UM1578
User manual

Demonstration and development platform for applications based on touch sensing microcontrollers

Introduction

The STMT-BOX^{TM} platform is designed as a complete demonstration and development platform for STMicroelectronics touch sensing microcontrollers. It includes three independent boards that can be connected together as shown in *Figure 1*.

- A display board, see *Chapter 2: STMT-BOX display board*.

  The STMT-BOX display board is designed around an STM32F103x microcontroller. The board features peripherals such as USB full speed, color LCD with resistive touch panel, buzzer and two user LEDs. The interface with touch and isolation board is performed through one 40-pin connector. A second 20-pin connector is available to connect an extension board. The STMT-BOX display board also embeds an ST-LINK/V2 in-circuit debugger and programmer for the display microcontroller or touch microcontroller.

- An isolation board, see *Chapter 3: STMT-BOX isolation board*.

  The STMT-BOX isolation board is an optional board which can be connected between the display board and the touch keypad board. All the connector signals are galvanic isolated by digital isolator chips.

  This isolation board can be used during the development cycle to measure and adjust capacitive sensing parameters with a limited influence on the capacitive sensing signals to be measured.

- A touch keypad board, see *Chapter 4: STMT-BOX STM8TL53 touch keypad board*.

  The STMT-BOX STM8TL53 touch keypad board features 7 icon touchkeys, 2 touchkeys simulating a linear sensor, and 10 touchkeys organized as a numeric pad. It allows demonstrating the features and performance of the STM8-based touch sensing STM8TL53 microcontroller for designers willing to implement a similar touch sensing technology in their application.

Figure 1.   STMT-BOX touch keypad
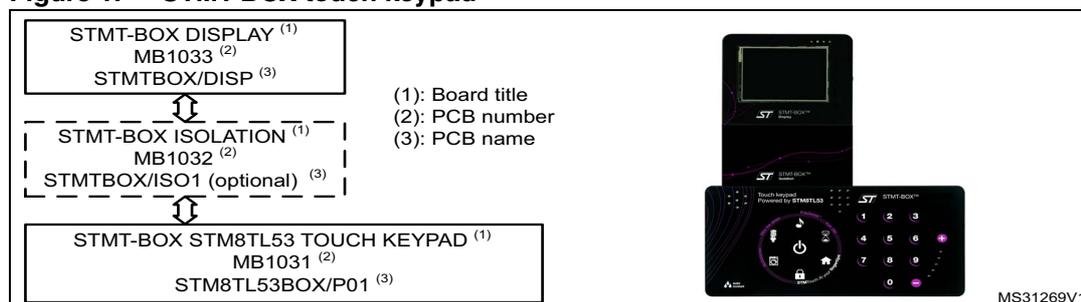
Table 1.   Applicable tools

Type	Applicable tools
Development tools	STMT_BOX

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1 Overview

1.1 Features

- Display board (STMT-BOX display)
  - Core: STM32F103CBT6 microcontroller
  - Embedded ST-LINK/V2
  - Two 5 V power supply options: ST-LINK/V2 USB connector or user USB connector
  - 240 x 320 TFT color LCD with touch capability
  - Reset pushbutton
  - 2 blue user LEDs and one buzzer
  - Connector for isolation/touch board
  - Connector for extension board
  - USB full speed user connector
  - Voltage translators supporting touch keypad board powered from 1.65 V to 3.6 V
- Isolation board (STMT-BOX isolation)
  - Connectors for display board and touch keypad board.
  - Galvanic isolation for USART, SPI, I2C, interrupt input, digital output, SWIM and SWD signals
  - Touch application voltage supported from 2.7 V to 3.6 V
- Touch keypad board (STMT-BOX STM8TL53 touch keypad)
  - Core: STM8TL53C4U6 touch sensing microcontroller
  - Three 5 V power supply options: USB, 5 V supplied from display board, or battery
  - 1.65 V to 3.6 V on-board voltage regulator
  - Power supply consumption measurement capability
  - 19 touchkeys
  - 22 blue LEDs to report touchkeys status
  - SWIM interface for debug support
  - Display/isolation board connector
  - SPI/USART/I2C communication capability

1.2 Demonstration firmware

For easy demonstration of the device peripherals in standalone mode, a demonstration firmware is preloaded in the display board STM32F103x Flash memory and in the touch board STM8TL53 Flash memory.

This demonstration firmware allows visualizing touchkey buttons status together with the values of the associated sensing parameters (signals and detection threshold).

In addition the STM8TL53 parameters can be monitored and tuned by using the STM-STUDIO application. The parameter values can be visualized by connecting the touch keypad board to a computer and by using either the display board or an ST-LINK/V2.

For more information and to download the latest version available, please refer to the STMT-BOX demonstration software available on www.st.com.

1.3 Ordering code

Table 2.   Device summary

Part number	Order code
STMT-BOX	STMT-BOX01

2 STMT-BOX display board

2.1 Hardware layout and configuration

STMT-BOX display board is designed around an STM32F103CBT6 microcontroller (128Kbyte Flash memory 48-pin QFP package). The hardware block diagram in *Figure 2* illustrates the connection between STM32F103CBT6 and peripherals (Color LCD with touch keypad, USB FS connector, Buzzer, reset button and embedded ST-LINK/V2). *Figure 3* and *Figure 4* will help you locate these features on the actual boards.

Figure 2. Hardware block diagram

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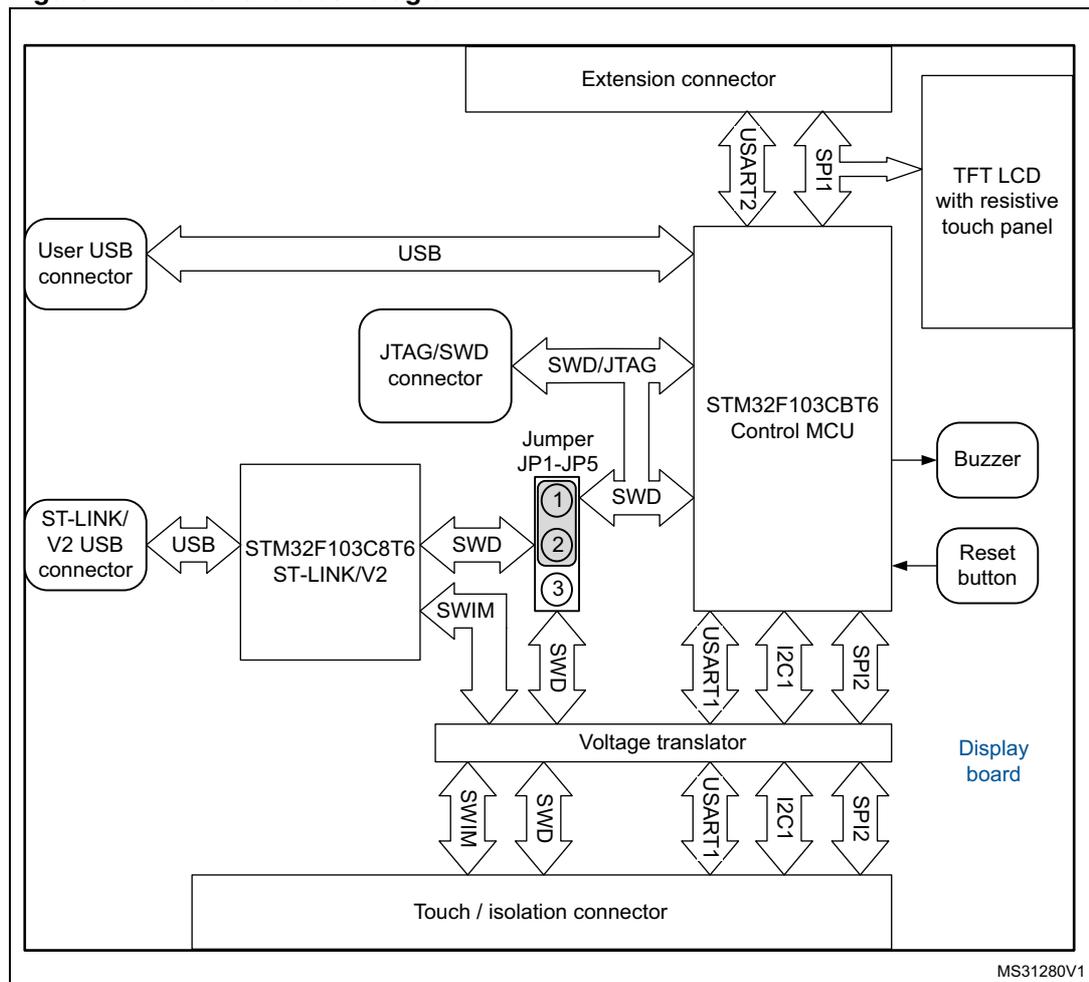
Figure 3.   STMT-BOX display board top layout

TFT LCD with resistive touch panel

LD3 ST-LINK/V2 COM

LD4 power

LD2 user LED (PB1)

LD1 user LED (PB0)

MS31281V1
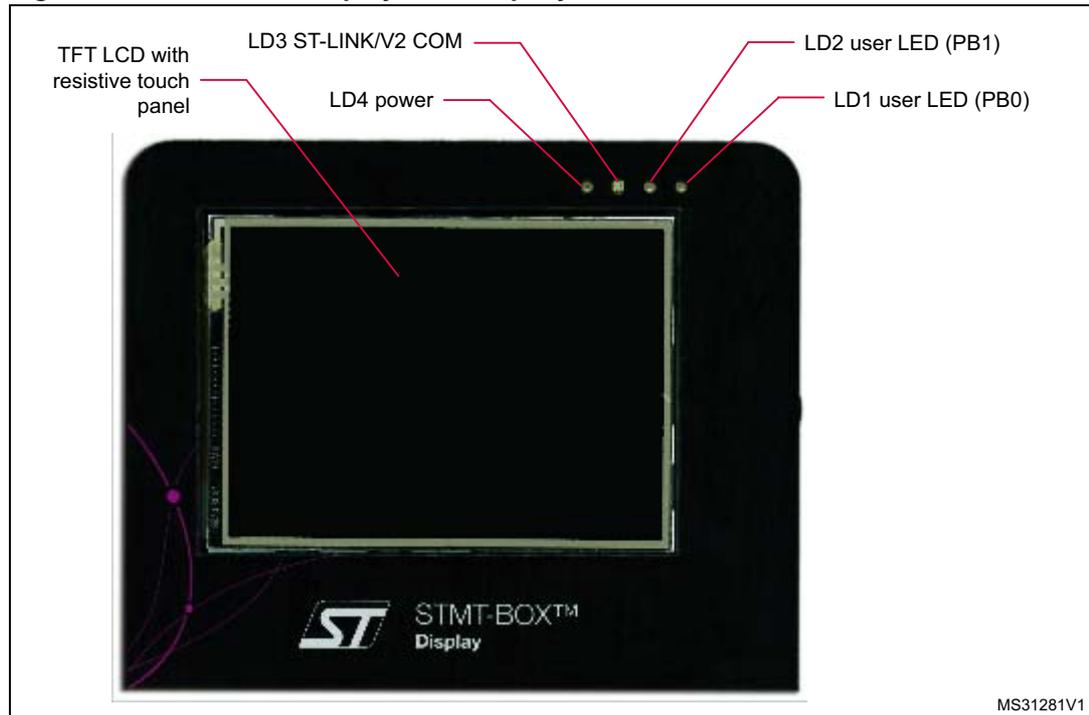
Figure 4.   STMT-BOX display board bottom layout

LD4 power LED

LD3 ST-LINK/V2 COM

LD2 user LED (PB1)

LD1 user LED (PB0)

