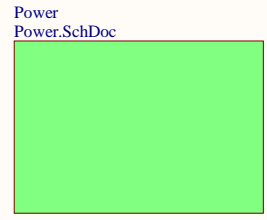


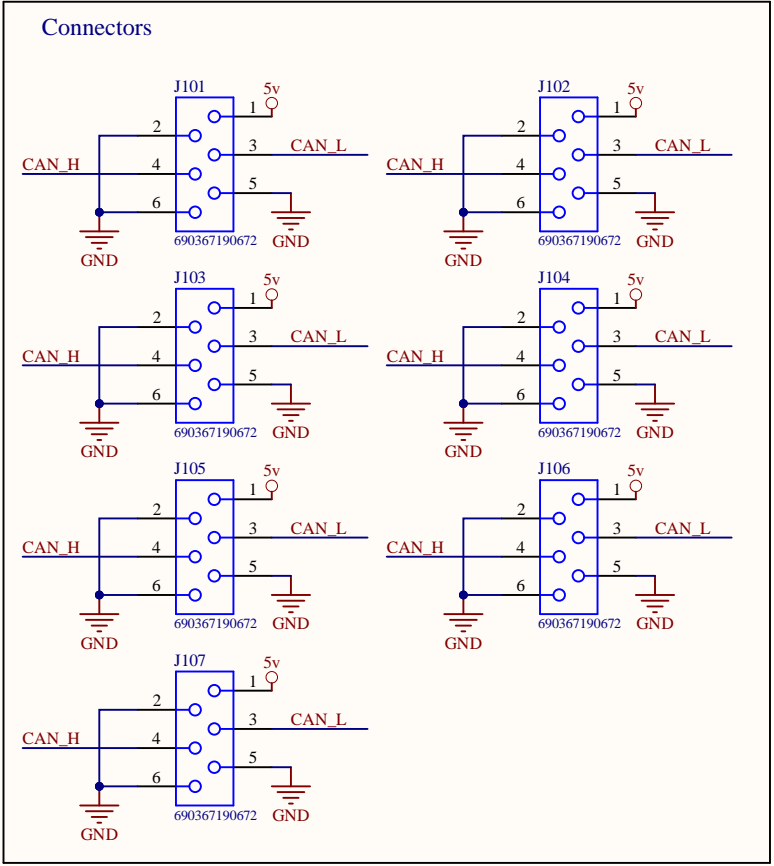
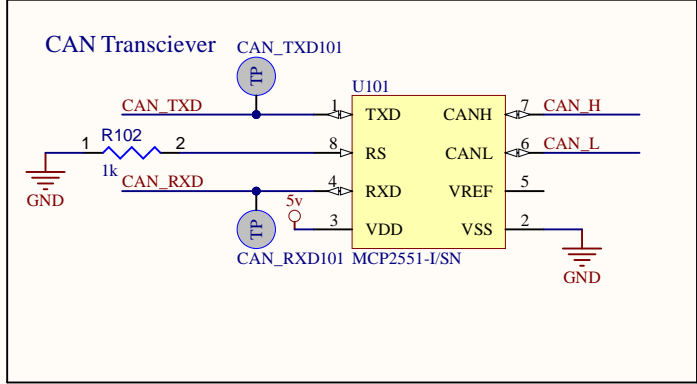
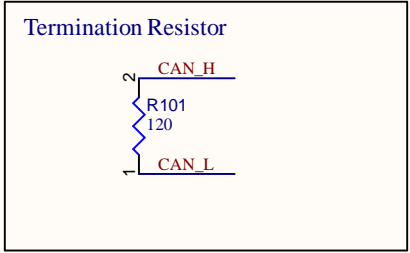
Mounting holes



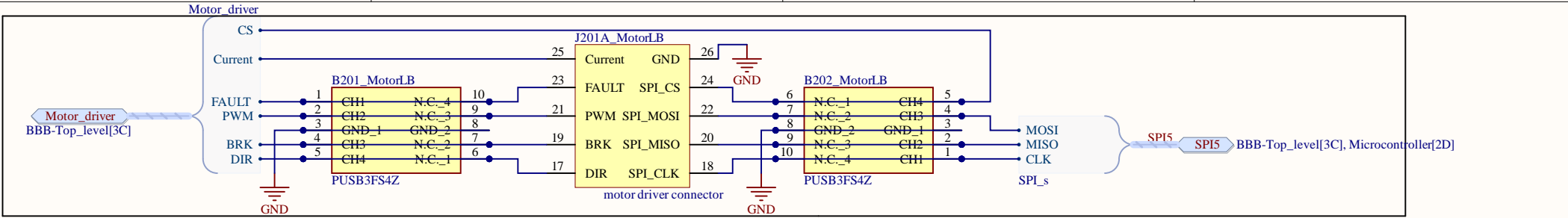
6.2x6.2mm silkscreen box



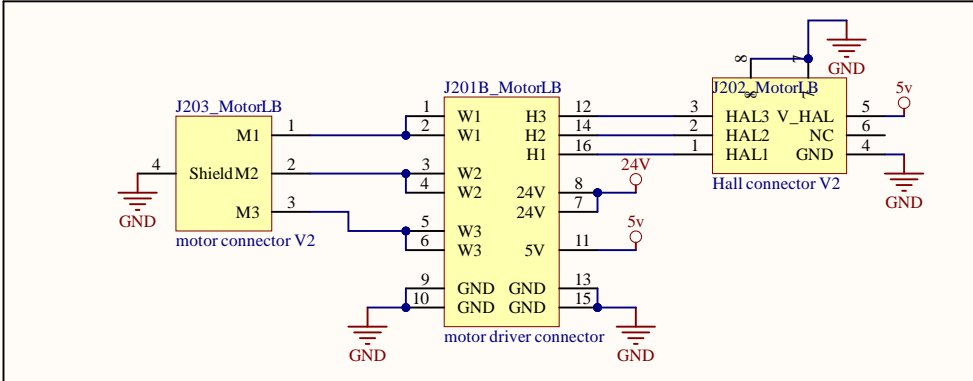
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Date:	8/19/2024	Sheet of
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Title		
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Date: 8/19/2024	Sheet of	
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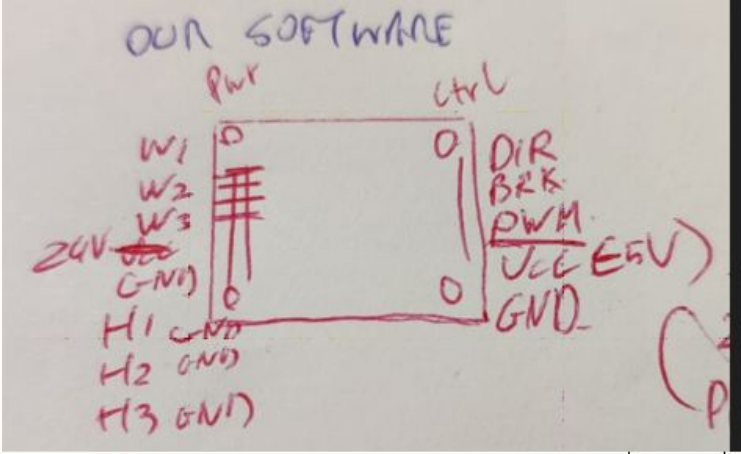
Control Signals



