# SR5E1-EVBE7000P rev. C evaluation board

Introduction

The SR5E1-EVBE7000P rev. C standalone evaluation board supports STMicroelectronics SR5E1xxE7 microcontroller in eQFP176 package.

Figure 1. SR5E1-EVBE7000P rev. C
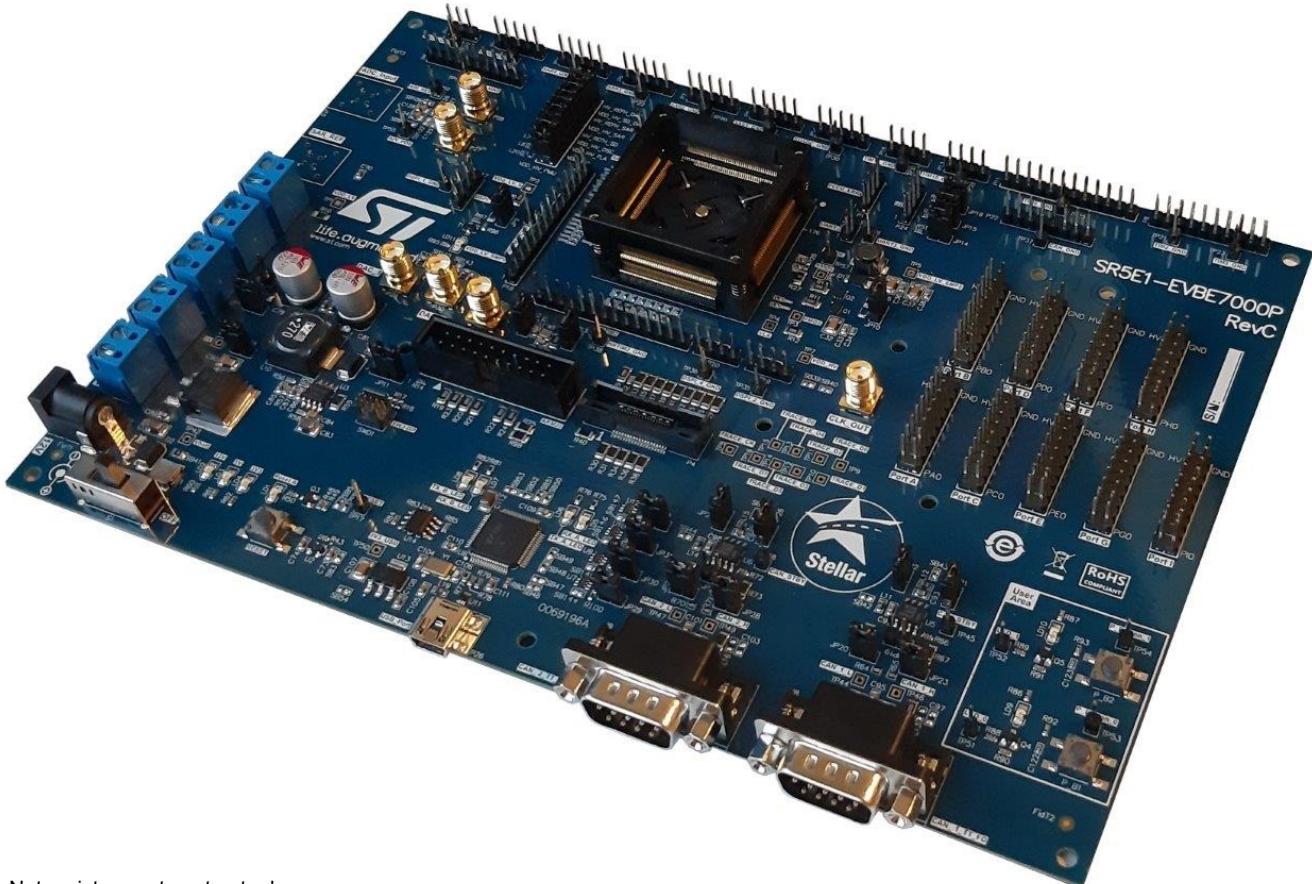
Note: picture not contractual

UM3104 - Rev 2 - February 2024
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1   Overview

The SR5E1-EVBE7000P rev. C standalone evaluation board supports STMicroelectronics SR5E1xxE7 microcontroller with package LQFP 24x24 176L EXPOSED PAD DOWN.

The evaluation board is a standalone unit allowing access to the CPU, access to the I/O pins as well as to any board peripherals. The evaluation board is intended for bench/laboratory use and has been designed using normal temperature specified components.

**Figure 2. SR5E1-EVBE7000P rev. C - top overview**
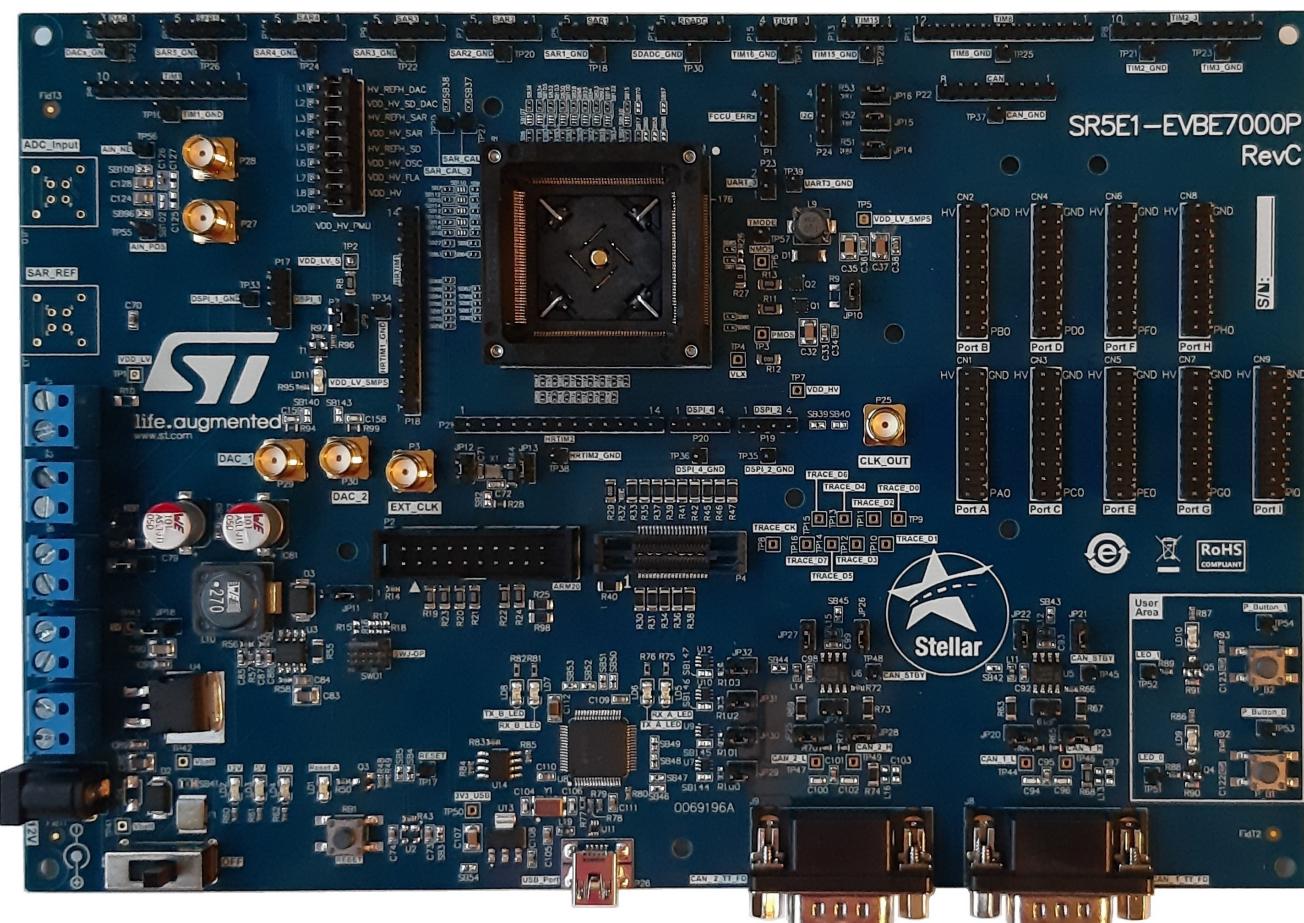
Figure 3. SR5E1-EVBE7000P rev. C - bottom overview
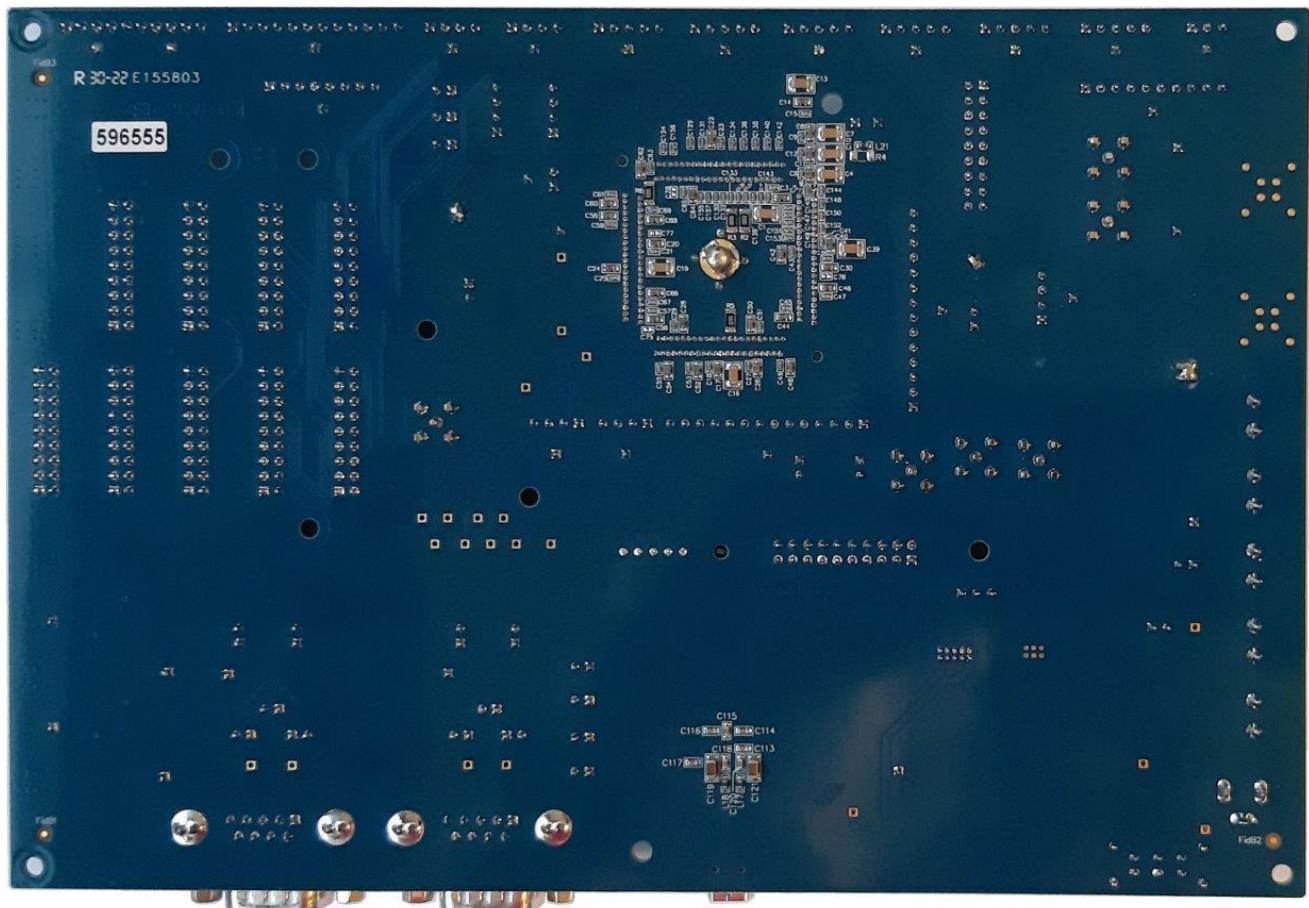
1.1 Supported devices

The SR5E1-EVBE7000P rev. C evaluation board supports the following STMicroelectronics family of microcontrollers in eQFP176 package:

• SR5E1xxE7

2 License agreement

The packaging of this evaluation board was sealed with a seal stating, by breaking this seal, you agree to the terms and conditions of the evaluation board license agreement, the terms and conditions of which are available at https://www.st.com/resource/en/evaluation_board_terms_of_use/evaluationproductlicenseagreement.pdf.

Upon breaking the seal, you and STMicroelectronics entered into the evaluation board license agreement, a copy of which is also enclosed with the evaluation board for convenience.

Attention: *This evaluation board only offers limited features for evaluating ST products. It has not been tested for use with other products and is not suitable for any safety or other commercial or consumer application. This evaluation board is otherwise provided "AS IS" and STMicroelectronics disclaims all warranties, express or implied, including the implied warranties of merchantability and fitness for a particular purpose.*

3 Handling precautions

Please take care to handle the package content in order to prevent electrostatic discharge.

Before the EVB is used or the power is applied, please fully read the following sections on how to correctly configure the board. Failure to correctly configure the board may cause irreparable damage to component or MCU and EVB.

4 Hardware description

4.1 Hardware features

The SR5E1-EVBE7000P rev. C evaluation board has the following features:

- 12 V external power supply
- Socketed device
- Reset generation
- Clock generation:
  - 40 MHz external oscillator
  - SMA connector
- 2x UART (USB connector)
- 4x CAN FD:
  - CAN1 and CAN 2 with CAN FD transceivers and DB9 connectors
  - CAN1, CAN2, CAN 3 and CAN4 at GPIO level (header connector)
- 3x SPI (DSPI_1, DSPI_2 and DSPI_4)
- 1x I2C
- 5 SAR ADC modules
- 2 SD ADC modules
- 2x buffered DACs
- 2x advanced control timers:
  - TIM1: 4 channels
  - TIM8: 4 channels
- 4x general purpose timers:
  - TIM2: 4 channels
  - TIM3: 4 channels
  - TIM15: 2 channels
  - TIM16: 1 channel
- 2x high resolution timers:
  - HRTIM1
  - HRTIM2
- JTAG debug connector (Mipi 10-pin + ARM 20-pin)
- Nexus Aurora connector
- 2x header connectors
- 2x probe connectors
- User area:
  - User controllable I/Os, 2 LED's and 2 pushbuttons

4.2 Hardware dimensions

The evaluation board has the following dimensions:

- PCB area: 220 mm x 150 mm
- Top components height: 25 mm
- Bottom components height: 5.0 mm
- PCB thickness 1.546 mm

5 Power and system configuration

5.1 Power supplies

The SR5E1-EVBE7000P rev. C evaluation board requires an external power supply voltage of 12 V DC, minimum 2 A. The single input voltage is regulated on-board using a step-down switching regulator for automotive applications providing the supply voltage of 3.3 V.

5.2 Power supply connectors

The following figure shows 2.1 mm barrel connector:

Figure 4. 2.1 mm power connector

5.3 Power switch, status LEDs and fuse

The main power switch (slide switch S1) can be used to isolate the power supply input from the EVB voltage regulators if required.

When power is applied to the evaluation board, the power LEDs adjacent to the voltage regulators show the presence of the supply voltages as follows:

• LED LD2 - 12 V
• LED LD3 - 5 V
• LED LD4 - 3.3 V

If no LED is illuminated when power is applied to the evaluation board and the regulators are correctly enabled using the appropriate jumpers, it is possible that either power switch SW1 is in the "OFF" position or that the fuse F1 has blown. The fuse blows also if the power is applied to the evaluation board in reverse bias.

The following jumpers are used to configure the power supply (common for all the supported devices):

Table 1. Power configuration jumpers

Jumper	Description	Default	Position
JP1 pin 1-2	HV_REFH_DAC configuration: • Open: not connected • Closed: connected to 3V3	Closed	Top layer - B1[1]
JP1 pin 3-4	VDD_HV_SD_DAC_COMP voltage configuration: • Open: not connected • Closed: connected to 3V3	Closed	Top layer - B1[1]
JP1 pin 5-6	HV_REFH_SAR configuration: • Open: not connected • Closed: connected to 3V3	Closed	Top layer - B1[1]
JP1 pin 7-8	VDD_HV_SAR voltage configuration: • Open: not connected • Closed: connected to 3V3	Closed	Top layer - B1[1]

Jumper	Description	Default	Position
JP1 pin 9-10	HV_REFH_SD configuration: • Open: not connected • Closed: connected to 3V3	Closed	Top layer - B1[1]
JP1 pin 11-12	VDD_HV_OSC voltage configuration: • Open: not connected • Closed: connected to 3V3	Closed	Top layer - B1[1]
JP1 pin 13-14	VDD_HV_FLA voltage configuration: • Open: not connected • Closed: connected to 3V3	Closed	Top layer - B1[1]
JP1 pin 15-16	VDD_HV voltage configuration: • Open: not connected • closed: connected to 3V3	Closed	Top layer - B1[1]
JP1 pin 17-18	VDD_HV_IO_PMU voltage configuration: • Open: not connected • Closed: connected to 3V3	Closed	Top layer - B1[1]
JP9	VDD_LV voltage configuration: • Open: not connected • Closed: connected to VDD_LV_SMPS	Closed	Top layer - B2[1]

1. Refer to Figure 15. SR5E1-EVBE7000P rev. C - top layer.

5.4 System clock configuration

The evaluation board supports the usage of crystal clock sources as well as an external clock source.

The following clock sources are supported:

- 40 MHz local crystal oscillator for PLL
- A SMA connector is provided for the external clock input

The following figure shows the 40 MHz local crystal oscillator schema:

Figure 5. 40 MHz local crystal oscillator schema
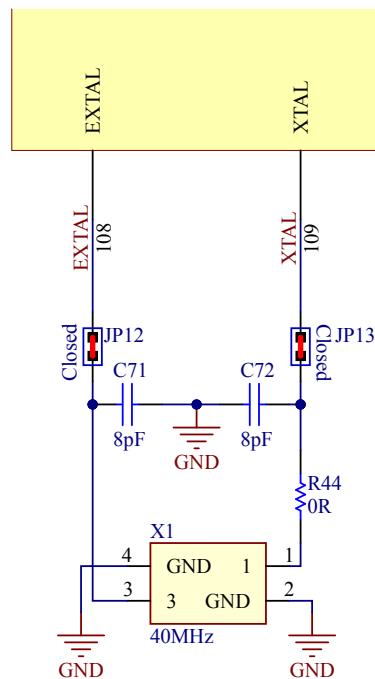
The following figure shows the external clock source schema:

Figure 6. External clock schema
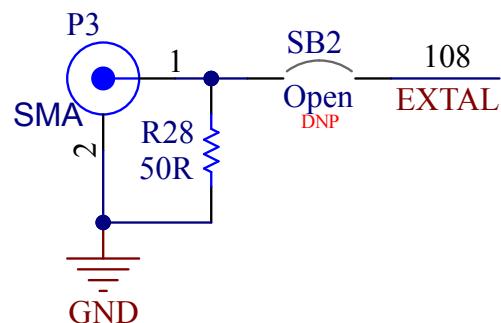
The Table 2 shows the system clock sources configuration setting.