JP1-JP5 SWD Jumpers

CN4 extension connector

LS1 buzzer

CN7 JTAG/SWD connector

CN3 ST-LINK/V2 MINI-B USB connector

B1 reset button

CN1 MINI-B USB FS connector

U3 ST-LINK/V2 MCU

U2 display MCU

CN5 touch/isolation connector

MS31282V1

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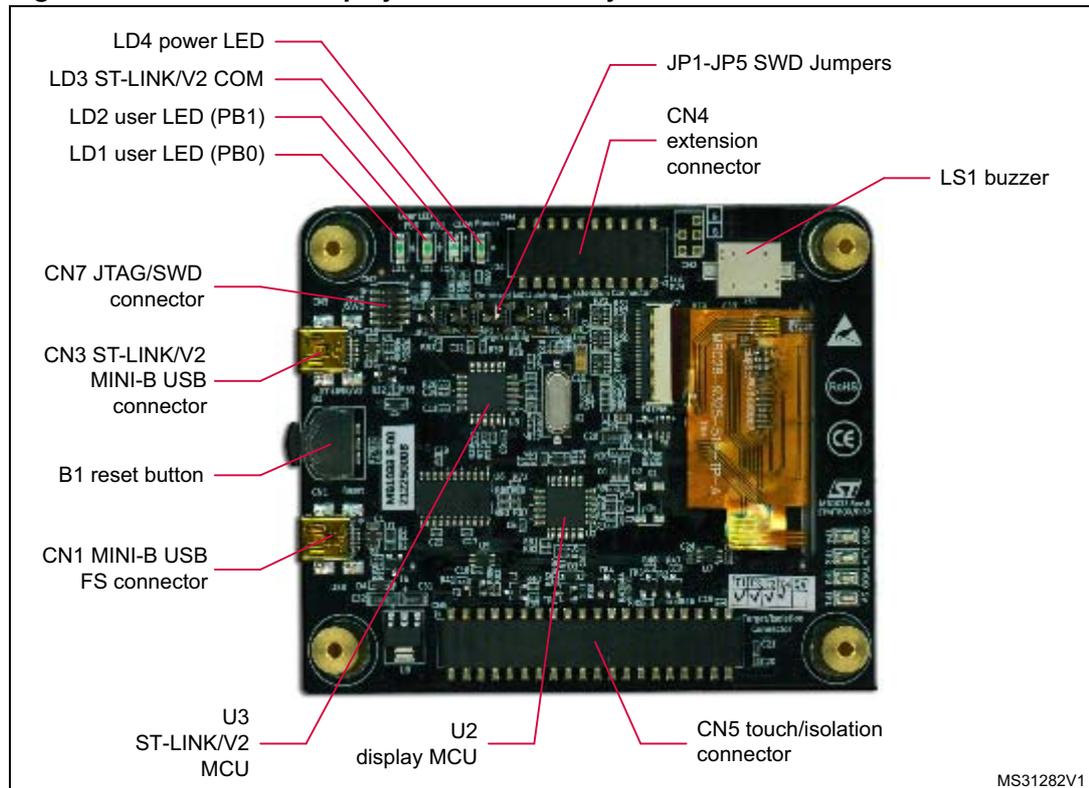
2.1.1 Development and debug support

The version 2 of the ST-LINK called ST-LINK/V2 is embedded on STMT-BOX display board.

A specific driver needs to be installed on your PC to communicate with the embedded ST-LINK/V2. The install shield called ST-LINK_V2_USBdriver.exe is available on the web. To download and install this driver, please refer to software and development tools page for STM32 family available on www.st.com.

Note: *Launching the STToolset wizard that includes STVD and STVP software will automatically take care of this driver installation.*

The embedded ST-LINK/V2 is connected to the PC via a MINI-B USB cable connected to connector CN3.The bicolor LED LD3 (COM) indicates the status of the communication as follows:

● Slow blinking Red/Off: at power-on before USB initialization

● Fast blinking Red/Off: after the first correct communication between PC and ST-LINK/V2 (USB device enumeration process)

● Red LED On: When initialization between PC and ST-LINK/V2 is successfully finished

● Green LED On: After successful touch communication initialization

● Blinking Red/Green: during communication with touch

● Red On: Communication finished and OK

● Orange On: Communication failure

The embedded ST-LINK/V2 can be used to download and debug code on touch board using SWD or SWIM interface present on CN5 connector. The embedded ST-LINK/V2 can also be used to download and debug a code on display board MCU (U2) via SWD. When using the SWD, the selection of the device is handled by the jumpers (JP1-JP5). All jumpers should be fitted on pin1-2 or pin2-3 at the same time.

Table 3. SWD jumpers

Jumper	Description
JP1:T_NRST JP2:T_JTCK JP3:T_JTMS JP4:T_SWDIO_IN JP5:AIN_1	JP1-JP5 are used to connect SWD to the on-board microcontroller MCU when jumpers are set as shown in *Figure 5* [1].
	JP1-JP5 are used to connect SWD to touch MCU when jumpers are set as shown in *Figure 6*.

1. Default setting

**Figure 5. JP1-JP5 settings to connect SWD to on board control MCU**
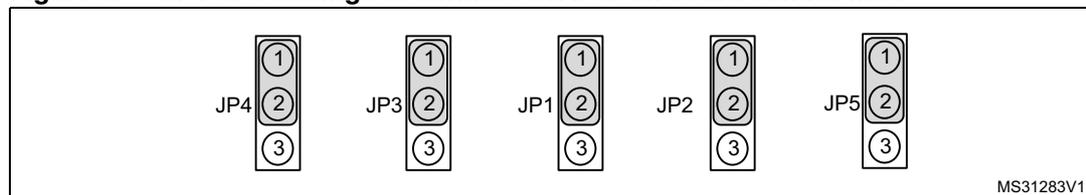
Figure 6.   JP1-JP5 settings to connect SWD to touch MCU
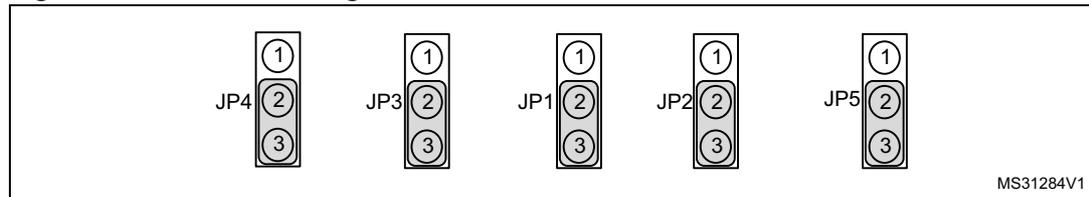
Note: *An external SWD tool can be connected to CN7 to download and debug the STM32F103CBT6 (U2) code.*

2.1.2   Power supply

The STMT-BOX display board is designed to be powered by a 5 V DC power supply from one of the following two sources:

● 5 V DC power supply with 500 mA limitation delivered by CN1 MINI-B USB connector (USB 5 V power supply source on silkscreen (USB)).

● 5 V DC power supply with 500 mA limitation delivered by CN3, the MINI-B USB connector of ST-LINK/V2 (USB 5 V power supply source on silkscreen (ST-LINK/V2)).

LED LD4 lighting confirms the presence of a 5 V power supply correctly applied to the STMT-BOX display board.

2.1.3   Reset sources

Both the display MCU board and the touch MCU board can be reset by the embedded ST-LINK/V2. You can also use the reset button B1 located on the right edge of the display board to reset the whole system except for the ST-LINK/V2 MCU which is reset only at board power-on.

2.1.4   USB

The STMT-BOX display board supports USB2.0 compliant full speed communication via a MINI-B USB connector (CN1). The board can be powered by this USB connection at 5 V DC with 500 mA current limitation.

2.1.5   Buzzer

A buzzer is driven by PB4 of the display board MCU (U2) used as timer 3 alternate function channel 1.

2.1.6   Displays

The 240x320 TFT color LCD with resistive touch panel is connected to SPI1 interface of the display board MCU (U2). In addition, 2 general purpose blue LEDs (LD1 and LD2) are available.

2.1.7   Voltage supported by connector signals

In order to support wide range voltage (1.65 V to 3.6 V) signals on touch keypad board, all signals on isolation/touch board connector are voltage translated from 3.3 V to touch voltage level by voltage translator. They include the SWIM, SWD, SPI2, USART1 and I2C1 signals as well as the wakeup signals to/from the touch keypad board.

The SPI1, USART2 and system signals available on the extension board connector only support 3.3 V.

Note: *If the isolation board is used between display board and touch board, voltage level range of these signals is reduced to 2.7 V to 3.6 V because isolation chip Si8420BB-D-IS does not support voltage below 2.7 V.*

2.2 Connector

2.2.1 User USB MINI-B connector CN1

Figure 7.   USB MINI-B connector CN1

Front view

MS31276V1
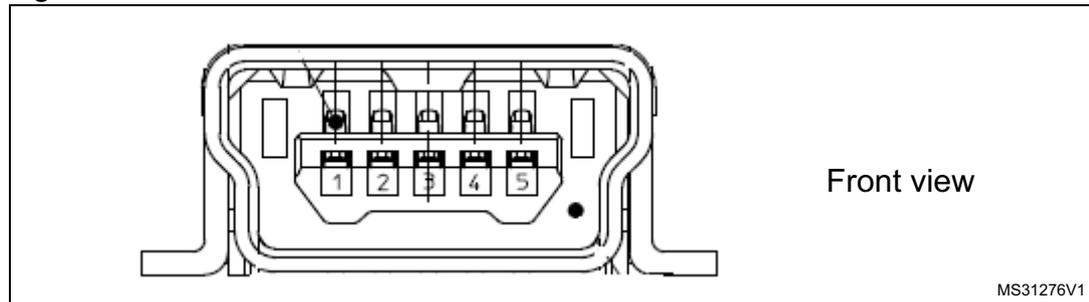
Table 4.   USB MINI-B connector CN1

Pin number	Description
1	VBUS (power supply)
2	DM
3	DP
4	ID
5	GND

2.2.2 ST-LINK/V2 programming connector CN2

The connector CN2 is used only for embedded ST-LINK/V2 programming during board manufacturing. It is not populated by default and not for end user.

2.2.3 ST-LINK/V2 USB type B connector CN3

The USB connector CN3 is used to connect the embedded ST-LINK/V2 to PC.

Figure 8. USB MINI-B connector CN3
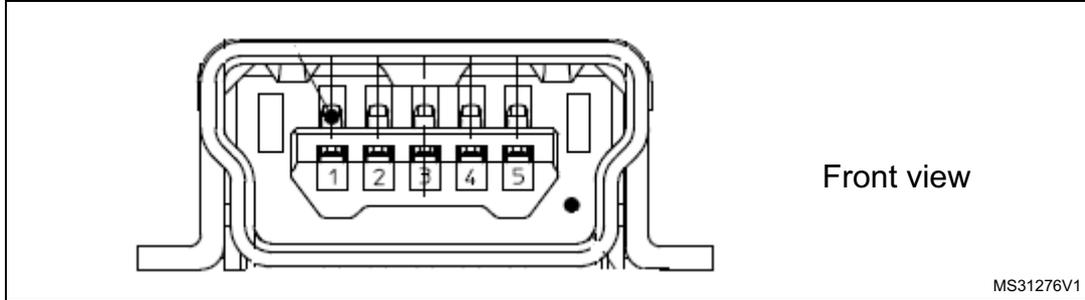
Table 5. USB MINI-B connector CN3

Pin number	Description
1	VBUS (power supply)
2	DM
3	DP
4	ID
5	GND

2.2.4 Extension board connector CN4

A 20-pin female connector CN4 is used to connect an extension board. The pin assignment is shown in *Table 6*.

Table 6. Extension board connector CN4

Pin No.	Signal direction (display board)	Display board signal name
1	Output	3.3V
2	Ground	Ground
3		Not connected
4		Not connected
5	Output	SPI1_MOSI(PA7)
6	Input	SPI1_MISO (PA6)
7	Output	SPI1_SCK(PA5)
8	Output	EXT_SPI1_CS (PB3)
9		Not connected
10		Not connected

Table 6. **Extension board connector CN4**

Pin No.	Signal direction (display board)	Display board signal name
11	Output	EXT_RESET (PC13)
12	Output on RESET then Input after	EXT_nStop (PB7)
13		Not connected
14	Output	EXT_nSwake (PB6,TIM4_CH1)
15	Input	EXT_Hwake (PA0 and PA1)
16	Output	USART2_TX (PA2)
17		Not connected
18	Input	USART2_RX (PA3)
19		Not connected
20	Ground	Ground

2.2.5 Isolation/touch board connector CN5

A 40-pin female connector CN5 is used to connect a touch board or an isolation board. The pin assignment is shown in *Appendix D*.

2.2.6 High density JTAG/SWD connector CN7

Figure 9. **High density JTAG/SWD debugging connector CN7**
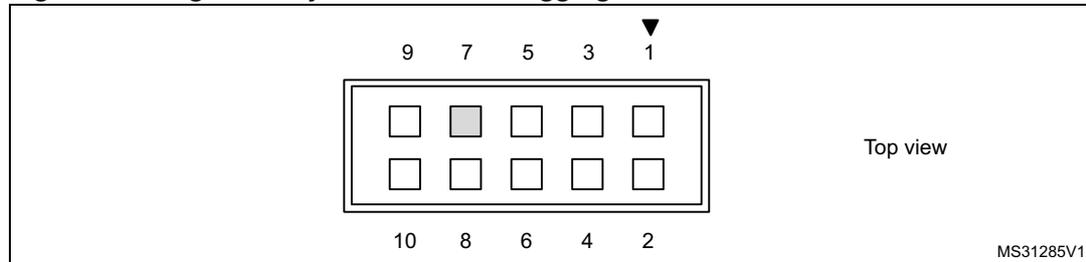
Table 7. **High density JTAG/SWD debugging connector CN7**

Pin number	Description
1	3.3V
2	TMS/SWDAT
3	GND
4	TCK/SWCLK
5	GND
6	TDO/SWO
7	KEY

Table 7.   High density JTAG/SWD debugging connector CN7

Pin number	Description
8	TDI
9	GND
10	RESET

3 STMT-BOX isolation board

3.1 Hardware layout and configuration

The hardware block diagram shown in *Figure 10* illustrates the signal isolation between touch board and display board (SWIM,SWD.USART1,I2C1,SPI2). *Figure 11* and *Figure 12* will help you locate these features on the actual boards.

