

DC Shield TLE9562-3QX

User guide

Z8F80648352

About this document

Scope and purpose

This user guide introduces the brushed *direct current (DC)* shield with the TLE9562-3QX. This document provides detailed information on the content, layout and usage of the board. Use it in conjunction with the TLE9562-3QX datasheet, which contains full technical details on the device specification and operation.

Intended audience

Users who develop applications with the TLE956x family.

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Safety precautions

Note: Please note the following warnings regarding the hazards associated with development systems.

Table 1 Safety precautions

	Caution: The heat sink and device surfaces of the evaluation or reference board may become hot during testing. Hence, necessary precautions are required while handling the board. Failure to comply may cause injury.
	Caution: Only personnel familiar with the drive, power electronics and associated machinery should plan, install, commission and subsequently service the system. Failure to comply may result in personal injury and/or equipment damage.
	Caution: The evaluation or reference board contains parts and assemblies sensitive to electrostatic discharge (ESD) . Electrostatic control precautions are required when installing, testing, servicing or repairing the assembly. Component damage may result if ESD control procedures are not followed. If you are not familiar with electrostatic control procedures, refer to the applicable ESD protection handbooks and guidelines.
	Caution: A drive that is incorrectly applied or installed can lead to component damage or reduction in product lifetime. Wiring or application errors such as undersizing the motor, supplying an incorrect or inadequate AC supply, or excessive ambient temperatures may result in system malfunction.

Warnings

Due to technical requirements products may contain dangerous substances. For information on the types in question please contact your nearest Infineon Technologies office.

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1 The board at a glance

1 The board at a glance

The TLE9562-3QX brushed direct current shield is a simple and easy-to-use tool for getting familiar with the device features and for first application tests.

Use the evaluation board either with a uIO-Stick or stacked on an Arduino UNO board.

The uIO-Stick is the interface between the PC and the application board, such as the TLE9562-3QX.

The TLE9562-3QX [serial peripheral interface \(SPI\)](#) communication is emulated by the uIO-Stick, which you can control through the [graphical user interface \(GUI\)](#).

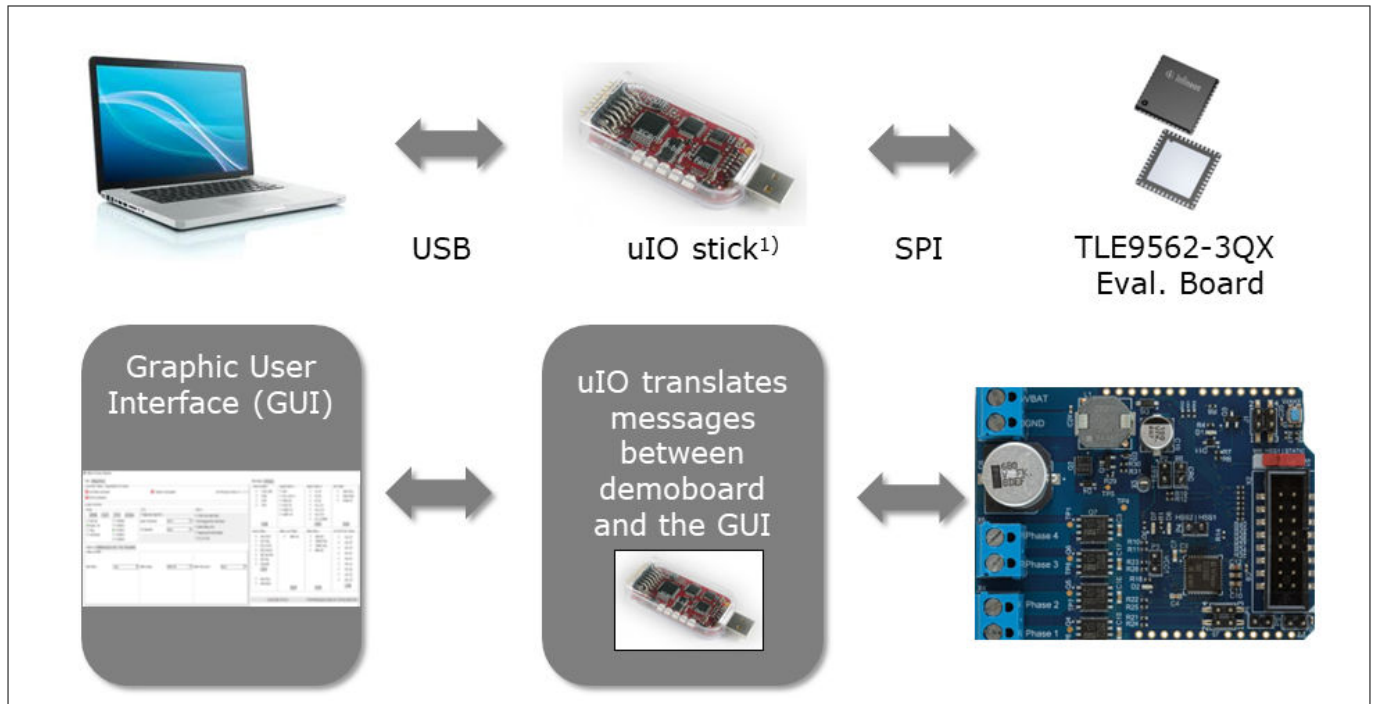


Figure 1 TLE9562-3QX Evaluation board with the uIO-Stick concept

1.1 Delivery content

The cardboard box includes one brushed direct current shield TLE9562-3QX board. The Arduino UNO board and the uIO -Stick are not included and you need to order them separately.

For further details about the uIO-Stick refer to: www.hitex.com/uIO

For further information about the Arduino UNO controller board refer to: [Arduino - Home](http://Arduino-Home).

1 The board at a glance

1.2 Block diagram

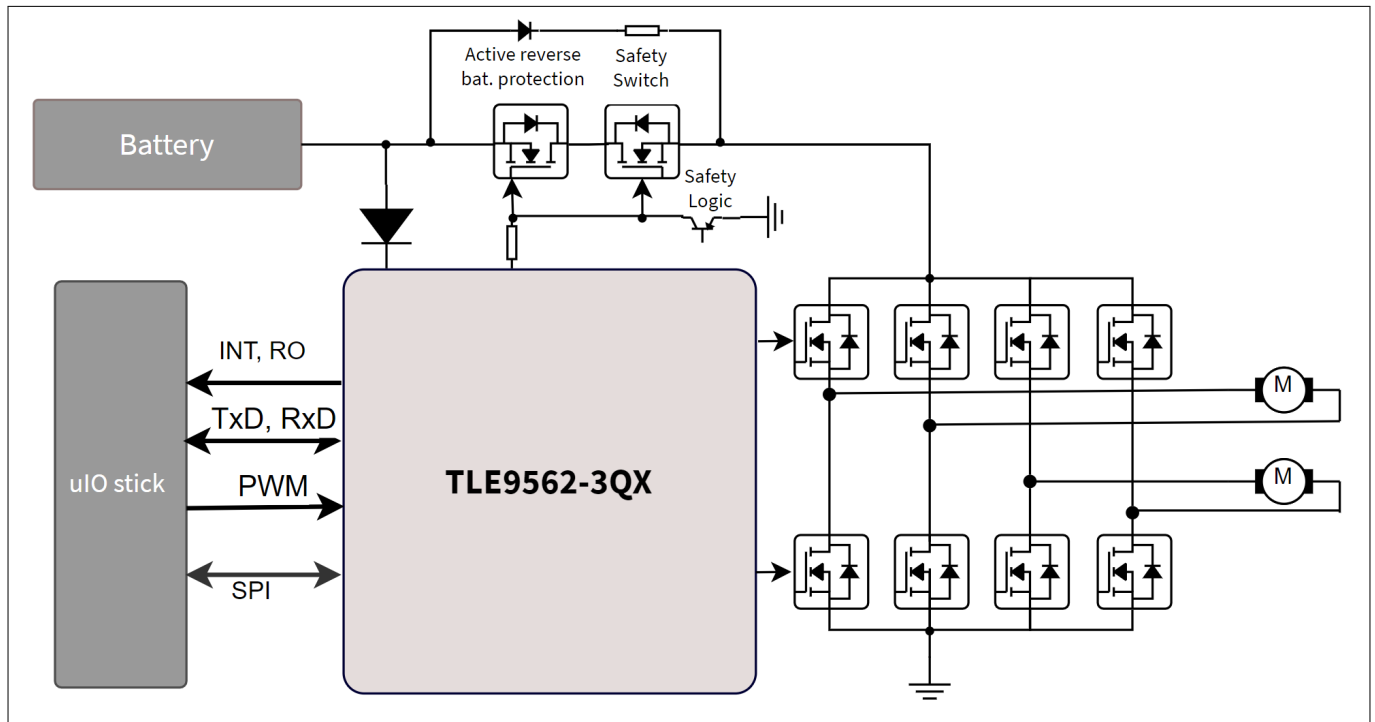


Figure 2 Application circuit for a bi-directional motor control with the TLE9562-3QX using a uIO-Stick

Note: Using the TLE9562 shield board with a uIO-Stick, you can spin a brushed direct current motor (bi-directional).

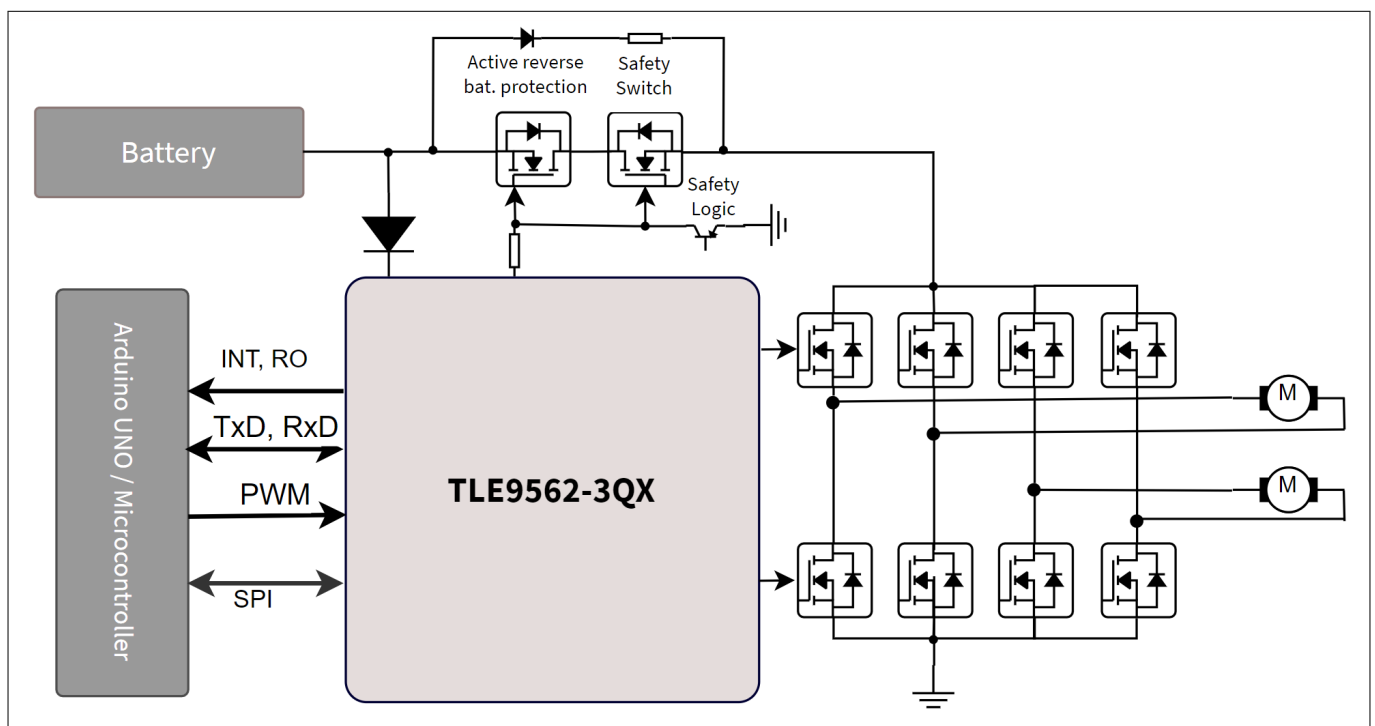


Figure 3 Application circuit for a bi-directional motor control with the TLE9562-3QX using an Arduino UNO board

1 The board at a glance

Note: Using the TLE9562 shield board with the Arduino UNO board, you can spin a brushed direct current motor (bi-directional).

1.3 Main features

The TLE9562 evaluation board includes:

- A MOTIX™ TLE9562-3QX
- A 16-pin connector for the uIO-Stick
- A placeholder for the pin header to stack the motor control shield directly on top of an Arduino UNO controller board¹⁾
- An active reverse battery protection circuitry with IPZ40N4S5L-2R8
- Four IAUC60N04S6N031H with dual N-channel MOSFETs
- Hall sensor connectors

Table 2 **Technical data**

Voltage supply	Maximum current
Typ. 12 V (max. 28 V)	16 A

¹ Due to manufacturing mistake the holes are filled and they need to be cleaned before connecting the pin header.

2 Hardware description

2 Hardware description

The TLE9562-3QX brushed direct current shield is compatible with the uIO-Stick. The uIO-Stick plugs into the TLE9562-3QX main board with a 16-pin header, and allows an easy interface to the microcontroller through *universal serial bus (USB)* for *SPI* communication.

