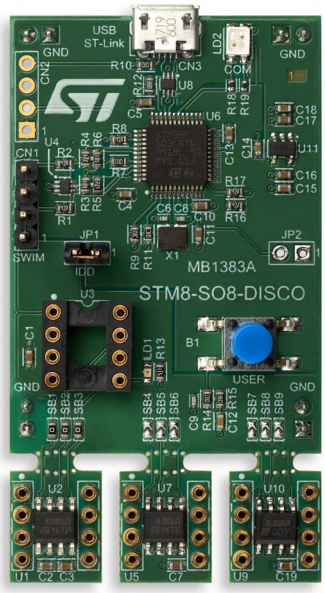
UM2339
User manual

Discovery kit with STM8S001J3M3, STM8L001J3M3 and STM8L050J3M3 MCUs

Introduction

The STM8-SO8-DISCO helps to discover features of STM8S Value Line and STM8L Value Line devices available in SO8 packages. This discovery kit offers three SO8 to DIL8 modules designed with STM8S001J3M3, STM8L001J3M3 and STM8L050J3M3 microcontrollers, and allows the user to easily develop and share applications. It includes an on-board ST-LINK/V2 to debug and program any of the embedded STM8 microcontrollers, or even an external target by means of a SWIM connector. The STM8-SO8-DISCO is operated by simply plugging it into a PC through a standard USB Type-A to Micro-B cable.

Figure 1. STM8-SO8-DISCO (Top view)



1. Picture is not contractual.

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1 Features

- STM8S001J3M3 microcontroller featuring 8 Kbytes of Flash memory, 1 Kbyte of RAM and 128 bytes of Data EEPROM in an SO8 package
- STM8L001J3M3 microcontroller featuring 8 Kbytes of Flash memory including up to 2 Kbytes of Data EEPROM and 1.5 Kbytes of RAM in an SO8 package
- STM8L050J3M3 microcontroller featuring 8 Kbytes of Flash memory, 1 Kbyte of RAM and 256 bytes of Data EEPROM in an SO8 package
- 1 user Led
- 1 user push-button
- Individual and breakable STM8 SO8 to DIL8 module
- DIL8 socket to ease programming of the STM8 MCU
- On-board ST-LINK/V2 debugger/programmer
- Comprehensive free software libraries and examples
- Support of a wide choice of Integrated Development Environments (IDEs) including Cosmic, IAR™, Raisonance, iSYSTEM and STMicroelectronics

2 Product marking

Evaluation tools marked as ‘ES’ or ‘E’ are not yet qualified and therefore they are not ready to be used as reference design or in production. Any consequences deriving from such usage will not be at ST charge. In no event, ST will be liable for any customer usage of these engineering sample tools as reference design or in production.

‘E’ or ‘ES’ marking examples of location:

- On the targeted STM8 that is soldered on the board (for illustration of STM8 marking, refer to the section ‘Package information’ of the STM8 datasheet at *www.st.com*).
- Next to the evaluation tool ordering part number, that is stuck or silkscreen printed on the board

3 System requirements

- Windows® OS (7, 8 and 10)
- USB Type-A to Micro-B cable

4 Development toolchains

- STMicroelectronics: free STVD-STM8 (using Cosmic toolchain)
- IAR™: IAR-EWSTM8
- Cosmic: free IDEA
- Raisonance: RIDE-STM8
- iSYSTEM: winIDEA-STM8

5 Demonstration software

The demonstration software, included in the corresponding STM8 standard peripheral library package, is preloaded in the STM8S001J3M3 Flash memory for easy demonstration of the device peripherals in standalone mode. The latest versions of the demonstration source code and associated documentation can be downloaded from the www.st.com/stm8-discovery web page.

6 Ordering information

To order the STM8-SO8-DISCO kit, refer to *Table 1*.