Figure 10. Hardware block diagram
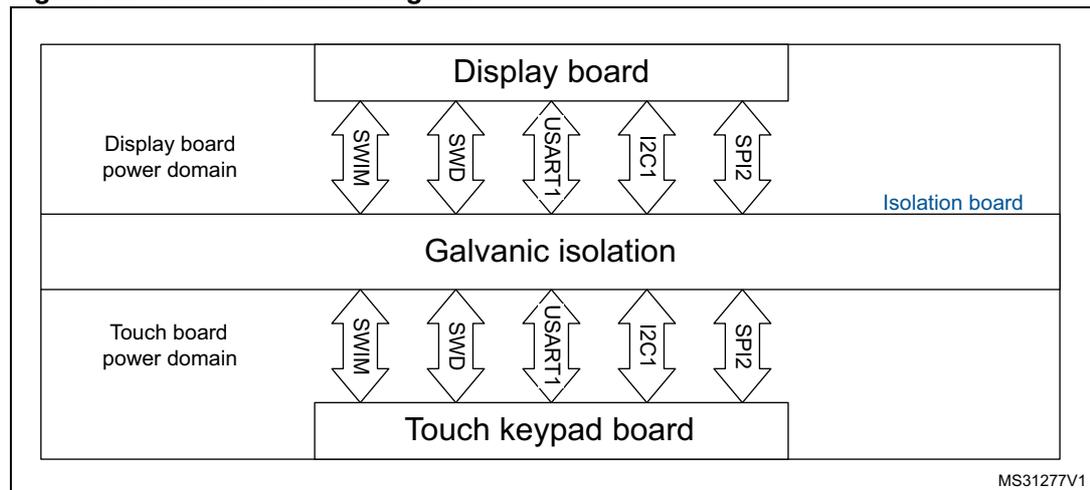
Figure 11. STMT-BOX isolation board top layout
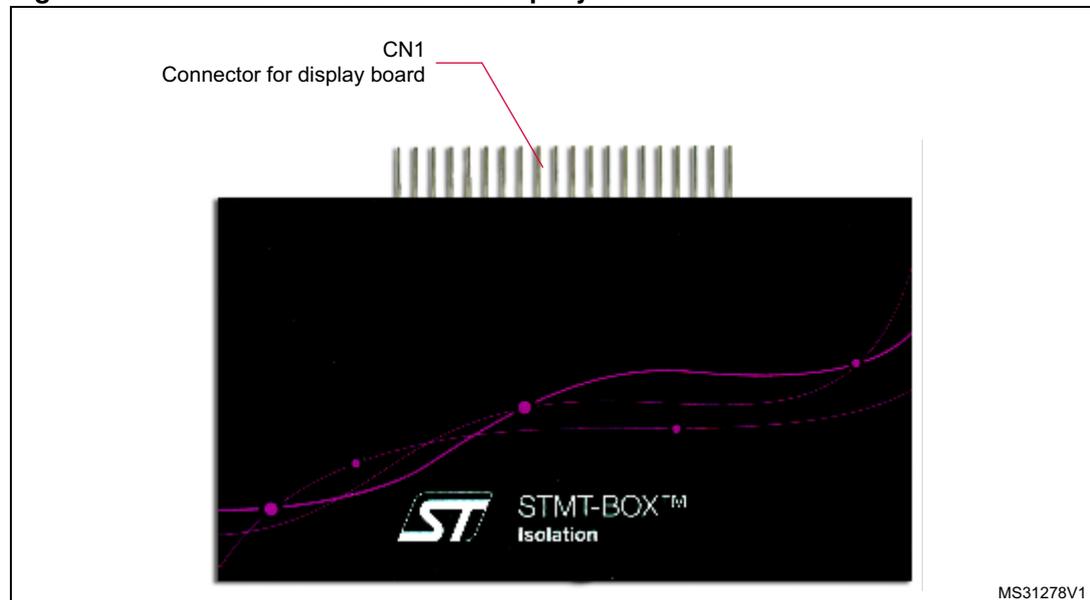
Figure 12.   STMT-BOX isolation board bottom layout
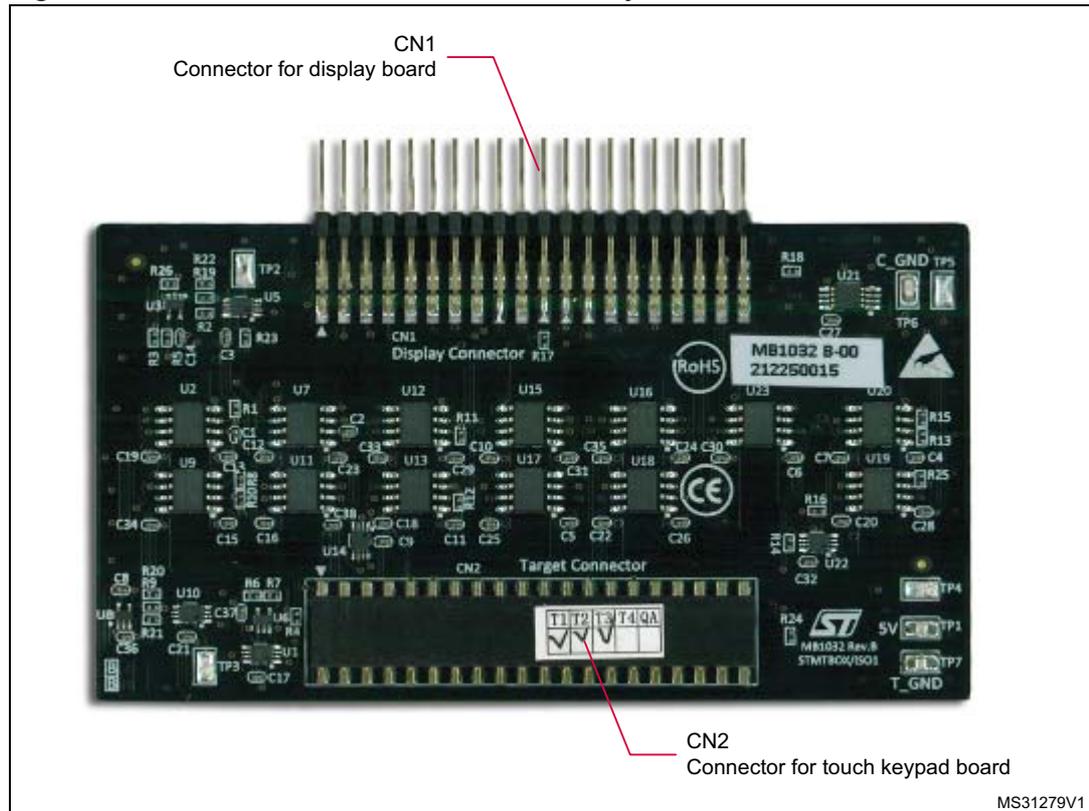
3.2   Power supply

The STMT-BOX isolation board has two power supply domains:

● One domain is powered by 3.3 V delivered from the display board on CN1

● The second domain is either powered by V_{DD} delivered from the touch keypad board on CN2, or by an external battery connected between TP1 and TP7.

Power supplies and signals on these domains are galvanically isolated by Si8420 digital isolators.

Note: *With battery supply, CN2, TP2 and TP1 on STM8TL53 touch keypad board must remain unused*

The above restriction only applies when STMT-BOX isolation board second power supply domain is powered by an external battery connected between TP1 (5 V) and TP7 (touch GND). This is because in that case the battery also supplies the touch board (STMT-BOX touch).

On touch keypad board, V_{DD} power supply ranges from 1.65 V to 3.6 V. However all isolation board signals have a reduced voltage level range (2.7 V to 3.6 V) due to the presence of an isolation chip (Si8420BB-D-IS) requiring a minimum power supply voltage of 2.7 V.

3.3 Connectors

The isolation board is connected to the display board and the touch board through the CN1 40-pin connector and the CN2 40-pin connector, respectively. The pin assignment is shown in *Appendix D*.

4   STMT-BOX STM8TL53 touch keypad board

4.1   Hardware layout and configuration

The STMT-BOX STM8TL53 touch keypad board (MB1031) is designed around the STM8TL53 (48-pin QFN) packaged device. The hardware block diagram in *Figure 13* illustrates the connection between STM8TL53C4U6 MCU and external circuitry (touchkeys, LEDs and display board connector). *Figure 14* and *Figure 15* will help you locating these features on the actual evaluation board.

Figure 13.   Hardware block diagram
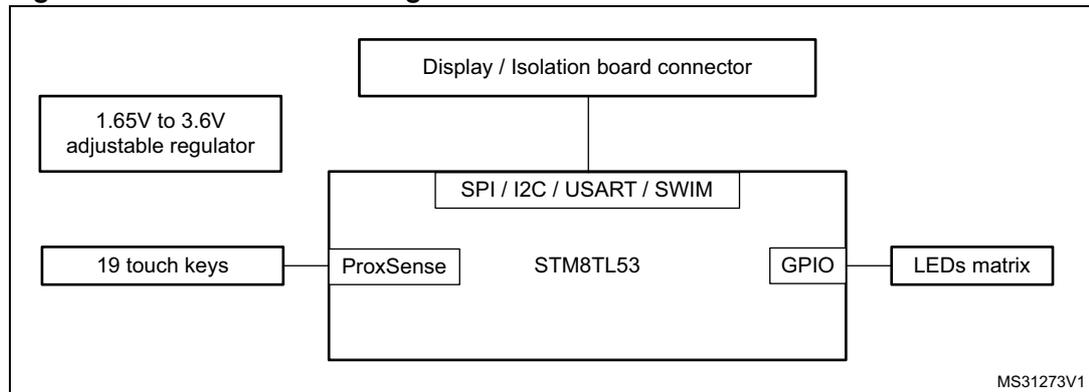

Figure 14.   STMT-BOX STM8TL53 touch keypad board top layout
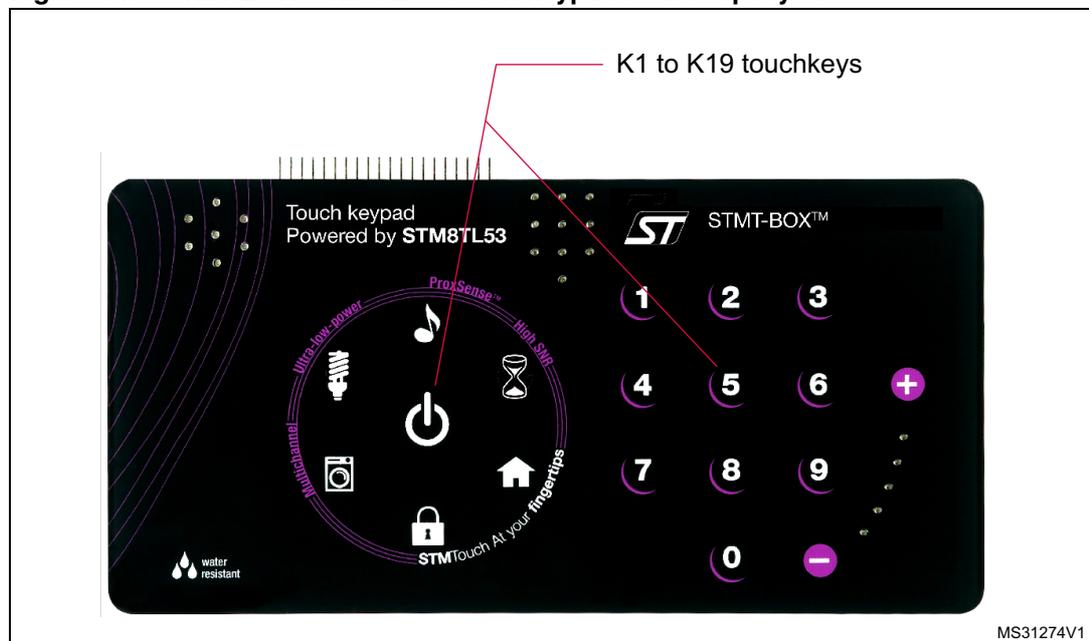
Figure 15. STMT-BOX STM8TL53 touch keypad board bottom layout
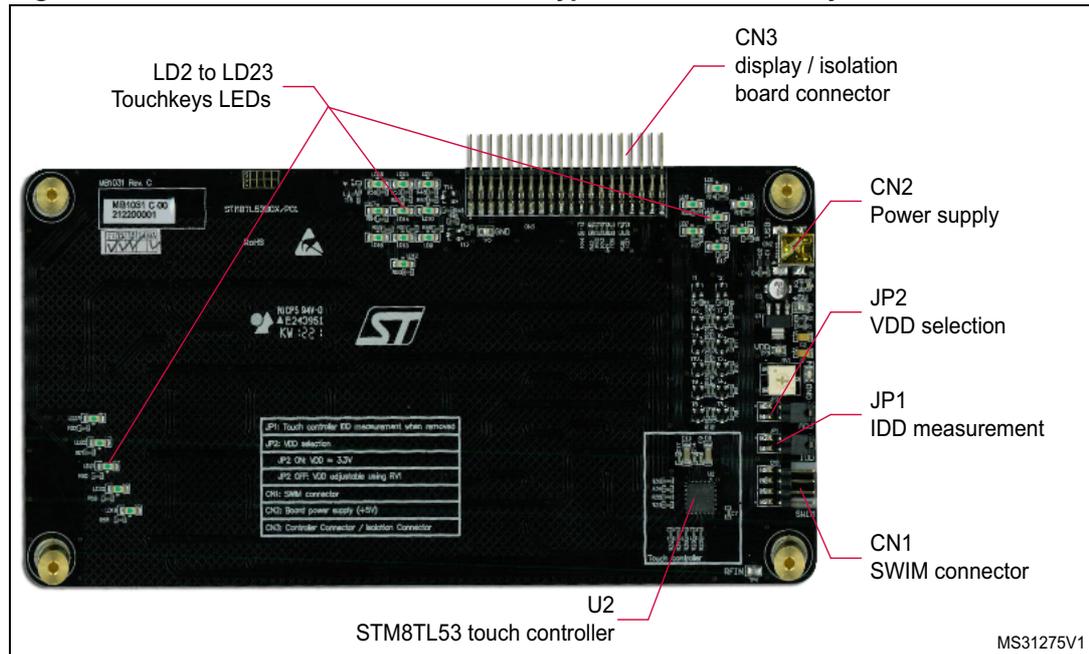
4.1.1 Power supply

