Discovery kit with STM32H5F5LJ MCU

Introduction

The STM32H5F5J-DK Discovery kit is a complete demonstration and development platform for the STM32H5F5LJH7Q microcontroller, featuring an Arm® Cortex®-M33 core with Arm® TrustZone® and Armv8-M mainline security extension, 4 Mbytes of flash memory, and 1.5 Mbytes of SRAM.

The board contains a 4.3", 480 x 272-pixel, color TFT LCD module with parallel interface and touch panel and an M.2 Key E connectRF connector for connectivity extension. For even more user-friendliness, the on-board STLINK-V3EC debugger provides out of-the-box loading and debugging capabilities, as well as a USB Virtual COM port bridge. The STM32H5F5J-DK Discovery kit comes with the STM32CubeH5 MCU Package, which gathers in one single package all generic software components required to develop an application using STM32H5 MCUs. The package provides several examples and applications to facilitate understanding.

Figure 1. STM32H5F5J-DK top view

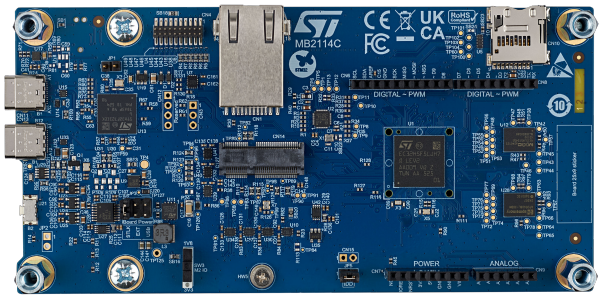


Figure 2. STM32H5F5J-DK bottom view

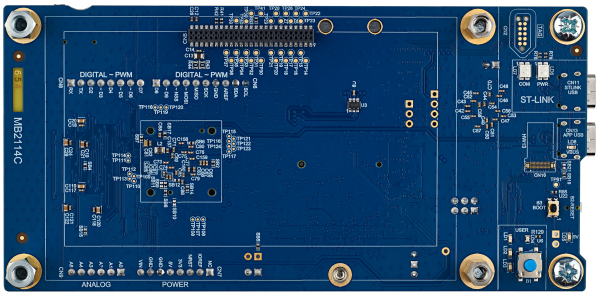


Figure 3. STM32H5F5J-DK assembled top view



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1 Features

- STM32H5F5LJH7Q microcontroller based on the Arm® Cortex®-M33 core with Arm® TrustZone®, featuring 4 Mbytes of flash memory and 1.5 Mbytes of SRAM, in a TFBGA225 package
- 512-Mbit Octo-SPI flash memory
- 64-Mbit Octo-SPI SRAM
- 4.3", 480 x 272-pixel, color TFT LCD module with parallel interface and touch panel
- USB Type-C® Sink Device
- Ethernet compliant with IEEE-802.3-2002
- microSD™ card holder
- Accelerometer/gyroscope module
- 4 user LEDs
- 3 push-buttons (USER, RESET, and BOOT)
- Board connectors:
  - M.2 Key E connectRF connector for connectivity extension
  - JTAG/SWD and TRACE debug connector (and Tag-Connect™ footprint)
  - I3C camera connector
  - ARDUINO® Uno V3 expansion connector
- On-board STLINK-V3EC debugger/programmer with USB re-enumeration capability: mass storage, Virtual COM port, and debug port
- Comprehensive free software libraries and examples available with the STM32CubeH5 MCU Package
- Support of a wide choice of Integrated Development Environments (IDEs) including IAR Embedded Workbench®, MDK-ARM, and STM32CubeIDE

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2 Ordering information

To order the STM32H5F5J-DK Discovery kit, refer to Table 1. Additional information is available from the datasheet and reference manual of the target STM32.

Table 1. Ordering information

Order code	Board references	Target STM32
STM32H5F5J-DK	• MB2114(1) • MB2274(2)	STM32H5F5LJH7Q

1. *Main board*
2. *LCD board*

2.1 Codification

The meaning of the codification is explained in Table 2.

Table 2. Codification explanation

STM32H5XXY-DK	Description	Example: STM32H5F5J-DK
STM32H5	MCU series in STM32 32-bit Arm Cortex MCUs	STM32H5 series
XX	MCU product line in the series	STM32H5F5 product line
Y	STM32 flash memory size: • J for 4 Mbytes	4 Mbytes
DK	Toolkit type: • DK: Discovery kit	Discovery kit

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3 Development environment

3.1 System requirements

- Multi-OS support: Windows® 10 or 11, Linux® 64-bit, or macOS®
- USB Type-A or USB Type-C® to USB Type-C® cable

Note: *macOS® is a trademark of Apple Inc., registered in the U.S. and other countries and regions.*

Linux® is a registered trademark of Linus Torvalds.

Windows is a trademark of the Microsoft group of companies.

3.2 Development toolchains

- IAR Systems® - IAR Embedded Workbench®(1)
- Keil® - MDK-ARM(1)
- STMicroelectronics - STM32CubeIDE

1. *On Windows® only.*

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*.

3.4 EDA resources

All board design resources, including schematics, EDA databases, manufacturing files, and the bill of materials, are available from the STM32H5F5J-DK product page at *www.st.com*.

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4 Conventions

Table 3 provides the conventions used for the ON and OFF settings in the present document.

Table 3. ON/OFF conventions

Convention	Definition
Jumper JPx ON	Jumper fitted
Jumper JPx OFF	Jumper not fitted
Jumper JPx [1-2]	Jumper fitted between pin 1 and pin 2
Solder bridge SBx ON	SBx connections closed by 0 Ω resistor
Solder bridge SBx OFF	SBx connections left open

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5 Safety recommendations

5.1 Targeted audience

This product targets users with at least basic electronics or embedded software development knowledge like engineers, technicians, or students.

This board is not a toy and is not suited for use by children.

5.2 Handling the board

This product contains a bare printed circuit board and like all products of this type, the user must be careful about the following points:

- The connection pins on the board might be sharp. Be careful when handling the board to avoid injury.
- This board contains static sensitive devices. To avoid damaging it, handle the board in an ESD-proof environment.
- While powered, do not touch the electric connections on the board with your fingers or anything conductive. The board operates at a voltage level that is not dangerous, but components might be damaged when shorted.
- Do not put any liquid on the board and avoid operating it close to water or at a high humidity level.
- Do not operate the board if it is dirty or dusty.
- The pins of the board are exposed and must not come into contact with a metal surface, as this can produce a short circuit and damage the board.

5.3 Delivery recommendations

Before the first use, inspect the board for any damage that may have occurred during shipment. Ensure that all socketed components are securely fixed in their sockets and that nothing is loose in the plastic bag.

5.4 Power supply

A power supply unit or auxiliary equipment complying with the EN 62368-1:2014+A11:2017 standard (or the one replacing it) and safety extralow voltage (SELV/ES1) with limited power capability (LPS/PS2) must power this equipment.

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6 Quick start

Before installing and using the product, accept the evaluation product license agreement from the *www.st.com/epla* webpage.

6.1 Getting started

Follow the sequence below to configure the STM32H5F5J-DK Discovery kit and launch the demonstration application (refer to Figure 5 and Figure 6 for component location).

- To identify all device interfaces from the host PC, install the DiscoveryUSB driver available from *www.st.com* before connecting the board.
- Make sure that jumper JP5 is ON.
- Make sure that jumper JP3 is set to "STLK".
- To power the board, connect the STM32H5F5J-DK Discovery kit USB connector (CN11) to a PC using a USB Type-A or USB Type-C® to USB Type-C® cable.
- The 5V LED (LD5) lights up.
- The LCD module displays a menu with icons, indicating the demonstration application software startup.
- Download the demo application software and user manual, as well as other software examples for exploring STM32H5 MCU features from the STM32H5F5J-DK webpage.
- Develop an application using the available examples.

