UM0817
User Manual

STM8S-DISCOVERY evaluation board

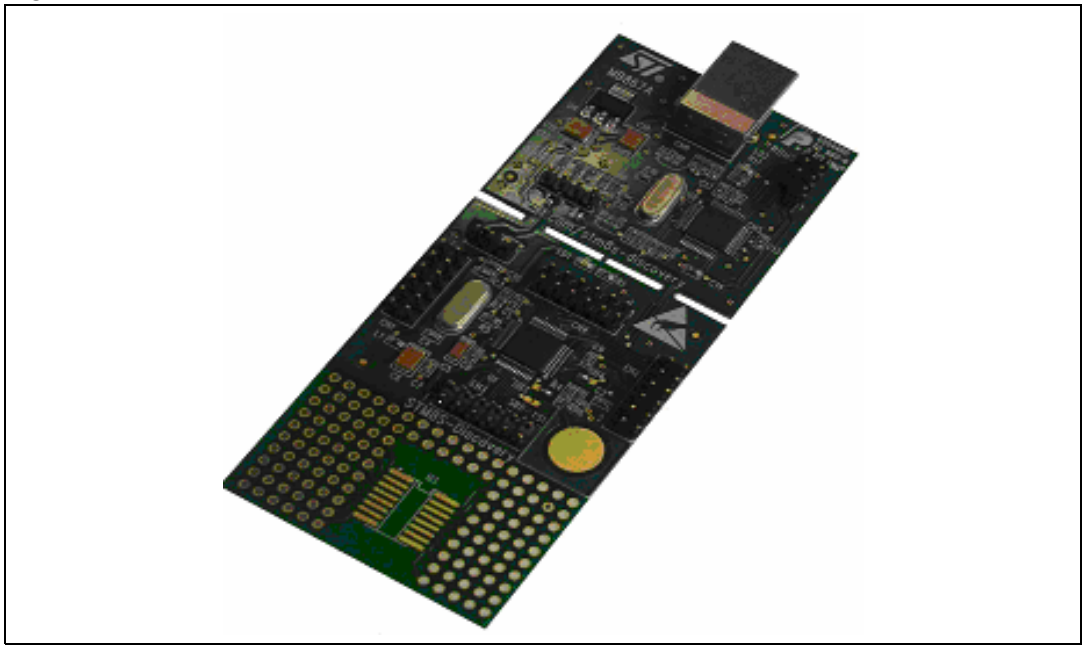
Introduction

STM8S-DISCOVERY is a quick start evaluation board which helps you to discover the STM8 features, and to develop and share your own application. It is based on an STM8S105C6T6 and includes an embedded debugger, ST-LINK, and a touch sensing button. Numerous applications are available.

Features

- STM8S105C microcontroller
- Powered by USB cable between PC and STM8S-DISCOVERY
- Selectable power of 5 V or 3.3 V
- Embedded ST-Link for STM8S
- USB interface for programming and debugging
- SWIM debug support
- Touch Sensing button, TS1
- User LED, LD1
- Extension header for all I/Os
- Wrapping area for users own application

Figure 1. STM8S-DISCOVERY evaluation board



Contents

1 Quick start

It is very simple to get started using the STM8S-DISCOVERY evaluation board, just follow these four steps:

1. Connect the STM8S-DISCOVERY board to a PC with a USB cable.
2. Press the TS1 button, Observe LED LD1 blinking.
3. Press the TS1 button to change blinking speed.
4. Connect to *www.st.com/stm8s-discovery* and follow the tutorial.

The STM8S-DISCOVERY evaluation board helps you to develop and share your own application. You can discover more of the STM8S features by downloading and executing the proposed programs in the project list.

2 Hardware and layout

The STM8S-DISCOVERY evaluation board is designed around the STM8S105C6 microcontroller in an LQFP48 package. It has two distinct sections that may be separated, the STM8S105C6 module and the ST-Link module.

Figure 2 illustrates the connections between the STM8S105C6 and its peripherals (ST-LINK, touch-sensing button, LED and connectors).

Figure 3 helps you to locate these features on the STM8S-DISCOVERY board, as well as the potential point of separation (for more details refer to *Section 2.2.2: Using the ST-Link on other applications*).