The STMT-BOX STM8TL53 touch keypad board is designed to be powered by a 5 V DC power supply from one of the following sources:

- 5 V DC power supply with 500 mA limitation delivered by CN2 MINI-B USB connector (USB 5 V power supply source on silkscreen (USB)).
- 5 V DC power supply delivered by CN3 display/isolation board connector.
- 4 V to 5 V battery connected between TP2 and TP1.
- 4 V to 5 V battery connected between TP1 and TP7 of STMT-BOX isolation board when used.

LED LD1 lighting confirms the presence of a 5 V power supply correctly applied to the STMT-BOX STM8TL53 touch keypad board.

The power supply is configured by setting the related jumpers JP1, JP2 as described in *Table 8*:

Table 8. Power supply related jumpers

Jumper	Description
JP1	JP1 is used to measure MCU current consumption using multi-meter connected to these two pins when the jumper is removed Default setting: Fitted
JP2	V_{DD} power supply has a fixed voltage of 3.3 V when JP2 is fitted (Default setting).
	V_{DD} power supply voltage is adjustable from 1.65 V to 3.3 V when JP2 is not fitted. The voltage is adjusted with RV1 potentiometer.

Test points are available to measure power supply voltages:

● TP1 and TP5 for GND
● TP2 for 5 V voltage power supply
● TP3 for V_{DD} voltage power supply

Note: *The V_{DD} power supply range has the particularity to be reduced on isolation board compared to touch board or display board:*

- V_{DD} ranges from 1.65 V to 3.6 V on display board or touch board

- V_{DD} ranges from 2.7 V to 3.6 V on isolation board (due to isolation chip Si8420BBD-IS requiring a minimum supply voltage of 2.7 V)

Consequently, when isolation board is connected between display and touch boards, please pay particular attention to JP2 jumper and RV1 potentiometer settings:

- if jumper JP2 is not fitted, RV1 potentiometer must be adjusted so that V_{DD} operating voltage remains in the range 2.7 V to 3.6 V.

- if the jumper JP2 is fitted, V_{DD} voltage is fixed and equal to 3.3 V and RV1 potentiometer setting has no effect.

4.1.2 Reset source

The reset signal of STMT-BOX STM8TL53 touch keypad board is active low and the reset sources include:

● Debugging tool from SWIM connector CN1
● Display/isolation board (STMT-BOX display) connector CN3

4.1.3 Touchkeys

19 touchkeys are available on the board. The touchkeys are connected to 4 receivers (Rx0a to Rx3a) and 5 transmitters (Rx5a to Rx9a acting as transmitters) with 1KΩ serial resistor for ESD immunity improvement. The touchkeys are divided in 3 groups as below:

● 7 touchkeys arranged in a circle
● 10 touchkeys arranged in numeric pad
● 2 touchkeys simulating a linear senor (Minus and Plus)

4.1.4 LED display

A total of 22 blue color LEDs arranged in a matrix are connected to PB0 to PB6 as data lines and PD3 to PD7 as scan lines. The LEDs are used to report touchkey status.

4.1.5 Communication interface

An optional SPI, USART or I2C communication interface is connected to the display/isolation board connector CN3.

The selection of SPI or USART or I2C communication interface is configured by setting the related resistors R37 to R40, R42 and R44 as described in *Table 9*:

Table 9.   Communication interface related resistor

Resistor	Description
R42, R44 soldered. R37, R38, R39, R40 removed.	SPI as communication interface.
R37, R38 soldered. R39, R40, R42, R44 removed.	USART as communication interface.
R39, R40 soldered. R37, R38, R42, R44 Removed.	I2C as communication interface (Default setting).

4.1.6   Development and debug support

The two debug connectors available on STMT-BOX STM8TL53 touch keypad board are:

1.   CN1, standard 4-pins SWIM interface connector.
2.   CN3, SAMTEC 40-pin connector. SWIM and RESET signals are present on this connector allowing touch MCU debug by ST-LINK/V2 embedded on display board.

4.1.7   Test point on RF_IN

One Keystone's SMT test point (TP4) is connected to RF_IN of STM8TL53 for debugging.

4.2   Connector

4.2.1   USB MINI-B connector CN2

Figure 16.   USB MINI-B connector CN2

Front view

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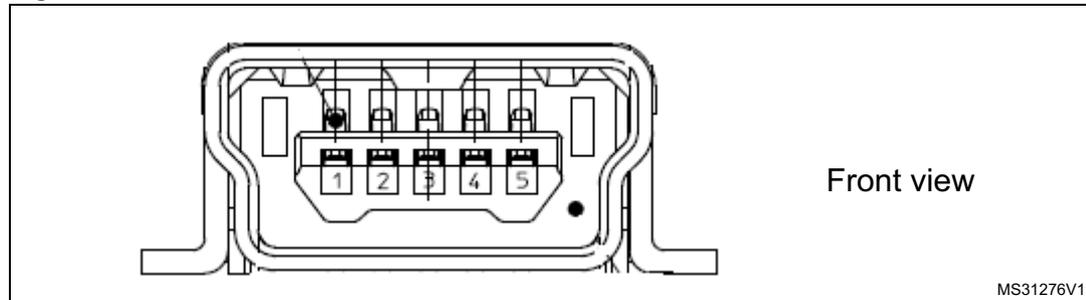
Table 10.   USB MINI-B connector CN2

Pin number	Description
1	5 V DC power supply
2	Not connected
3	Not connected
4	Not connected
5	GND

4.2.2 SWIM connector CN1

Table 11.   SWIM connector CN1

Pin number	Description
1	V_{DD}
2	SWIM
3	GND
4	RST

4.2.3 Display/isolation board connector CN3

A 40-pin male connector CN3 is used to connect with display board or isolation board. The pin assignment is shown in *Appendix D*.

