# UM1735
# User manual

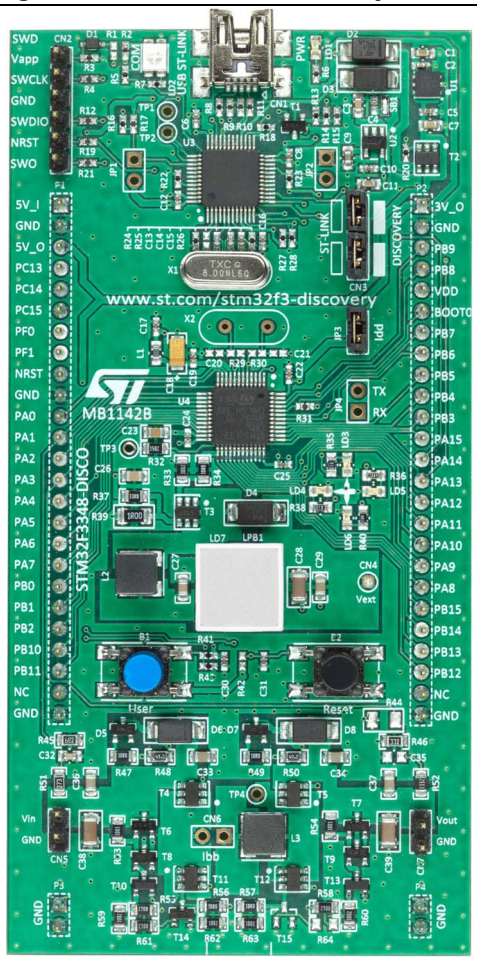
## Discovery kit for STM32F3 series with STM32F334C8 MCU

## Introduction

The STM32F334 discovery kit (32F3348DISCOVERY) helps the user discover the full range of features of the STM32F334 line and develop applications. It is based on STM32F334C8T6 and includes ST-LINK/V2-1 embedded debug tool interface, high-brightness LED dimming with buck converter, buck/boost converter, LEDs and pushbuttons.

The board comes with a comprehensive STM32 software HAL library with various packaged software examples, as well as direct access to mbed™ online resources at http://mbed.org.

**Figure 1. STM32F334 discovery board**




Picture not contractual.

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# 1 Conventions

*Table 1* provides the definition of some conventions used in the present document.

**Table 1. ON/OFF conventions**

| Convention | Definition |
|---|---|
| Jumper JPx ON | Jumper fitted |
| Jumper JPx OFF | Jumper not fitted |
| Solder bridge SBx ON | SBx connections closed by Solder |
| Solder bridge SBx OFF | SBx connections left open |

# 2 Ordering and product information

The STM32F334 discovery kit is a low-cost and easy-to-use development kit to quickly evaluate and start a development with an STM32F3 series microcontroller.

Before installing and using the product, please accept the Evaluation Product License Agreement from www.st.com/epla.

For more information on the STM32F334 discovery board and for demonstration software, visit www.st.com/stm32f3-discovery.

## 2.1 Product marking

Tools marked as "ES" or "E" are not yet qualified and as such, they may be used only for evaluation purposes. ST shall not be liable for any consequences related with other ways of use of such non-qualified tools, for example, as reference design or for production.

Examples of location of "E" or "ES" marking:

- on target STM32 microcontroller part mounted on the board (for illustration, refer to section "Package information" in its datasheet at *www.st.com*)
- next to the evaluation tool ordering part number, as a label stuck or a silk-screen printed on the board

## 2.2 Order code

To order the Discovery kit for STM32F334 line microcontrollers, use the order code: STM32F3348-DISCO.

# 3 Features

The STM32F334 discovery board offers the following features:

- STM32F334C8T6 microcontroller featuring 64 Kbytes of Flash memory, 16 Kbytes of RAM in an LQFP48 package
- on-board ST-LINK/V2-1 with selection mode switch to use the kit as a standalone programming and debugging tool (with SWD connector for programming and debugging)
- mbed™-enabled (mbed.org)
- USB ST-LINK with re-enumeration capability and three different interfaces:
  - virtual COM port
  - mass storage
  - debug port
- board power supply: through USB bus or from an external 5 V supply voltage
- external application power supply: 3 V and 5 V
- high brightness LED dimming with buck converter
- one buck/boost converter
- six LEDs:
  - LD1 (red) for 3.3 V power on
  - LD2 (red/green) for USB communication
  - four user LEDs: LD3 (red), LD4 (orange), LD5 (green) and LD6 (blue)
- two pushbuttons (user and reset)
- extension header for LQFP48 I/Os for a quick connection to the prototyping board and easy probing

# 4 Hardware layout

The STM32F334 discovery board has been designed around the STM32F334C8T6 microcontroller in a 48-pin LQFP package.

*Figure 2* illustrates the connections between the STM32F334C8T6 and its peripherals (ST-LINK/V2-1, high brightness LED dimming with buck converter, buck/boost converter, LEDs, pushbuttons).

*Figure 3* and *Figure 4* help you to locate these features on the STM32F334 discovery board.