Table 1. Ordering information

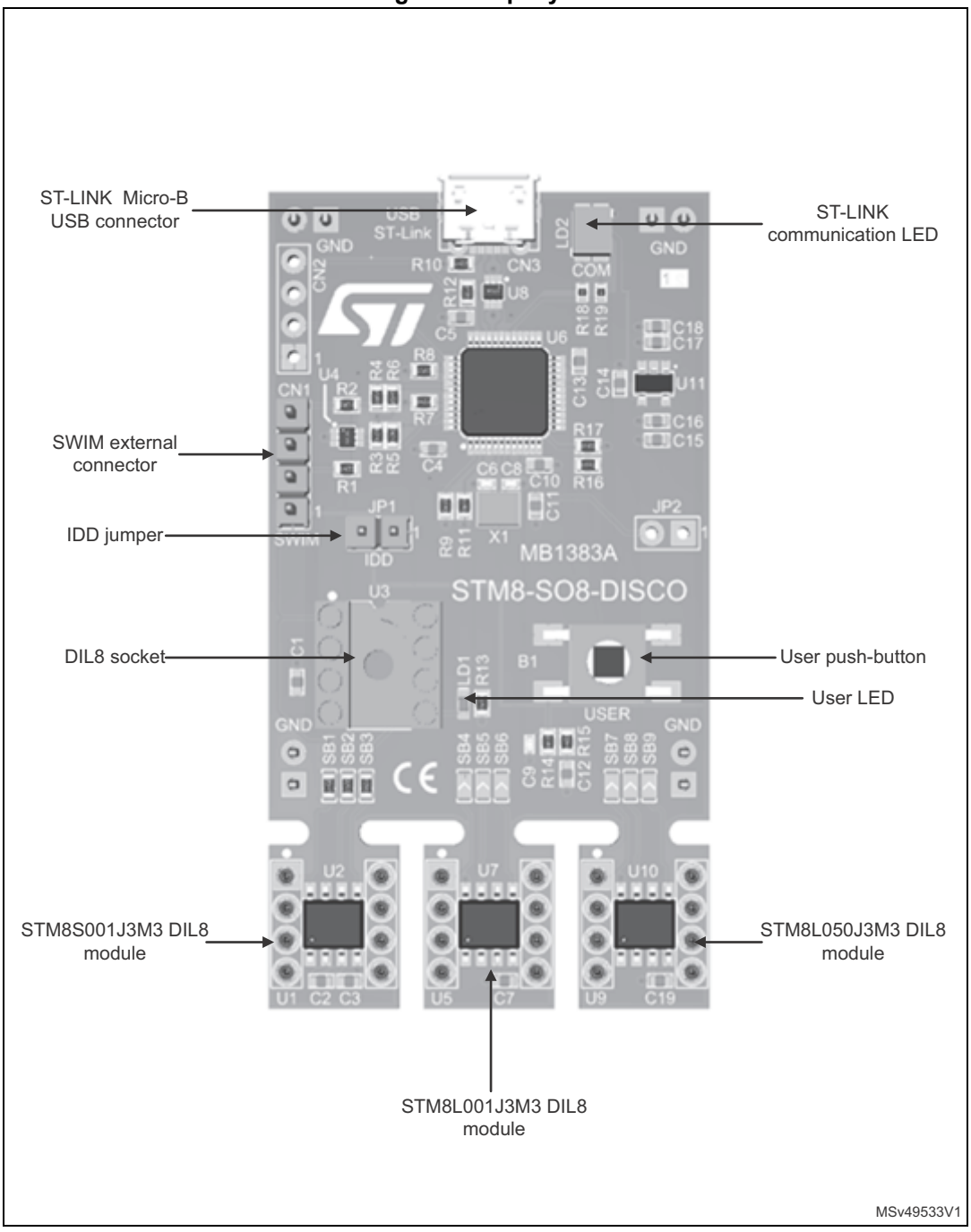
Order code	Target STM8
STM8-SO8-DISCO	STM8S001J3M3 STM8L001J3M3 STM8L050J3M3

7 Hardware layout and configuration

The STM8-SO8-DISCO has been designed around three STM8 microcontrollers available in SO8 package: STM8S001J3M3, STM8L001J3M3 and STM8L050J3M3. To ease the evaluation, each STM8 device is mounted on individual and breakable SO8 to DIL8 module.

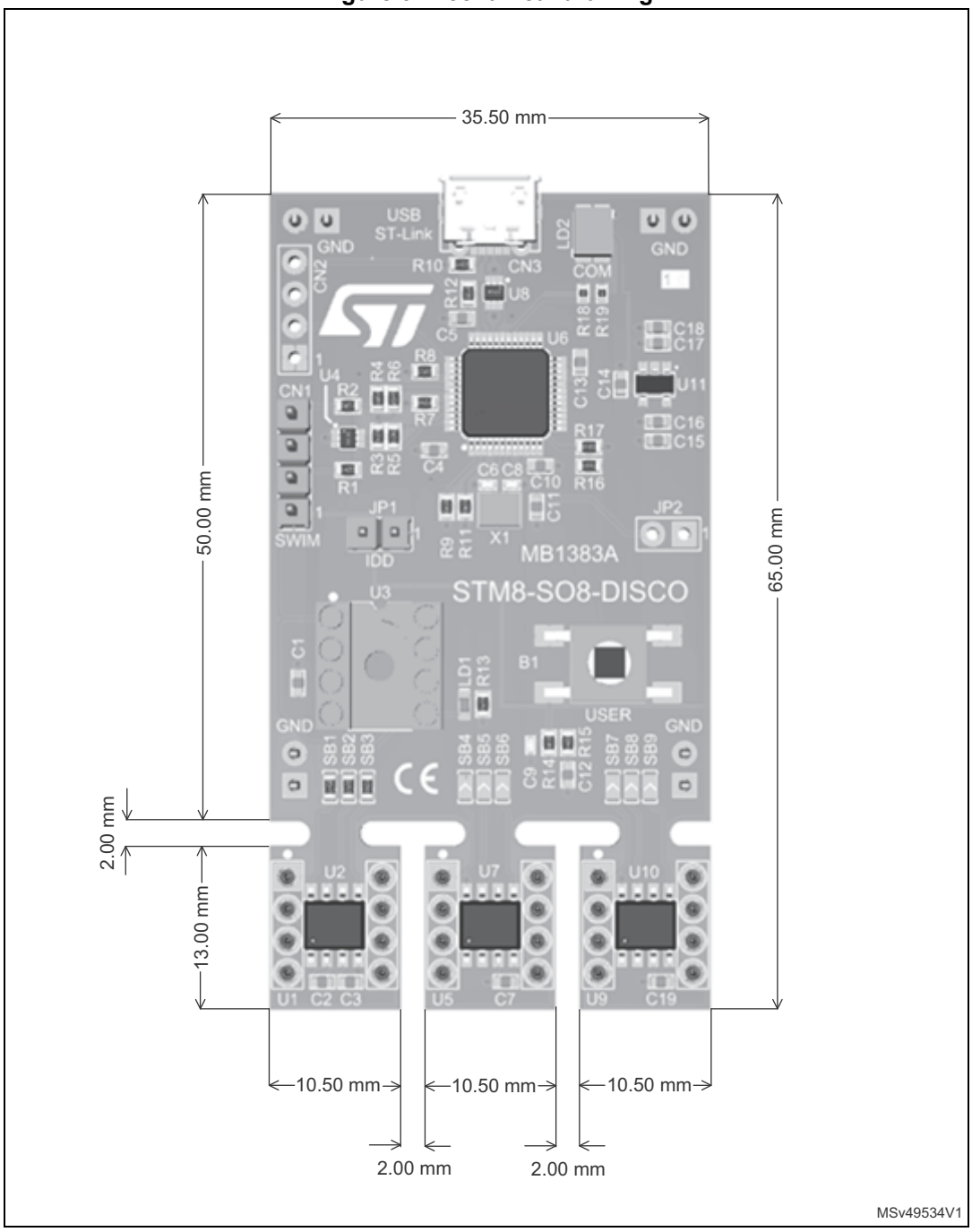
Figure 2 helps users to locate the different features of the STM8-SO8-DISCO board.