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Appendix A Schematic

A.1 Display board

Figure 17. STMT-BOX display, power supply

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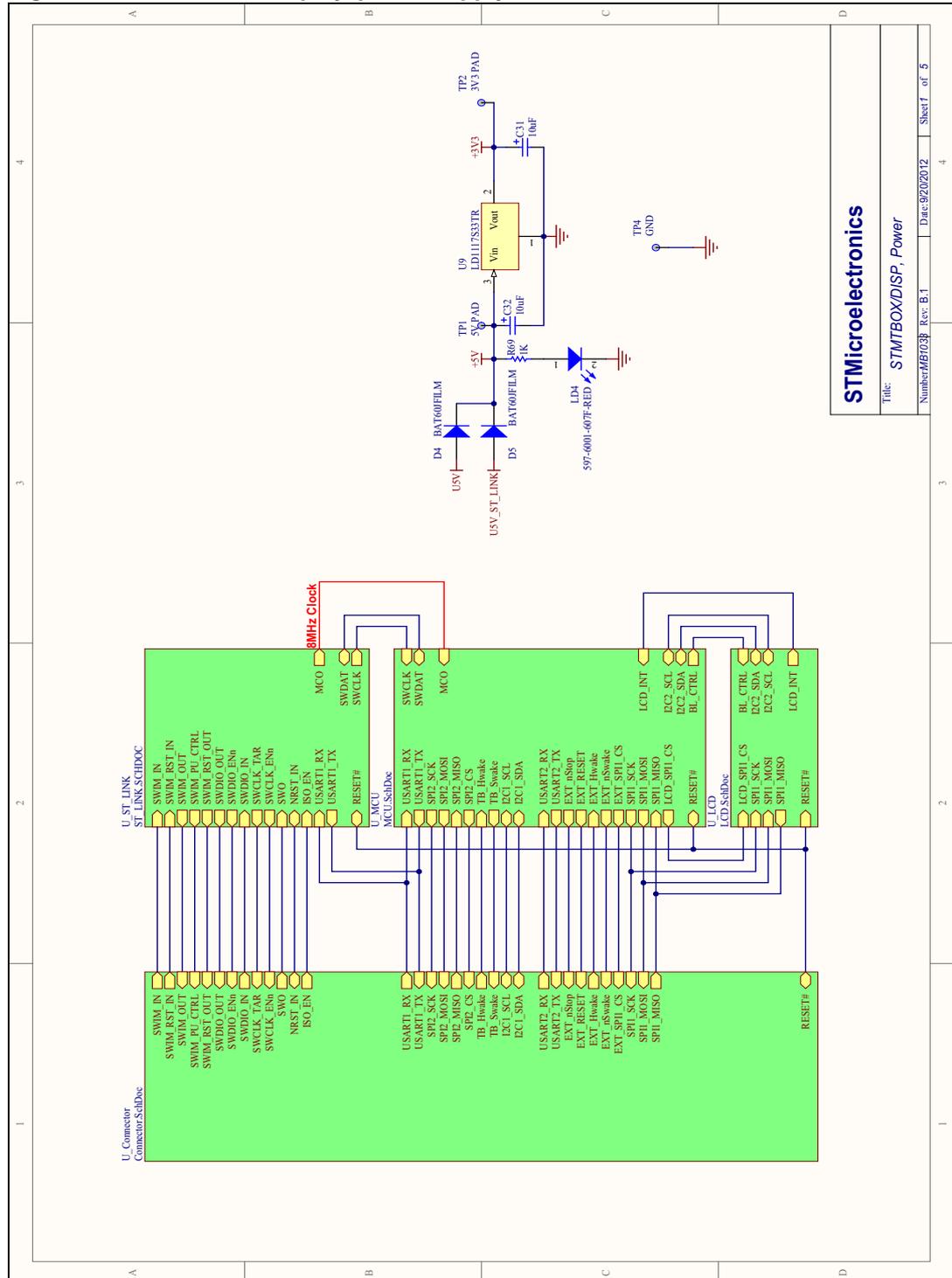
Figure 18. STMT-BOX display, MCU
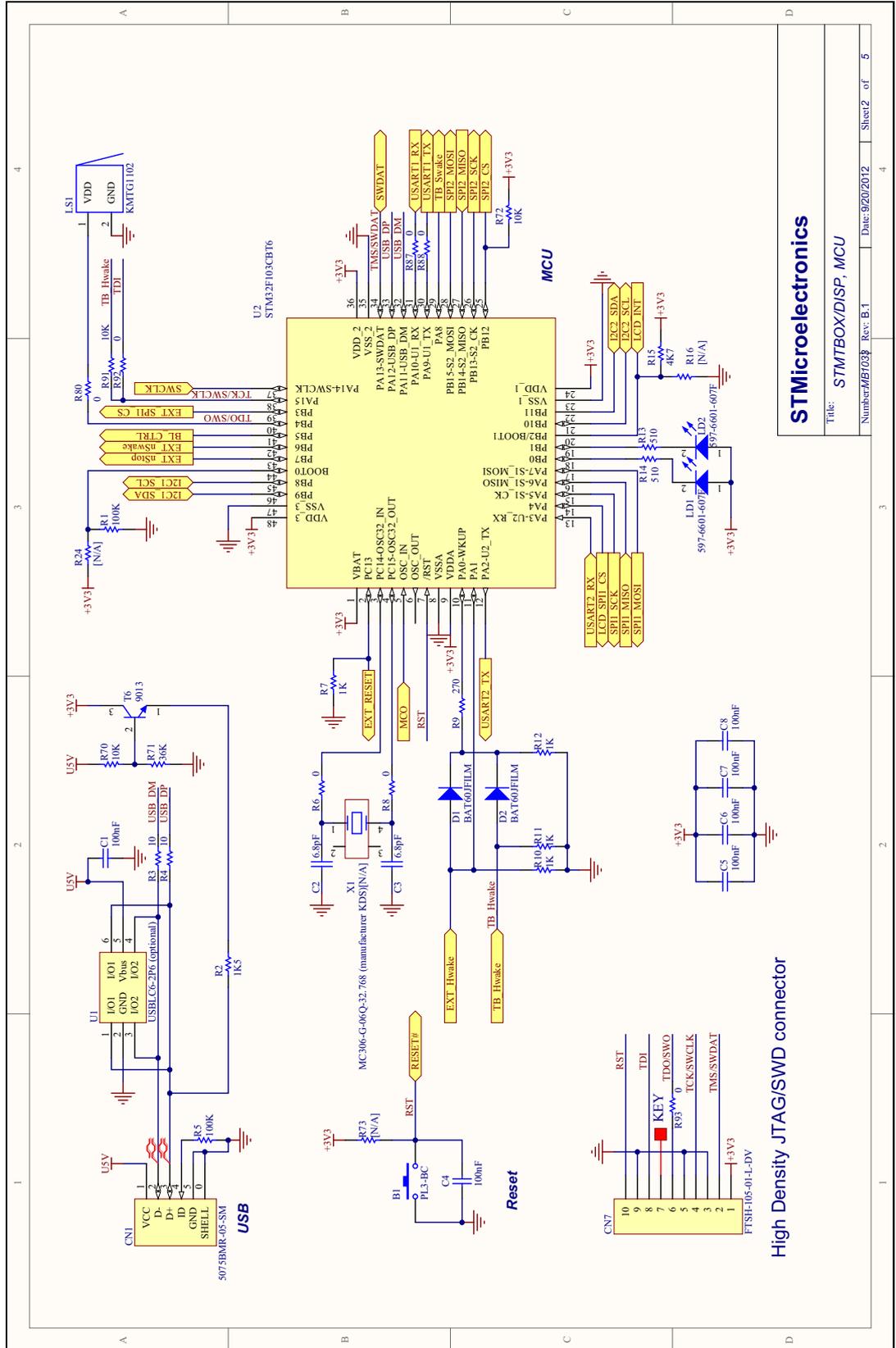
Figure 19. STMT-BOX display, ST-LINK/V2
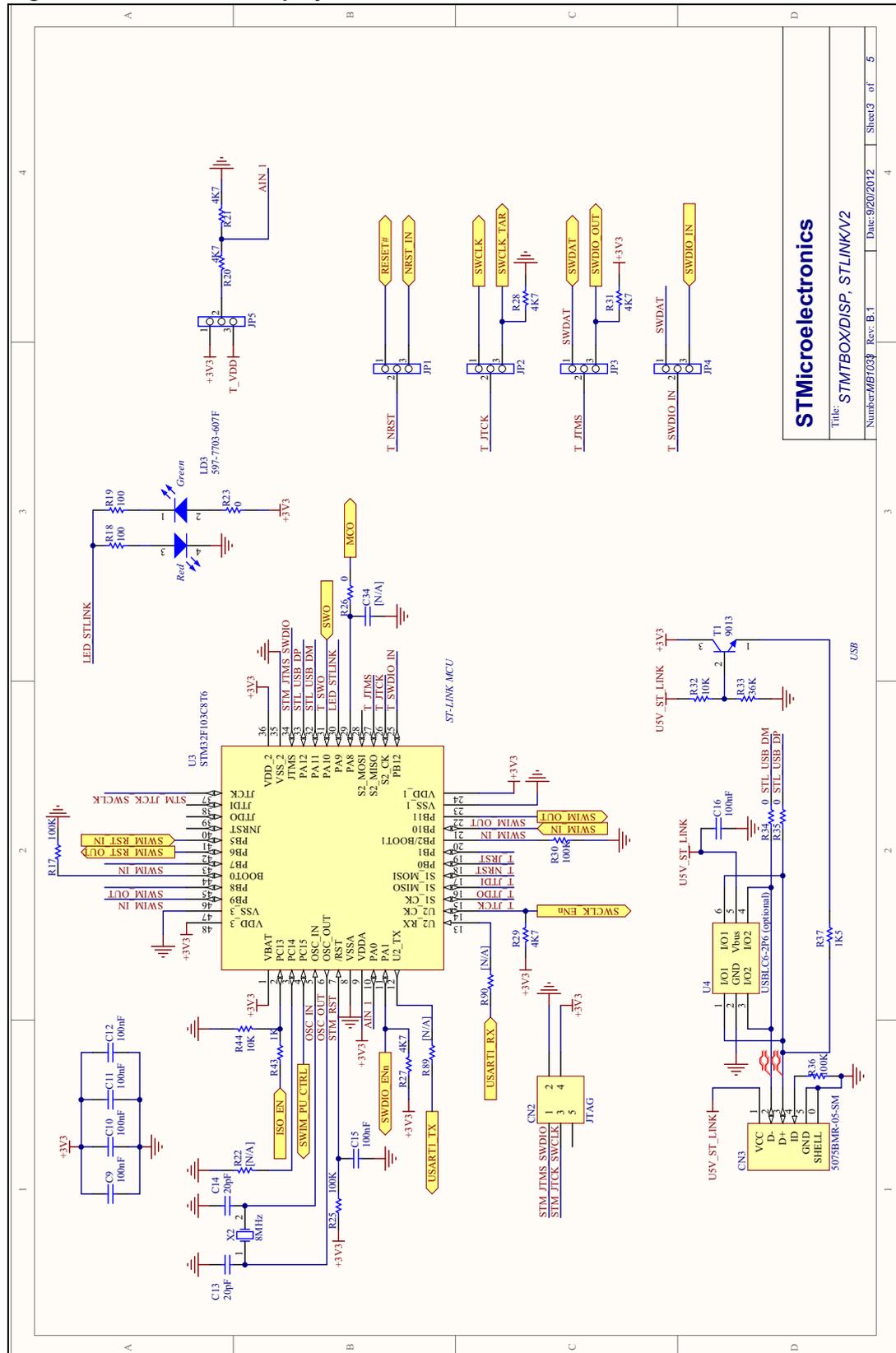
Figure 20.　STMT-BOX display, voltage translators and connectors
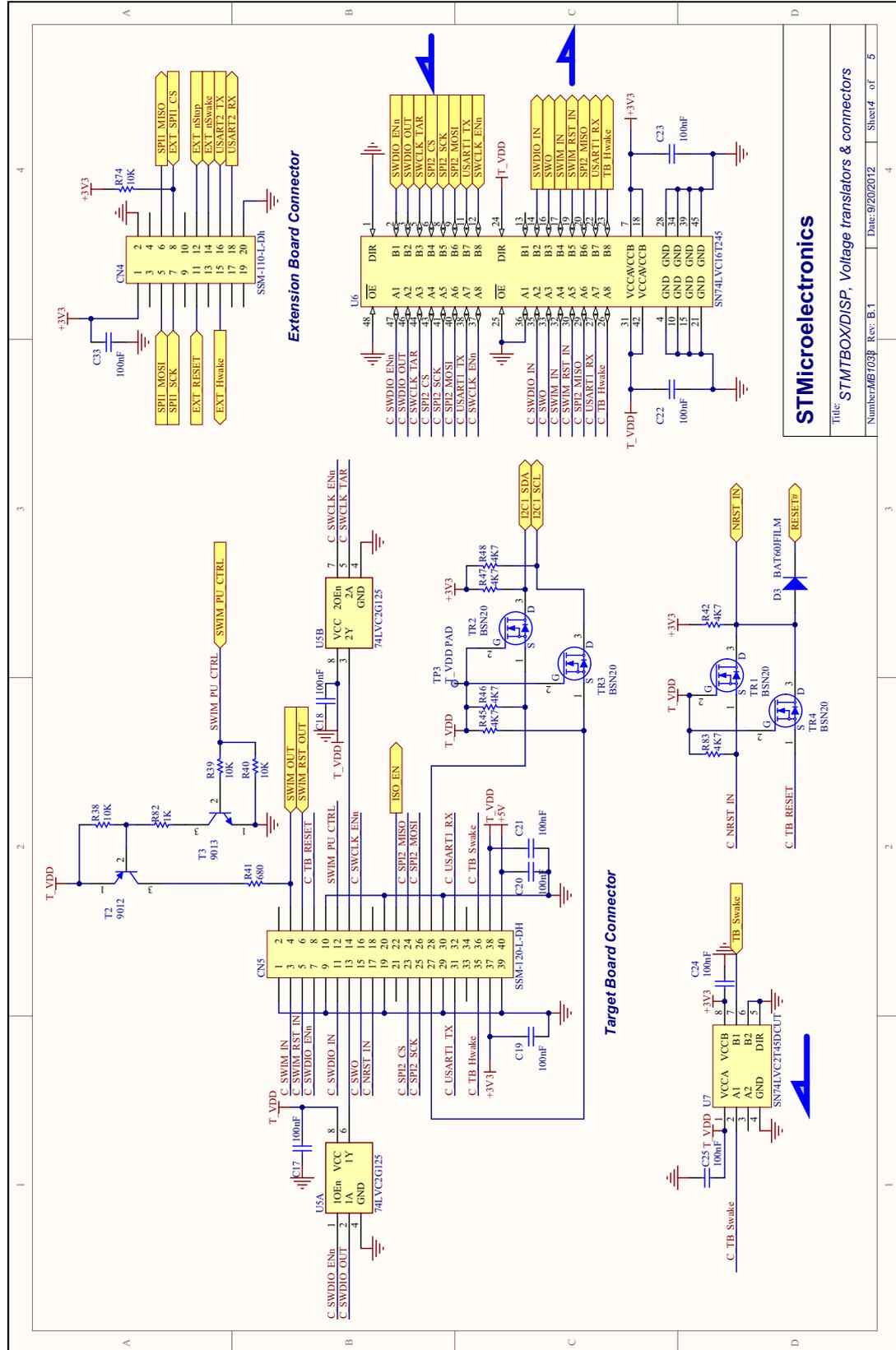
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Figure 21. STMT-BOX display, LCD
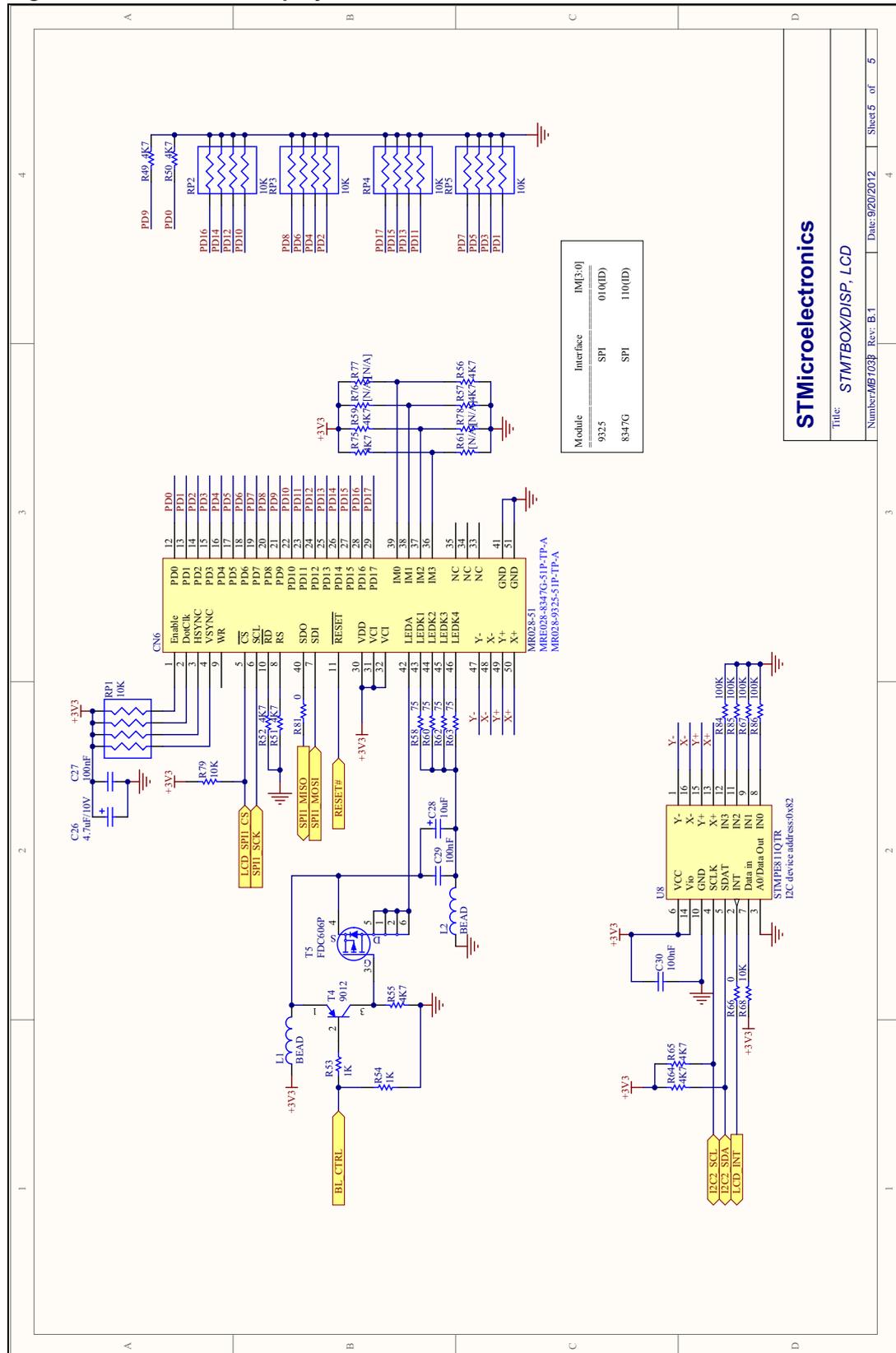
A.2 Isolation board

