Infineon SPOCTM+2 Multichannel SPI High Side Power Controller

Infineon SPOCTM+2 Multichannel SPI High Side Power Controller User Manual

Contents

Infineon SPOCTM+2 Multichannel SPI High Side Power Controller

Specifications

- Product Name: SPOCTM+2
- Type: Multichannel SPI High-Side Power Controller

Product Usage Instructions

General Information

To use the SPOCTM+2 Software, you will need the following:

1. Required hardware
2. Software installation
3. Hardware setup

Required hardware

The following hardware is required to use the SPOCTM+2 Software:

- SPOCTM+2 Motherboard (SPOCTM+2 MB)
- SPOCTM+2 Daughterboard (SPOCTM+2 DB)
- Limp Home Input (LHI)
- Sense current (IS)

Software Installation

To install the SPOCTM+2 Software, follow these steps:

SPOCTM+2 Application

Download the SPOCTM+2 Application from the provided source and follow the installation instructions.

Setup Hardware

Connect the SPOCTM+2 Motherboard (SPOCTM+2 MB) and the SPOCTM+2 Daughterboard (SPOCTM+2 DB) using the provided cables.

Setup details

Follow these steps to set up the hardware:

1. Connect the Limp Home Input (LHI) to the appropriate port on the SPOCTM+2 Motherboard.
2. Connect the Sense current (IS) to the appropriate port on the SPOCTM+2 Daughterboard.

Using the software

Starting the program

To start the SPOCTM+2 Software, follow these steps:

1. Open the installed SPOCTM+2 Application.
2. Click on the “Start” button to launch the program.

User Interface

The SPOCTM+2 Software provides a user-friendly interface for controlling the multichannel SPI high-side power controller. The interface includes various options and settings to customize the power control.

FAQ

Q: What is SPOCTM+2?

A: SPOCTM+2 is a multichannel SPI high-side power controller.

Q: What hardware is required to use the SPOCTM+2 Software?

A: To use the SPOCTM+2 Software, you will need the SPOCTM+2 Motherboard (SPOCTM+2 MB), SPOCTM+2 Daughterboard (SPOCTM+2 DB), Limp Home Input (LHI), and Sense current (IS).

Q: How do I start the SPOCTM+2 Software?

A: To start the SPOCTM+2 Software, open the installed application and click on the “Start” button.

About this document

Scope and purpose

This User Manual is intended to enable users to integrate the SPOCTM+2 Software for the SPOCTM+2-Demoboard.

Intended audience
This document is intended for anyone using the SPOCTM+2 Software.

Document conventions

Table 1 Conventions

Convention	Explanation
Bold	Emphasizes heading levels, column headings, table and figure captions, screen names, windows, dialog boxes , menus and sub-menus
Italics	Denotes variable(s) and reference(s)
Courier New	Denotes APIs, functions, interrupt handlers, events, data types, error han dlers, file/folder names, directories, command line inputs, code snippets

Conventions for reading the configuration class field
The following examples help the integrator to identify the configuration class of the parameter for a given delivery type.

Abbreviations and definitions

Table 2 Abbreviations

Abbreviation	Definition
SPOC^{TM}+2	SPI Power Controller
SPOC^{TM}+2 MB	SPOC^{TM}+2 Motherboard
SPOC^{TM}+2 DB	SPOC^{TM}+2 Daughterboard
NC	Not Connected
LHI	Limp Home Input
IS	Sense current

General information

Required hardware
First of all some special hardware is needed:

- SPOCTM+2 MB
  - SPOCTM+2 Motherboard
  - See Figure 1

Figure 1 – SPOC™+2 MB

- SPOCTM+2 DB
  - Product specific (BTSxxxxx-xxxx)
  - See Figure 2

Figure 2 – SPOC™+2 DB

- µIO-Stick
  - Communication between your computer and the Demoboard
  - Isar Number: SP001215532

- See Figure 3

Figure 3 - µIO-Stick

- Connection cable
  - Ribbon cable
  - 16 pin female connector
  - See figure 4

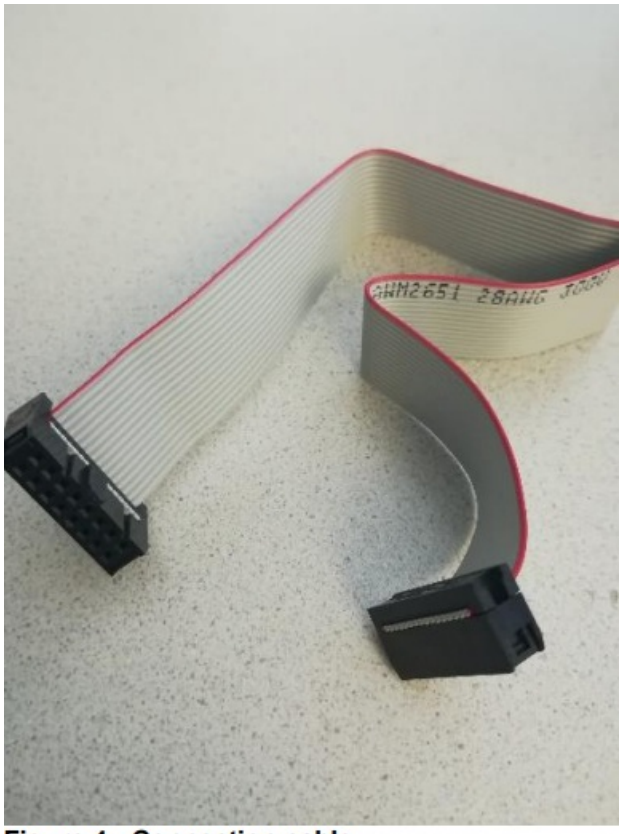
Figure 4 - Connection cable

- USB-Stick
  - For software installation
  - See Figure 5

Figure 5 - Software installation USB-Stick

Software Installation

SPOCTM+2 Application

How to install software for the SPOCTM+2 Evaluation Board:

- Plug in the Software-USB-Stick into a USB port of your computer
- Run setup.exe in the following location:
  - USB-Drive:\SPOC+2_Installer\Volume\setup.exe (see Figure 6)

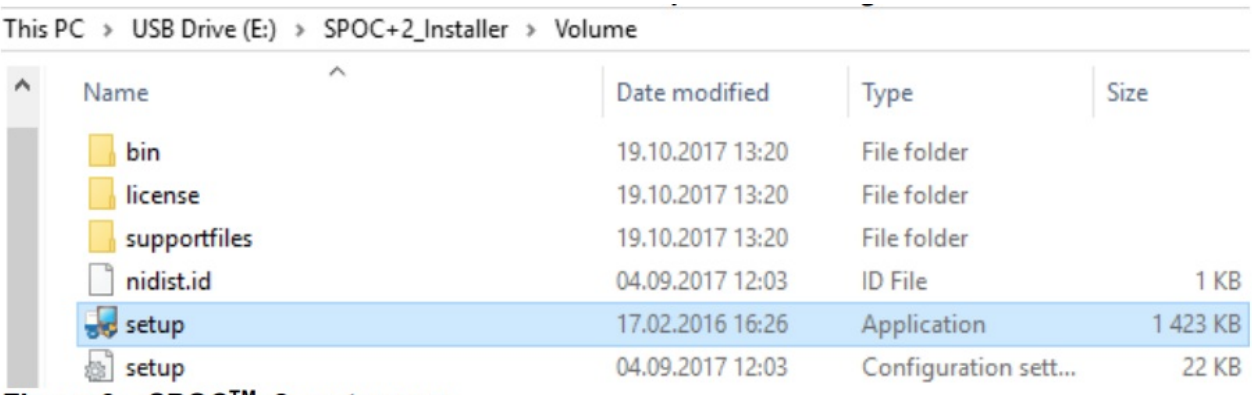

Figure 6 – SPOC™+2 - setup.exe

  - Note: You must log in as administrator!
- Follow the steps of the Installation Wizard (see Figures below):
  - Select installation directory, then click “next”

