "low" and all input pins are set to "low". When IDLE pin is set to "low" while one of the input pins is set to "high" the device enters Limp Home mode.

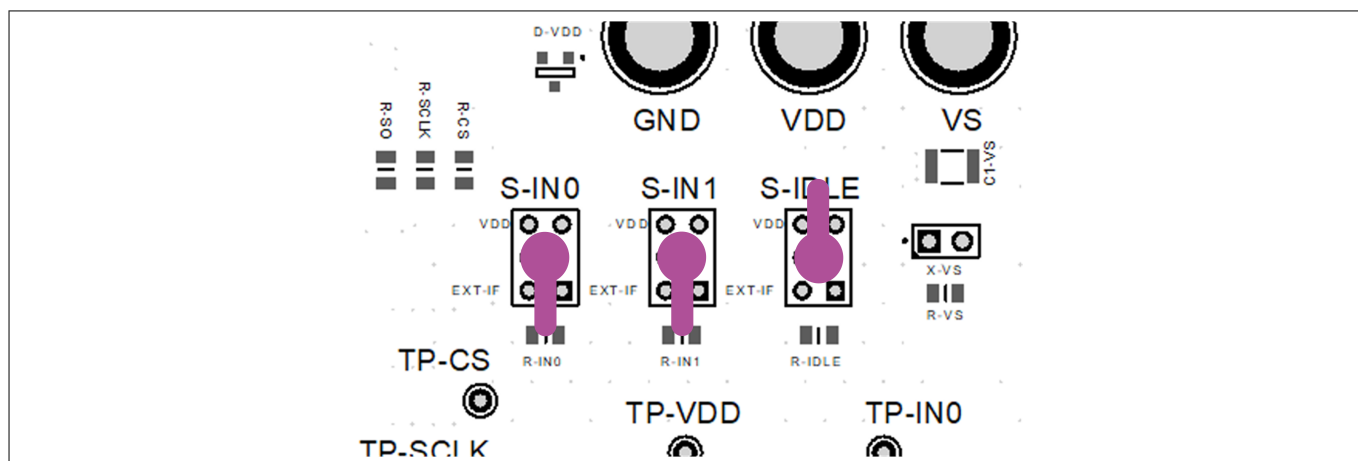The default position of the switches is shown in Figure 9 and Table 7

Figure 9 **Control switches default position**

Table 7 **Switches and their default positions**

Switch name	Default switch position
S-IN0, S-IN1	EXT-IF
S-IDLE	VDD

8 µIO-Stick and Developer Center Launcher

The Infineon µIO-stick is an interface device for controlling Infineon boards/kits. It enables:

- The connection between the evaluation board and USB for SPI programming
- Monitoring by using the Config Wizard software, which can be downloaded from the Infineon Developer Center Launcher

Note: *Before connecting the µIO-Stick to the PC, it is necessary to install the stick's driver. Click on* µIO-Stick [2] *to download the driver.*

Click on µIO-Stick [2] to purchase the Infineon µIO-Stick.

Refer to Developer Center Launcher [3] for installation.
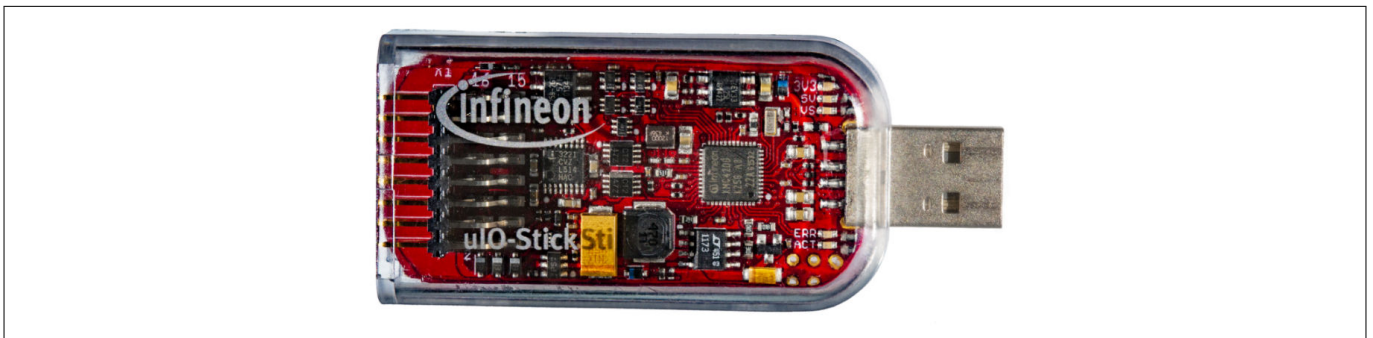
Figure 10   **Infineon µIO-Stick**