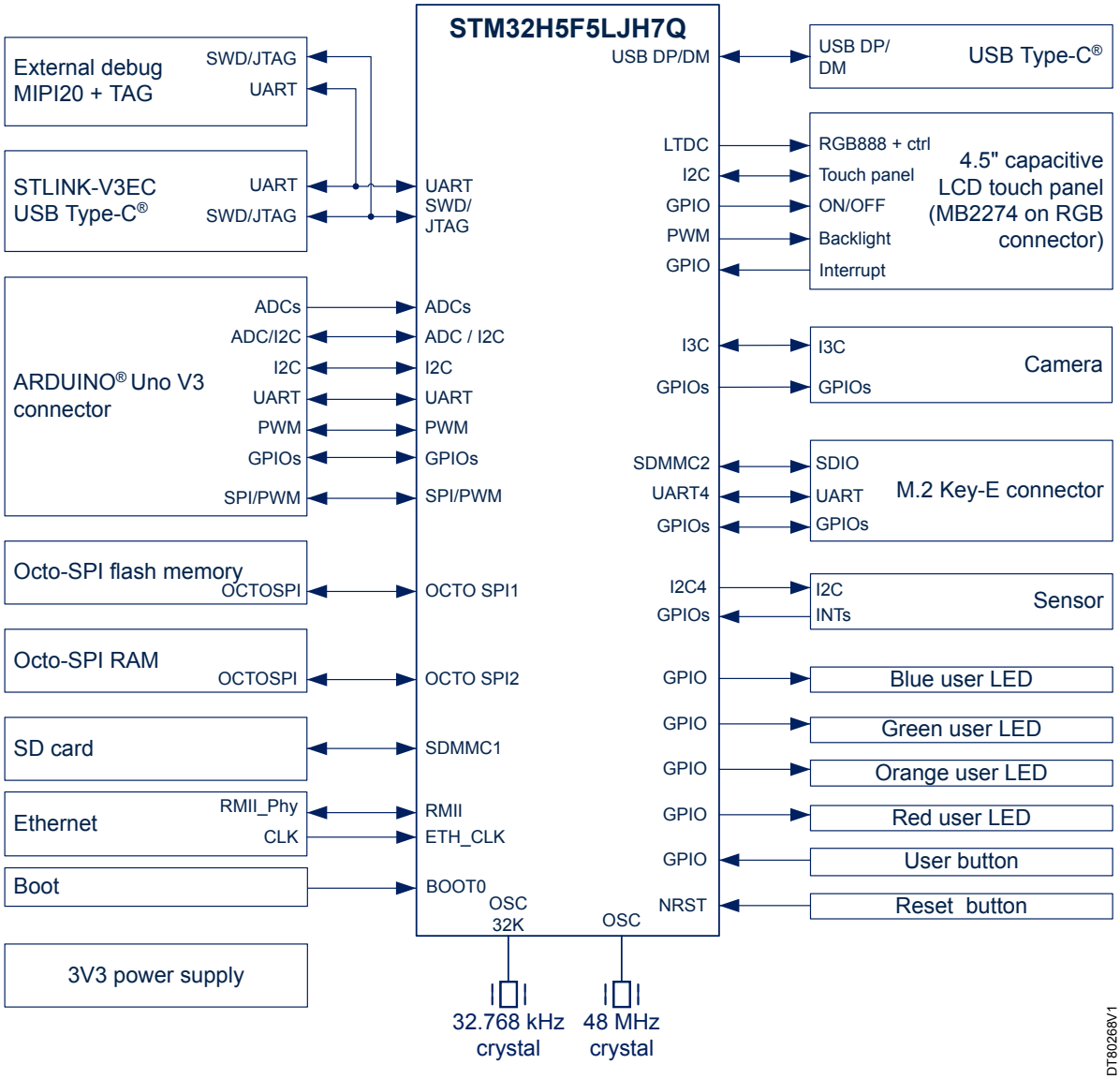
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7 Hardware layout and configuration

7.1 Hardware layout

The STM32H5F5J-DK Discovery kit is designed around the STM32H5F5LJH7Q microcontroller in a TFBGA225 package. The hardware block diagram in Figure 4 illustrates the connections between the microcontroller and the peripherals. Figure 5 and Figure 6 show where these peripherals are located on the board.

Figure 4. STM32H5F5J-DK hardware block diagram



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Figure 5. STM32H5F5J-DK board layout - top view

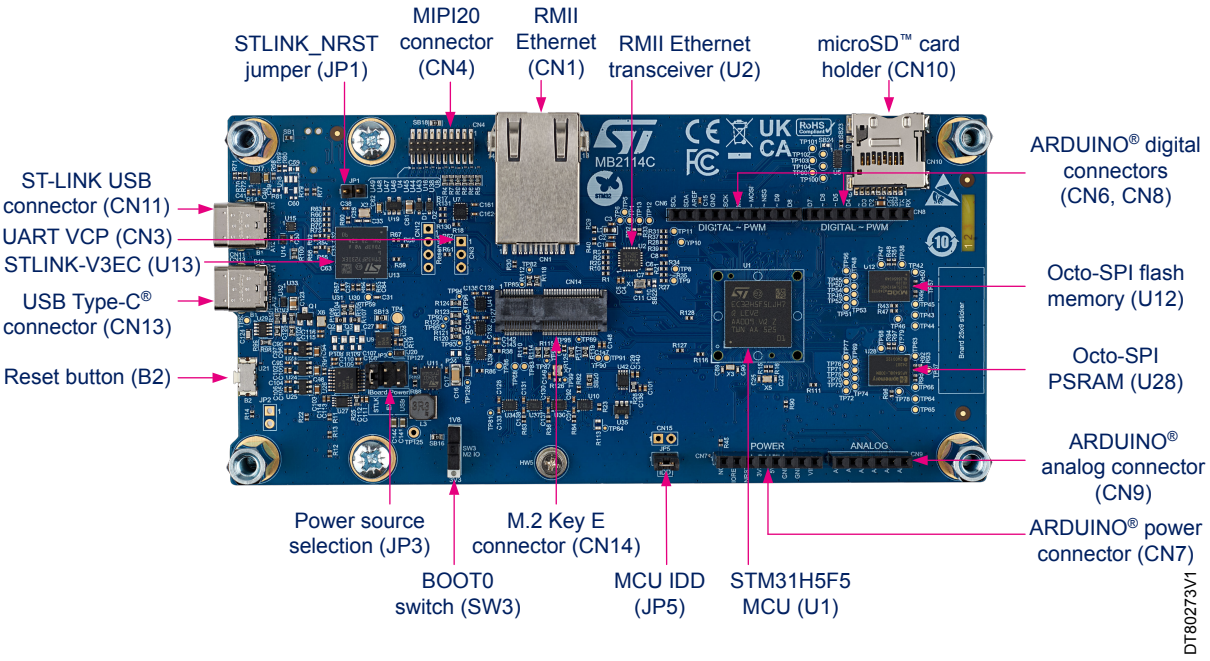
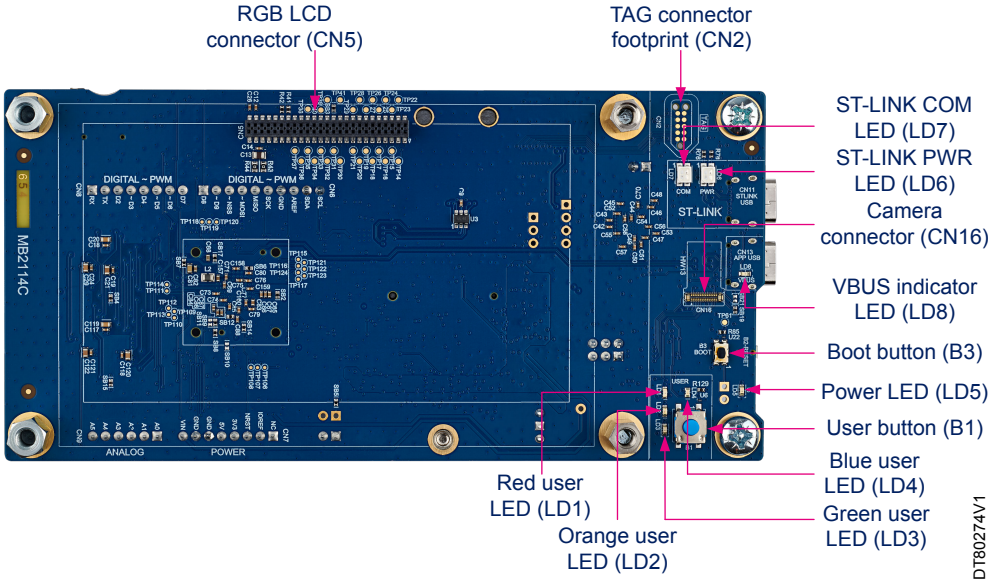