Figure 2. Hardware block diagram

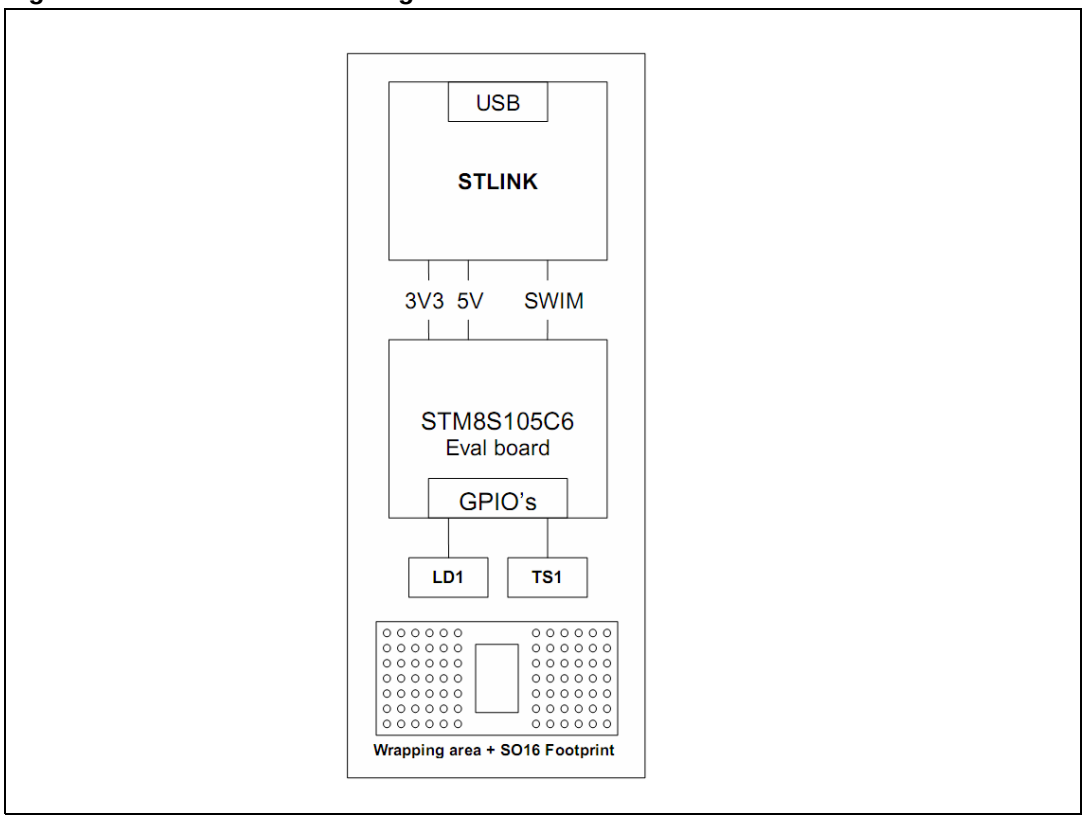
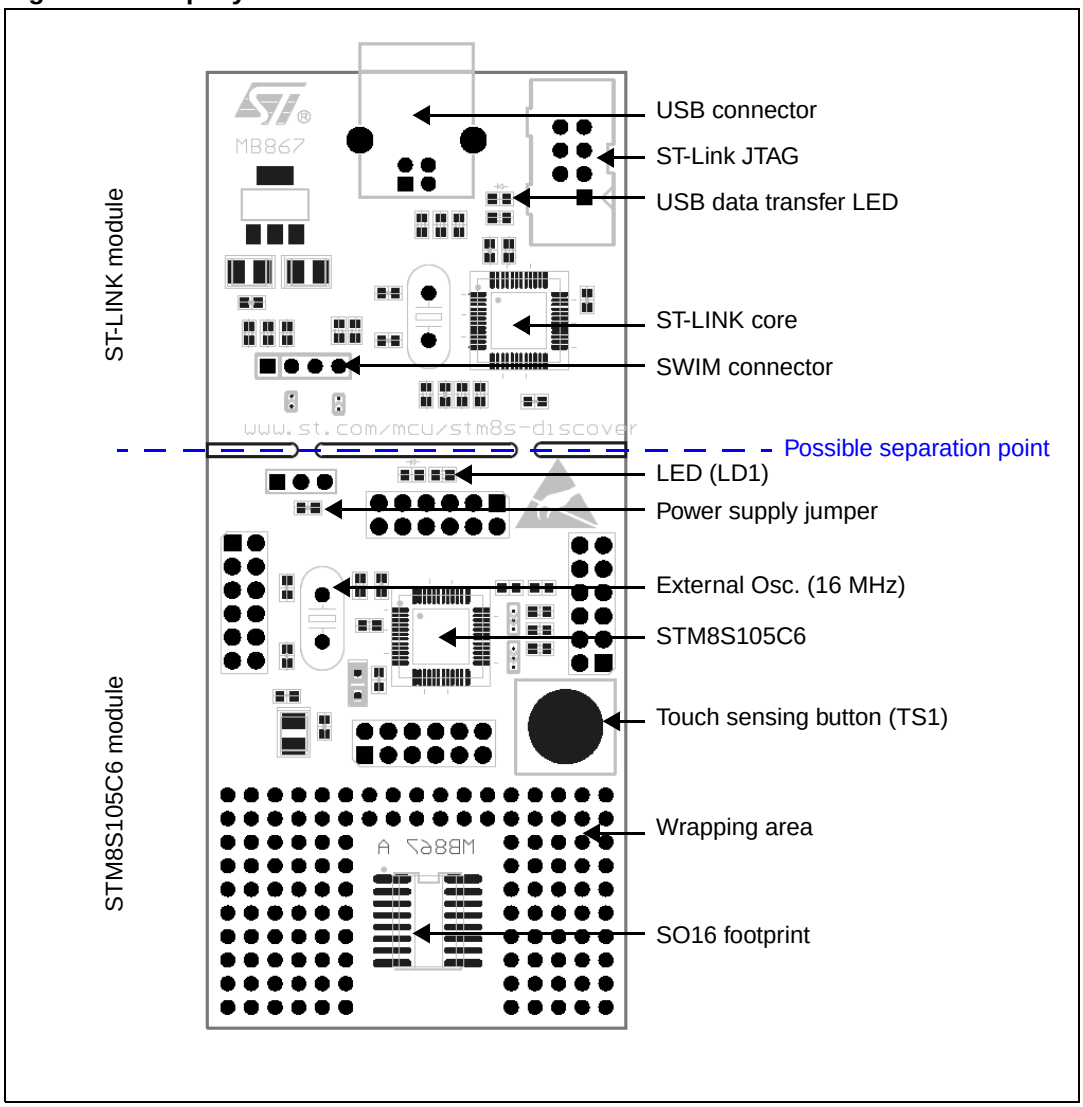
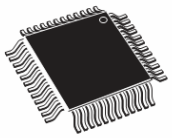