2.1 Board overview and connectors

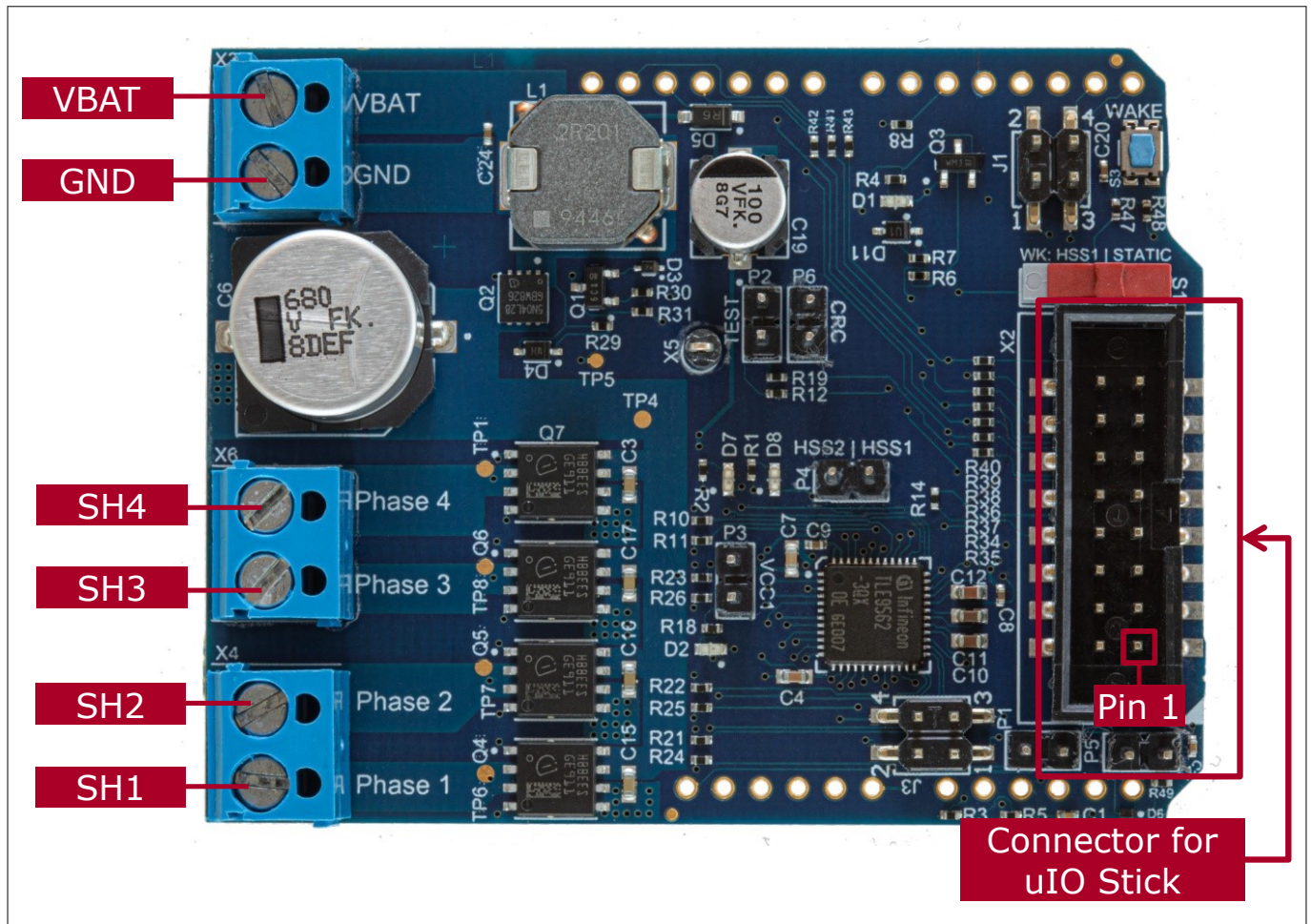


Figure 4 Evaluation board connectors

2 Hardware description

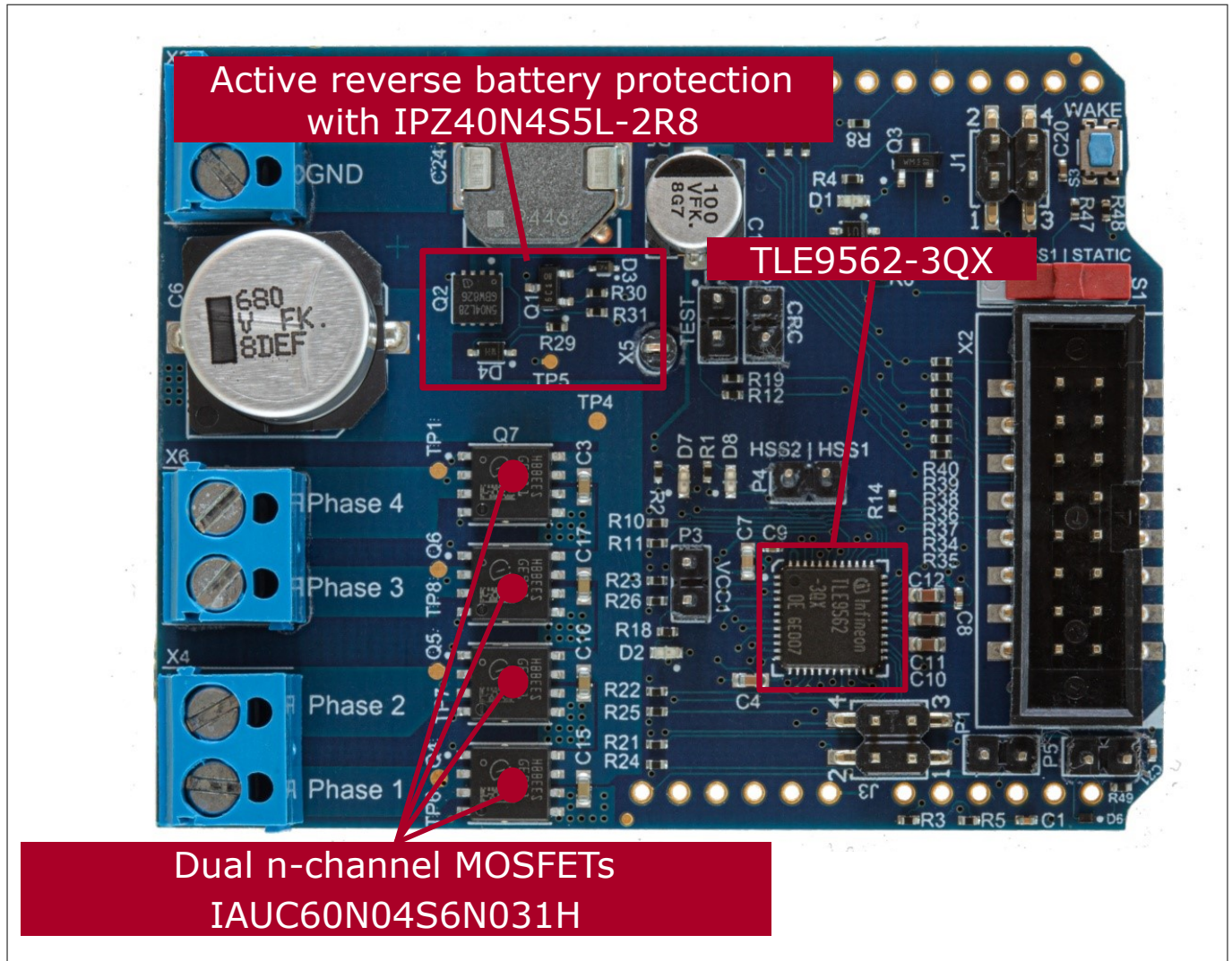


Figure 5

Board components overview 1

2 Hardware description

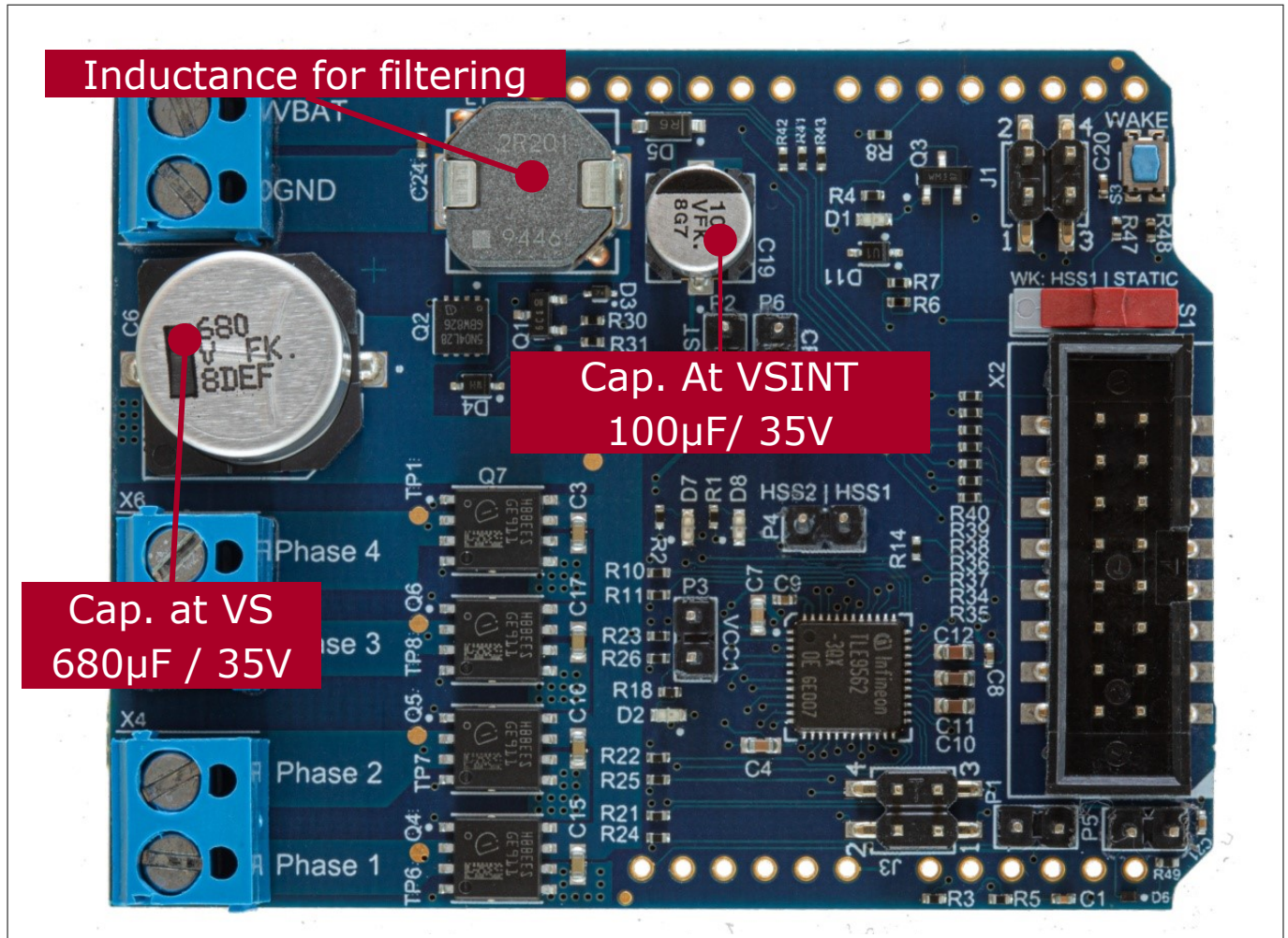


Figure 6 Board components overview 2

2 Hardware description

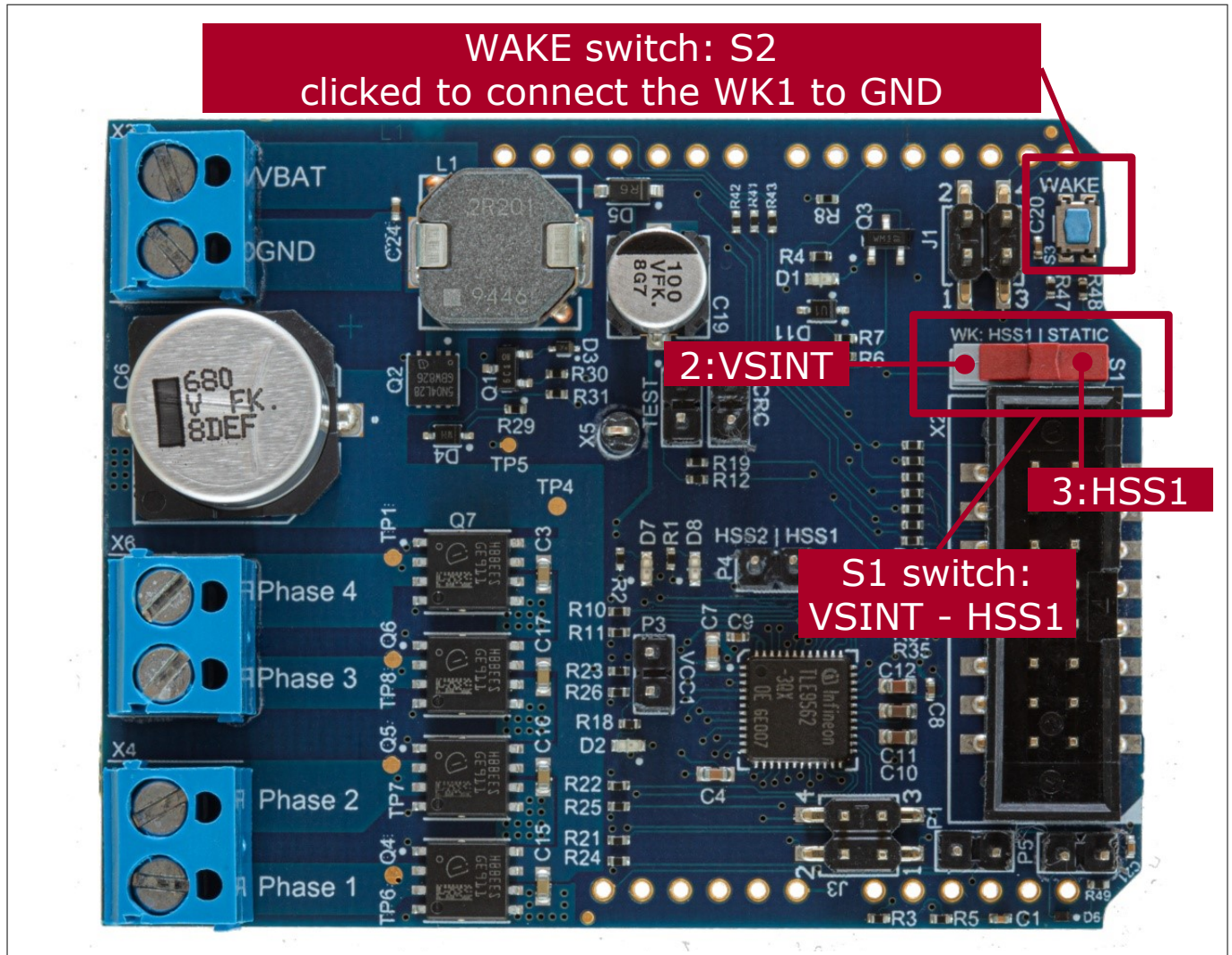


Figure 7 Board switches

Table 3 Switches and positions

Switches	Positions	Description
Wake switch S2	-	Wake the TLE9562-3QX up and exit sleep mode
Switch S1	Position 2:VSINT	To use the interrupt function properly, ensure that the switch S1 is in position 2:VSINT. Otherwise the interrupt is bound to the pulse-width modulation (PWM) of HSS1 (HS1) and called periodically, if this HSS1 (HS1) is used.
	Position 3:HSS1	To use the cyclic sense feature, set the switch S1 to position 3:HSS1 (HS1). One of the high-side drivers is switched on periodically and supplies some external circuits connected to the WK inputs (for more details refer to sub-chapter 5.7 of the datasheet).

2 Hardware description

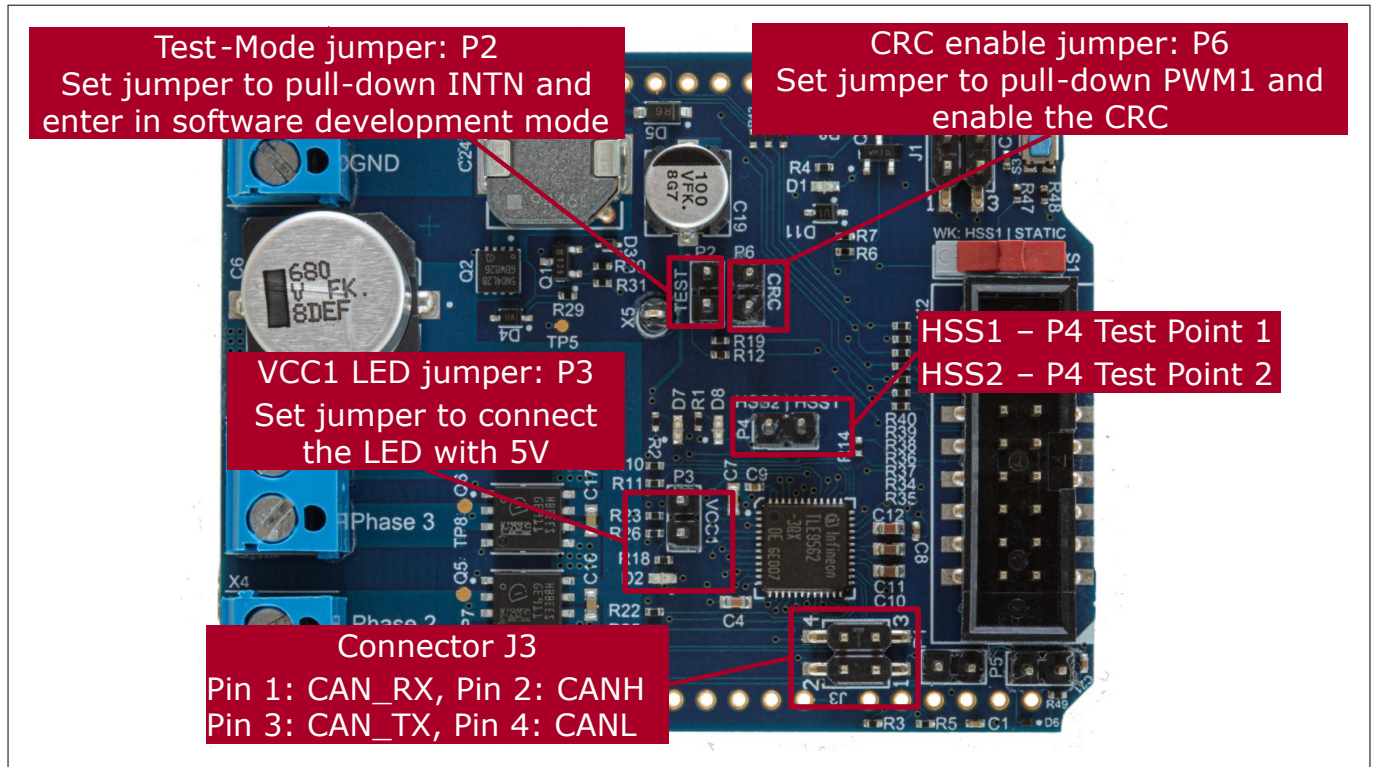