Table 2. System clock configuration

| Jumper	Description	Default	Position
JP13	XTAL configuration: • Closed: connect pin 1 of 40 MHz crystal (X1) to XTAL • Open: disconnect the 40 MHz crystal (X1)	Closed	B3[(1)]
JP12	EXTAL configuration: • Closed: connect pin 3 of 40 MHz crystal (X1) to EXTAL • Open: disconnect the 40 MHz crystal (X1)	Closed	B3[(1)]
SB2	System clock external source: • Open: disconnect SMA connector (P3) from EXTAL • Closed: connect SMA connector (P3) to EXTAL	Open	B3[(1)]

1. *Refer to the Figure 15. SR5E1-EVBE7000P rev. C - top layer.*

5.5 Reset circuit

The reset circuit is performed using the STM6315 device.

The following picture shows the schema of the evaluation board reset circuit:

Figure 7. Reset circuit schema
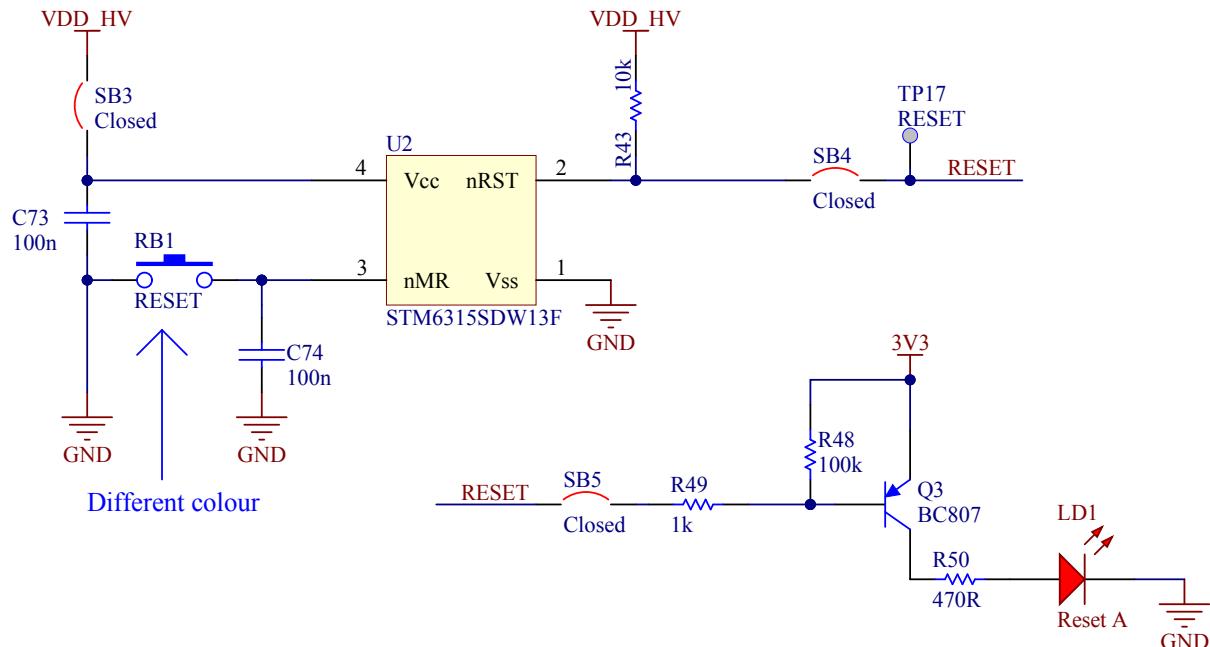
To use and perform the reset driving, there are different solder bridges:

Table 3. Reset configuration jumpers

Jumper	Description	Default	Position
RB1	Reset pushbutton	Open	B4[1]
SB3	• Open: disconnect the V_{CC} of the STM6315 device • Closed: connect the V_{CC} of the STM6315 device to VDD_HV	Closed	B4[1]
SB4	• Open: disconnect the RESET signal from the Reset out of the STM6315 device • Closed: directly connect the signal to the Reset out of the STM6315 device	Closed	B4[1]
SB5	• Open: disconnect the RESET signal from the Q3 base transistor to drive the LD1 • Closed: connect the RESET signal from the Q3 base transistor to drive the LD1	Closed	B4[1]

1.   Refer to the *Figure 15. SR5E1-EVBE7000P rev. C - top layer*.

5.6   TESTMODE configuration

The following picture shows the TESTMODE configuration schema.

Figure 8. TESTMODE configuration schema
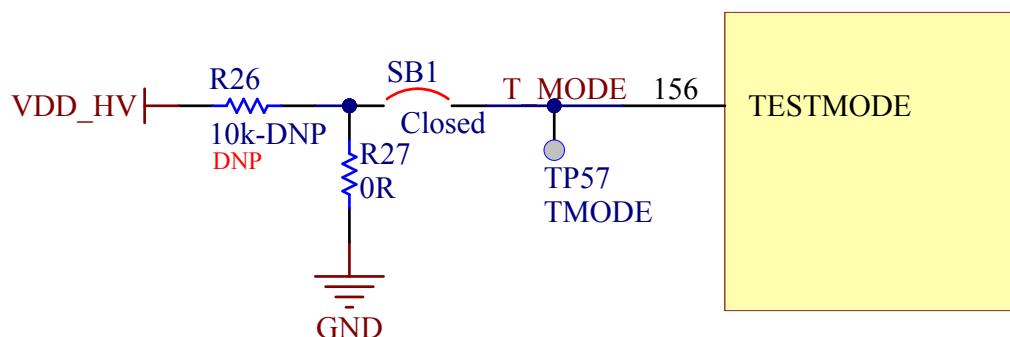
The following table shows the TESTMODE configuration setting:

Table 4. TESTMODE configuration schema

Jumper	Description	Default	Position
SB1	TESTMODE settings: • Open: TESTMODE pin is unconnected. • Closed: TESTMODE pin is connected to GND (optional a 10 kΩ pull up resistor)	Closed (10 kΩ down)	C2[1]

1.   Refer to the *Figure 15. SR5E1-EVBE7000P rev. C - top layer*.

6 Hardware description

6.1 CAN interface

The SR5E1-EVBE3000P rev. A has four MCP2542WFD high-speed CAN transceivers, two male standard DB9 connectors, and one 8x1 header connector to provide physical CAN interfaces for the MCU.

The following table describes the CAN connectors:

Table 5. DSPI connectors

Connectors	Description	Position
J8	CAN_1 FD DB9 connector	Top side–C4 [1]
J9	CAN_2 FD DB9 connector	Top side–D4 [1]
P22	8x1 header connector	Top side–C1 [1]

1. Refer to the Figure 15. SR5E1-EVBE7000P rev. C - top layer

The following table shows the CAN_0 DB9 connector pinout (J8).

Table 6. CAN_0 DB9 connector pinout

Pin number (DB9)	Signal
1	N.C.
2	CAN_0_L
3	GND
4	N.C.
5	N.C.
6	GND
7	CAN_0_H
8	N.C.
9	N.C.

The following table shows the CAN_1 DB9 connector pinout (J9).

Table 7. CAN_1 DB9 connector pinout

Pin number (DB9)	Signal
1	N.C.
2	CAN_1_L
3	GND
4	N.C.
5	N.C.
6	GND
7	CAN_1_H
8	N.C.
9	N.C.

The following table shows the 8x1 header connector pinout (P22).

Table 8. **8 x 1 header CAN connector pinout**

Pin number (DB9)	Signal
1	CAN_1_RX
2	CAN_1_TX
3	CAN_2_RX
4	CAN_2_TX
5	Not connected
6	Not connected
7	CAN_4_RX
8	CAN_4_TX

The jumpers and the solder bridges detailed in the following table are used to configure the CAN interfaces.

Table 9. CAN configuration jumpers and solder bridges

Jumper	Description	Default	Position
SB42	CAN 1 transceiver VIO supply configuration: • Open: disconnect the VDD_HV_IO_MAIN from the VIO of the U5 CAN transceiver • Closed: connect the VDD_HV_IO_MAIN to the VIO of the U5 CAN transceiver	Closed	Top side–D3 [1]
SB43	CAN 1 transceiver VDD supply configuration: • Open: disconnect the VDD of the U5 CAN transceiver from the 5 V domain. • Closed: connect the VDD of the U5 CAN transceiver to the 5 V domain.	Closed	Top side–D3 [1]
JP19	CAN_1_STBY configuration: • Open: disconnect CAN_1_STBY • Closed: connect CAN_1_STBY to VIO pin of CAN transceiver	Open	Top side–D4 [1]
JP21	CAN_1_TX configuration: • Open: disconnect PA4 from CAN_1_TX • Closed: connect PA4 to CAN_1_TX	Closed	Top side–D3 [1]
JP22	CAN_1_RX configuration: • Open: disconnect PA5 from CAN_1_RX • Closed: connect PA5 to CAN_1_RX	Closed	Top side–D3 [1]
JP20	CAN_1_L termination resistor configuration: • Open: disconnect the termination resistor • Closed: connect CAN_1_L to a 60.4 Ω termination resistor	Closed	Top side–D4 [1]
JP23	CAN_1_H termination resistor configuration: • Open: disconnect the termination resistor • Closed: connect CAN_1_H to a 60.4 Ω termination resistor	Closed	Top side–D4 [1]
SB44	CAN 2 transceiver VIO supply configuration: • Open: disconnect the VDD_HV_IO_MAIN from the VIO of the U6 CAN transceiver • Closed: connect the VDD_HV_IO_MAIN to the VIO of the U6 CAN transceiver	Closed	Figure 1–C3 [1]
SB45	CAN 2 transceiver VDD supply configuration: • Open: disconnect the VDD of the U6 CAN transceiver from the 5 V domain. • Closed: connect the VDD of the U6 CAN transceiver to the 5 V domain.	Closed	Top side–C3 [1]
JP24	CAN_2_STBY configuration: • Open: disconnect CAN_2_STBY • Closed: connect CAN_2_STBY to VIO pin of CAN transceiver	Open	Top side–C4 [1]
JP26	CAN_2_TX configuration: • Open: disconnect PA12 from CAN_FD2_TX • Closed: connect PA12 to CAN_FD2_TX	Closed	Top side–C3 [1]
JP27	CAN_2_RX configuration: • Open: connect PA11 to CAN_2_RX • Closed: dis connect PA11 to CAN_2_RX	Closed	Top side–C3 [1]
JP25	CAN_2_L termination resistor configuration: • Open: disconnect the termination resistor • Closed: connect CAN_2_L to a 60.4 Ω termination resistor	Closed	Top side–C4 [1]
JP28	CAN_2_H termination resistor configuration: • Open: disconnect the termination resistor	Closed	Top side–C4 [1]

Jumper	Description	Default	Position
	• Closed: connect CAN_2_H to a 60.4 Ω termination resistor		

1. Refer to the Figure 15. SR5E1-EVBE7000P rev. C - top layer

6.2 UART interface

The board contains an FT2232HL with two receivers and two drivers. It has a USB MINI-B, 5-pin connector and a two pins header connector.

Each Tx and Rx pin has a jumper allowing the possibility to disconnect the default pin and connect another pin.

The following table lists the UART interface connectors:

Table 10. UART interface connectors

Connector	Description	Position
P23	UART_3 connector	Top side–C1 [1]
P26	USB port	Top side–B4 [1]

1. Refer to the Figure 15. SR5E1-EVBE7000P rev. C - top layer

The following table shows the UART interface jumpers configuration.

Table 11. UART interface pin configuration

Jumper	Description	Default	Position
JP29	UART_A_RX connection: • Open: UART_A_RX not connected • Closed: UART_A_RX connected to PH14	Closed	Top side–C4 [1]
JP30	UART_A_TX connection: • Open: UART_A_TX not connected • Closed: UART_A_TX connected to PH15	Closed	Top side–C4 [1]
JP31	UART_B_RX connection: • Open: UART_B_RX not connected • Closed: UART_B_RX connected to PA0	Closed	Top side–C4 [1]
JP32	UART_B_TX connection: • Open: UART_B_TX not connected • Closed: UART_B_TX connected to PA1	Closed	Top side–C3 [1]
SB46	TX_A_USB connection • Open: TX_A_USB not connected • Closed: TX_A_USB connected to UART_A_RX using a level shifter	Closed	Top side–B4 [1]
SB47	RX_A_USB connection • Open: RX_A_USB not connected • Closed: RX_A_USB connected to UART_A_TX using a level shifter	Closed	Top side–B4 [1]
SB48	USB A DTR and DSR connection • Open: DTR and DSR not connected • Closed: DTR and DSR connected	Closed	Top side–B4 [1]
SB49	USB A DCD and RI connection • Open: DCD and RI not connected • Closed: DCD and RI connected	Closed	Top side–B4 [1]
SB50	TX_B_USB connection • Open: TX_B_USB not connected	Closed	Top side–B4 [1]

Jumper	Description	Default	Position
	• Closed: TX_B_USB connected to UART_B_RX using a level shifter		
SB51	RX_A_USB connection • Open: RX_B_USB not connected • Closed: RX_B_USB connected to UART_B_TX using a level shifter	Closed	Top side–B4 [1]
SB52	USB B DTR and DSR connection • Open: DTR and DSR not connected • Closed: DTR and DSR connected	Closed	Top side–B4 [1]
SB53	USB B DCD and RI connection • Open: DCD and RI not connected • Closed: DCD and RI connected	Closed	Top side–B4 [1]
SB54	USB GND connection • Open: USB_GND not connected • Closed: USB_GND connected to GND	Closed	Top side–B4 [1]

1. Refer to the *Figure 15. SR5E1-EVBE7000P rev. C - top layer*

The following table shows the UART interface LEDs.

Table 12. **UART interface LEDs**

LED	Description	Position
LED5	RX_A_LED	Top side–B4 [1]
LED6	TX_A_LED	Top side–B4 [1]
LED7	RX_B_LED	Top side–B4 [1]
LED8	TX_B_LED	Top side–B4 [1]

1. Refer to the *Figure 15. SR5E1-EVBE7000P rev. C - top layer*

The following figure shows the two connectors of the pins header schema.

Figure 9. **UART 3 schema**

The following table shows the 1 x 2 header connector pinout (P23).

Table 13. UART3 1 x 2 header connector (P23) pinout

Pin number	Signal
1	UART3_RX
2	UART3_TX

6.3 I²C interface

This paragraph describes the embedded I²C interface present on the board.

The following figure shows the I²C schema.

Figure 10. I²C schema
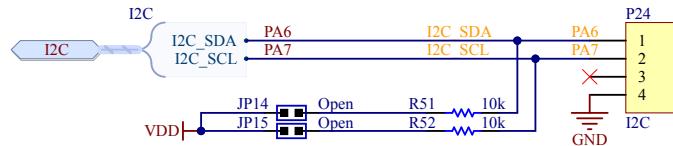
The following table describes the connector and the jumpers used to configure the interface:

Table 14. I²C connector and jumpers

Component	Description	Default	Position
P24	I²C connector	-	Top side–C1[1]
JP14	I²C SDA pull-up configurator: • Closed: I²C_SDA pull-up inserted • Open: I²C_SDA pull up not inserted	Open	Top side–C1 [1]
JP15	I²C SCL pull-up configurator: • Closed: I²C_SCL pull-up inserted • Open: I²C_SCL pull up not inserted	Open	Top side–C1[1]

1.   *Refer to the Figure 15. SR5E1-EVBE7000P rev. C - top layer*

The following picture shows the 1x4 header connector pinout (P24).