Figure 3. Top layout



2.1 STM8S105C6 microcontroller

Figure 4. STM8S105C6 package



LQFP48 7x7

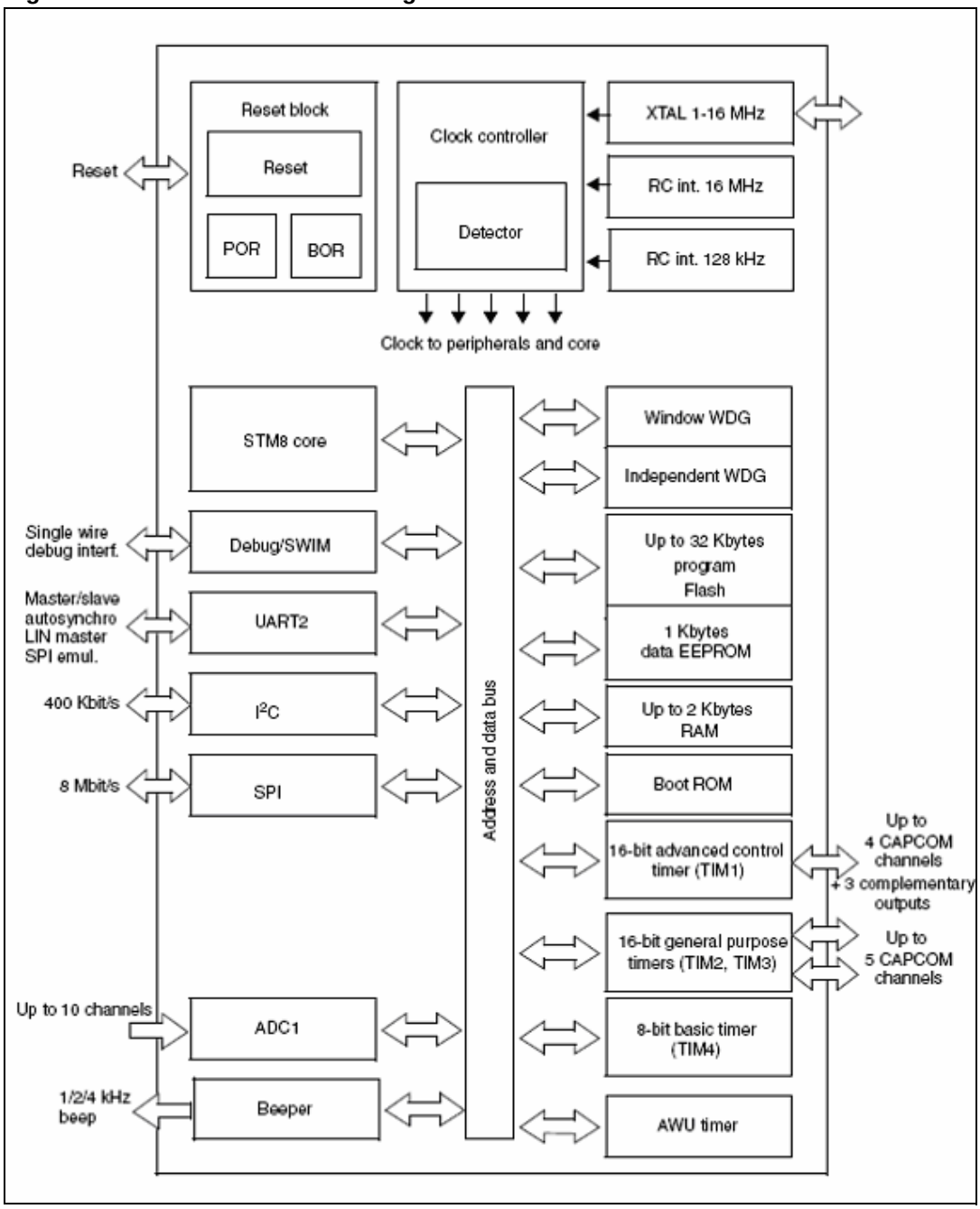
The STM8S105C6 8-bit microcontroller offers:

- 32 Kbytes of Flash program memory, and
- 1 Kbyte true data EEPROM.