**Figure 2. STM32F334 discovery board hardware block diagram**

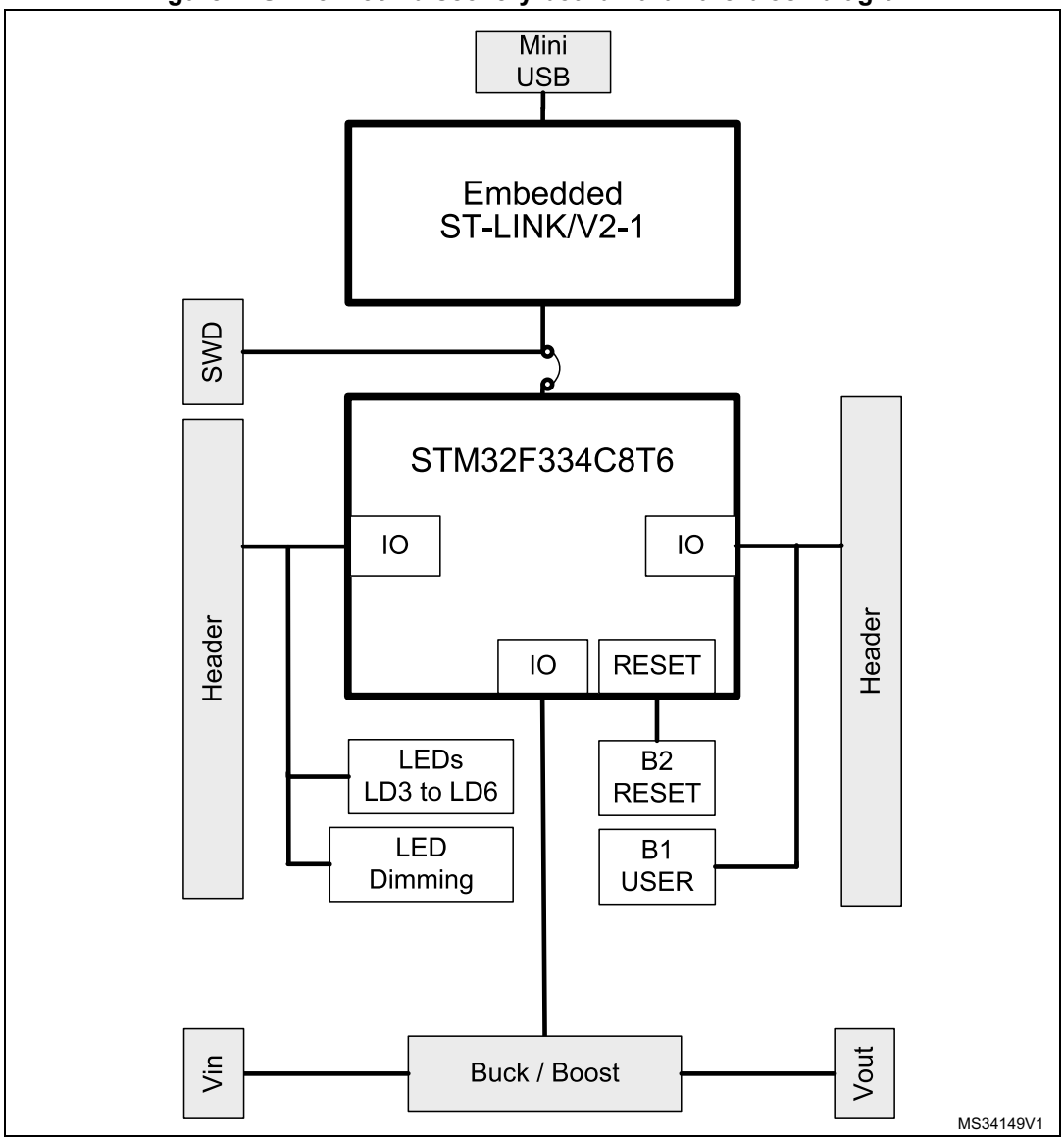


**Figure 3. Top layout**

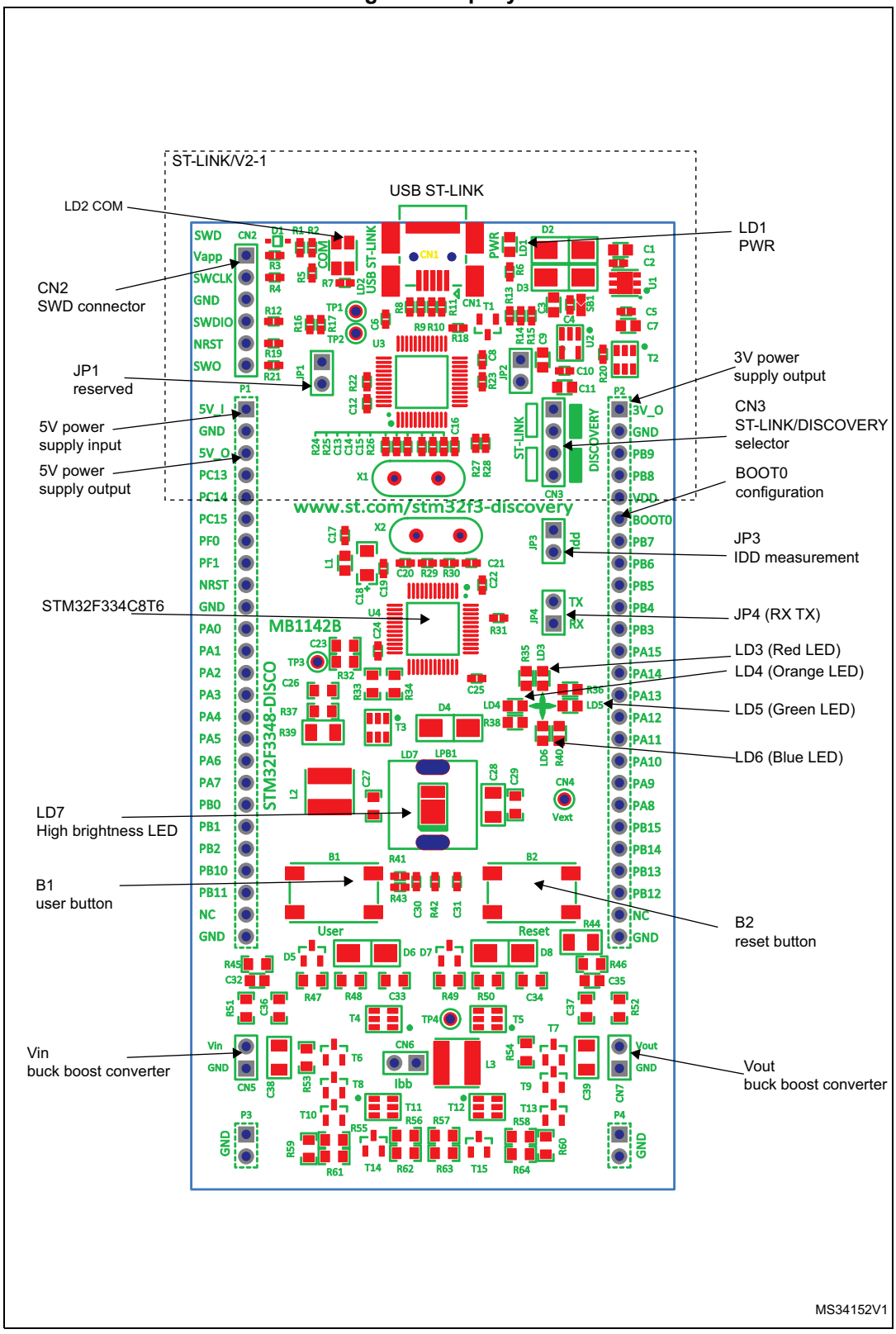
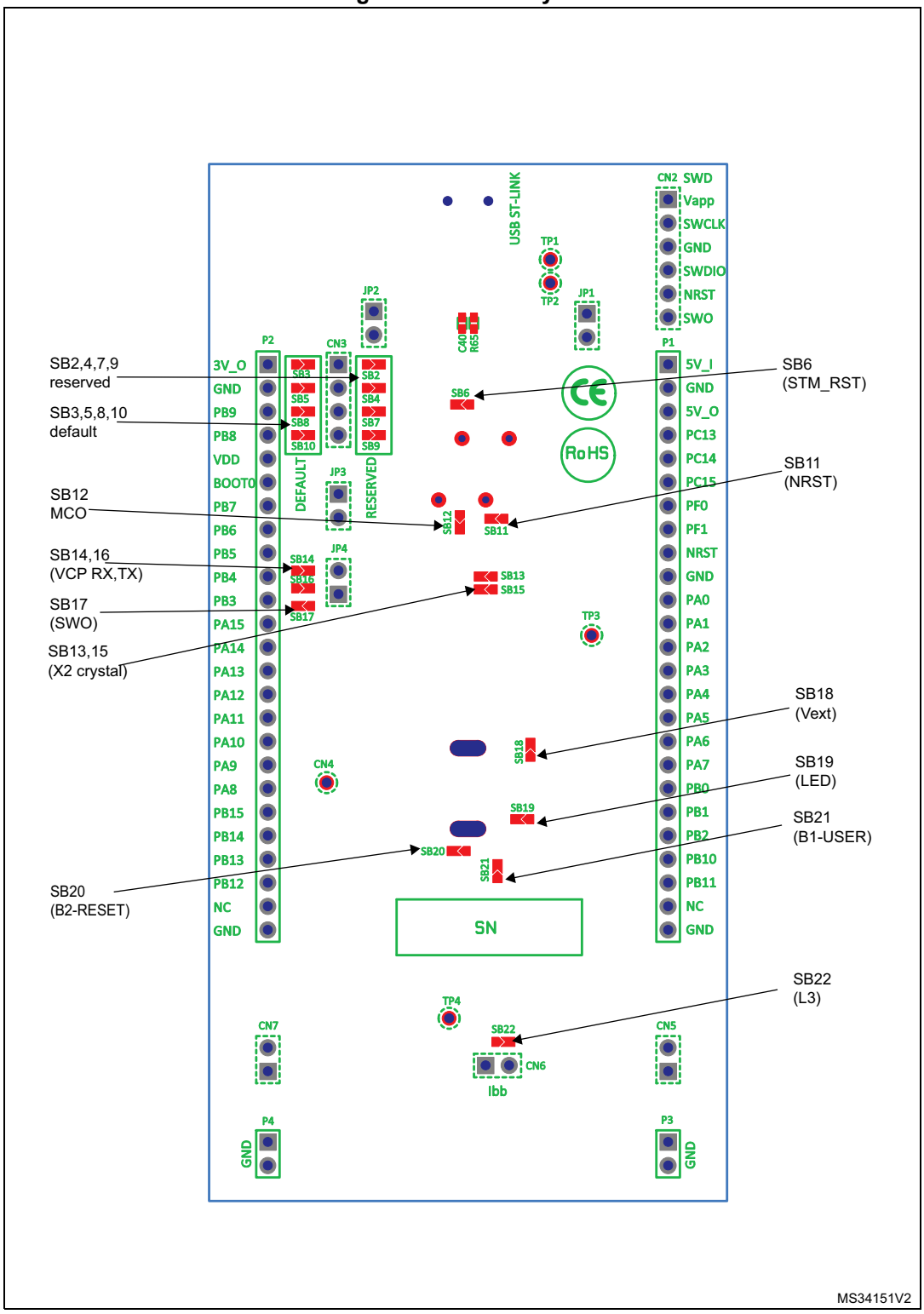


**Figure 4. Bottom layout**



## 4.1 Embedded ST-LINK/V2-1

The ST-LINK/V2-1 programming and debugging tool is integrated on the STM32F334 discovery board.

The embedded ST-LINK/V2-1 tool supports only SWD for STM32 devices. For information about debugging and programming features, refer to user manual UM1075 (ST-LINK/V2 in-circuit debugger/programmer for STM8 and STM32) that describes in detail all the ST-LINK/V2 features.

The changes versus ST-LINK/V2 are listed below.