Figure 2. Top layout



7.1 Mechanical drawing

Figure 3. Mechanical drawing



7.2 Embedded ST-LINK/V2

The ST-LINK/V2 programming and debugging tool is integrated on the STM8-SO8-DISCO board.

The embedded ST-LINK/V2 can be used in 3 different ways:

- Program/debug one on-board STM8 device by selecting it using the corresponding solder bridges
- Program/debug a STM8 device mounted on a DIL8 module plugged to the socket U3
- Program/debug an external STM8 device mounted on a user application board using a cable connected to SWIM connector (CN1)

The embedded ST-LINK/V2 supports only SWIM for STM8 devices. For information about debugging and programming features refer to ST-LINK/V2 in-circuit debugger/programmer for STM8 and STM32 User manual (UM1075), which describes in details all the ST-LINK/V2 features.

7.2.1 Using the ST-LINK/V2 to program/debug one on-board STM8 device

To program/debug one of the on-board STM8 device, solder bridges must be configured as detailed in below table. In addition, no DIL8 module must be present on the socket U3 and no external target must be connected to CN1.

Table 2. Selecting one on-board STM8

Selected STM8 device	Solder Bridge ON	Solder Bridge OFF
STM8S001J3M3 (U2)	SB1, SB2, SB3	SB4, SB5, SB6, SB7, SB8, SB9
STM8L001J3M3 (U7)	SB4, SB5, SB6	SB1, SB2, SB3, SB7, SB8, SB9
STM8L050J3M3 (U10)	SB7, SB8, SB9	SB1, SB2, SB3, SB4, SB5, SB6

Note: Practically, only SB1, SB4 and SB7 are used to redirect the SWIM signal to the selected STM8 device. But to prevent conflict on GPIOs used for the user push-button and LED, it is preferable to also configure others solder bridges.

7.2.2 Using the ST-LINK/V2 to program/debug a STM8 device on a DIL8 module

To program/debug a STM8 device mounted on a DIL8 module plugged to the socket U3, it is required to set all solder bridges OFF (SB1 to SB9) and no external target must be connected to CN1. The DIL8 socket pinout is detailed *Table 3*.

Table 3. DIL8 socket (U3) pinout

Pin number	Pin name	Description
1	GPIO1/SWIM	Serial wire interface module (SWIM)
2	GPIO2	Not connected
3	GND	Ground
4	VDD	Power supply (+3.3 V)
5	GPIO3/LED	User LED

Table 3. DIL8 socket (U3) pinout (continued)

Pin number	Pin name	Description
6	GPIO4	Not connected
7	GPIO5/BP	User push-button
8	GPIO6	Not connected

Note: When plugging the DIL8 module to the socket, please pay attention to the pin 1.

7.2.3 Using the ST-LINK/V2 to program/debug an external STM8 device

To program/debug an external STM8 device mounted on a user application, it is required to set all solder bridges OFF (SB1 to SB9) and to remove any DIL8 module from the socket U3.

The user application must be connected to the STM8-SO8-DISCO using the SWIM connector (CN1).

Table 4. External SWIM connector (CN1) pinout

Pin number	Pin name	Description
1	NC	Not connected
2	SWIM	Serial wire interface module
3	VSS	Ground
4	NRST	Reset of STM8 device

Note: This program/debug connector is only 3.3 V compliant.

7.2.4 Driver

Before connecting the STM8-SO8-DISCO board to a Windows PC via USB, a driver for the ST-LINK/V2 must be installed. It can be downloaded from the *www.st.com* website.

In case the STM8-SO8-DISCO board is connected to the PC before installing the driver, the PC device manager may report the interface as ‘Unknown’.

To recover from this situation, after installing the dedicated driver, the association of the ‘Unknown’ USB device found on the STM8-SO8-DISCO board to this dedicated driver, must be updated in the device manager manually.

7.2.5 ST-LINK/V2 firmware upgrade

The ST-LINK/V2 embeds a firmware upgrade mechanism for in-situ upgrade through the USB port. As the firmware may evolve during the life time of the ST-LINK/V2 product (for example new functionality, bug fixes, support for new microcontroller families), it is recommended to visit *www.st.com* website before starting to use the STM8-SO8-DISCO board and periodically, in order to stay up-to-date with the latest firmware version.

7.3 Power supply (CN3)

The STM8-SO8-DISCO is designed to be powered using the ST-LINK/V2 USB connector CN3.

7.4 LEDs (LD1 and LD2)

The STM8-SO8-DISCO features a user LED (LD1) connected to the pin 5 of the DIL8 module. To light on this LED, a high logic state must be output on the corresponding STM8 GPIO.