This device provides the following benefits:

- Reduced system cost
  - Integrated true data EEPROM for up to 300 K write/erase cycles
  - High system integration level; internal clock oscillators, brown-out reset, watchdog.
- Performance and robustness
  - 16 MHz CPU clock frequency
  - Up to 38 I/Os on a 48-pin package including 16 high sink outputs
  - Robust I/O immune against current injection
  - Independent watchdogs with separate clock source
  - Flexible clock control, 4 master clocks (HSI, LSI, HSE and external HSE)
  - Clock security system
  - A family of products for applications with 2.95 V to 5.5 V operating supply
- Short development cycles
  - Applications scalability across common family product architecture with compatible pinout, memory map and modular peripherals.
  - Full documentation and a wide choice of development tools
  - Standard S/W library for firmware development quick start
  - Numerous application notes and firmware examples available
- Product longevity
  - Advanced core and peripherals made in state-of-the-art technology
  - Low power modes (wait, active-halt, halt)
  - Auto wake-up timer for active halt
  - Permanently active, low consumption
- Other features
  - Nested interrupt controller with 32 interrupts
  - Up to 37 external interrupts on 6 vectors
  - 2 x 16-bit general purpose timers; with 2+3 CAPCOM channels (IC, OC or PWM)
  - Advanced control timer: 16-bit, 4 CAPCOM channels, 3 complementary outputs, dead- time insertion and flexible synchronization
  - 8-bit basic timer with 8-bit prescaler
  - UART with clock output for synchronous operation, Smartcard, IrDA, LIN
  - SPI interface up to 8 Mbit/s
  - I2C interface up to 400 Kbit/s
  - Analog-to-digital converter 10-bit, ±1 LSB ADC with up to 10 multiplexed channels

Figure 5. STM8S105C6 block diagram



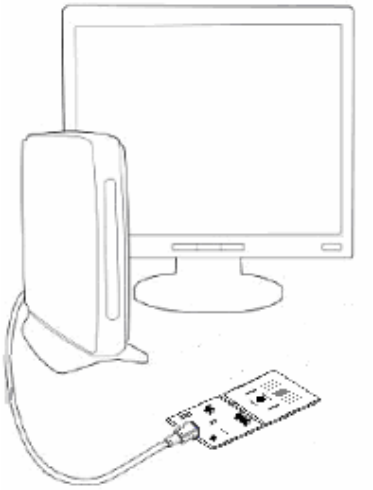
For more information see the complete STM8S documentation.

2.2 ST-Link

The ST-Link provides a USB interface for programming and debugging using a single wire interface module (SWIM). The ST-Link module of the STM8S-DISCOVERY evaluation board also supplies 5 V and 3.3 V to the STM8S105C6 module.

2.2.1 Using the ST-Link

Figure 6. Typical configuration



Hardware requirements:
- USB cable type A to B
- Computer with Windows 2000, XP or Vista OS

Software requirement:
Programming tool chain supporting ST-Link SWIM

Note: The driver for ST-Link is installed automatically when the USB is connected.

For more information about ST-Link debugging and programming features refer to the software and debug documentation.

For information about the SWIM protocol, refer to UM0470.

2.2.2 Using the ST-Link on other applications

You can connect your ST-Link to other applications in 2 ways.

- By removing the solder bridges: This way uses the ST-Link without breaking the PCB: Unsolder the two solder bridges SB1 and SB2 under the SWIM connector. See *Figure 7*. You can re-solder the two bridges at a later date thus keeping the STM8S-DISCOVERY usable.
- By removing it from your board: This way constitutes a good alternative to programming the STM8 devices in other applications. See *Figure 8*.

Figure 7. ST-Link alternative

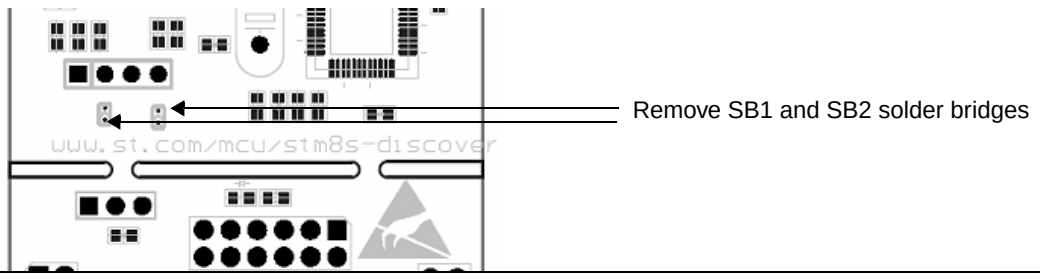
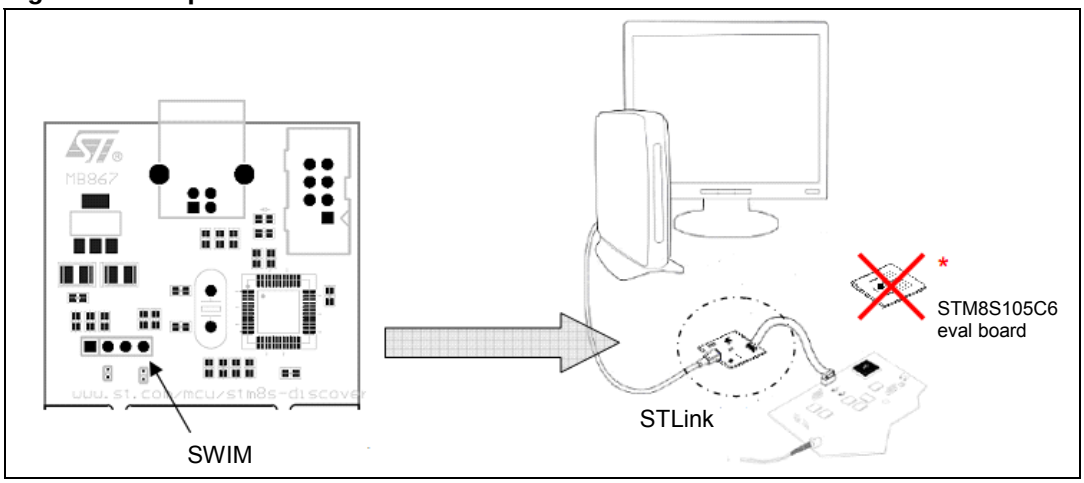