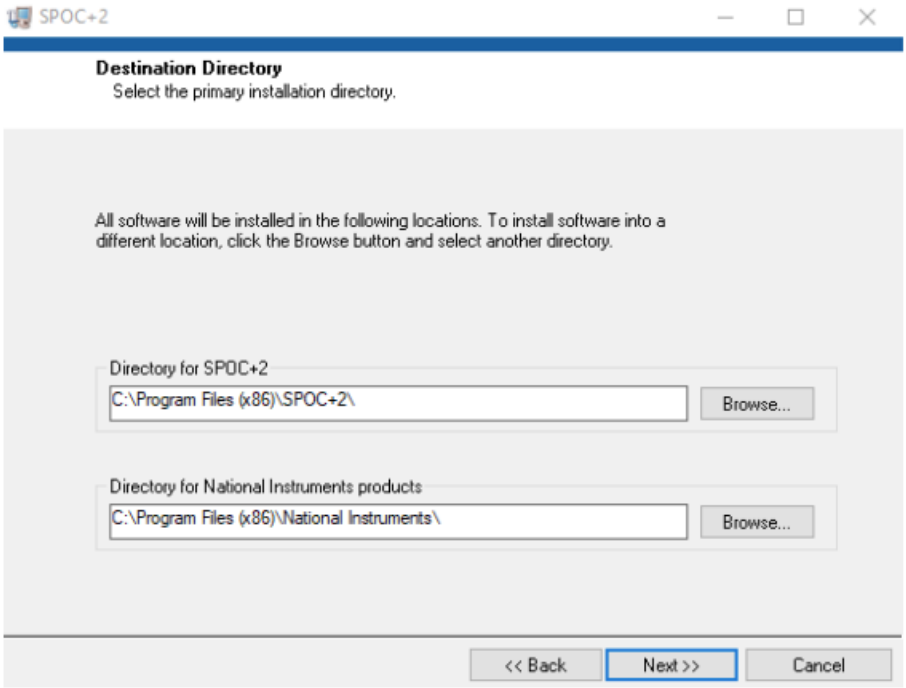

Figure 7 - SPOC™+2 Application - Select Directory

- Again click “next”

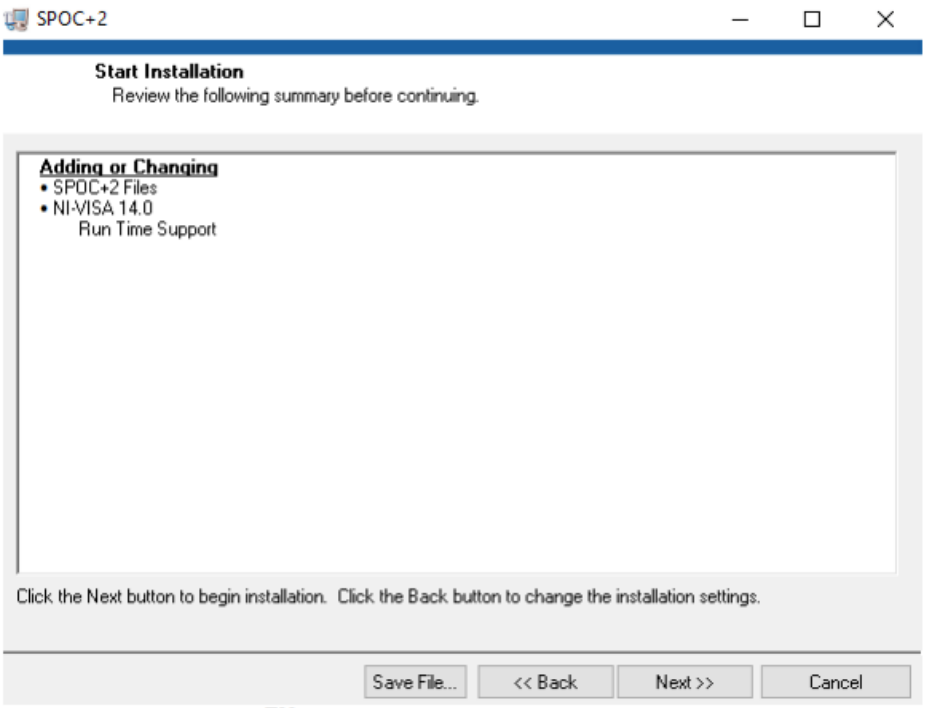

Figure 8 – SPOC™+2 - Application - Start Installation

- The installation will start, after that click „finish“

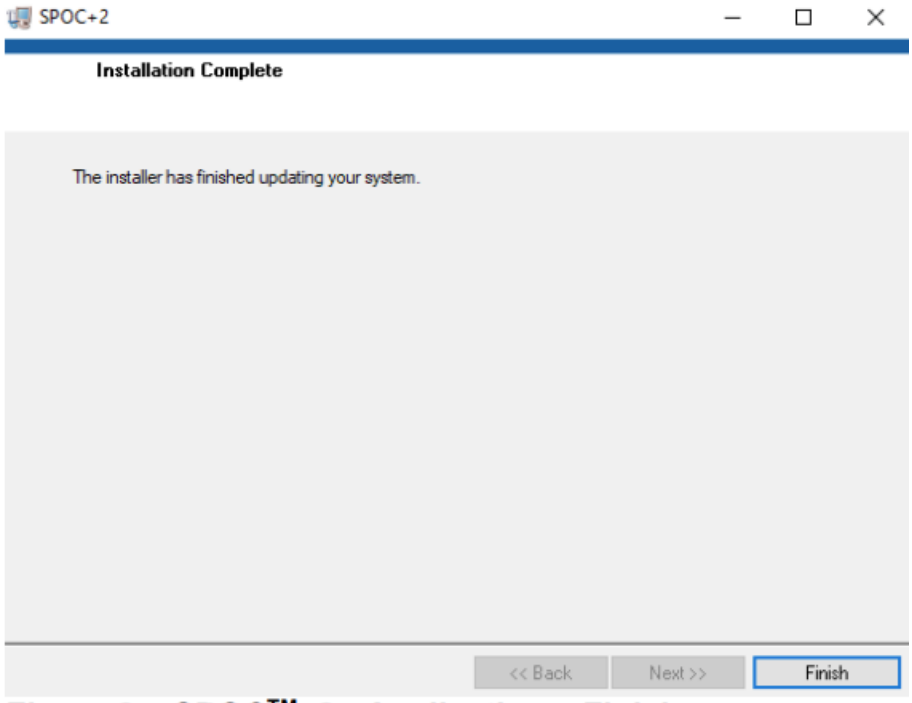

Figure 9 – SPOC™+2 - Application – Finish

µIO-Stick Driver Install

After installing the SPOCTM+2-Application keep the Software-USB plugged in and plug in the µIO-Stick.
In order to use the virtual COM-port (neccesairy for the application) go to https://www.ehitex.de/usbapplication-sticks/infineon/2529/uio-stick, scroll to Available Downloads and select Download uIO Updater (zip file) see Figure 10. Extract the zip file and run UpdatePEK afterwards

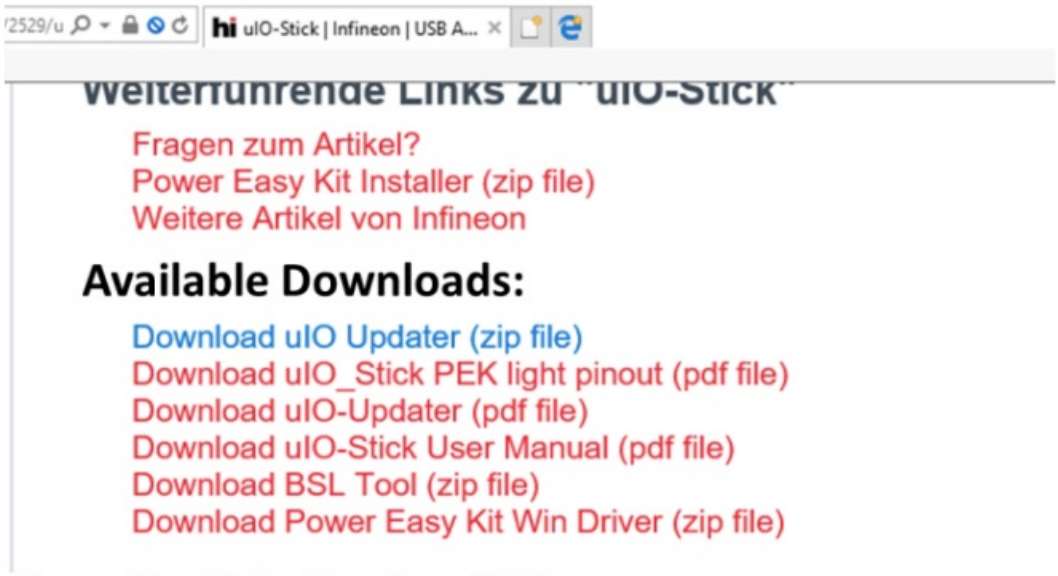

Figure 10 - µIO-Updater (for vCOM)