Table 5. User LED port assignment

Selected STM8 device	GPIO assigned to user LED
STM8S001J3M3 (U2)	PA3/PB5
STM8L001J3M3 (U7)	PB3/PB5/PD0
STM8L050J3M3 (U10)	

The tricolor LED (green, orange, red) LD2 (COM) provides information about ST-LINK communication status:

- Slow blinking Red/Off: at power-on before USB initialization
- Fast blinking Red/Off: after the first correct communication between the PC and ST-LINK/V2 (enumeration)
- Red LED On: when the initialization between the PC and ST-LINK/V2-1 is complete
- Green LED On: after a successful target communication initialization
- Blinking Red/Green: during communication with target
- Green On: communication finished and successful
- Orange On: Communication failure

7.5 Push-button (B1)

The STM8-SO8-DISCO offers a user push-button (B1) connected to pin 7 of the DIL8 module. To retrieve the push-button state, the firmware must read the corresponding STM8 GPIO.

Table 6. User push-button port assignment

Selected STM8 device	GPIO assigned to user push-button
STM8S001J3M3 (U2)	PC3/PC4/PC5
STM8L001J3M3 (U7)	PB7/PC0
STM8L050J3M3 (U10)	

The use of the push-button depends on the STM8 device firmware.

7.6 IDD measurement (JP1)

Jumper IDD (JP1) allows to measure the consumption of a STM8 device by removing the jumper and by connecting an ammeter:

- Jumper ON: STM8 device(s) is (are) powered (default).
- Jumper OFF: an ammeter must be connected to measure the STM8 device(s) current. If there is no ammeter, STM8 device(s) is (are) not powered.

Note: By default all STM8 devices are powered. To isolate the power consumption of only one STM8 device, it is required to either cutout the non-required DIL8 modules or to cut all of them and insert the required DIL8 module in the socket U3.

Appendix A STM8S001J3M3 DIL8 module

Table 7. STM8S001J3M3 DIL8 module

DIL8 module pin number	DIL8 module pin name	STM8 SO8 pin number	Description
1	GPIO1/SWIM	8	PC6/PD1/PD3/PD5
2	GPIO2	1	PA1/PD6
3	GND	2	Ground
4	VDD	4	Power supply
5	GPIO3	5	PA3/PB5
6	GPIO4	6	PB4
7	GPIO5	7	PC3/PC4/PC5
8	GPIO6	NC	Not connected
N/A	N/A	3	1.8 V voltage regulator decoupling capacitor

Appendix B STM8L001J3M3 DIL8 module

Table 8. STM8L001J3M3 DIL8 module

DIL8 module pin number	DIL8 module pin name	STM8 SO8 pin number	Description
1	GPIO1/SWIM	1	PA0/PC3/PC4
2	GPIO2	2	PA2/PA4/PA6
3	GND	3	Ground
4	VDD	4	Power supply
5	GPIO3	5	PB3/PB5/PD0
6	GPIO4	6	PB6
7	GPIO5	7	PB7/PC0
8	GPIO6	8	PC1/PC2

Appendix C STM8L050J3M3 DIL8 module

Table 9. STM8L050J3M3 DIL8 module

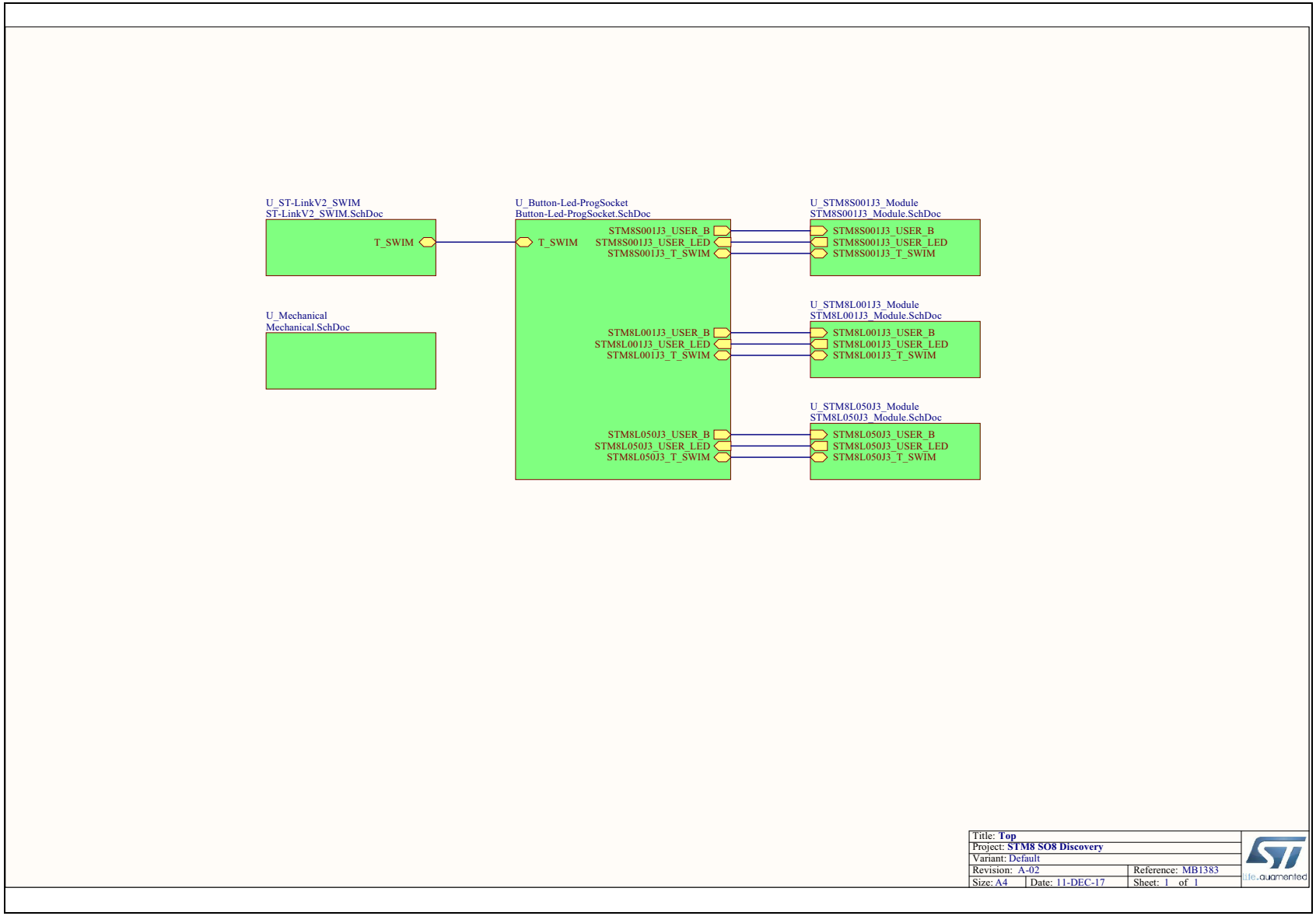
DIL8 module pin number	DIL8 module pin name	STM8 SO8 pin number	Description
1	GPIO1/SWIM	1	PA0/PA2/PC6
2	GPIO2	2	PA3
3	GND	3	Ground
4	VDD	4	Power supply
5	GPIO3	5	PB3/PB5/PD0
6	GPIO4	6	PB6
7	GPIO5	7	PB7/PC0
8	GPIO6	8	PC1/PC4/PC5