Figure 8 TLE9562 jumpers overview

Note: The software development mode is a dedicated SBC (system basis chip) configuration, which is useful for software development. To enter this mode, set the jumper P2. In software development mode the watchdog is enabled, but does not trigger the transition to fail-safe mode or restart mode.

Note: The *SPI* interface includes also 8 bits used for *cyclic redundancy check (CRC)* to ensure data integrity on sent or received *SPI* command. Set the jumper P6 to pull down the PWM1 pin to ground and enable the CRC.

2 Hardware description

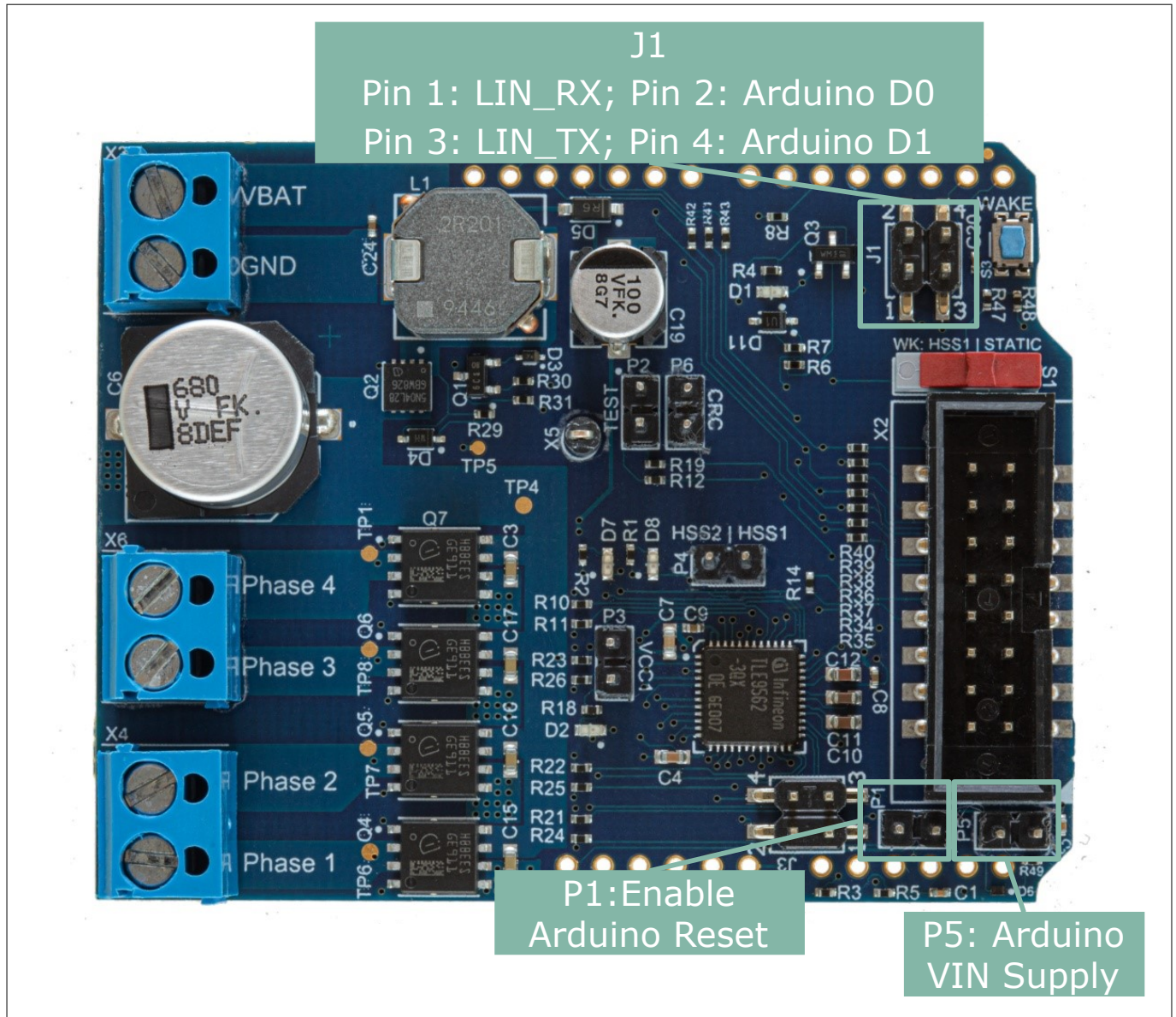


Figure 9 Arduino jumpers

Set the jumper P5 to connect VIN of Arduino with the 5 V regulator (VCC1) on the TLE9562 shield.

For the Arduino jumper settings refer to <https://motor-system-ic-tle956x.readthedocs.io/en/latest/hardware-platforms.html#id4>

2 Hardware description

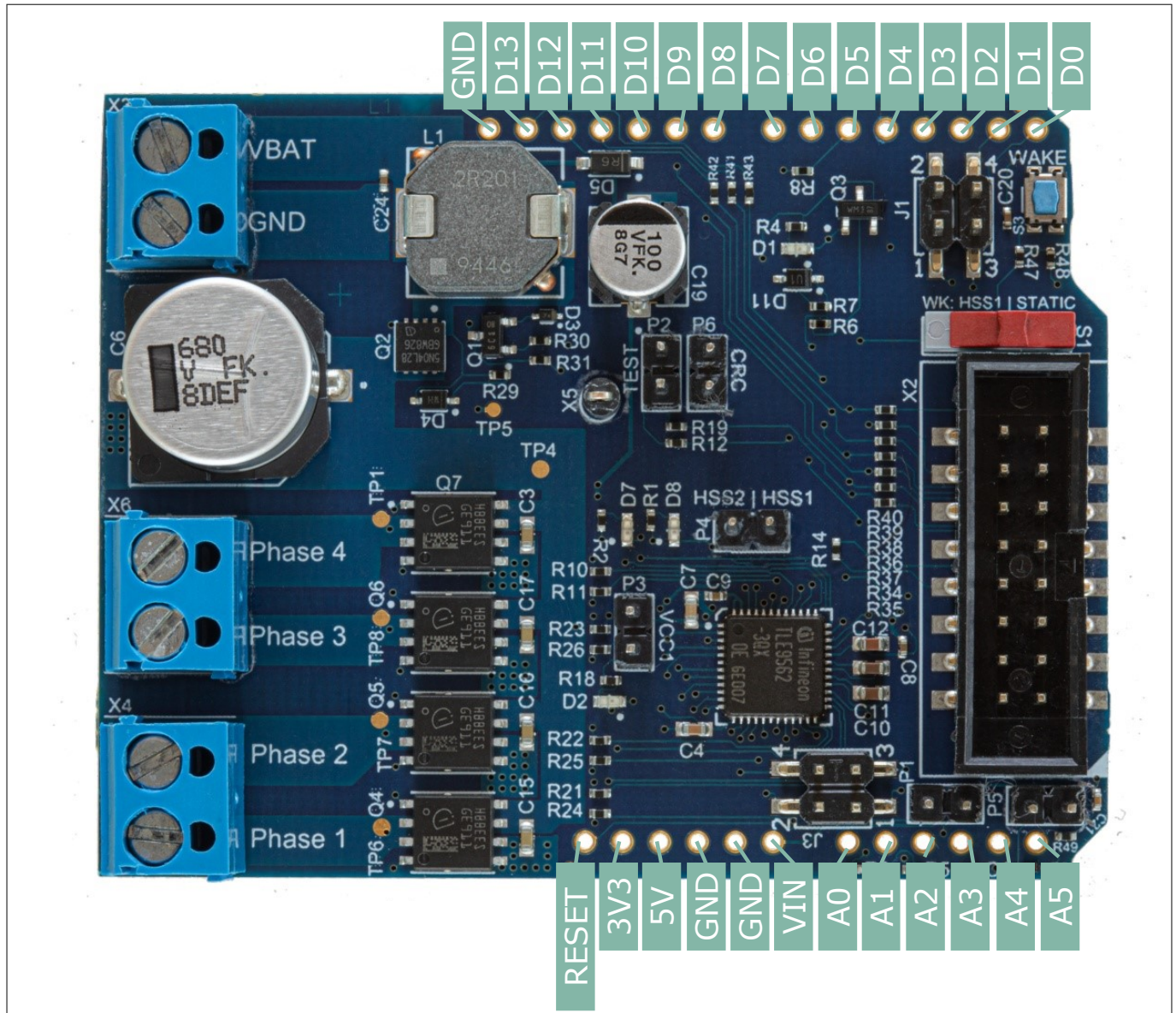


Figure 10 **Arduino connectors**

For the Arduino pins details refer to <https://motor-system-ic-tle956x.readthedocs.io/en/latest/hardware-platforms.html#dc-motor-shield-with-tle9562>.

