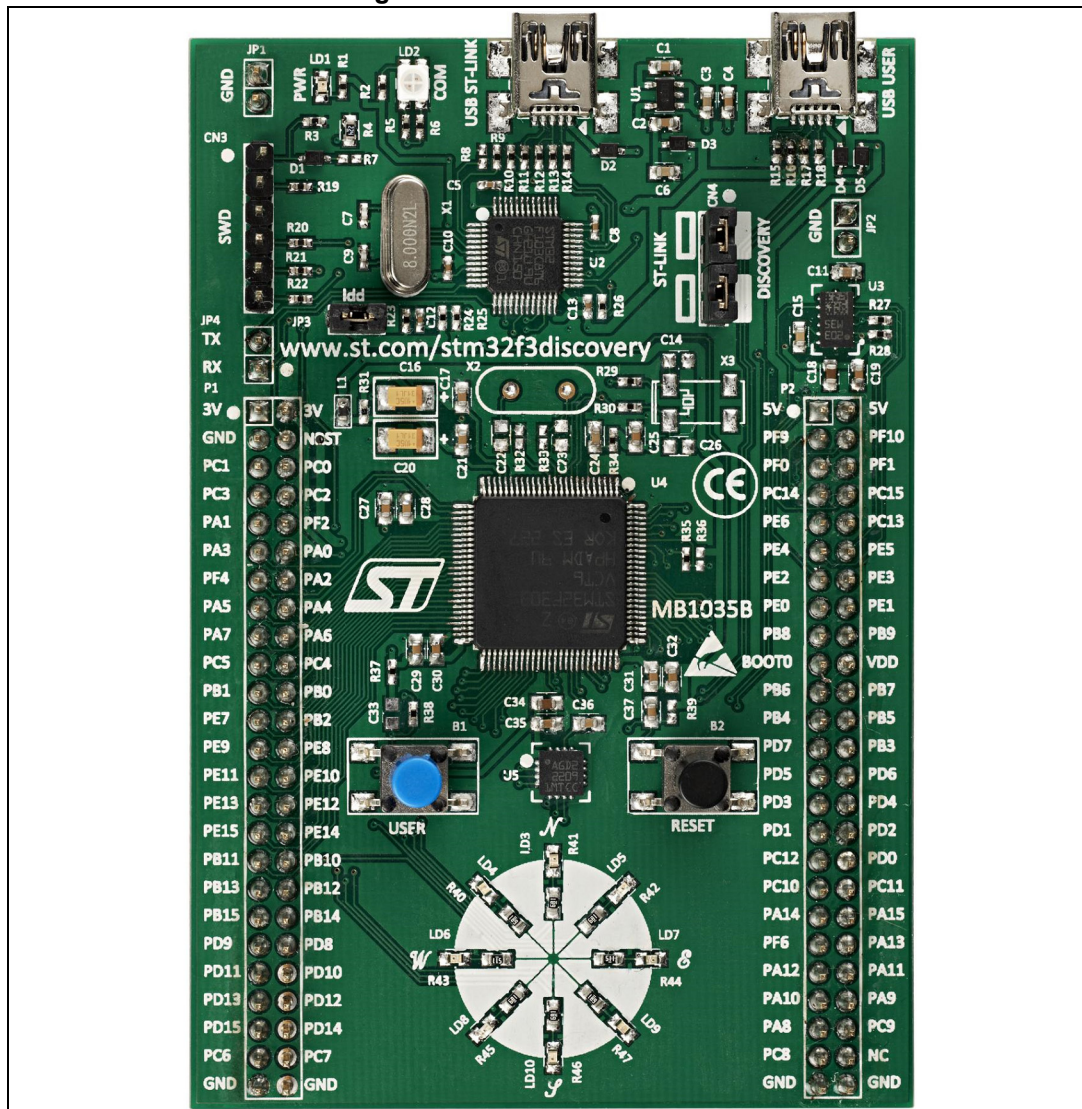Discovery kit with STM32F303VC MCU

Introduction

The STM32F3DISCOVERY Discovery kit is a complete demonstration and development platform for STMicroelectronics Arm® Cortex®-M4 core-based STM32F303VCT6 microcontroller. It includes an ST-LINK/V2 (or V2-B) embedded debug tool interface, an ST MEMS gyroscope, an ST MEMS E-compass, LEDs, push-buttons, and a USB Mini-B connector.

Figure 1. STM32F3DISCOVERY

Picture is not contractual.

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1 Features

The STM32F3DISCOVERY board offers the following features.

- STM32F303VCT6 Arm$^{®(a)}$-based microcontroller featuring 256 Kbytes of Flash memory, 48 Kbytes of RAM in an LQFP100 package
- On-board ST-LINK/V2 for PCB Version A or B or ST-LINK/V2-B for PCB Version C and newer
- USB ST-LINK functions:
  - Debug port
  - Virtual COM port with ST-LINK/V2-B only
  - Mass storage with ST-LINK/V2-B only
- Board power supply: through the USB bus or from an external 3 V or 5 V supply voltage
- External application power supply: 3 V and 5 V
- ST MEMS motion sensor, 3-axis digital output gyroscope
- ST MEMS system-in-package featuring a 3D digital linear acceleration sensor and a 3D digital magnetic sensor
- Ten LEDs:
  - LD1 (red) for 3.3 V power-on.
  - LD2 (red/green) for USB communication.
  - Eight user LEDs, LD3/10 (red), LD4/9 (blue), LD5/8 (orange), and LD6/7 (green).
- Two push buttons (user and reset)
- USB USER with Mini-B connector
- Extension header for LQFP100 I/Os for quick connection to prototyping board and easy probing
- Comprehensive free software including a variety of examples, part of STM32CubeF3 package or STSW-STM32118 for legacy Standard Library usage

A large number of free ready-to-run application firmware examples are available at www.st.com/stm32f3discovery to support quick evaluation and development.

arm

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a. Arm is a registered trademark of Arm Limited (or its subsidiaries) in the US and/or elsewhere.

2 Ordering information

To order the STM32F3DISCOVERY Discovery with the STM32F303VCT6 microcontroller, refer to *Table 1*. Additional information is available from the datasheet and reference manual of the target microcontroller.

Table 1. Ordering information

Order code	Board reference	Target STM32
STM32F3DISCOVERY[1]	MB1035	STM32F303VCT6

1. STM32F3DISCOVERY with ST-LINK/V2 for PCB version A or B, with ST-LINK/V2-B for PCB version C and newer.

2.1 Codification

The meaning of the codification is explained in *Table 2*.

Table 2. Codification explanation

STM32XXDISCOVERY	Description	Example: STM32F3DISCOVERY
32XX	MCU series in STM32 32-bit Arm Cortex MCUs	STM32F3 Series
DISCOVERY	Discovery kit	Discovery kit

The order code is mentioned on a sticker placed on the top or bottom side of the board.

3 Development environment

3.1 System requirements

- Windows® OS (7, 8 and 10), Linux® 64-bit or macOS®(a)
- USB Type-A or USB Type-C® to Mini-B cable

3.2 Development toolchains

- IAR Systems - IAR Embedded Workbench®(b)
- Keil® - MDK-ARM(b)
- STMicroelectronics - STM32CubeIDE

3.3 Demonstration software

The demonstration software, included in the STM32Cube MCU Package corresponding to the on-board microcontroller, is preloaded in the STM32 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 *www.st.com*.

4 Conventions

Table 3 provides the definition of some conventions used in the present document.

Table 3. 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

Note: *Board figures and photos in this document are based on version B, versions C, D, and E are similar.*

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a. macOS® is a trademark of Apple Inc. registered in the U.S. and other countries.

b. On Windows® only.

5 Quick start

The STM32F3DISCOVERY board is a low-cost and easy-to-use development kit to quickly evaluate and start development with an STM32 F3 Series microcontroller. Before installing and using the product, accept the Evaluation Product License Agreement from the www.st.com/stm32f3discovery web page. For more information on the STM32F3DISCOVERY board and for demonstration software, visit the www.st.com/stm32f3discovery web page.