- New features supported on ST-LINK/V2-1:
  - USB software re-enumeration
  - virtual COM port interface on USB (*Section 4.1.3*)
  - mass storage interface on USB
  - USB power management request for more than 100 mA power on USB
- Features not supported on ST-LINK/V2-1:
  - SWIM interface
  - minimum supported application voltage limited to 3 V

There are two different ways to use ST-LINK/V2-1, depending on the jumper states (see *Table 2*):

- program/debug the MCU on board (*Section 4.1.4*)
- program/debug an MCU in an external application board using a cable connected to SWD connector CN3 (*Section 4.1.5*)

**Table 2. Jumper states**

| Jumper state | Description |
|---|---|
| Both CN3 jumpers ON | ST-LINK/V2-1 functions enabled for on board programming (default) |
| Both CN3 jumpers OFF | ST-LINK/V2-1 functions enabled for application through external CN2 connector (SWD supported) |

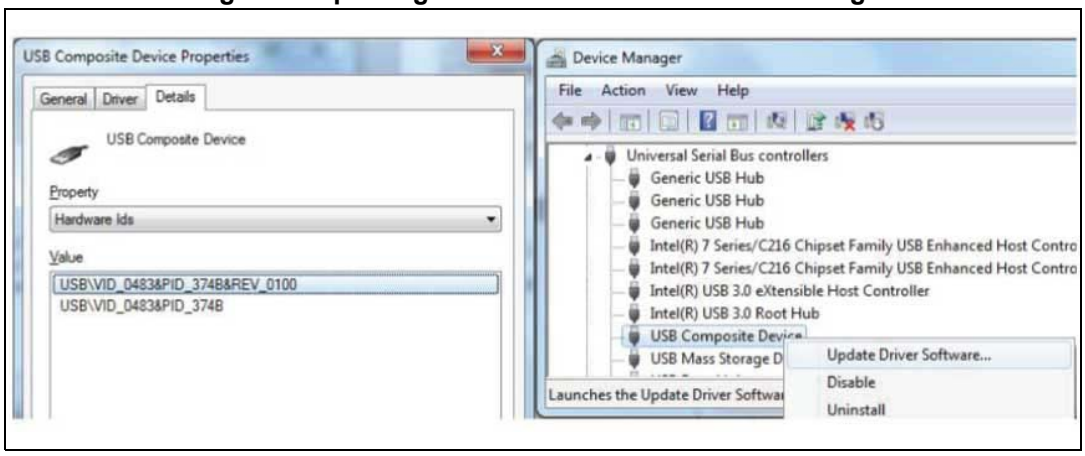
### 4.1.1 Drivers

ST-LINK/V2-1 requires a dedicated USB driver that, for Windows XP, 7 and 8, can be found at www.st.com.

In case the STM32F334 discovery board is connected to the PC before the driver is installed, some discovery interfaces may be declared as “Unknown” in the PC device manager. In this case the user must install the driver files (*Figure 5*), and from the device manager update the driver of the connected device.

*Note: Prefer using the “USB Composite Device” handle for a full recovery.*

**Figure 5. Updating the list of drivers in device manager**




### 4.1.2 ST-LINK/V2-1 firmware upgrade

ST-LINK/V2-1 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/V2-1 product (for example new functionality, bug fixes, support for new microcontroller families), it is recommended to visit www.st.com periodically in order to stay up-to-date with the latest firmware version.

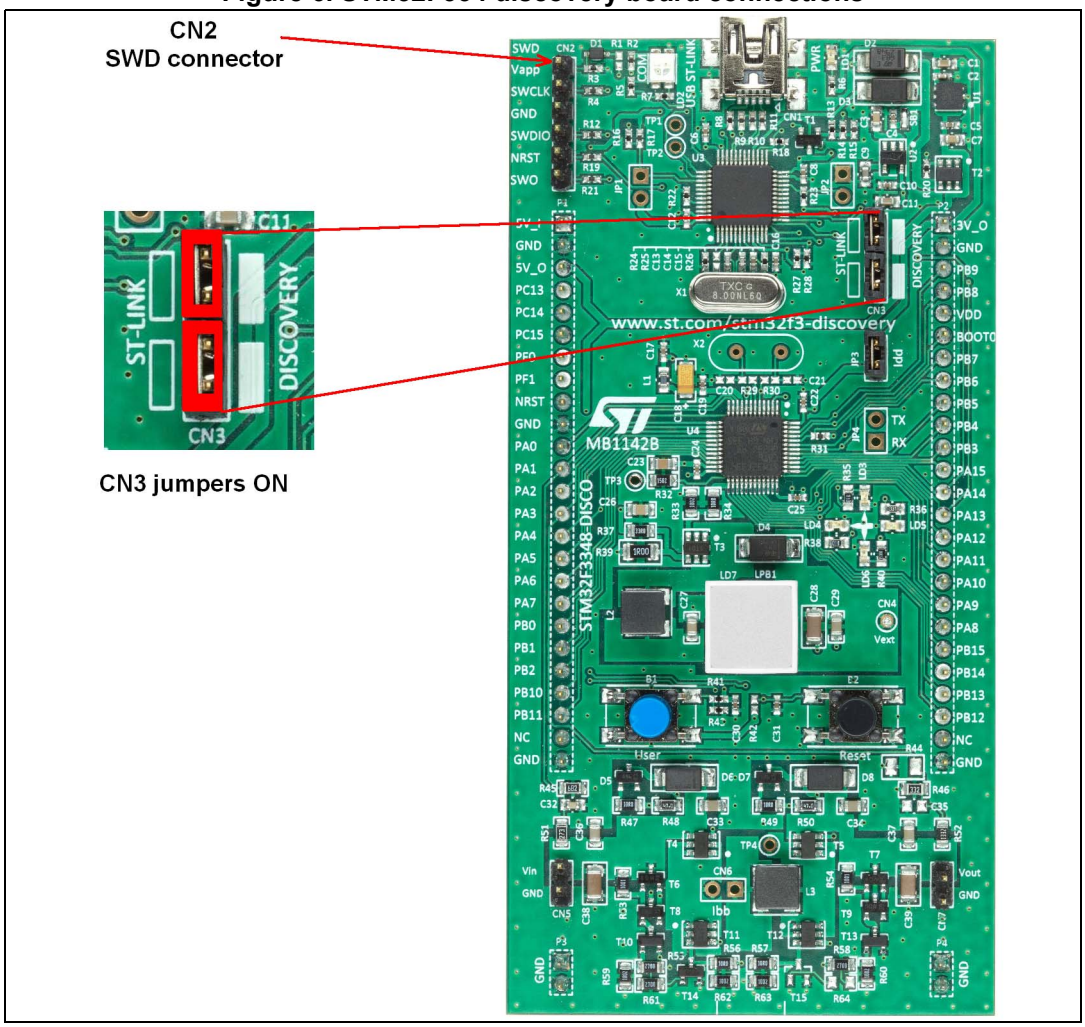
### 4.1.3 VCP configuration

ST-LINK/V2-1 supports virtual COM port (VCP). To enable this function, the solder bridges SB14 and SB16 (See *Figure 4: Bottom layout*) for mbed support are closed. *Table 4: Solder bridges* indicates this with ON state.

### 4.1.4 Using ST-LINK/V2-1 to program/debug the STM32F334 MCU on board

To program the STM32F334 MCU on board, simply plug in the two jumpers on CN3, as shown in *Figure 6* in red, but do not use the CN2 connector as that could disturb communication with the STM32F334C8T6 of the STM32F334 discovery board.

**Figure 6. STM32F334 discovery board connections**



### 4.1.5 Using ST-LINK/V2-1 to program/debug an external STM32 application

It is very easy to use ST-LINK/V2-1 to program an STM32 microcontroller on an external application. Simply remove the 2 jumpers from CN3 as shown in *Figure 7* and connect your application to the CN2 debug connector according to *Table 3*.

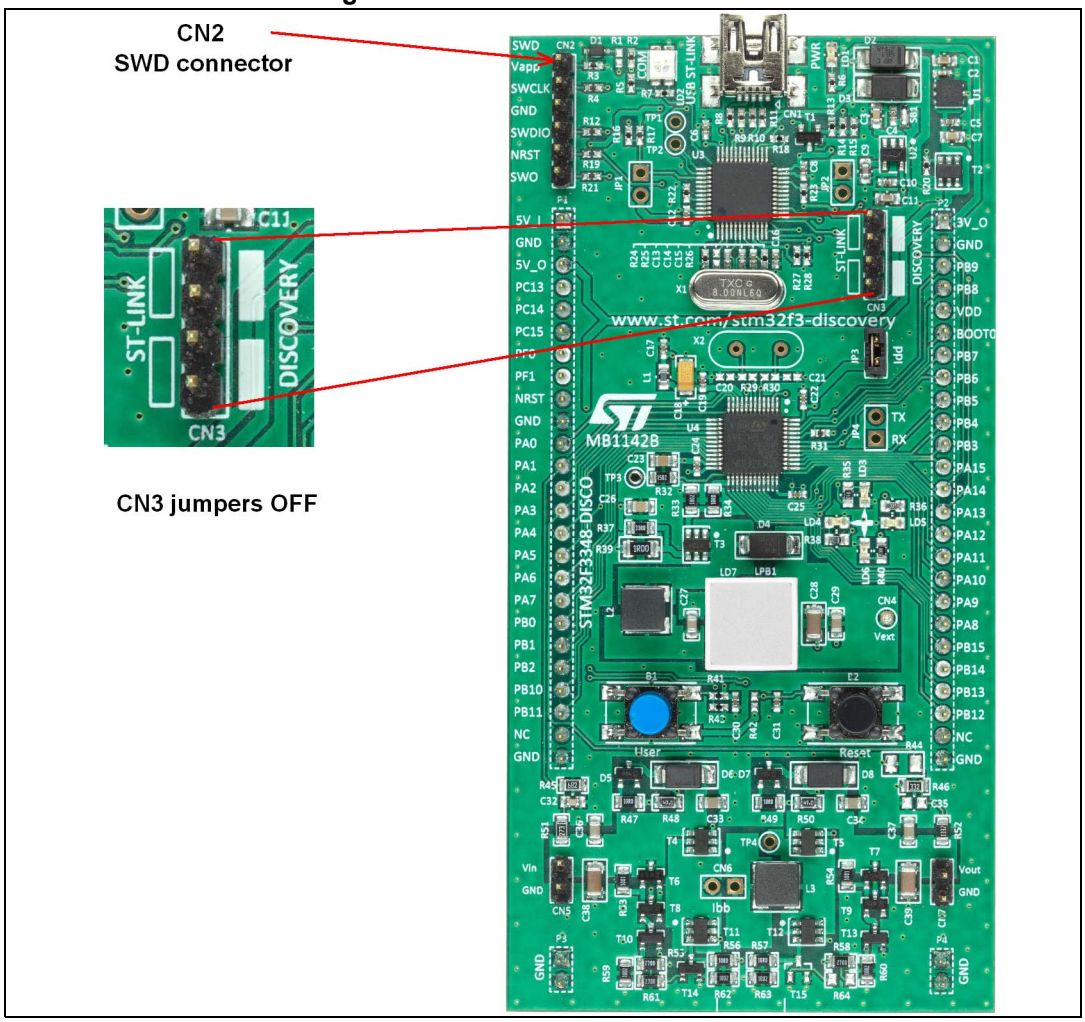
*Note: SB11, must be OFF if you use CN2 pin 5 (NRST) in your external application.*