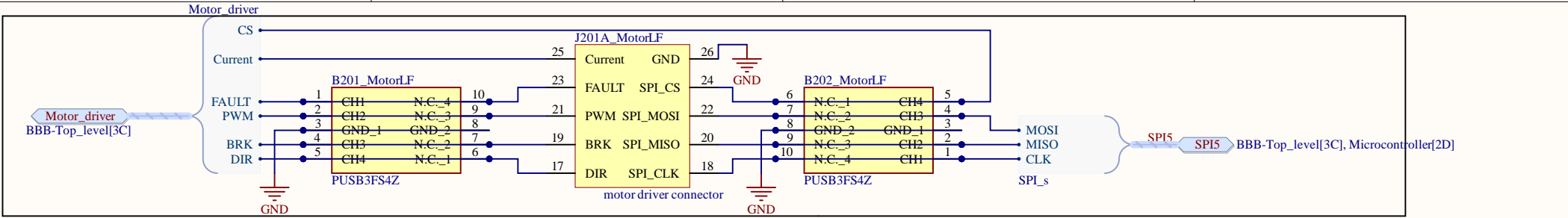
Motor connectors

Pin Allocation		Pin Allocation	
Connection V1		Connection V2	
Motor + Sensors		Sensors (AWG 24)	
Pin 1	Hall sensor 1	Pin 1	Hall sensor 1
Pin 2	Hall sensor 2	Pin 2	Hall sensor 2
Pin 3	V _{HAL} 4.5...18 VDC	Pin 3	Hall sensor 3
Pin 4	Motor winding 3	Pin 4	GND
Pin 5	Hall sensor 3	Pin 5	V _{HAL} 4.5...18 VDC
Pin 6	GND	Pin 6	N.C.
Pin 7	Motor winding 1	Motor (AWG 22)	
Pin 8	Motor winding 2	Pin 1	Motor winding 1
		Pin 2	Motor winding 2
		Pin 3	Motor winding 3
		Pin 4	Not connected
Encoder		Encoder (AWG 28)	
Pin 1	N.C.	Pin 1	N.C.
Pin 2	V _{CC}	Pin 2	V _{CC}
Pin 3	GND	Pin 3	GND
Pin 4	N.C.	Pin 4	N.C.
Pin 5	Channel A	Pin 5	Channel A
Pin 6	Channel A	Pin 6	Channel A
Pin 7	Channel B	Pin 7	Channel B
Pin 8	Channel B	Pin 8	Channel B
Pin 9	Do not connect	Pin 9	Do not connect
Pin 10	Do not connect	Pin 10	Do not connect
Pin type:		Pin type:	
39-28-1083 Molex		43025-600 Molex	
DIN 41651/EN 60603-13		39-01-2040 Molex	
		DIN 41651/EN 60603-13	

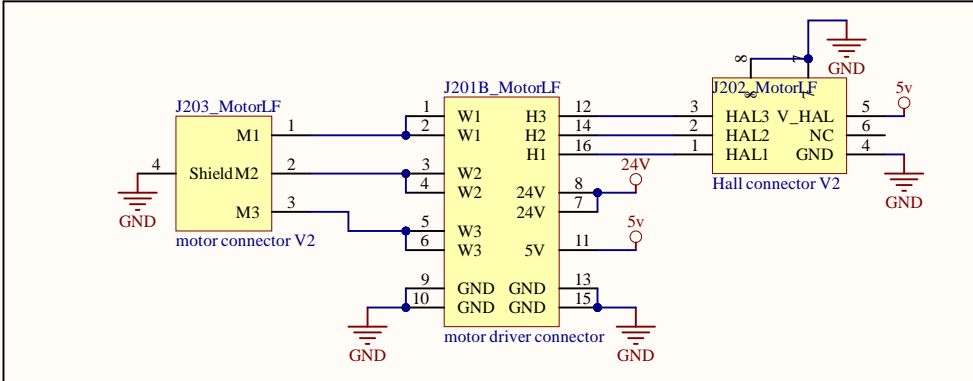
Opt. terminal resistance R = typical 120 Ω
Capacitor C ≥ 0.1 nF per m line length



A4	Number	Revision
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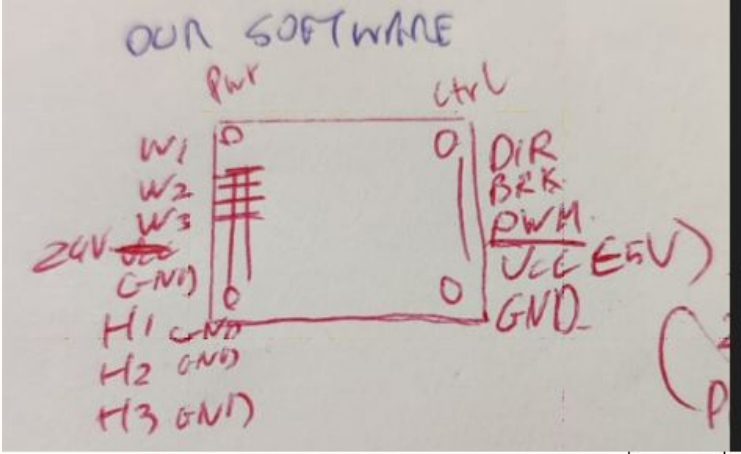
Control Signals



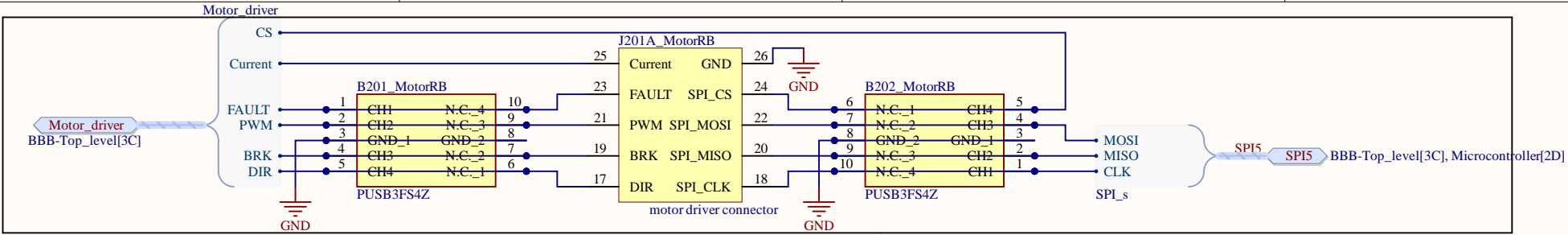
Motor connectors

Pin Allocation		Pin Allocation	
Connection V1		Connection V2	
Motor + Sensors		Sensors (AWG 24)	
Pin 1	Hall sensor 1	Pin 1	Hall sensor 1
Pin 2	Hall sensor 2	Pin 2	Hall sensor 2
Pin 3	V _{HAL} 4.5...18 VDC	Pin 3	Hall sensor 3
Pin 4	Motor winding 3	Pin 4	GND
Pin 5	Hall sensor 3	Pin 5	V _{HAL} 4.5...18 VDC
Pin 6	GND	Pin 6	N.C.
Pin 7	Motor winding 1	Motor (AWG 22)	
Pin 8	Motor winding 2	Pin 1	Motor winding 1
		Pin 2	Motor winding 2
		Pin 3	Motor winding 3
		Pin 4	Not connected
Encoder		Encoder (AWG 28)	
Pin 1	N.C.	Pin 1	N.C.
Pin 2	V _{CC}	Pin 2	V _{CC}
Pin 3	GND	Pin 3	GND
Pin 4	N.C.	Pin 4	N.C.
Pin 5	Channel A	Pin 5	Channel A
Pin 6	Channel A	Pin 6	Channel A
Pin 7	Channel B	Pin 7	Channel B
Pin 8	Channel B	Pin 8	Channel B
Pin 9	Do not connect	Pin 9	Do not connect
Pin 10	Do not connect	Pin 10	Do not connect
Pin type:		Pin type:	
39-28-1083 Molex		43025-600 Molex	
DIN 41651/EN 60603-13		39-01-2040 Molex	
		DIN 41651/EN 60603-13	

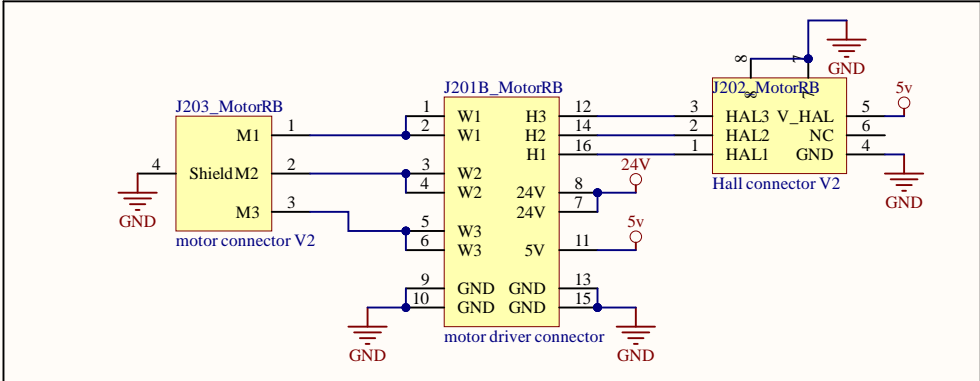
Opt. terminal resistance R = typical 120 Ω
Capacitor C ≥ 0.1 nF per m line length