Table 15. I²C header 1x4 pins connector pinout

Pin number	Signal
1	I2C_SDA
2	I2C_SCL
3	Not connected
4	GND

6.4 DSPI interface

The board has three DSPI connectors: DSPI_1 (P17), DSPI_2 (P19) and DSPI_4 (P20). The figure below shows the pin out of the three header connectors:

Figure 11. DSPI header connectors schema
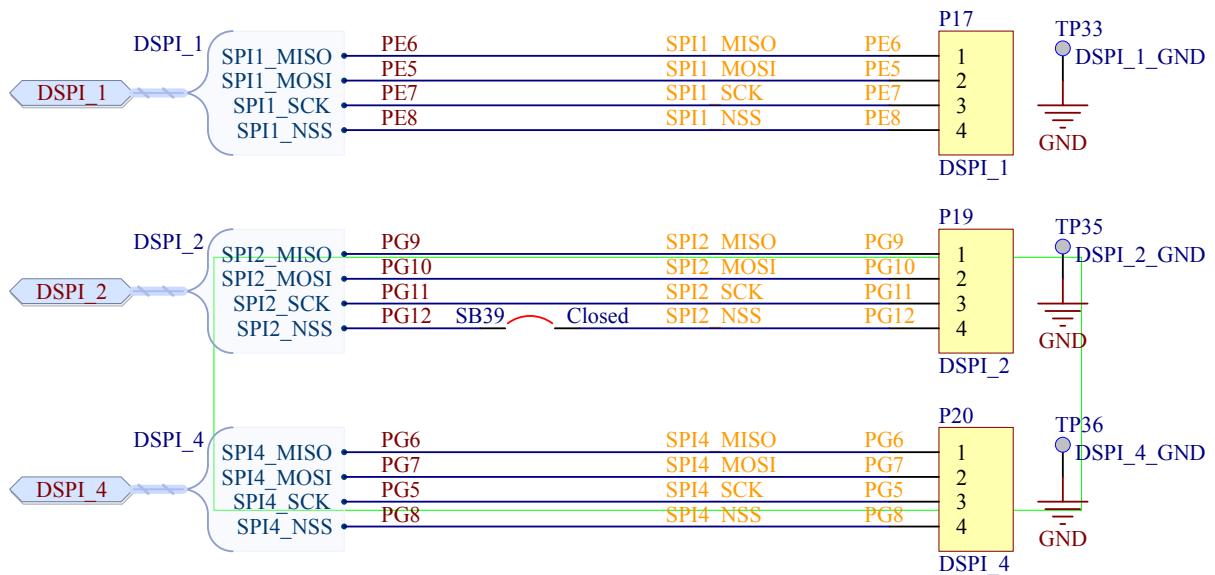
The following table lists the connectors:

Table 16. DSPI connectors

Connectors	Description	Position
P17	DSPI_1 connector	Top layer - A2[1]
P19	DSPI_2 connector	Top layer - C2[1]
P20	DSPI_4 connector	Top layer - C2[1]

1. Refer to the *Figure 15. SR5E1-EVBE7000P rev. C - top layer*.

The following table shows the DSP_1 connector (P17) pin mapping:

Table 17. DSP_1 connector (P17) pin mapping

Pin	Description	Port	QFP 176
1	SPI1_MISO	PE[6]	74
2	SPI1_MOSI	PE[5]	73
3	SPI1_SCK	PE[7]	75
4	SPI1_NSS	PE[8]	72

The Table 18 shows the DSP_2 connector (P19) pin mapping:

Table 18. **DSP_2 connector (P19) pin mapping**

Pin	Description	Port	QFP 176
1	SPI2_MISO	PG[9]	133
2	SPI2_MOSI	PG[10]	134
3	SPI2_SCK	PG[11]	135
4	SPI2_NSS	PG[12]	136

The following table shows the DSP_4 connector (P20) pin mapping:

Table 19. **DSP_4 connector (P20) pin mapping**

Pin	Description	Port	QFP 176
1	SPI4_MISO	PG[6]	130
2	SPI4_MOSI	PG[7]	131
3	SPI4_SCK	PG[5]	129
4	SPI4_NSS	PG[8]	132

6.5 Analog and timers connectors

The SR5E1-EVBE7000P rev. C evaluation board has some analog and timers' connectors indicated in the following table:

Table 20. **Analog and timers connectors**

Connectors	Description	Position
P5	SAR1_IO connector	Top layer - B1[1]
P6	TIM1 connector	Top layer - A1[1]
P7	SAR2_IO connector	Top layer - B1[1]
P8	TIM2_3 connector	Top layer - D1[1]
P9	SAR3_IO connector	Top layer - B1[1]
P10	SAR4_IO connector	Top layer - A1[1]
P11	TIM8 connector	Top layer - C1[1]
P12	SAR5_IO connector	Top layer - A1[1]
P13	TIM15 connector	Top layer - C1[1]
P14	SDADC_IO connector	Top layer - C1[1]
P15	TIM16 connector	Top layer - C1[1]
P16	DAC_OUT_IO connector	Top layer - A1[1]
P18	HRTIM1 connector	Top layer - B2[1]
P21	HRTIM2 connector	Top layer - B2[1]

1. *Refer to the Figure 15. SR5E1-EVBE7000P rev. C - top layer.*

6.5.1 SAR1_IO ADC module

The following table shows the SAR1_IO connector (P5) pin mapping:

Table 21. SAR1_IO connector pin mapping (P5)

Pin	Description	Port	QFP 176
1	SAR1_1	PB[2]	20
2	SAR1_2	PB[3]	21
3	SAR1_3	PB[4]	22
4	SAR1_4	PB[5]	23
5	SAR1_5	PB[6]	25

6.5.2 SAR2_IO ADC module

The following table shows the SAR2_IO connector (P7) pin mapping:

Table 22. SAR2_IO connector (P7) pin mapping

Pin	Description	Port	QFP 176
1	SAR2_1	PB[7]	26
2	SAR2_2	PB[8]	27
3	SAR2_3	PB[9]	28
4	SAR2_4	PB[10]	29
5	SAR2_5	PB[11]	30

6.5.3 SAR3_IO ADC module

The following table shows the SAR3_IO connector (P9) pin mapping:

Table 23. SAR3_IO connector (P9) pin mapping

Pin	Description	Port	QFP 176
1	SAR3_1	PB[12]	31
2	SAR3_2	PB[13]	32
3	SAR3_3	PB[14]	33
4	SAR3_4	PB[15]	34
5	SAR3_5	PC[0]	35

6.5.4 SAR4_IO ADC module

The following table shows the SAR4_IO connector (P10) pin mapping:

Table 24. SAR4_IO connector (P10) pin mapping

Pin	Description	Port	QFP 176
1	SAR4_1	PC[3]	46
2	SAR4_2	PC[4]	47
3	SAR4_3	PC[6]	48
4	SAR4_4	PC[7]	49
5	SAR4_5	PC[8]	50

6.5.5 SAR5_IO ADC module

The following table shows the SAR5_IO connector (P12) pin mapping:

Table 25. SAR5_IO connector (P12) pin mapping

Pin	Description	Port	QFP 176
1	SAR5_1	PC[9]	51
2	SAR5_2	PC[10]	52
3	SAR5_3	PC[11]	53
4	SAR5_4	PC[12]	54
5	SAR5_5	PC[13]	55

6.5.6 SAR_CAL ADC module

The following table shows the SAR_CAL ADC connector pin mapping:

Table 26. SAR_CAL ADC connector pin mapping

Pin	Description	Port	QFP 176
1	SAR_CAL_1	PC[1]	44
2	SAR_CAL_2	PC[2]	45

6.5.7 SADC_IO module

The following table shows the SADC_IO connector (P14) pin mapping:

Table 27. SADC_IO connector (P14) pin mapping

Pin	Description	Port	QFP 176
1	SADC_1_0	PA[13]	16
2	SADC_1_1	PA[14]	17
3	GND		GND
4	SADC_2_0	PA[15]	18
5	SADC_2_1	PB[0]	19

6.5.8 DAC_OUT module

The following table shows the DAC_OUT connector (P16) pin mapping:

Table 28. DAC_OUT connector (P16) pin mapping

Pin	Description	Port	QFP 176
1	DAC_1	PB[1]	56
2	DAC_2	PC[5]	57
3	GND		GND

6.5.9 TIM1 module

The following table shows the TIM1 connector (P6) pin mapping:

Table 29. TIM1 connector (P6) pin mapping

Pin	Description	Port	QFP 176
1	TIM1_CH1	PC[15]	67
2	TIM1_CH1N	PC[14]	66
3	TIM1_CH2	PD[1]	70
4	TIM1_CH2N	PD[0]	69
5	TIM1_CH3	PD[4]	60
6	TIM1_CH3N	PD[3]	59
7	TIM1_CH4	PD[6]	62
8	TIM1_CH4N	PD[5]	61
9	TIM1_BkIn	PD[2]	71
10	GND		GND

6.5.10 TIM2_3 module

The following table shows the TIM2_3 connector (P8) pin mapping:

Table 30. TIM2_3 connector (P8) pin mapping

Pin	Description	Port	QFP 176
1	TIM2_CH1	PH[2]	147
2	TIM2_CH2	PH[3]	149
3	TIM2_CH3	PH[4]	150
4	TIM2_CH4	PH[5]	151
5	GND		GND
6	TIM3_CH1	PG[14]	140
7	TIM3_CH2	PG[15]	141
8	TIM3_CH3	PH[0]	145
9	TIM3_CH4	PH[1]	146
10	TIM3_ETR	PG[13]	138

6.5.11 TIM8 module

The following table shows the TIM8 connector (P11) pin mapping:

Table 31. TIM8 connector (P11) pin mapping

Pin	Description	Port	QFP 176
1	TIM8_CH1	PI[0]	164
2	TIM8_CH1N	PI[1]	165
3	TIM8_CH2	PI[2]	167
4	TIM8_CH2N	PI[3]	168
5	TIM8_CH3	PI[4]	169
6	TIM8_CH3N	PI[5]	170
7	TIM8_CH4	PI[6]	172
8	TIM8_CH4N	PI[7]	173
9	TIM8_BkIn	PI[8]	174
10	TIM8_BkIn2	PI[9]	175
11	TIM8_ETR	PA[3]	6
12	GND		GND

6.5.12 TIM15 module

The following table shows the TIM15 connector (P13) pin mapping:

Table 32. TIM15 connector (P13) pin mapping

Pin	Description	Port	QFP 176
1	TIM15_CH1	PH[6]	152
2	TIM15_CH1N	PH[7]	153
3	TIM15_CH2	PH[8]	154
4	TIM15_BKIn	PH[9]	155

6.5.13 TIM16 module

The following table shows the TIM16 connector (P15) pin mapping:

Table 33. TIM16 (P15) connector pin mapping

Pin	Description	Port	QFP 176
1	TIM16_CH1	PA[0]	3
2	TIM16_CH1N	PA[1]	4
3	TIM16_BKIn	PA[2]	5
4	GND		GND

6.5.14 HRTIM1 module

The following table shows the HRTIM1 connector (P18) pin mapping:

Table 34. HRTIM1 connector (P18) pin mapping

Pin	Description	Port	QFP 176
1	HRTIM1_CHA1	PE[4]	89
2	HRTIM1_CHA2	PE[3]	88
3	HRTIM1_CHB1	PE[2]	87
4	HRTIM1_CHB2	PE[1]	86
5	HRTIM1_CHC1	PD[15]	85
6	HRTIM1_CHC2	PD[14]	84
7	HRTIM1_CHD1	PD[13]	82
8	HRTIM1_CHD2	PD[12]	81
9	HRTIM1_CHE1	PD[11]	80
10	HRTIM1_CHE2	PD[10]	79
11	HRTIM1_CHF1	PD[8]	78
12	HRTIM2_CHF1	PD[7]	77
13	HRTIM2_EEV2	PD[9]	64
14	HRTIM2_EEV6	PE[0]	65

6.5.15 HRTIM2 module

The following table shows the HRTIM2 connector (P21) pin mapping:

Table 35. HRTIM2 connector (P21) pin mapping

Pin	Description	Port	QFP 176
1	HRTIM2_CHA1	PE[9]	91
2	HRTIM2_CHA2	PE[10]	92
3	HRTIM2_CHB1	PE[11]	93
4	HRTIM2_CHB2	PE[12]	94
5	HRTIM2_CHC1	PE[14]	95
6	HRTIM2_CHC2	PE[15]	96
7	HRTIM2_CHD1	PF[0]	98
8	HRTIM2_CHD2	PF[1]	99
9	HRTIM2_CHE1	PF[2]	101
10	HRTIM2_CHE2	PF[3]	102
11	HRTIM2_CHF1	PF[4]	103
12	HRTIM2_CHF1	PF[5]	104
13	HRTIM2_EEV2	PF[6]	105
14	HRTIM2_EEV6	PE[13]	106

6.6 Probe connectors

The SR5E1-EVBE7000P rev. C evaluation board has some probe connectors listed in the following table:

Table 36. Probe connectors

Connectors	Description	Position
J3	SAR_REF (LEMO P/N: EPG.0B.304.HLN) not populated by default	Top layer - A2[1]
J10	ADC input (LEMO P/N: EPG.0B.304.HLN) not populated by default	Top layer - A1[1]
P27	SMA not populated by default	Top layer - A1[1]
P28	SMA not populated by default	Top layer - A1[1]
P29	DAC out SMA connector not populated by default	Top layer - A3[1]

1. *Refer to the Figure 15. SR5E1-EVBE7000P rev. C - top layer.*

6.7 I/O user connectors

The SR5E1-EVBE7000P rev. C evaluation board has nine I/O connectors indicated in the following table:

Table 37. I/O user connectors

Connectors	Description	Position
CN1	Port A 9x2 header connector	Top layer - C2[1]
CN2	Port B 9x2 header connector	Top layer - C2[1]
CN3	Port C 9x2 header connector	Top layer - D2[1]
CN4	Port D 9x2 header connector	Top layer - D2[1]
CN5	Port E 9x2 header connector	Top layer - D2[1]
CN6	Port F 9x2 header connector	Top layer - D2[1]
CN7	Port G 9x2 header connector	Top layer - D2[1]
CN8	Port H 9x2 header connector	Top layer - D2[1]
CN9	Port I 9x2 header connector	Top layer - D2[1]

1. *Refer to the Figure 15. SR5E1-EVBE7000P rev. C - top layer.*

6.8 Debug connectors

The SR5E1-EVBE7000P rev. C evaluation board has the following debug connectors:

Table 38. Debug connectors

Connectors	Description	Position
SWD1	10-pin header connector for JTAG/SWD interface	Top layer - B3[1]
P2	20-pin ARM connector for JTAG interface	Top layer - B3[1]
P4	NEXUS 2x19-pin connector for AURORA interface	Top layer - B3[1]

1. Refer to the *Figure 15. SR5E1-EVBE7000P rev. C - top layer.*

The following figure shows the main DAP connectors and the secondary DAP connector schema:

Figure 12. JTAG/SWD debug ports schema
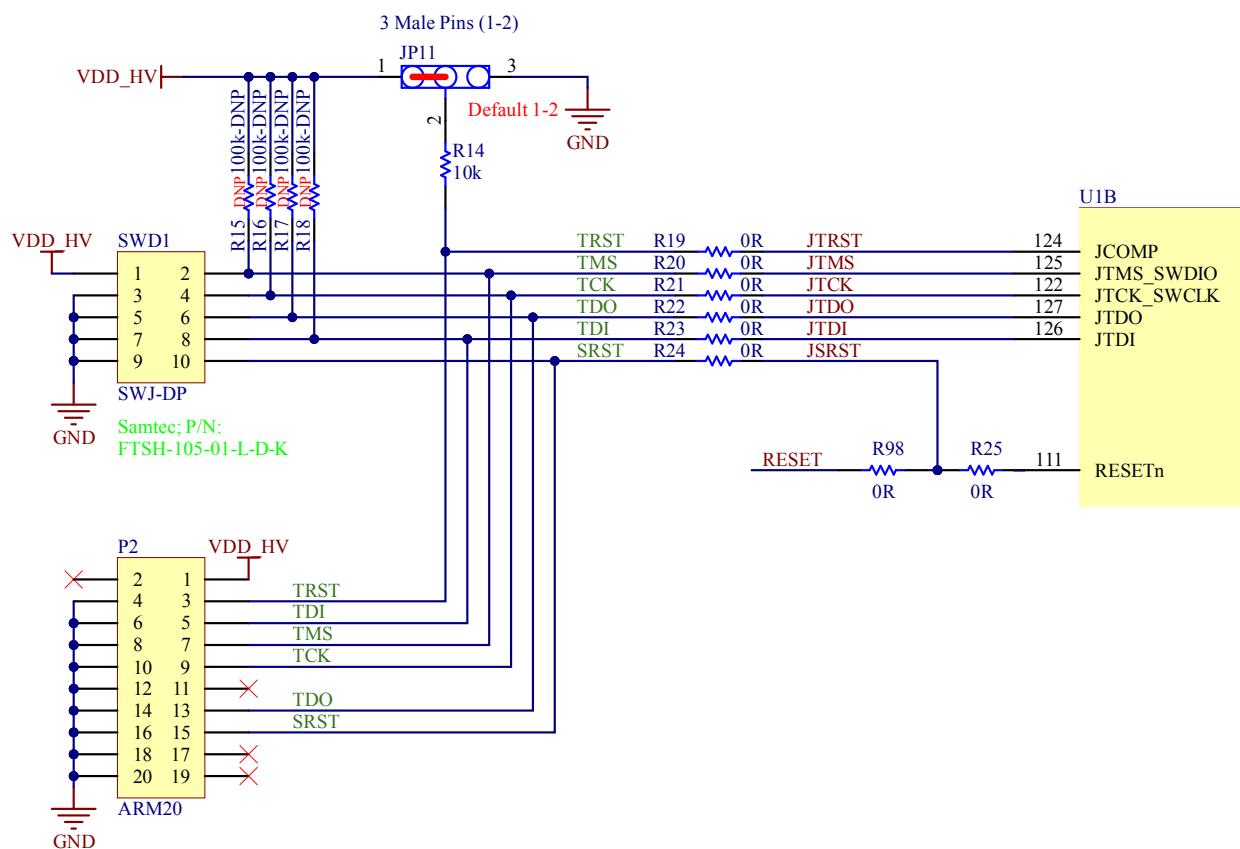
The following table shows the 2x5 header connector pinout (SWD1):

Table 39. SWJ1 main DAP header 2x5 pins connector pinout

Pin number	Signal
1	VDD_HV
2	TMS/SWDIO
3	GND
4	TCK/SWCLK
5	GND
6	TDO
7	GND
8	TDI
9	GND
10	SRST

The following table shows the ARM20 2x10 header connector pinout (P2):

Table 40. P2 JTAG Header 2x10 pins connector pinout

Pin number	Signal
1	VDD_HV_IO_MAIN
2	N.C.
3	TRST
4	GND
5	TDI
6	GND
7	TMS
8	GND
9	TCK
10	GND
11	N.C.
12	GND
13	TDO
14	GND
15	SRST
16	GND
17	N.C.
18	GND
19	N.C.
20	GND

The following table describes all jumpers, all 0R resistors and all solder bridges used to configure the JTAG/SWD ports of the board and their position on PCB:

Table 41. JTAG/SWD configuration

Reference	Description	Default	Position
JP11	TRST configuration: • 1-2: TRST connected to10K resistor pull up to VDD_HV • 2-3: TRST connected to10K resistor pull down	Closed	Top layer - B3[1]
R19	JTRST connection configuration: • Mounted: pin 124 connected to JTRST • Not mounted: pin 124 not connected to JTRST	Mounted	Top layer - B3[1]
R20	TMS configuration: • Mounted: pin 125 connected to TMS • Not mounted: pin 125 not connected to TMS	Mounted	Top layer - B3[1]
R21	TCK configuration: • Mounted: pin 122 connected to TCK • Not mounted: pin 122 not connected to TCK	Mounted	Top layer - B3[1]
R22	TDO configuration: • Mounted: pin 127 connected to TDO • Not mounted: pin 127 not connected to TDO	Mounted	Top layer - B3[1]
R23	TDI configuration: • Mounted: pin 126 connected to TDI • Not mounted: pin 126 not connected to TDI	Mounted	Top layer - B3[1]
R24	SRST pin configuration: • Mounted: SRST pin not connected to RESET • Not mounted: SRSR pin connected to RESET	Mounted	Top layer - B3[1]

1. Refer to the Figure 15. SR5E1-EVBE7000P rev. C - top layer.

The following figure shows the NEXUS schema:

Figure 13. Nexus schema
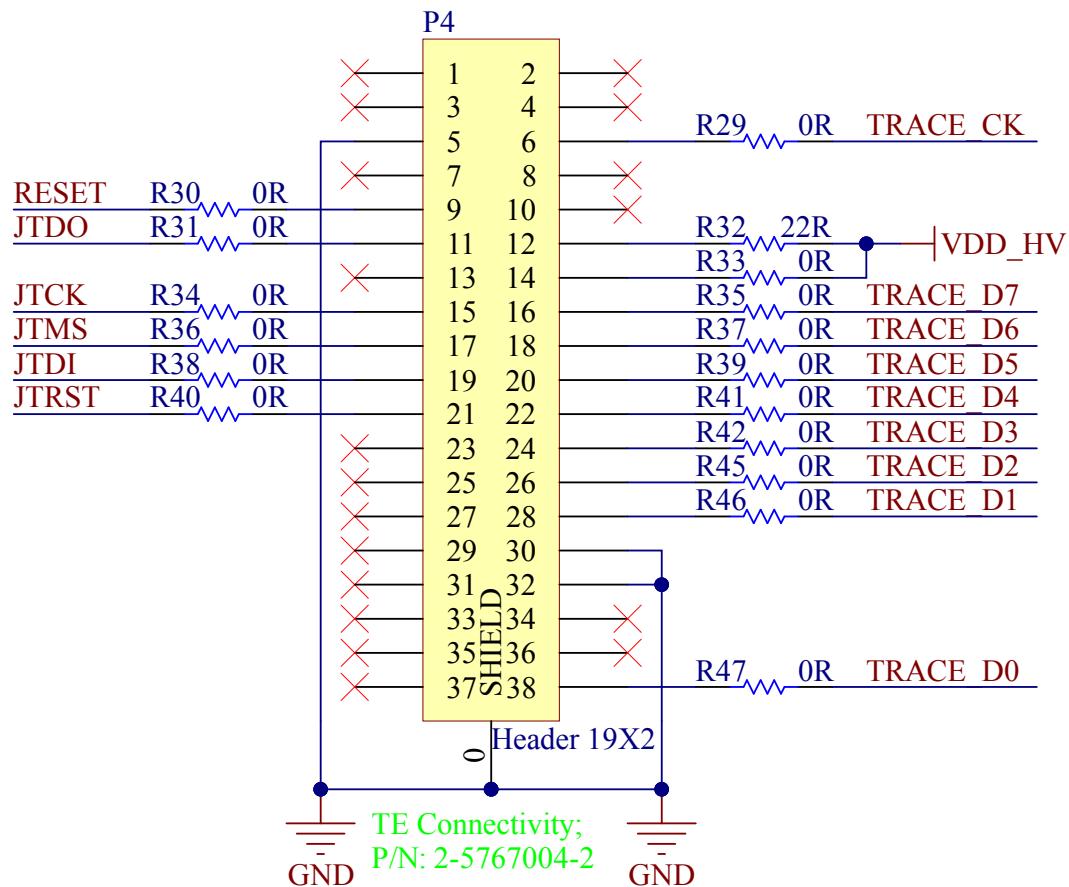
The following table shows the 2x19 header connector pinout:

Table 42. Nexus 2x19 pins connector pinout

Pin number	Signal
1	Not connected
2	Not connected
3	Not connected
4	Not connected
5	GND
6	TRACE_CK
7	Not connected
8	Not connected
9	RESET
10	Not connected
11	JTDO
12	VDD_HV
13	Not connected
14	VDD_HV
15	JTCK
16	TRACE_D7
17	JTMS
18	TRACE_D6
19	JTDI
20	TRACE_D5
21	JTRST
22	TRACE_D4
23	Not connected
24	TRACE_D3
25	Not connected
26	TRACE_D2
27	Not connected
28	TRACE_D1
29	Not connected
30	GND
31	Not connected
32	GND
33	Not connected
34	Not connected
35	Not connected
36	Not connected
37	Not connected
38	TRACE_D0

6.9 User AREA

There is a user area on the SR5E1-EVBE7000P rev. C evaluation board, consisting of the following features:

- 2 LEDs
- 2 pushbuttons

There are two active low user LEDs: LD9 and LD10. The LED inputs are pulled to 3.3 V through 680 Ω resistors.

There are two active high pushbuttons: PB_1 and PB_2 which will drive VDD_HV onto the respective test point when pressed. The switch outputs are pulled to GND via 10 kΩ.

The following figure shows the user area schema:

Figure 14. Nexus 2x19 pins connector pinout
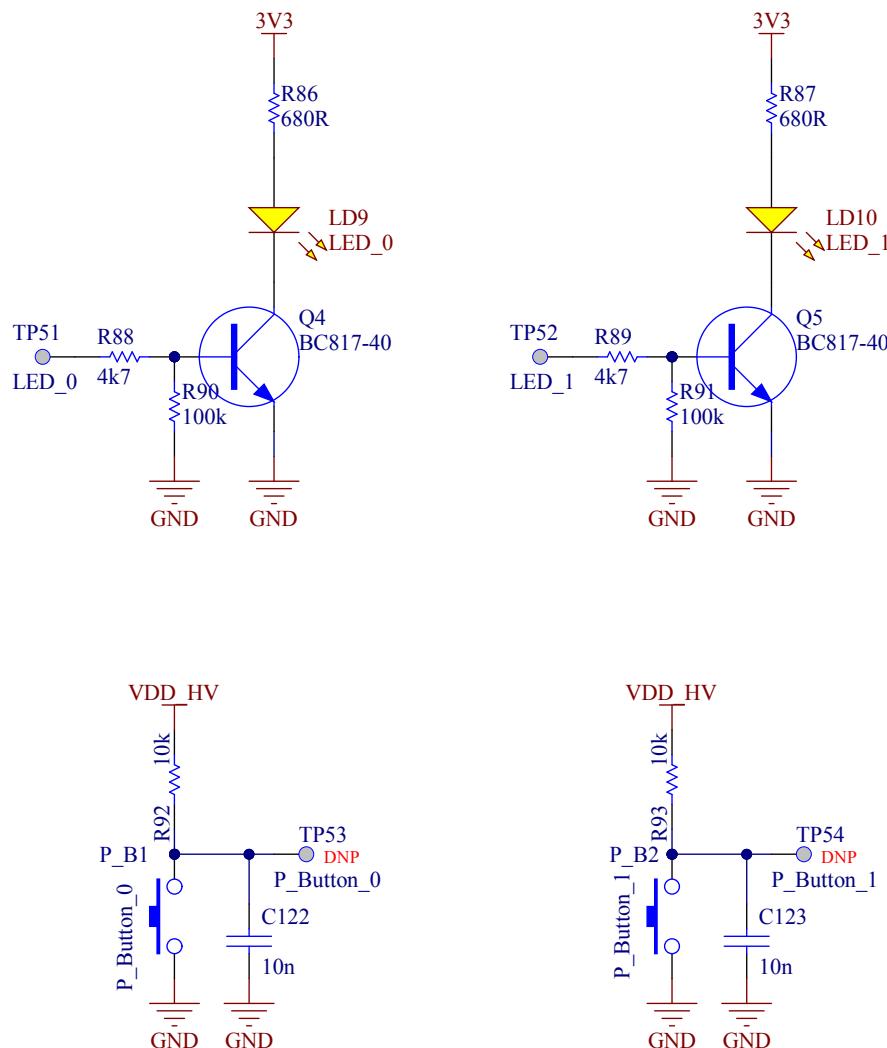
6.10 Test points

Several test points of different shape and functionality is scattered around the SR5E1-EVBE7000P rev. C evaluation board to allow easy access to MCU and reference signals. This chapter summarizes and describes the available test points. Test points are listed and detailed in the following table:

Table 43. Test points

Test point	Description	Position
TP1	VDD_LV	Top layer - A2[1]
TP2	VDD_LV_S	Top layer - B2[1]
TP3	SMPS_PMOS	Top layer - C2[1]
TP4	SMPS_VLX	Top layer - C1[1]
TP5	VDD_LV_SMPS	Top layer - C1[1]
TP6	SMPS_NMOS	Top layer - C2[1]
TP7	VDD_HV	Top layer - C2[1]
TP8	TRACE_CK	Top layer - C3[1]
TP9	TRACE_D0	Top layer - C3[1]
TP10	TRACE_D1	Top layer - C3[1]
TP11	TRACE_D2	Top layer - C3[1]
TP12	TRACE_D3	Top layer - C3[1]
TP13	TRACE_D4	Top layer - C3[1]
TP14	TRACE_D5	Top layer - C3[1]
TP15	TRACE_D6	Top layer - C3[1]
TP16	TRACE_D7	Top layer - C3[1]
TP17	RESET	Top layer - B4[1]
TP18	SAR1_GND	Top layer - B1[1]
TP19	TIM1_GND	Top layer - A1[1]
TP20	SAR2_GND	Top layer - B1[1]
TP21	TIM2_GND	Top layer - D1[1]
TP22	SAR3_GND	Top layer - B1[1]
TP23	TIM3_GND	Top layer - D1[1]
TP24	SAR4_GND	Top layer - A1[1]
TP25	TIM8_GND	Top layer - D1[1]
TP26	SAR5_GND	Top layer - A1[1]
TP27	SAR_CAL_1	Top layer - B1[1]
TP28	TIM15_GND	Top layer - C1[1]
TP29	SAR_CAL2	Top layer - B1[1]
TP30	SDADC_GND	Top layer - C1[1]
TP31	TIM16_GND	Top layer - C1[1]
TP32	DACx_GND	Top layer - A1[1]
TP33	DSPI_1_GND	Top layer - A2[1]
TP34	HRTIM1_GND	Top layer - B2[1]

Test point	Description	Position
TP35	DSPI_2_GND	Top layer - C3[1]
TP36	DSPI_4_GND	Top layer - C3[1]
TP37	CAN_GND	Top layer - D1[1]
TP38	HRTIM2_GND	Top layer - B3[1]
TP39	UART3_GND	Top layer - C1[1]
TP40	3V3	Top layer - A3[1]
TP41	Vbatt	Top layer - A4[1]
TP42	Vbatt	Top layer - A4[1]
TP43	5V	Top layer - A3[1]
TP44	CAN_1_L	Top layer - D4[1]
TP45	CAN_1_STBY	Top layer - D3[1]
TP46	CAN_1_H	Top layer - D4[1]
TP47	CAN_2_L	Top layer - C4[1]
TP48	CAN_2_STBY	Top layer - C3[1]
TP49	CAN_2_H	Top layer - C4[1]
TP50	3V3_USB	Top layer - B4[1]
TP51	LED_0	Top layer - D4[1]
TP52	LED_1	Top layer - D4[1]
TP53	P_Button_0	Top layer - D4[1]
TP54	P_Button_1	Top layer - D3[1]
TP55	AIN_POS	Top layer - A1[1]
TP56	AIN_NEG	Top layer - A1[1]

1. Refer to the *Figure 15. SR5E1-EVBE7000P rev. C - top layer*.

7 Layout overview

Figure 15. SR5E1-EVBE7000P rev. C - top layer
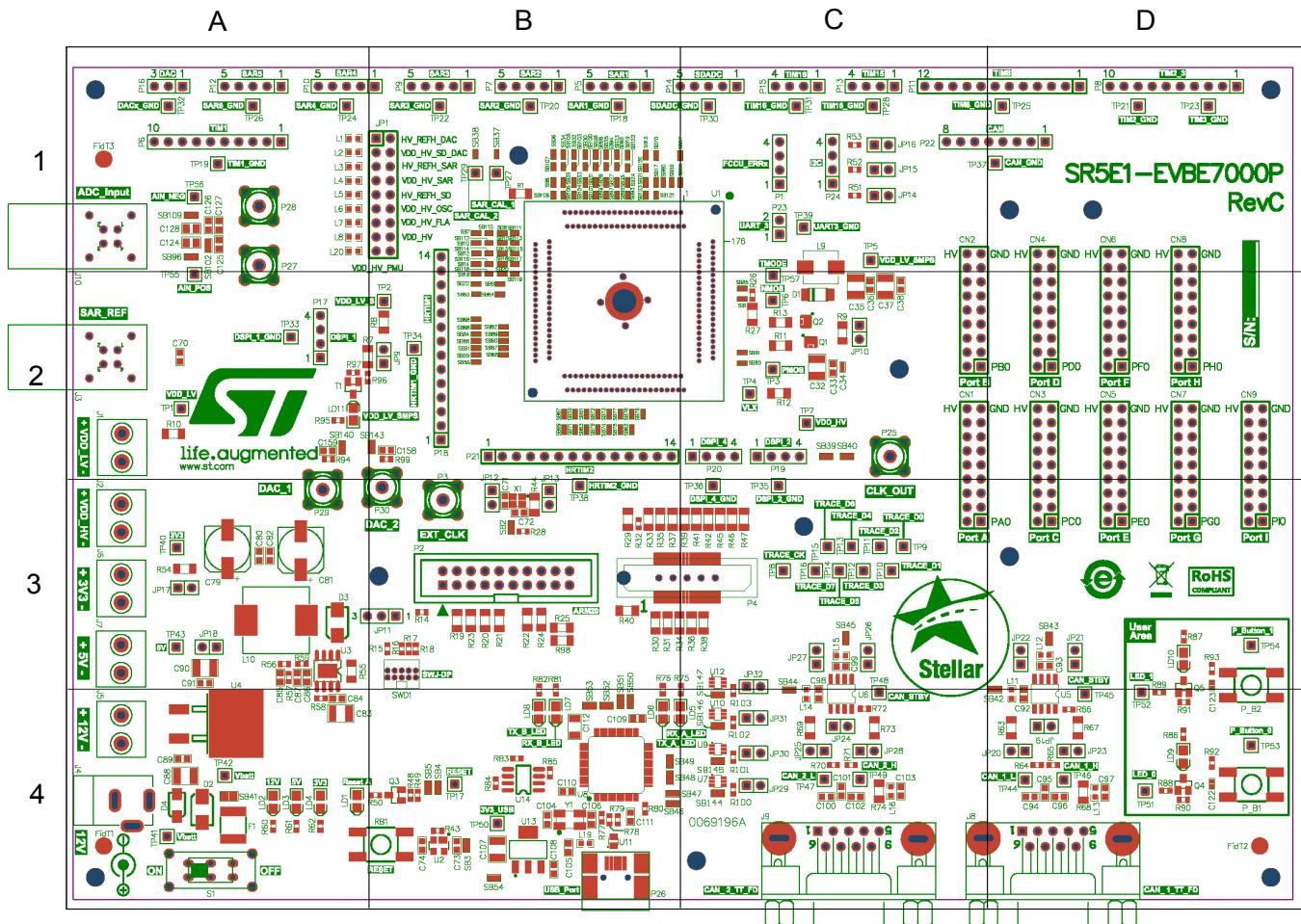
Figure 16. SR5E1-EVBE7000P rev. C - bottom layer

8 BOM
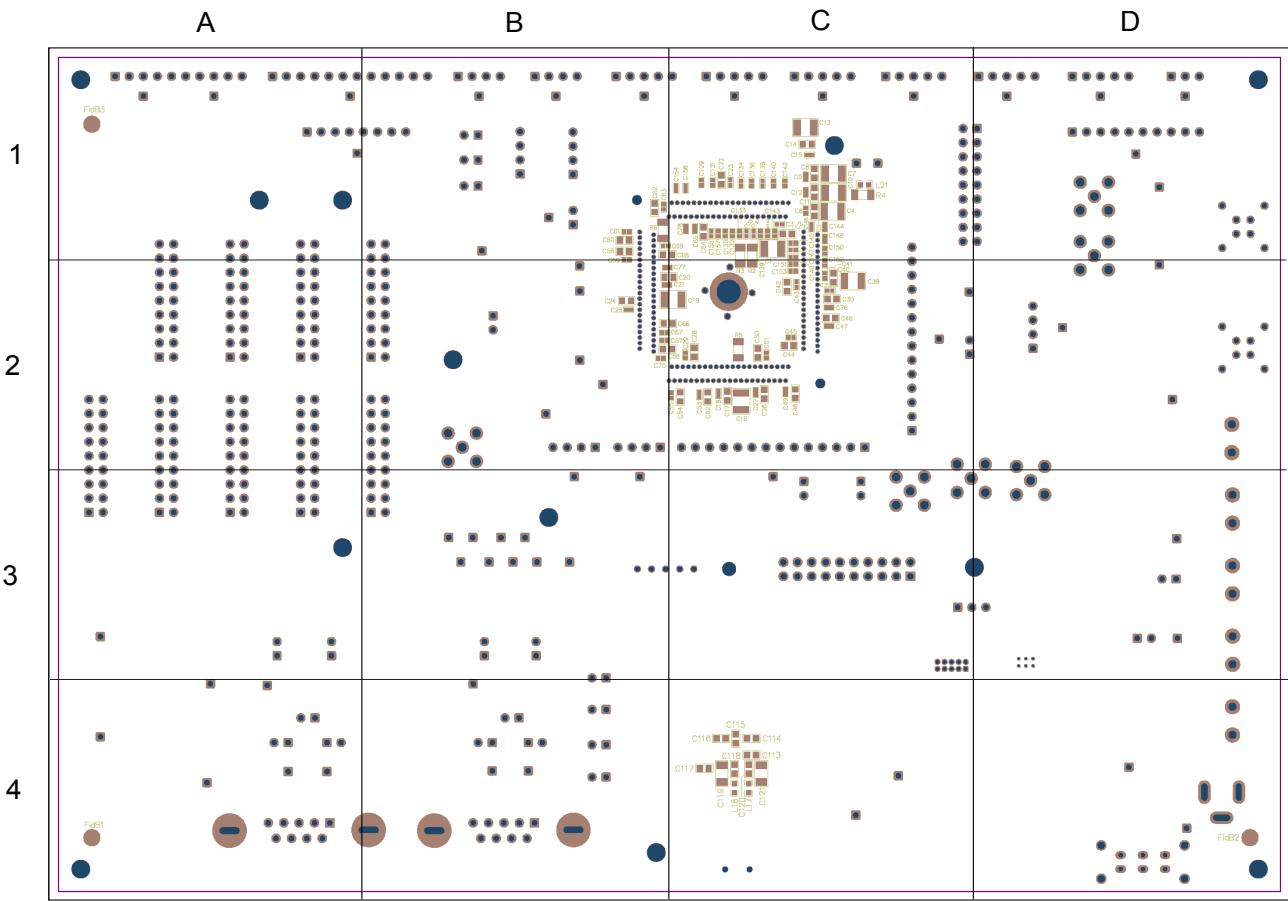
Table 44. **Bill of material**

#	Item	Quantity	Reference	Value	Footprint	Description	Manufacturer	Manufacturer part number
1	C1, C4, C7, C10, C13, C16, C19, C32, C35, C37, C39, C83, C88, C90, C107	15	CAP_SMD_X7R	10 µF	C1210-B	SMD Multilayer ceramic cap., KEMET - C1206C106K3RACAUTO - Keramik vielschichtkondensator, SMD, AEC-Q200, 10 µF, 25 V, 1206 [Metrisch 3216], ± 10%, X7R	KEMET	C1206C106K3RACAUTO
2	C2, C5, C8, C11, C14, C17, C20, C22, C24, C26, C28, C30, C40, C42, C44, C46, C48, C50, C52, C54, C56, C58, C60, C62, C64, C66, C68	27	CAP_SMD_X7R	47 nF	C0603-B	SMD multilayer ceramic cap. automotive	Murata	
3	C3, C6, C9, C12, C15, C18, C21, C23, C25, C27, C29, C31, C34, C41, C43, C45, C47, C49, C51, C53, C55, C57, C59, C61, C63, C65, C67, C69, C75, C76, C77, C78, C122, C123, C129, C130, C131, C132, C133, C134, C135, C136, C137, C138, C139, C140, C141, C142, C143, C144, C145, C146, C147, C148, C149, C150, C151, C152, C153, C154, C155, C156, C157	63	CAP_SMD_X7R	10 nF	C0402-B	SMD multilayer ceramic cap. automotive	Murata	