2 Hardware description

2.1.1 Board design

2.1.1.1 Schematics

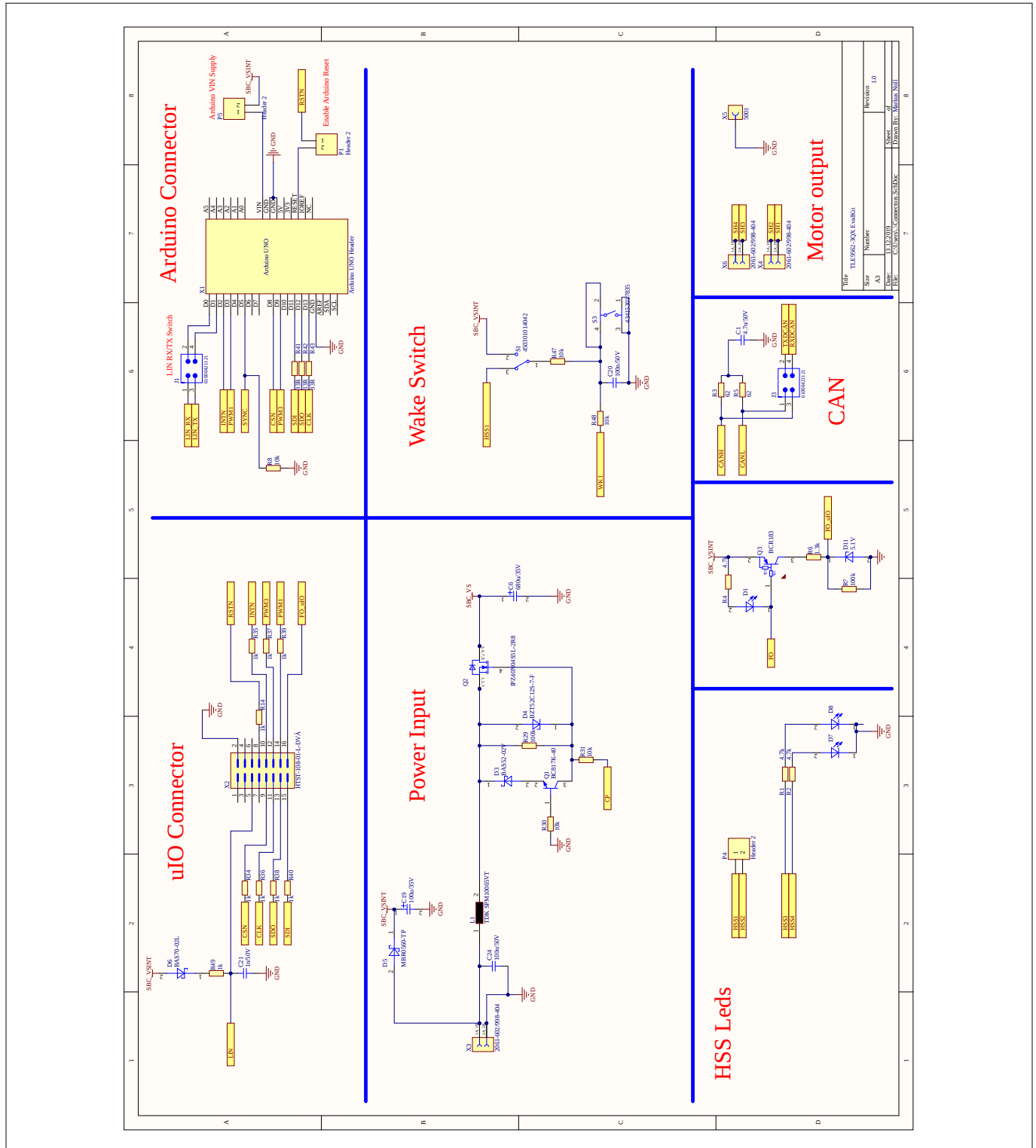


Figure 11 Schematic 1/3

2 Hardware description

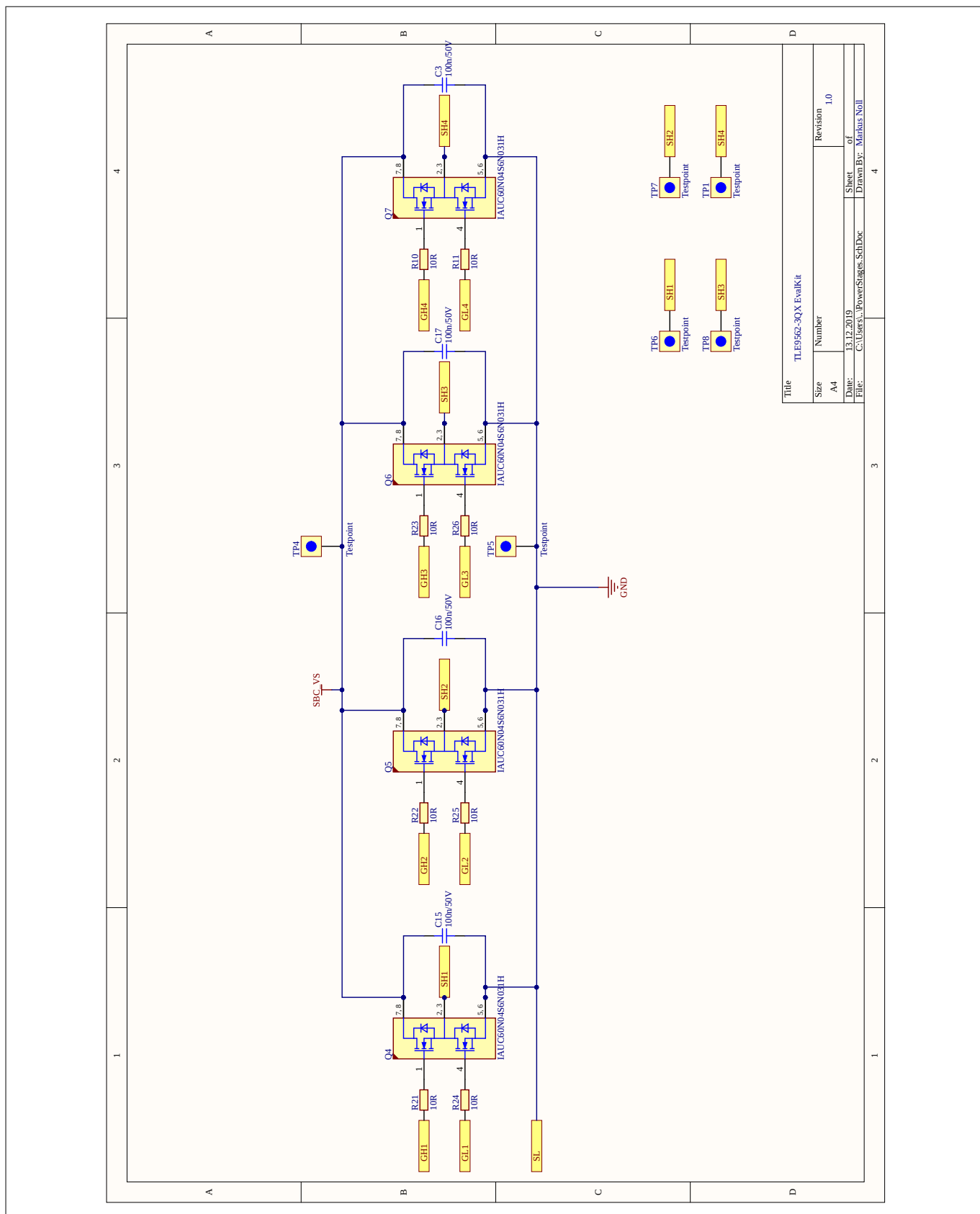


Figure 12 **Schematic 2/3**

2 Hardware description

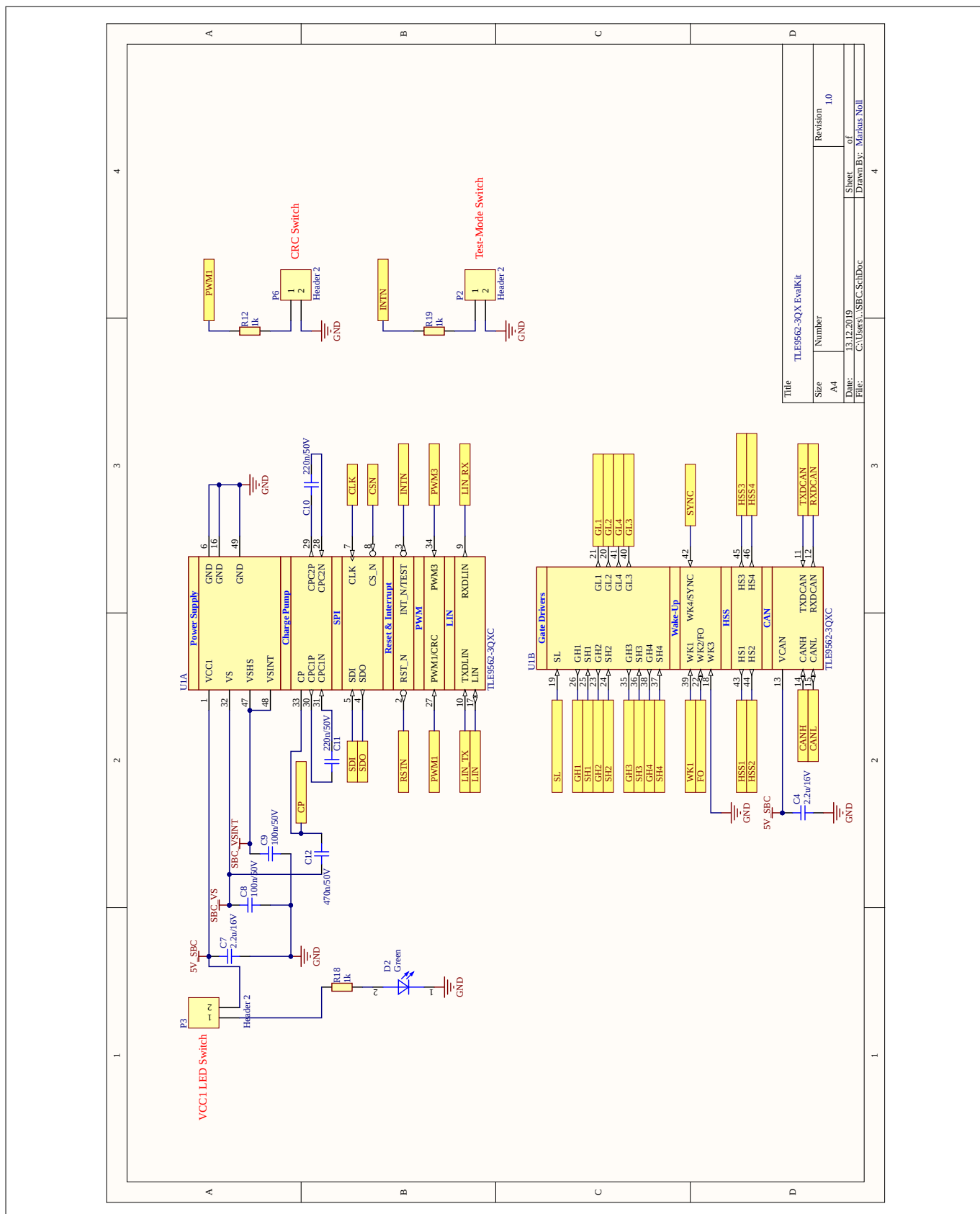


Figure 13 **Schematic 3/3**

2 Hardware description

2.1.1.2 Layout

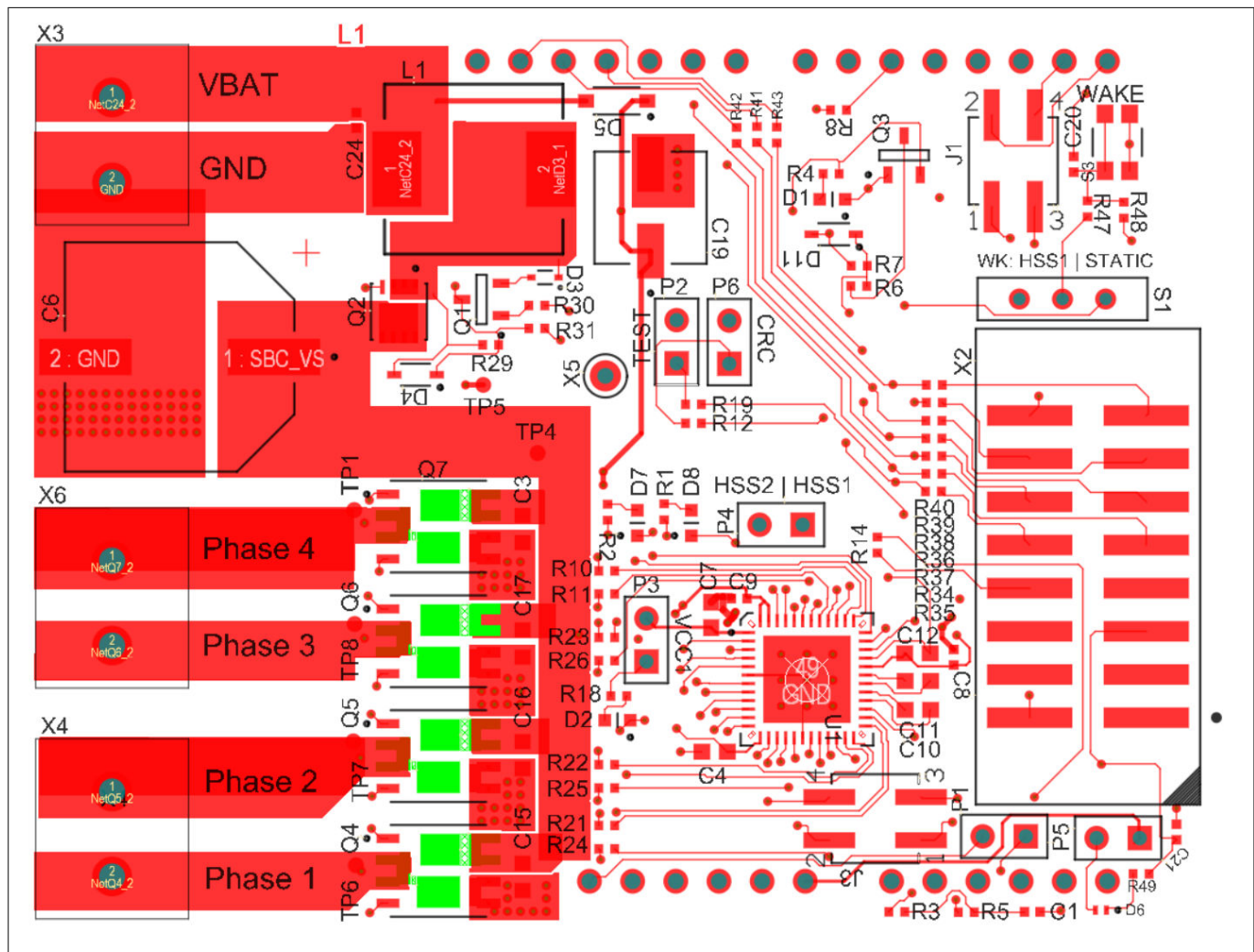


Figure 14 Top layer with overlay

2 Hardware description

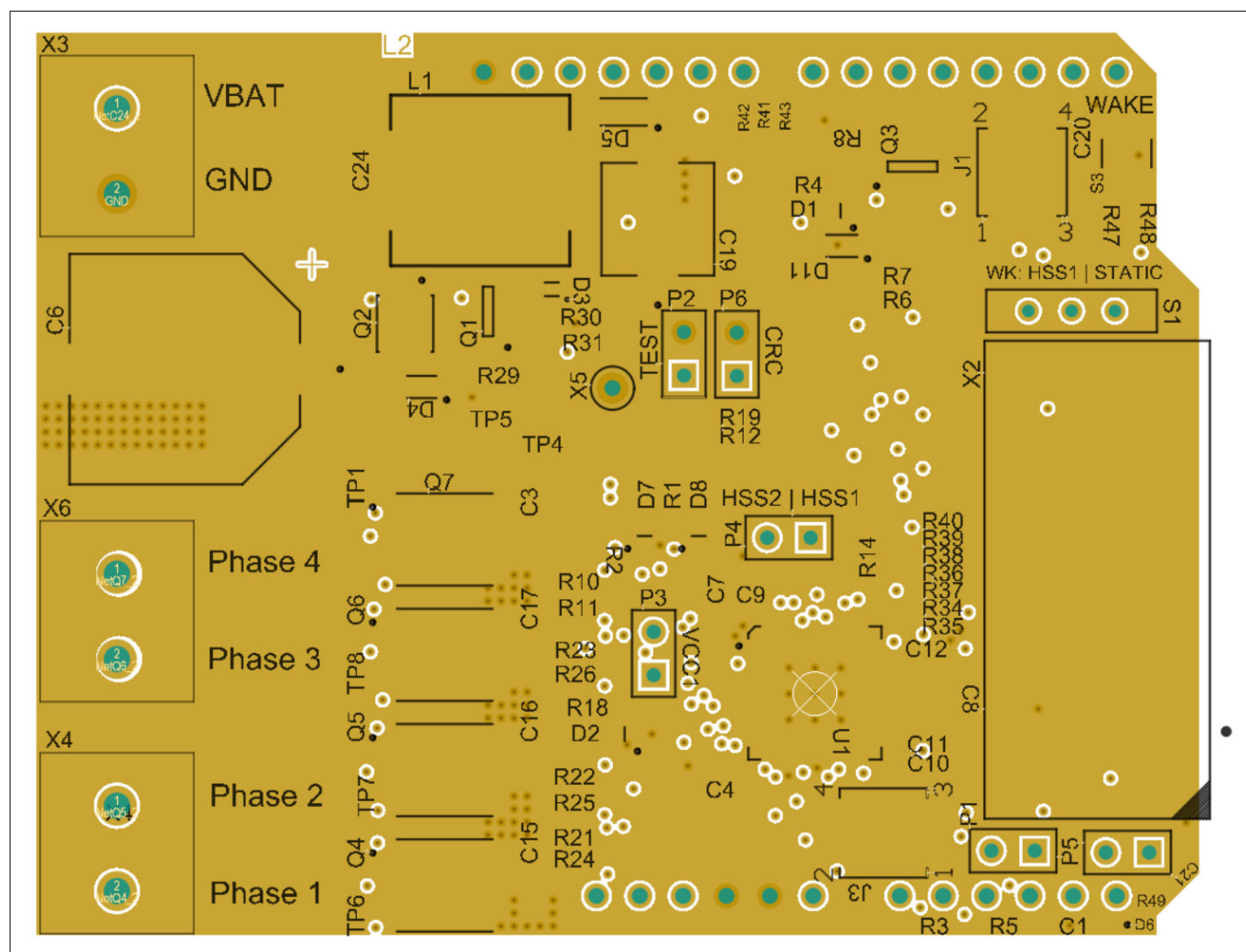


Figure 15 Inner layer 1

2 Hardware description

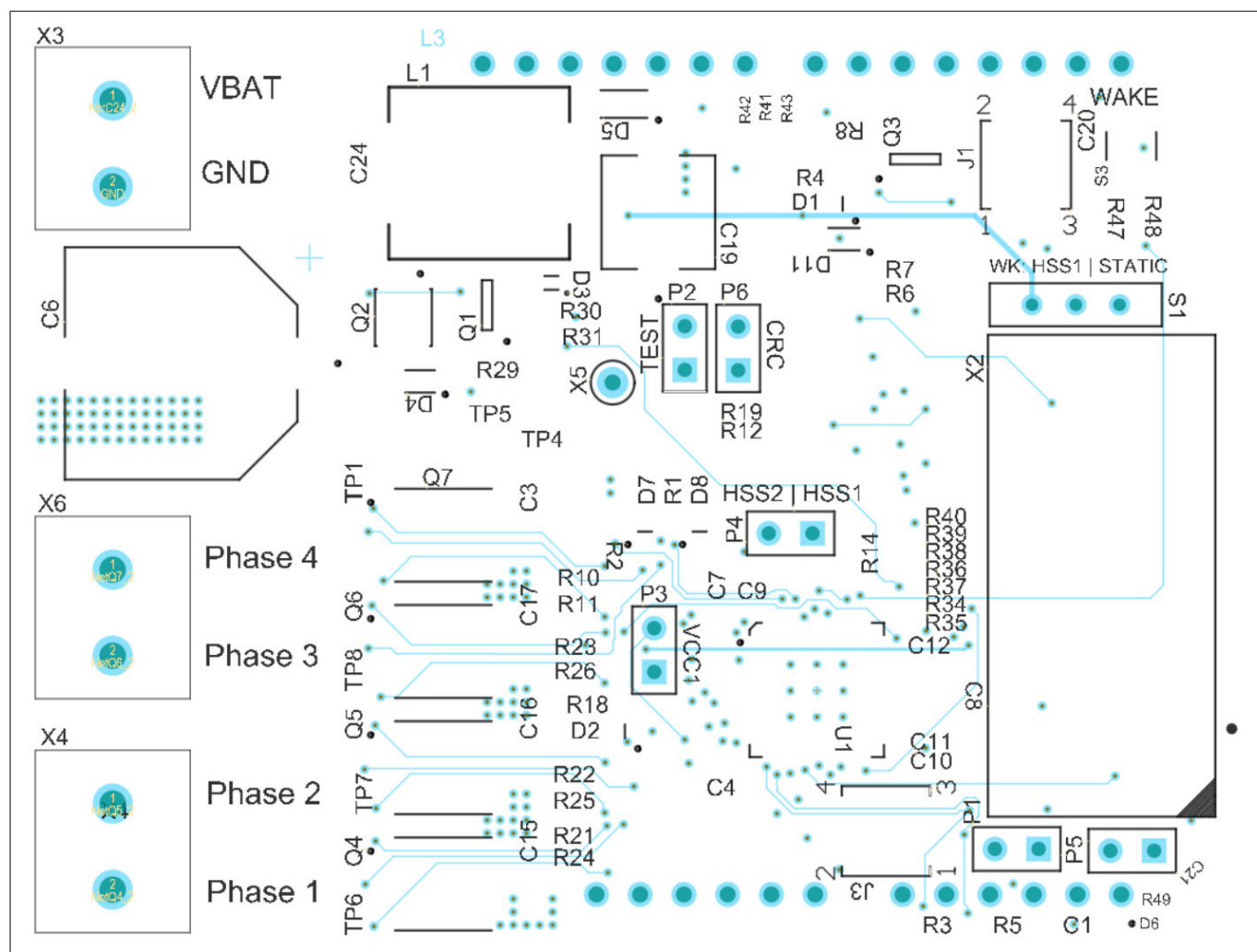


Figure 16 **Inner layer 2**

2 Hardware description