5.1 Getting started

Follow the sequence below to configure the STM32F3DISCOVERY board and launch the DISCOVER application:

1. Check the jumper positions on the board, JP3 ON, CN4 ON (DISCOVERY selected).
2. Connect the STM32F3DISCOVERY board to a PC with a USB cable Type-A or USB Type-C$^®$ to Mini-B through the USB ST-LINK or USB USER connector to power the board. The red LEDs LD1 (PWR) and LD2 (COM) light up.
3. The eight LED indicators blink sequentially.
4. Press the USER button to enable the ST MEMS gyroscope sensor. Hold the board horizontal then tilt it. Observe how the blinking of the LEDs indicates the gyroscope movement. Press the USER button again and the LEDs restart blinking sequentially.
5. Press the USER button to enable the MEMs accelerator sensor. Hold the board horizontal then tilt it. Observe how the blinking of the LEDs indicates the board inclination with respect to the horizontal plane. Press the USER button again and the LEDs restart blinking sequentially.
6. Press the USER button. LD3, LD6, LD7, and LD10 are ON. The board is recognized as a standard mouse (the board must be connected through the USB USER connector). Move the board to control the cursor on the screen. Press the USER button again and the LEDs restart blinking sequentially.
7. The demo application software as well as other software examples for exploring STM32F3 features are available at www.st.com/stm32f3discovery.

6 Hardware layout and configuration

The STM32F3DISCOVERY board is designed around the STM32F303VCT6 microcontroller in a 100-pin LQFP package.

Figure 2 illustrates the connections between the STM32F303VCT6 and its peripherals (ST-LINK/V2, push-buttons, LEDs, USB, ST MEMS Gyroscope, ST MEMS E-compass, and connectors).

Figure 2 and *Figure 3* help the user to locate these features on the STM32F3DISCOVERY board.

Figure 2. Hardware block diagram

MSv41785V3

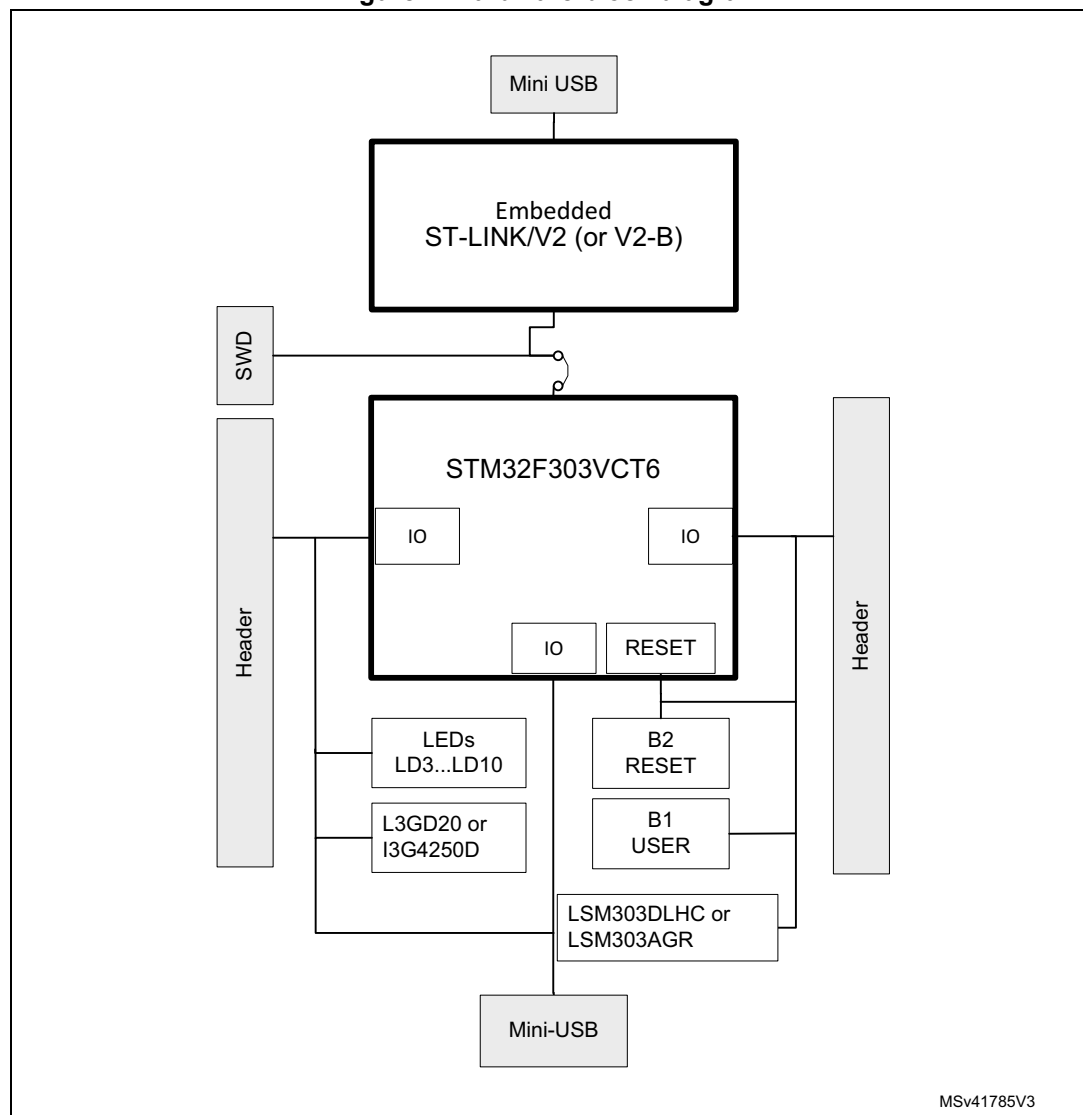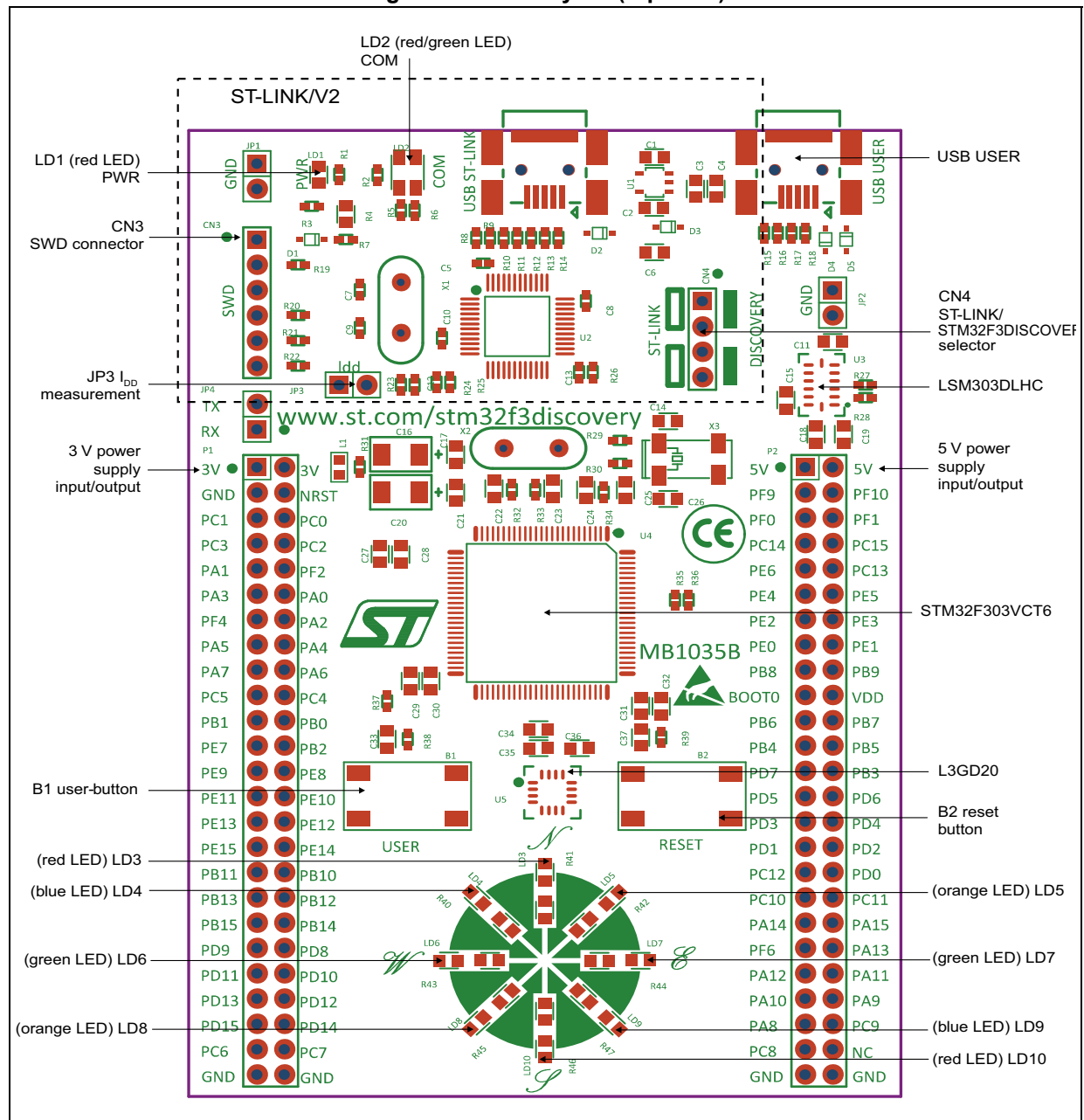**Figure 3. Board layout (top view)**