#	Item	Quantity	Reference	Value	Footprint	Description	Manufacturer	Manufacturer part number
4	C33, C36, C70, C73, C74, C80, C82, C89, C91, C92, C93, C98, C99, C105, C108, C109, C110, C111, C113, C114, C115, C116, C117, C118, C120	25	CAP_SMD_X7R	100 nF	C0603-B	SMD multilayer ceramic cap. automotive, TDK - CGA3E2X7R1H104K080AA. - CERAMIC CAPACITOR, 0.1UF, 50V, X7R, 0603, FULL REEL	TDK	CGA3E2X7R1H104K080AA
5	C38, C86, C97, C103, C125, C126, C127	7	CAP_SMD_X7R	1 nF	C0603-B	SMD multilayer ceramic cap. automotive, capacitor X7R, SMD multilayer ceramic cap.	Murata, KEMET	C0603S102J5RACAUTO
6	C71, C72	2	CAP_SMD_X7R	8 pF	C0603-B	SMD multilayer ceramic cap.	SAMSUNG	
7	C79, C81	2	Generic Cap. Pol.	100 µF	CAP. 8.3 X 10.2 - SMD	Polarized capacitor		
8	C84	1	CAP_SMD_X7R	220 nF	C0603-B	Capacitor X7R	KEMET	C0805F224M5RACAUTO7210
9	C85	1	CAP_SMD_X7R	22 nF	C0603-B	Capacitor X7R	KEMET	C0603S223K5RACAUTO
10	C87	1	CAP_SMD_X7R	82 nF	C0603-B	CAP CER 8200PF 50V X7R 0603 AUTO	KEMET	C0603Y822K5RACAUTO
11	C94, C96, C100, C102	4	CAP_SMD_X7R	47 pF	C0603-B	SMD multilayer ceramic cap.	AVX corporation	
12	C95, C101	2	CAP_SMD_X7R	4.7 nF	C0603-B	SMD multilayer ceramic cap. automotive	TDK	
13	C104, C106	2	CAP_SMD_X7R	18 pF	C0603-B	SMD multilayer ceramic cap.	TDK	
14	C112, C119, C121	3	CAP_SMD_X7R	4.7 µF	C1206-B	Capacitor X7R	TAIYO YUDEN	
15	C124, C128	2	CAP_SMD_X7R	1 µF	C0805-b	Multilayer ceramic capacitors MLCC - SMD/SMT 0805 25V 1.0uF X7R No solder-glue only	TDK	CGA4J3X7R1E105K125AD
16	C158	1	CAP_SMD_X7R	20 pF	C0603-B	Cap ceramic 20pF 50V C0G 5% SMD 0603 125C T/R	Kyocera AVX	06035A200JAT2A
17	CN1	1	CONN_HDR_9X2	Port A	HEADER 9X2	Male strip 9x2 poles straight gold plated	HARWIN	
18	CN2	1	CONN_HDR_9X2	Port B	HEADER 9X2	Male strip 9x2 poles straight gold plated	HARWIN	
19	CN3	1	CONN_HDR_9X2	Port C	HEADER 9X2	Male strip 9x2 poles straight gold plated	HARWIN	

#	Item	Quantity	Reference	Value	Footprint	Description	Manufacturer	Manufacturer part number
20	CN4	1	CONN_HDR_9X2	Port D	HEADER 9X2	Male strip 9x2 poles straight gold plated	HARWIN	
21	CN5	1	CONN_HDR_9X2	Port E	HEADER 9X2	Male strip 9x2 poles straight gold plated	HARWIN	
22	CN6	1	CONN_HDR_9X2	Port F	HEADER 9X2	Male strip 9x2 poles straight gold plated	HARWIN	
23	CN7	1	CONN_HDR_9X2	Port G	HEADER 9X2	Male strip 9x2 poles straight gold plated	HARWIN	
24	CN8	1	CONN_HDR_9X2	Port H	HEADER 9X2	Male strip 9x2 poles straight gold plated	HARWIN	
25	CN9	1	CONN_HDR_9X2	Port I	HEADER 9X2	Male strip 9x2 poles straight gold plated	HARWIN	
26	D1	1	Diode 10TQ035	PMEG3030EP	SOD-128	SMD 3A low Vf MEGA Schottky barrier rectifier	NXP Semiconductors	
27	D2	1	D Schottky	STPS340U	DO-214AA	Schottky diode	STMicroelectronics	
28	D3	1	D Schottky	STPS2L25U	DO-214AA	Rectificador Schottky, 25 V, 2 A, unico, DO-214AA (SMB), 2 pines, 450 mV	STMicroelectronics	
29	D4	1	D Schottky	SMAJ24A_DNP	DO-214AC	Schottky diode	STMicroelectronics	
30	F1	1	Fuse 2	2 A	2018 (5045)	PTC resettable fuse 0.8A(hold) 2A(trip) 16VDC 70A 1.5W 9s 0.13 Ω SMD Solder Pad 2018 T/R	Littelfuse	AHS080-2018-2
31	FidB1, FidB2, FidB3, FidT1, FidT2, FidT3	6	Fiducial	Fiducial	Fiducial 1 mm	Fiducial 1 mm		
32	J1, J2, J6, J7	4	ARK_2	ARK_2	CON2	Screw conn. tTerm., single row, 5.00 pitch, 9 depth, 12.6 height, AWG 14-26, 16A	WURTH	
33	J4	1	PJ202A	DC-10A	CON DC10A		CLIFF ELECTRONIC COMPONENTS	
34	J5	1	ARK_2	12 V	CON2	Screw conn. term., single row, 5.00 pitch, 9 depth, 12.6 height, AWG 14-26, 16A	WURTH	
35	J8	1	2BCONNECTPG00211	CAN_ 1_TT_FD	DB9M SLOT	Conn DB9 male 90°	MULTICOMP	
36	J9	1	2BCONNECTPG00211	CAN_ 2_TT_FD	DB9M SLOT	Conn DB9 male 90°	MULTICOMP	
37	JP1	1	HEADER 9X2	HEADER 9X2	HEADER 9X2	HEADER 9X2 PASSO 2,54MM		

#	Item	Quantity	Reference	Value	Footprint	Description	Manufacturer	Manufacturer part number
38	JP9, JP10, JP12, JP13, JP17, JP18, JP20, JP21, JP22, JP23, JP25, JP26, JP27, JP28, JP29, JP30, JP31, JP32	18	Jumper 2.54_Closed	Closed	SIP2	Male strip, single row, 2 poles, p = 2,54 mm (see mech parts) - closed	TE connectivity	
39	JP11	1	JUMP3	3 male pins (1-2)	SIP3	JUMP3		
40	JP14, JP15, JP16, JP19, JP24	5	Jumper 2.54_Open	Open	SIP2	Conn unshrouded header HDR 2 POS 2.54 mm solder ST thru-hole automotive carton	TE connectivity	826646-2
41	L1, L2, L3, L4, L5, L6, L7, L8, L11, L12, L14, L15, L17, L18, L19, L20	16	Inductor	60 Ω at 100 MHz	F0603	SMD multilayer ferrite	Wurth electronics	
42	L9	1	Inductor	10 µH	CLF6045NIT	Fixed inductors 10 uH AEC-Q200 (150C)	TDK	CLF6045T-100M-D
43	L10	1	Inductor	27 µH	WE-PD	WURTH ELEKTRONIK 744771127 surface mount power inductor, WE-PD series, 27 H, 2.97 A, 3.55 A, Shielded, 0.051 Ω	Wurth	744771127
44	L13, L16	2	Inductor	60 Ω at 100 MHz (DNP)	F0603	SMD multilayer ferrite	Wurth Electronics	
45	LD1	1	LED2	Reset A	0805 LED	SMD led diode red - Standard bright	Kingbright	
46	LD2	1	LED2	12 V	0805 LED	Led green clear chip smd	Kingbright	APT2012SGC
47	LD3	1	LED2	5 V	0805 LED	Led green clear chip smd	Kingbright	APT2012SGC
48	LD4	1	LED2	3.3 V	0805 LED	Led green clear chip smd	Kingbright	APT2012SGC
49	LD5	1	LED2	RX_A_LED	0805 LED	SMD micro LED®	Kingbright	
50	LD6	1	LED2	TX_A_LED	0805 LED	SMD micro LED®	Kingbright	
51	LD7	1	LED2	RX_B_LED	0805 LED	SMD micro LED®	Kingbright	
52	LD8	1	LED2	TX_B_LED	0805 LED	SMD micro LED®	Kingbright	
53	LD9	1	LED2	LED_0	0805 LED	Led orange clear chip smd	Kingbright	APT2012SECK
54	LD10	1	LED2	LED_1	0805 LED	Led orange clear chip smd	Kingbright	APT2012SECK

#	Item	Quantity	Reference	Value	Footprint	Description	Manufacturer	Manufacturer part number
55	LD11	1	LED2	VDD_LV_SMPS	0805 LED	SMD led diode red - standard bright	Kingbright	
56	P1	1	Header 4	FCCU_ERRx	SIP4	Conn header vert 4POS 2.54MM	TE connectivity	826646-4
57	P2	1	Header 10X2	ARM20	IDC20	Conn flat male 20 pins, straight low profile	AMPHENOL	
58	P3, P25, P27, P28, P29	5	2BCONCOAXPG00008	SMA	SMA DRITTO - 200X200	Female RF SMA 180°	TE connectivity	
59	P4	1	Header 19X2	Header 19X2	MICTOR MALE 767004-2	Conn high speed fine pitch connector RCP 38 POS 2.54 mm/0.64 mm solder ST thru-hole/SMD tube	AMP - TE connectivity	2-5767004-2
60	P5	1	Header 5	SAR1	SIP5	Conn unshrouded header HDR 5 POS 2.54 mm solder ST thru-hole	TE connectivity	826646-5
61	P6	1	Header 10	TIM1	SIP10	10P AMPMODU II STIFT LEI	TE connectivity	1-826646-0
62	P7	1	Header 5	SAR2	SIP5	Conn unshrouded header HDR 5 POS 2.54 mm solder ST thru-hole	TE connectivity	826646-5
63	P8	1	Header 10	TIM2_3	SIP10	10P AMPMODU II STIFT LEI	TE connectivity	1-826646-0
64	P9	1	Header 5	SAR3	SIP5	Conn unshrouded header HDR 5 POS 2.54 mm solder ST thru-hole	TE connectivity	826646-5
65	P10	1	Header 5	SAR4	SIP5	Conn unshrouded header HDR 5 POS 2.54 mm solder ST thru-hole	TE connectivity	826646-5
66	P11	1	Header 12	TIM8	SIP12	Header, 12-Pin		
67	P12	1	Header 5	SAR5	SIP5	Conn unshrouded header HDR 5 POS 2.54 mm solder ST thru-hole	TE connectivity	826646-5
68	P13	1	Header 4	TIM15	SIP4	CONN HEADER VERT 4POS 2.54MM	TE connectivity	826646-4
69	P14	1	Header 5	SDADC	SIP5	Conn unshrouded header HDR 5 POS 2.54 mm solder ST thru-hole	TE connectivity	826646-5
70	P15	1	Header 4	TIM16	SIP4	CONN HEADER VERT 4POS 2.54MM	TE connectivity	826646-4
71	P16	1	Header 3	DAC	SIP3	Header, 3-Pin		

#	Item	Quantity	Reference	Value	Footprint	Description	Manufacturer	Manufacturer part number
72	P17	1	Header 4	DSPI_1	SIP4	CONN HEADER VERT 4POS 2.54MM	TE connectivity	826646-4
73	P18	1	Header 14	HRTIM1	SIP14	CONN HEADER VERT 14POS .100 TIN	TE connectivity	4-644695-4
74	P19	1	Header 4	DSPI_2	SIP4	CONN HEADER VERT 4POS 2.54MM	TE connectivity	826646-4
75	P20	1	Header 4	DSPI_4	SIP4	CONN HEADER VERT 4POS 2.54MM	TE connectivity	826646-4
76	P21	1	Header 14	HRTIM2	SIP14	CONN HEADER VERT 14POS .100 TIN	TE connectivity	4-644695-4
77	P22	1	Header 8	CAN	SIP8	TE connectivity AMPMODU series, 2.54 mm pitch 8 way 1 row straight PCB header, solder termination, 3A	TE connectivity	826646-8
78	P23	1	Header 2	UART_3	SIP2	Conn unshrouded header HDR 2 POS 2.54 mm solder ST thru-hole automotive carton	TE connectivity	826646-2
79	P24	1	Header 4	I2C	SIP4	CONN HEADER VERT 4POS 2.54MM	TE connectivity	826646-4
80	P26	1	USB_Port	USB_Port	MINI USB MOLEX	MOLEX connector SMT, right angle, USB MINI-B, 5pin	Molex	
81	P_B1	1	KTH55150KA	P_Button_0	KTH55150KA	SWITCH, TACTILE, SMD, h = 5 mm	Kanghong Electronic	
82	P_B2	1	KTH55150KA	P_Button_1	KTH55150KA	SWITCH, TACTILE, SMD, h = 5 mm	Kanghong Electronic	
83	Q3	1	PNP	BC807	SOT-23-RS	ON SEMICONDUCTOR - BC807-25LT1G - bipolar (BJT) single transistor, PNP, -45 V, 100 MHz, 225 mW, -500 mA, 160 hFE	ON Semiconductor	BC807-25LT1G
84	Q4, Q5	2	BC817-40	BC817-40	SOT-23-RS	Bipolar (BJT) single transistor, NPN, 45 V, 170 MHz, 300 mW, 500 mA, 250	MULTICOMP	

#	Item	Quantity	Reference	Value	Footprint	Description	Manufacturer	Manufacturer part number
85	R1, R2, R3, R4, R5, R6, R8, R10, R11, R12, R13, R19, R20, R21, R22, R23, R24, R25, R27, R29, R30, R31, R33, R34, R35, R36, R37, R38, R39, R40, R41, R42, R44, R45, R46, R47, R55, R63, R67, R68, R69, R73, R74, R98	44	Resistor_SMD	0 Ω	R1206-RS	SMD resistor, SMD resistor automotive	Yageo, VISHAY [no value]	
86	R7, R9, R54	3	Resistor_SMD	0 Ω (DNP)	R1206-RS	SMD resistor automotive	VISHAY	
87	R14, R43, R51, R52, R53, R92, R93	7	Resistor_SMD	10 kΩ	R0603-RS	SMD resistor	Yageo	
88	R15, R16, R17, R18	4	Resistor_SMD	100 kΩ (DNP)	R0603-RS	SMD resistor	Yageo	
89	R26	1	Resistor_SMD	10 kΩ (DNP)	R0603-RS	SMD resistor	Yageo	
90	R28, R94	2	Resistor_SMD	50 Ω	R0603-RS	SMD resistor automotive	Vishay Dale	
91	R32	1	Resistor_SMD	22 Ω	R0603-RS	Res thick film 0603 22 Ohm 1% 0.1W(1/10W) ±100 ppm/C Pad SMD T/R	Yageo	RC0603FR-0722RL
92	R48, R90, R91, R97	4	Resistor_SMD	100 kΩ	R0603-RS	Res thick film 1.6 x 0.8 mm 100 K Ω 1% 0.1W(1/10W) 100 ppm/ C molded SMD paper T/R, SMD resistor	Yageo, TE connectivity	RC0603FR-07100KL
93	R49, R96	2	Resistor_SMD	1 kΩ	R0603-RS	RES SMD 1K Ω 1% 1/10W 0603, SMD resistor	Yageo	RC0603FR-071KL
94	R50	1	Resistor_SMD	470 Ω	R0603-RS	SMD resistor	Yageo	
95	R56, R75, R76, R81, R82	5	Resistor_SMD	220 Ω	R0603-RS	THICK FILM RESISTOR, 220 Ω, 100 mW, 1%; product range:RC series; resistance: 220 Ω; power rating:100 mW; resistance tolerance: 1%; voltage rating: 50 V; resistor case style: 0603 [1608 metric]; packaging: cut tape; MSL:-; No. of pins:2 ; RoHS compliant: yes, SMD resistor automotive	Yageo, Panasonic	RC0603FR-07220RL