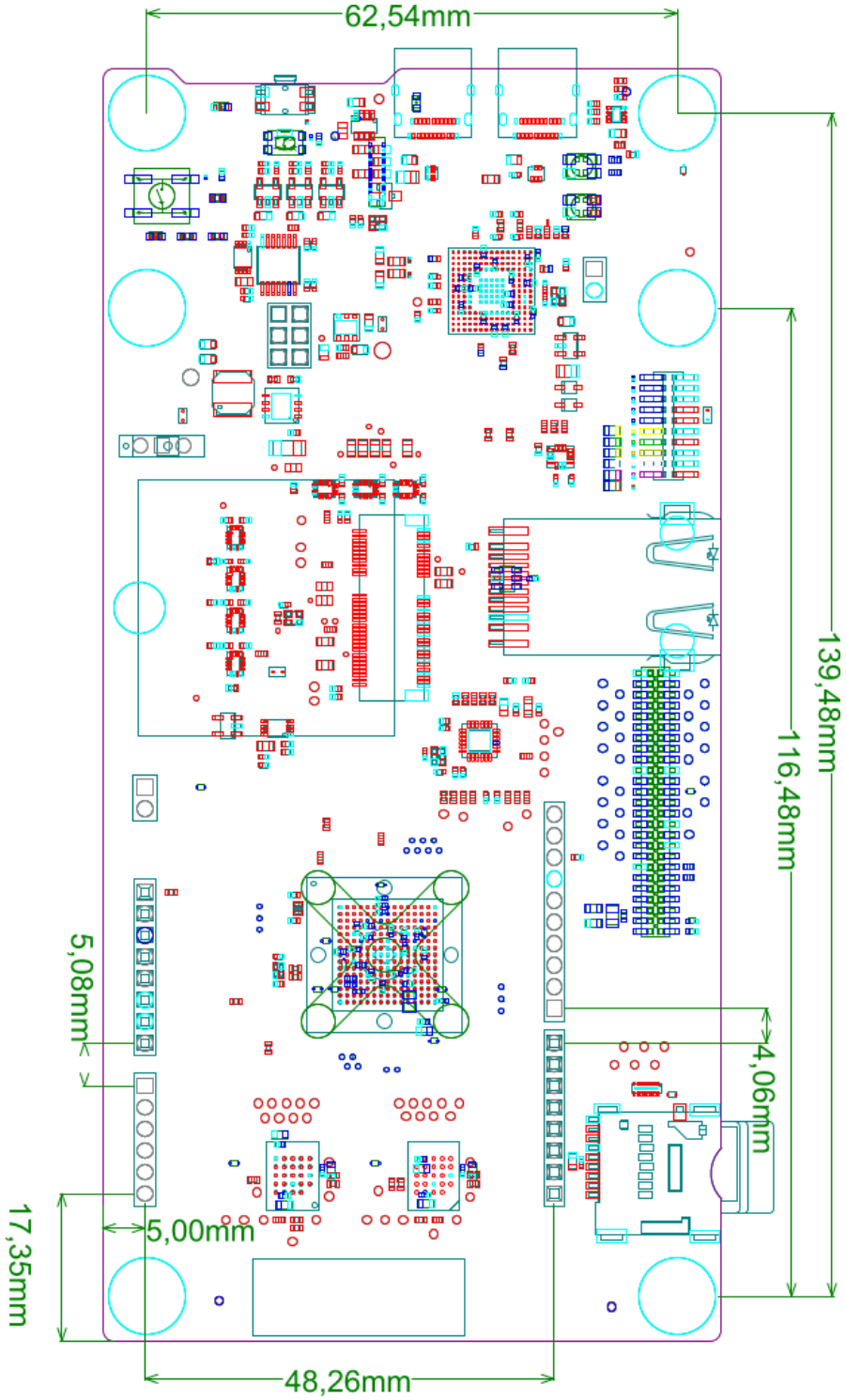
Figure 6. STM32H5F5J-DK board layout - bottom view



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7.2 Mechanical dimensions

Figure 7. **STM32H5F5J-DK Discovery kit mechanical drawing (in millimeters)**



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7.3 Embedded STLINK-V3EC

This chapter provides information about the implementation of the embedded STLINK-V3EC on this STM32H5F5J-DK Discovery kit.

For further details on ST-LINK capabilities, LED management, and driver and firmware for STLINK-V3EC, refer to the technical note *Overview of ST-LINK derivatives* (TN1235).

For more information about the debugging and programming features of STLINK-V3EC, refer to the user manual *STLINK-V3SET debugger/programmer for STM8 and STM32* (UM2448).

Figure 8 and Figure 9 and show the location of the different ST-LINK components on the STM32H5F5J-DK board.

7.3.1 Description

There are two different ways to program and debug the onboard STM32 MCU:

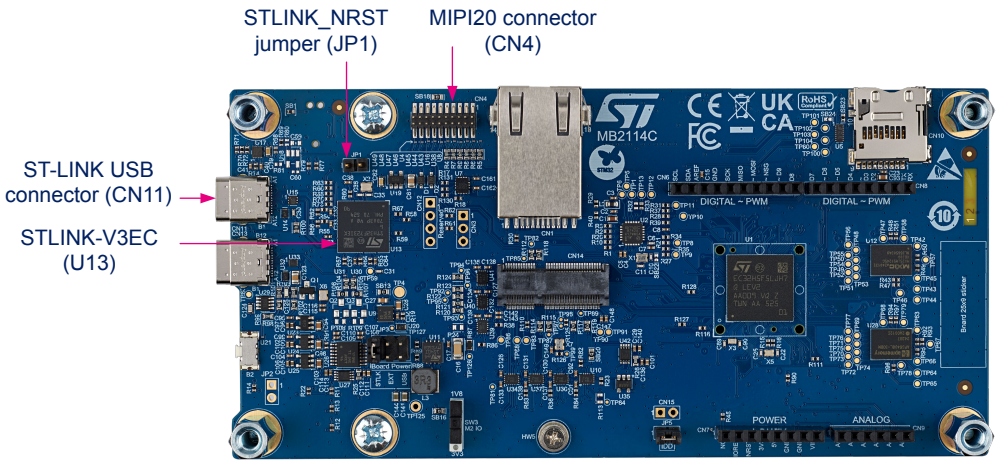
- Using the embedded STLINK-V3EC.
- Using an external debug tool connected to the STDC14/MIPI20 connector (CN4) or the TAG footprint (CN13) for a TC2050-IDC-NL cable.

The STLINK-V3EC tool for debugging and programming is integrated into this STM32H5F5J-DK Discovery kit.