Figure 22. STMT-BOX isolation, connectors
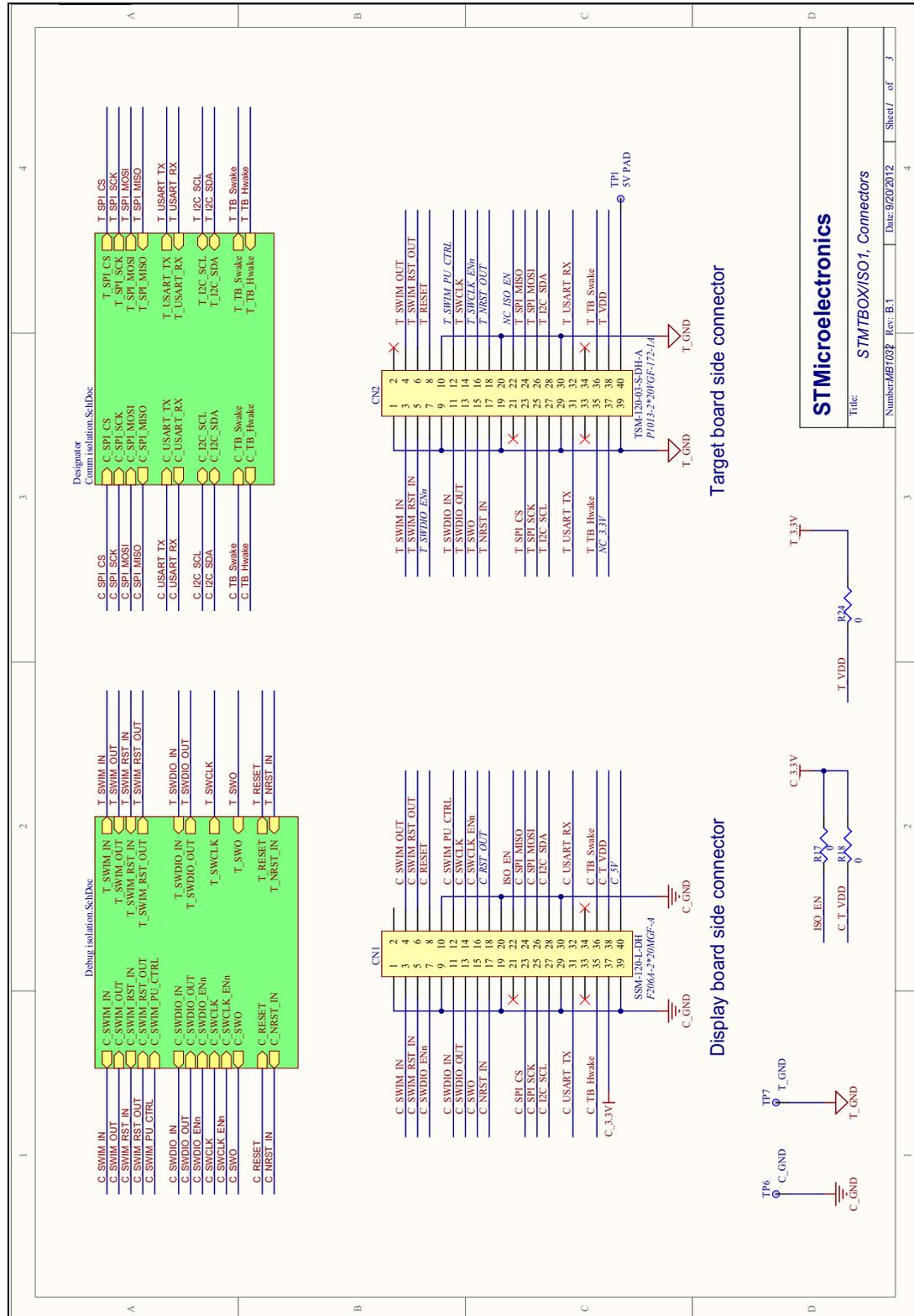
Figure 23. STMT-BOX isolation, communication ports galvanic isolation

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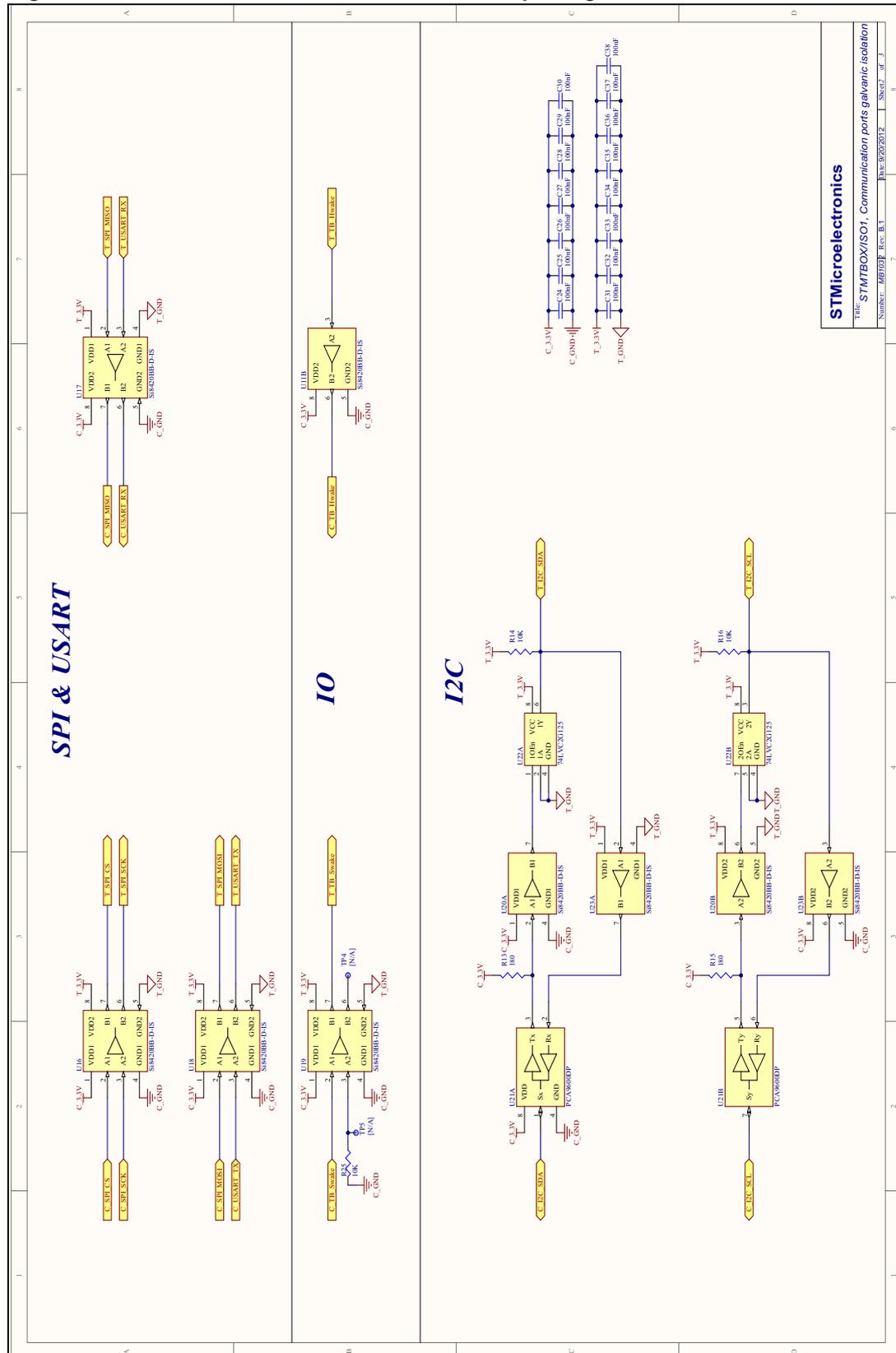
Figure 24. STMT-BOX isolation, debug ports galvanic isolation
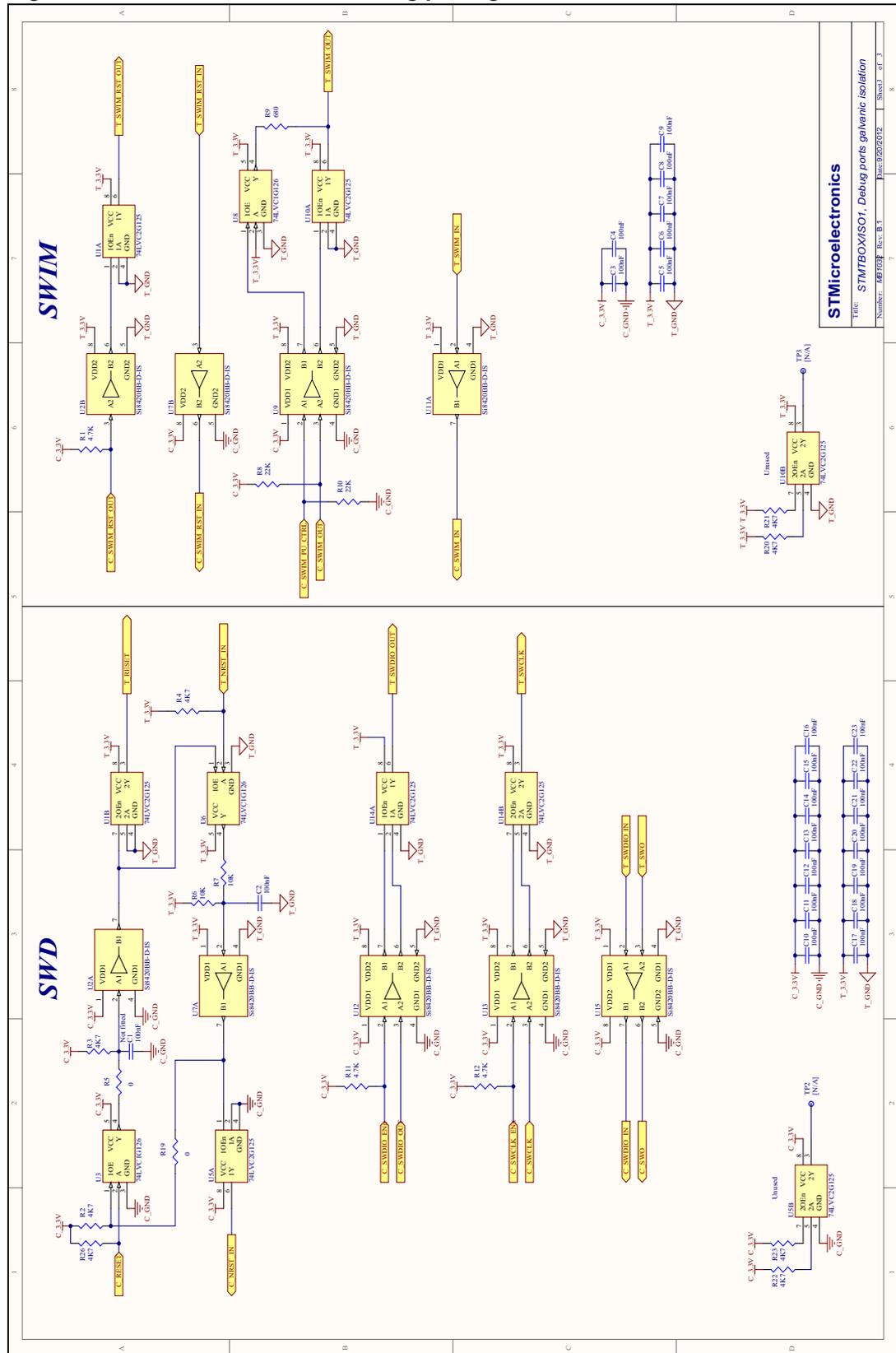
A.3 Touch keypad board