Setup Hardware

Plug the SPOCTM+2 DB onto the SPOCTM+2 MB (see Figure 11)

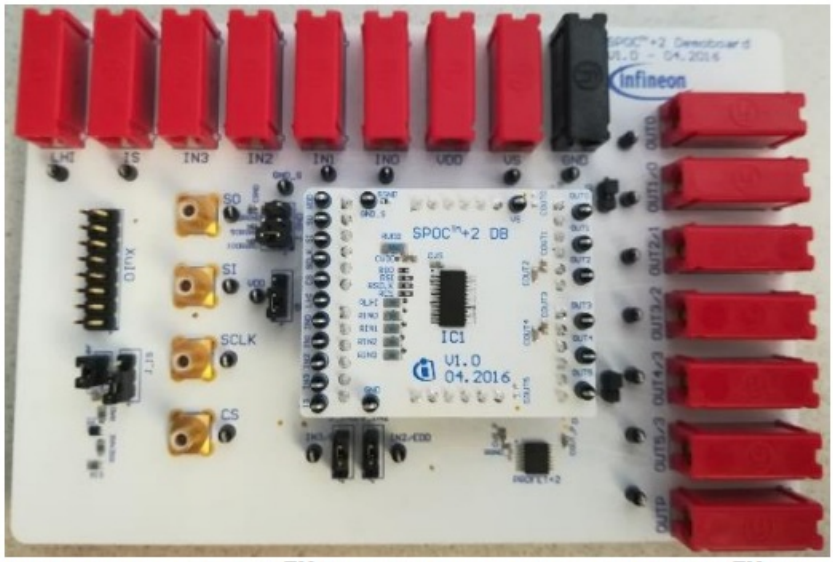

Figure 11 – SPOC™+2 DB plugged onto SPOC™+2 MB

- Connect the µIO-Stick to the SPOCTM+2 MB via the connector cable (see Figure 12)
  - Be careful: Position of Pin 1 is marked with a dot on the SPOCTM+2 MB!

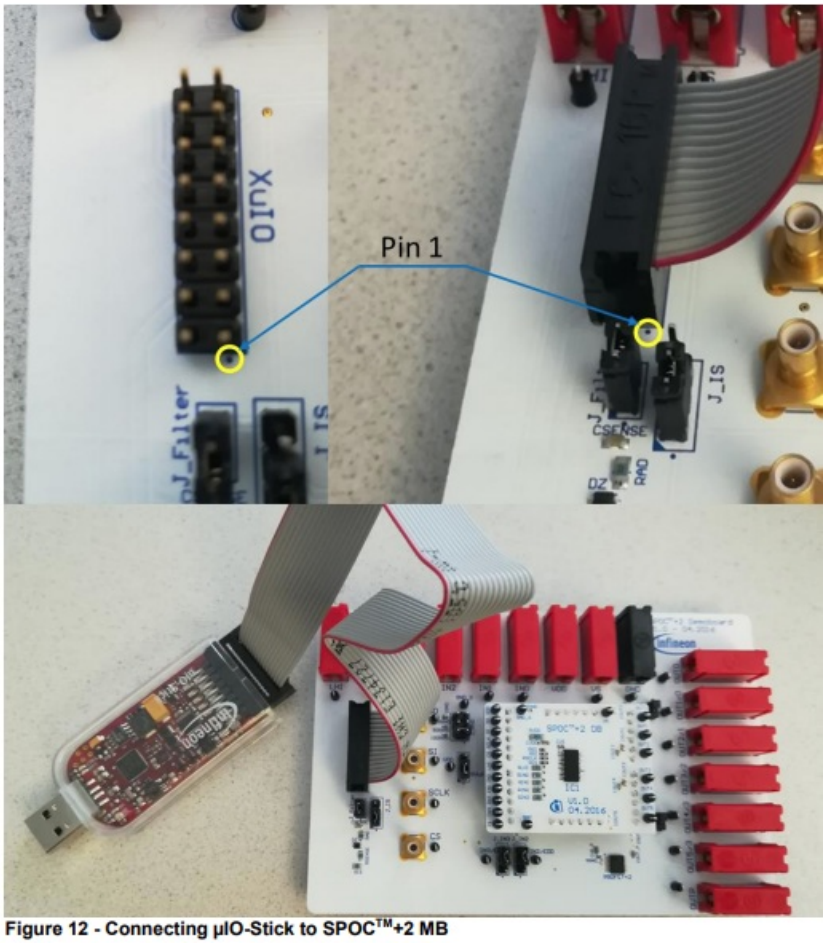

Figure 12 - Connecting µIO-Stick to SPOC™+2 MB

- Connect the µIO-Stick to your computer and run the SPOCTM+2-Application. (see Figure 13)

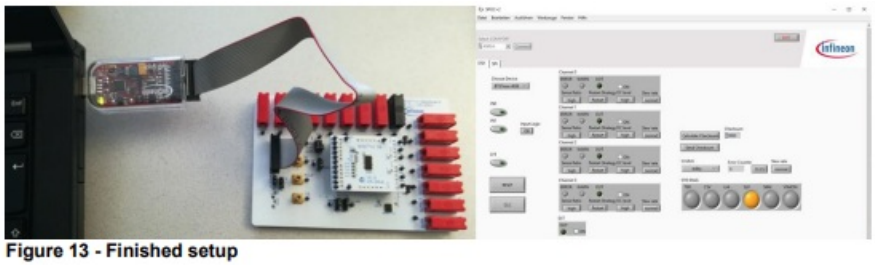
Figure 13 - Finished setup

Setup details

Table 3	
XµIO	
Pin #	
o 1	NC
o 2	GND
o 3	NC
o 4	+5VµIO
o 5	NC
o 6	NC
o 7	NC
o 8	IN3

o 9		CS
o	10	IN2
o	11	SCLK
o	12	IN1
o	13	SO
o	14	IN0
o	15	SI
o	16	Sense
J_Filter		Closed by default
J_IS		1-2 closed by default If 2-3 is closed: · J_Filter has to be opened! · Sense directly switched to IS (Filter disconnected)
J_GND		1-2 closed: R_GND = 150 Ω (default) 3-4 closed: R_GND = 50 Ω 5-6 closed: R_GND = 0 Ω
J_IN2		3-2 closed by default. If 1-2 is closed: · Connect PROFET [2]
J_IN3		3-2 closed by default. If 1-2 is closed: · Connect PROFET [2]
J_VDD		1-2 closed (default VDD via µIO-Stick): · Use +5VµIO (USB) as digital supply voltage 2-3 closed: · VDD via external supply
J_ch0 [1]		Closed if 4 Channel SPOC™+2 is used:

	· OUT0 and OUT1/0 in parallel.
J_ch3 [1]	Closed if 4 Channel SPOC+2 is used: · OUT4/3 and OUT5/3 in parallel.
SO	Slave Out (SPI Interface)
SI	Slave In (SPI Interface)
SCLK	Serial Clock (SPI Interface)
CS	Chip Select (SPI Interface)
IN0	activate the corresponding output channel
IN1	activate the corresponding output channel
IN2/EDD [2]	activate the corresponding output channel
IN3/EDO [2]	activate the corresponding output channel
OUT0	Output channel 0
OUT1/0 [1]	Output channel 1 if J_ch0 is open, Output channel 0 if J_ch0 is closed
OUT2/1 [1]	Output channel 2 if J_ch0 is open, Output channel 1 if J_ch0 is closed
OUT3/2 [1]	Output channel 3 if J_ch0 is open, Output channel 2 if J_ch0 is closed
OUT4/3 [1]	Output channel 4 if J_ch3 is open, Output channel 3 if J_ch3 is closed
OUT5/3 [1]	Output channel 5 if J_ch3 is open, Output channel 3 if J_ch3 is closed
OUTP	Output PROFET [2]
IS	Sense current
LIH	Limp Home Input
VDD	Digital supply voltage
GND	Ground
VS	Supply voltage

1. If 4-Channel-SPOCTM are used J_ch0 and J_ch3 had to be closed, otherwise (6-Channel-SPOC) opened.
2. If Jumpers J_IN2 and J_IN3 are set to 1-2: SPOCTM Outputs EDD and EDO can control the PROFET.