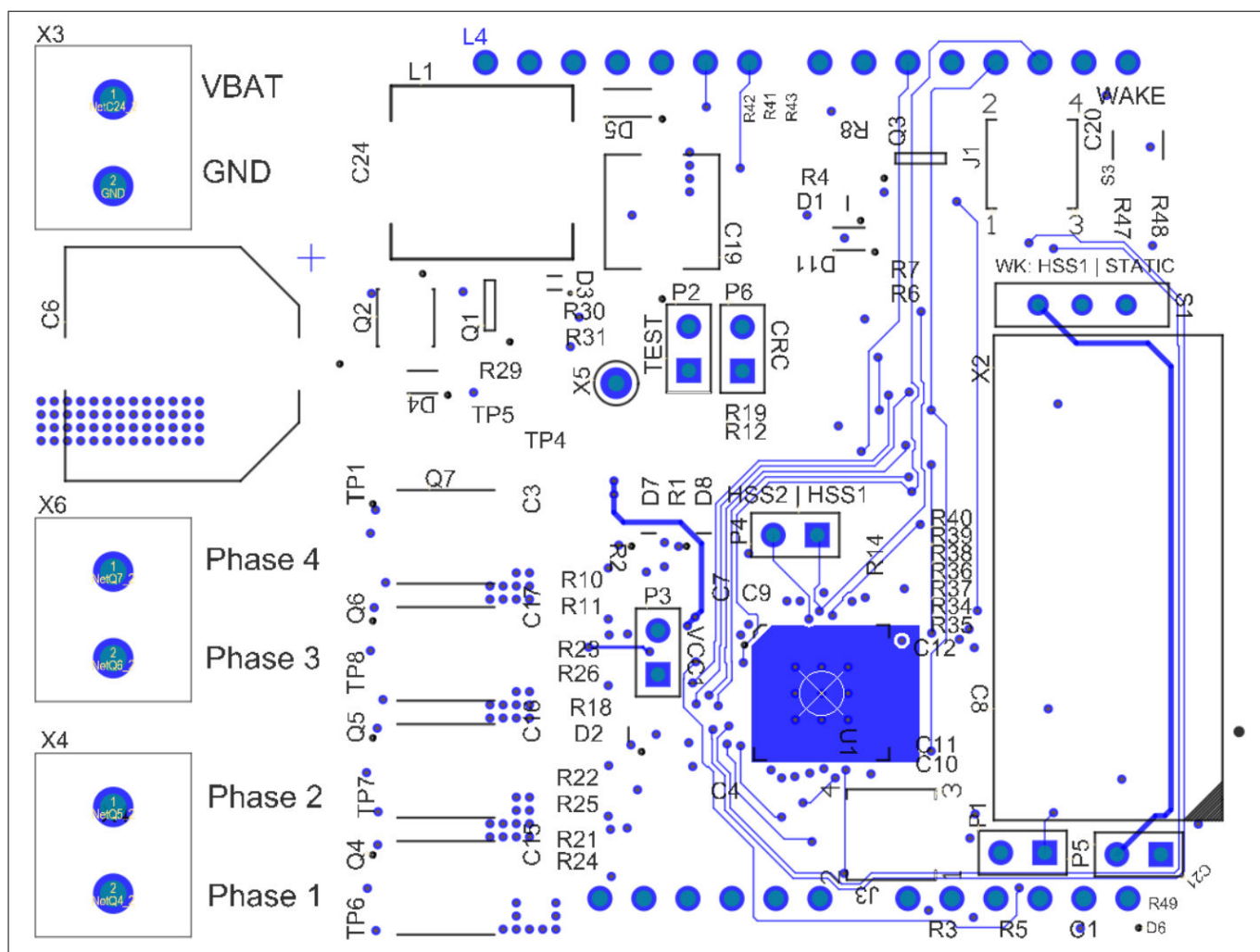


Figure 17 Bottom layer with overlay

2.1.1.3 Bill of material

Designator	Value	Qty	Description	Footprint	Manufacturer
C1	4.7 nF/50 V	1	Chip Multilayer Ceramic Capacitor for General Purpose	CAPC1005X60N	TDK Corporation
C3, C15, C16, C17	100 nF/50 V	4	Multilayer Ceramic Chip Capacitor, Automotive Grade, Soft Termination	CAPC1608X90N	AVX
C4, C7	2.2 uF/50 V	2	Multilayer Ceramic Chip Capacitor, Automotive Grade, Soft Termination	CAPC1708X95N	TDK Corporation
C6	680 uF/35 V	1	Aluminum Electrolytic Capacitors	CAPAE1350X1400N	Panasonic
C8, C9, C20, C24	100 nF/50 V	4	Chip Multilayer Ceramic Capacitor for General Purpose	CAPC1005X60N	TDK Corporation