STLINK-V3EC provides the following features:

- 5 V/500 mA power supplied by the USB Type-C® connector (CN11)
- USB 2.0 high-speed compatible interface
- JTAG and Serial Wire Debug (SWD) with Serial Wire Viewer (SWV)
- Virtual COM port (VCP)
- 1.7 to 3.6 V application voltage
- Tricolor (green, orange, and red) COM status LED (LD7) that blinks during communication with the PC
- Tricolor (green, orange, and red) power status LED (LD6) that provides information about the STLINK-V3EC target power
- USB Type-C® overvoltage protection (U17) with current limitation

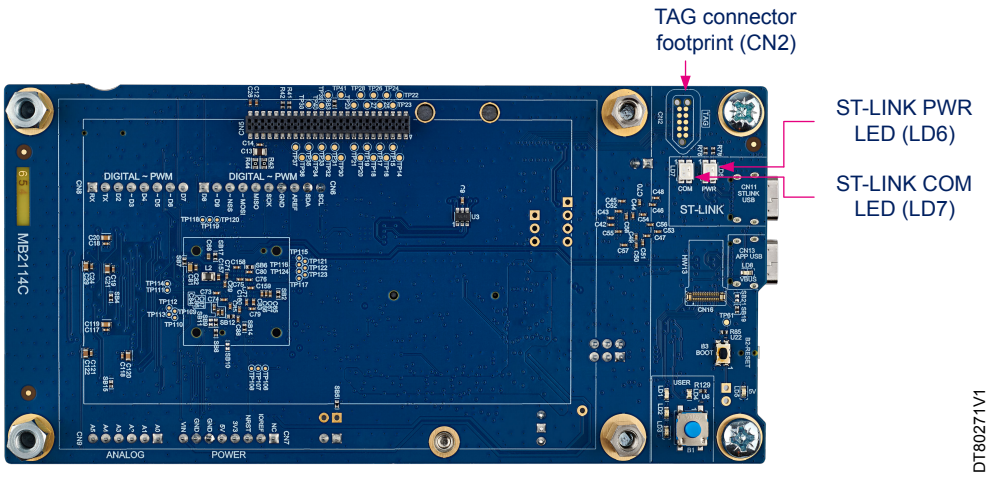
Figure 8. STLINK-V3EC components - STM32H5F5J-DK top side



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Figure 9. **STLINK-V3EC components - STM32H5F5J-DK bottom side**



7.3.2 Drivers

Driver installation is not required for Windows® 10 or later. However, installing the driver assigns an ST-specific name to the ST-LINK COM port in the system device manager.

7.3.3 Firmware upgrade

STLINK-V3EC includes a firmware upgrade mechanism (*stsw_link007*) through the USB port. The firmware can change during the STLINK-V3EC lifetime, to add new features, correct errors, and support new microcontroller families. Visit the www.st.com website regularly and before using this board to stay up to date with the latest firmware version.

7.3.4 Using an external debug tool to program and debug the on-board STM32

To support an external debug tool, set jumper JP1 to isolate the output I/O from STLINK-V3EC. Then connect the external debug tool through the MIPI20 debug connector (CN4) or through the TAG connector footprint (CN2) for the TC2050-IDC-NL cable .

Table 4 and Table 5 show the pinout for the MIPI20 connector and TAG connector footprint, respectively.

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Table 4. MIPI20 connector (CN4) pinout

MIPI20 pin	Signal	Function
1	VDD	VREF_DEBUG
2	TMS	SWDIO using SWD protocol or TMS (JTMS) using JTAG protocol
3	GND	Ground
4	TCK	SWCLK using SWD protocol or TCK (JTCK) using JTAG protocol
5	GND	Ground
6	TDO	SWO using SWD protocol or TDO (JTDO) using JTAG protocol
7	-	-
8	TDI	Not used by SWD protocol; TDI (JTDI) using JTAG protocol
9	DETECT	GND detection for plug indicator
10	nRESET	NRST
11	GND	Ground must be disconnected (SB18) if debugger probe provides power supply on this pin
12	TRC_CLK	MCU TRACECLK
13	GND	Ground must be disconnected (SB18) if debugger probe provides power supply on this pin
14	TRC_DATA0	MCU TRACED0
15	GND	Ground
16	TRC_DATA1	MCU TRACED1
17	GND	Ground
18	TRC_DATA2	MCU TRACED2
19	GND	Ground
20	TRC_DATA3	MCU TRACED3

Table 5. TAG connector footprint (CN12) pinout

CN10 Pin	Signal	Function
1	VDD	VDD
2	TMS_SWDIO	Target SWDIO using SWD protocol or JTMS using JTAG protocol
3	GND	Ground
4	TCK_SWCLK	Target SWCLK using SWD protocol or JTCK using JTAG protocol
5	GND	Ground must be disconnected (SB1) if debugger probe provides power supply on this pin
6	TDO_SWO	SWO using SWD protocol or JTDO using JTAG protocol
7	NC	NC
8	TDI	Not used by SWD protocol; TDI using JTAG protocol
9	NRST	NJTRST using JTAG protocol
10	TAG_RESET	NRST

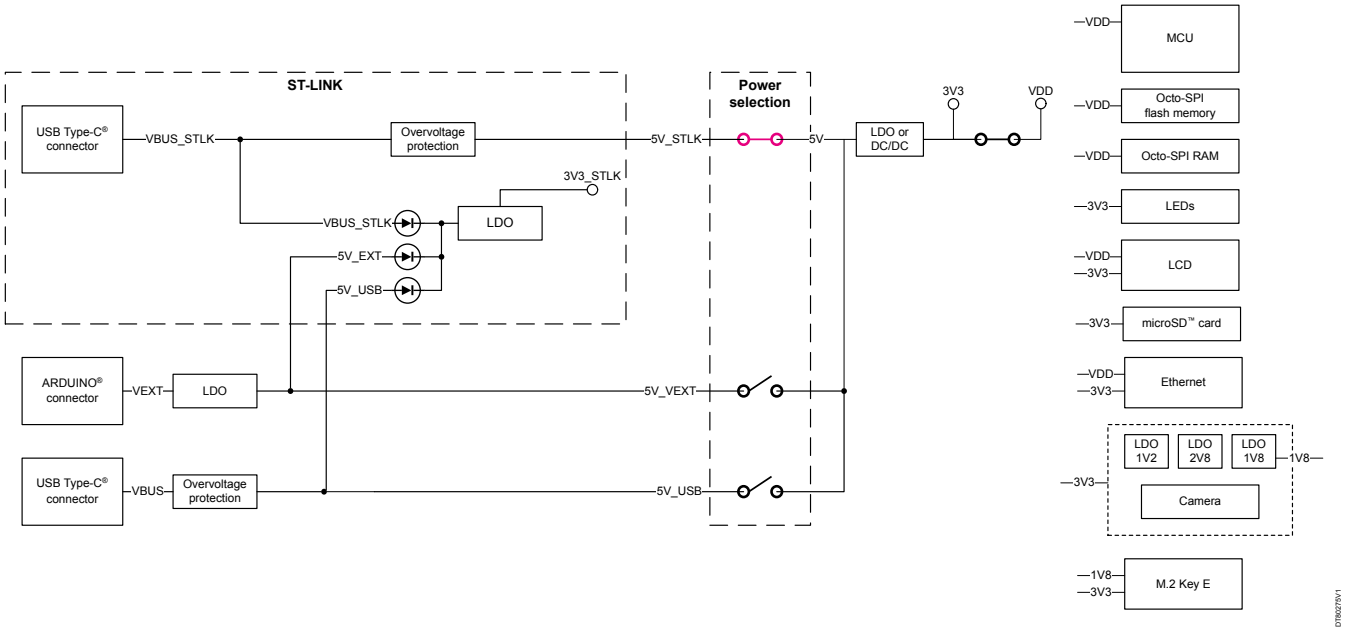
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7.4 Power supply

7.4.1 Power diagram

Figure 10 shows the power architecture for the STM32H5F5J-DK Discovery kit.