A4	number	Revision
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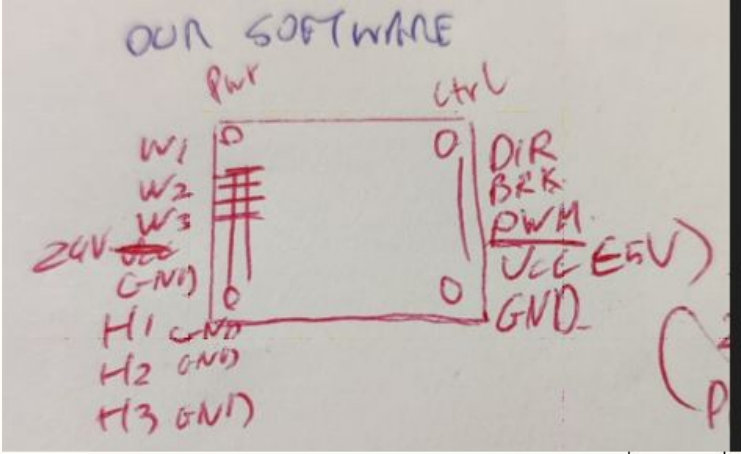


Control Signals

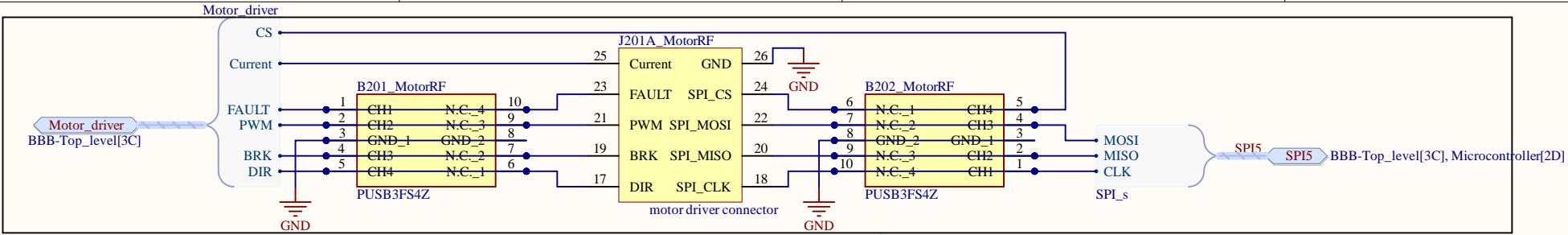


Motor connectors

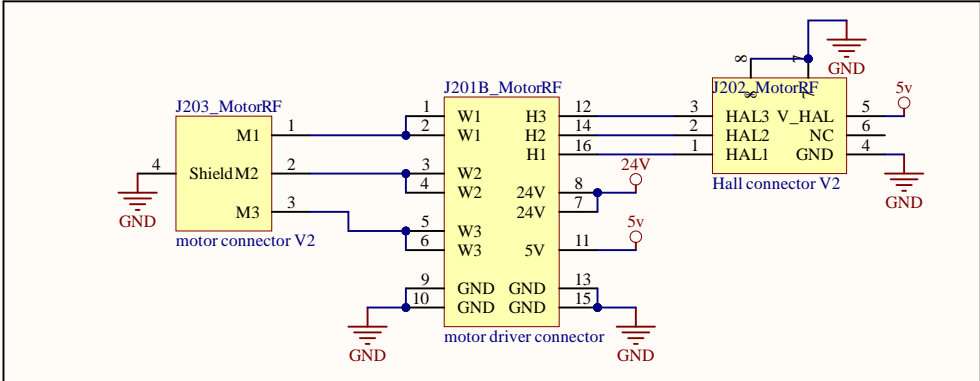
Pin Allocation		Pin Allocation	
Connection V1		Connection V2	
Motor + Sensors		Sensors (AWG 24)	
Pin 1	Hall sensor 1	Pin 1	Hall sensor 1
Pin 2	Hall sensor 2	Pin 2	Hall sensor 2
Pin 3	V _{HAL} 4.5...18 VDC	Pin 3	Hall sensor 3
Pin 4	Motor winding 3	Pin 4	GND
Pin 5	Hall sensor 3	Pin 5	V _{HAL} 4.5...18 VDC
Pin 6	GND	Pin 6	N.C.
Pin 7	Motor winding 1	Motor (AWG 22)	
Pin 8	Motor winding 2	Pin 1	Motor winding 1
Encoder		Pin 2	Motor winding 2
Pin 1	N.C.	Pin 3	Motor winding 3
Pin 2	V _{CC}	Pin 4	Not connected
Pin 3	GND	Encoder (AWG 28)	
Pin 4	N.C.	Pin 1	N.C.
Pin 5	Channel A	Pin 2	V _{CC}
Pin 6	Channel A	Pin 3	GND
Pin 7	Channel B	Pin 4	N.C.
Pin 8	Channel B	Pin 5	Channel A
Pin 9	Do not connect	Pin 6	Channel A
Pin 10	Do not connect	Pin 7	Channel B
Pin type:		Pin 8	Channel B
39-28-1083 Molex		Pin 9	Do not connect
DIN 41651/EN 60603-13		Pin 10	Do not connect
43025-600 Molex		Line receiver	
39-01-2040 Molex		Recommended IC's:	
DIN 41651/EN 60603-13		- MC 9486	
		- SN 75175	
		- AM 26 LS 32	



A4	Number	Revision
Date:	8/19/2024	Sheet of
File:	Motor_driver_connector.SchDoc	Drawn By: Csongor Buzogany