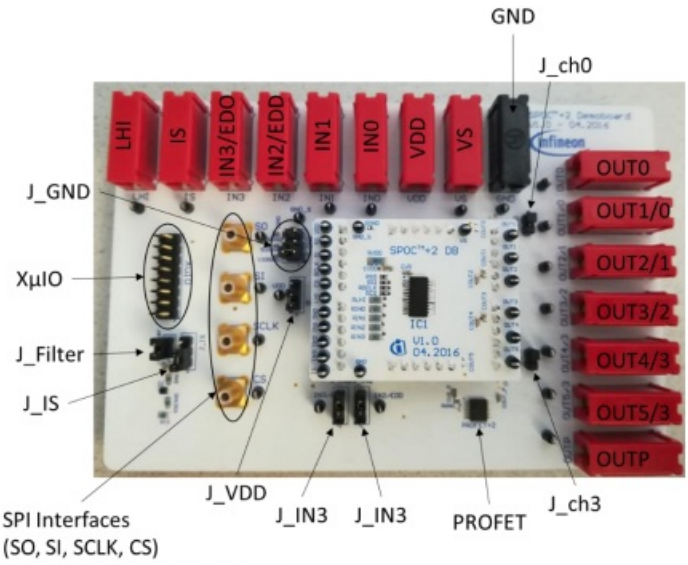

Figure 14 - Device components

Using the software

Starting the program

- Installed Application can be found in the windows start menu in the section “all programs” “SPOC+2” SPOC+2 (see Figure 15):
    - Installed Application can be found in the windows start menu in the section **“all programs” → “SPOC+2” → SPOC+2** (see Figure 15):

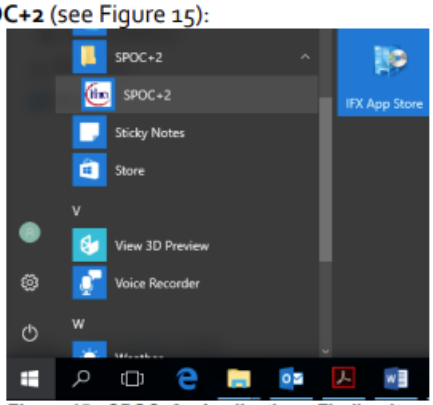

Figure 15 - SPOC+2 - Application - Finding it

or by using the search bar (see Figure 16):

Figure 16 – SPOC™+2 - Application - searching for it

- Run the program by clicking on the file (see Figures 15 and 16)

User Interface

STD-View

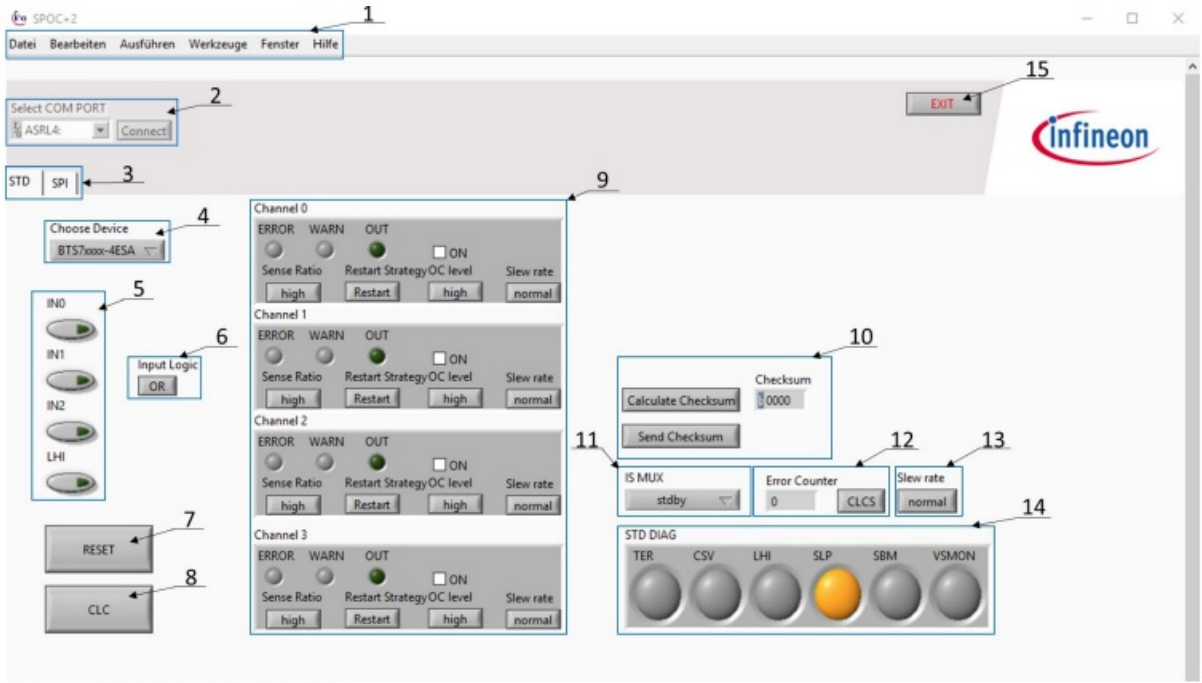

Figure 17 - User Interface - STD-View

Table 4 – STD-View		
1	Menu bar	*
2	Port selection	Software should detect the Comport automatically. · If not: select the needed Comport.
3	Standard or SPI view	Change between a button based control(Figure 17) and a low level SPI comman d control(Figure 18)
4	Device selection	Select the used device type
5	Direct inputs and LHI	· Switch IN0-IN2 on or off · LHI can be set on or off
6	Input logics	OR/AND operation between direct inputs (IN0-IN3) with the channel's on-status (channel 0 to 3)
7	Reset	Reset SPOC^{TM}+2
8	Clear	Clear all Error latches and error counter
9	Channels	Indicates the Status of a channel (Error, Warn, OUT, Slew rate) and configures the channel (ON, Sense ratio, Restart Strategy, OC level) .
10	Checksum	Shows the calculated checksum reflecting the configuration. This value will be transmitted when clicking on send checksum.
11	IS MUX	Configure the mux setting. For more information see datasheet of SPOC ^{TM}+2
12	Error counter	Error counter of the selected channel .
13	Slew rate settings	configures the slew rate of the selected channel
14	Status display	Visualizes the standard diagnosis (spi response)
15	Exit button	Closes connection and program