Note: *Pin 1 of CN3, CN4, JP3, JP4, P1, and P2 connectors are identified by a square.*

Figure 4. Board layout (bottom view)
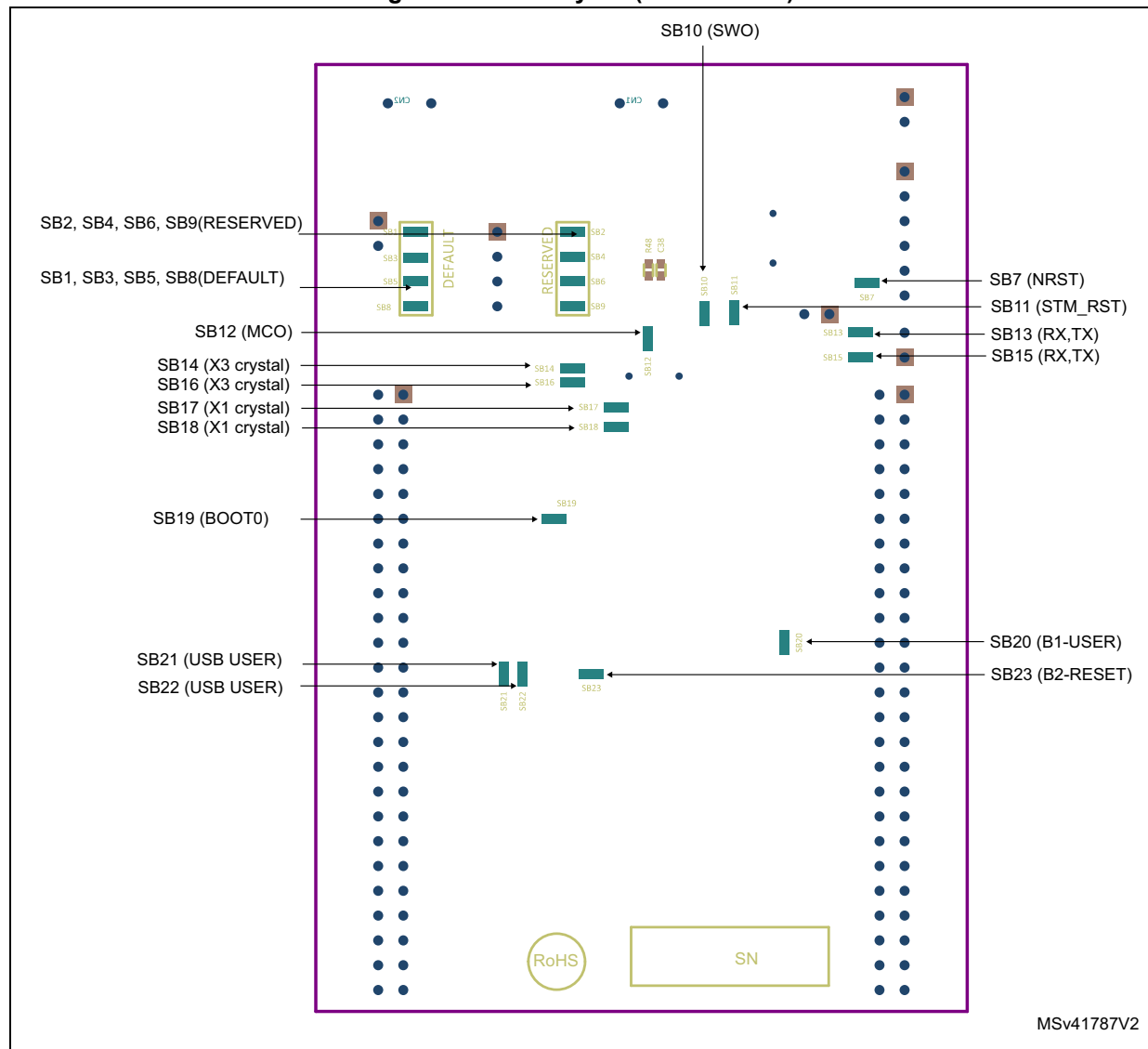
Note: *If SB12 is ON, SB17 must be OFF and R33 removed to provide the clock source from MCO correctly.*

6.1 The STM32F3DISCOVERY Discovery board mechanical drawing

Figure 5. STM32F3DISCOVERY mechanical drawing
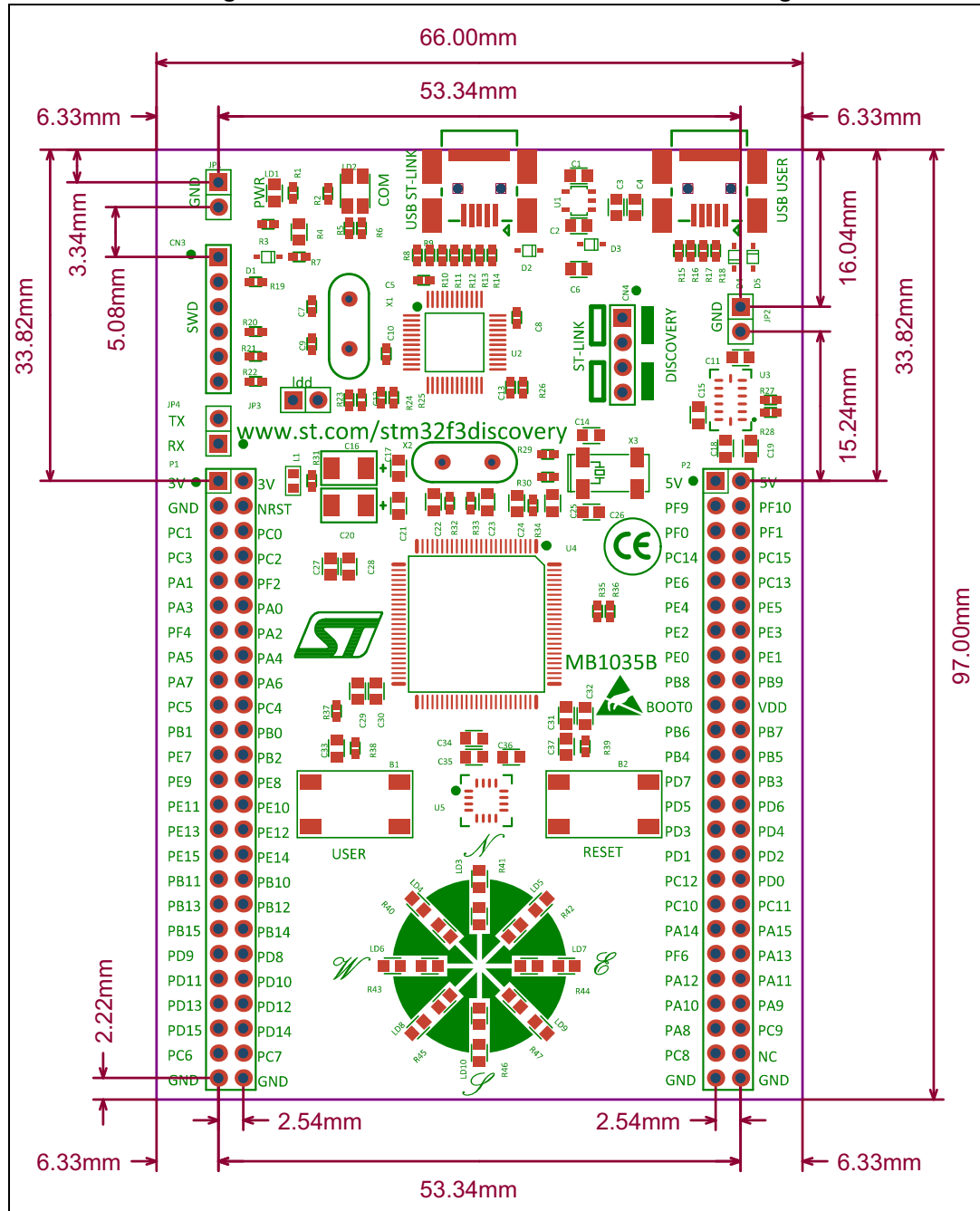
6.2 Embedded ST-LINK/V2 (or V2-B)