Figure 8. Separated ST-Link module



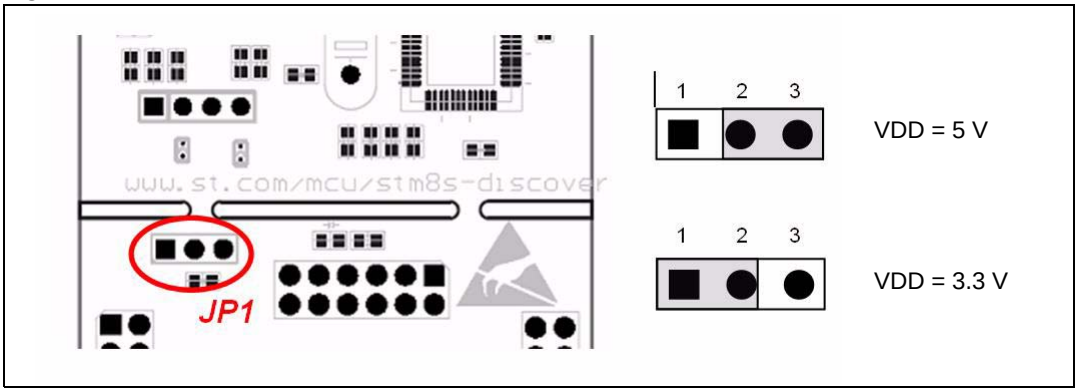
Warning: **By removing this module you will lose power supply on the STM8S105C6 evaluation board. In consequence, you will not be able to program and use the STM8S105C6 evaluation board without a SWIM cable and an external power supply.**

To reconnect your STM8S105C6 use connector CNn see *Section 3: Daughter board connection*.

2.3 Power supply and power selection

The power supply is provided by a USB connector. Jumper JP1 selects the VDD value (5 V or regulated 3.3 V) see *Figure 9*.

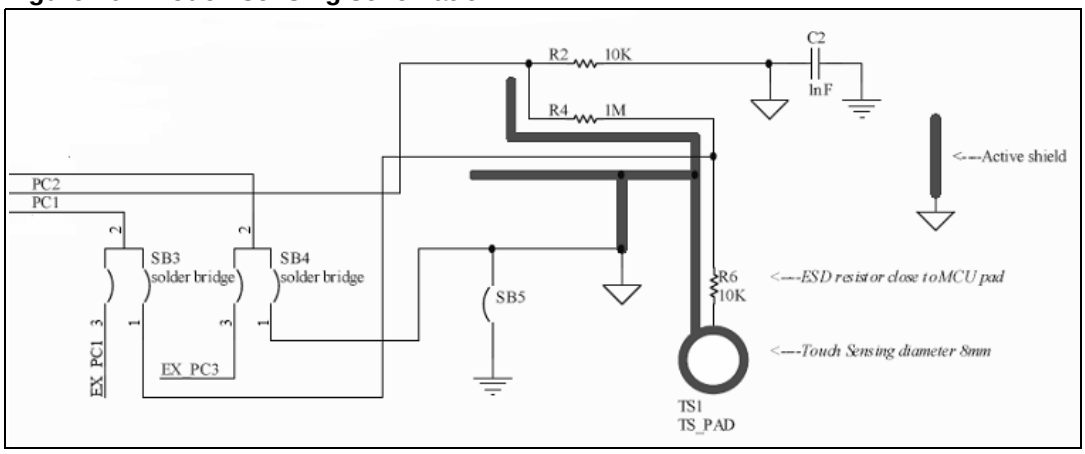
Figure 9. Power selection



2.4 Single touch sensing

A touch sensing button TS1 is available on the STM8S-DISCOVERY evaluation board (see *Figure 10*).

Figure 10. Touch sensing schematic



To disable the touch sensing interface and to use PC1, PC2 and PC3 as standard I/O, you need to unsolder the 2-1 connection and solder 2-3 connection on SB4 and SB3, you also need to unsolder the R2 resistor.

RC acquisition principle

The RC acquisition method detects a human touch on key touch sensor (TS1) by measuring the small variation of the touch electrode capacitance (C2). Electrode capacitance C2 is periodically charged and discharged through a fixed resistor (R2).

The capacitance value depends on the following parameters: electrode area (A), relative dielectric constant of the insulator (eR), the relative permittivity of air (e0) and the distance between the two electrodes.