Connect the µIO-Stick to the mother board using the EXT-IF connector and then to the PC by using a USB extension cable, as shown in Figure 11.
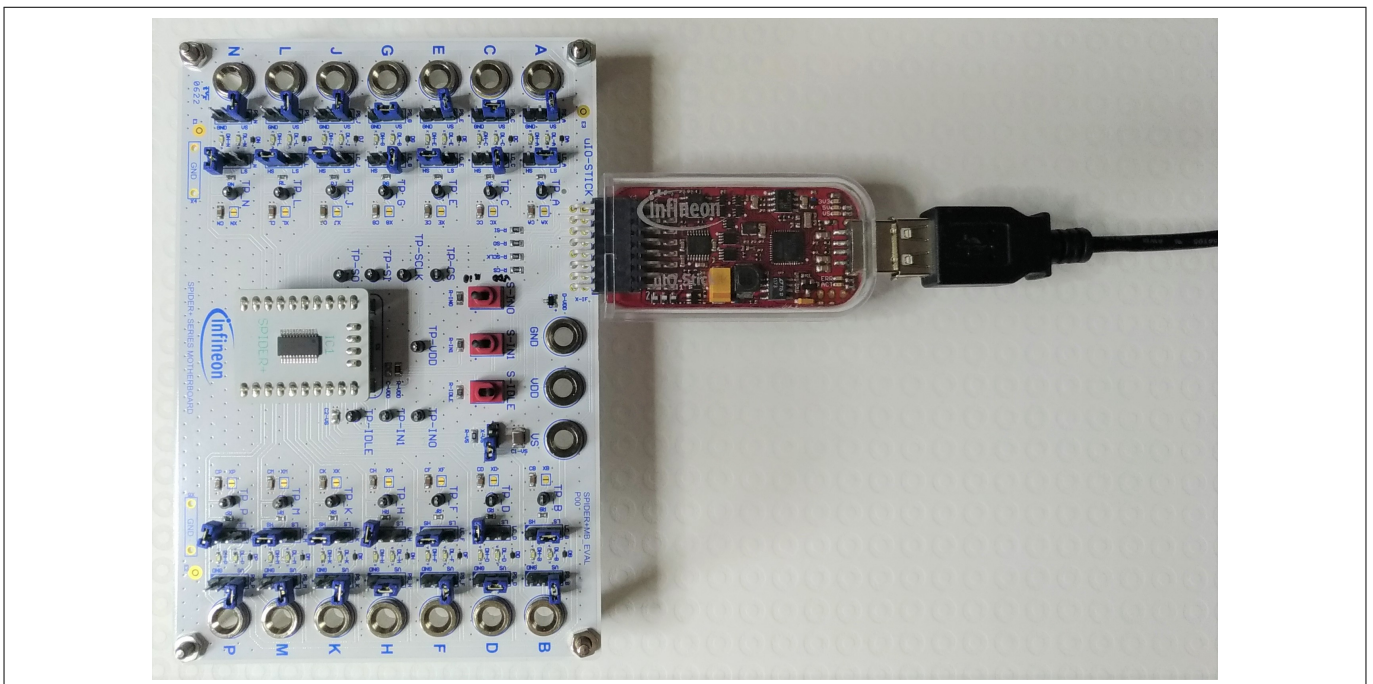
Figure 11   **µIO-Stick connection**

9 Installing the graphical user interface (GUI)

Install the Infineon Developer Center Launcher at the website Infineon Developer Center Launcher [3].
Run the Infineon Developer Center Launcher and click **Manage Tools**.
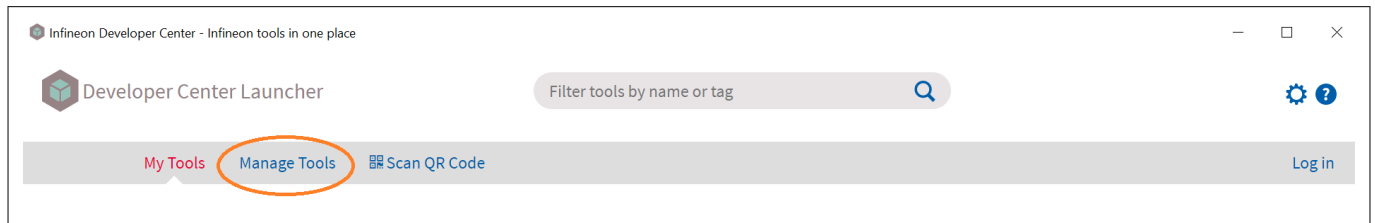
Figure 12   **Manage tools**