The ST-LINK/V2 on PCB version A or B or the ST-LINK/V2-B on PCB version C is embedded as a programming and debugging tool. Virtual COM port and USB mass storage features are supported by the ST-LINK/V2-B only.

The embedded ST-LINK/V2 (or V2-B) supports only SWD for STM32 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 detail all the ST-LINK/V2 features.

The changes in ST-LINK/V2-B versus ST-LINK/V2 version are listed below. New features supported on ST-LINK/V2-B are:

- Virtual Com port interface on USB
- Mass storage interface on USB

The embedded-on-board features not supported either on ST-LINK/V2 or on ST-STLINK/V2-B are:

- SWIM interface
- Minimum supported application voltage limited to 3 V
- USB power management request for more than 100 mA power on USB

Known limitation:

Activating the readout protection on the STM32 target prevents the target application from running afterward. The readout protection must be kept disabled on the STM32 target.

There are two different ways to use the embedded ST-LINK/V2 (or V2-B), depending on the jumper states (see *Table 4*):

- Programming/debugging the STM32 on board (refer to *Section 6.2.4: Using ST-LINK/V2 (or V2-B) to program/debug the on-board STM32F303VCT6*)
- Programming/debugging the STM32 in an external application board, using a cable connected to SWD connector CN2 (refer to *Section 6.2.5: Using ST-LINK/V2 (or V2-B) to program/debug an external STM32 application*)

Table 4. Jumper states

Jumper state	Description
Both CN4 jumpers ON	ST-LINK/V2 (or V2-B) functions enabled for on-board programming (default)
Both CN4 jumpers OFF	ST-LINK/V2 (or V2-B) functions enabled for application through external CN3 connector (SWD supported)

6.2.1 Drivers

The ST-LINK/V2 (or V2-B) requires a dedicated USB driver, which, for Windows® XP, 7, 8, can be found at the *www.st.com* website. In case the STM32 Discovery 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, and from the device manager, he must update the driver of the connected device (see *Figure 6*).

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

Figure 6. USB composite device
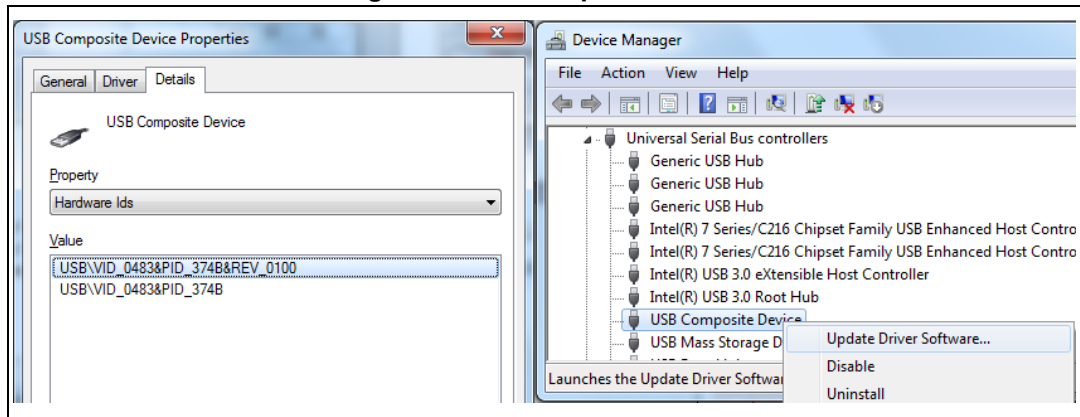
6.2.2 ST-LINK/V2 (or V2-B) firmware upgrade

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

6.2.3 VCP configuration

The ST-LINK/V2-B on STM32F3DISCOVERY supports virtual Com port (VCP) on U2 pin 12 (ST-LINK_TX) and U2 pin 13 (ST-LINK_RX), which are connected to the STM32F303 MCU target STM32 USART1 (PC4, PC5), thanks to SB13 and SB15 solder bridges.

The SB13 (PC4) and SB15 (PC5) default configurations for STM32F3DISCOVERY are given in *Table 6: Solder bridges*.

6.2.4 Using ST-LINK/V2 (or V2-B) to program/debug the on-board STM32F303VCT6

To program the STM32F303VCT6 MCU on the board, simply plug in the two jumpers marked in red on CN4, as shown in *Figure 7: STM32F3DISCOVERY connections*, but do not use the CN3 connector as that could disturb the communication with the STM32F303VCT6 of the STM32F3DISCOVERY.

Figure 7. STM32F3DISCOVERY connections
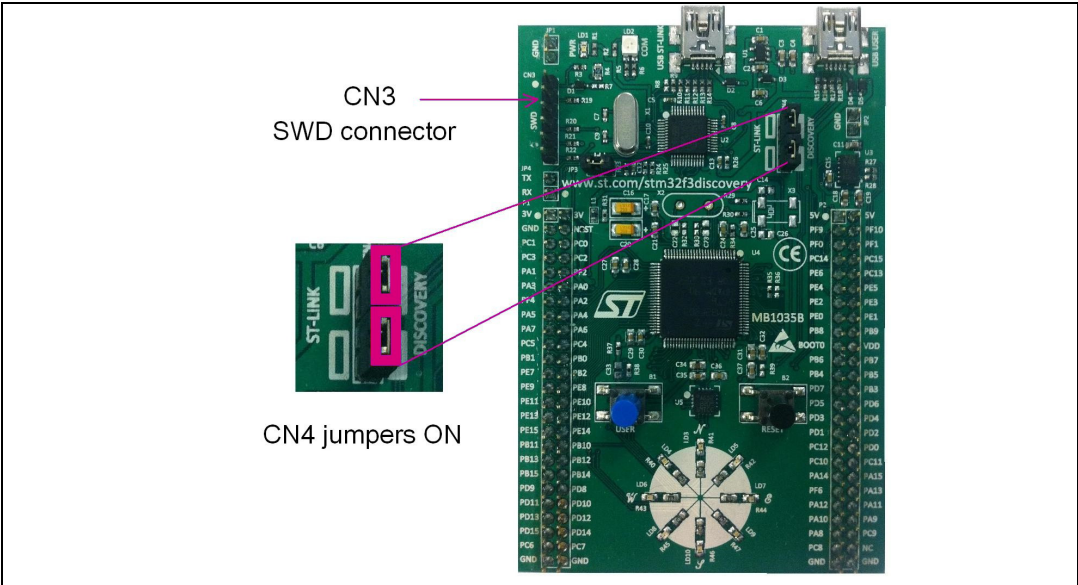
6.2.5 Using ST-LINK/V2 (or V2-B) to program/debug an external STM32 application

It is very easy to use the ST-LINK/V2 (or V2-B) to program the STM32 on an external application. Simply remove the two jumpers from CN4 as shown in *Figure 8: ST-LINK/V2 (or V2-B) connections*, and connect the application to the CN3 debug connector according to *Table 5*.