*SB17, must be OFF if you use CN2 pin 6 (SWO) in your external application.*

**Table 3. Debug connector CN2 (SWD)**

| Pïn | CN2 | Designation |
|---|---|---|
| **1** | VDD_TARGET | VDD from application |
| **2** | SWLCK | SWD clock |
| **3** | GND | Ground |
| **4** | SWDIO | SWD data input/output |
| **5** | NRST | RESET of target MCU |
| **6** | SWO | Reserved |

Figure 7. ST-LINK/V2-1 connections




## 4.2 Power supply and power selection

The power supply is provided either by the host PC through the USB cable, or by an external 5 V power supply.

The STM32F334 discovery board requires to the Host PC 500mA, but around 300mA is needed for its demo, 100mA for an extension board and a safety margin of 100mA.

The D2 and D3 diodes protect the 5 V pins from external power supplies:

- 5 V and 3 V can be used as output power supplies when an extension board is connected to pins P1 and P2.
  In this case, the 5V_O and 3V_O pins deliver a 5 V or 3.3 V power supply and the power consumption of the extension board must be lower than 100 mA.
- 5 V can also be used as input power supplies, e.g. when the USB connector is not connected to the PC. ( 5V_I pin of P1 Header)
  In this case, the STM32F334 discovery board must be powered by a power supply unit

or by auxiliary equipment complying with standard EN-60950-1: 2006+A11/2009, and must be Safety Extra Low Voltage (SELV) with limited power capability.

### 4.2.1 Power supply input from the USB connector

ST-LINK/V2-1 supports USB power management allowing to request more than 100 mA current to the host PC.

All parts of the STM32F334 discovery board and extension board can be powered from the ST-LINK/V2-1 USB connector CN1 (U5V or VBUS). Note that only the ST-LINK/V2-1 part is power supplied before the USB enumeration as the host PC only provides 100 mA to the board at that time. During the USB enumeration, the STM32F334 discovery board requires 500 mA of current to the Host PC. If the host is able to provide the required power, the targeted STM32 microcontroller is powered and the red LED LD1 is turned on, thus the STM32F334 discovery board and its extension board can consume a maximum of 500 mA current, not more. If the host is not able to provide the required current, the targeted STM32 microcontroller and the MCU part including the extension board are not power supplied. As a consequence the red LED LD1 remains turned OFF. In such case it is mandatory to use an external power supply as explained in the next chapter.

Warning: If the maximum current consumption of the STM32F334 discovery and its extension boards exceeds 500 mA, it is mandatory to power the STM32F334 discovery using an external power supply connected to 5V_IN.

*Note: In case of this board is powered by an USB charger or USB battery then there is no USB enumeration so the led LD1 remains OFF permanently and the target MCU is not powered. In this specific case the jumper JP1 needs to be ON to allow target MCU to be powered anyway. This is a special use without enumeration and JP1 is not soldered. To use this optional power supply, solder a 2 pins header in JP1 and set a jumper (you can use a jumper plugged on P3 or P4)*

### 4.2.2 External power supply inputs: 5V_IN

The external power source 5V_IN is automatically detected, in this case the current consumption of STM32F334 discovery board and extension board exceed the allowed current on USB. In this condition it is still possible to use the USB for communication, for programming or debugging only, but it is mandatory to power supply the board first using 5V_IN then connect the USB cable to the PC. Proceeding this way ensures that the enumeration occurs thanks to the external power source.

The following power sequence procedure must be respected:

1. Connect the external power source to 5V_IN.
2. Power on the external power supply 5V_IN.
3. Check that LD1 is turned on.
4. Connect the PC to USB connector CN1.

If this order is not respected, the board may be supplied by VBUS first then by 5V_IN, and the following risks may be encountered:

1. If more than 500 mA current is needed by the board, the PC may be damaged or the current supply can be limited by the PC. As a consequence the board is not powered correctly.
2. 500 mA is requested at enumeration (since JP1 must be OFF) so there is risk that the request is rejected and the enumeration does not succeed if the PC cannot provide such current. Consequently the board is not power supplied (LED LD1 remains OFF).

## 4.3 LEDs

- LD1 PWR:
  The red LED indicates that the board is powered.
- LD2 COM:
  LD2 default status is red. LD2 turns to green to indicate that communications are in progress between the PC and ST-LINK/V2-1.
- User LD3:
  The red LED is a user LED connected to the I/O PB6 of the STM32F334C8T6.
- User LD4:
  The orange LED is a user LED connected to the I/O PB8 of the STM32F334C8T6.
- User LD5:
  The green LED is a user LED connected to the I/O PB9 of the STM32F334C8T6.
- User LD6:
  The blue LED is a user LED connected to the I/O PB7 of the STM32F334C8T6.

## 4.4 Pushbuttons

- B1 USER:
  User and Wake-Up button connected to the I/O PA0 of the STM32F334C8T6.
- B2 RESET:
  The pushbutton connected to NRST is used to RESET the STM32F334C8T6.

## 4.5 High brightness LED dimming with buck converter

The STM32F334 discovery integrates a high brightness LED dimming feature. This function has been designed with on-chip peripherals MCU to reduce the number of external components generally included in analog components based solutions for LED dimming.

The default LED Voltage supply is 5 Volts from 5V_OUT signal or can be provided by an external voltage through CN4 (Vext signal) and by removing the solder of SB18. This external voltage must be between 5 and 15 Volts.

LED information:

- reference LE-CWC12100-D, 1W, Everluck
- VF = 2.8V Typical
- IF = 350mA Max

To design a high brightness LED dimming application, refer to the following documentation and firmware:

- For details concerning I/O ports, refer to the STM32F334C8T6 datasheet.
- For information on software development, see DISCOVER application software on www.st.com/stm32f3-discovery.
- For more detail concerning high brightness LED dimming, refer to AN4885 high brightness LED dimming using the STM32F334 discovery kit.
- STM32Cube library available from www.st.com/stm32f3-discovery.

**Warning: The high brightness of this LED can be very dangerous for your eyes...**

For safety reasons, the maximum high brightness LED forward current has been limited by software to 250 mA and an optical cube-shaped protection has been placed over the LED. Do not override this current limitation and do not remove the optical protection while the LED is operating.

The STM32F334C8T6 MCU controls this high brightness LED dimming feature through the High-Resolution Timers interface.

*Note: If LED buck converter is used then buck/boost converter cannot be enabled.*

## 4.6 Buck/boost converter

The STM32F334 discovery includes a buck/boost converter. This DC/DC converter function has been designed with on-chip peripherals MCU and is able to convert an input Voltage (Vin on CN5) from 3 Volts to 15 Volts to an output voltage (Vout on CN7) from 3 Volts to 15 Volts.

Input current on Vin (CN5) or output current on Vout (CN7) are limited to 500 mA max. Whatever the input or output voltage conditions are.

The STM32F334C8T6 MCU controls this Buck / Boost converter feature through the High-Resolution Timers interface.

To design a buck/boost converter application, refer to the following documentation and firmware:

- For details concerning I/O ports, refer to the STM32F334C8T6 datasheet.
- For information on software development, see DISCOVER application software on www.st.com/stm32f3-discovery.
- For more detail concerning the buck/boost converter, refer to AN4449 buck boost converter using the STM32F334 discovery kit.
- STM32Cube library available from www.st.com/stm32f3-discovery.

*Note: If buck/boost converter is used then LED buck converter cannot be enabled.*

## 4.7 JP3 (Idd)

Jumper JP3, labeled Idd, allows the consumption of STM32F334C8T6 to be measured by removing the jumper and connecting an ammeter.