SPI-View

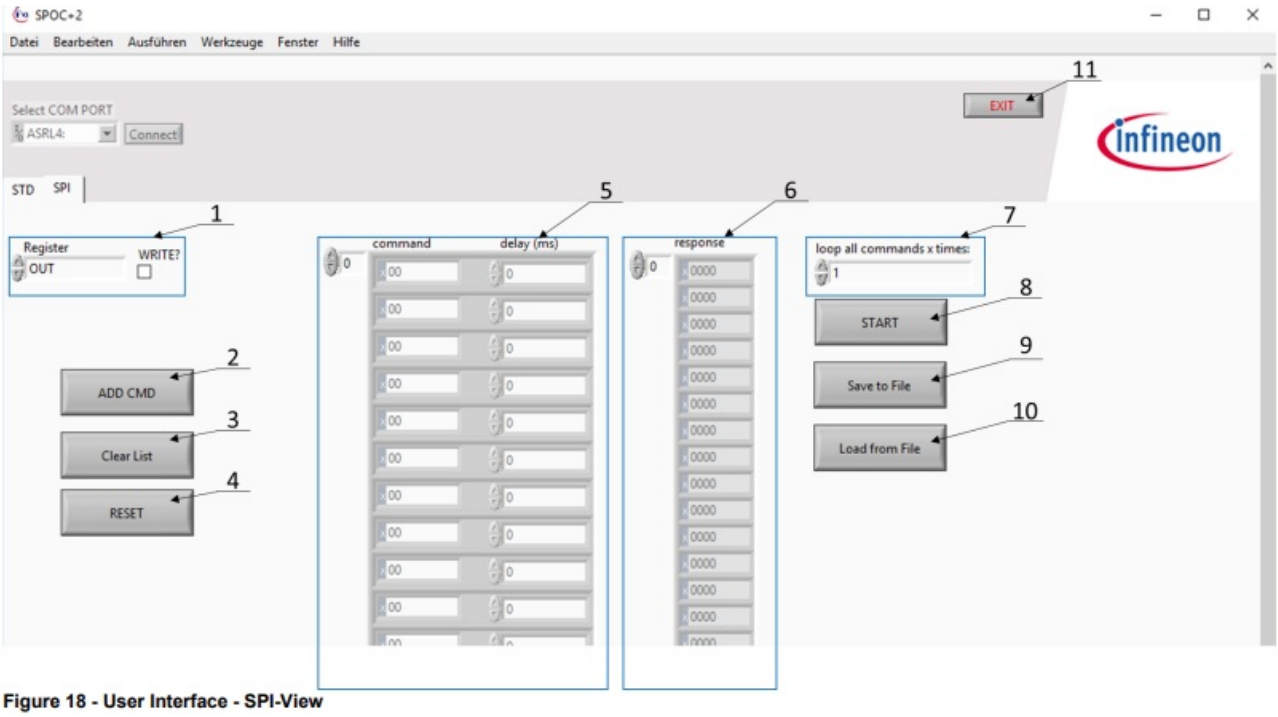

Figure 18 - User Interface - SPI-View

Table 5 – SPI-View		
1	Register selection	Select the register addres and in case WRITE is enabled the content for the next spi command. If WRITE is disabled a read command will be added.
2	Add command	Adds the composed command to the command list (see 8)
3	Clear command list	Clears the content of the command list
4	Reset	Resets SPOC™+2
5	Command list	Displays all added commands in ascending order
6	Response list	Displays SPOC™+2's response to the currently processed command (see datasheet of the used SPOC™+2)
7	Loop configuration	Commands are embedded in a loop Change the number of iterations (default is 1)
8	Start button	Starts the command sequence resp. the loop
9	Save to file	Saves the command sequence to a file
10	Load from File	Loads a saved command sequence from a file
11	Exit button	Closes connection and program

menu description not necessairy at the moment Tobias

Examples: Command sequences, SPI-View

Figure 19 below illustrates a possible test setup. The examples in 2.3.1 and 2.3.2 refer to this setup.

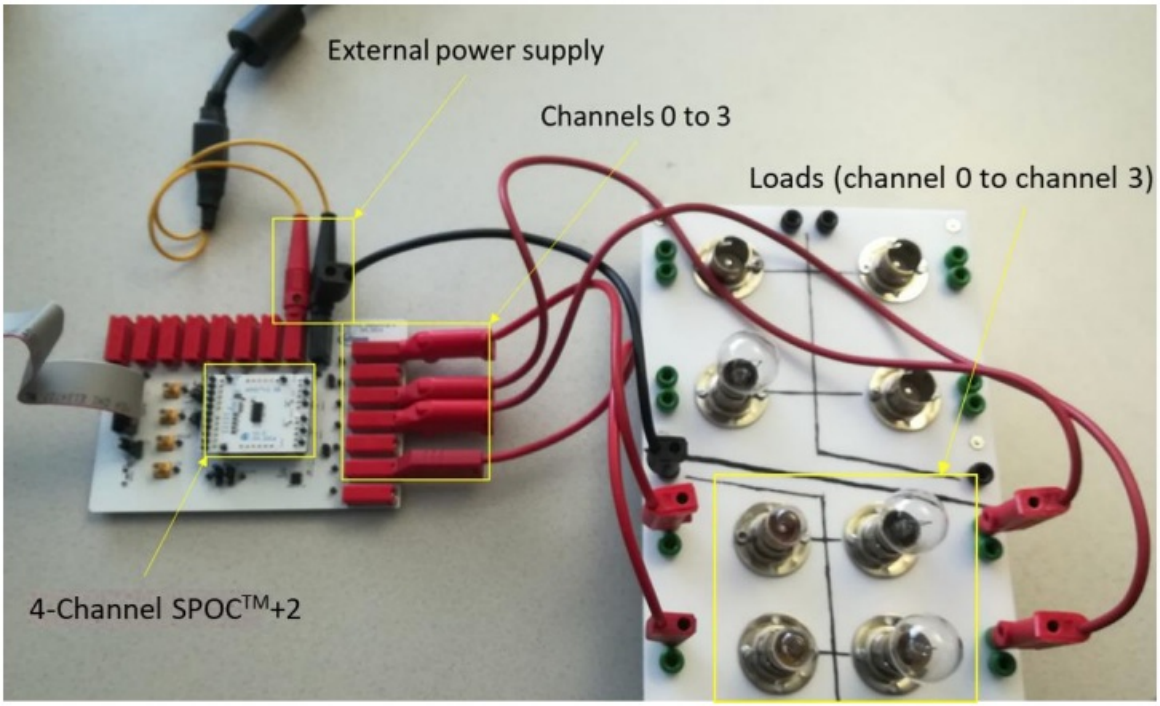

Figure 19 - Possible setup

Example 1: Switching on 4 lights step by step with 1 Second delay

- Switch to SPI view and select register OUT (See Figure 20)

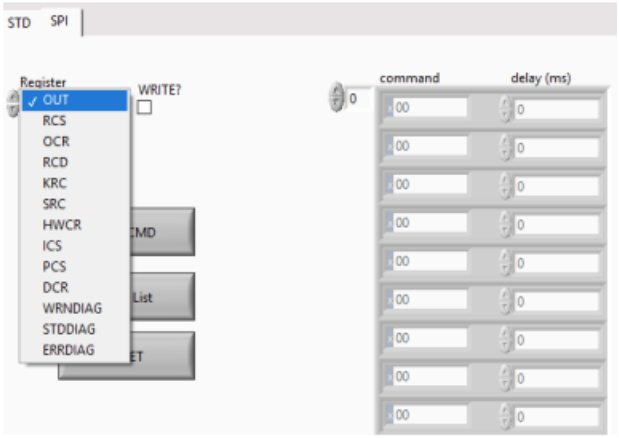

Figure 20 - Select register OUT

- Tick the WRITE?-Box and select no Output (See Figure 21)

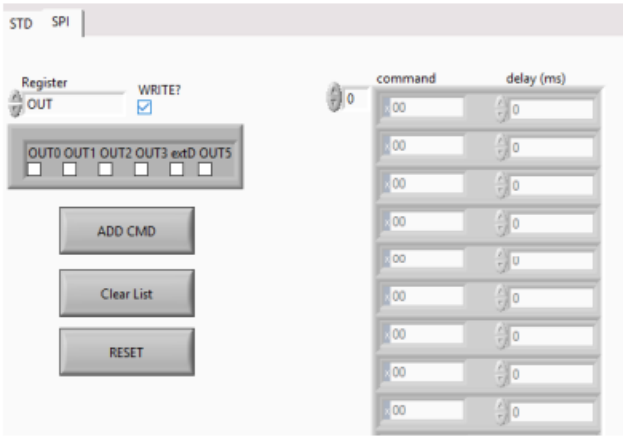

Figure 21 - Write to register OUT

- Click ADD CMD and your command is added to the command list (See Figure 22)