Note: *SB7 must be OFF if the CN3 pin 5 is used in an external application.*

Table 5. Debug connector CN3 (SWD)

Pin	CN3	Designation
1	VDD_TARGET	VDD from application
2	SWCLK	SWD clock
3	GND	Ground
4	SWDIO	SWD data input/output
5	NRST	RESET of target MCU
6	SWO	Reserved

Figure 8. ST-LINK/V2 (or V2-B) connections
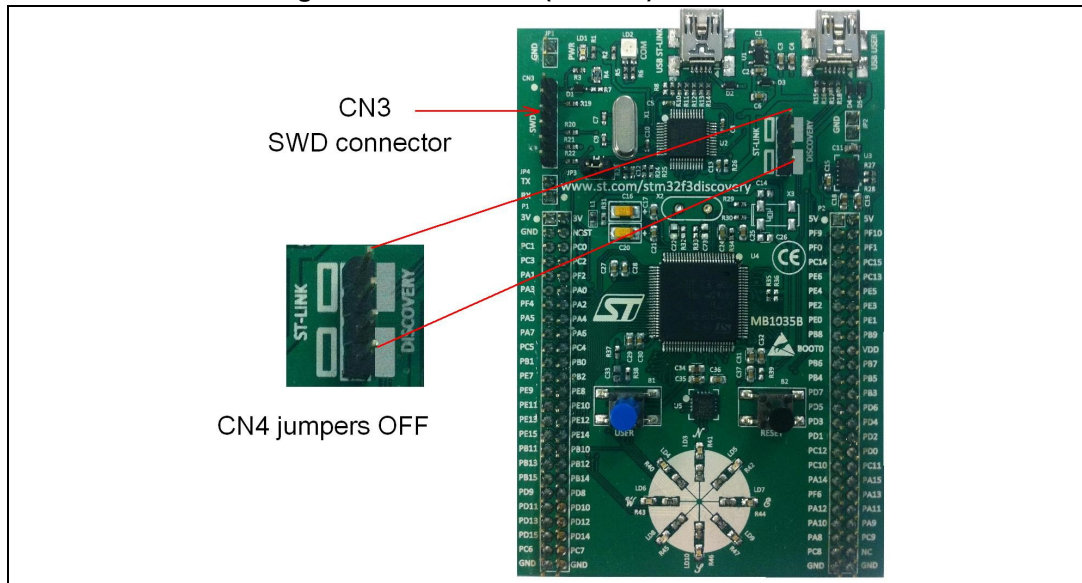
6.3 Power supply and power selection

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

The D1 and D2 diodes protect the 5 V and 3 V pins from external power supplies.

- 5 V and 3 V can be used as output power supplies when another application board is connected to pins P1 and P2. In this case, the 5 V and 3 V pins deliver a 5 V or 3 V power supply and power consumption must be lower than 100 mA.

- 5 V and 3 V can also be used as input power supplies, for example when the USB connectors are not connected to the PC. In this case, the STM32F3DISCOVERY board must be powered by a power supply unit or by auxiliary equipment complying with the standard EN-60950-1: 2006+A11/2009, and must be Safety Extra Low Voltage (SELV) with limited power capability.

Note: *The board can be also powered through the USB USER connector and it is protected by D4 and D5 diodes when both USBs are connected (in which case, the 5 V power is around 4.4 volts).*

6.4 LEDs

- LD1 PWR: 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 the ST-LINK/V2.
- User LD3: Red LED is a user LED connected to the I/O PE9 of the STM32F303VCT6.
- User LD4: Blue LED is a user LED connected to the I/O PE8 of the STM32F303VCT6.
- User LD5: Orange LED is a user LED connected to the I/O PE10 of the STM32F303VCT6.
- User LD6: Green LED is a user LED connected to the I/O PE15 of the STM32F303VCT6.
- User LD7: Green LED is a user LED connected to the I/O PE11 of the STM32F303VCT6.
- User LD8: Orange LED is a user LED connected to the I/O PE14 of the STM32F303VCT6.
- User LD9: Blue LED is a user LED connected to the I/O PE12 of the STM32F303VCT6.
- User LD10: Red LED is a user LED connected to the I/O PE13 of the STM32F303VCT6.

6.5 Push-buttons

- B1 USER: user and wake-up button connected to the I/O PA0 of the STM32F303VCT6.
- B2 RESET: push-button connected to NRST is used to RESET the STM32F303VCT6.

6.6   USB device supported

The STM32F303VCT6 MCU is also used to drive the second USB Mini-B connector (USB USER), which allows the board to be used as a USB Device. The STM32F3DISCOVERY can then act as a USB joystick, mouse, or another similar device. If both USBs are connected, diodes D4 and D5 protect the board and use the power from the USB ST-LINK.

The board can be powered through this USB USER connector, then LED1 PWR lights, LED2 COM blinks and it can run an application in standalone mode.

6.7   ST MEMS E-compass (ST MEMS LSM303DLHC or LSM303AGR)

The LSM303DLHC is an ultra-compact low-power system-in-package featuring a 3D digital linear acceleration sensor and a 3D digital magnetic sensor. It includes a sensing element and an IC interface able to provide the measured acceleration to the external world through an I^2C serial interface.

The LSM303DLHC has dynamically user-selectable full scales of ±2g/±8g and is capable of measuring acceleration, and a magnetic field full scale from ±1.3g to 8.1g with an output data rate of 100 Hz or 400 Hz.

The LSM303AGR has linear acceleration full scales of ±2g/±4g/±8g/±16g and a magnetic field dynamic range of ±50 gauss with an output data rate of 100 kHz, 400 kHz, 1 MHz, and 3.4 MHz.

The STM32F303VCT6 MCU controls this motion sensor through the I^2C interface.

6.8   ST MEMS Gyroscope (ST MEMS L3GD20 or I3G4250D)

The L3GD20 is an ultra-compact, low-power, three-axis-angular-rate sensor. It includes a sensing element and an IC interface able to provide the measured angular rate to the external world through the I^2C/SPI serial interface.

The L3GD20 has dynamically user-selectable full scales of ±250 dps/±500 dps/±2000 dps and is capable of measuring rates.

The I3G4250D has a selectable full scale ±245/±500/±2000 dps and is capable of measuring rates with a user-selectable bandwidth.

The STM32F303VCT6 MCU controls this motion sensor through the SPI interface.

6.9   JP3 (Idd)

Jumper JP3, labeled Idd, allows the measurement of the consumption of the STM32F303VCT6 by removing the jumper and connecting an ammeter.

- Jumper ON: STM32F303VCT6 is powered (default).
- Jumper OFF: An ammeter must be connected to measure the STM32F303VCT6 current. If there is no ammeter, the STM32F303VCT6 is not powered.

6.10 OSC clock

6.10.1 OSC clock supply

The following information indicates all configurations for clock supply selection:

- **MCO from ST-LINK**. From MCO of the STM32F103C8T6. This frequency cannot be changed, it is fixed at 8 MHz and connected to PF0-OSC_IN of the STM32F303VCT6. Configuration needed:
    – SB12 closed, SB17 open, R33 removed
    – SB18, R32, C22, C23, X2 = do not care
- **Oscillator on board**. From X2 crystal (not provided). For typical frequencies and its capacitors and resistors, refer to the STM32F303VCT6 Datasheet. Configuration needed:
    – SB12, SB17, SB18 open
    – R32, R33, C22, C23, X2 soldered
- **Oscillator from external PF0**. From external oscillator through pin 5 of the P2 connector. Configuration needed:
    – SB12 open, SB17 closed, R33 removed
    – SB18, R32, C22, C23, X2 = do not care
- **No external oscillator**. From Internal oscillator HSI only. PF0 and PF1 can be used as GPIO. Configuration needed:
    – SB12 open, SB17 closed, SB18 closed, R32 removed, R33 removed
    – C22, C23, X2 = do not care

6.10.2 OSC 32 kHz clock supply

The following information indicates all the configurations for the 32 kHz clock supply selection:

- **Oscillator on board**. From X3 Crystal (not provided). Configuration needed:
    – SB14 open, SB16 open.
    – R29, R30, C14, C26, X3 soldered.
- **Oscillator from external PC14**. From external oscillator through the pin 7 of P2 connector. Configuration needed:
    – SB14 closed, R29 removed
    – SB16, R30, C14, C26, X3 = do not care
- **No external oscillator**. PC14 and PC15 can be used as GPIO. Configuration needed:
    – SB14 closed, SB16 closed, R29 removed, R30 removed.
    – C14, C26, X3 = do not care.