For more information about touch sensing please refer to AN2927.

3 Daughter board connection

Four 12-pin male headers CN1, CN2, CN3 and CN4 are connected to the STM8S105C6 microcontroller. See the following tables for pin assignments.

Table 1. CN1 pinout

Pin number (Cn1)	Pin number (chip)	Pin name	Type	Main function	Alternate function
1	1	NRST	IO	Reset	
2	2	OSCIN/PA1	IO	Port A1	
3	3	OSCOUT/PA2	IO	Port A2	
4	4	Vssio_1	S	I/O ground	
5	5	Vss	S	Digital ground	
6	6	VCAP	S	1.8V regulator capacitor	
7	7	Vdd	S	Digital power supply	
8	8	Vddio_1	S	I/O power supply	
9	9	PA3	IO	Port A3	
10	10	PA4	IO	Port A4	
11	11	PA5	IO	Port A5	
12	12	PA6	IO	Port A6	

Table 2. CN2 pinout

Pin number (Cn2)	Pin number (chip)	Pin name	Type	Main function	Alternate function
1	25	PE5	IO	Port E5	SPI master / slave
2	26	PC1/TS1	IO	Port C1	Timer 1 - channel 1 / UART2 synchronous clock
3	27	PC2/TS1_load	IO	Port C2	Timer 1 - channel2
4	28	PC3	IO	Port C3	Timer 1 - channel 3
5	29	PC4	IO	Port C4	Timer 1 - channel 4
6	30	PC5	IO	Port C5	SPI clock
7	31	Vssio_2	S	I/O ground	
8	32	Vddio_2	S	I/O power supply	
9	33	PC6	IO	Port C6	SPI master out / slave in
10	34	PC7	IO	Port C7	SPI master in / slave out
11	35	PG0	IO	Port G0	
12	36	PG1	IO	Port G1	

Table 3. CN3 pinout

Pin number (Cn3)	Pin number (chip)	Pin name	Type	Main function	Alternate function
1	13	Vdda	S	Analog power supply	
2	14	Vssa	S	Analog ground	
3	15	PB7	IO	Port B7	Analog input 7
4	16	PB6	IO	Port B6	Analog input 6
5	17	PB5	IO	Port B5	Analog input 5
6	18	PB4	IO	Port B4	Analog input 4
7	19	PB3	IO	Port B3	Analog input 3
8	20	PB2	IO	Port B2	Analog input 2
9	21	PB1	IO	Port B1	Analog input 1
10	22	PB0	IO	Port B0	Analog input 0
11	23	PE7	IO	Port E7	Analog input 8
12	24	PE6	IO	Port E6	Analog input 9(2)

Table 4. CN4 pinout

Pin number (Cn4)	Pin number (chip)	Pin name	Type	Main function	Alternate function
1	37	PE3	IO	Port E3	Timer 1 – break Input
2	38	PE2	IO	Port E2	I2C data
3	39	PE1	IO	Port E1	I2C clock
4	40	PE0	IO	Port E0	Configurable clock output
5	41	PD0/LED	IO	Port D0	Timer 3 - channel 2
6	42	PD1/SWIM	IO	Port D1	SWIM data interface
7	43	PD2	IO	Port D2	Timer 3 - channel 1
8	44	PD3	IO	Port D3	Timer 2 - channel 2
9	45	PD4	IO	Port D4	Timer 2 - channel 1
10	46	PD5	IO	Port D5	UART2 data transmit
11	47	PD6	IO	Port D6	UART2 data receive
12	48	PD7	IO	Port D7	Top level interrupt