Appendix D Electrical schematics

This section provides design schematics of the STM8-SO8-DISCO discovery board:

- *Figure 4: STM8-SO8-DISCO board interconnections*
- *Figure 5: STM8S001J3M3 module*
- *Figure 6: STM8L001J3M3 module*
- *Figure 7: STM8L050J3M3 module*
- *Figure 8: Button, LED and programming socket*
- *Figure 9: ST-LINK/V2*

Figure 4. STM8-SO8-DISCO board interconnections



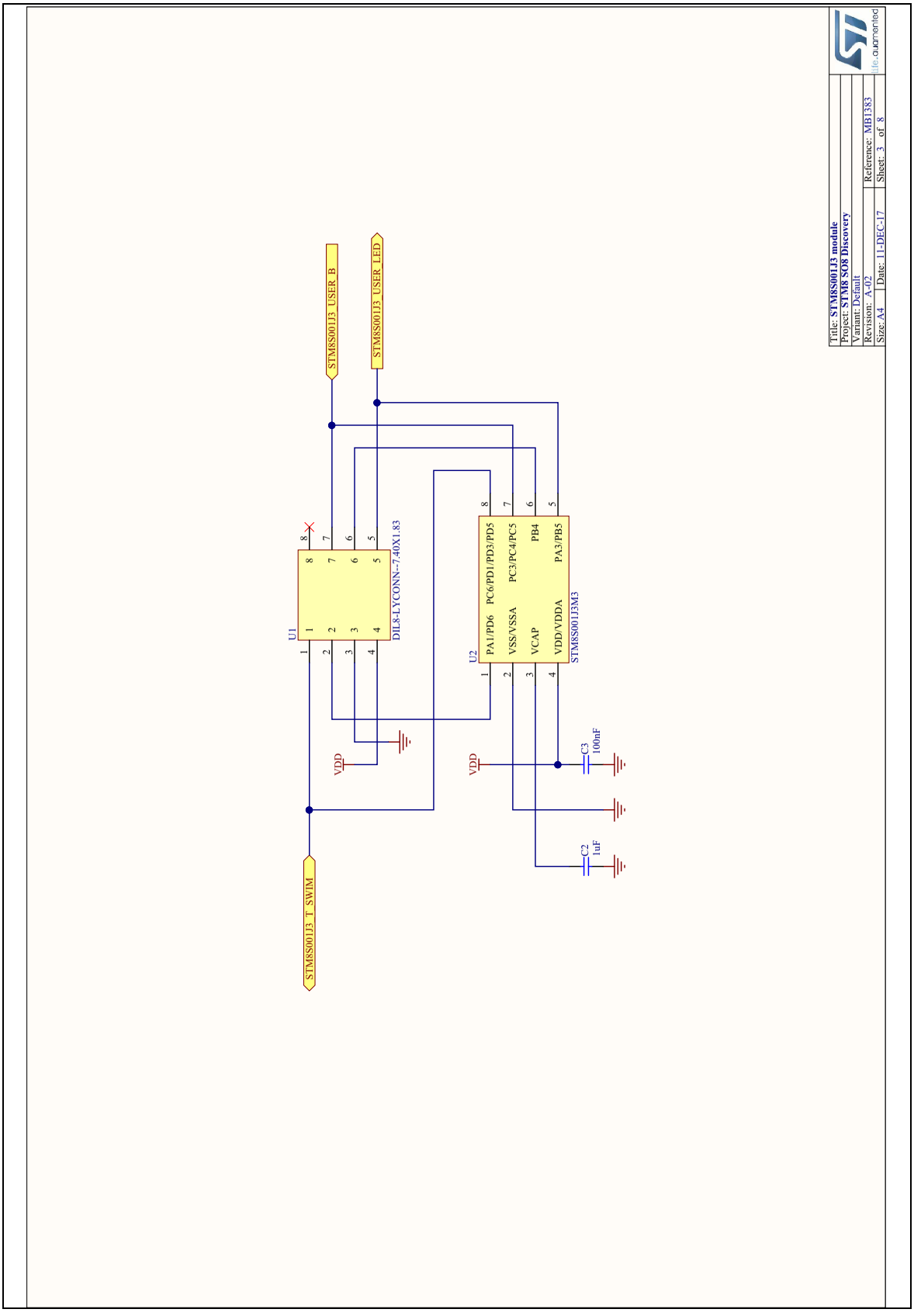


Figure 5. STM8S001J3M3 module