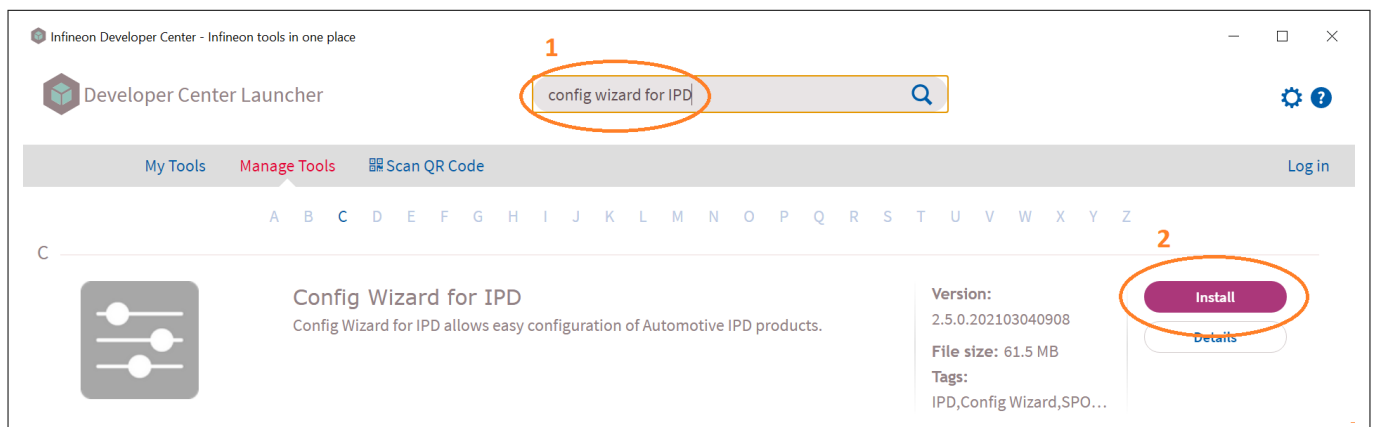Then search for **Config Wizard for IPD** and click **Install**.

Figure 13   **Searching tool**

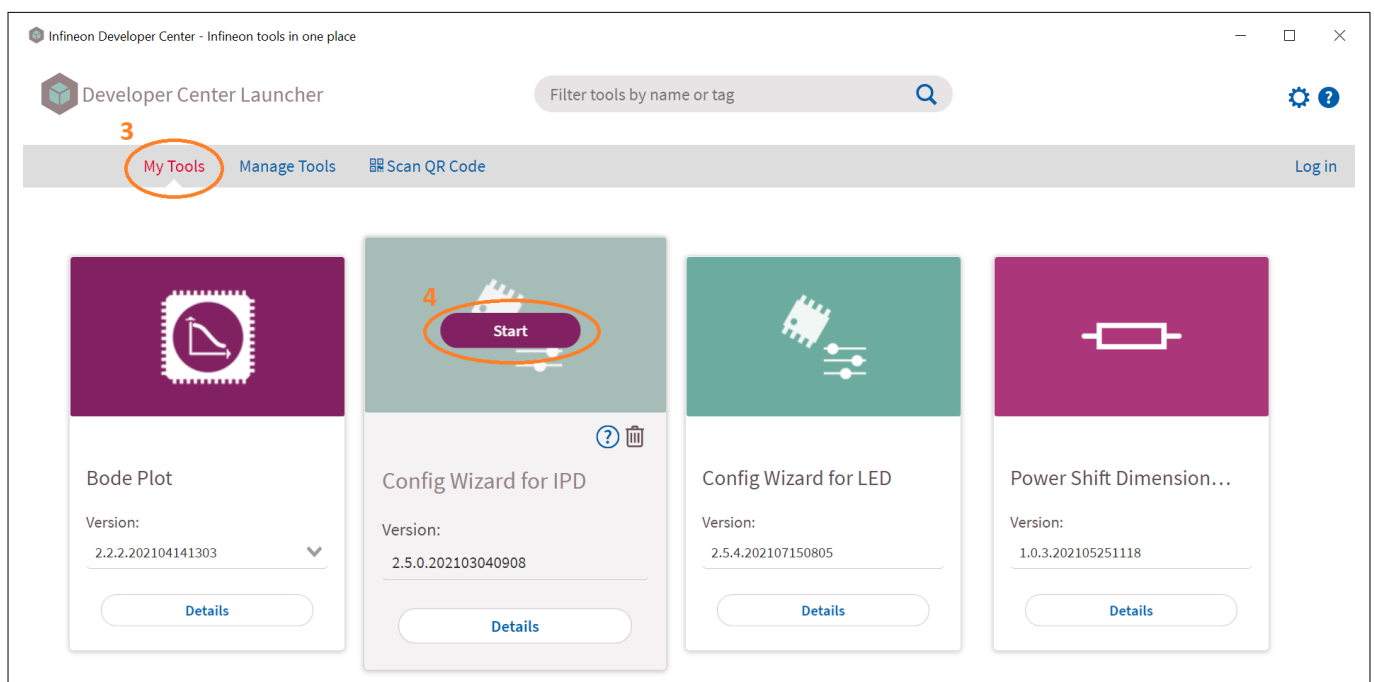When the installation is complete, select **My Tools**, then, on the **Config Wizard for IPD** panel, click **Start**.