#	Item	Quantity	Reference	Value	Footprint	Description	Manufacturer	Manufacturer part number
96	R57, R83, R84, R88, R89	5	Resistor_SMD	4.7 kΩ	R0603-RS	RES SMD 4.7K Ω 1% 1/10W 0603, SMD resistor	Yageo	RC0603FR-074K7L
97	R58	1	Resistor_SMD	1.05 kΩ	R0603-RS	RC series 0603 0.1 W 1.05 kΩ 1% ±100 ppm/°C SMT thick film chip resistor	Yageo	RC0603FR-071K05L
98	R59	1	Resistor_SMD	1.3 kΩ	R0603-RS	RES SMD 1.3K Ω 1% 1/10W 0603	Yageo	RC0603FR-071K3L
99	R60	1	Resistor_SMD	5.1 kΩ	R0603-RS	RES SMD 5.1K Ω 1% 1/10W 0603	Yageo	RC0603FR-075K1L
100	R61, R95	2	Resistor_SMD	1.5 kΩ	R0603-RS	Res thick film 0603 1.5K Ω 1% 1/5W ±200 ppm/°C molded SMD, SMD resistor	Yageo	RC0603FR-7W1K5L
101	R62, R86, R87	3	Resistor_SMD	680 Ω	R0603-RS	YAGEO - RC0603FR-07680RL - SMD chip resistor, 0603 [1608 metric], 680 Ω, RC series, 50 V, thick film, 100 mW, SMD resistor	Yageo	RC0603FR-07680RL
102	R64, R65, R70, R71	4	Resistor_SMD	60.4 Ω	R0603-RS	SMD resistor	Yageo	
103	R66, R72	2	Resistor_SMD	47 kΩ	R0603-RS	SMD resistor	Yageo	
104	R77	1	Resistor_SMD	12 kΩ	R0603-RS	SMD resistor	MULTICOMP	
105	R78, R79	2	Resistor_SMD	10 Ω	R0603-RS	SMD resistor automotive	Yageo	
106	R80	1	Resistor_SMD	15 kΩ	R0603-RS	SMD resistor	Yageo	
107	R85	1	Resistor_SMD	2.2 kΩ	R0603-RS	SMD resistor automotive	VISHAY	
108	RB1	1	KTH55150KA	RESET	KTH55150KA	SWITCH, TACTILE, SMD, h = 5 mm	Kanghong Electronic	
109	S1	1	SPDT - SLITTA	SPDT - SLITTA	SWITCH C.S. MFP211N	SPDT - SLITTA p. 4,00 mm	Knitter Switch	
110	SB1, SB6, SB7, SB8, SB9, SB10, SB11, SB12, SB13, SB14, SB15, SB16, SB17, SB18, SB19, SB20, SB21, SB22, SB23, SB24, SB25, SB26, SB27, SB28, SB29,	66	Circuit Breaker_Closed	Closed	JUMP A SALDARE - 0402	Circuit breaker	Yageo	

#	Item	Quantity	Reference	Value	Footprint	Description	Manufacturer	Manufacturer part number
	SB30, SB31, SB32, SB33, SB34, SB35, SB36, SB37, SB38, SB55, SB56, SB59, SB61, SB62, SB63, SB64, SB65, SB67, SB68, SB69, SB71, SB72, SB73, SB74, SB75, SB76, SB77, SB78, SB79, SB80, SB81, SB82, SB83, SB84, SB85, SB86, SB87, SB88, SB89, SB90, SB91							
111	SB2, SB40, SB102, SB140, SB143	5	Circuit Breaker_Open	Open	JUMP A SALDARE - 0603	Circuit breaker	Yageo	
112	SB3, SB4, SB5, SB39, SB42, SB43, SB44, SB45, SB46, SB47, SB48, SB49, SB50, SB51, SB52, SB53, SB54, SB96, SB109	19	Circuit Breaker_Closed	Closed	JUMP A SALDARE - 0603	Circuit breaker	Yageo	
113	SB41	1	Circuit Breaker_Closed	Closed	JUMP A SALDARE - 0805	Circuit breaker	Yageo	
114	SB57, SB58, SB60, SB66, SB70	5	Circuit Breaker_Open	Open	JUMP A SALDARE - 0402	Circuit breaker	Yageo	

#	Item	Quantity	Reference	Value	Footprint	Description	Manufacturer	Manufacturer part number
115	SB92, SB93, SB94, SB95, SB97, SB98, SB99, SB100, SB101, SB103, SB104, SB105, SB106, SB107, SB108, SB110, SB111, SB112, SB113, SB114, SB115, SB116, SB117, SB118, SB119, SB120, SB121, SB122, SB123	29	Micro Solder Jumper 3p	Micro Solder Jumper 3p	Triple solder jump - micro	Micro solder jumper - three poles		
116	SWD1	1	Header 5X2	SWJ-DP	FTSH-105-01-L-D-K	Debug Connector 5x2 1.27 mm	Samtec	
117	T1	1	NPN	BC848	SOT-23-RS	NPN bipolar transistor	ON Semiconductor	
118	TP1	1	Test Point	VDD_LV	SIP1	PCB ring test point - white (drill 1.32 mm)		
119	TP2	1	Test Point	VDD_LV_S	SIP1	PCB ring test point - white (drill 1.32 mm)		
120	TP3	1	Test Point	PMOS	SIP1	PCB ring test point - white (drill 1.32 mm)		
121	TP4	1	Test Point	VLX	SIP1	PCB ring test point - white (drill 1.32 mm)		
122	TP5	1	Test Point	VDD_LV_SMPS	SIP1	PCB ring test point - white (drill 1.32 mm)		
123	TP6	1	Test Point	NMOS	SIP1	PCB ring test point - white (drill 1.32 mm)		
124	TP7	1	Test Point	VDD_HV	SIP1	PCB ring test point - white (drill 1.32 mm)		
125	TP8	1	Test Point	TRACE_CK	SIP1	PCB ring test point - white (drill 1.32 mm)		
126	TP9	1	Test Point	TRACE_D0	SIP1	PCB ring test point - white (drill 1.32 mm)		
127	TP10	1	Test Point	TRACE_D1	SIP1	PCB ring test point - white (drill 1.32 mm)		
128	TP11	1	Test Point	TRACE_D2	SIP1	PCB ring test point - white (drill 1.32 mm)		

#	Item	Quantity	Reference	Value	Footprint	Description	Manufacturer	Manufacturer part number
129	TP12	1	Test Point	TRACE_D3	SIP1	PCB ring test point - white (drill 1.32 mm)		
130	TP13	1	Test Point	TRACE_D4	SIP1	PCB ring test point - white (drill 1.32 mm)		
131	TP14	1	Test Point	TRACE_D5	SIP1	PCB ring test point - white (drill 1.32 mm)		
132	TP15	1	Test Point	TRACE_D6	SIP1	PCB ring test point - white (drill 1.32 mm)		
133	TP16	1	Test Point	TRACE_D7	SIP1	PCB ring test point - white (drill 1.32 mm)		
134	TP17	1	Test Point	RESET	SIP1	PCB ring test point - white (drill 1.32 mm)		
135	TP18	1	Test Point	SAR1_GND	SIP1	PCB ring test point - white (drill 1.32 mm)		
136	TP19	1	Test Point	TIM1_GND	SIP1	PCB ring test point - white (drill 1.32 mm)		
137	TP20	1	Test Point	SAR2_GND	SIP1	PCB ring test point - white (drill 1.32 mm)		
138	TP21	1	Test Point	TIM2_GND	SIP1	PCB ring test point - white (drill 1.32 mm)		
139	TP22	1	Test Point	SAR3_GND	SIP1	PCB ring test point - white (drill 1.32 mm)		
140	TP23	1	Test Point	TIM3_GND	SIP1	PCB ring test point - white (drill 1.32 mm)		
141	TP24	1	Test Point	SAR4_GND	SIP1	PCB ring test point - white (drill 1.32 mm)		
142	TP25	1	Test Point	TIM8_GND	SIP1	PCB ring test point - white (drill 1.32 mm)		
143	TP26	1	Test Point	SAR5_GND	SIP1	PCB ring test point - white (drill 1.32 mm)		
144	TP27	1	Test Point	SAR_CAL_1	SIP1	PCB ring test point - white (drill 1.32 mm)		
145	TP28	1	Test Point	TIM15_GND	SIP1	PCB ring test point - white (drill 1.32 mm)		
146	TP29	1	Test Point	SAR_CAL_2	SIP1	PCB ring test point - white (drill 1.32 mm)		
147	TP30	1	Test Point	SDADC_GND	SIP1	PCB ring test point - white (drill 1.32 mm)		

#	Item	Quantity	Reference	Value	Footprint	Description	Manufacturer	Manufacturer part number
148	TP31	1	Test Point	TIM16_GND	SIP1	PCB ring test point - white (drill 1.32 mm)		
149	TP32	1	Test Point	DACx_GND	SIP1	PCB ring test point - white (drill 1.32 mm)		
150	TP33	1	Test Point	DSPI_1_GND	SIP1	PCB ring test point - white (drill 1.32 mm)		
151	TP34	1	Test Point	HRTIM1_GND	SIP1	PCB ring test point - white (drill 1.32 mm)		
152	TP35	1	Test Point	DSPI_2_GND	SIP1	PCB ring test point - white (drill 1.32 mm)		
153	TP36	1	Test Point	DSPI_4_GND	SIP1	PCB ring test point - white (drill 1.32 mm)		
154	TP37	1	Test Point	CAN_GND	SIP1	PCB ring test point - white (drill 1.32 mm)		
155	TP38	1	Test Point	HRTIM2_GND	SIP1	PCB ring test point - white (drill 1.32 mm)		
156	TP39	1	Test Point	UART3_GND	SIP1	PCB ring test point - white (drill 1.32 mm)		
157	TP40	1	Test Point	3.3 V	SIP1	PCB ring test point - white (drill 1.32 mm)		
158	TP41, TP42	2	Test Point	Vbatt	SIP1	PCB ring test point - white (drill 1.32 mm)		
159	TP43	1	Test Point	5 V	SIP1	PCB ring test point - red (drill 1.32 mm)		
160	TP44	1	Test Point	CAN_1_L	SIP1	PCB ring test point - white (drill 1.32 mm)		
161	TP45, TP48	2	Test Point	CAN_STBY	SIP1	PCB ring test point - white (drill 1.32 mm)		
162	TP46	1	Test Point	CAN_1_H	SIP1	PCB ring test point - white (drill 1.32 mm)		
163	TP47	1	Test Point	CAN_2_L	SIP1	PCB ring test point - white (drill 1.32 mm)		
164	TP49	1	Test Point	CAN_2_H	SIP1	PCB ring test point - white (drill 1.32 mm)		
165	TP50	1	Test Point	3.3 V (USB)	SIP1	PCB ring test point - red (drill 1.32 mm)		
166	TP51	1	Test Point	LED_0	SIP1	PCB ring test point - white (drill 1.32 mm)		

#	Item	Quantity	Reference	Value	Footprint	Description	Manufacturer	Manufacturer part number
167	TP52	1	Test Point	LED_1	SIP1	PCB ring test point - white (drill 1.32 mm)		
168	TP53	1	Test Point	P_Button_0	SIP1	PCB ring test point - white (drill 1.32 mm)		
169	TP54	1	Test Point	P_Button_1	SIP1	PCB ring test point - white (drill 1.32 mm)		
170	TP55	1	Test Point	AIN_POS	SIP1	PCB ring test point - white (drill 1.32 mm)		
171	TP56	1	Test Point	AIN_NEG	SIP1	PCB ring test point - white (drill 1.32 mm)		
172	U1	1	Stellar E1_176	Stellar E1-176	OTQ-176SG-0.5-016-00			
173	U2	1	STM6315RDW13F	STM6315SDW13F	SOT-143	STMicroelectronics - STM6315SDW13F - reset circuit, active-low, open-drain, 1 V to 5.5 V, 2.93 V threshold, 1 monitor, SOT-143-4	STMicroelectronics	STM6315SDW13F
174	U3	1	A7986A	A7986A	HSOP-8	DC-DC switching buck (step down) regulator, adjustable, 3A, HSOP-8	STMicroelectronics	
175	U4	1	LD1086D2T50TR	LD1086D2T50TR	D2PAK	LDO regulator pos 5V 1.5A 3-Pin(2+Tab) D2PAK T/R	STMicroelectronics	LD1086D2T50TR
176	U7, U9, U10, U12	4	SN74LVC1T45	SN74LVC1T45	SC-70	IC SMD single-bit dual-supply bus transceiver SC-70-6	Texas Instruments	
177	U8	1	FTDI2232	FT2232HL	QFP64 - SMALL PADS	IC FTDI SMD USB HS DUAL UART/FIFO LQFP64	FTDI	
178	U11	1	USBLC6-2P6	USBLC6-2P6	SOT-666	USBLC6-2P6	STMicroelectronics	
179	U13	1	LD1117S33TR	LD1117S33TR	SOT223	Volt. reg. low drop out lin. 3.3 V SOT223	STMicroelectronics	
180	U14	1	M93S46RMN6	M93S46-WMN6P	SO-8	1K (x16) serial microwire bus EEPROM with block protection	STMicroelectronics	
181	X1	1	Crystal 4Pin	40 MHz	ECX-2236Q	SMD quartz ECS	ECS International	
182	Y1	1	7B-12.000MAAJ-T	7B-12.000MAAJ-T	7B-12.000MAAJ-T	TXC - 7B-12.000MAAJ-T - XTAL, 12.000MHZ, 18PF, SMD, 5,0X3,2	TXC	

#	Item	Quantity	Reference	Value	Footprint	Description	Manufacturer	Manufacturer part number
183	J3, J10	2	EPG.0B.304.HLN	EPG.0B.304.HLN	EPG.0B.304.HLN	Elbow receptacle for printed circuit (solder or screw fixing), key (G), 0B series, multipole type with 4 contacts		
184	U5, U6	2	MCP2542WFD-H/SN	MCP2542WFD-H/SN	SO-8 - NARROW	Can Fd transceiver / 8 Soic 3.90 Mm (.150In) tube		
185	Q1	1	PMPB100XPEAX	PMPB100XPEAX	DFN2020MD (SOT1220)			
186	Q2	1	PMPB55XNEAX	PMPB55XNEAX	DFN2020MD (SOT1220)			