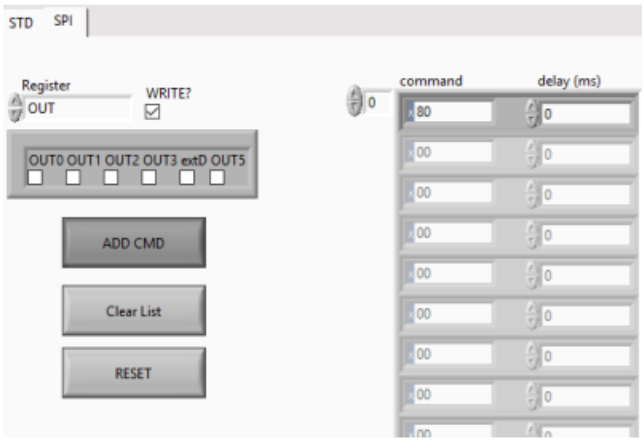

Figure 22 - Add command to command list

- Select OUT0 in the WRITE-Box (See Figure 23)

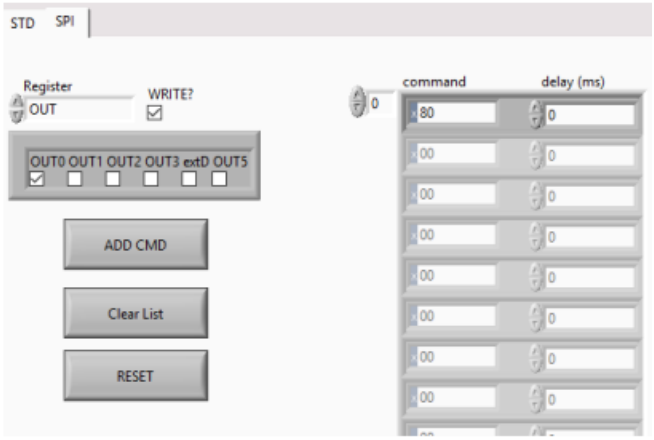

Figure 23 - Write OUT0

- Click ADD CMD (See Figure 24)

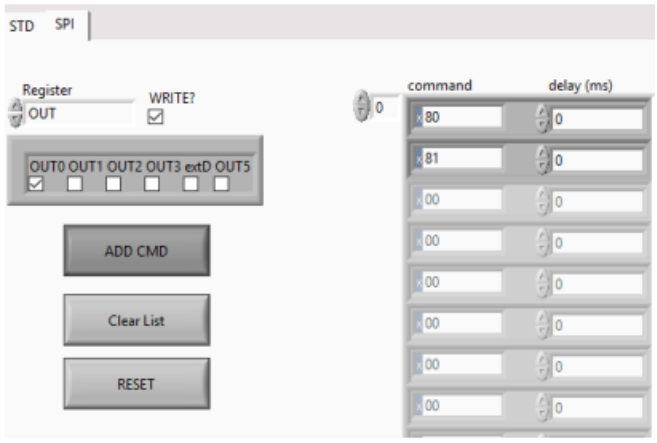

Figure 24 - Add to command list

- Change the delay of each command to 1000 (delay of 1 second, See Figure 25)

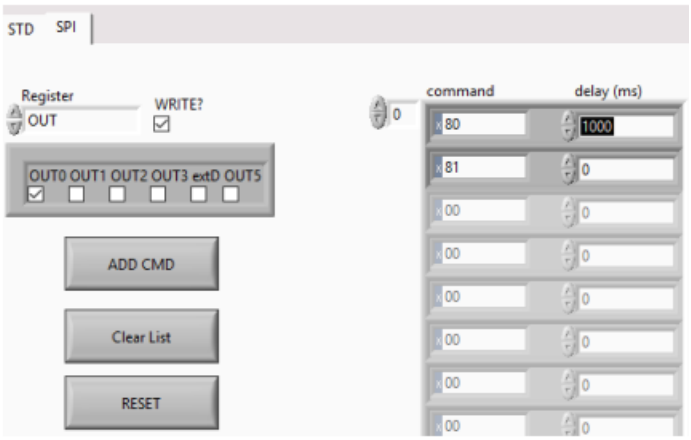

Figure 25 - change delay of cammands

- Repeat the last three steps until you reach OUT3 (See Figure 26)

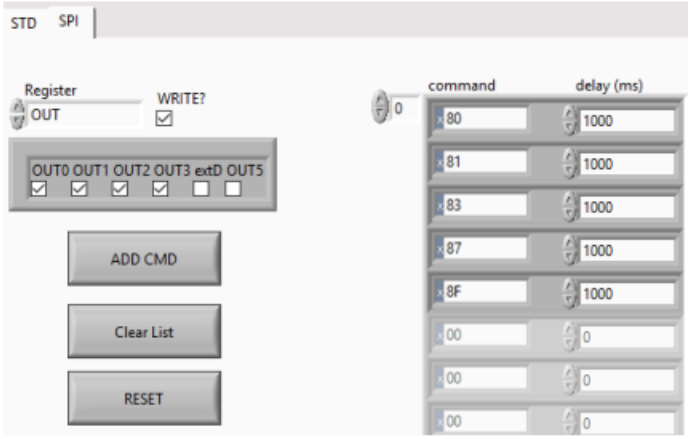

Figure 26 - repeat until all OUTS (OUT0-OUT3) are selected

- Switch to STD view (See Figure 27) and select a channel (0 – 3) at IS MUX (See Figure 28)

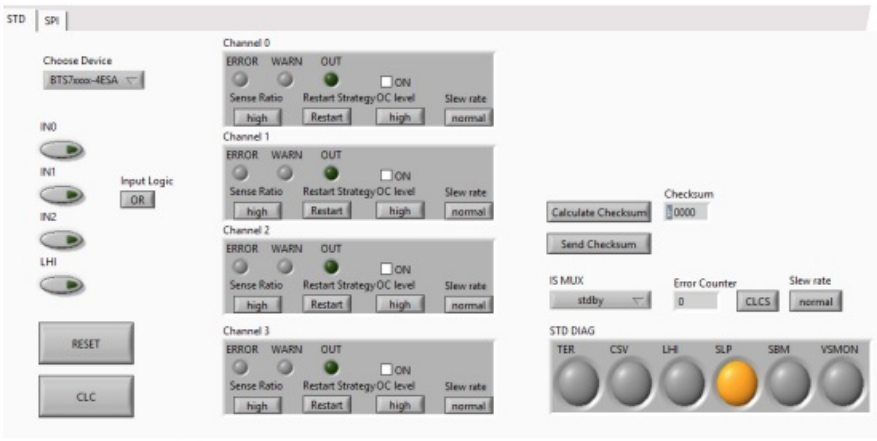

Figure 27 - switch to STD view

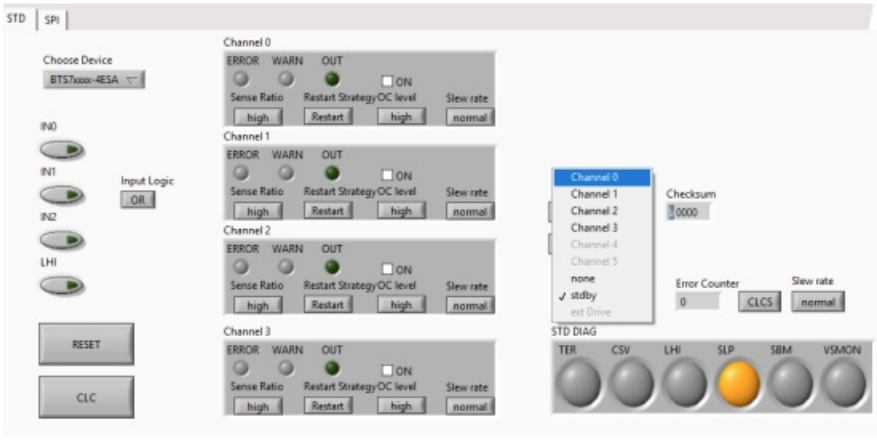

Figure 28 - Select channel at IS MUX

- Switch back to SPI view and click the START-button (See Figure 29)