- Jumper on: STM32F334C8T6 is powered (default).
- Jumper off: an ammeter must be connected to measure the STM32F334C8T6 current, (if there is no ammeter, the STM32F334C8T6 is not powered).

## 4.8 BOOT0 Configuration

BOOT0 is at level “0” through a pull-down R31. If you want to set BOOT0 at level “1”, it can be configured by setting a jumper between P2.6 (BOOT0) and P2.5 (VDD).

This facility is offered for fast and instantaneous configuration.

*Note: If you need to set BOOT0 at level "1" continuously, then unsolder the resistor R31 to avoid a consumption of 6 mA while connecting pin P2.6 (BOOT0) and P2.5 (VDD) with a jumper or with a wire.*

## 4.9 USART configuration

The USART2 interface available on PB3 and PB4 of the STM32F334C8T6 can be connected to ST-LINK/V2-1 MCU to use the virtual COM port function.

By default the USART2 communication between the target STM32F334C8T6 and ST-LINK/V2-1 MCU is not enabled.

To use the virtual COM port function with:

- The on-board STM32F334C8T6, then set SB14 and SB16 ON.
- An external MCU then remove solder from SB14 and SB16, solder an 2 pins header on JP4, then you can connect RX and TX of the external MCU directly to RX and TX of JP4.

## 4.10 OSC clock supply

If PF0 and PF1 are only used as GPIOs instead of as a clock, then SB13 and SB15 are closed and R29 and R30 are removed. (SB12 must be open)

**MCO from ST-LINK/V2-1** (from MCO of the STM32F103CBT6)
This frequency cannot be changed, it is fixed at 8 MHz and connected to PF0-OSC_IN of the STM32F334C8T6. The configuration needed is:

– SB12 closed and SB13 open
– R30 removed

**HSE Oscillator on board** from X2 crystal (not provided)
For typical frequencies and its capacitors and resistors, please refer to the STM32F334C8T6 Datasheet. The configuration needed is:

– SB12, SB13, SB15 open
– X2, R29, R30, C20, C21 soldered

**Oscillator from external PF0** (from external oscillator through pin 7 of the P1 connector)
The configuration needed is:

– SB13 closed
– SB12 open
– R30 removed

*Note: Please refer to the AN2867 for oscillator design guide for STM32 microcontrollers.*

## 4.11 Solder bridges

**Table 4. Solder bridges**

| Bridge | State[1] | Description |
|---|---|---|
| SB13, 15 (X2 crystal) | **OFF** | X2, C20, C21, R29 and R30 provide a clock. PF0, PF1 are disconnected from P1. |
| | ON | PF0, PF1 are connected to P1 Remove only R29 and R30 |
| SB3,5,8,10 (default) | **ON** | Reserved, do not modify |
| SB2,4,7,9 (reserved) | **OFF** | Reserved, do not modify |
| SB20 (B2-RESET) | **ON** | B2 Push Button is connected to NRST of STM32F334C8T6 |
| | OFF | B2 Push Button is not connected to NRST of STM32F334C8T6 |
| SB21 (B1-USER) | **ON** | B1 Push Button is connected to PA0 |
| | OFF | B1 Push Button is not connected to PA0 |
| SB14, 16 (VCP RX, TX)[2] | OFF | PA2, PA3 of STM32F103CBT6 are not connected to PB4, PB3 of STM32F334C8T6 |
| | **ON** | PA2, PA3 of STM32F103CBT6 are connected to PB4, PB3 of STM32F334C8T6, then SW0 cannot be used and SB17 must be OFF |
| SB18 (Vext) | **ON** | LED Buck is powered from 5V_OUT |
| | OFF | LED Buck is powered from CN4 |
| SB22 (L3) | **ON** | Default position. |
| | OFF | Use CN6 for Current measurement. |
| SB1 (ST-LINK/V2-1 PWR) | **ON** | ST-LINK/V2-1 module is powered |
| | OFF | ST-LINK/V2-1 module is not powered |
| SB19 (LED) | **ON** | Default position. |
| | OFF | Use it connecting 2 wires for Current measurement. |
| SB11 (NRST) | **ON** | T_NRST signal from connector CN2 and STM32F103CBT6, is connected to NRST of STM32F334C8T6 |
| | OFF | T_NRST signal is not connected |
| SB17 (SWO) | **OFF** | SWO signal is not connected |
| | ON | SWO signal of connector CN3 is connected to PB3, then USART_TX cannot be used and SB16 must be OFF |
| SB6 (STM_RST) | **OFF** | No incidence on NRST signal of STM32F103CBT6 |
| | ON | NRST signal of STM32F103CBT6 is connected to GND |
| SB12 (MCO) | **ON** | MCO clock signal from STM32F103CBT6 is connected to OSC_IN of STM32F334C8T6. |
| | OFF | MCO signal of STM32F103CBT6 is not used. |

1. Default value is in bold.
2. Default state is OFF for boards labeled MB1142 B-01 and older.

## 4.12 Extension connectors

The male headers P1 and P2 can connect the STM32F334 discovery board to a standard prototyping/wrapping board. STM32F334C8T6 GPI/Os are available on these connectors. P1 and P2 can also be probed by an oscilloscope, logical analyzer or voltmeter.

**Table 5. Extension connectors**

| MCU pin | | Board funtion | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Main function | LQFP48 pin num. | SYSTEM | VCP | PushButtons | LED | Buck/boost | Buck LED | Free I/O | Power Supply | P1 | P2 | CN5 | CN7 | SBx(1) |
| - | - | - | - | - | - | Vin | - | - | - | - | - | 2 | - | - |
| - | - | - | - | - | - | Vout | - | - | - | - | - | - | 2 | - |
| BOOT0 | 44 | BOOT0 | - | - | - | - | - | - | - | - | 6 | - | - | - |
| NRST | 7 | NRST | - | RESET | - | - | - | - | - | 9 | - | - | - | SB11, 20 |
| PA0 | 10 | - | - | USER | - | - | - | - | - | 11 | - | - | - | SB21 |
| PA1 | 11 | - | - | - | - | Vin_Sense | - | - | - | 12 | - | - | - | - |
| PA2 | 12 | - | - | - | - | - | - | - | - | 13 | - | - | - | - |
| PA3 | 13 | - | - | - | - | Vout_Sense | - | - | - | 14 | - | - | - | - |
| PA4 | 14 | - | - | - | - | - | - | PA4 | - | 15 | - | - | - | - |
| PA5 | 15 | - | - | - | - | - | - | PA5 | - | 16 | - | - | - | - |
| PA6 | 16 | - | - | - | - | - | - | PA6 | - | 17 | - | - | - | - |
| PA7 | 17 | - | - | - | - | - | - | PA7 | - | 18 | - | - | - | - |
| PA8 | 29 | - | - | - | - | P1_Drive | - | - | - | - | 19 | - | - | - |

**Table 5. Extension connectors (continued)**

| MCU pin | | Board funtion | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Main function | LQFP48 pin num. | SYSTEM | VCP | PushButtons | LED | Buck/boost | Buck LED | Free I/O | Power Supply | P1 | P2 | CN5 | CN7 | SBx(1) |
| PA9 | 30 | - | - | - | - | N1_Drive | - | - | - | - | 18 | - | - | - |
| PA10 | 31 | - | - | - | - | N2_Drive | - | - | - | - | 17 | - | - | - |
| PA11 | 32 | - | - | - | - | P2_Drive | - | - | - | - | 16 | - | - | - |
| PA12 | 33 | - | - | - | - | - | - | PA12 | - | - | 15 | - | - | - |
| PA13 | 34 | SWDIO | - | - | - | - | - | - | - | - | 14 | - | - | - |
| PA14 | 37 | SWCLK | - | - | - | - | - | - | - | - | 13 | - | - | - |
| PA15 | 38 | - | - | - | - | - | - | PA15 | - | - | 12 | - | - | - |
| PB0 | 18 | - | - | - | - | - | BK_Sense | - | - | 19 | - | - | - | - |
| PB1 | 19 | - | - | - | - | - | - | PB1 | - | 20 | - | - | - | - |
| PB2 | 20 | - | - | - | - | - | - | PB2 | - | 21 | - | - | - | - |
| PB3 | 39 | SWO | USART_TX | - | - | - | - | - | - | - | 11 | - | - | SB17, 16 |
| PB4 | 40 | - | USART_RX | - | - | - | - | - | - | - | 10 | - | - | SB14 |
| PB5 | 41 | - | - | - | - | - | - | PB5 | - | - | 9 | - | - | - |
| PB6 | 42 | - | - | - | RED | - | - | - | - | - | 8 | - | - | - |