Figure 17. Main
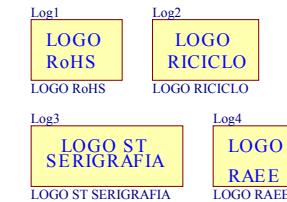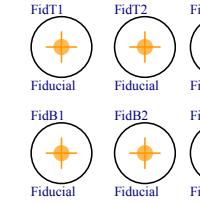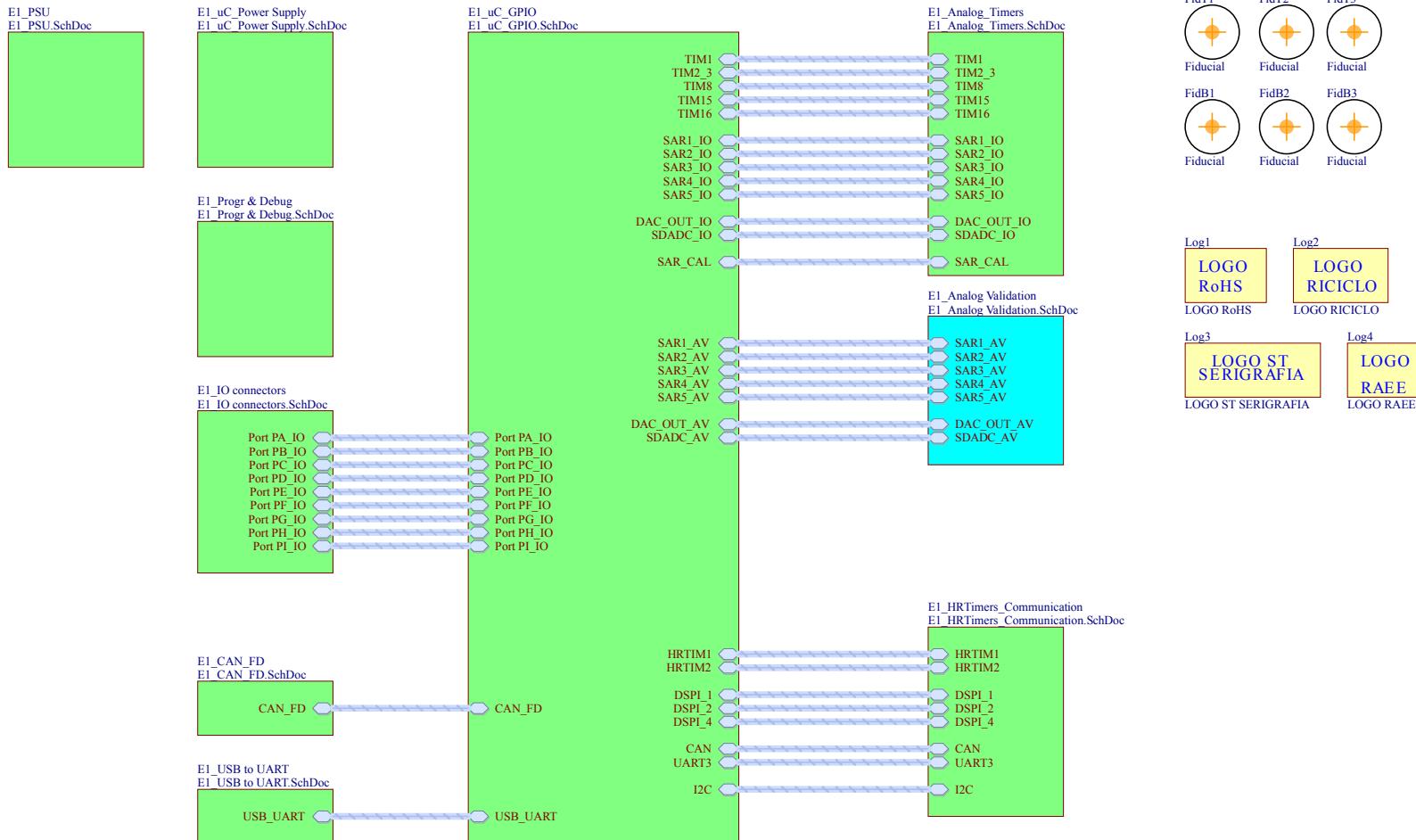
Figure 18. Power supply
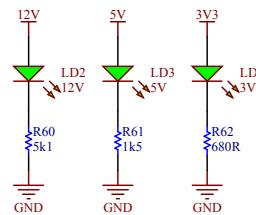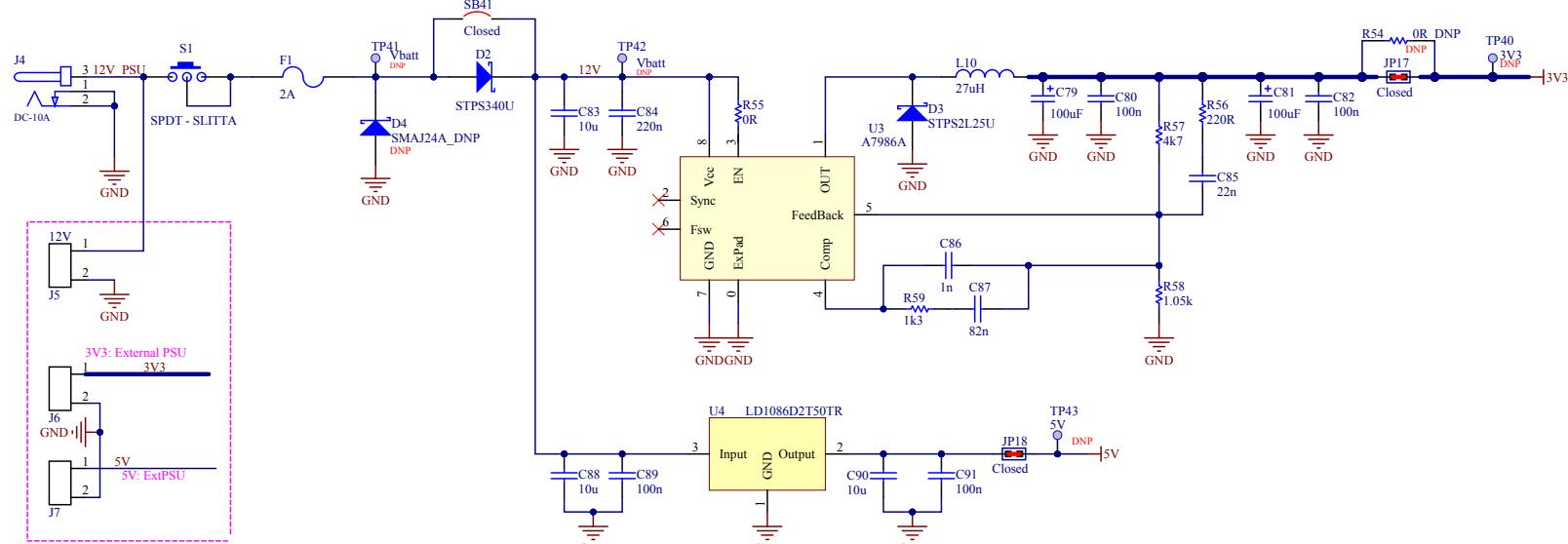
Figure 19. uC PSU
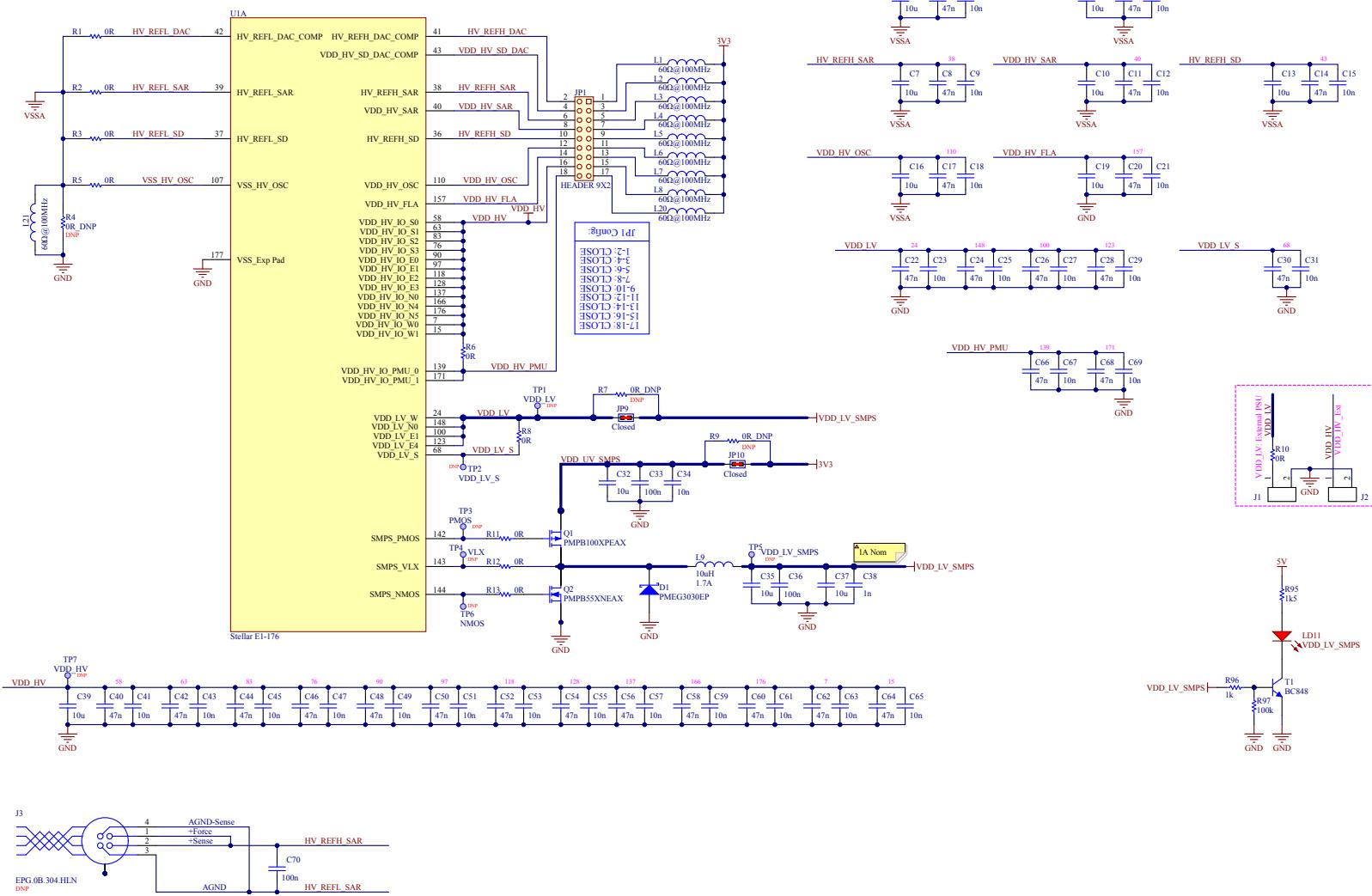
Figure 20. uC GPIO
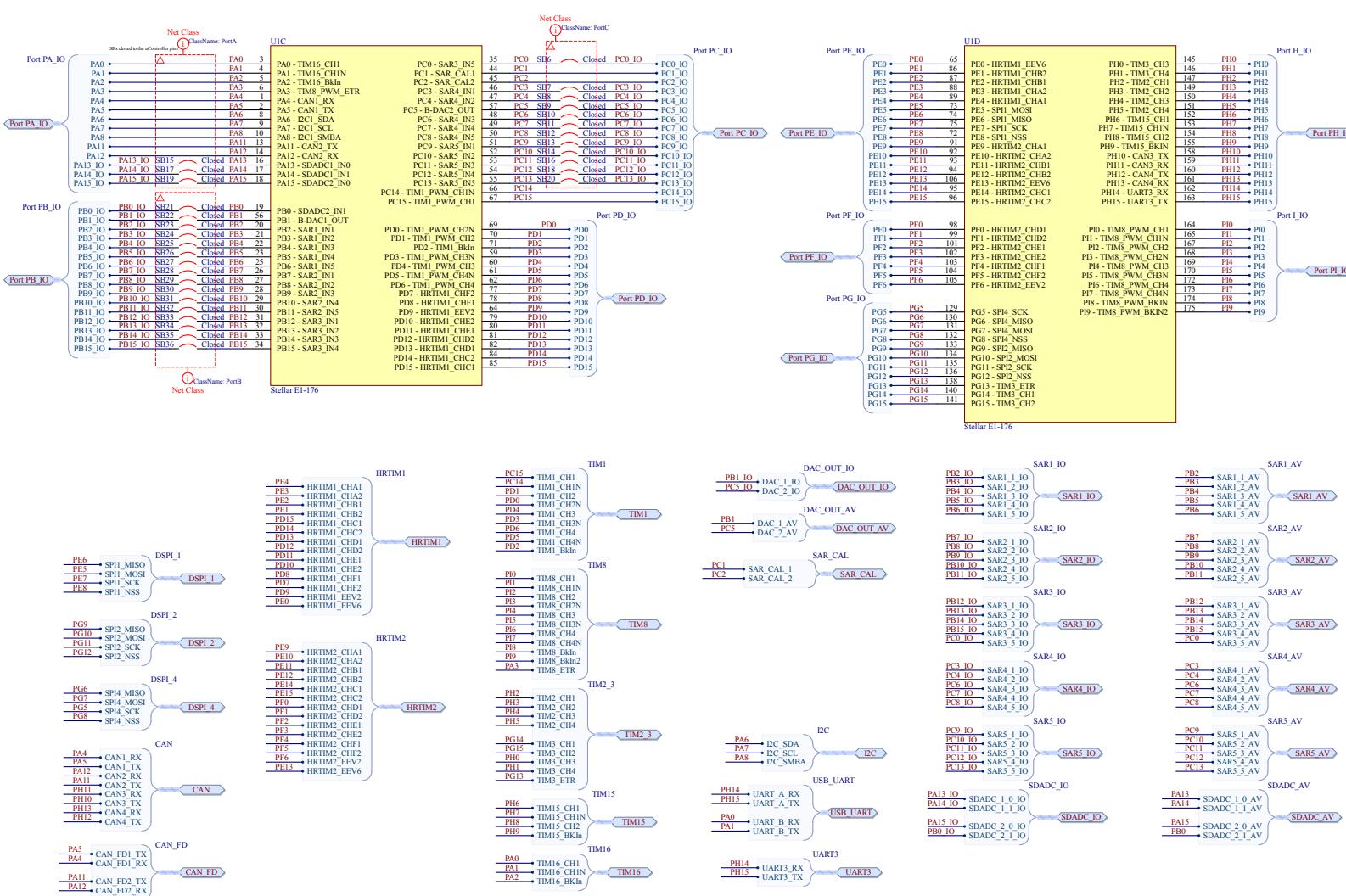
Figure 21. Program and debug