6.11   Solder bridges

Table 6. Solder bridges

Bridge	State[1]	Description
SB17,18 (X1 crystal) [2]	**OFF**	X1, C22, C23, R32, and R33 provide a clock. PF0 and PF1 are disconnected from P2.
	ON	PF0 and PF1 are connected to P2 (R32 and R33 must not be fitted).
SB1,3,5,8 (default)	**ON**	Reserved, do not modify
SB2,4,6,9 (reserved)	**OFF**	Reserved, do not modify
SB14,16 (X3 crystal)	OFF	X3, C14, C26, R29, and R30 deliver a 32 KHz clock. PC14, PC15 are not connected to P2.
	ON	PC14 and PC15 are only connected to P2. Remove only R29 and R30.
SB23 (B2-RESET)	**ON**	B2 push-button is connected to NRST of STM32F303VCT6
	OFF	B2 push-button is not connected to NRST of STM32F303VCT6
SB20 (B1-USER)	**ON**	B1 push-button is connected to PA0
	OFF	B1 push-button is not connected to PA0
SB13,15 (RX, TX)	OFF	STM32F303VCT6 USART1 is not connected to ST-LINK, so VCP is disabled (Default configuration on PCB version A or B).
	ON	STM32F303VCT6 USART1 is connected to ST-LINK, so VCP is enabled (default configuration on PCB version C and newer).
SB7 (NRST)	**ON**	NRST signal of connector CN3 is connected to NRST of STM32F303VCT6
	OFF	NRST signal is not connected
SB10 (SWO)	ON	SWO signal of connector CN3 is connected to PB3
	OFF	SWO signal is not connected
SB11 (STM_RST)	**OFF**	No incidence on NRST signal of STM32F103C8T6
	ON	NRST signal of STM32F103C8T6 is connected to GND
SB19 (BOOT0)	**ON**	BOOT0 signal of STM32F303VCT6 is at level LOW through 510 Ω pull-down
	OFF	BOOT0 signal of STM32F303VCT6 is at level HIGH through 10 KΩ pull-up (not provided).
SB21,22 (USB USER)	**OFF**	PA11 and PA12 are only used for USB USER and not connected to P2 to avoid noise.
	ON	PA11 and PA12 are connected to P2.
SB12 (MCO)[2]	OFF	MCO signal of STM32F103C8T6 is not used.
	ON	MCO clock signal from STM32F103C8T6 is connected to OSC_IN of STM32F303VCT6.

1. The default state is shown in bold.

2. If SB12 is ON, SB17 must be OFF and R33 removed to provide the clock source from the MCO correctly.

6.12 Extension connectors

The male headers P1 and P2 can connect the STM32F3DISCOVERY to a standard prototyping/wrapping board. STM32F303VCT6 GPIOs are available on these connectors. P1 and P2 can also be probed by an oscilloscope, logical analyzer, or voltmeter.

Table 7. STM32F303VCT6 MCU pin description versus board function [1]

MCU pin			Board function												
Main function	Alternate function	LQFP100 pin number	VCP	LSM303DLHC or LSM303AGR	L3GD20 or I3G4250D	Push-button	LED	SWD	USB	OSC	Free I/O	Power supply	CN3	P1	P2
BOOT0	-	94	-	-	-	-	-	-	-	-	-	-	-	-	19
NRST	-	14	-	-	-	RESET	'	NRST	-	-	-	-	5	4	-
PA0	TIM2_CH1_ETR, G1_IO1, USART2_CTS, COMP1_OUT, TIM8_BKIN, TM8_ETR	23	-	-	-	USER	-	-	-	-	-	-	-	12	-
PA1	TIM2_CH2, G1_IO2, USART2_RTS, TIM15_CH1N	24	-	-	-	-	-	-	-	-	-	-	-	9	-
PA2	TIM2_CH3, G1_IO3, USART2_TX, COMP2_OUT, TIM15_CH1, AOP1_OUT	25	-	-	-	-	-	-	-	-	-	-	-	14	-
PA3	TIM2_CH4, G1_IO4, USART2_RX, TIM15_CH2	26	-	-	-	-	-	-	-	-	-	-	-	11	-
PA4	TIM3_CH2, G2_IO1, SPI1_NSS, SPI3_NSS/I2S3_WS, USART2_CK	29	-	-	-	-	-	-	-	-	-	-	-	16	-

Table 7. STM32F303VCT6 MCU pin description versus board function (continued)[1]

MCU pin			Board function												
Main function	Alternate function	LQFP100 pin number	VCP	LSM303DLHC or LSM303AGR	L3GD20 or I3G4250D	Push-button	LED	SWD	USB	OSC	Free I/O	Power supply	CN3	P1	P2
PA5	TIM2_CH1_ETR, G2_IO2, SPI1_SCK	30	-	-	SCL/SPC	-	-	-	-	-	-	-	-	15	-
PA6	TIM16_CH1, TIM3_CH1, G2_IO3, TIM8_BKIN, SPI1_MISO, TIM1_BKIN, AOP2_OUT, COMP1_OUT	31	-	-	SAO/SDO	-	-	-	-	-	-	-	-	18	-
PA7	TIM17_CH1, TIM3_CH2, G2_IO4, TIM8_CH1N, SPI1_MOSI, TIM1_CH1N, COMP2_OUT	32	-	-	SDA/SDI/SDO	-	-	-	-	-	-	-	-	17	-
PA8	MCO, I2C2_SMBAL, I2S2_MCK, TIM1_CH1, USART1_CK, COMP3_OUT, TIM4_ETR	67	-	-	-	-	-	-	-	-	-	-	-	-	45
PA9	G4_IO1, I2C2_SCL, I2S3_MCK, TIM1_CH2, USART1_TX, COMP5_OUT, TIM15_BKIN, TIM2_CH3	68	-	-	-	-	-	-	-	-	-	-	-	-	44

Table 7. STM32F303VCT6 MCU pin description versus board function (continued)[1]

MCU pin			Board function												
Main function	Alternate function	LQFP100 pin number	VCP	LSM303DLHC or LSM303AGR	L3GD20 or I3G4250D	Push-button	LED	SWD	USB	OSC	Free I/O	Power supply	CN3	P1	P2
PA10	TIM17_BKIN, G4_IO2, I2C2_SDA, TIM1_CH3, USART1_RX, COMP6_OUT, TIM2_CH4, TIM8_BKIN	69	-	-	-	-	-	-	-	-	-	-	-	-	43
PA11	TIM1_CH1N, USART1_CTS, COMP1_OUT, CAN_RX, TIM4_CH1, TIM1_CH4_BKIN2, USBDM	70	-	-	-	-	-	-	DM	-	-	-	-	-	42
PA12	TIM16_CH1, TIM1_CH2N, USART1_RTS, COMP2_OUT, CAN_TX, TIM4_CH2, TIM1_ETR, USBDP	71	-	-	-	-	-	-	DP	-	-	-	-	-	41
PA13	JTMS-SWDAT, TIM16_CH1N, G4_IO3, IR-Out, USART3_CTS, TIM4_CH3	72	-	-	-	-	-	SWDIO	-	-	-	-	4	-	40
PA14	JTCK-SWCLK, G4_IO4, I2C1_SDA, TIM8_CH2, TIM1_BKIN, USART2_TX	76	-	-	-	-	-	SWCLK	-	-	-	-	2	-	37

Table 7. STM32F303VCT6 MCU pin description versus board function (continued)[1]

MCU pin			Board function												
Main function	Alternate function	LQFP100 pin number	VCP	LSM303DLHC or LSM303AGR	L3GD20 or I3G4250D	Push-button	LED	SWD	USB	OSC	Free I/O	Power supply	CN3	P1	P2
PA15	JTDI, TIM2_CH1_ETR, TIM8_CH1, I2C1_SCL, SPI1_NSS, SPI3_NSS/I2S3_WS, USART2_RX, TIM1_BKIN	77	-	-	-	-	-	-	-	-	-	-	-	-	38
PB0	TIM3_CH3, G3_IO2, TIM8_CH2N, TIM1_CH2N	35	-	-	-	-	-	-	-	-	-	-	-	22	-
PB1	TIM3_CH4, G3_IO3, TIM8_CH3N, TIM1_CH3N, COMP4_OUT, AOP3_OUT	36	-	-	-	-	-	-	-	-	-	-	-	21	-
PB2	G3_IO4	37	-	-	-	-	-	-	-	-	-	-	-	24	-
PB3	JTDO/TRACESWO, TIM2_CH2, TIM4_ETR, G5_IO1, TIM8_CH1N, SPI1_SCK, SPI3_SCK/I2S3_CK, USART2_TX, TIM3_ETR	89	-	-	-	-	-	SWO	-	-	-	-	6	-	26
PB4	NJTRST, TIM16_CH1, TIM3_CH1, G5_IO2, TIM8_CH2N, SPI1_MISO, SPI3_MISO/I2S3_DIN, USART2_RX, TIM17_BKIN	90	-	-	-	-	-	-	-	-	-	-	-	-	23