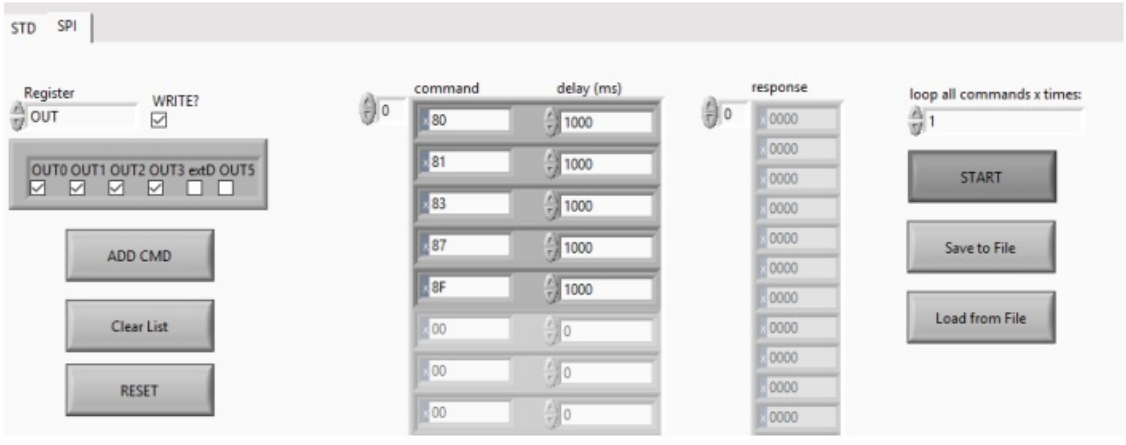

Figure 29 - Start command sequence

- The response of the SPOCTM+2 is shown in the response list (See Figure 30)

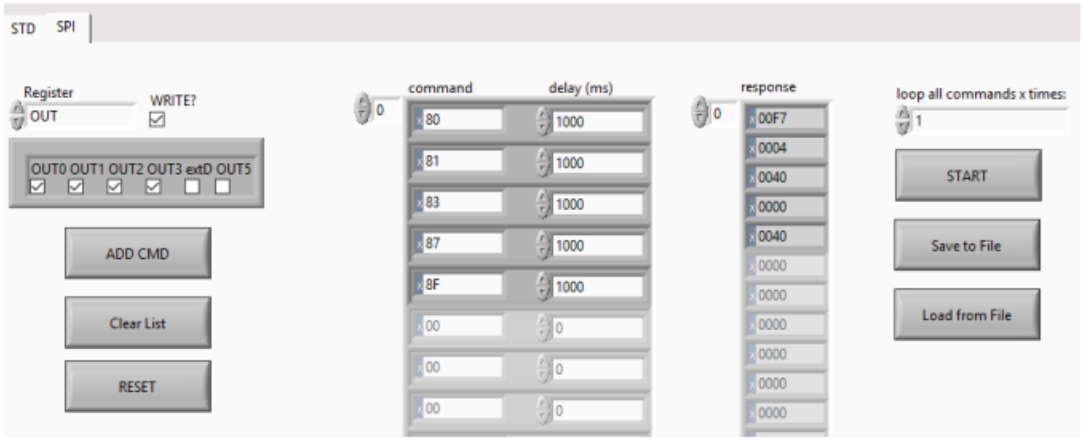

Figure 30 - response of SPOC™+2 to command sequence

Example 2: Let one light blink 10 times

Description t [ms] T_ON Duration light on 500
T_OFF Duration light off 500

- Switch to SPI view and select register OUT (See Figure 31)

	Description	t [ms]
T_ON	Duration light on	500
T_OFF	Duration light off	500

- Switch to SPI view and select register OUT (See Figure 31)

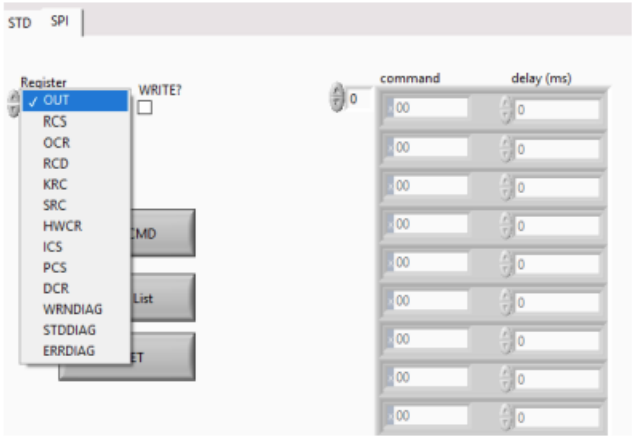

Figure 31 - Select Register OUT

- Tick the WRITE?-Box and select OUT0 and click ADD CMD (See Figure 32)

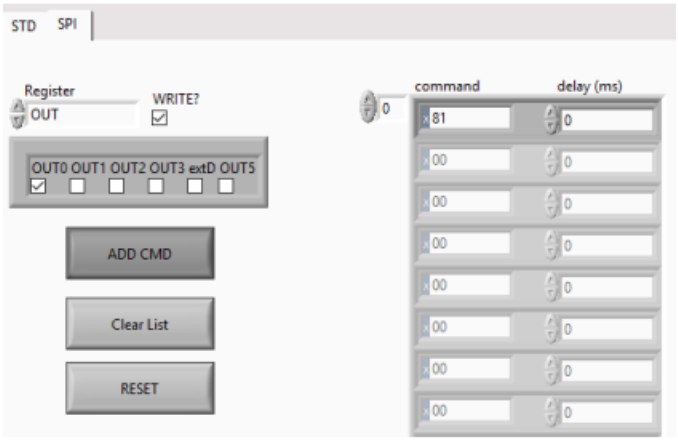

Figure 32 - Select OUT0 and add command

- Select no output in the WRITE-Box and click ADD CMD (See Figure 33)

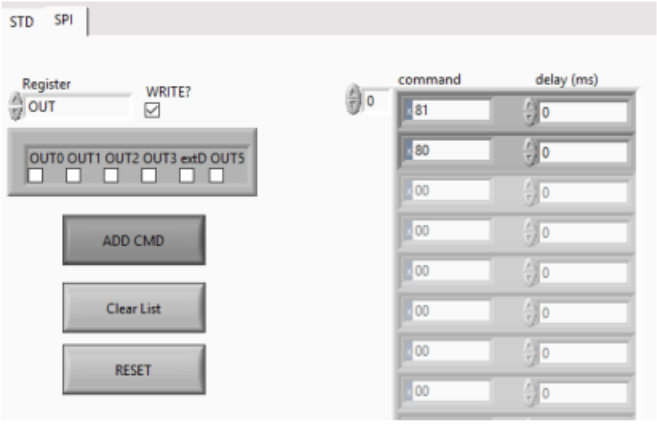

Figure 33 - Select no output and add command

- Also typing in commands directly is possible (See SPOCTM+2 datasheet for command reference)
  o E.g.:
    - The command 80h means Write no output to OUT
    - The command 81h would mean Write to OUT and set OUT0 high.
    - See Figure 32 above
- Change the delay of command 81 to T_ON, the delay of command 80 to T_OFF (See Figure 34)

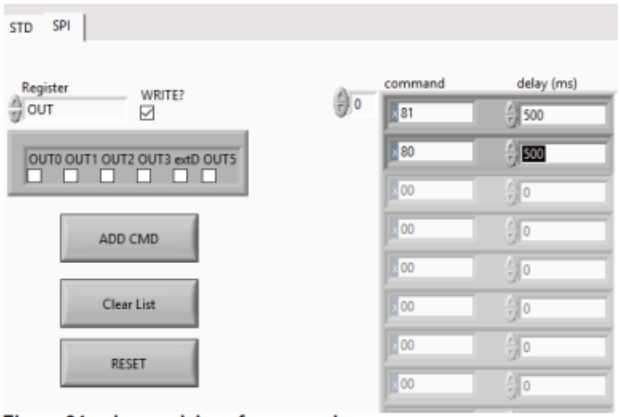

Figure 34 - change delay of commands

- Change loop all commands x times to 10 (See Figure 35)