Figure 22. Analog and timers
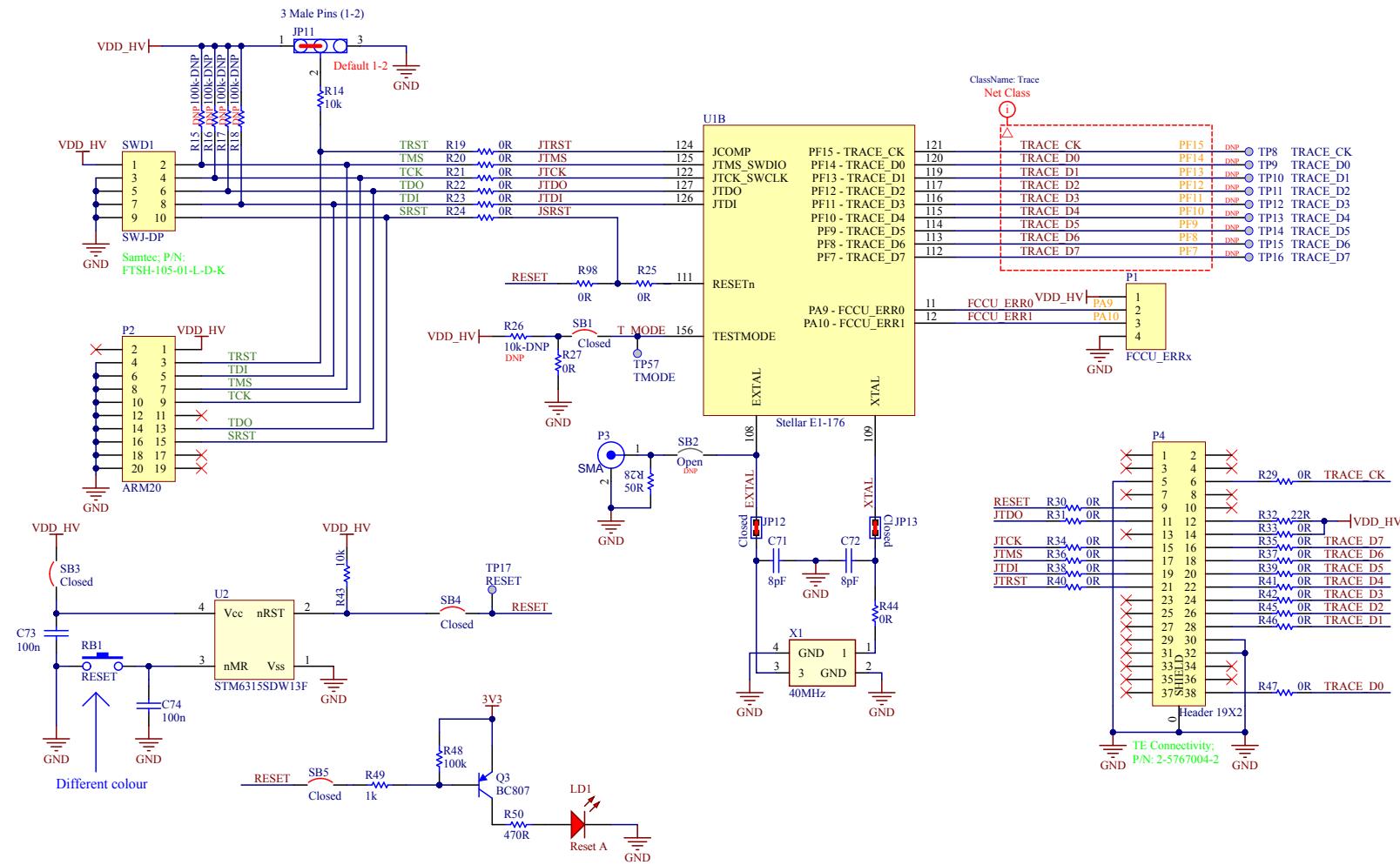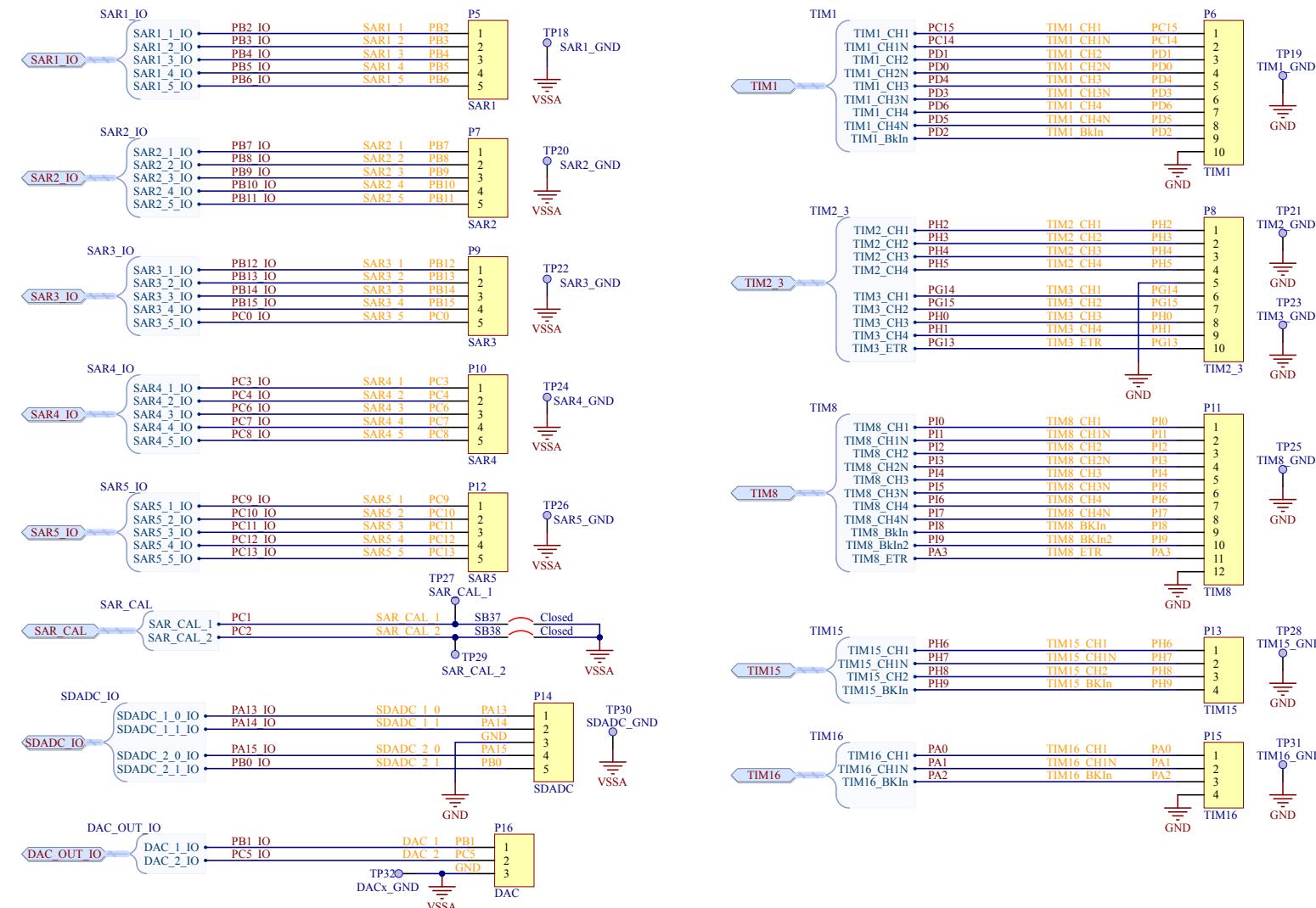
Figure 23. HR timers and communication
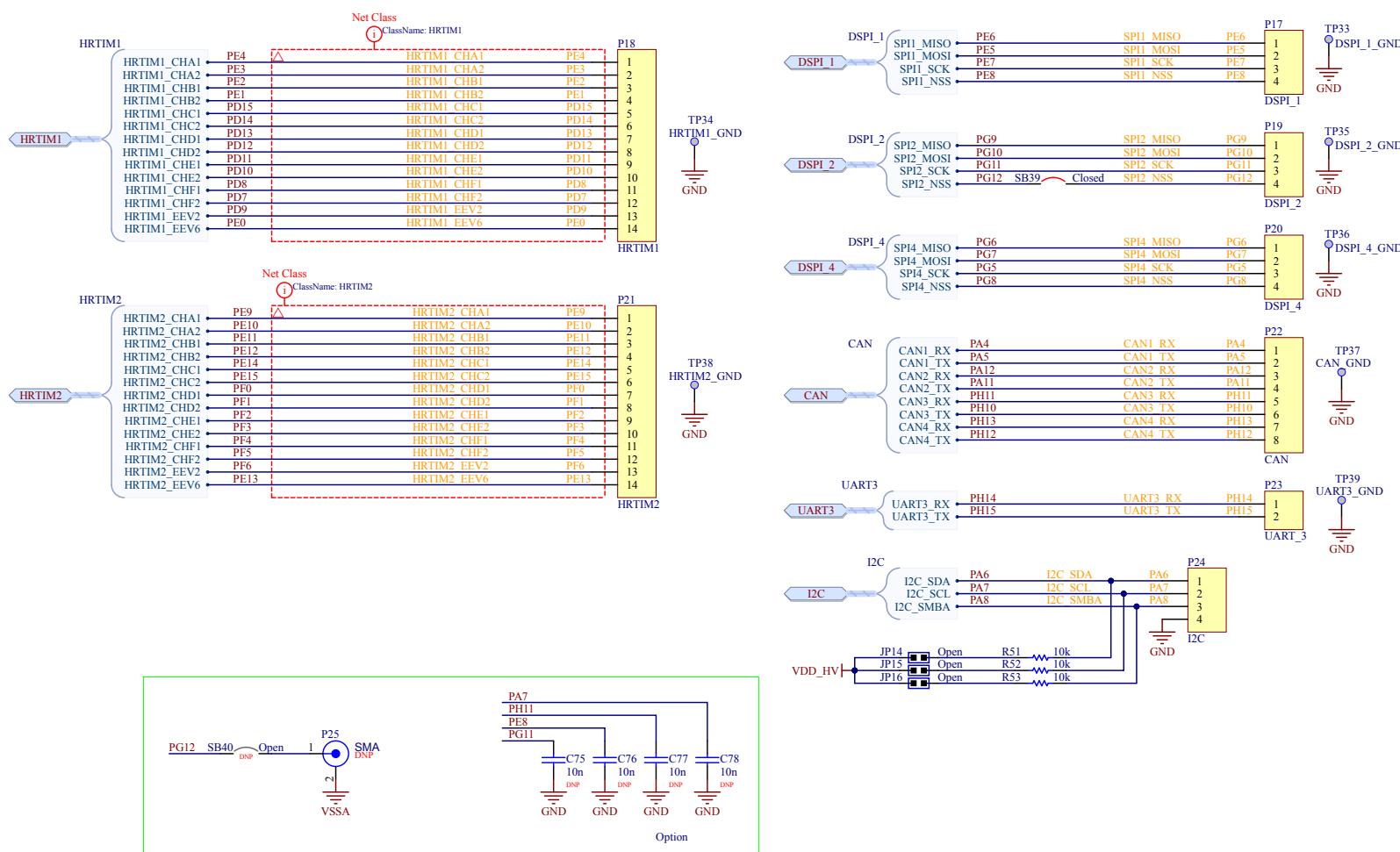
Figure 24. CAN-FD
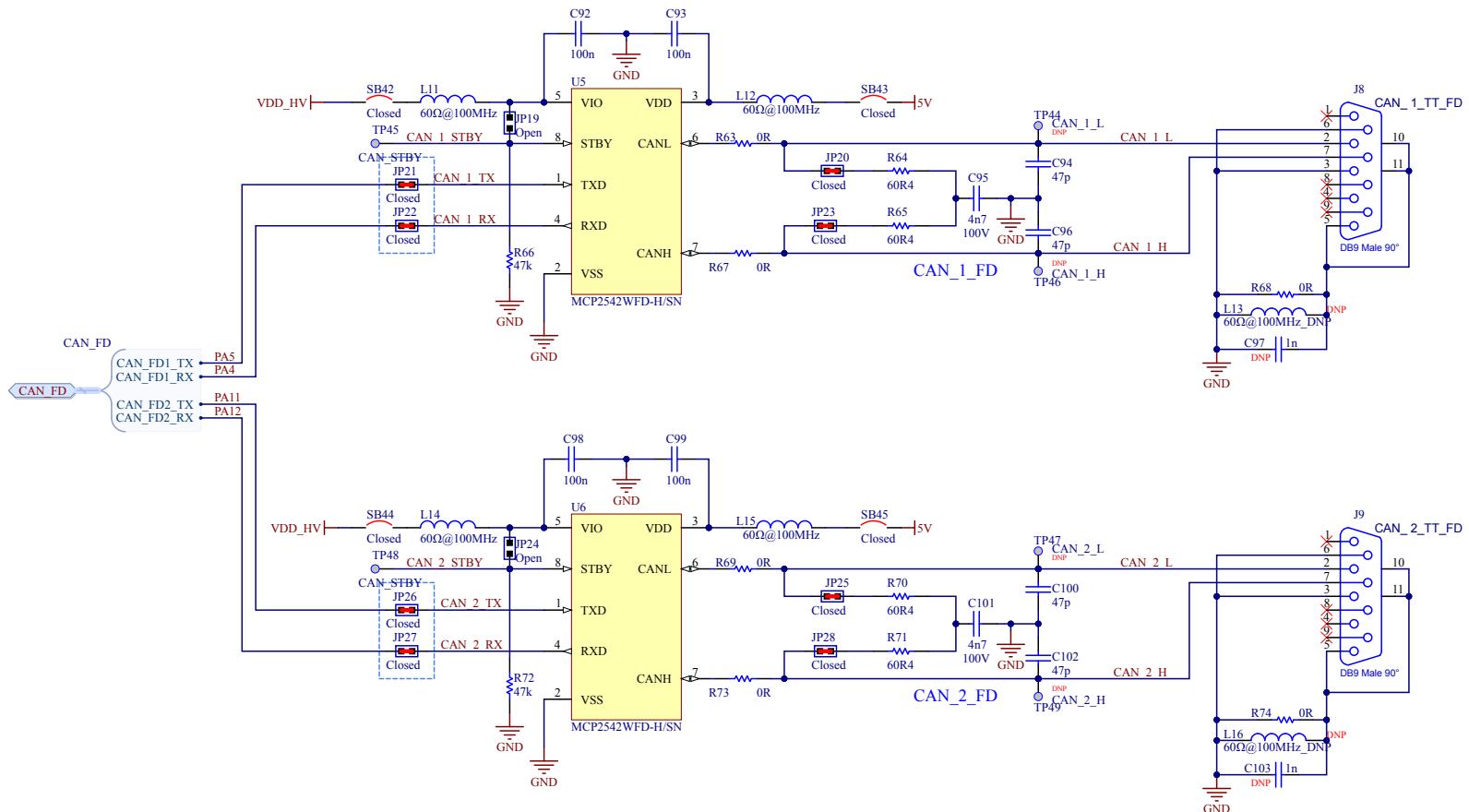
Figure 25. USB to UART
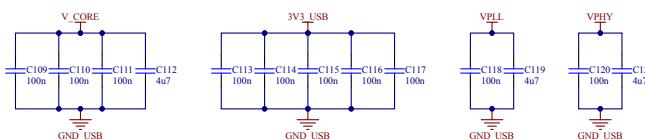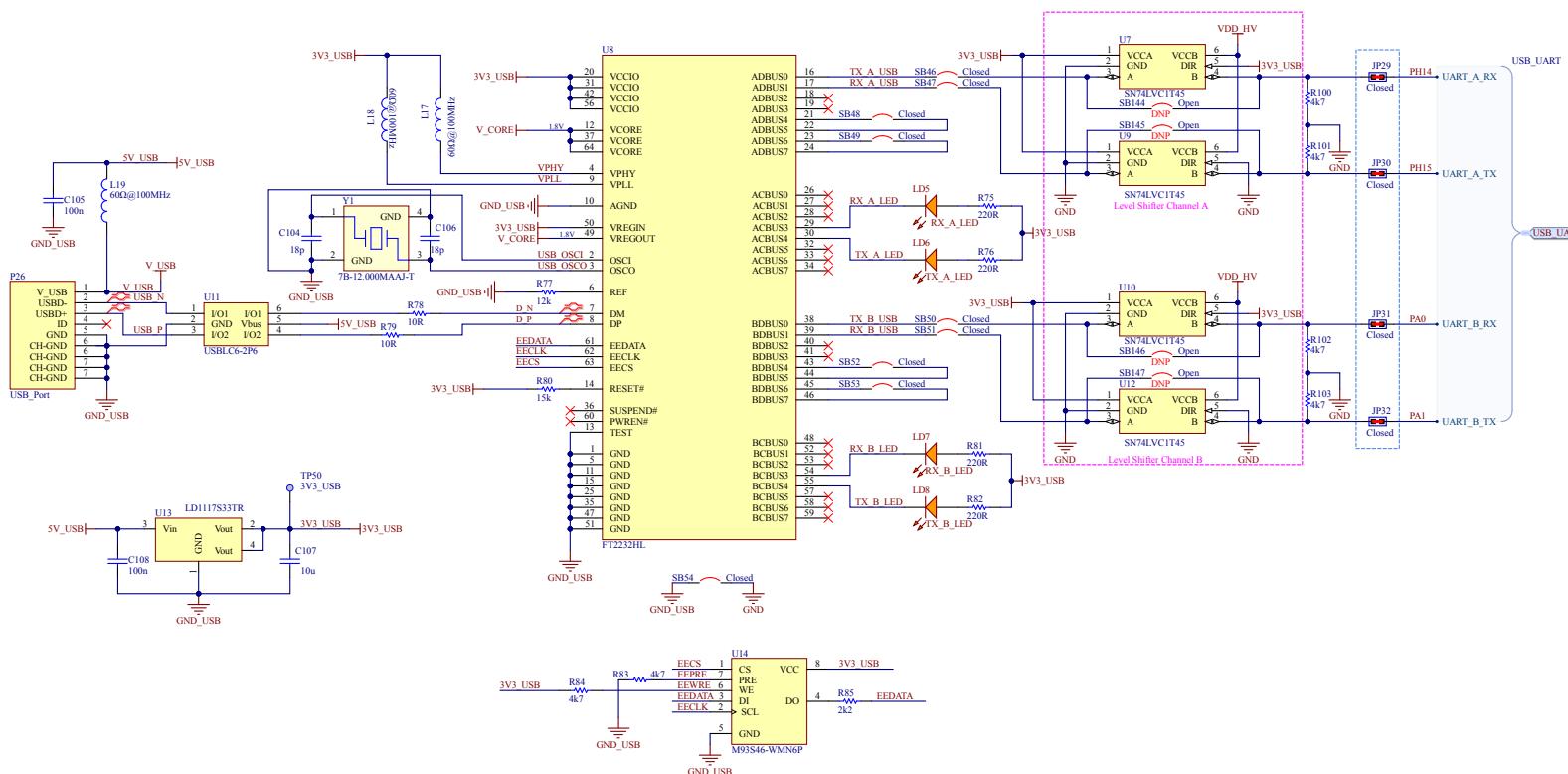
Figure 26. I/O user 1
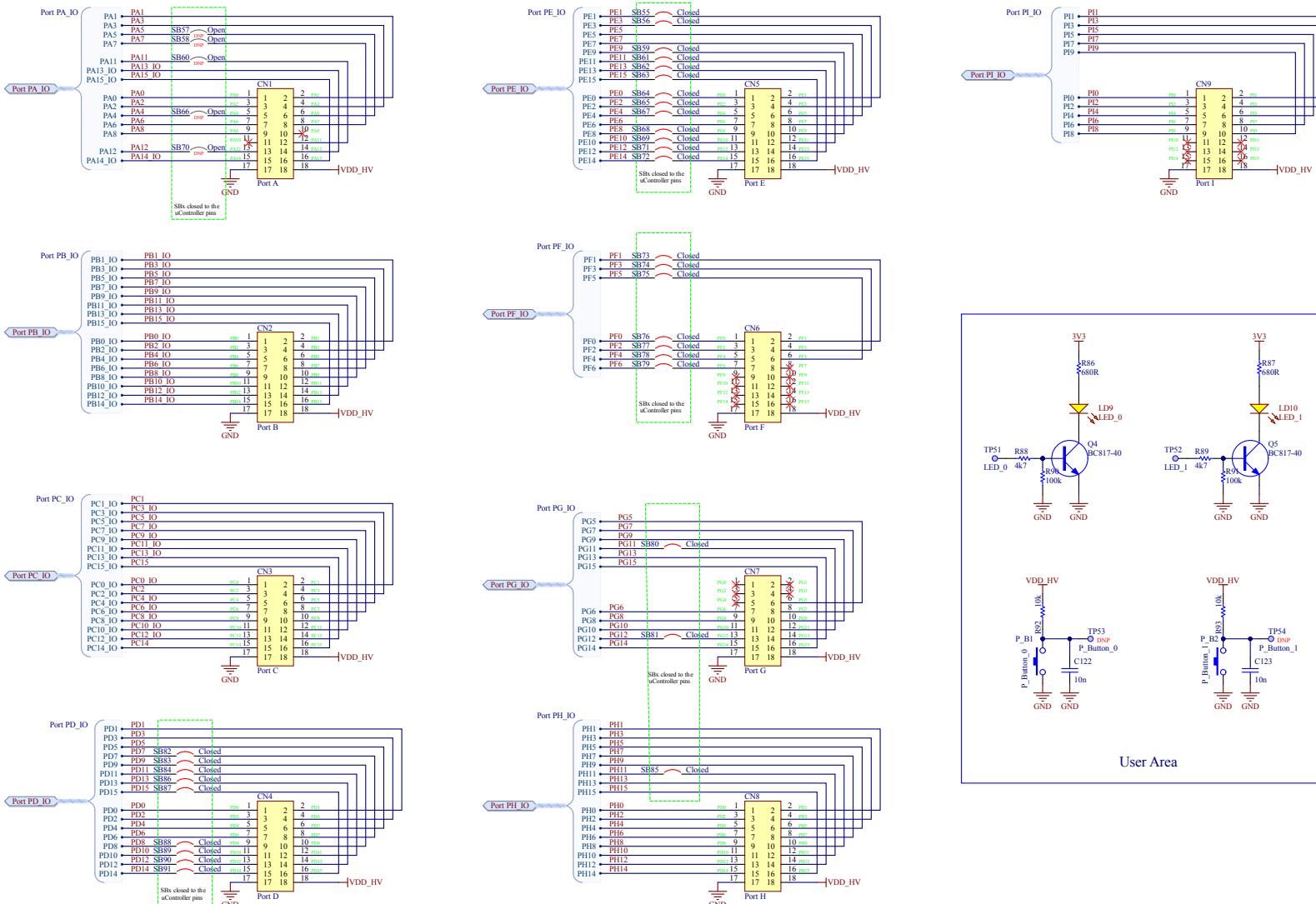
Figure 27. Analog validation
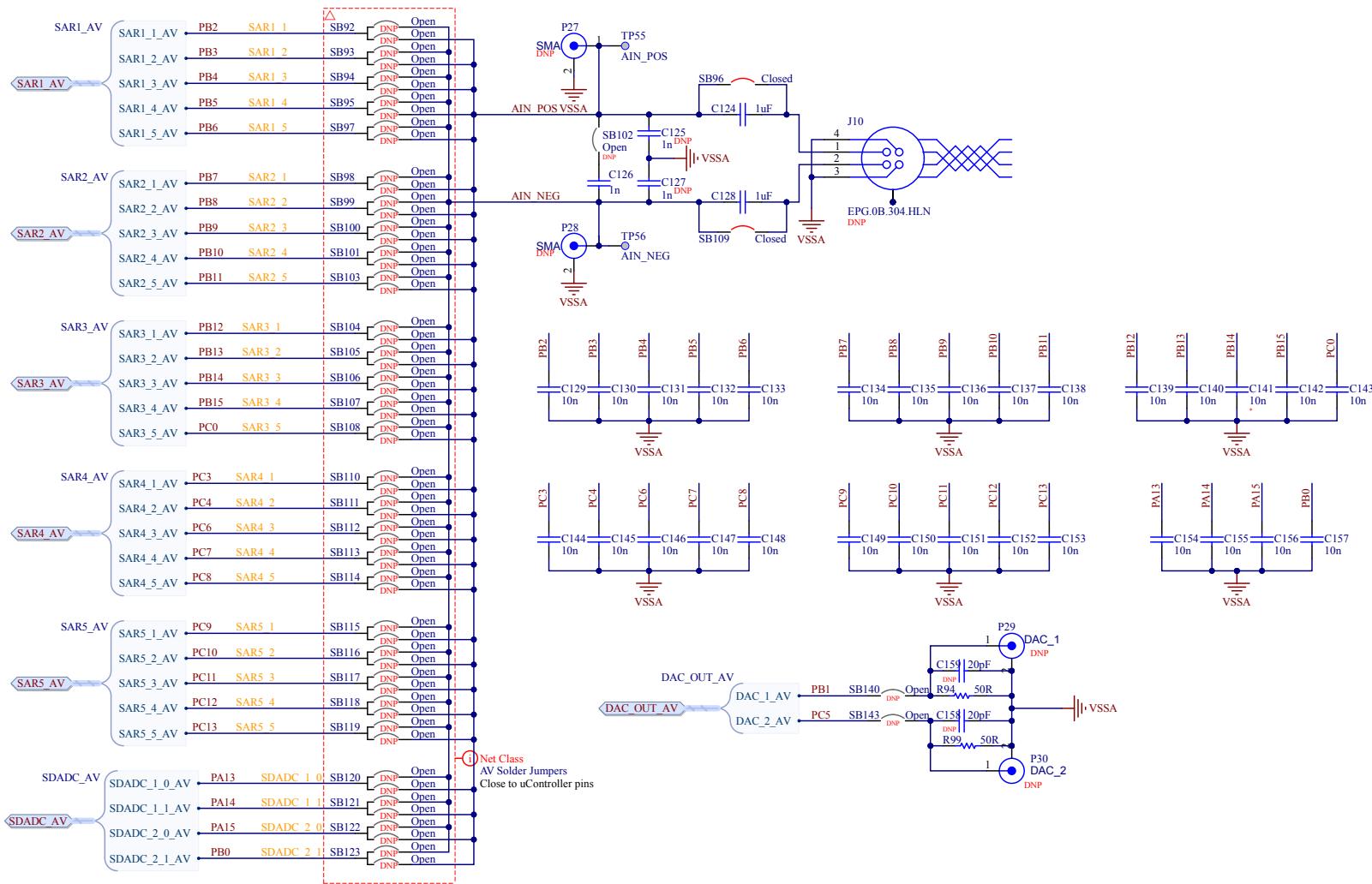
Revision history

Table 45. Document revision history

Date	Revision	Changes
22-Nov-2022	1	Initial release.
08-Feb-2024	2	Confidentiality level changed from ST restricted to public.

Contents

List of tables

List of figures

IMPORTANT NOTICE – READ CAREFULLY