Figure 10. Power diagram



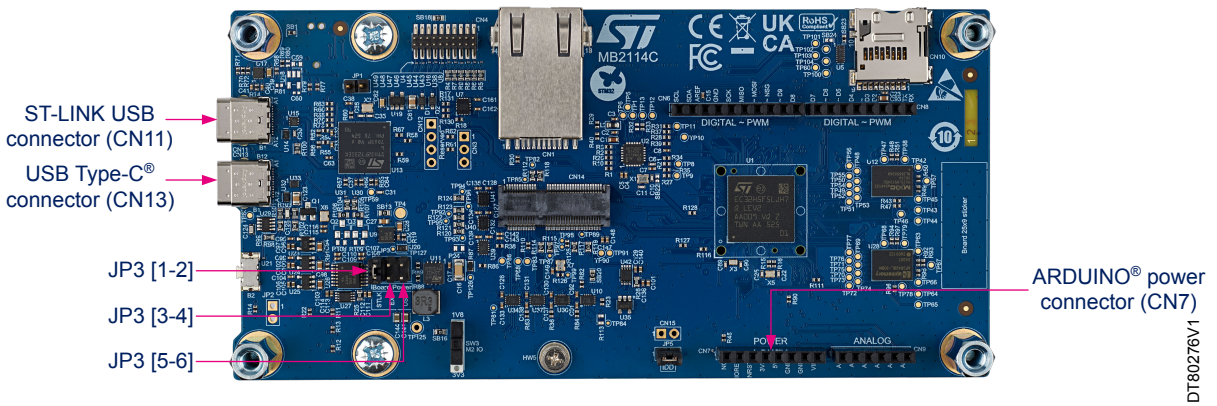
7.4.2 Power source selection

The STM32H5F5J-DK Discovery kit is designed to be powered by a 5 V DC power supply. Configure the power source selection using the JP3 jumper (refer to Figure 11) to use any of the three sources described in Table 6. This table shows the default power source selection configuration in bold.

Table 6. 5 V power source selection (JP3)

Pins	Source	Function
1-2	**STLK**	**5 V is supplied by the STLINK-V3EC USB connector (CN11)**
3-4	EXT	5 V is supplied by the ARDUINO® power connector (CN7)
5-6	USBC	5 V is supplied by the user USB connector (CN13)

Figure 11. Power source selection



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STLINK-V3EC USB connector (CN11)

The STM32H5F5J-DK Discovery kit can be powered by the STLINK-V3EC USB connector (CN11). The JP3 jumper must be set to pins [1-2] (refer to Figure 11), and the green LED (LD5) confirms the presence of a 5 V power supply. This is the default power selection configuration.

External power supply from the ARDUINO® power connector (CN7)

In this mode, the STM32H5F5J-DK Discovery kit is powered from 7 V to 12 V DC through the VIN pin of the ARDUINO® Uno V3 power connector (CN7). The embedded regulator (U11) generates the 5 V power supply. The JP3 jumper must be set to pins [3-4] (refer to Figure 11), and the green LED (LD5) confirms the presence of a 5 V power supply.

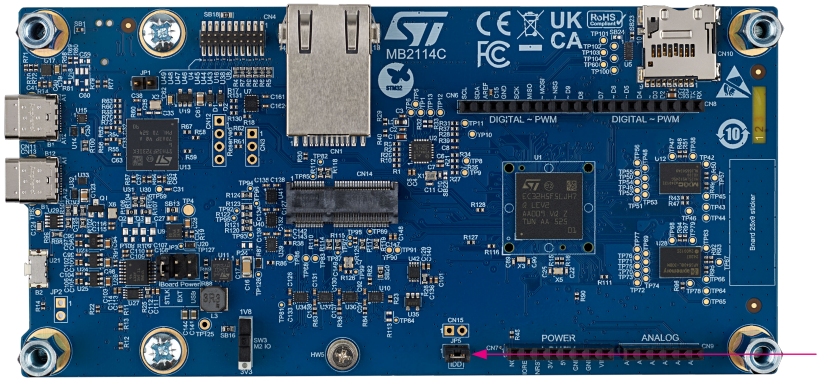
External power supply from the USB Type-C® power connector (CN13)

The STM32H5F5J-DK Discovery kit can be powered by the USB Type-C® power connector (CN13). The JP3 jumper must be set to pins [5-6] (refer to Figure 11), and the green LED (LD5) confirms the presence of a 5 V power supply.

7.4.3 Measurement of the microcontroller current consumption

Power consumption measurement of the STM32H5F5LJ microcontroller is possible by inserting an ammeter in series after removing the IDD jumper (JP5).

Figure 12. Current consumption measurement jumper (JP5)



7.5 Clock sources

7.5.1 LSE clock reference

The LSE clock reference on the STM32H5F5LJH7Q MCU is provided by the external crystal X3:

- 32.768 kHz crystal

7.5.2 HSE clock reference

The HSE clock reference on the STM32H5F5LJH7Q microprocessor is provided by the external crystal X5:

- 48 MHz crystal

7.6 Boot modes

Boot configuration is managed with the BOOT0 pin of the MCU.

The boot button (B3) allows the user to select the boot mode. Refer to Figure 6 to locate the boot button.

- No action: BOOT0 is pulled down to ground. Code is executed from the internal flash memory. This is the default configuration.
- Push on: BOOT0 is pulled up to VDD and the bootloader is executed.

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7.7 Reset sources

The reset (NRST) signal of the STM32H5F5LJH7Q microcontroller is active low. The internal pull-up resistor forces the reset (NRST) signal to a high level.

Reset sources include:

- Reset button (B2, side button)
- Embedded STLINK-V3EC
- External debug interfaces (CN2)
- ARDUINO® Uno V3 power connector (CN7), pin 3

7.8 LEDs

The STM32H5F5J-DK Discovery kit contains eight LEDs:

- Four user LEDs:
  - Red user LED (LD1), connected to PH10
  - Orange user LED (LD2), connected to PD15
  - Green user LED (LD3), connected to PA5
  - Blue user LED (LD4), connected to PB9
- One power LED (LD5), indicating a 5 V power supply
- Two ST-LINK LEDs:
  - ST-LINK PWR LED (LD6), providing information about the STLINK-V3EC communication status
  - ST-LINK communication LED (LD7), providing information about the STLINK-V3EC power status

  For further information about these ST-LINK LEDs, refer to the technical note *Overview of ST-LINK derivatives* (TN1235).
- One USB LED (LD8), indicating a USB host connection

Refer to Figure 6 to locate these LEDs on the board.

7.9 Push-buttons

Three buttons are available on the STM32H5F5J-DK Discovery kit:

- User button (B1), connected to PI8-WKUP. When this buttons is pressed, the logic state is HIGH; otherwise, the logic state is LOW.
- Reset button (B2, located on the side of the board), connected to the global reset signal (NRST of the STM32H5F5LJ MCU).
- Boot button (B3).

Refer to Figure 5 and Figure 6 to locate these push-buttons on the board.

7.10 TFT LCD

The STM32H5F5J-DK Discovery kit includes a 4.3-inch, 480 × 272-pixel TFT LCD board (MB2274), which connects to the RGB interface of the STM32H5F5LJ microcontroller through a 50-pin connector (CN5).

The MB2274 LCD board uses the TST043WQHS-184C TFT LCD from TSD, which includes a backlight and capacitive touch panel. The touchscreen controller connects to the STM32H5F5LJ microcontroller via the I^2C bus (seven-bit address: 0x55).

Table 7 provides the pinout for the RGB LCD connector (CN5); refer to Figure 6 to locate the connector on the board.

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Table 7. RGB LCD connector (CN5) pinout

MCU		Connector				MCU	
PIO	Function	Signal	Pin	Pin	Signal	Function	PIO
GND		GND	1	2	GND	GND	
PI5	LCD_R0	R0	3	4	G0	LCD_G0	PK15
PJ8	LCD_R1	R1	5	6	G1	LCD_G1	PE3
PD0	LCD_R2	R2	7	8	G2	LCD_G2	PJ4
PB2	LCD_R3	R3	9	10	G3	LCD_G3	PE4
PD9	LCD_R4	R4	11	12	G4	LCD_G4	PB10
PD8	LCD_R5	R5	13	14	G5	LCD_G5	PF14
PD11	LCD_R6	R6	15	16	G6	LCD_G6	PJ15
PH9	LCD_R7	R7	17	18	G7	LCD_G7	PB7
GND		GND	19	20	GND	GND	
PK11	LCD_B0	B0	21	22	DE	LCD_DE	PF6
PI11	LCD_B1	B1	23	24	DISP ON/OFF	PF3	PF3
PK13	LCD_B2	B2	25	26	HSYNC	LCD_HSYNC	PJ10
PK12	LCD_B3	B3	27	28	VSYNC	LCD_VSYNC	PJ11
PD3	LCD_B4	B4	29	30	GND	GND	
PE11	LCD_B5	B5	31	32	PCLK	LCD_CLK	PJ9
PF13	LCD_B6	B6	33	34	GND	GND	
PD4	LCD_B7	B7	35	36	TP_WAKE	NRST	NRST
GND		GND	37	38	TP_SDA	I2C2_SDA	PK10
PC13	PC13	TP_INT	39	40	TP_SCL	I2C2_SCL	PK9
-		NC(1)	41	42	NC(1)	3V3	
PF8	PF8	BL_CTRL	43	44	NC(1)	-	
5V		BL_5V	45	46	NC(1)	-	
GND		BL_GND	47	48	NC(1)	-	
GND		BL_GND	49	50	VDD	-	

1. *NC = not connected.*

7.11 100-Mbit/s Ethernet

The STM32H5F5J-DK Discovery kit provides a 100-Mbit/s Ethernet feature using an external physical interface device (PHY).