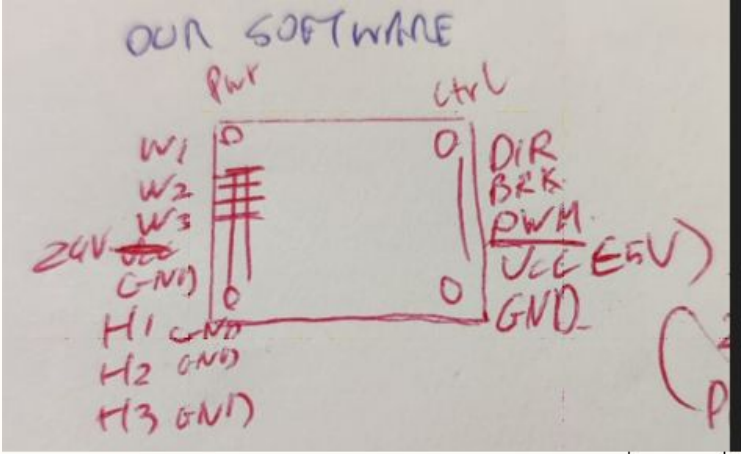


Control Signals

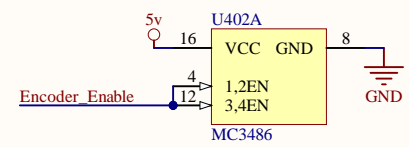
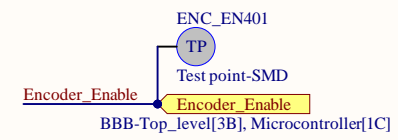
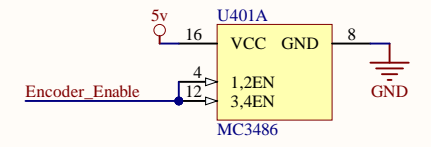
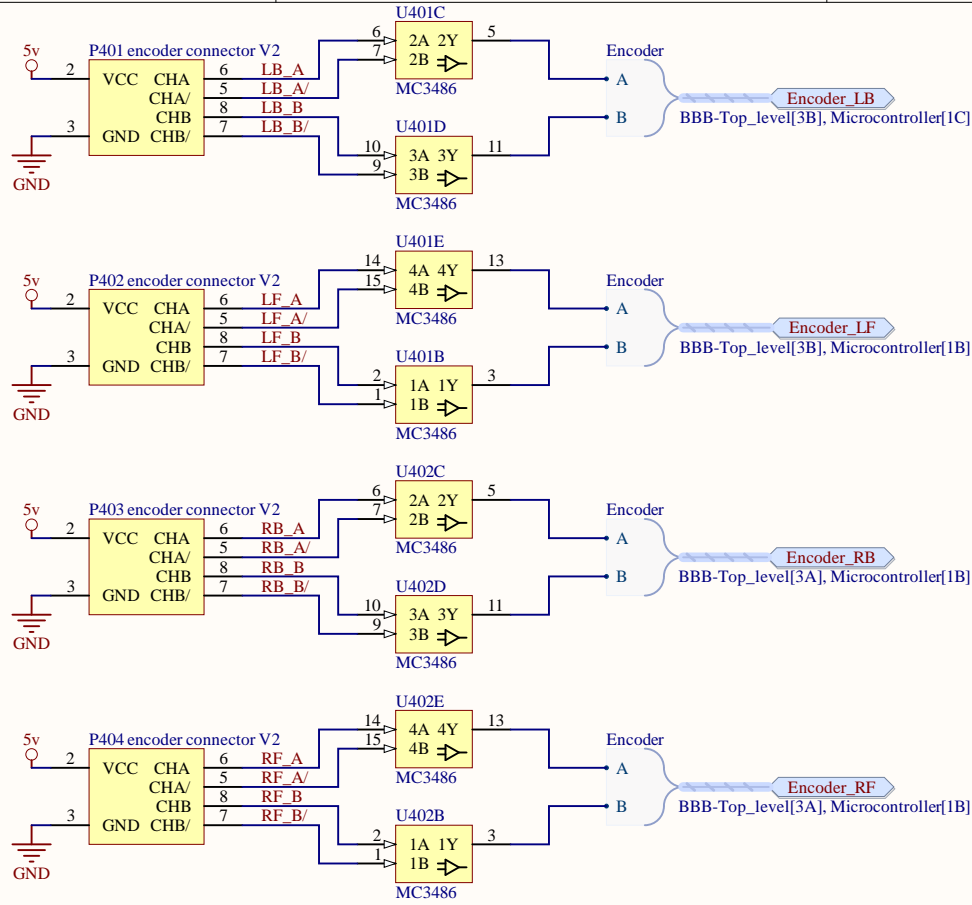


Motor connectors

Pin Allocation		Pin Allocation	
Connection V1		Connection V2	
Motor + Sensors		Sensors (AWG 24)	
Pin 1	Hall sensor 1	Pin 1	Hall sensor 1
Pin 2	Hall sensor 2	Pin 2	Hall sensor 2
Pin 3	V _{HAL} 4.5...18 VDC	Pin 3	Hall sensor 3
Pin 4	Motor winding 3	Pin 4	GND
Pin 5	Hall sensor 3	Pin 5	V _{HAL} 4.5...18 VDC
Pin 6	GND	Pin 6	N.C.
Pin 7	Motor winding 1	Motor (AWG 22)	
Pin 8	Motor winding 2	Pin 1	Motor winding 1
Encoder		Pin 2	Motor winding 2
Pin 1	N.C.	Pin 3	Motor winding 3
Pin 2	V _{CC}	Pin 4	Not connected
Pin 3	GND	Encoder (AWG 28)	
Pin 4	N.C.	Pin 1	N.C.
Pin 5	Channel A	Pin 2	V _{CC}
Pin 6	Channel A	Pin 3	GND
Pin 7	Channel B	Pin 4	N.C.
Pin 8	Channel B	Pin 5	Channel A
Pin 9	Do not connect	Pin 6	Channel A
Pin 10	Do not connect	Pin 7	Channel B
Pin type:		Pin 8	Channel B
39-28-1083 Molex	43025-600 Molex	Pin 9	Do not connect
DIN 41651/EN 60603-13	39-01-2040 Molex	Pin 10	Do not connect
	DIN 41651/EN 60603-13	Opt. terminal resistance R = typical 120 Ω	
		Capacitor C ≥ 0.1 nF per m line length	



A4	number	Revision
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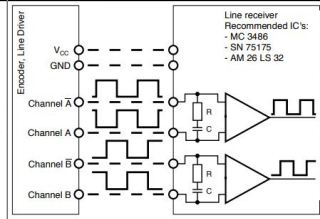


Encoder (AWG 28)

- Pin 1 N.C.
- Pin 2 V_{CC}
- Pin 3 GND
- Pin 4 N.C.
- Pin 5 Channel \bar{A}
- Pin 6 Channel A
- Pin 7 Channel \bar{B}
- Pin 8 Channel B
- Pin 9 Do not connect
- Pin 10 Do not connect

43025-600 Molex
 39-01-2040 Molex
 DIN 41651/EN 60603-13

Pin Allocation		Pin Allocation	
Connection V1 Motor + Sensors		Connection V2 Sensors (AWG 24)	
Pin 1	Hall sensor 1	Pin 1	Hall sensor 1
Pin 2	Hall sensor 2	Pin 2	Hall sensor 2
Pin 3	V _{ref} 4.5...18 VDC	Pin 3	Hall sensor 3
Pin 4	Motor winding 3	Pin 4	GND
Pin 5	Hall sensor 3	Pin 5	V _{ref} 4.5...18 VDC
Pin 6	GND	Pin 6	N.C.
Pin 7	Motor winding 1	Motor (AWG 22)	
Pin 8	Motor winding 2	Pin 1	Motor winding 1
Pin 9	Motor winding 3	Pin 2	Motor winding 2
Pin 10	Do not connect	Pin 3	Motor winding 3
Encoder		Pin 4	Not connected
Pin 1	N.C.	Encoder (AWG 28)	
Pin 2	V _{CC}	Pin 1	N.C.
Pin 3	GND	Pin 2	V _{CC}
Pin 4	N.C.	Pin 3	GND
Pin 5	Channel \bar{A}	Pin 4	N.C.
Pin 6	Channel A	Pin 5	Channel \bar{A}
Pin 7	Channel \bar{B}	Pin 6	Channel A
Pin 8	Channel B	Pin 7	Channel \bar{B}
Pin 9	Do not connect	Pin 8	Channel B
Pin 10	Do not connect	Pin 9	Do not connect
		Pin 10	Do not connect
Pin type: 39-28-1083 Molex DIN 41651/EN 60603-13		43025-600 Molex 39-01-2040 Molex DIN 41651/EN 60603-13	



Opt. terminal resistance R = typical 120 Ω
 Capacitor C ≥ 0.1 nF per m line length

PIN		TYPE ⁽¹⁾	DESCRIPTION
NAME	NO.		
1B	1	I	Channel 1 Differential Receiver Inverting Input
1A	2	I	Channel 1 Differential Receiver Non-Inverting Input
1Y	3	O	Channel 1 Single Ended Output
1,2 EN	4	I	Active High Enable for Channels 1 and 2
2Y	5	O	Channel 2 Single Ended Output
2A	6	I	Channel 2 Differential Receiver Non-Inverting Input

Title		
Size	Number	Revision
A4		
Date:	8/19/2024	Sheet of
File:	Encoder_connector.SchDoc	Drawn By: Csongor Buzogany

U501A

Encoder_LFA	34	PA0	PA8	100	Encoder_RFA
Encoder_LFB	35	PA1	PA9	101	Encoder_RFB
	36	PA2	PA10	102	
	37	PA3	PA11	103	
	40	PA4	PA12	104	
DIP_SW7	41	PA5	PA13	105	JTAG.TMS
Encoder_LBA	42	PA6	PA14	109	JTAG.TCK
Encoder_LBB	43	PA7	PA15	110	JTAG.TDI

U501C

RB.Current	26	PC8	98	SD_CARD.D0
RF.Current	27	PC1	99	SD_CARD.D1
LB.Current	28	PC2	111	SD_CARD.D2
LF.Current	29	PC3	112	SD_CARD.D3
DIP_SW6	44	PC4	113	SD_CARD.CLK
DIP_SW5	45	PC5	7	LFCS
RB.PWM	96	PC6	8	
RF.PWM	97	PC7	9	

U501E

UART8.RX	141	PE0	PE8	59	LED1
UART8.TX	142	PE1	PE9	60	LED0
LF.FAULT	1	PE2	PE10	63	
LF.BRK	2	PE3	PE11	64	SPI4.NSS
LF.DIR	3	PE4	PE12	65	SPI4.CLK
LF.PWM	4	PE5	PE13	66	SPI4.MISO
LB.PWM	5	PE6	PE14	67	SPI4.MOSI
LED2	58	PE7	PE15	68	SPI4.RST