2 Hardware description

Designator	Value	Qty	Description	Footprint	Manufacturer
C10, C11	220 nF/50 V	2	Multilayer Ceramic Chip Capacitor, Automotive Grade, Soft Termination	CAPC1708X95N	TDK Corporation
C12	470 nF/50 V	2	Multilayer Ceramic Chip Capacitor, Automotive Grade, Soft Termination	CAPC1708X95N	TDK Corporation
C19	100 uF/35 V	1	Surface Mount Aluminium Electrolytic Capacitor	CAPAE660X800N-2	Panasonic
C21	1 nF/50 V	1	Chip Multilayer Ceramic Capacitor for General Purpose	CAPC1005X60N	TDK Corporation
D1, D7, D8	Red	1	Surface Mount LED, Super Red, 630nm	LED-SMD-LS L29K-XXXX-1	OSRAM Opto Semiconductors
D2	Green	1	Surface Mount LED, Green, 570nm	LED-SMD-LG L29K-XXXX-24	OSRAM Opto Semiconductors
D3	BAS52-02V	1	Silicon Schottky Diode	SODFL1608X59N	Infineon Technologies
D4	BZT52C12S-7-F	1	Surface Mount Zener Diode	SOD2513X120N	Diodes Incorporated
D5	MBR0560-TP	1	Schottky Rectifier, 0.5A/60V	SOD3716X135N-2	Micro Commercial Components
D6	BAS70-02L	1	Schottky Rectifier, 0.5A/60V	DFN100X60X50-2N-V	Infineon Technologies
D11	5.1 V	1	Small Signal Zener Diode, GDZ-G-Series/5.1V	SOD2713X115N	Vishay General Semiconductor
J1, J3	61000421121	2	SMT Vertical Pin Header WR-PHD, Pitch 2.54 mm, Dual Row, 4 pins	61000421121	
L1	1.5 uH	1	SPM10065VT	SPM10065VT	TDK Corporation
P1, P2, P3, P4, P5, P6	Header 2	6	Header, 2-Pin	HDR1X2	
Q1	BC817K-40	1	NPN Silicon AF Transistor	SOT95P240X110-3N-1	NXP
Q2	IPZ40N04S5L-2 R8	1	OptiMOS-5 N-Channel Enhancement Mode Power-Transistor, VDS 40V, ID 40A	TSDSON-8-33-V	Infineon Technologies
Q3		1	PNP Silicon Digital Transistor	SOT95P240X110-3N-1	Infineon Technologies
Q4, Q5, Q6, Q7	IAUC60N04S6N 031H	4	OptiMOS-6 N-Channel	PG-TSON-8-56	Infineon Technologies

2 Hardware description

Designator	Value	Qty	Description	Footprint	Manufacturer
R1, R2, R4,	4.7 k	3	Standard Thick Film Chip Resistor	RESC1005X40N	Vishay
R3, R5	62	2	Standard Thick Film Chip Resistor	RESC1005X40N	Vishay
R6	3.3 k	1	Standard Thick Film Chip Resistor	RESC1005X40N	Vishay
R7, R29	100 k	2	Standard Thick Film Chip Resistor	RESC1005X40N	Vishay
R8, R30, R31, R47, R48	10 K	5	Standard Thick Film Chip Resistor	RESC1005X40N	Vishay
R10, R11, R21, R22, R23, R24, R25, R26	10 R	8	Standard Thick Film Chip Resistor	RESC1005X40N	Vishay
R12, R14, R18, R19, R34, R35, R36, R37, R38, R39, R40, R49	1 k	12	Standard Thick Film Chip Resistor	RESC1005X40N	Vishay
R41, R42, R43	33 R	3	Standard Thick Film Chip Resistor	RESC1005X40N	Vishay
S1	450301014042	1	10x2.5mm THT WS-SLTV	450301014042	
S3	434153017835	1	3.5x2.9mm SMD J-Bend WS-TASV, height 1.7 mm, 350 gf	434153017835	
TP1, TP4, TP5, TP6, TP7, TP8	Testpoint	6		Testpoint	
U1A, U1B	TLE9562-3QXC	1	Bridge SBC Family, PLGM	QFN50P700X700X90-49N-3-1	Infineon Technologies
X1	Arduino UNO Header	1		Arduino UNO Header	
X2	HTST-108-01-L-DVÂ	1	SMT, .025" Shrouded SQ POST IDC Headers , 2.54mm pitch, 16-pin Vertical, Double row	CON-M-SMD-HTST-108-01-L-DV	Samtec
X3, X4, X6	20020316-G021B01LF	3	Connector	20020316G021B01LF	
X5	5001	1	Test Point THT, Black	CON-THT-TP-5001	Keystone Electronics Corp.

3 Getting started

3 Getting started

There are two options to operate the TLE9562 brushed direct current shield:

- Stacked on an Arduino UNO board or compatible
- Config Wizard for MOTIX™ Motor System *integrated circuit (IC)*s with uIO-Stick

3.1 Arduino UNO controller board

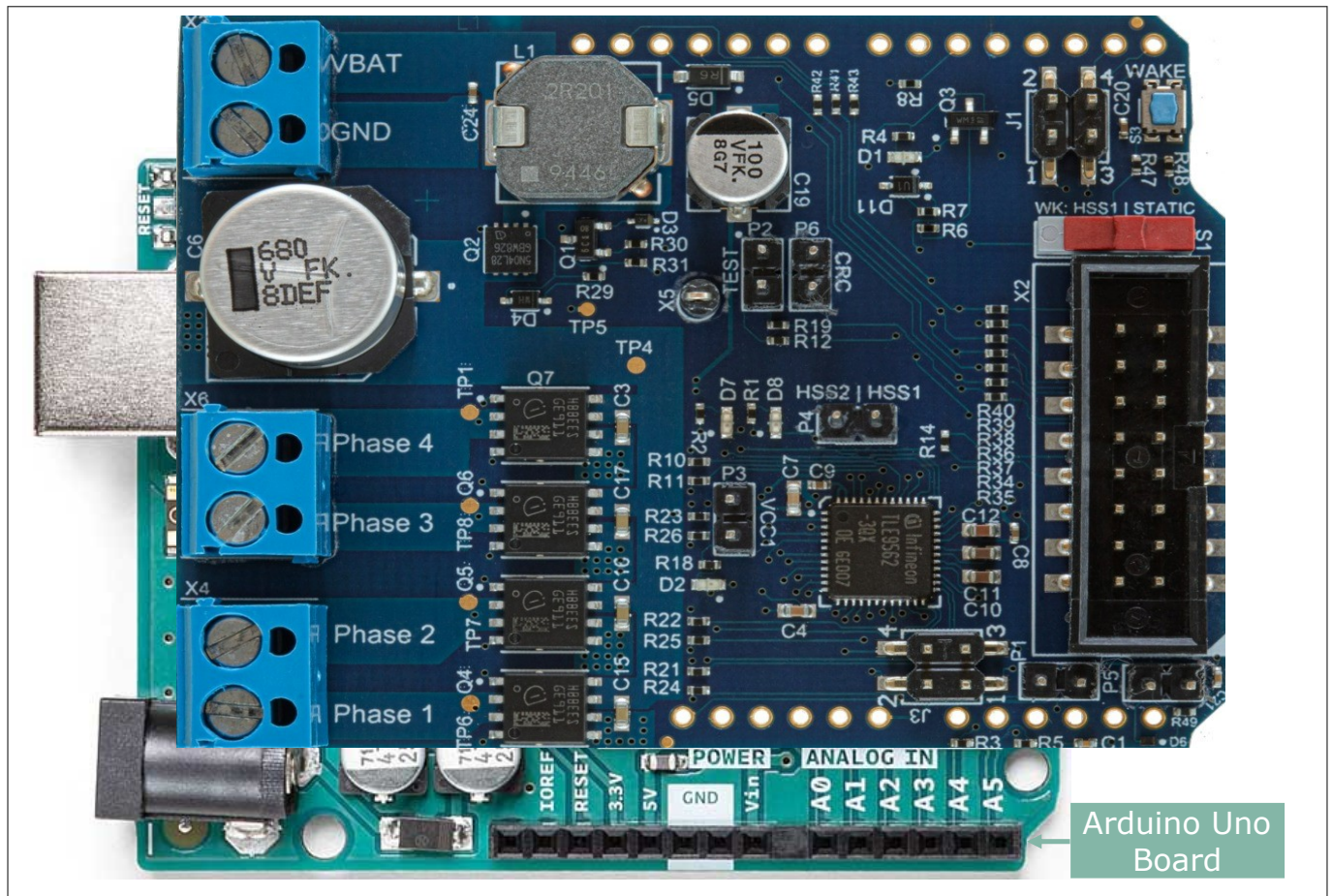


Figure 18 TLE9562 board stacked on an Arduino UNO board

Infineon offers the TLE9562 device driver to provide an *application programming interface (API)* to configure the devices.

TLE9562 device driver is available here: <https://www.infineon.com/cms/en/product/power/motor-control-ics/brushed-dc-motor-control-ics/dc-motor-system-ics/tle9562-3qx/>

Example codes to operate with an Arduino UNO board are available here: <https://github.com/Infineon/motor-system-ic-tle956x>

Before using the brushed *DC* shield with an Arduino, refer to *Arduino getting started* for more information.

3.2 Config Wizard for MOTIX™ Motor System ICs with the uIO-Stick

The Config Wizard for MOTIX™ Motor System *IC*s is a software tool running on a PC or laptop and providing a *GUI* to control the TLE9562-3QX on the board.

Use a uIO-Stick to interface the boards to the *USB* port of the PC or laptop.

3 Getting started

3.2.1 Download the graphical user interface for the uIO-Stick

Config Wizard for MOTIX™ Motor System ICs allows easy configuration of Automotive Motor System IC products. To install the [GUI](#) from the Infineon development center, follow the steps below:

1. Go to [Infineon Developer Center Launcher](#)
2. Follow the instructions provided on the launcher web page
3. Launch the **Infineon Developer Center Launcher** on your computer
4. Select **Manage Tools**
5. Search and install **Config Wizard for MOTIX™ Motor System ICs**
6. After the installation click **Start** on the launch tool