This PHY connects to the reduced media-independent interface (RMII) of the STM32H5F5LJ microcontroller and can be clocked by the 25 MHz signal from the MCU or by a crystal.

The default configuration uses the 25 MHz signal from the crystal. The Ethernet PHY is powered by 3.3 V.

Table 8. RMII I/O configuration

MCU I/O	Function
PJ6	ETH1.MDIO.
PJ7	ETH1.MDC.
PD1	ETH1.CRS_DV.
PC4	ETH1.RXD0.

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MCU I/O	Function
PE5	ETH1.RXD1.
PB11	ETH1.TX_EN.
PB12	ETH1.TXD0.
PG12	ETH1.TXD1.
PA10	ETH1.CLK is not used by default.

7.12 microSD™ card

The microSD™ card interface uses four data lines, D[0:3], with one clock (CLK), one command line (CMD), and one card detection signal (SD_DETECT). SDMMC1 is a bootable interface.

Table 9 describes the input/output configuration for the secure digital input/output (SDIO) interface.

Table 9. microSD™ I/O configuration

MCU I/O	Function
PC8	SDMMC1_D0
PF7	SDMMC1_D1
PC10	SDMMC1_D2
PC11	SDMMC1_D3
PK7	SDMMC1_CMD
PK8	SDMMC1_CK
PD5	GPIO (SD_DETECT)

7.13 Octo-SPI flash memory

The Octo-SPI flash memory of the STM32H5F5J-DK Discovery kit has the following characteristics:

- 512-Mbit
- 3V3
- 133 MHz maximum frequency
- DTR

It is connected to the Octo-SPI1 interface of the STM32H5F5LJ MCU. Table 10 shows the I/O configuration for this flash memory.

Table 10. Octo-SPI flash memory I/O configuration

MCU PIO	MCU signal	Octo-SPI flash memory signal
NRST	NRST	RESET#
PG6	OSPI1_NCS	CS#
PF10	OSPI1_CLK	SCLK
PC5	OSPI1_DQS0	DQS
PC9	OSPI1_IO0	SI/SIO0
PF9	OSPI1_IO1	SO/SIO1
PE2	OSPI1_IO2	SIO2
PA6	OSPI1_IO3	SIO3
PH2	OSPI1_IO4	SIO4
PH3	OSPI1_IO5	SIO5
PE9	OSPI1_IO6	SIO6

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MCU PIO	MCU signal	Octo-SPI flash memory signal
PE10	OSPI1_IO7	SIO7
-	-	ECS# VDD_OCTOSPI
PE0	OSPI1_NCS2	NC
PB1	OSPI1_NCLK	NC

7.14 Octo-SPI RAM

The Octo-SPI RAM of the STM32H5F5J-DK Discovery kit has the following characteristics:

- 64-Mbit
- 3V3
- 133 MHz maximum frequency
- DDR

It is connected to the Octo-SPI2 interface of the STM32H5F5LJ MCU. Table 11 shows the I/O configuration for this RAM.

Table 11. Octo-SPI RAM I/O configuration

MCU PIO	MCU signal	Octo-SPI RAM signal
NRST	NRST	RESET#
PE15	OSPI2_NCS1	CE#
PE14	OSPI2_CLK	CLK
PF5	OSPI2_DQS	DQS/DM
PG0	OSPI2_IO0	ADQ0
PD2	OSPI2_IO1	ADQ1
PG2	OSPI2_IO2	ADQ2
PG3	OSPI2_IO3	ADQ3
PG4	OSPI2_IO4	ADQ4
PG5	OSPI2_IO5	ADQ5
PG10	OSPI2_IO6	ADQ6
PG15	OSPI2_IO7	ADQ7
-	-	NC VDD_OCTOSPI
PF15	OSPI2_NCS2 (1)	RSU
PG8	OSPI2_NCLK	NC

7.15 Virtual COM port

The Virtual COM port is available on the STLINK-V3EC USB connector (CN11). Communication between the STM32H5F5LJ microcontroller and the ST-LINK microcontroller is enabled on USART2 (PA2 and PA3).

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8 Board connectors

8.1 USB Type-C® user connector (CN13)

The BOARD provides a USB Type-C® user connector (CN13) that can support a custom USB application. It works in USB Type-C® Power Delivery (UCPD) Sink mode only.

The green VBUS LED (LD8) lights up when the board is powered by a USB host.

Table 12 provides the pinout for the USB Type-C® user connector.

Table 12. USB Type-C® user connector (CN13) pinout

MCU pin	Signal name	Pin name	Pin number	Pin number	Pin name	Signal name	MCU pin
-	GND	GND	A1	B12	GND	GND	-
-	-	TX3+	A2	B11	RX3+	-	-
-	-	TX3-	A3	B10	RX3-	-	-
-	VBUS	VBUS	A4	B9	VBUS	VBUS	-
-	-	CC1	A5	B8	SBU2	-	-
HSDP	CON_HSD_P	D+	A6	B7	D-	CON_HSD_N	HSDM
HSDM	CON_HSD_N	D-	A7	B6	D+	CON_HSD_P	HSDP
-	-	SBU1	A8	B5	CC2	-	-
-	VBUS	VBUS	A9	B4	VBUS	VBUS	-
-	-	RX5-	A10	B3	TX5-	-	-
-	-	RX5+	A11	B2	TX5+	-	-
-	GND	GND	A12	B1	GND	GND	-

8.2 M.2 Key E connectivity connector (CN14)

The STM32H5F5J-DK Discovery kit includes an M.2 connector with mechanical Key E to support Wi-Fi® and Bluetooth® LE connectivity modules.

The connector uses the SDIO interface for Wi-Fi® connectivity. For Bluetooth® LE, it uses the UART interface for control and the PCM interface for audio. The SPI bus is also available to meet the requirements of specific M.2 modules.