Figure 25. STMT-BOX STM8TL53 touch keypad, touch keypad board
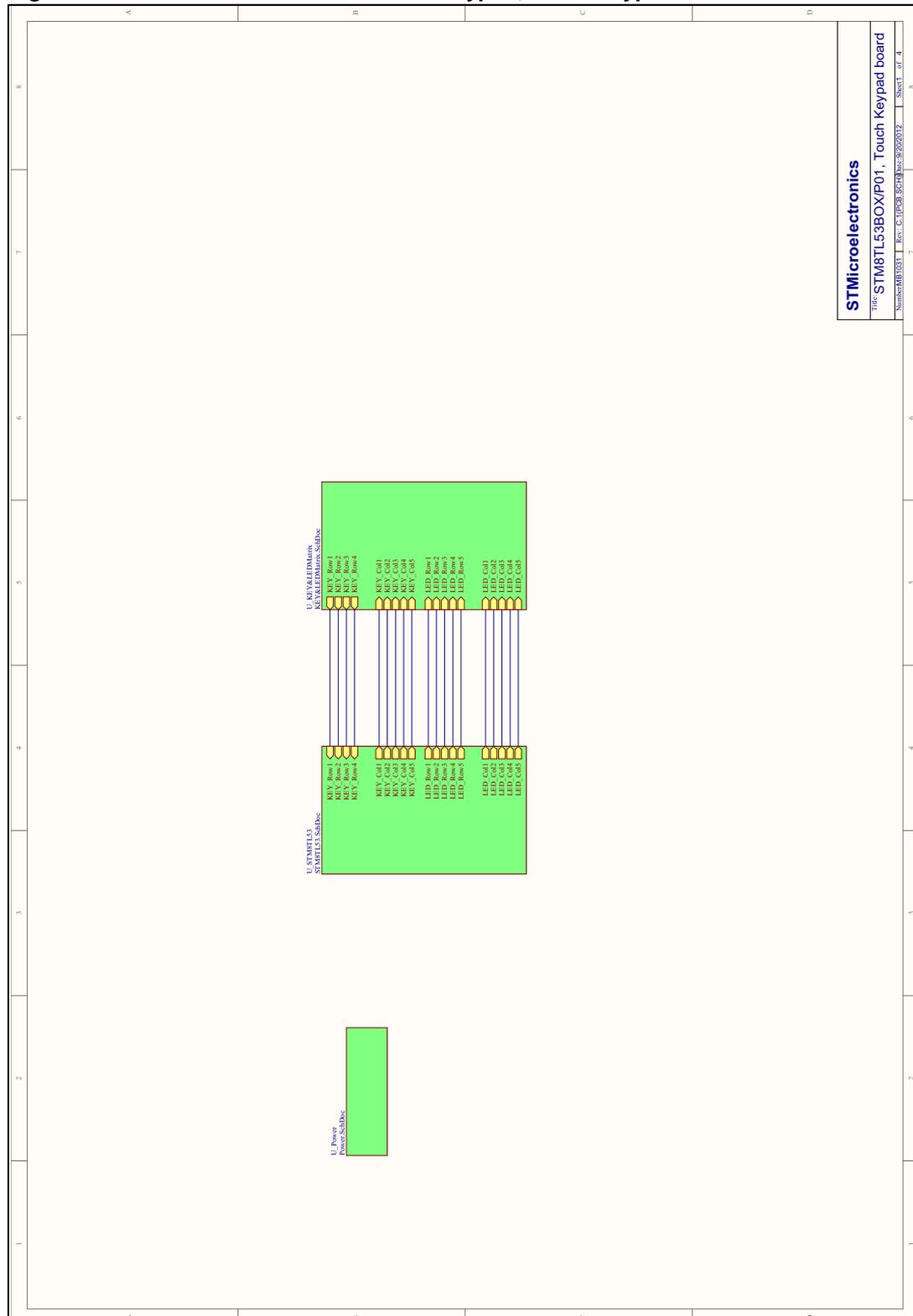
Figure 26.   STMT-BOX STM8TL53 touch keypad, MCU
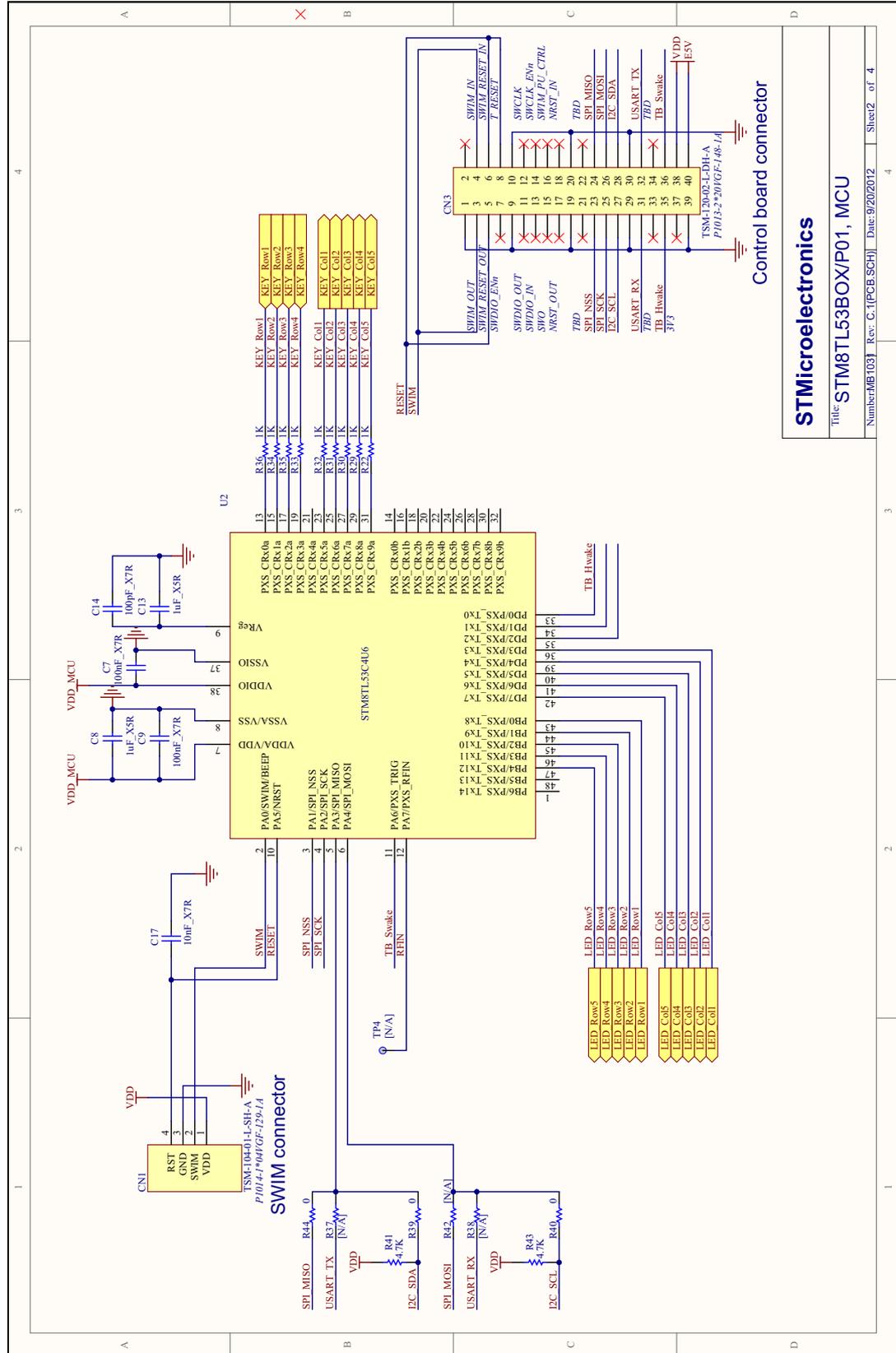
Figure 27. STMT-BOX STM8TL53 touch keypad, key and LED matrix
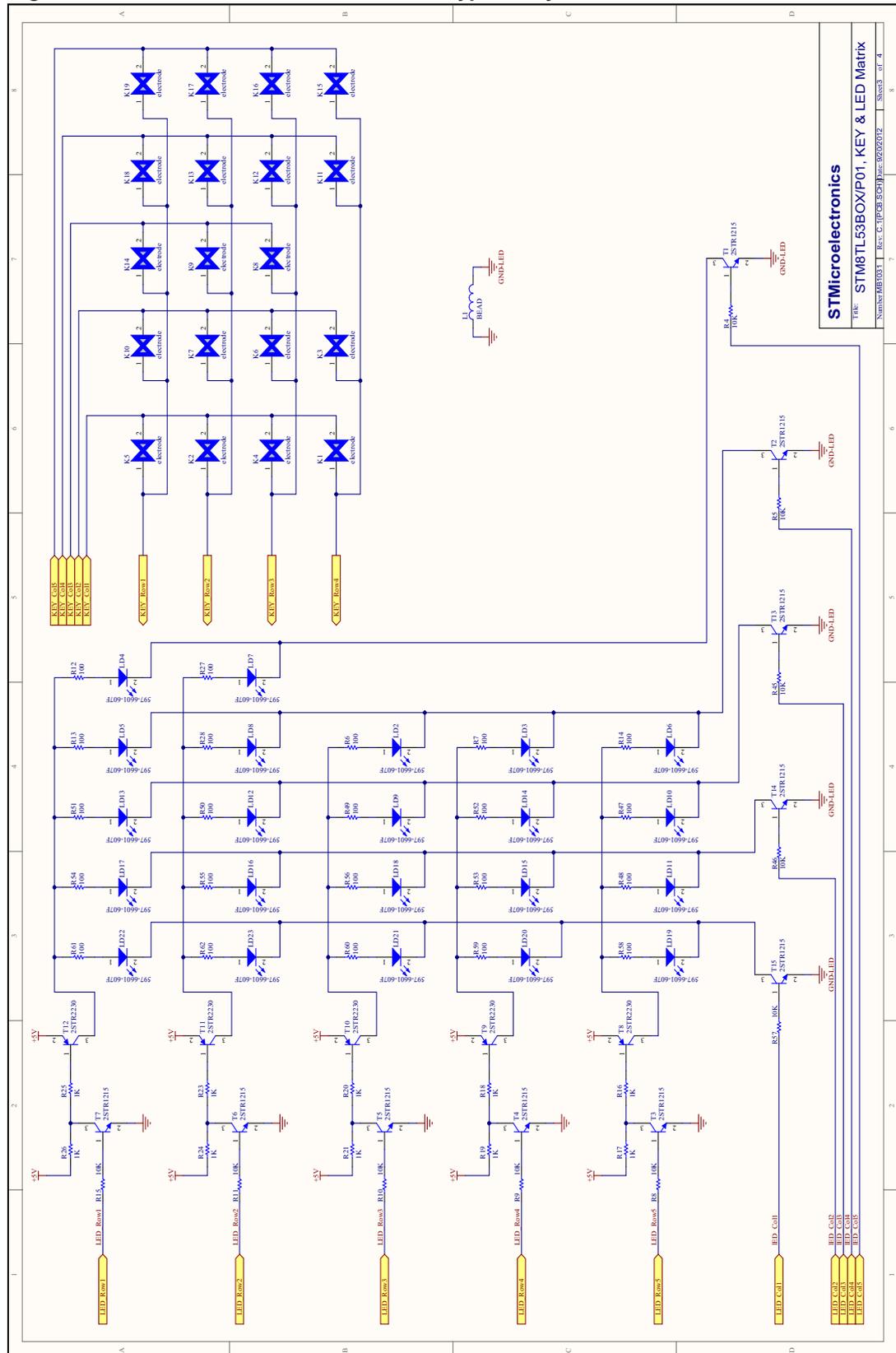
Figure 28.   STMT-BOX STM8TL53 touch keypad, power supply
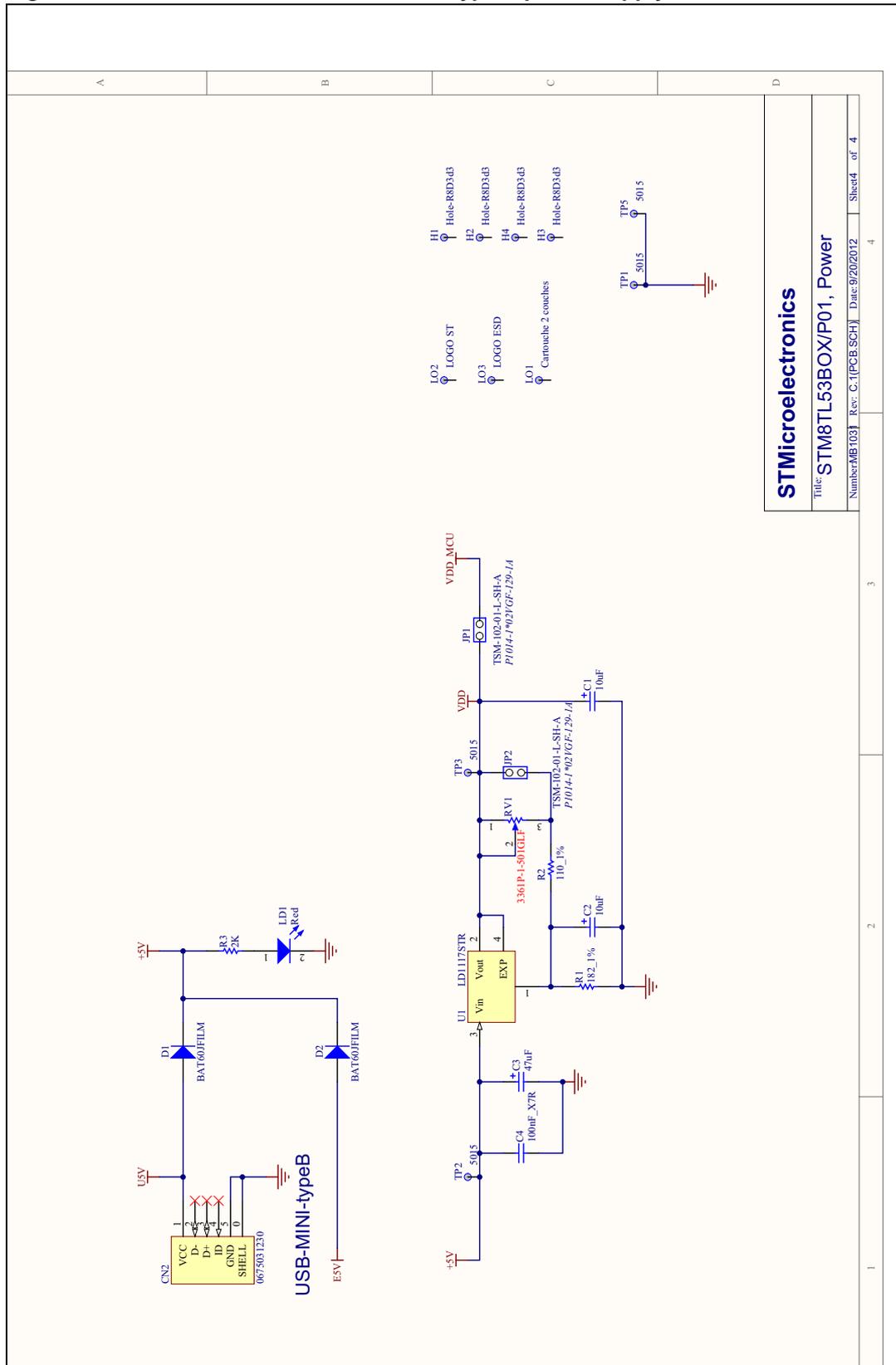
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Appendix B STMT-BOX STM8TL53 touch keypad board MCU IO assignment