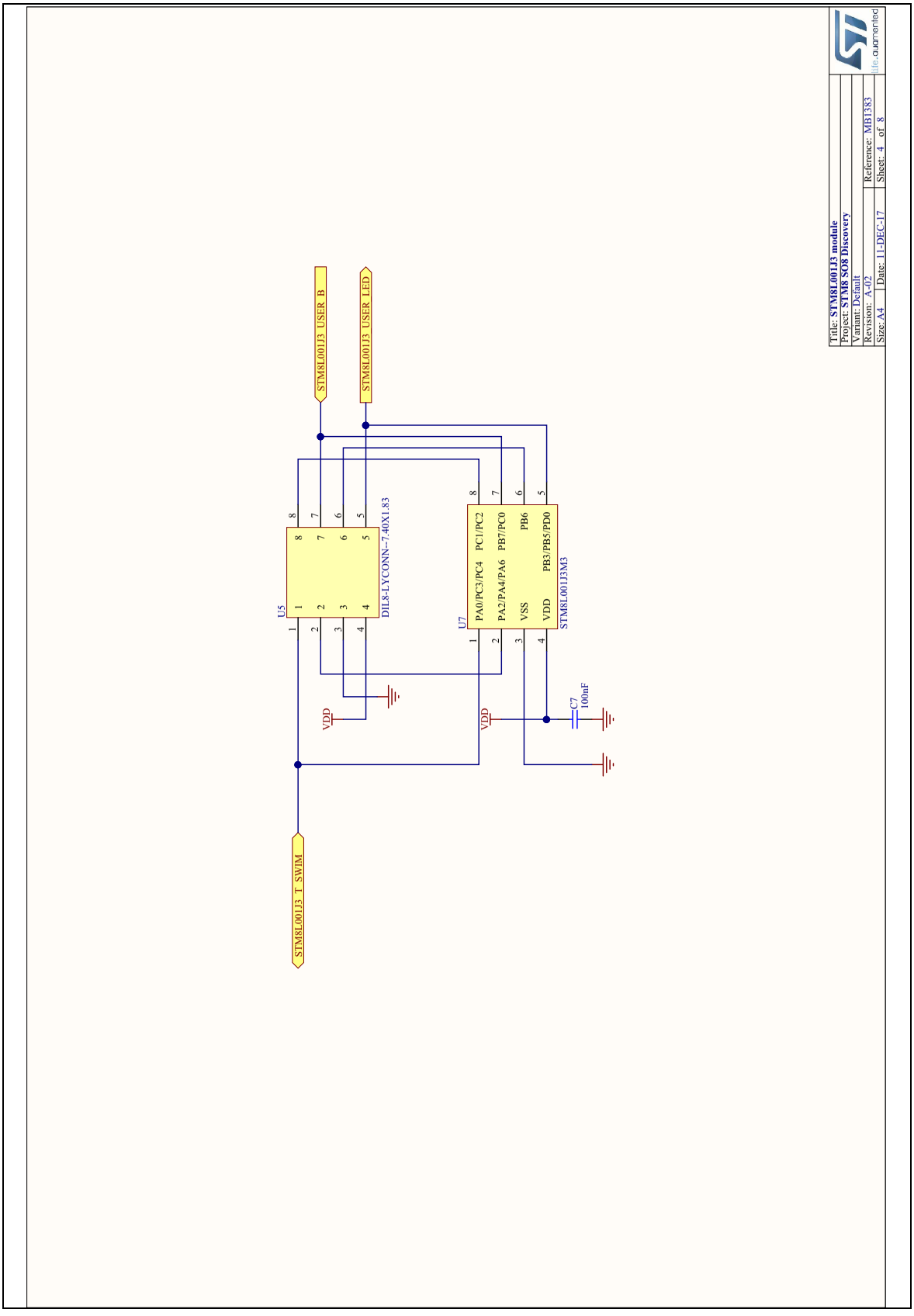


Figure 6. STM8L001J3M3 module

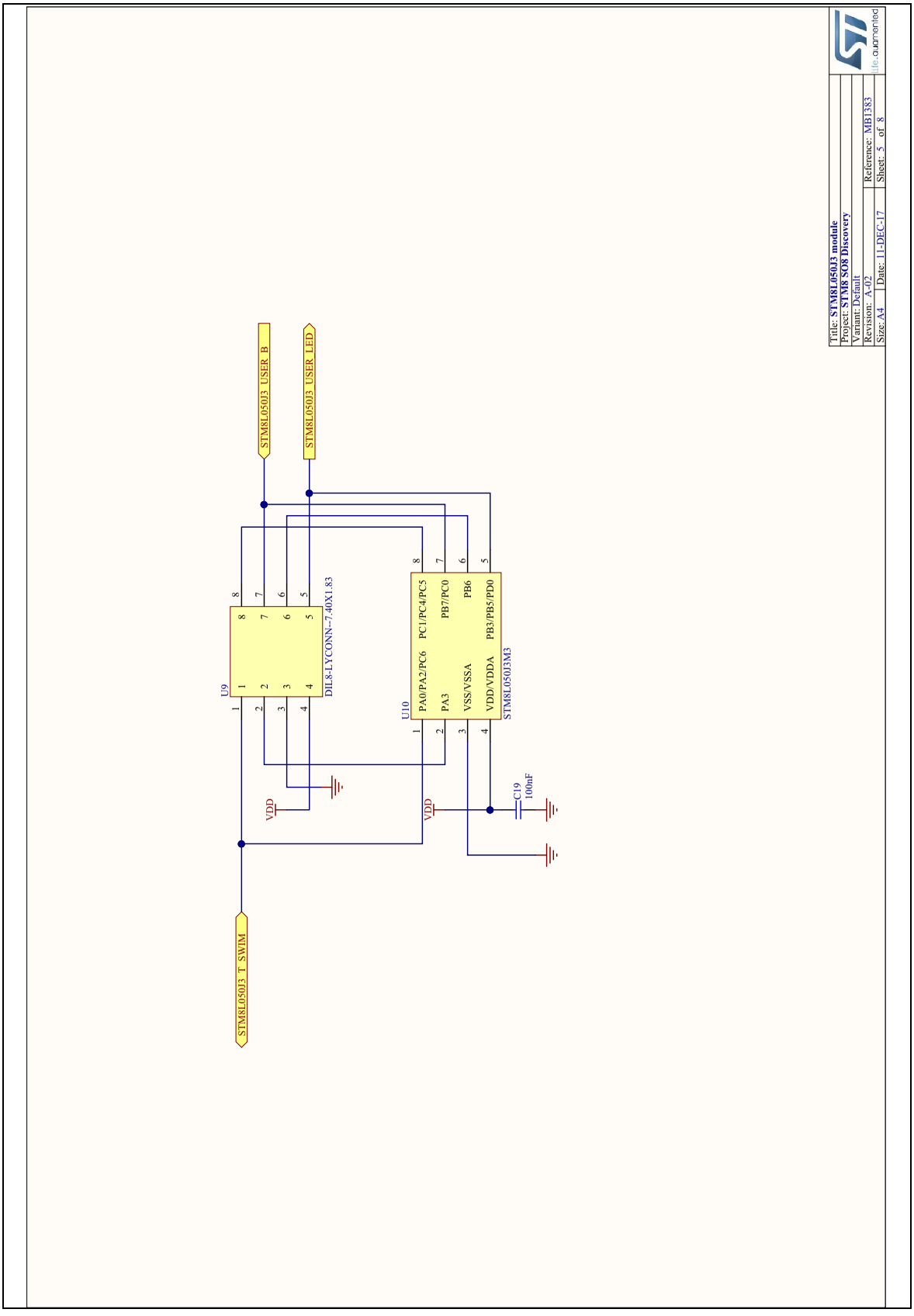


Figure 7. STM8L050J3M3 module

Figure 8. Button, LED and programming socket

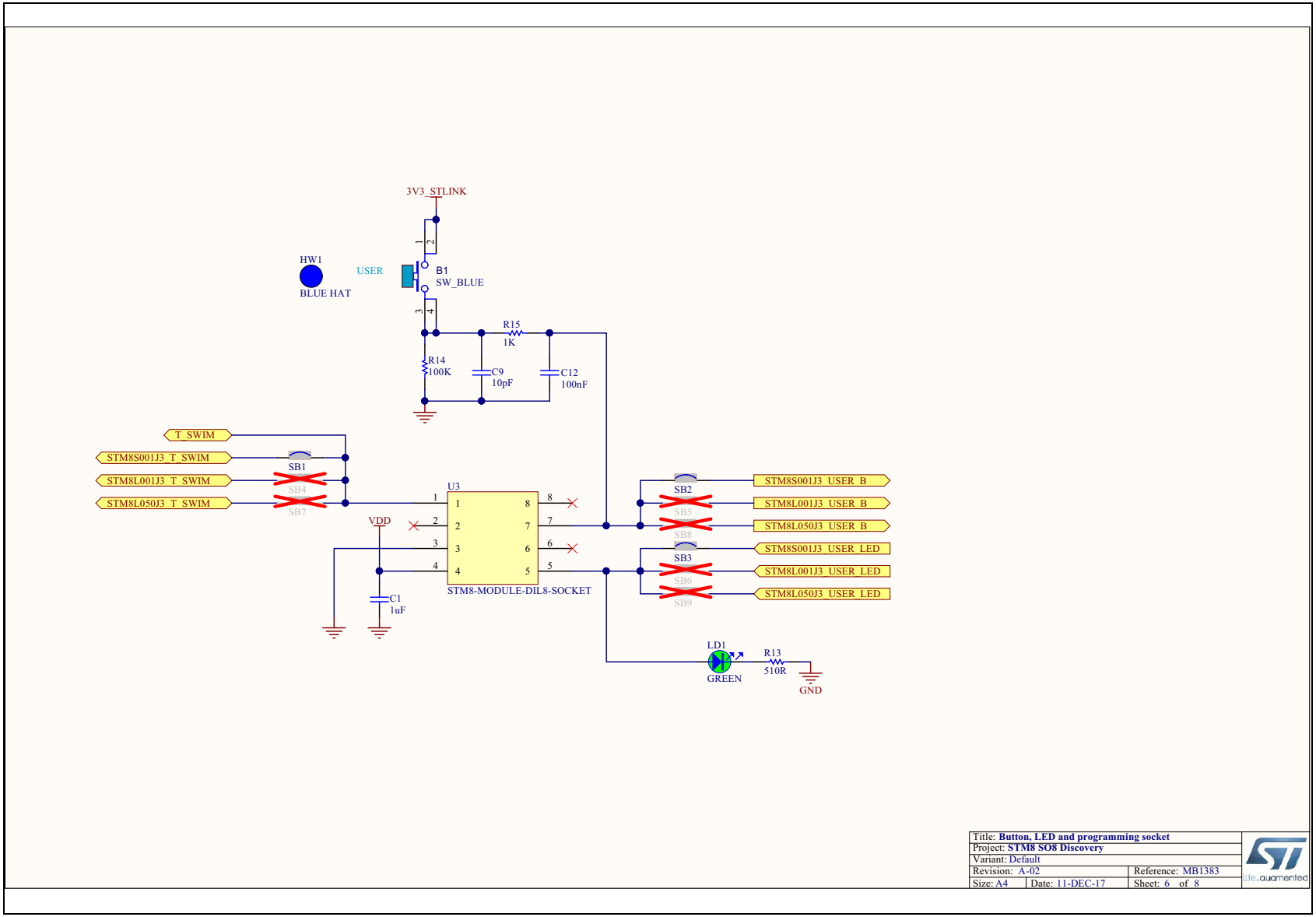
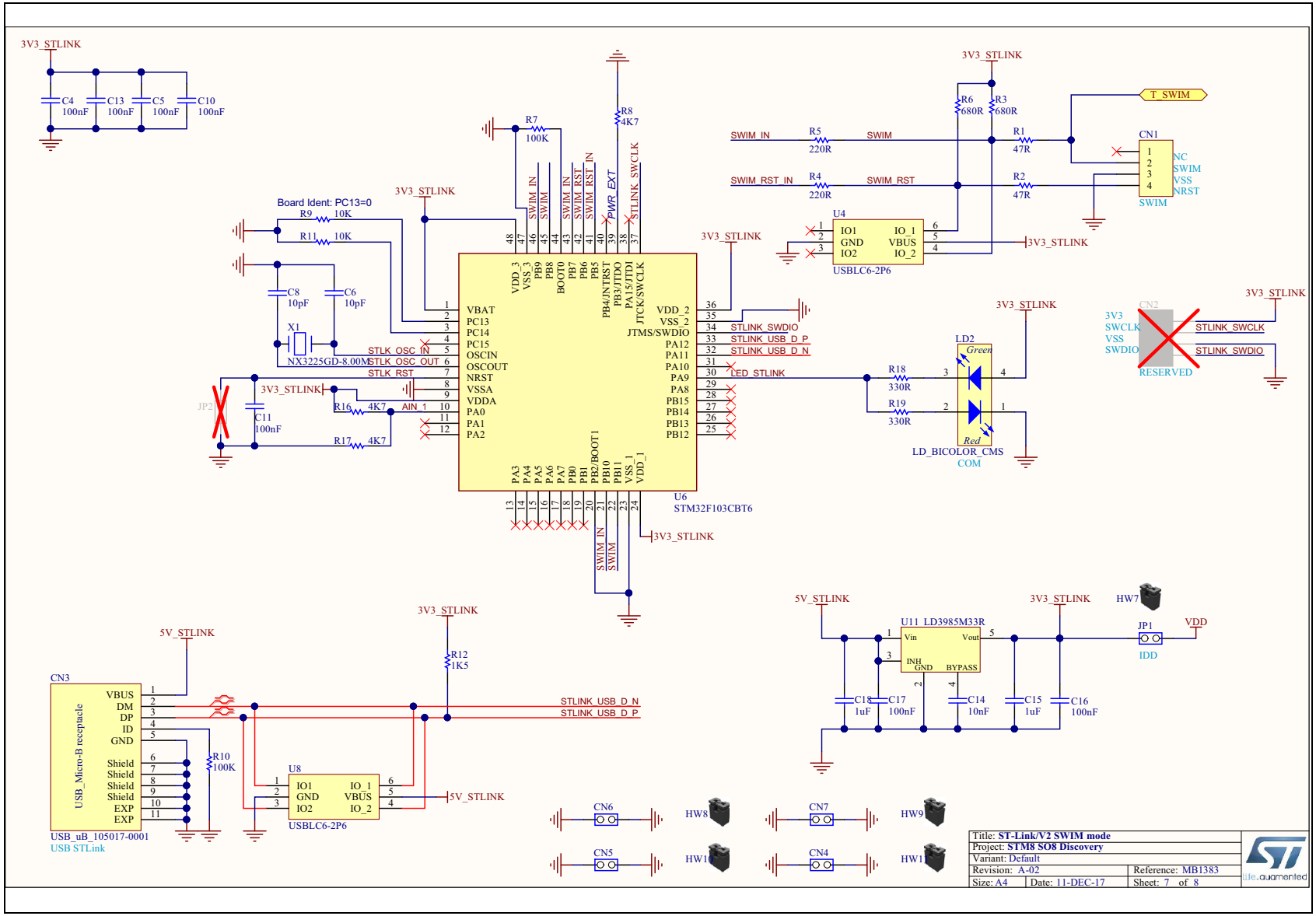


Figure 9. ST-LINK/V2



Appendix E Federal Communications Commission (FCC) and Industry Canada (IC) Compliance

This kit is designed to allow:

1. Product developers to evaluate electronic components, circuitry, or software associated with the kit to determine whether to incorporate such items in a finished product and
2. Software developers to write software applications for use with the end product. This kit is not a finished product and when assembled may not be resold or otherwise marketed unless all required FCC equipment authorizations are first obtained. Operation is subject to the condition that this product not cause harmful interference to licensed radio stations and that this product accept harmful interference. Unless the assembled kit is designed to operate under part 15, part 18 or part 95 of 47 CFR, Chapter I (‘FCC Rules’), the operator of the kit must operate under the authority of an FCC license holder or must secure an experimental authorization under part 5 of this chapter.

Revision history

Table 10. Document revision history

Date	Revision	Changes
19-Mar-2018	1	Initial version