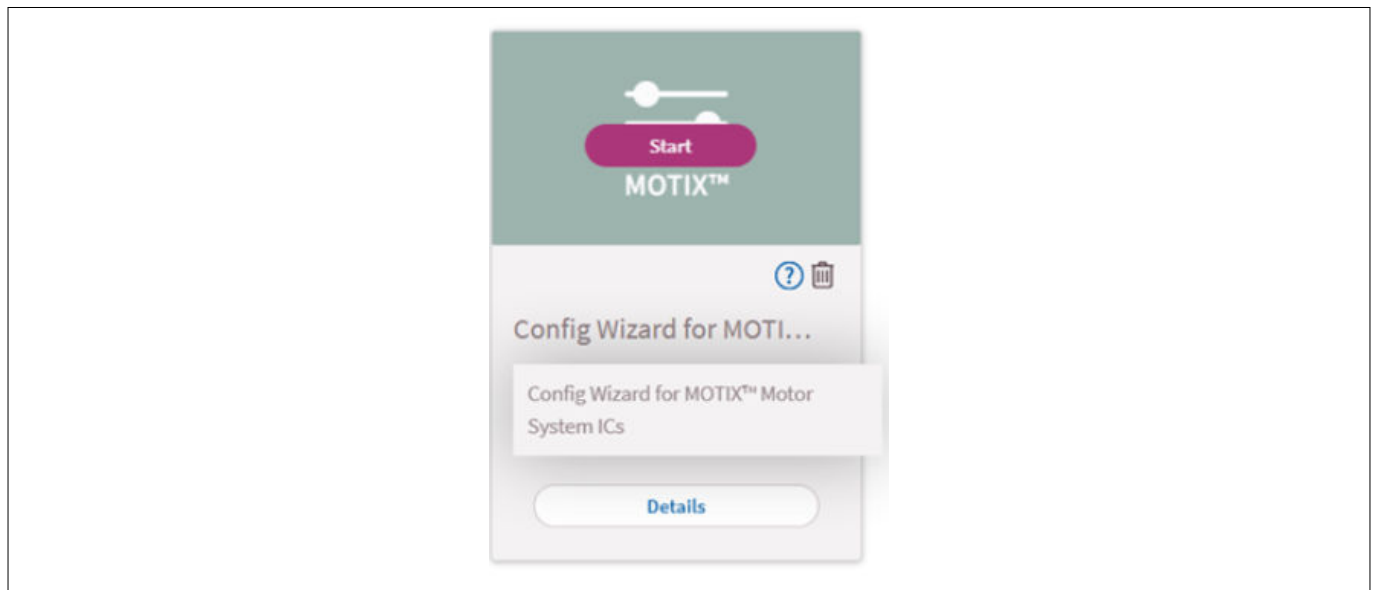


Figure 19 Starting the Config Wizard for MOTIX™ Motor System ICs

7. Click on the **TLE9562 SHIELD**

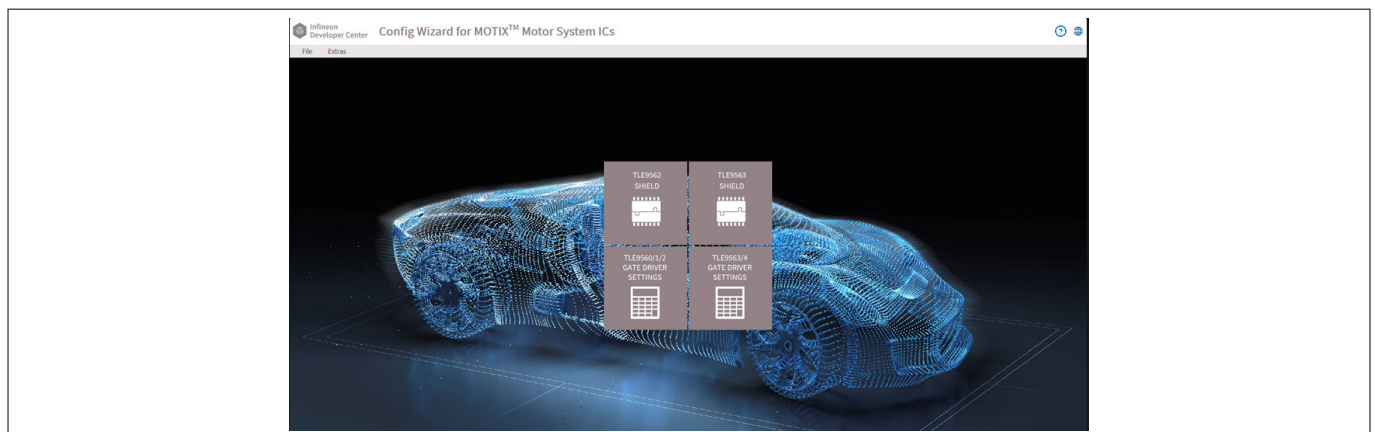


Figure 20 TLE9562 SHIELD selection

3.2.2 Start the configuration Wizard for TLE9562-3QX

The uIO-Stick requires to be programmed when first used in combination with the Config Wizard to control the TLE9562-3QX.

To program the uIO-Stick and get started with the Config Wizard, follow the steps listed below:

1. Set the Jumper P2 to pull down the INT/TEST pin and enable the device to enter in software development mode

3 Getting started

2. Set the Jumper P3 to connect the LED to the LDO VCC1 (5 V regulator)
3. Connect the uIO-Stick to the [USB](#) port
4. Supply the board connecting the [voltage supply \(VS\)](#)
5. Start the **Config Wizard for Motor System IC**
6. Select the tab **Extras**
7. Select **Update uIO**

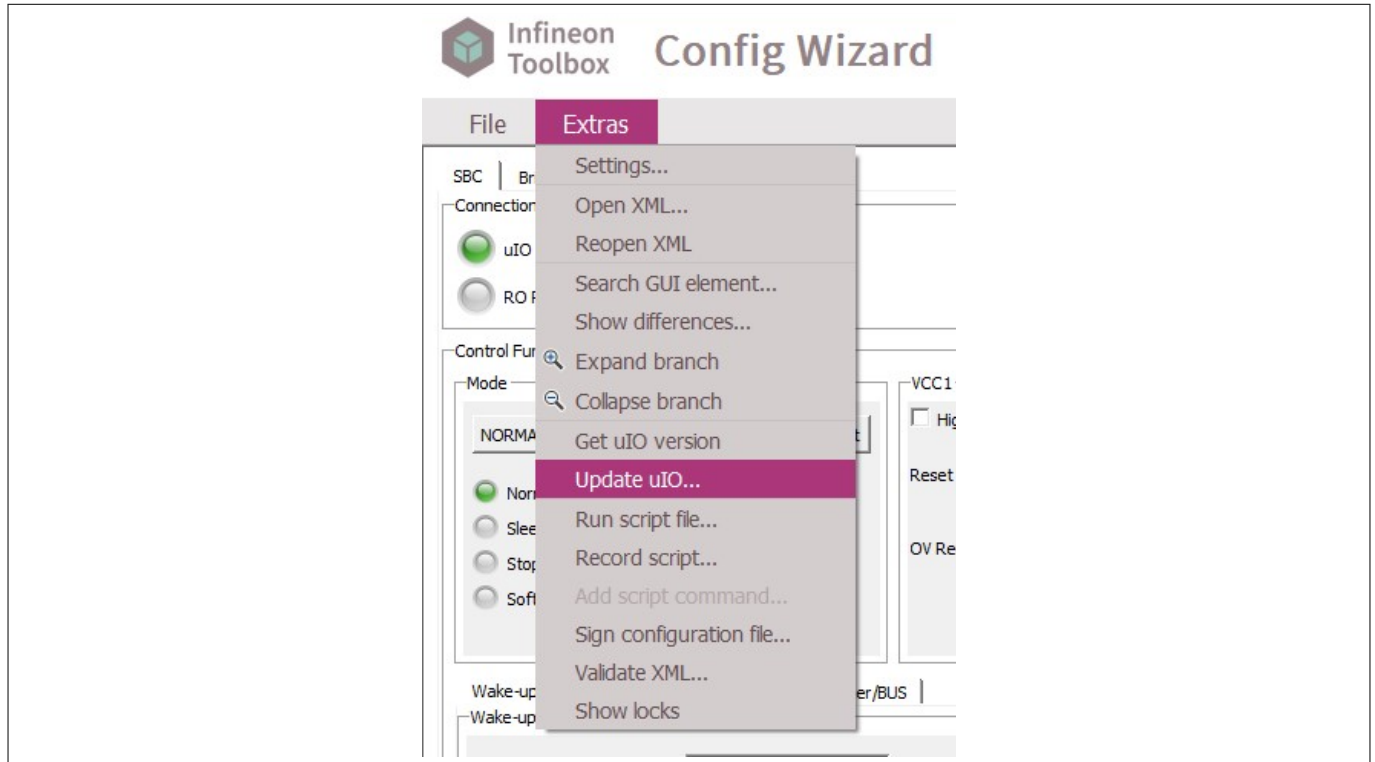


Figure 21 Update uIO

8. Click **Yes**

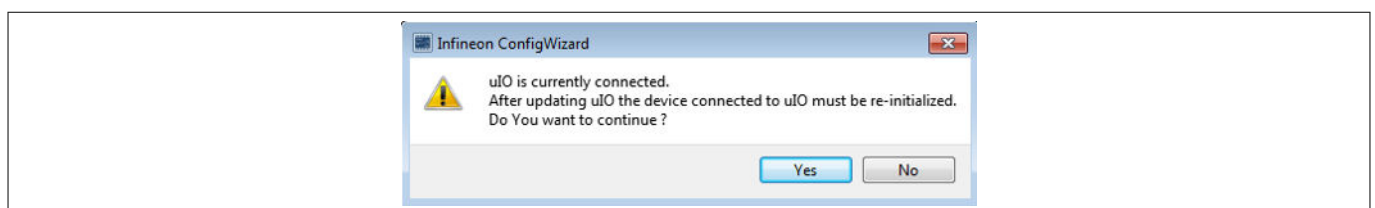


Figure 22 Pop-up window

9. Select **uIO.V222.hex** and open the valid version at the creation time of the document

4 Config Wizard for MOTIX™ Motor System ICs - control tab pages

4 Config Wizard for MOTIX™ Motor System ICs - control tab pages

4.1 SBC tab page

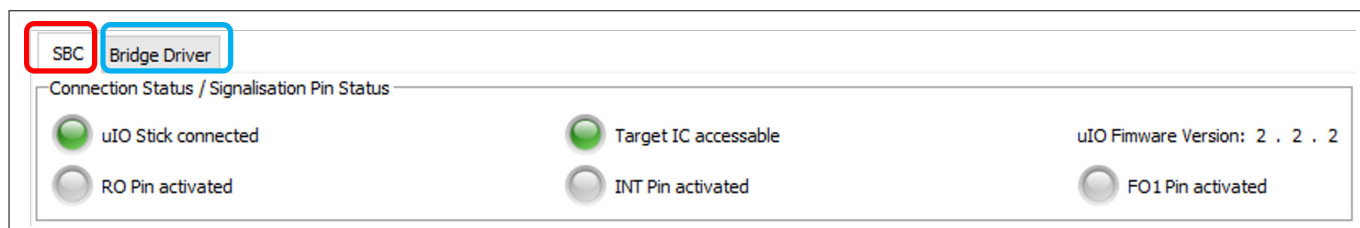


Figure 23 Two main tabs: SBC, Bridge Driver

Table 4 Legend

Color	Description
	SBC (system basic chip): Overview (selected in this view)
	Bridge Diver

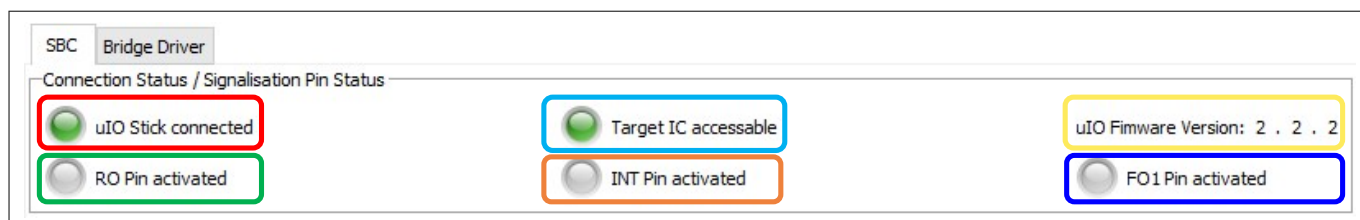


Figure 24 Connection Status, Signaling Pin Status

Table 5 Legend

Color	Status indicator	Description
	uIO stick connected	Communication between the uIO-Stick and the TLE9562-3QX is connected and is working
	Target <i>IC</i> accessible	-
	uIO Firmware version	Firmware version of the connected uIO
	RO Pin activated	-
	INT Pin activated	-
	Fail Output Pin activated	-

4 Config Wizard for MOTIX™ Motor System ICs - control tab pages

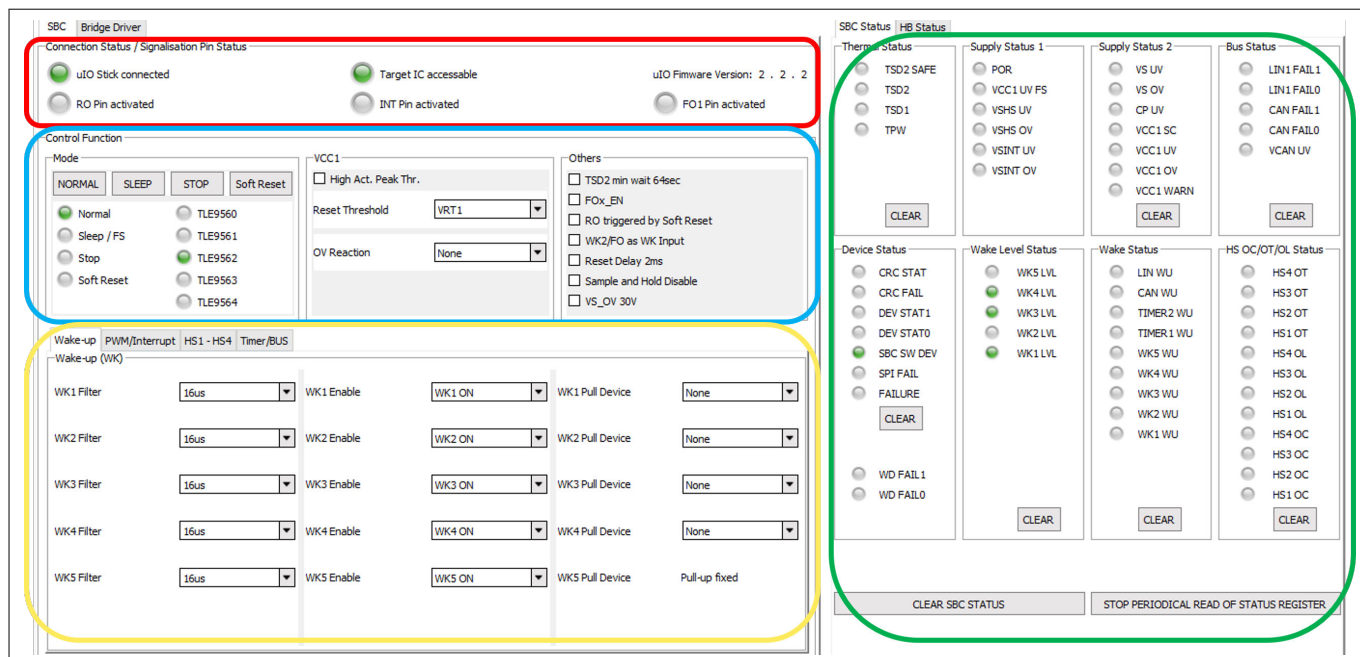


Figure 25 GUI – SBC overview

Table 6 Legend

Color	Description
	Connection status/Signalisation pin status
	Control function
	Available tabs: - Wake-up (WK) <i>PWM</i>/Interrupt - HS1-HS4 - Timer/BUS
	SBC (system basis chip) Status

4 Config Wizard for MOTIX™ Motor System ICs - control tab pages

Control Function

Mode

NORMAL

SLEEP

STOP

Soft Reset

Normal

Sleep / FS

Stop

Soft Reset

TLE9560

TLE9561

TLE9562

TLE9563

TLE9564

VCC1

☐ High Act. Peak Thr.