Wi-Fi® I/O interface

Table 13. M.2 Key E connectivity connector (CN14) Wi-Fi® pinout

MCU I/O	Function	M.2 pin
PF1	SDMMC2_D3	SDIO_D3
PF0	SDMMC2_D2	SDIO_D2
PB15	SDMMC2_D1	SDIO_D1
PI1	SDMMC2_D0	SDIO_D0
PD7	SDMMC2_CMD	SDIO_CMD
PD6	SDMMC2_CK	SDIO_CLK
PI7	GPIO (WL_REG_ON)	W_DISABLE1#
PB6	GPIO (WL_WAKE_IN)	WL_WAKE_IN
PC7	GPIO (SDIO_WAKE)	SDIO_WAKE#
PA12	GPIO (SDIO_RESET)	SDIO_RESET#

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Bluetooth® LE I/O interface

Table 14. M.2 Key E connectivity connector (CN14) Bluetooth® LE pinout

MCU I/O	Function	M.2 pin
PF12	GPIO (UART_WAKE)	UART_WAKE#
PF11	GPIO (BT_REG_ON)	W_DISABLE2#
PH6	(BT_WAKE_IN)	BT_WAKE_IN
PI9	UART4_RXD	UART_TXD
PD12	UART4_TXD	UART_RXD
PB0	UART4_CTS	UART_RTS
PB14	UART4_RTS	UART_CTS
PC6	I2S2_MCK	PCM_CLK
PI0	I2S2_WS	PCM_SYNC
PI3	I2S_SDO	PCM_OUT
PC2	I2S_SDI	PCM_IN

SPI and I²C I/O interface

Table 15. M.2 Key E connectivity connector (CN14) SPI/I²C pinout

MCU I/O	Function	M.2 pin
PA11	SPI2_NSS	CS (RESERVED/VIO pin)
PG1	SPI2_MOSI	MOSI (VENDOR_DEFINED pin)
PI2	SPI2_MISO	MISO (shared with WL_WAKE_IN pin)
PB13	SPI2_SCK	SCK (shared with BT_WAKE_IN pin)
PH5	I2C2_SDA	I2C_SDA
PI6	GPIO (SPI_INT)	INT (ALERT# pin)
PH4	I2C2_SCL	I2C_SCL

8.3 ARDUINO® Uno V3 connectors (CN6, CN7, CN8, CN9)

CN6, CN7, CN8, and CN9 are female connectors compatible with the ARDUINO® Uno V3 standard. Most shields designed for ARDUINO® Uno V3 fit the STM32H5F5J-DK Discovery kit.

Note: STM32 microcontroller I/Os are 3.3 V compatible, instead of 5 V as for ARDUINO® Uno V3.

As detailed in Section 7.4.2: Power source selection, the STM32H5F5J-DK Discovery kit can be powered from the ARDUINO® Uno V3 connector CN7 (VIN, pin 8) with a power supply from 7 to 12 V.

Figure 13 shows the location of the ARDUINO® Uno V3 connectors on the STM32H5F5J-DK Discovery kit. Tables 16, 17, 18, and 19 show the pinout configurations for the ARDUINO® Uno V3 connectors.

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Figure 13. **ARDUINO® Uno V3 connectors (CN6, CN7, CN8, CN9)**

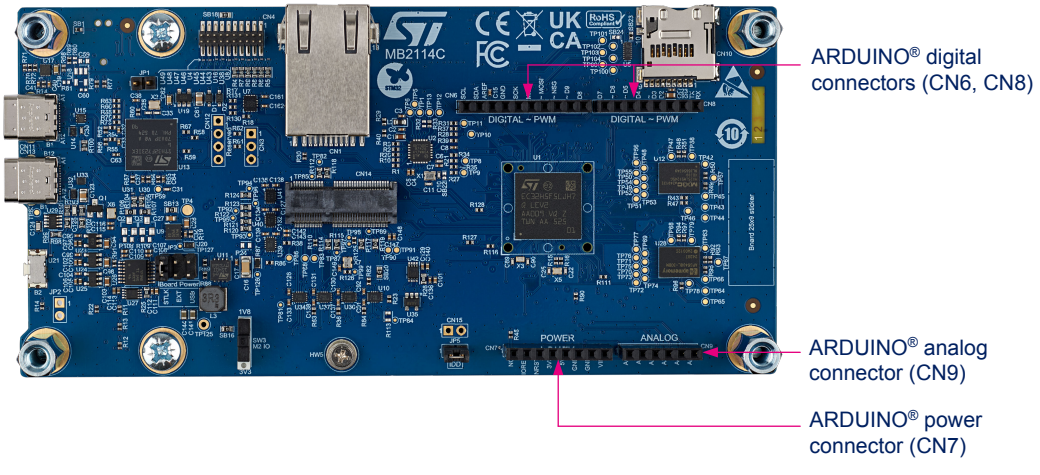


Table 16. **ARDUINO® Power connector (CN7) pinout**

Pin number	Pin name	MCU I/O	Function
1	-	-	Reserved
2	IOREF	-	I/O voltage reference information (3.3 V) for shield
3	RESET	NRST	RESET
4	3V3	-	3.3 V power supply from Discovery kit to shield
5	5V	-	5 V power supply from Discovery kit to shield
6	GND	-	Ground
7	GND	-	Ground
8	VIN	-	Power supply from shield to Discovery kit

Table 17. **ARDUINO® Analog connector (CN9) pinout**

Pin number	Pin name	MCU I/O	Function
1	A0	PA0	ADC12_INP0
2	A1	PE12	ADC3_INP6
3	A2	PE13	ADC3_INP7
4	A3	PC0	ADC12_INP10
5	A4	PC1	ADC12_INP11
6	A5	PC3	ADC12_INP13

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Table 18. **ARDUINO® Digital connector (CN6) pinout**

Pin number	Pin name	MCU I/O	Function
1	D8	PF3	PF3
2	PWM-D9	PB8	TIM16_CH1
3	PWM-CS-D10	PA4	SPI1_NSS / LPTIM2_CH1
4	PWM-MOSI-D11	PB5	SPI1_MOSI / TIM3_CH2
5	MISO-D12	PG9	SPI1_MISO
6	SCK-D13	PG11	SPI1_SCK
7	GND	Ground	
8	AREF	Analog reference from shield to Discovery kit	
9	SDA-D14	PH8	I2C3_SDA
10	SCL-D15	PH7	I2C3_SCL

Table 19. **ARDUINO® Digital connector (CN8) pinout**

Pin number	Pin name	MCU I/O	Function
1	RX-D0	PE7	UART7_RX
2	TX-D1	PE8	UART7_TX
3	D2	PA8	PA8
4	PWM-D3	PA7	TIM14_CH1
5	D4	PI12	PI12
6	PWM-D5	PC12	TIM15_CH1
7	PWM-D6	PE6	TIM15_CH2
8	D7	PF2	PF2

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9 STM32H5F5J-DK I/O assignment

Table 20. STM32H5F5J-DK Discovery kit I/O assignment

Pin name	Signal assignment	Main function
PA0	ADC12_INP0	ARDUINO® Analog A0
PA1	ETH_RMII_REF_CLK	Ethernet RMII REF CLK
PA2	USART2_TX	VCP UART Tx
PA3	USART2_RX	VCP UART Rx
PA4	SPI1_NSS-LPTIM2_CH1	ARDUINO® Digital D10
PA5	TIM2_CH1	Green user LED
PA6	OSPI1_IO3	NOR flash IO3
PA7	TIM14_CH1	ARDUINO® Digital D3
PA8	GPIO	ARDUINO® Digital D2
PA9	GPIO	USB VBUS detect
PA10	ETH_CLK	Ethernet RMII CLK
PA11	SPI2_NSS	M.2 SPI NSS
PA12	GPIO	M.2 SDIO reset
PA13	JTMS/SWDIO	JTAG TMS
PA14	JTCK/SWCLK	JTAG TCK
PA15	JTDI	JTAG TDI
PB0	UART4_CTS	M.2 UART CTS
PB1	OSPI1_NCLK	NOR flash NCLK
PB2	LCD_R3	LCD_R3
PB3	JTDO/SWO	JTAG TDO
PB4	NJTRST	JTAG NJRST
PB5	SPI1_MOSI-TIM3_CH2	ARDUINO® Digital D11
PB6	GPIO	WLAN wake
PB7	LCD_G7	LCD_G7
PB8	TIM16_CH1	ARDUINO® Digital D9
PB9	TIM17_CH1	Blue user LED
PB10	LCD_G4	LCD_G4
PB11	ETH_RMII_TX_EN	Ethernet RMII TXEN
PB12	ETH_RMII_TXD0	Ethernet RMII TXD0
PB13	SPI2_SCK	M.2 SPI SCK
PB14	UART4_RTS	M.2 UART RTS
PB15	SDMMC2_D1	M.2 SDIO D1
PC0	ADC12_INP10	ARDUINO® Analog A3
PC1	ADC12_INP11	ARDUINO® Analog A4
PC2	I2S2_SDI	M.2 I2S SDI
PC3	ADC12_INP13	ARDUINO® Analog A5
PC4	ETH_RMII_RXD0	Ethernet RMII RXD0