4 Electrical schematics

Figure 11. STM8S-DISCOVERY

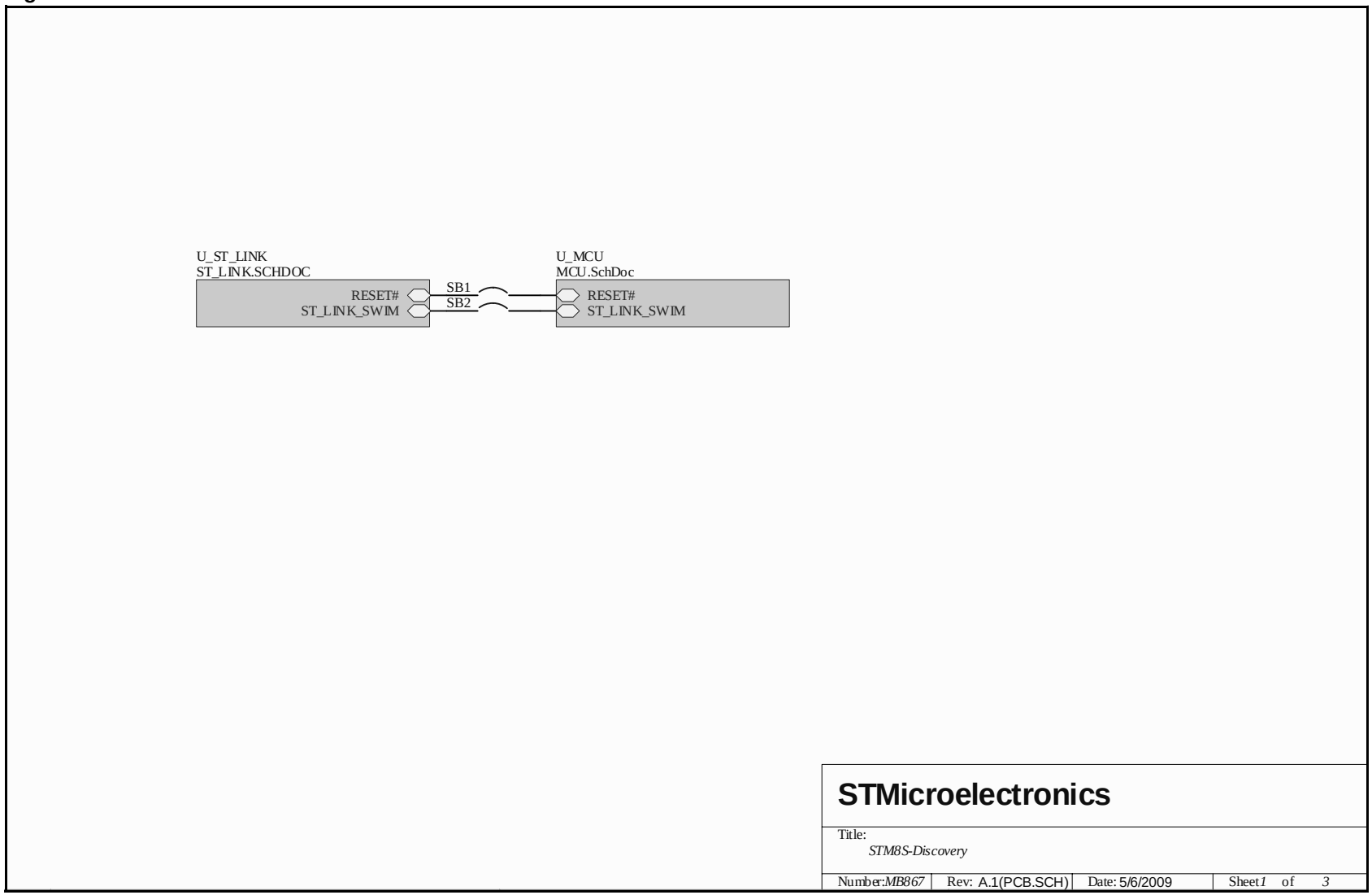


Figure 12. STM8S-DISCOVERY MCU

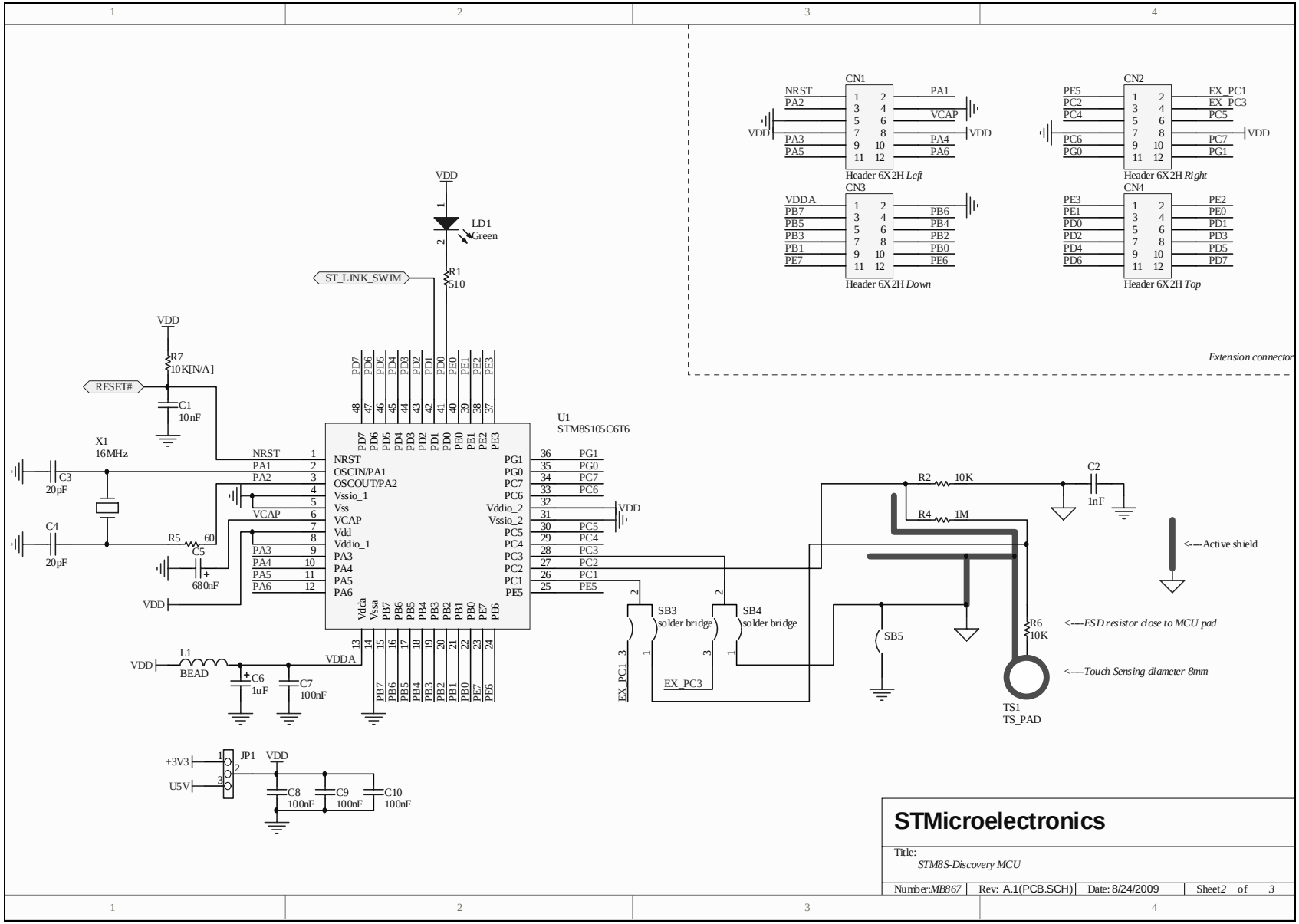