U501G

LED4	56	PG0	PG8	93	RF.DIR
LED3	57	PG1	PG9	124	SPI1.MISO
RB.FAULT	87	PG2	PG10	125	SPI1.NSS
RB.BRK	88	PG3	PG11	126	SPI1.CLK
RB.DIR	89	PG4	PG12	127	
RF.CS	90	PG5	PG13	128	
RF.FAULT	91	PG6	PG14	129	
RF.BRK	92	PG7	PG15	132	

STM32F767ZIT6(new symbol)
U501B

DIP_SW4	46	PB0	PB8	139	
DIP_SW3	47	PB1	PB9	140	
DIP_SW2	48	PB2	PB10	69	SPI4.BUSY
JTAG.TDO	133	PB3	PB11	70	SPI4.IRQ
JTAG.NRST	134	PB4	PB12	73	UART5.RX
	135	PB5	PB13	74	UART5.TX
I2C1_SCL	136	PB6	PB14	75	BTN_SW0
I2C1_SDA	137	PB7	PB15	76	BTN_SW1

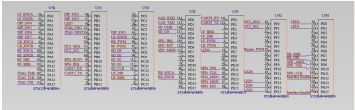
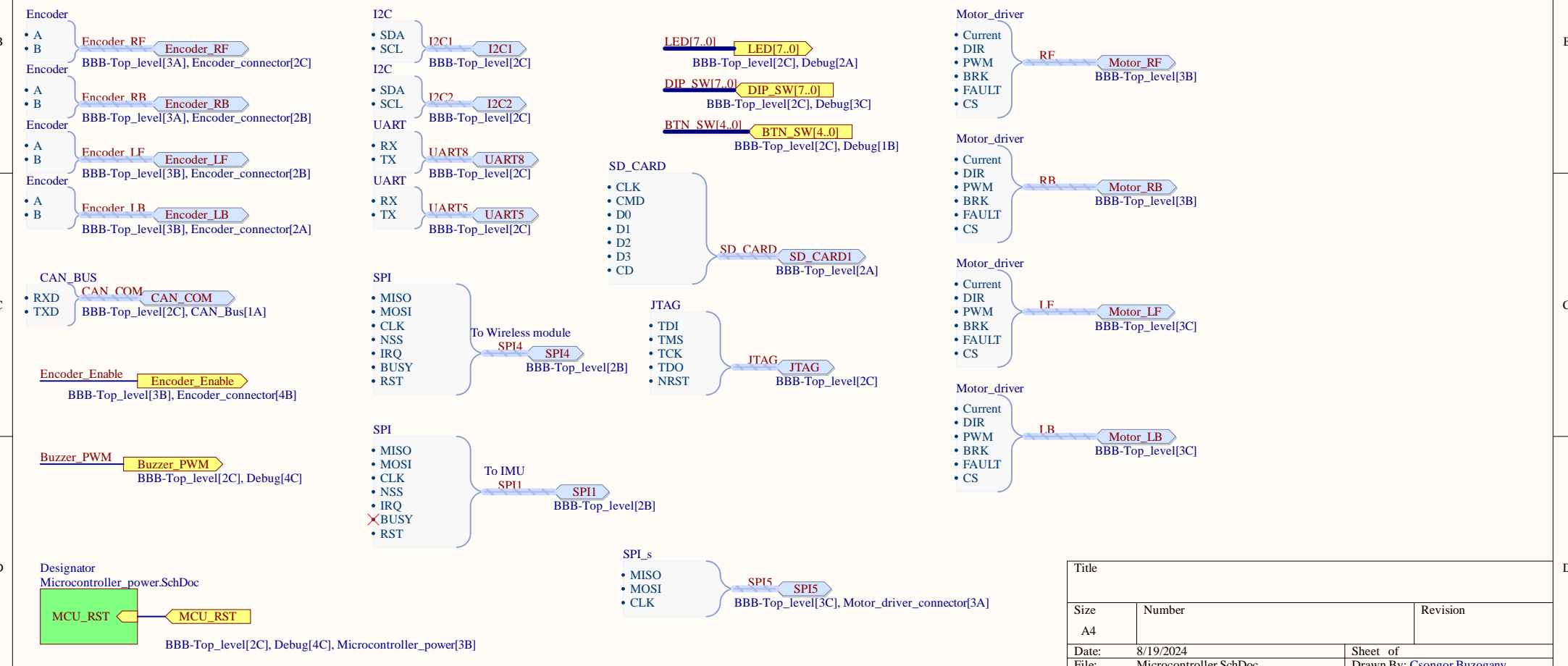
STM32F767ZIT6(new symbol)
U501D

CAN_COM.RXD	114	PD0	PD8	77	BTN_SW2
CAN_COM.TXD	115	PD1	PD9	78	BTN_SW3
SD_CARD.CMD	116	PD2	PD10	79	BTN_SW4
SD_CARD.CD	117	PD3	PD11	80	
	118	PD4	PD12	81	Encoder_RB.A
SPI1.IRQ	119	PD5	PD13	82	Encoder_RB.B
SPI1.RST	122	PD6	PD14	85	Encoder_Enable
SPI1.MOSI	123	PD7	PD15	86	RB.CS

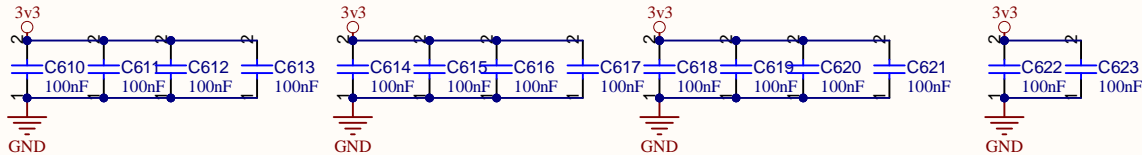
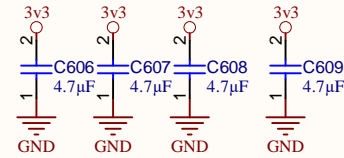
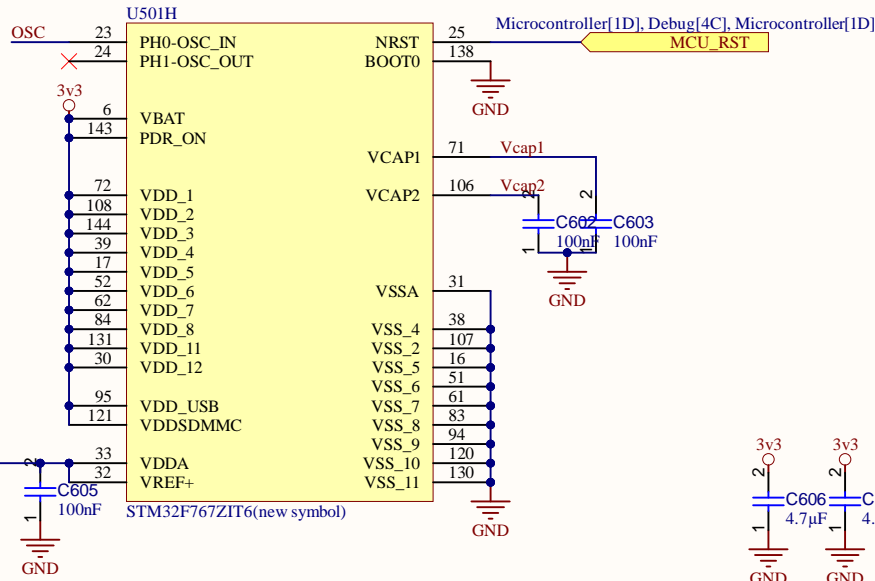
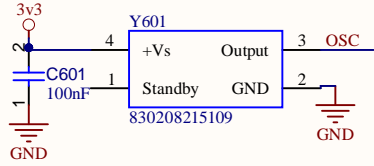
STM32F767ZIT6(new symbol)
U501F