Table 7. STM32F303VCT6 MCU pin description versus board function (continued)[1]

MCU pin			Board function												
Main function	Alternate function	LQFP100 pin number	VCP	LSM303DLHC or LSM303AGR	L3GD20 or I3G4250D	Push-button	LED	SWD	USB	OSC	Free I/O	Power supply	CN3	P1	P2
PB5	TIM16_BKIN, TIM3_CH2, TIM8_CH3N, I2C1_SMBAL, SPI1_MOSI, SPI3_MOSI/I2S3_DOUT, USART2_CK, TIM17_CH1	91	-	-	-	-	-	-	-	-	-	-	-	-	24
PB6	TIM16_CH1N, TIM4_CH1, G5_IO3, I2C1_SCL, TIM8_CH1, TIM8_ETR_BKIN2, USART1_TX	92	-	SCL	-	-	-	-	-	-	-	-	-	-	21
PB7	TIM17_CH1N, TIM4_CH2, G5_IO4, I2C1_SDA, TIM8_BKIN, USART1_RX, TIM3_CH4	93	-	SDA	-	-	-	-	-	-	-	-	-	-	22
PB8	TIM16_CH1, TIM4_CH3, SYNCH, I2C1_SCL, COMP1_OUT, CAN_RX, TIM8_CH2, TIM1_BKIN	95	-	-	-	-	-	-	-	-	-	-	-	-	17
PB9	TIM17_CH1, TIM4_CH4, I2C1_SDA, IR-OUT, CAN_TX, TIM8_CH3	96	-	-	-	-	-	-	-	-	-	-	-	-	18
PB10	TIM2_CH3, SYNCH, USART3_TX	47	-	-	-	-	-	-	-	-	-	-	-	34	-

Table 7. STM32F303VCT6 MCU pin description versus board function (continued)[1]

MCU pin			Board function											
Main function	Alternate function	LQFP100 pin number	VCP	LSM303DLHC or LSM303AGR	L3GD20 or I3G4250D	Push-button	LED	SWD	USB	OSC	Free I/O	Power supply	CN3	P1	P2
PB11	TIM2_CH4, G6_IO1, USART3_RX, COMP2_OUT	48	-	-	-	-	-	-	-	-	-	-	-	33	-
PB12	G6_IO2, I2C2_SMBAL, SPI2_NSS/I2S2_WS, TIM1_BKIN, USART3_CK, AOP4_OUT	51	-	-	-	-	-	-	-	-	-	-	-	36	-
PB13	G6_IO3, SPI2_SCK/I2S2_CK, TIM1_CH1N, USART3_CTS	52	-	-	-	-	-	-	-	-	-	-	-	35	-
PB14	TIM15_CH1, G6_IO4, SPI2_MISO/I2S2_DIN,TIM1_CH2N, USART3_RTS	53	-	-	-	-	-	-	-	-	-	-	-	38	-
PB15	TIM15_CH2, TIM15_CH1N, TIM1_CH3N, SPI2_MOSI/ I2S2_DOUT	54	-	-	-	-	-	-	-	-	-	-	-	37	-
PC0	-	15	-	-	-	-	-	-	-	-	-	-	-	6	-
PC1	-	16	-	-	-	-	-	-	-	-	-	-	-	5	-
PC2	COMP7_OUT	17	-	-	-	-	-	-	-	-	-	-	-	8	-
PC3	TIM1_BKIN2	18	-	-	-	-	-	-	-	-	-	-	-	7	-

Table 7. STM32F303VCT6 MCU pin description versus board function (continued)[1]

MCU pin			Board function												
Main function	Alternate function	LQFP100 pin number	VCP	LSM303DLHC or LSM303AGR	L3GD20 or I3G4250D	Push-button	LED	SWD	USB	OSC	Free I/O	Power supply	CN3	P1	P2
PC4	USART1_TX	33	USART1_TX	-	-	-	-	-	-	-	-	-	-	20	-
PC5	G3_IO1, USART1_RX	34	USART1_RX	-	-	-	-	-	-	-	-	-	-	19	-
PC6	TIM3_CH1, TIM8_CH1, I2S2_MCK, COMP6_OUT	63	-	-	-	-	-	-	-	-	-	-	-	47	-
PC7	TIM3_CH2, TIM8_CH2, I2S3_MCK, COMP5_OUT	64	-	-	-	-	-	-	-	-	-	-	-	48	-
PC8	TIM3_CH3, TIM8_CH3, COMP3_OUT	65	-	-	-	-	-	-	-	-	-	-	-	-	47
PC9	TIM3_CH4, TIM8_CH4_BKIN2, COMP3_OUT	66	-	-	-	-	-	-	-	-	-	-	-	-	46
PC10	TIM8_CH1N, UART4_TX, SPI3_SCK/I2S3_CK, USART3_TX	78	-	-	-	-	-	-	-	-	-	-	-	-	35
PC11	TIM8_CH2N, UART4_RX, SPI3_MISO/I2S3_DIN,USART3_RX	79	-	-	-	-	-	-	-	-	-	-	-	-	36

Table 7. STM32F303VCT6 MCU pin description versus board function (continued)[1]

MCU pin			Board function												
Main function	Alternate function	LQFP100 pin number	VCP	LSM303DLHC or LSM303AGR	L3GD20 or I3G4250D	Push-button	LED	SWD	USB	OSC	Free I/O	Power supply	CN3	P1	P2
PC12	TIM8_CH3N, UART5_TX, SPI3_MOSI/ I2S3_DOUT, USART3_CK	80	-	-	-	-	-	-	-	-	-	-	-	-	33
PC13	TIM1_CH1N	7	-	-	-	-	-	-	-	-	-	-	-	-	10
PC14	OSC32_IN	8	-	-	-	-	-	-	-	OSC32_IN	-	-	-	-	7
PC15	OSC32_OUT	9	-	-	-	-	-	-	-	OSC32_OUT	-	-	-	-	8
PD0	CAN_RX	81	-	-	-	-	-	-	-	-	-	-	-	-	34
PD1	TIM8_CH4_BKIN2, CAN_TX	82	-	-	-	-	-	-	-	-	-	-	-	-	31
PD2	TIM3_ETR, TIM8_BKIN, UART5__RX	83	-	-	-	-	-	-	-	-	-	-	-	-	32
PD3	TIM2_CH1_ETR, USART2_CTS	84	-	-	-	-	-	-	-	-	-	-	-	-	29
PD4	TIM2_CH2, USART2_RTS	85	-	-	-	-	-	-	-	-	-	-	-	-	30
PD5	USRT2_TX	86	-	-	-	-	-	-	-	-	-	-	-	-	27
PD6	TIM2_CH4, USART2_RX	87	-	-	-	-	-	-	-	-	-	-	-	-	28
PD7	TIM2_CH3, USART2_CK	88	-	-	-	-	-	-	-	-	-	-	-	-	25

Table 7. STM32F303VCT6 MCU pin description versus board function (continued)[1]