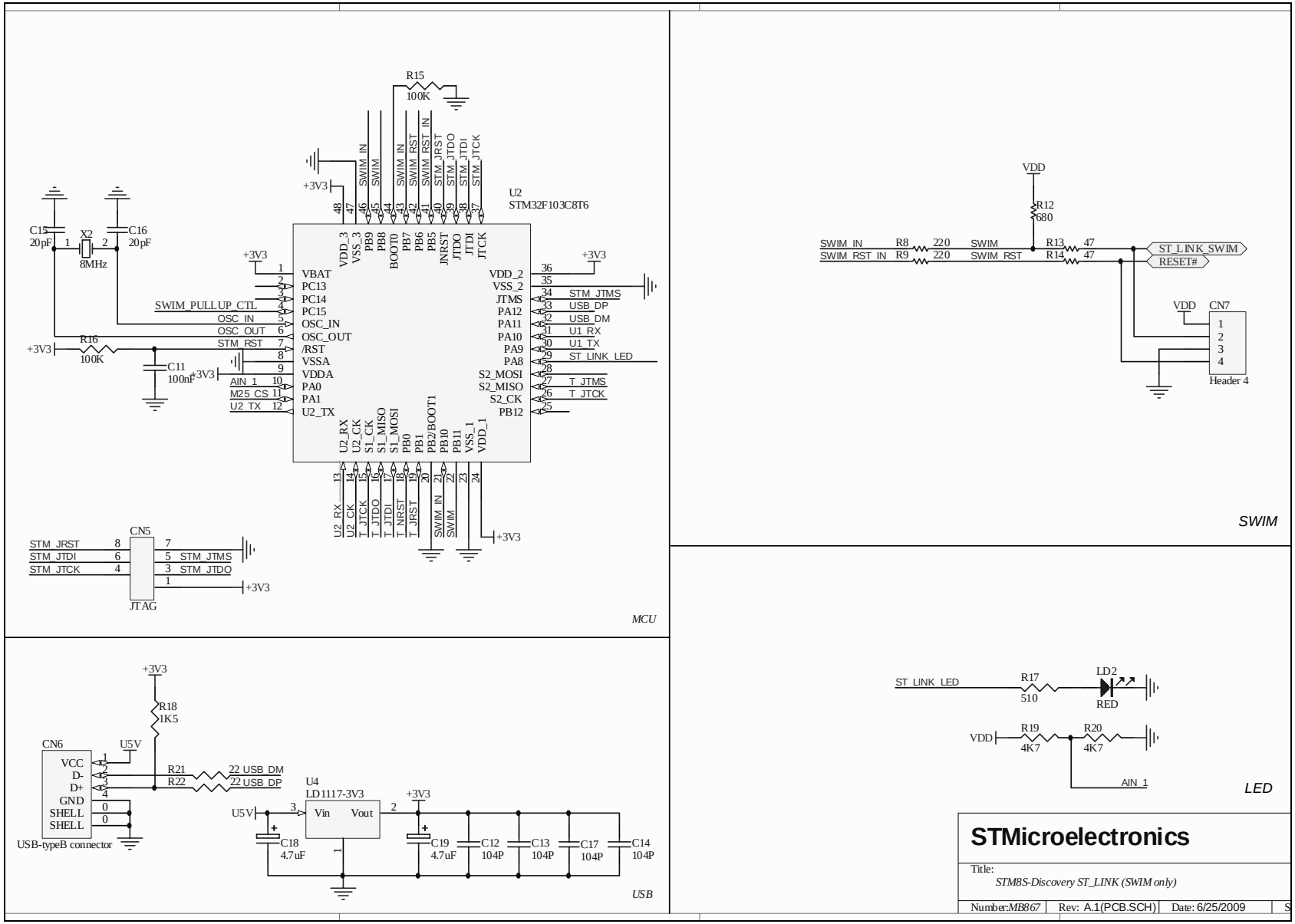


Figure 13. STM8S-DISCOVERY ST-Link (SWIM only)



5 Revision history

Table 5. Document revision history

Date	Revision	Changes
05-Oct-2009	1	Initial release.