**Table 5. Extension connectors (continued)**

| MCU pin | | Board funtion | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Main function | LQFP48 pin num. | SYSTEM | VCP | PushButtons | LED | Buck/boost | Buck LED | Free I/O | Power Supply | P1 | P2 | CN5 | CN7 | SBx(1) |
| PB7 | 43 | - | - | - | BLUE | - | - | - | - | - | 7 | - | - | - |
| PB8 | 45 | - | - | - | ORANGE | - | - | - | - | - | 4 | - | - | - |
| PB9 | 46 | - | - | - | GREEN | - | - | - | - | - | 3 | - | - | - |
| PB10 | 21 | - | - | - | - | - | - | PB10 | - | 22 | - | - | - | - |
| PB11 | 22 | - | - | - | - | - | - | PB11 | - | 23 | - | - | - | - |
| PB12 | 25 | - | - | - | - | - | BK_Drive | - | - | - | 23 | - | - | - |
| PB13 | 26 | - | - | - | - | - | - | PB13 | - | - | 22 | - | - | - |
| PB14 | 27 | - | - | - | - | RC | - | - | - | - | 21 | - | - | - |
| PB15 | 28 | - | - | - | - | - | - | PB15 | - | - | 20 | - | - | - |
| PC13 | 2 | - | - | - | - | - | - | PC13 | - | 4 | - | - | - | - |
| PC14 | 3 | - | - | - | - | - | - | PC14 | - | 5 | - | - | - | - |
| PC15 | 4 | - | - | - | - | - | - | PC15 | - | 6 | - | - | - | - |
| PF0 | 5 | OSC_IN | - | - | - | - | - | - | - | 7 | - | - | - | SB12, 13 |
| PF1 | 6 | OSC_OUT | - | - | - | - | - | - | - | 8 | - | - | - | SB15 |
| - | - | - | - | - | - | - | - | - | 3V | - | 1 | - | - | - |
| - | - | - | - | - | - | - | - | - | 5V_IN | 1 | - | - | - | - |

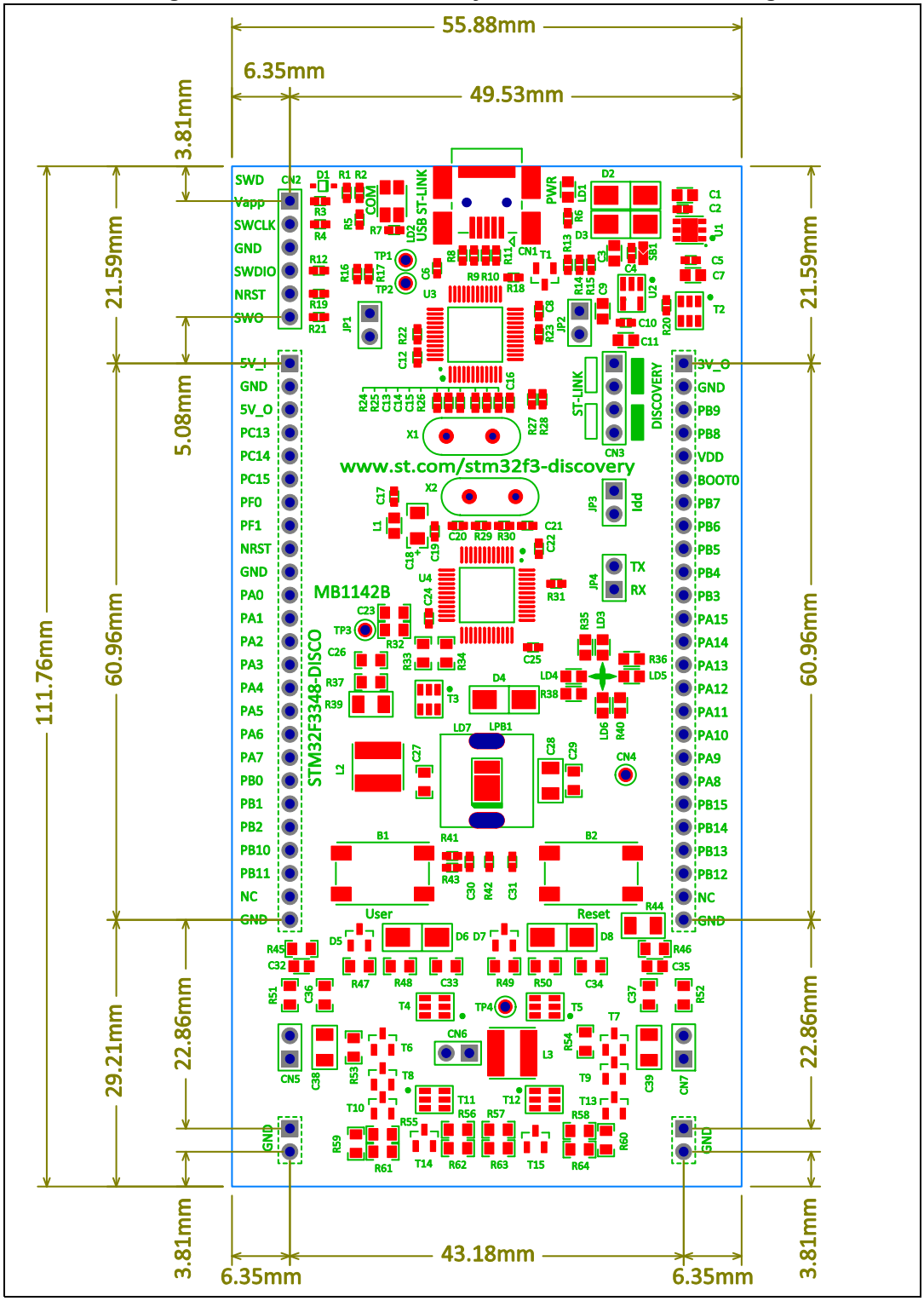
**Table 5. Extension connectors (continued)**

| MCU pin | | Board funtion | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Main function | LQFP48 pin num. | SYSTEM | VCP | PushButtons | LED | Buck/boost | Buck LED | Free I/O | Power Supply | P1 | P2 | CN5 | CN7 | SBx(1) |
| - | - | - | - | - | - | - | - | - | 5V_OUT | 3 | - | - | - | - |
| VDD | 24 | - | - | - | - | - | - | - | VDD | - | 5 | - | - | - |
| VDD | 36 | - | - | - | - | - | - | - | VDD | - | - | - | - | - |
| VDD | 48 | - | - | - | - | - | - | - | VDD | - | - | - | - | - |
| VBAT | 1 | - | - | - | - | - | - | - | VDD | - | - | - | - | - |
| VDDA | 9 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| GND | 23 | - | - | - | - | - | - | - | GND | 2 | 2 | 1 | 1 | - |
| GND | 35 | - | - | - | - | - | - | - | GND | 10 | - | - | - | - |
| GND | 47 | - | - | - | - | - | - | - | GND | 25 | 25 | - | - | - |
| VSSA | 8 | - | - | - | - | - | - | - | GND | - | - | - | - | - |