I2C2.SDA	10	PF0	PF8	20	SPI5.MISO
I2C2_SCL	11	PF1	PF9	21	SPI5.MOSI
LB.CS	12	PF2	PF10	22	
LB.FAULT	13	PF3	PF11	49	DIP_SW1
LB.BRK	14	PF4	PF12	50	DIP_SW0
LB.DIR	15	PF5	PF13	53	LED7
Buzzer_PWM	18	PF6	PF14	54	LED6
SPI5.CLK	19	PF7	PF15	55	LED5

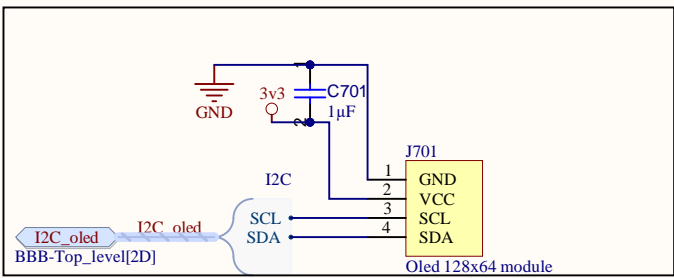
STM32F767ZIT6(new symbol)

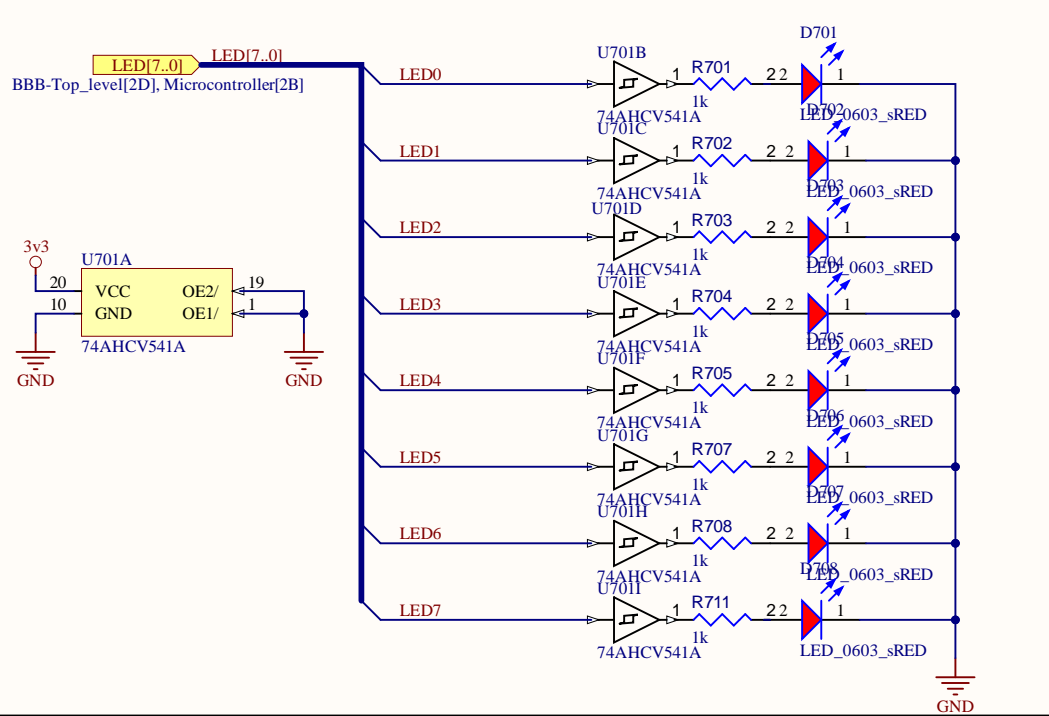
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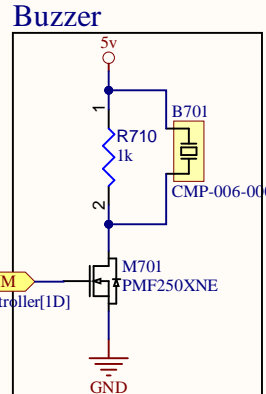
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Date:	8/19/2024	Sheet of
File:	Microcontroller_power.SchDoc	Drawn By: Csongor Buzogany