Figure 14   **Starting tool**

10 GUI instructions

When the "Config Wizard for LED" has started, select SPIDER and then TLE75008. This option is suitable for all other SPIDER+ models. SPIDER+LED models can be also be used, but it is not possible to set the specific registers of this series, such as PWM control and open load detection at ON.

Figure 15   Tool selection

The GUI appears as in Figure 16.
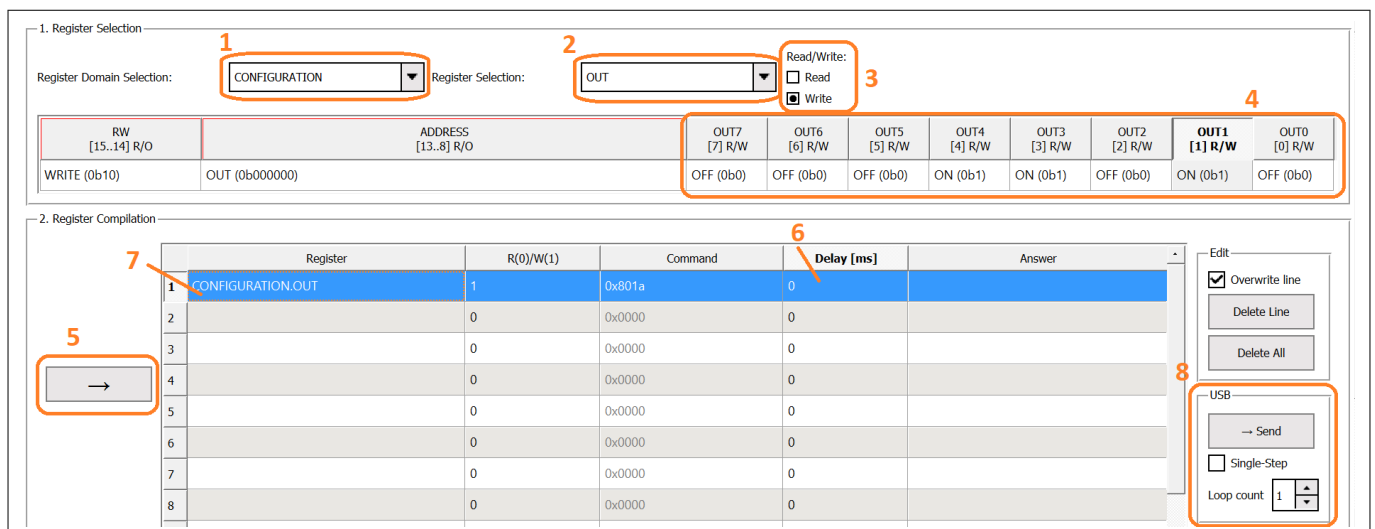
Figure 16   The GUI for SPIDER+/SPIDER+LED

1.   Select the register domain (CONFIGURATION or DIAGNOSIS)
2.   Select the register name
3.   Set Read/Write access to register
4.   Set each single bit of the selected register as preferred
5.   Send the register configuration to the register compilation list
6.   Set a delay time before jumping to the next command
7.   Click the starting command (the command row turns blue)
8.   Set the loop count of the register compilation list not equal to 0 (set -1 for infinite loop), then click Send

11 Schematics

Figure 17 **S01 P01 Schematics main**
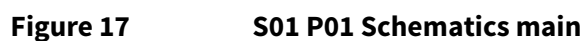
Figure 18   **S01 P01 Schematic channel options**

References

[1]   *SPIDER+ datasheets* https://www.infineon.com/cms/en/design-support/tools/utilities/infineon-developer-center-idc-launcher/

[2]   *Infineon Evaluation boards µIO-Stick*: https://www.infineon.com/cms/en/product/evaluation-boards/uio-stick/

[3]   *Infineon Developer Center Launcher*: https://www.infineon.com/cms/en/design-support/tools/utilities/infineon-developer-center-idc-launcher/

Revision history

Document version	Date of release	Description of changes
Rev.1.00	2022-04-08	• First release related to mother board S01_P01

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