MCU pin			Board function												
Main function	Alternate function	LQFP100 pin number	VCP	LSM303DLHC or LSM303AGR	L3GD20 or I3G4250D	Push-button	LED	SWD	USB	OSC	Free I/O	Power supply	CN3	P1	P2
PD8	USART3_TX	55	-	-	-	-	-	-	-	-	-	-	-	40	-
PD9	USART3_RX	56	-	-	-	-	-	-	-	-	-	-	-	39	-
PD10	USART3_CK	57	-	-	-	-	-	-	-	-	-	-	-	42	-
PD11	USART3_CTS	58	-	-	-	-	-	-	-	-	-	-	-	41	-
PD12	TIM4_CH1, G8_IO1, USART3_RTS	59	-	-	-	-	-	-	-	-	-	-	-	44	-
PD13	TIM4_CH2, G8_IO2	60	-	-	-	-	-	-	-	-	-	-	-	43	-
PD14	TIM4_CH3, G8_IO3	61	-	-	-	-	-	-	-	-	-	-	-	46	-
PD15	TIM4_CH4, G8_IO4, SPI2_NSS	62	-	-	-	-	-	-	-	-	-	-	-	45	-
PE0	TIM4_ETR, TIM16_CH1, USART1_TX	97	-	-	INT1	-	-	-	-	-	-	-	-	-	15
PE1	TIM17_CH1, USART1_RX	98	-	-	DRDY/INT2	-	-	-	-	-	-	-	-	-	16
PE2	TRACECK, TIM3_CH1, G7_IO1	1	-	DRDY	-	-	-	-	-	-	-	-	-	-	13
PE3	TRACED0, TIM3_CH2, G7_IO2	2	-	-	CS_I2C/SPI	-	-	-	-	-	-	-	-	-	14
PE4	TRACED1, TIM3_CH3, G7_IO3	3	-	INT1	-	-	-	-	-	-	-	-	-	-	11
PE5	TRACED2, TIM3_CH4, G7_IO4	4	-	INT2	-	-	-	-	-	-	-	-	-	-	12

Table 7. STM32F303VCT6 MCU pin description versus board function (continued)[1]

MCU pin			Board function												
Main function	Alternate function	LQFP100 pin number	VCP	LSM303DLHC or LSM303AGR	L3GD20 or I3G4250D	Push-button	LED	SWD	USB	OSC	Free I/O	Power supply	CN3	P1	P2
PE6	TRACED3	5	-	-	-	-	-	-	-	-	-	-	-	-	9
PE7	TIM1_ETR	38	-	-	-	-	-	-	-	-	-	-	-	23	-
PE8	TIM1_CH1N	39	-	-	-	-	LD4/ BLUE	-	-	-	-	-	-	26	-
PE9	TIM1_CH1	40	-	-	-	-	LD3/ RED	-	-	-	-	-	-	25	-
PE10	TIM1_CH2N	41	-	-	-	-	LD5/ ORANGE	-	-	-	-	-	-	28	-
PE11	TIM1_CH2	42	-	-	-	-	LD7/ GREEN	-	-	-	-	-	-	27	-
PE12	TIM1_CH3N	43	-	-	-	-	LD9/ BLUE	-	-	-	-	-	-	30	-
PE13	TIM1_CH3	44	-	-	-	-	LD10/ RED	-	-	-	-	-	-	29	-
PE14	TIM1_CH4_BKIN2	45	-	-	-	-	LD8/ ORANGE	-	-	-	-	-	-	32	-
PE15	TIM1_BKIN, USART3_RX	46	-	-	-	-	LD6/ GREEN	-	-	-	-	-	-	31	-
PF0	**OSC_IN**, I2C2_SDA, TIM1_CH3N	12	-	-	-	-	-	-	-	OSC_IN	-	-	-	-	5
PF1	**OSC_OUT**, I2C2_SCL	13	-	-	-	-	-	-	-	OSC_OUT	-	-	-	-	6

Table 7. STM32F303VCT6 MCU pin description versus board function (continued)[1]

MCU pin			Board function												
Main function	Alternate function	LQFP100 pin number	VCP	LSM303DLHC or LSM303AGR	L3GD20 or I3G4250D	Push-button	LED	SWD	USB	OSC	Free I/O	Power supply	CN3	P1	P2
PF2	-	19	-	-	-	-	-	-	-	-	-	-	-	10	-
PF4	COMP1_OUT	27	-	-	-	-	-	-	-	-	-	-	-	13	-
PF6	TIM4_CH4, I2C2_SCL, USART3_RTS	73	-	-	-	-	-	-	-	-	-	-	-	-	39
PF9	TIM15_CH1, SPI2_SCK	10	-	-	-	-	-	-	-	-	-	-	-	-	3
PF10	TIM15_CH2, SPI2_SCK	11	-	-	-	-	-	-	-	-	-	-	-	-	4
-	-	-	-	-	-	-	-	-	-	-	-	5V	-	-	1
-	-	-	-	-	-	-	-	-	-	-	-	5V	-	-	2
-	-	-	-	-	-	-	-	-	-	-	-	3V	-	1	-
-	-	-	-	-	-	-	-	-	-	-	-	3V	-	2	-
-	-	-	-	-	-	-	-	-	-	-	-	VDD	-	-	20
-	-	-	-	-	-	-	-	-	-	-	-	GND GND	3	-	-
-	-	-	-	-	-	-	-	-	-	-	-	GND GND	-	49	49
-	-	-	-	-	-	-	-	-	-	-	-	GND	-	50	50

1. The cells marked in grey identify connections between MCU pin function and the board function.

7 STM32F3DISCOVERY information

7.1 Product marking

The sticker located on the top or bottom side of the PCB board shows the information about product identification such as board reference, revision, and serial number.

The first identification line has the following format: 'MBxxxx-Variant-yzz', where 'MBxxxx' is the board reference, "Variant" (optional) identifies the mounting variant when several exist, 'y' is the PCB revision and 'zz' is the assembly revision: for example B01.

The second identification line is the board serial number used for traceability.

Evaluation tools marked as "ES" or "E" are not yet qualified and therefore 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 designs or in production.

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

- On the target STM32 that is soldered on the board (for illustration of STM32 marking, refer to the STM32 datasheet "Package information" paragraph at the *www.st.com* website).
- Next to the evaluation tool ordering part number that is stuck or silk-screen printed on the board.

The board reference for the STM32F3DISCOVERY base board is MB1035.

7.2 Board revision history

Revision B-01

The revision B-01 is the initial release.

Revision C-01

PCB label MB1035 C-01, SB13 and SB15 closed

STM32F103C8T6 replaced by STM32F103CBT6, ST-LINK/V2-B

Revision D-01

PCB label MB1035 D-01, only silkscreen modification

STM32F303C-DISC1 replaced by STM32F3DISCOVERY

Revision E-02

C7 and C9 changed from 20 pF to 33 pF

7.3 Board known limitations

Revisions B-01, C-01, D-01 and E-02

When the board is used as a USB application, like a mouse or other similar device, it needs to be powered up through the ST-LINK USB connector firstly.

8 Revision history

Table 8. Document revision history

Date	Revision	Changes
10-Sep-2012	1	Initial release.
20-Sep-2012	2	Added *Figure 7 on page 11* and updated *Figure 12 on page 35*
07-Feb-2013	3	Updated *Section 6.2: Embedded ST-LINK/V2 (or V2-B)*: removed WLCSP package, sigma-delta ADC, CEC, updated timers and SPI/I²Ss.
21-Jul-2016	4	Updated to introduce the information that boards come with ST-LINK/V2 or ST-LINK/V2-B. Updated *Section 1: Features*, *Section 3: Ordering information*, *Section 6.2.4: Using ST-LINK/V2 (or V2-B) to program/debug the STM32F303VCT6 on board*, *Section 6.2.5: Using ST-LINK/V2 (or V2-B) to program/debug an external STM32 application*, *Table 5: Solder bridges*, *Table 6: STM32F303VCT6 MCU pin description versus board function*. Added *Section 2: Product marking*, *Section 6.2.1: Drivers*, *Section 6.2.2: ST-LINK/V2 (or V2-B) firmware upgrade*, *Section 6.2.3: VCP configuration*.
13-Apr-2018	5	Corrected the VCP pin connection of the MCU from incorrect PA9&PA10 to PC4&PC5 in *Section 6.2.3: VCP configuration* and *Table 7: STM32F303VCT6 MCU pin description versus board function*.
27-Aug-2020	6	Reshuffle of the document to align with latest standards: – *Introduction* to *Quick start* reordering – *Electrical schematics* removed – New *Table 2: Codification explanation* and *Section 7: STM32F3DISCOVERY information* Updated: – *Features*, *Figure 2*, *Section 6.7*, *Section 6.8*, and *Table 7* header adding LSM303AGR and I3G4250D sensors

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