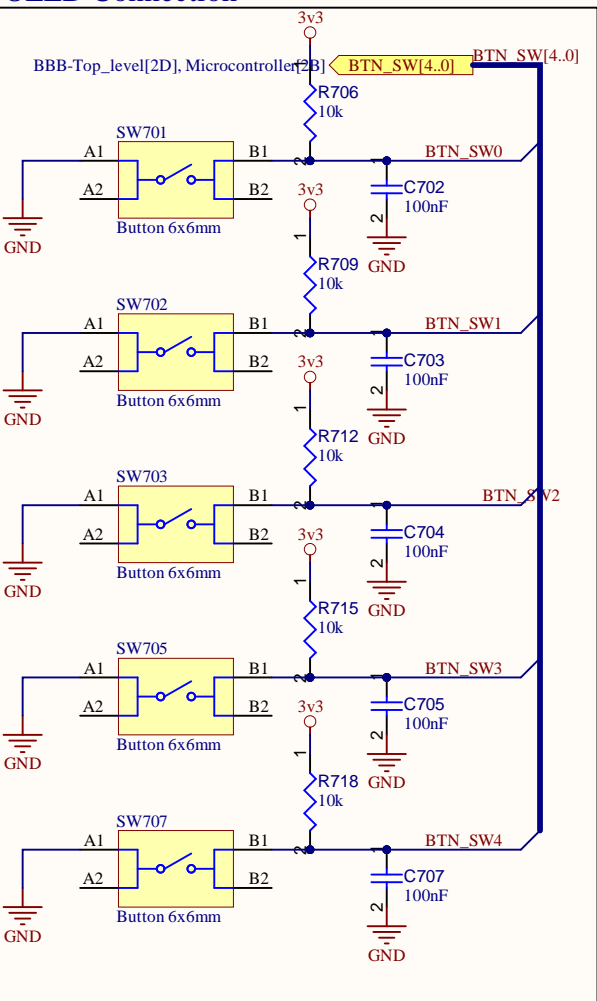
OLED Connection



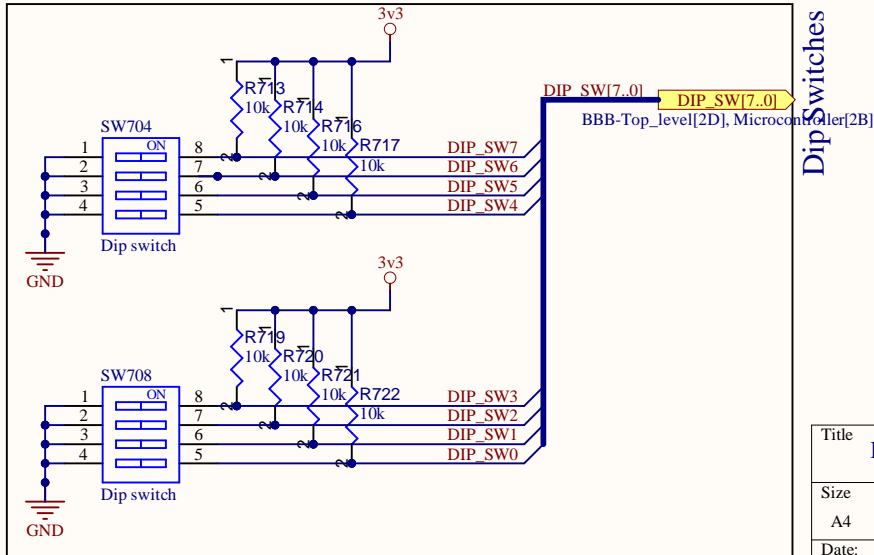
LEDs



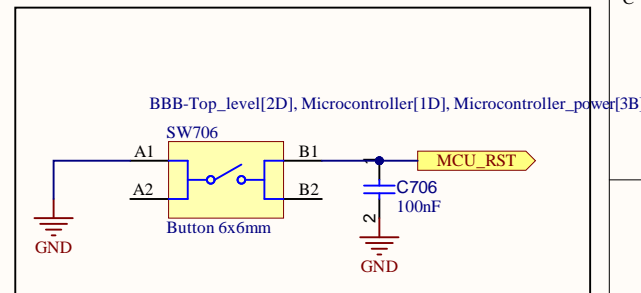
Buzzer



Buttons



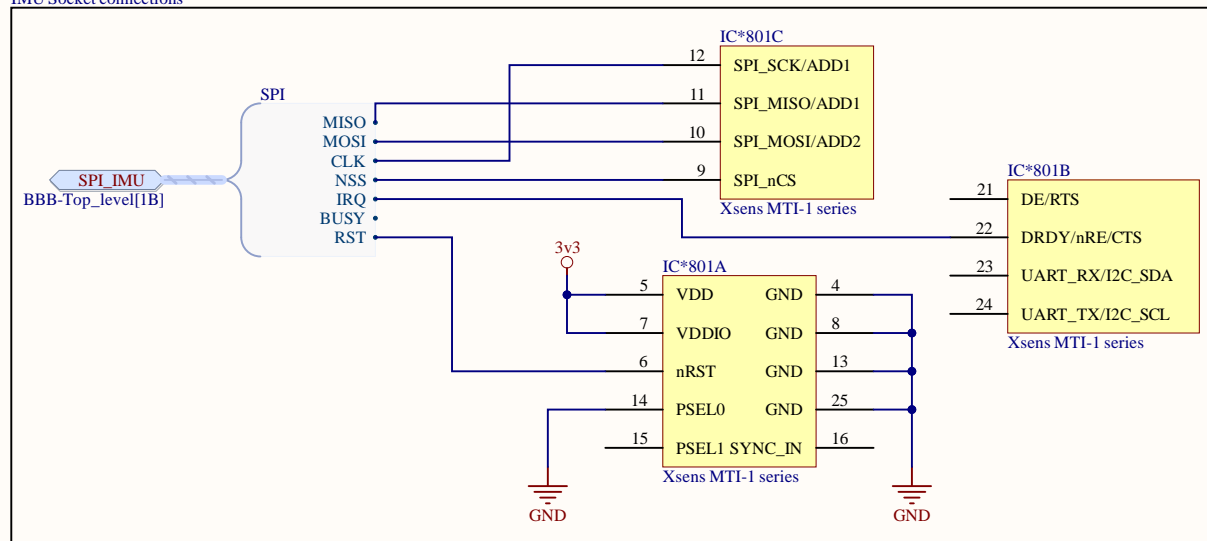
Dip Switches



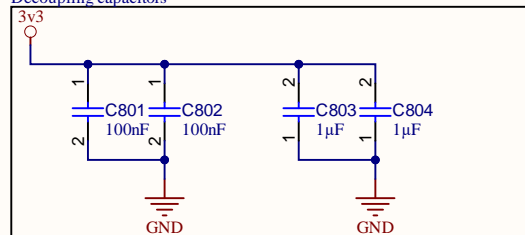
Reset Button

Title		
Debugging		
Size	Number	Revision
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Date:	8/19/2024	Sheet of
File:	Debug_SchDoc	Drawn By: Greg Ward

IMU Socket connections

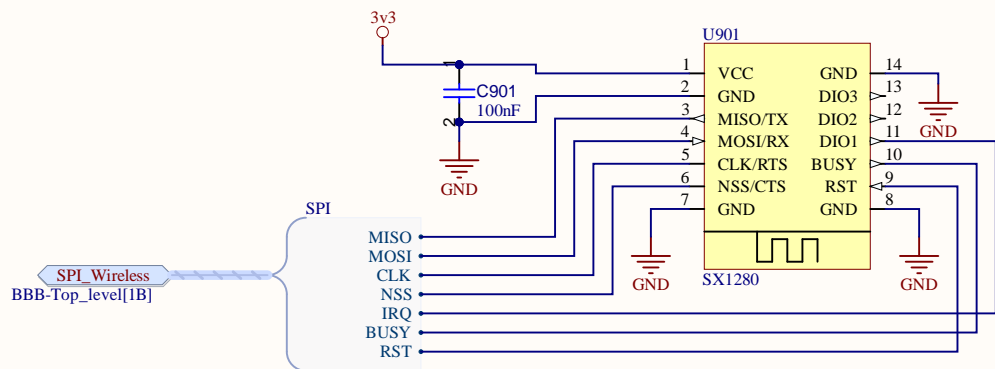


Decoupling capacitors



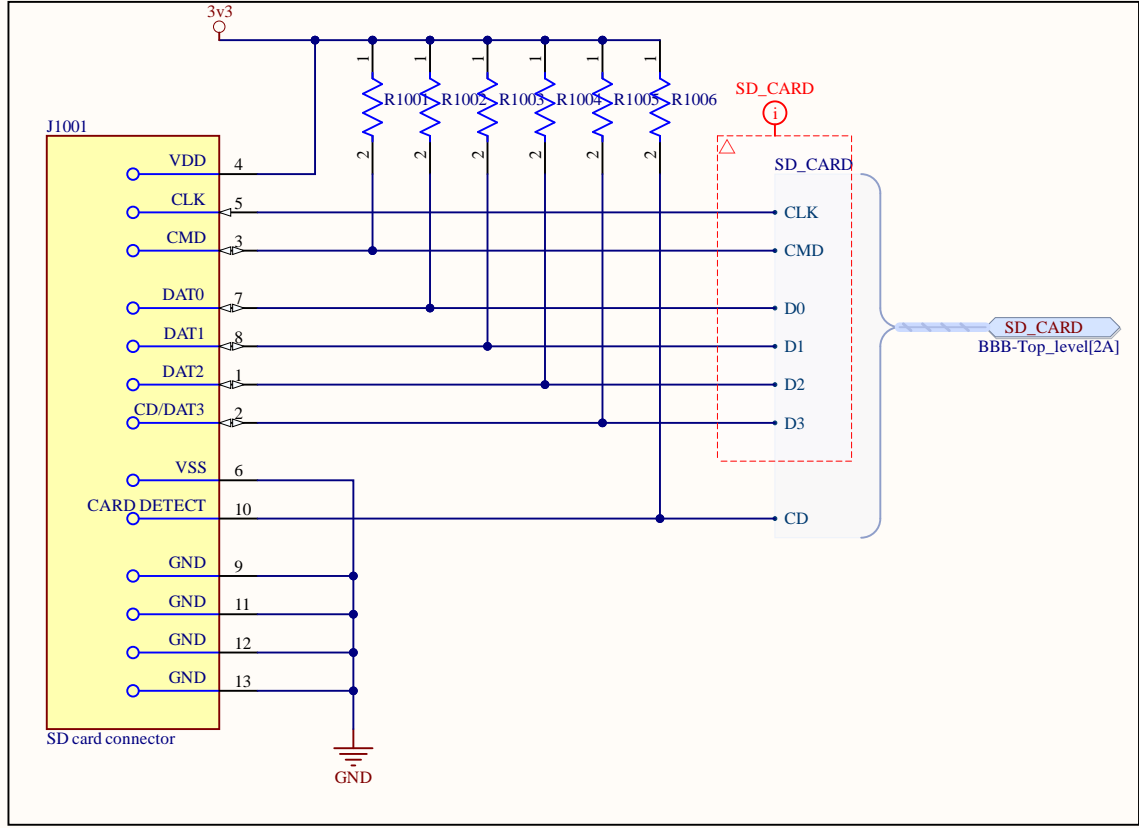
This acts as a power reservoir to ensure that the Xsense always has power available. Also 100nF caps should be close to the 3.3v pin.