1. Signals available depending on SBx value. Refer to *Table 4: Solder bridges* or schematics in *Section 6*.

# 5 Mechanical drawing

Figure 8. STM32F334 discovery board mechanical drawing



# 6 Electrical schematics

**Figure 9. STM32F334 discovery**

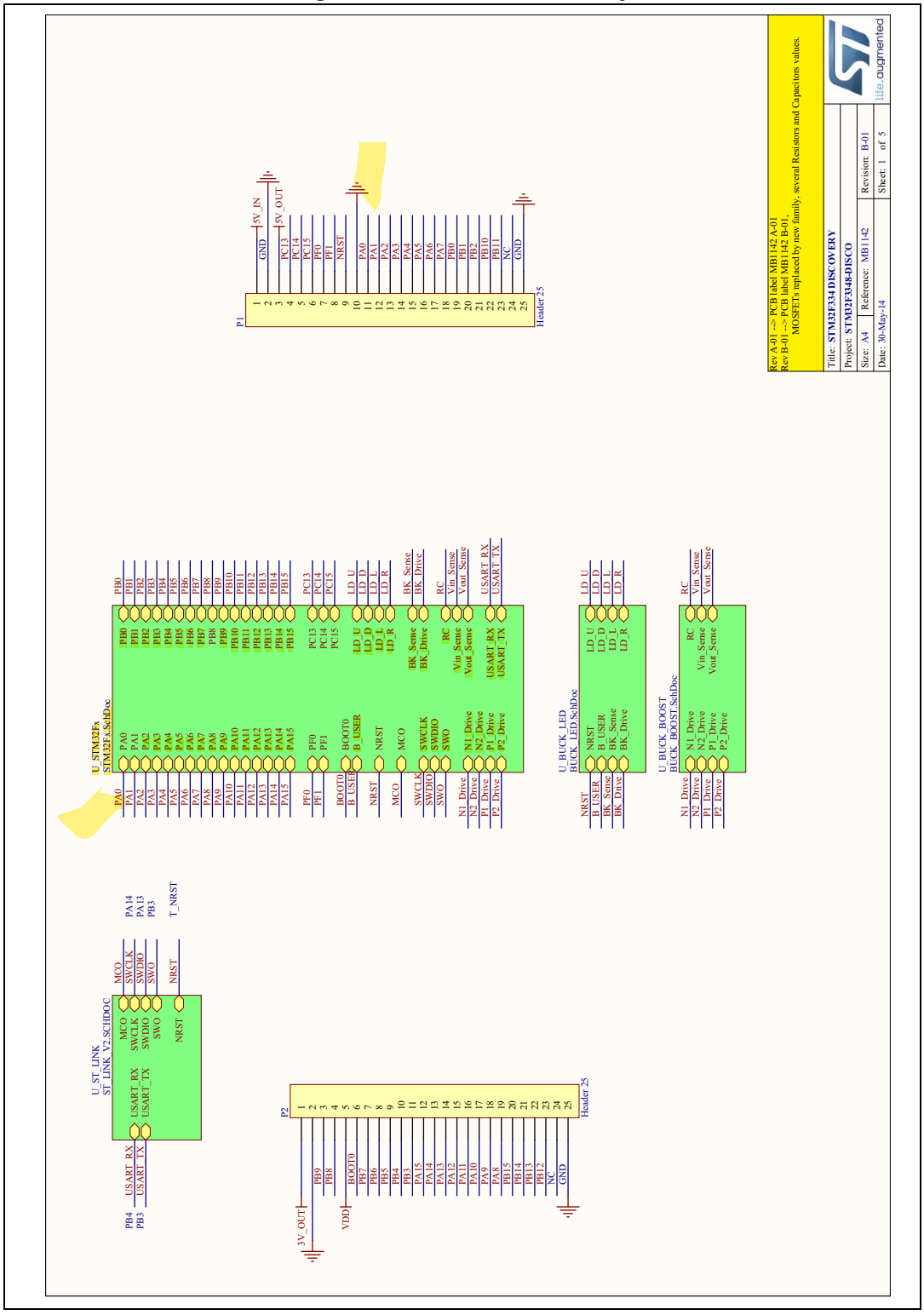


**Figure 10. ST-LINK/V2-1 (SWD only)**

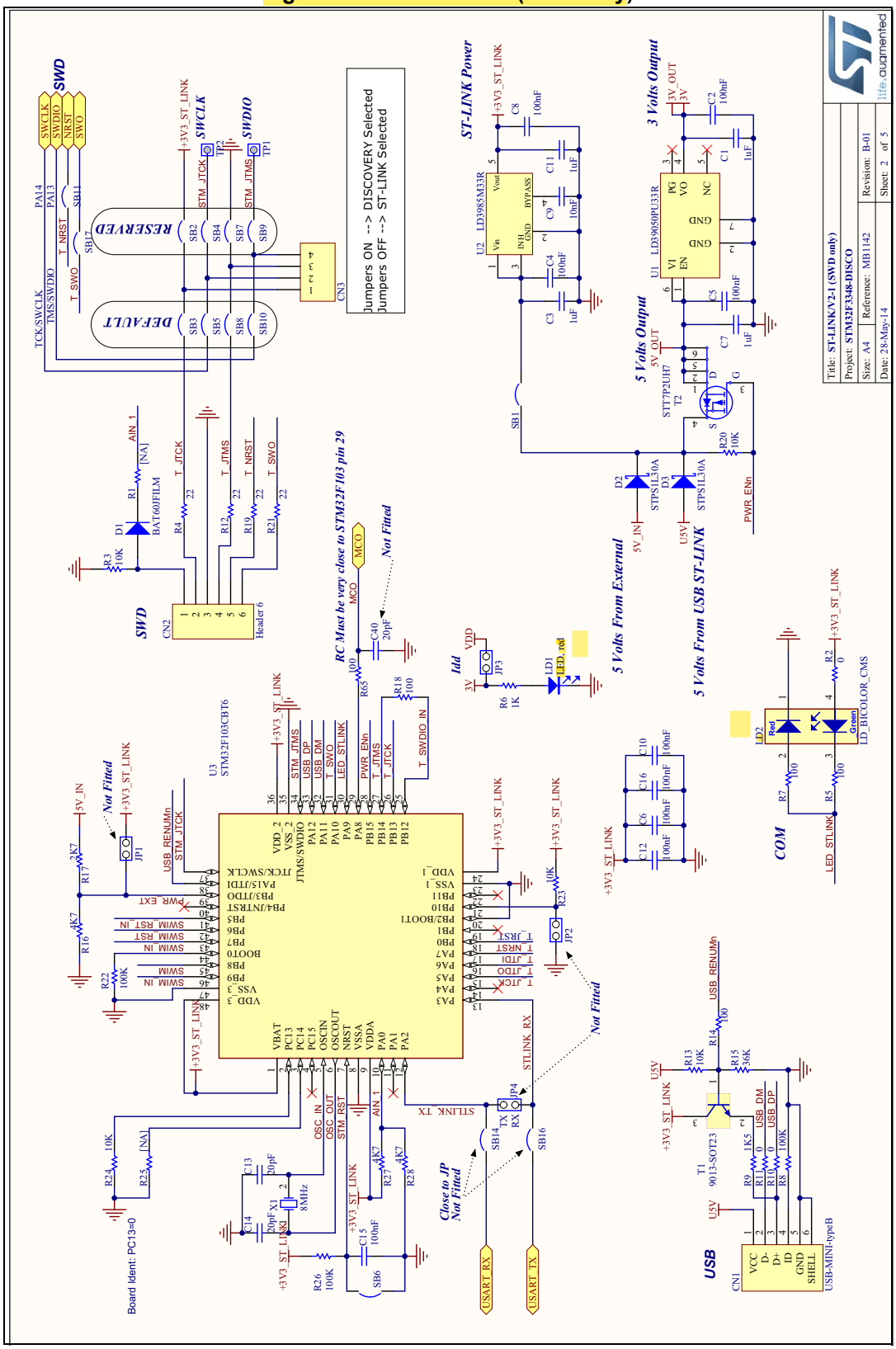


**Figure 11. STM32F334C8T6 MCU**

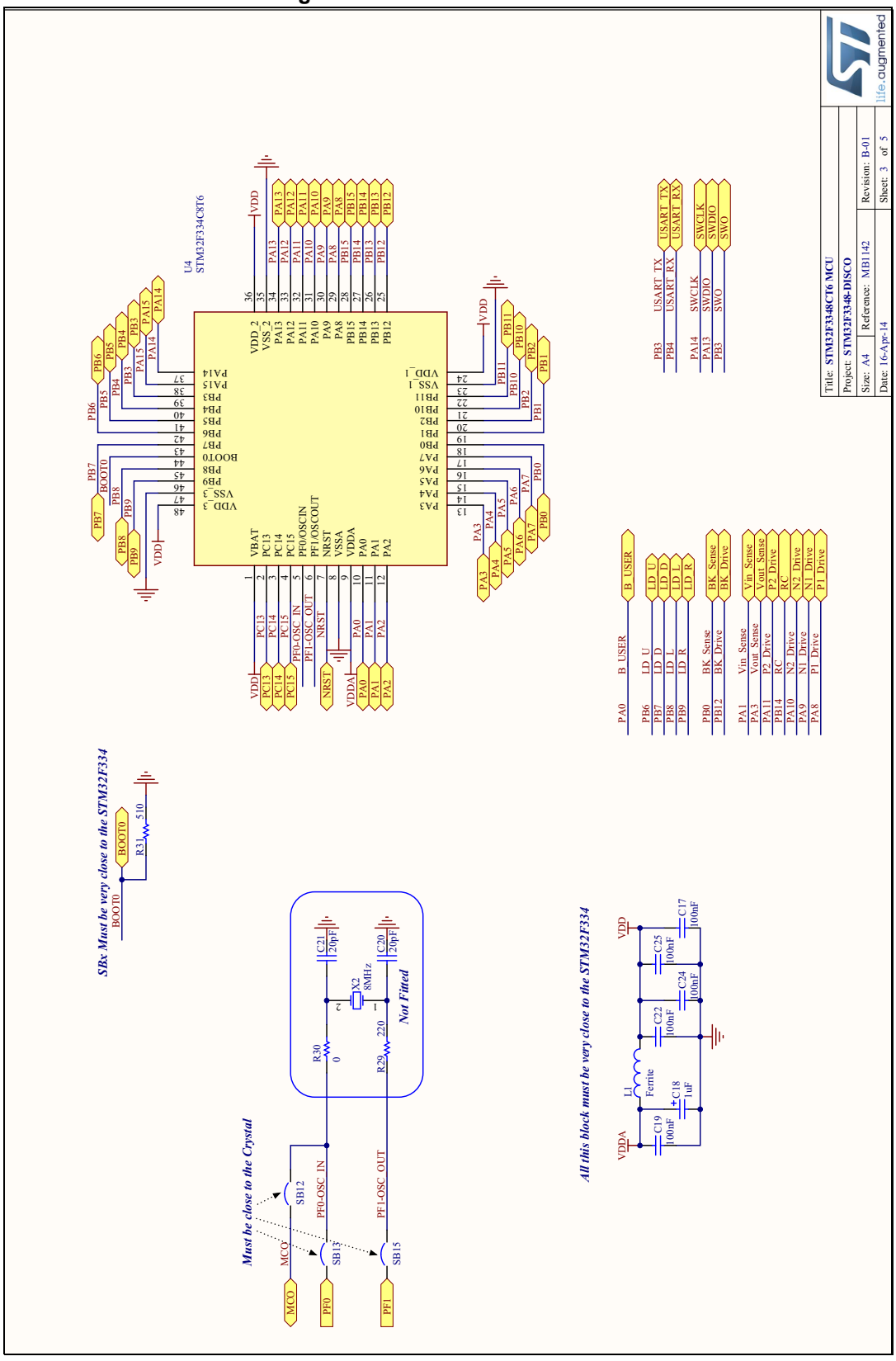


**Figure 12. LED buck converter**

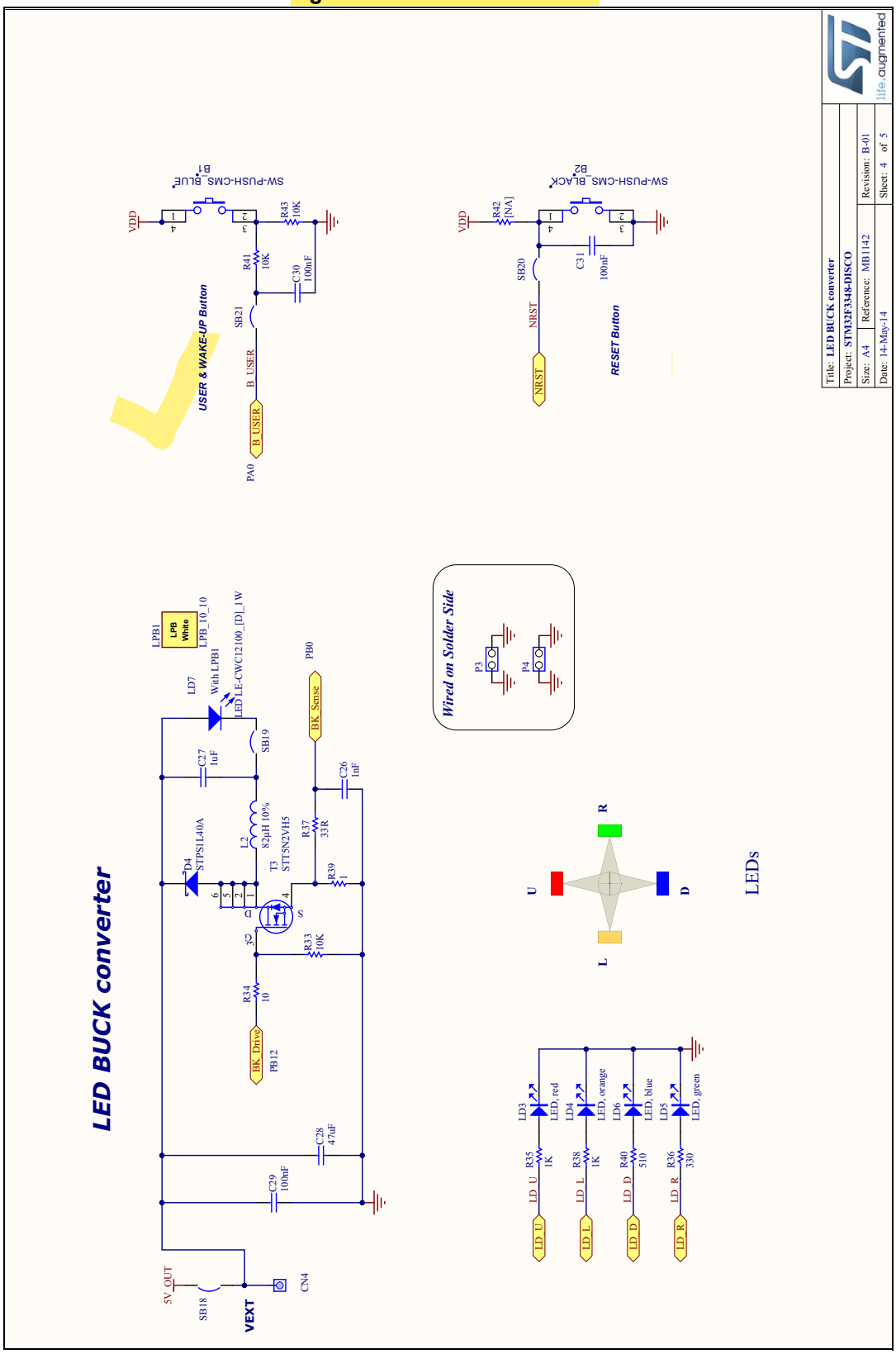
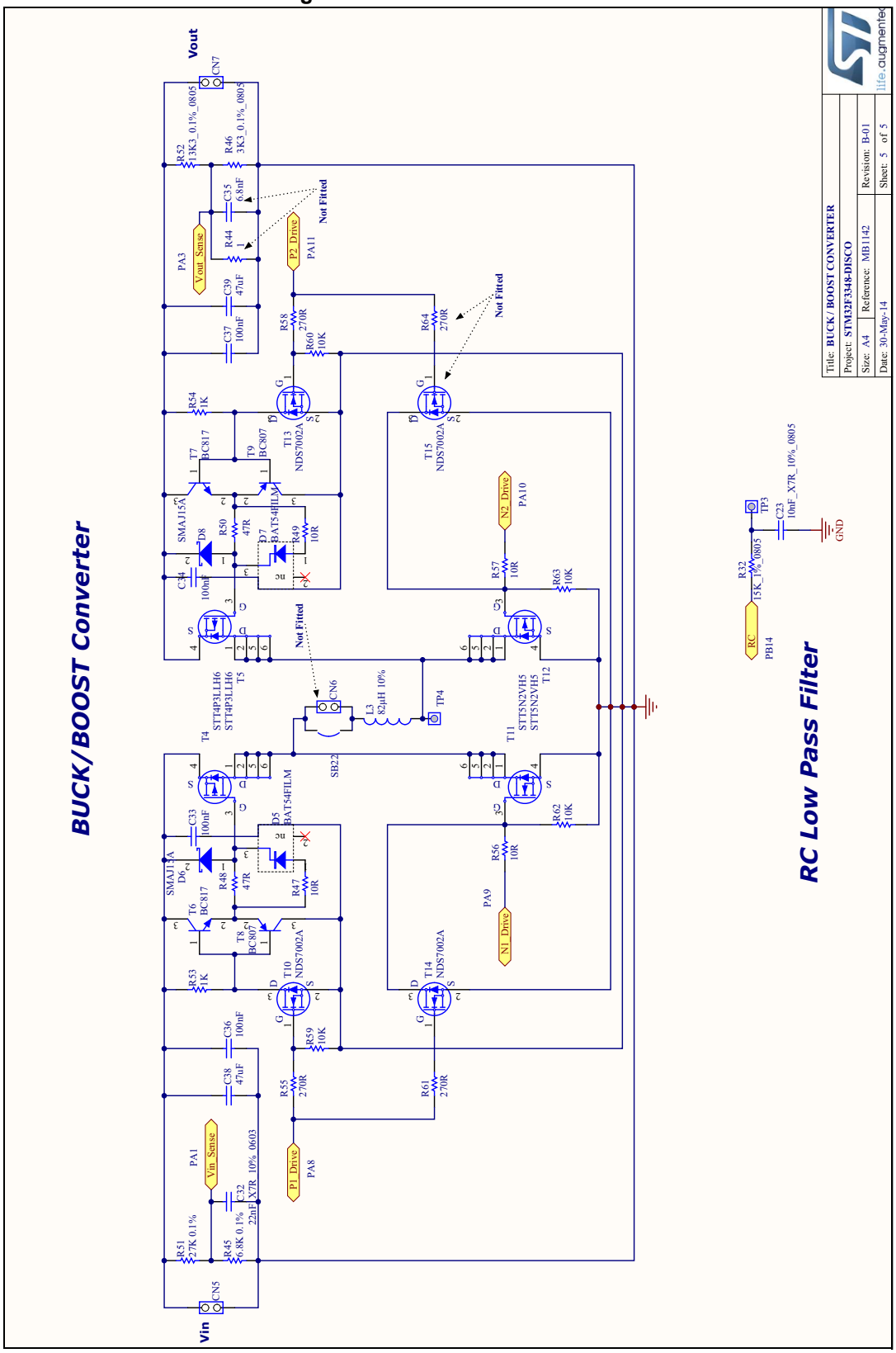


**Figure 13. Buck/boost converter**



# 7 Revision history

Table 6. Document revision history

| Date | Revision | Changes |
|---|---|---|
| 19-Jun-2014 | 1 | Initial release |
| 01-Feb-2016 | 2 | Change of STM32F3x4 to STM32F334 in *Introduction*.<br>mbed-enabled logo added on the cover page.<br>Added mbed-enabled in *Section 3: Features*.<br>Added *Section 2.1: Product marking*.<br>Text change in *Section 2.2: Order code*.<br>Remove Windows Vista in *Section 4.1.1: Drivers*.<br>SB14 and SB16 default position update in *Table 4: Solder bridges*<br>Added *Section 4.1.3: VCP configuration* |