Table 12. STMT-BOX STM8TL53 touch keypad board MCU IO assignment

Pin No.	Pin Name	MCU IO Assignment
1	PB6/ PXS_TX14	
2	PA0(1)/SWIM/BEEP	SWIM
3	PA1/SPI_NSS/[TIM3_CH1]	SPI_NSS
4	PA2/SPI_SCK/USART_CK/[TIM3_CH2]	SPI_SCK
5	PA3/SPI_MISO/USART_TX/I2C_SDA	SPI_MISO/USART_TX/I2C_SDA
6	PA4/SPI_MOSI/USART_RX/I2C_SCL	SPI_MOSI/USART_RX/I2C_SCL
7	V_{DD}	V_{DD}
8	V_{SS}	GND
9	PXS_VREG	
10	PA5/NRST(3)	RESET
11	PA6/ PXS_TRIG/CLK_CCO	TB_Swake
12	PA7/PXS_RFIN	RFIN
13	PXS_RX0a	KEY_Row1
14	PXS_RX0b	
15	PXS_RX1a	KEY_Row2
16	PXS_RX1b	
17	PXS_RX2a	KEY_Row3
18	PXS_RX2b	
19	PXS_RX3a	KEY_Row4
20	PXS_RX3b	
21	PXS_RX4a	
22	PXS_RX4b	
23	PXS_RX5a	KEY_Col1
24	PXS_RX5b	
25	PXS_RX6a	KEY_Col2
26	PXS_RX6b	
27	PXS_RX7a	KEY_Col3
28	PXS_RX7b	
29	PXS_RX8a	KEY_Col4
30	PXS_RX8b	
31	PXS_RX9a	KEY_Col5

Table 12.   STMT-BOX STM8TL53 touch keypad board MCU IO assignment

Pin No.	Pin Name	MCU IO Assignment
32	PXS_RX9b	
33	PD0/PXS_TX0	TB_Hwake
34	PD1/PXS_TX1	
35	PD2/PXS_TX2	
36	PD3/PXS_TX3	LED_Col1
37	V_{SSIO}	GND
38	V_{DDIO}	V_{DD}
39	PD4/PXS_TX4/TIM2_CH1	LED_Col2
40	PD5/PXS_TX5/TIM2_CH2	LED_Col3
41	PD6/PXS_TX6/TIM3_CH1	LED_Col4
42	PD7/PXS_TX7/TIM3_CH2	LED_Col5
43	PB0/PXS_TX8/TIM3_ETR	LED_Row1
44	PB1(2)/PXS_TX9/ TIM2_ETR	LED_Row2
45	PB2/PXS_TX10	LED_Row3
46	PB3/PXS_TX11	LED_Row4
47	PB4/PXS_TX12	LED_Row5
48	PB5/PXS_TX13	

Appendix C   STMT-BOX display MCU IO assignment

Table 13.   STMT-BOX STM8TL53 touch keypad board MCU IO assignment

Pin No.	Pin Name	MCU IO Assignment
1	VBAT	
2	PC13-ANTI_TAMP	EXT_RESET
3	PC14-OSC32_IN	OSC32_IN
4	PC15-OSC32_OUT	OSC32_OUT
5	OSC_IN	MCO_IN
6	OSC_OUT	
7	NRST	RESET#
8	V_{SSA}	
9	V_{DDA}	
10	PA0-WKUP	EXT and TB_Hwake
11	PA1	EXT_Hwake
12	PA2	EXT_USART2_TX
13	PA3	EXT_USART2_RX
14	PA4	LCD_SPI1_CS
15	PA5	LCD_EXT_SPI1_SCK
16	PA6	LCD_EXT_SPI1_MISO
17	PA7	LCD_EXT_SPI1_MOSI
18	PB0	LED1_TIM
19	PB1	LED2_TIM
20	PB2	LCD_INT
21	PB10	EXPANDER_I2C2_SCL
22	PB11	EXPANDER_I2C2_SDA
23	V_{SS_1}	
24	V_{DD_1}	
25	PB12	TB_SPI2_CS
26	PB13	TB_SPI2_SCK
27	PB14	TB_SPI2_MISO
28	PB15	TB_SPI2_MOSI
29	PA8	TB_Swake_TIM
30	PA9	TB_USART1_TX
31	PA10	TB_USART1_RX
32	PA11	USB_ DM

Table 13.   STMT-BOX STM8TL53 touch keypad board MCU IO assignment

Pin No.	Pin Name	MCU IO Assignment
33	PA12	USB_ DP
34	PA13	TMS/SWDAT
35	V_{SS_2}	
36	V_{DD_2}	
37	PA14	TCK/SWCLK
38	PA15	TB_Hwake/TDI
39	PB3	EXT_SPI1_CS/TDO
40	PB4	BUZZER_TIM
41	PB5	BACK_LIGHT_CTRL
42	PB6	EXT_nSwake
43	PB7	EXT_nStop
44	BOOT0	
45	PB8	TB_I2C1_SCL
46	PB9	TB_I2C1_SDA
47	V_{SS_3}	
48	V_{DD_3}	

Appendix D Display//isolation/touch connector signals assignment

Table 14.   Display/isolation/touch connector signals assignment

	Touch board		Isolation board (Optional)		Display board
Pin No.	Signal name on CN3	Signal direction	Signal name on CN2	Signal name on CN1	Signal name on CN5
1	Ground	Ground	T_Ground	C_Ground	Ground
3	SWIM_OUT	To display board	T_SWIM_IN	C_SWIM_IN	C_SWIM_IN
5	SWIM_RESET_OUT	To display board	T_SWIM_RESET_IN	C_SWIM_RESET_IN	C_SWIM_RESET_IN
7		From display board to isolation board	Not connected	C_SWDIO_ENn	C_SWDIO_ENn
9	Ground	Ground	T_Ground	C_Ground	Ground
11		To display board	T_SWDIO_IN	C_SWDIO_IN	C_SWDIO_IN
13		To touch board	T_SWDIO_OUT	C_SWDIO_OUT	C_SWDIO_OUT
15		To display board	T_SWO	C_SWO	C_SWO
17		To display board	T_NRST_IN	C_NRST_IN	C_NRST_IN
19	Ground	Ground	T_Ground	C_Ground	Ground
21			Not connected	Not connected	Not connected
23	SPI_NSS	To touch board	T_SPI_CS	C_SPI_CS	C_SPI_CS
25	SPI_SCK	To touch board	T_SPI_SCK	C_SPI_SCK	C_SPI_SCK
27	I2C_SCL	Bidir	T_I2C_SCL	C_I2C_SCL	I2C_SCL
29	Ground	Ground	T_Ground	C_Ground	Ground
31	USART_RX	To display board	T_USART_RX	C_USART_TX	C_USART1_TX
33			Not connected	Not connected	Not connected
35	TB_Hwake	To display board	T_TB_Hwake	C_TB_Hwake	C_TB_Hwake
37		From display board to isolation board	Not connected	C_3.3V	3.3V
39	Ground	Ground	T_Ground	C_Ground	Ground
2			Not connected	Not connected	Not connected
4	SWIM_IN	To touch board	T_SWIM_OUT	C_SWIM_OUT	SWIM_OUT
6	SWIM_RESET_IN	To touch board	T_SWIM_RESET_OUT	C_SWIM_RESET_OUT	SWIM_RESET_OUT
8	T_RESET	To touch board	T_RESET	C_RESET	C_TB_RESET
10	Ground	Ground	T_Ground	C_Ground	Ground

Table 14.   Display/isolation/touch connector signals assignment

	Touch board	Signal direction	Isolation board (Optional)		Display board
Pin No.	Signal name on CN3		Signal name on CN2	Signal name on CN1	Signal name on CN5
12		From display board to isolation board	Not connected	C_SWIM_PU_CTRL	SWIM_PU_CTRL
14		To touch board	T_SWCLK	C_SWCLK	SWCLK
16		From display board to isolation board	Not connected	C_SWCLK_ENn	C_SWCLK_ENn
18			Not connected	Not connected	Not connected
20	Ground	Ground	T_Ground	C_Ground	Ground
22		From isolation board to display board	Not connected	ISO_EN (to C_3.3V)	ISO_EN
24	SPI_MISO	To display board	T_SPI_MISO	C_SPI_MISO	C_SPI_MISO
26	SPI_MOSI	To touch board	T_SPI_MOSI	C_SPI_MOSI	C_SPI_MOSI
28	I2C_SDA	Bidir	T_I2C_SDA	C_I2C_SDA	I2C_SDA
30	Ground	Ground	T_Ground	C_Ground	Ground
32	USART_TX	To touch board	T_USART_TX	C_USART_RX	C_USART1_RX
34			Not connected	Not connected	Not connected
36	TB_Swake	To touch board	T_TB_Swake	C_TB_Swake	C_TB_Swake
38	TB_V_{DD}	To display board	T_V_{DD}	C_T_V_{DD} (to C_3.3V)	T_V_{DD}
40	5V	To touch board	5V PAD (To TP1)	Not connected	5V

5 Revision history

Table 15. Document revision history

Date	Revision	Changes
19-Oct-2012	1	Initial release.

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