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Size A4	Number 9	Revision
Date: 8/19/2024	Sheet of	
File: IMU.SchDoc	Drawn By: Greg Ward	

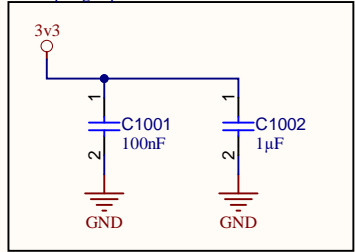


Title		
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SD Card Connector

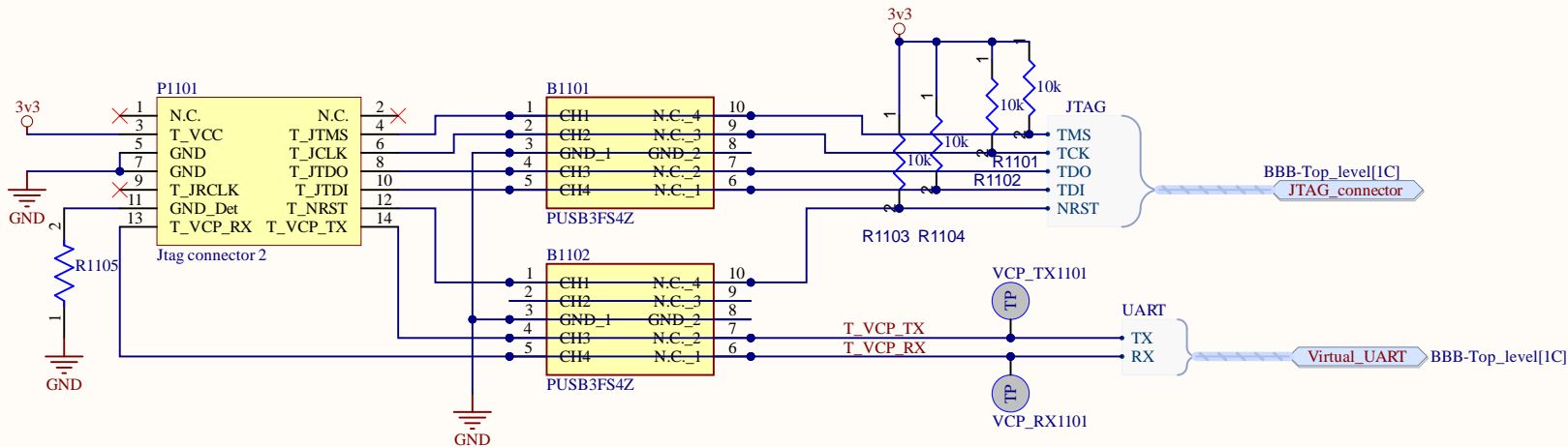


Decoupling capacitors



^ This acts as a power reservoir to ensure that the SD card always has power available. Also 100nF caps should be close to the 3.3v pin.

Title SD Card Connector		
Size A4	Number 11	Revision
Date: 8/19/2024	Sheet of	
File: SD_Card.SchDoc	Drawn By: Greg Ward	



8.1.2 STDC14 (STM32 JTAG/SWD and VCP)

The STDC14 CN1 connector allows the connection to an STM32 target using the JTAG or SWD protocol, respecting (from pin 3 to pin 12) the ARM10 pinout (Arm Cortex debug connector). But it also advantageously provides two UART signals for the Virtual COM port. The related pinout for the STDC14 connector is listed in [Table 6](#).

Table 6. STDC14 connector pinout CN1

Pin No.	Description	Pin No.	Description
1	Reserved ⁽¹⁾	2	Reserved ⁽¹⁾
3	T_VCC ⁽²⁾	4	T_JTMS/T_SWDIO
5	GND	6	T_JCLK/T_SWCLK
7	GND	8	T_JTDO/T_SWO ⁽³⁾
9	T_JRCLK ⁽⁴⁾ /NC ⁽⁵⁾	10	T_JTDI/NC ⁽⁵⁾
11	GNDDetect ⁽⁶⁾	12	T_NRST
13	T_VCP_RX ⁽⁷⁾	14	T_VCP_TX ⁽²⁾

- Do not connect to the target.
- Input for STLINK-V3SET.
- SWO is optional, required only for Serial Wire Viewer (SWV) trace.
- Optional loopback of T_JCLK on the target side, required if loopback is removed on the STLINK-V3SET side.
- NC means not required for the SWD connection.
- Tied to GND by STLINK-V3SET firmware; may be used by the target for detection of the tool.
- Output for STLINK-V3SET

The used connector is SAMTEC FTSH-107-01-L-DV-K-A.

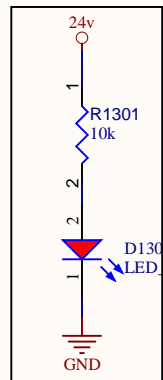
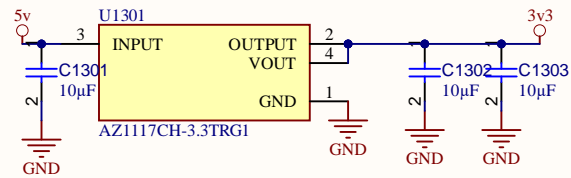
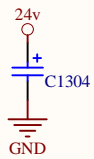
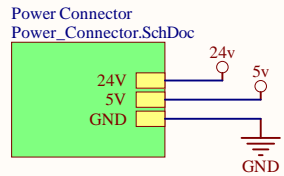
Virtual COM port (VCP)

The serial interface VCP is directly available as a Virtual COM port of the PC, connected to STLINK-V3SET USB connector CN5. This function can be used for STM32 and STM8 microcontrollers. The signals are 3.3 V compatible and can perform from 732 bps to 16 Mbps. This function is available on MB1440 CN1 and CN3, and MB1441 CN1. T_VCP_RX (or RX) signal is the Rx for the target (Tx for the STLINK-V3SET), T_VCP_TX (or TX) signal is the Tx for the target (Rx for the STLINK-V3SET).

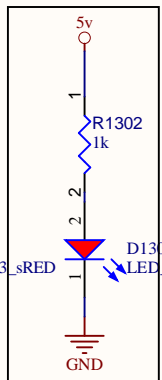
A second Virtual COM port may be activated, as detailed later in [Section 7.3.5](#) (Bridge UART).

For details regarding baud rates, refer to [Section 14.2](#).

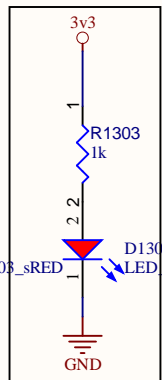
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Size	Number	Revision
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Date:	8/19/2024	Sheet of
File:	JTAG.SchDoc	Drawn By: Csongor Buzogany



24v LED

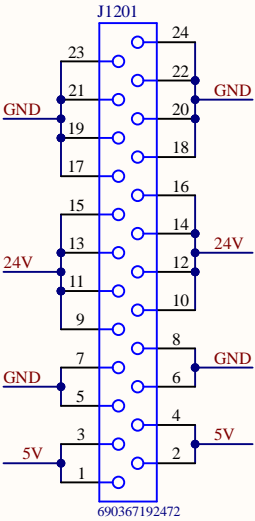
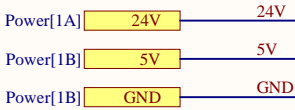


5v LED

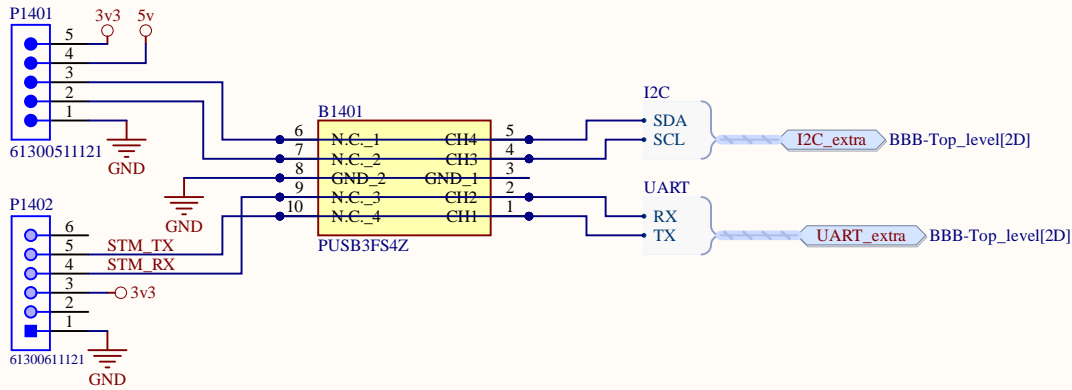


3v3 LED

Title		
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Date: 8/19/2024	Sheet of	
File: Power.SchDoc	Drawn By: Csongor Buzogany	



Title		
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Date: 8/19/2024	Sheet of	
File: Power_Connector.SchDoc	Drawn By: Csongor Buzogany	



https://www.we-online.com/en/components/products/PHD_2_54_THT_PIN_HEADER_6130XX11121

Title		
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Date: 8/19/2024	Sheet of	
File: Extra_connectors.SchDoc	Drawn By: Csongor Buzogany	