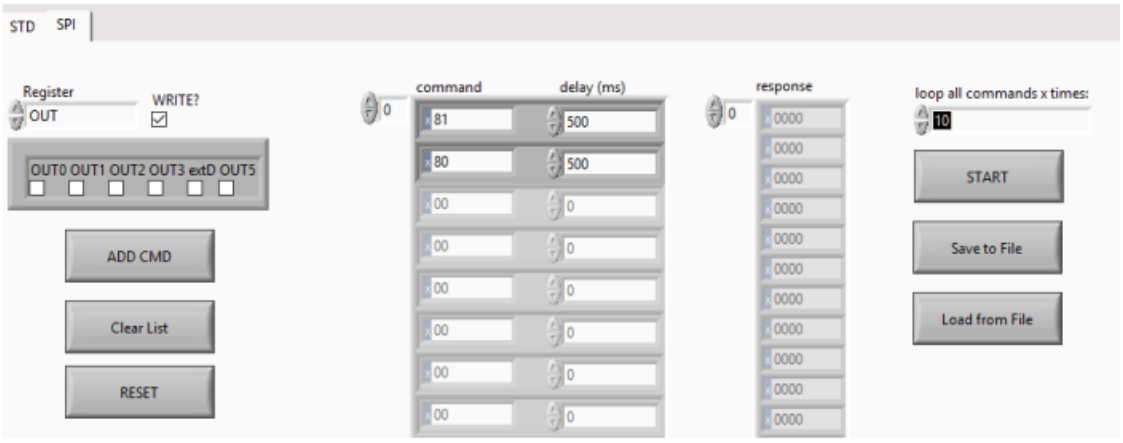

Figure 35 - change number of command sequences iterations

- Switch to STD view (See Figure 36) and select a channel (0 – 3) at IS MUX (See Figure 37)

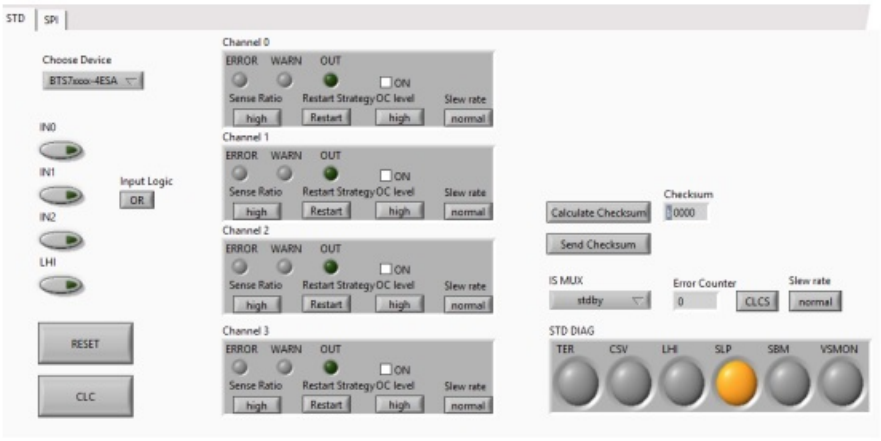

Figure 36 - Switch to STD view

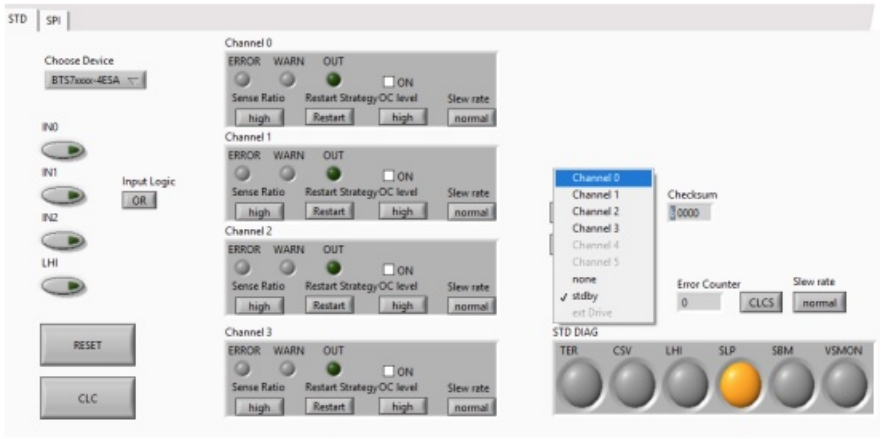

Figure 37 - Select a channel at IS MUX

- Switch back to SPI view and click the START-button (See Figure 38)

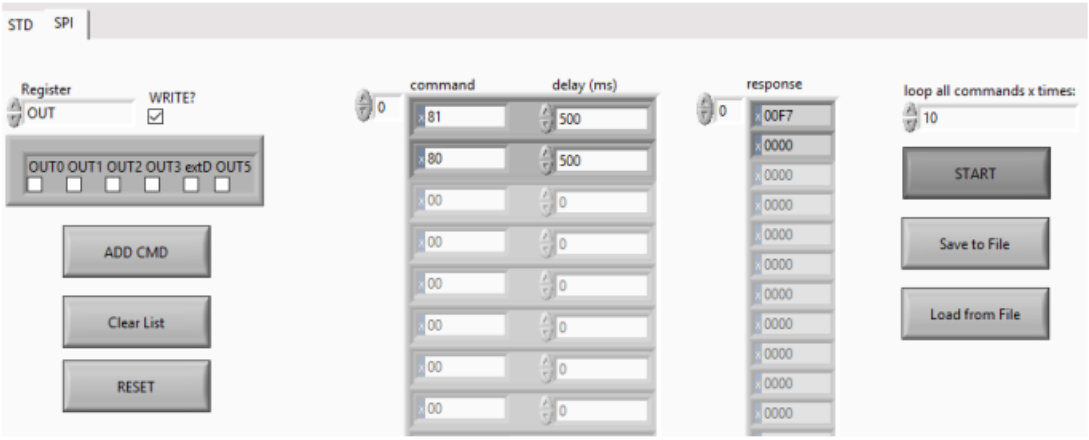

Figure 38 - Switch to SPI and start command sequence

- The response of the SPOCTM+2 is shown in the response list (See Figure 39)

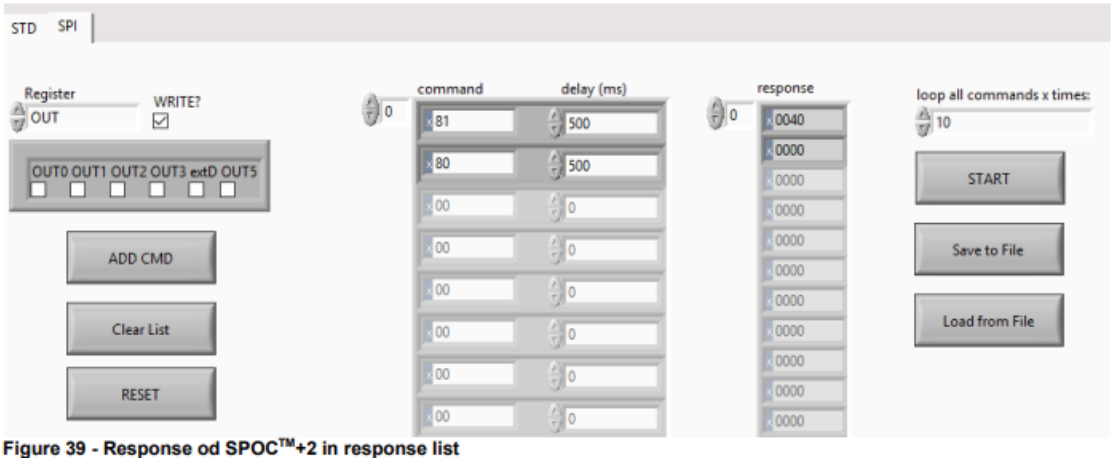

Figure 39 - Response od SPOC™+2 in response list

Revision history

Major changes since the last revision

Major changes since the last revision

Date	Version	Description

Template revision history

Note: The below table is for reference purpose only. Delete this table before circulation.

Changes since the last revision

Date	Version	Author	Description
11-2017	1.0	Rasser René	Initial released version

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References

- Semiconductor & System Solutions - Infineon Technologies
- hi uIO STICK: | Hitex
- User Manual