Reset Threshold

VRT1

OV Reaction

None

Others

☐ TSD2 min wait 64sec

☐ FOx_EN

☐ RO triggered by Soft Reset

☐ WK2/FO as WK Input

☐ Reset Delay 2ms

☐ Sample and Hold Disable

☐ VS_OV 30V

Figure 26 SBC: Control function

Table 7 Legend

Color	Description
	Mode, for example Sleep/Fs → Normal , check uIO connection and click on NORMAL
	Product identifier

4 Config Wizard for MOTIX™ Motor System ICs - control tab pages

Figure 27 SBC: Wake-up, PWM/Interrupt, HS1-HS4, Timer/BUS

Table 8 Legend

Color	Description
	Wake-up
	PWM/Interrupt
	HS1 – HS4
	Timer/BUS

4 Config Wizard for MOTIX™ Motor System ICs - control tab pages



SBC Status HB Status

Thermal Status

- ☐ TSD2 SAFE
- ☐ TSD2
- ☐ TSD1
- ☐ TPW

CLEAR

Supply Status 1

- ☐ POR
- ☐ VCC1 UV FS
- ☐ VSHS UV
- ☐ VSHS OV
- ☐ VSINT UV
- ☐ VSINT OV

Supply Status 2

- ☐ VS UV
- ☐ VS OV
- ☐ CP UV
- ☐ VCC1 SC
- ☐ VCC1 UV
- ☐ VCC1 OV
- ☐ VCC1 WARN

CLEAR

Bus Status

- ☐ LIN1 FAIL1
- ☐ LIN1 FAIL0
- ☐ CAN FAIL1
- ☐ CAN FAIL0
- ☐ VCAN UV

CLEAR

Device Status

- ☐ CRC STAT
- ☐ CRC FAIL
- ☐ DEV STAT1
- ☐ DEV STAT0
- ☒ SBC SW DEV
- ☐ SPI FAIL
- ☐ FAILURE

CLEAR

- ☐ WD FAIL1
- ☐ WD FAIL0

Wake Level Status

- ☐ WK5 LVL
- ☒ WK4 LVL
- ☒ WK3 LVL
- ☐ WK2 LVL
- ☒ WK1 LVL

CLEAR

Wake Status

- ☐ LIN WU
- ☐ CAN WU
- ☐ TIMER2 WU
- ☐ TIMER1 WU
- ☐ WK5 WU
- ☐ WK4 WU
- ☐ WK3 WU
- ☐ WK2 WU
- ☐ WK1 WU

CLEAR

HS OC/OT/OL Status

- ☐ HS4 OT
- ☐ HS3 OT
- ☐ HS2 OT
- ☐ HS1 OT
- ☐ HS4 OL
- ☐ HS3 OL
- ☐ HS2 OL
- ☐ HS1 OL
- ☐ HS4 OC
- ☐ HS3 OC
- ☐ HS2 OC
- ☐ HS1 OC

CLEAR

CLEAR SBC STATUS STOP PERIODICAL READ OF STATUS REGISTER

Figure 28 SBC status

Table 9 Legend

Color	Description
	Thermal Status
	Supply Status 1
	Supply Status 3
	Bus Status
	Device Status
	Wake Level Status
	Wake Status
	HS OC/OT/OL Status
	Clear SBC Status

4 Config Wizard for MOTIX™ Motor System ICs - control tab pages

SBC Status **HB Status**

PWM Switching Characteristics

	Config. TDON	Config. TDOFF	Eff. TDON	Eff. TDOFF	Eff. TRISE	Eff. TFALL
PWM Ch. 1	639.6ns	639.6ns	0ns	0ns	0ns	0ns
PWM Ch. 2	639.6ns	639.6ns	0ns	0ns	0ns	0ns
PWM Ch. 3	639.6ns	639.6ns	0ns	0ns	0ns	0ns
PWM Ch. 4	639.6ns	639.6ns	0ns	0ns	0ns	0ns

GEN Status

- ☐ HB4VOUT
- ☐ HB3VOUT
- ☐ HB2VOUT
- ☐ HB1VOUT
- ☐ PWM3STAT
- ☐ PWM1STAT

TD REG

- ☒ IPDCHG4 ST
- ☒ IPDCHG3 ST
- ☒ IPDCHG2 ST
- ☒ IPDCHG1 ST
- ☒ IPCHG4 ST
- ☒ IPCHG3 ST
- ☒ IPCHG2 ST
- ☒ IPCHG1 ST
- ☐ TDREG4
- ☐ TDREG3
- ☐ TDREG2
- ☐ TDREG1

DSOV

- ☐ VSINTOOVBRAKE ST
- ☐ VSOVBRAKE ST
- ☐ LS4DSOV BRK
- ☐ LS3DSOV BRK
- ☐ LS2DSOV BRK
- ☐ LS1DSOV BRK
- ☐ LS4DSOV
- ☐ HS4DSOV
- ☐ LS3DSOV
- ☐ HS3DSOV
- ☐ LS2DSOV
- ☐ HS2DSOV
- ☐ LS1DSOV
- ☐ HS1DSOV

CLEAR **CLEAR** **CLEAR**

CLEAR DIAGNOSTIC BD STATUS **STOP PERIODICAL READ OF STATUS REGISTER**

Figure 29 Half-Bridge (HB) Status

Table 10 Legend

Color	Description
	PWM Switching Characteristics
	GEN Status
	TD REG
	DSOV
	Clear Diagnostic Bridge Driver (BD) Status

4 Config Wizard for MOTIX™ Motor System ICs - control tab pages

4.2 Bridge driver tab page

The screenshot shows the 'Bridge Driver' configuration page with three main sections highlighted by colored rounded rectangles:

- On-Board PWM Generator (Red):** Includes settings for F = 20 kHz, PWM1 Enable, PWM1 Duty Cycle (0 %), PWM3 Enable, PWM3 Duty Cycle (0 %), F = 400 Hz, SYNC (0), and Info: 0-10 for (0% - 100%).
- General Bridge Control (Blue):** Includes settings for BD Freq (18.75 MHz), PWM1 mapped to (HB1), PWM3 mapped to (HB3), CPUV (Threshold 1), ext. MOSFET (Logic Level), checkboxes for single/auto CP auto switch over, BRDV recover from OV, 2 steps adaption of precharge/predischage current, Adaptive Gate Control (0:Disabled), checkboxes for Charge Pump Enable, Postcharge disable, Filter adaptive gate control, Detection of active/FW Mosfet, Hold Current (TH1), and Frequency Modulation enable.
- LS/HS Drain Current (Green):** Includes settings for LS Filter Time (0.5us), LS1 OV Threshold (0.20V), LS2 OV Threshold (0.20V), LS3 OV Threshold (0.20V), LS4 OV Threshold (0.20V), checkboxes for Deep adaptation enable, HS1 OV Threshold (0.20V), HS2 OV Threshold (0.20V), HS3 OV Threshold (0.20V), and HS4 OV Threshold (0.20V).

Figure 30 Bridge driver: General, VDS monitoring

Table 11 Legend

Color	Description
	On-Board <i>PWM</i> Generator
	General Bridge Control
	LS/HS Drain Current

4 Config Wizard for MOTIX™ Motor System ICs - control tab pages

The screenshot shows the 'Bridge Driver' configuration window with the following sections:

- Blank time / CCP time (Red border):** Contains settings for TBANK ACTIVE_HB1, TCCP ACTIVE_HB1, TBANK ACTIVE_HB2, TCCP ACTIVE_HB2, TBANK ACTIVE_HB3, TCCP ACTIVE_HB3, TBANK ACTIVE_HB4, TCCP ACTIVE_HB4, TBANK ACTIVE_FW1, TCCP ACTIVE_FW1, TBANK ACTIVE_FW2, TCCP ACTIVE_FW2, TBANK ACTIVE_FW3, TCCP ACTIVE_FW3, TBANK ACTIVE_FW4, and TCCP ACTIVE_FW4. All values are set to 2.45us.
- HBMODE / Precharge Predischarge time (Blue border):** Contains settings for HB1 Mode (Passive Off), Act. Freewheeling HB1 (checked), PWM HB1 (unchecked), HB2 Mode (Passive Off), Act. Freewheeling HB2 (checked), PWM HB2 (unchecked), HB3 Mode (Passive Off), Act. Freewheeling HB3 (checked), PWM HB3 (unchecked), HB4 Mode (Passive Off), Act. Freewheeling HB4 (checked), PWM HB4 (unchecked), Precharge Time HB1-4 (107ns), and Predischarge Time HB1-4 (107ns).
- Brake (Yellow border):** Contains settings for LS1-4 Disable in SLAM (unchecked), SLAM Active (unchecked), VDS OV Brake LS1-4 (800 mV selected), Blank Time Brake (11 us selected), Parking Brake enable (unchecked), OV Brake enable (unchecked), and OV Brake Threshold (27 V).
- TDON / TDOFF Timing (Green border):** Contains settings for tDON HB1-4 (0.64 us) and tDOFF HB1-4 (0.64 us).

Figure 31 Blank/CCP time, HBMODE, Brake, TDON/TDOFF timing

Table 12 Legend

Color	Description
	Blank time/CCP time
	HBMODE/Pre-charge time; Pre-discharge time
	Brake
	TDON timing/TDOFF timing

4 Config Wizard for MOTIX™ Motor System ICs - control tab pages

SBC Bridge Driver

General / VDS Mon / Blank/CCP time / HBMODE / Brake / TDON/TDOFF / Mosfet Drive Currents

Static charge/discharge current

Format: charge / discharge current

HB1 9.2 mA / 9.2 mA

HB2 9.2 mA / 9.2 mA

HB3 9.2 mA / 9.2 mA

HB4 9.2 mA / 9.2 mA

PWM max precharge/predischarge

Format: charge / discharge current

HB1 19.2 mA / 18.8 mA

HB2 19.2 mA / 18.8 mA

HB3 19.2 mA / 18.8 mA

HB4 19.2 mA / 18.8 mA

☐ HB1 off-state pull-down

☐ HB2 off-state pull-down

☐ HB3 off-state pull-down

☐ HB4 off-state pull-down

Precharge / Predischarge INIT

Precharge HB1 Init 6.5 mA

Predischarge HB1 Init 8.2 mA

Precharge HB2 Init 6.5 mA

Predischarge HB2 Init 8.2 mA

Precharge HB3 Init 6.5 mA

Predischarge HB3 Init 8.2 mA

Precharge HB4 Init 6.5 mA

Predischarge HB4 Init 8.2 mA

PWM charge/discharge current

PWM charge Active MOSFET

Charge HB1 Active 6.5 mA

Charge HB2 Active 6.5 mA

Charge HB3 Active 6.5 mA

Charge HB4 Active 6.5 mA

PWM discharge Active MOSFET

Discharge HB1 Active 8.2 mA

Discharge HB2 Active 8.2 mA

Discharge HB3 Active 8.2 mA

Discharge HB4 Active 8.2 mA

FW MOSFET; Format: charge/discharge current

Charge/Discharge HB1 FW 6.5 mA / 6.5 mA

Charge/Discharge HB2 FW 6.5 mA / 6.5 mA

Charge/Discharge HB3 FW 6.5 mA / 6.5 mA

Charge/Discharge HB4 FW 6.5 mA / 6.5 mA

Figure 32 MOSFET Drive currents

Table 13 Legend

Color	Description
	Static charge current/static discharge current
	Pre-charge initial/pre-discharge initial
	PWM charge current/PWM discharge current
	PWM max. Pre-charge/PWM max. Pre-discharge
	19.2 mA: Pre-charge/18.8 mA: Pre-discharge

5 References and appendices

5.1 Glossary

API

application programming interface (API)

A set of defined rules that enables various software components to communicate with each other.

CRC

cyclic redundancy check (CRC)

A procedure that uses a checksum to check the validity of a data transfer.

DC

direct current (DC)

One-directional flow of electric charge. An electrochemical cell is a prime example of DC power. Direct current may flow through a conductor such as a wire, but can also flow through semiconductors, insulators, or even through a vacuum as in electron or ion beams. The electric current flows in a constant direction, distinguishing it from alternating current (AC).

ESD

electrostatic discharge (ESD)

A sudden and momentary flow of electric current between two electrically charged objects caused by contact, an electrical short or dielectric breakdown.

GUI

graphical user interface (GUI)

An interface that enables users to interact with electronic devices through icons and visual indicators.

IC

integrated circuit (IC)

A miniature electronic circuit built on the surface of a thin substrate of a semiconductor material.

PWM

pulse-width modulation (PWM)

A technique to encode an analog value into the duty cycle of a pulsing signal with arbitrary amplitude.

SPI

serial peripheral interface (SPI)

A synchronous serial communication interface specification used for inter-chip communication, primarily in embedded systems.

USB

universal serial bus (USB)

An industry standard that defines cables, connectors, and communication protocols used in a bus for connection, communication, and power supply between computers and electronic devices.

VS

voltage supply (VS)

5 References and appendices**5.2 References**

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Revision history

Document version	Date of release	Description of changes
Rev. 1.10	2024-07-04	- Document type corrected from User manual to User guide Important notice and Safety precautions added Delivery content added Block diagram added Main features added Arduino UNO controller board added Schematics and Layout updated - Images updated in SBC tab page, Bridge driver tab page, and Board overview and connectors Glossary and References added
Rev. 1.00	2020-07-16	Initial document release

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