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Pin name	Signal assignment	Main function
PC5	OSPI1_DQS	NOR flash DQS
PC6	I2S2_MCK	M.2 I2S MCK
PC7	GPIO	M.2 SDIO_WAKE
PC8	SDMMC1_D0	SDCARD_D0
PC9	OSPI1_IO0	NOR flash IO0
PC10	SDMMC1_D2	SDCARD_D2
PC11	SDMMC1_D3	SDCARD_D3
PC12	TIM15_CH1	ARDUINO® Digital D5
PC13	GPIO	Touch panel IRQ
PC14	OSC32_IN	CLK 32 kHz
PC15	OSC32_OUT	CLK 32 kHz
PD0	LCD_R2	LCD_R2
PD1	ETH_RMII_CRS_DV	Ethernet RMII CRSDV
PD2	OSPI2_IO1	PSRAM IO1
PD3	LCD_B4	LCD_B4
PD4	LCD_B7	LCD_B7
PD5	GPIO	SDCARD detect
PD6	SDMMC2_CK	M.2 SDIO CLK
PD7	SDMMC2_CMD	M.2 SDIO CMD
PD8	LCD_R5	LCD_R5
PD9	LCD_R4	LCD_R4
PD10	GPIO	CAMERA GPIO1
PD11	LCD_R6	LCD_R6
PD12	UART4_TX	M.2 UART Tx
PD13	I3C1_SDA	CAMERA I2C SDA
PD14	GPIO	CAMERA GPIO2
PD15	TIM4_CH4	Orange user LED
PE0	OSPI1_NCS2	NOR flash NCS2
PE1	GPIO	Camera GPIO
PE2	OSPI1_IO2	NOR flash IO2
PE3	LCD_G1	LCD_G1
PE4	LCD_G3	LCD_G3
PE5	ETH_RMII_RXD1	Ethernet RMII RXD1
PE6	TIM15_CH2	ARDUINO® Digital D6
PE7	UART7_RX	ARDUINO® Digital D0
PE8	UART7_TX	ARDUINO® Digital D1
PE9	OSPI1_IO6	NOR flash IO6
PE10	OSPI1_IO7	NOR flash IO7
PE11	LCD_B5	LCD_B5
PE12	ADC3_INP6	ARDUINO® Analog A1
PE13	ADC3_INP7	ARDUINO® Analog A2

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Pin name	Signal assignment	Main function
PE14	OSPI2_CLK	PSRAM CLK
PE15	OSPI2_NCS1	PSRAM NCS1
PF0	SDMMC2_D2	M.2 SDIO D2
PF1	SDMMC2_D3	M.2 SDIO D3
PF2	GPIO	ARDUINO® Digital D7
PF3	GPIO	ARDUINO® Digital D8
PF4	GPIO	CAMERO LDO enable
PF5	OSPI2_DQS	PSRAM DQS
PF6	LCD_DE	LCD_DE
PF7	SDMMC1_D1	SDCARD_D1
PF8	TIM13_CH1	LCD backlight control
PF9	OSPI1_IO1	NOR flash IO1
PF10	OSP1_CLK	NOR flash CLK
PF11	GPIO	M.2 BT REG ON
PF12	GPIO	M.2 UART WAKE
PF13	LCD_B6	LCD_B6
PF14	LCD_G5	LCD_G5
PF15	OSPI2_NCS2	PSRAM NCS2
PG0	OSPI2_IO0	PSRAM IO0
PG1	SPI2_MOSI	M.2 SPI MOSI
PG2	OSPI2_IO2	PSRAM IO2
PG3	OSPI2_IO3	PSRAM IO3
PG4	OSPI2_IO4	PSRAM IO4
PG5	OSPI2_IO5	PSRAM IO5
PG6	OSPI1_NCS1	NOR flash NCS1
PG7	I3C1_SCL	CAMERA I2C SCL
PG8	OSPI2_NCLK	PSRAM NCLK
PG9	SPI1_MISO	ARDUINO® Digital D12
PG10	OSPI2_IO6	PSRAM IO6
PG11	SPI1_SCK	ARDUINO® Digital D13
PG12	ETH_RMII_TXD1	Ethernet RMII TXD1
PG13	TRACE_D0	MIPI20 TRACE D0
PG14	TRACE_D1	MIPI20 TRACE D1
PG15	OSPI2_IO7	PSRAM IO7
PH0	OSC_IN	CLK 48 MHz
PH1	OSC_OUT	CLK 4848 MHz
PH2	OSPI1_IO4	NOR flash IO4
PH3	OSPI1_IO5	NOR flash IO5
PH4	I2C2_SCL	M.2 I2C SCL
PH5	I2C2_SDA	M.2 I2C SDA
PH6	GPIO	BT WAKE

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Pin name	Signal assignment	Main function
PH7	I2C3_SCL	ARDUINO® Digital D15
PH8	I2C3_SDA	ARDUINO® Digital D14
PH9	LCD_R7	LCD_R7
PH10	TIM5_CH1	Orange user LED
PH11	I2C4_SCL	SENSOR I2C SCL
PH12	I2C4_SDA	SENSOR I2C SDA
PH13	GPIO	SENSOR_INT1
PH14	GPIO	SENSOR_INT2
PH15	TRACECLK	MIPI20 TRACE CLK
PI0	I2S2_WS	M.2 I2S WS
PI1	SDMMC2_D0	M.2 SDIO D0
PI2	SPI2_MISO	M.2 SPI MISO
PI3	I2S2_SDO	M.2 I2S SDO
PI4	TRACE_D3	MIPI20 TRACE D3
PI5	LCD_R0	LCD_R0
PI6	GPIO	M.2 SPI INT
PI7	GPIO	M.2 WLAN REG ON
PI8	GPIO	User button
PI9	UART4_RX	M.2 UART Rx
PI10	GPIO	FREE available on TP106
PI11	LCD_B1	LCD_B1
PI12	GPIO	ARDUINO® Digital D4
PI13	GPIO	FREE available on TP107
PI14	GPIO	FREE available on TP108
PI15	GPIO	FREE available on TP109
PJ0	GPIO	FREE available on TP110
PJ1	GPIO	FREE available on TP111
PJ2	GPIO	FREE available on TP112
PJ3	GPIO	FREE available on TP113
PJ4	LCD_G2	LCD_G2
PJ5	GPIO	FREE available on TP114
PJ6	ETH_MDIO	Ethernet RMII MDIO
PJ7	ETH_MDC	Ethernet RMII MDC
PJ8	LCD_R1	LCD_R1
PJ9	LCD_CLK	LCD_CLK
PJ10	LCD_HSYNC	LCD_HSYNC
PJ11	LCD_VSYNC	LCD_VSYNC
PJ12	GPIO	FREE available on TP115
PJ13	GPIO	FREE available on TP116
PJ14	GPIO	FREE available on TP117
PJ15	LCD_G6	LCD_G6

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Pin name	Signal assignment	Main function
PK0	GPIO	FREE available on TP118
PK1	GPIO	FREE available on TP119
PK2	GPIO	FREE available on TP120
PK3	GPIO	FREE available on TP121
PK4	GPIO	FREE available on TP122
PK5	GPIO	FREE available on TP123
PK6	GPIO	FREE available on TP124
PK7	SDMMC1_CMD	SDCARD CMD
PK8	SDMMC1_CLK	SDCARD CLK
PK9	I2C1_SCL	I2C TOUCH PANEL
PK10	I2C1_SDA	I2C TOUCH PANEL
PK11	LCD_B0	LCD_B0
PK12	LCD_B3	LCD_B3
PK13	LCD_B2	LCD_B2
PK14	TRACED2	MIPI20 TRACE D2
PK15	LCD_G0	LCD_G0

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10 STM32H5F5J-DK product information

10.1 Product marking

The product and each board composing the product are identified with one or several stickers. The stickers, located on the top or bottom side of each PCB, provide product information:

- Main board featuring the target device: product order code, product identification, serial number, and board reference with revision.

  Single-sticker example:

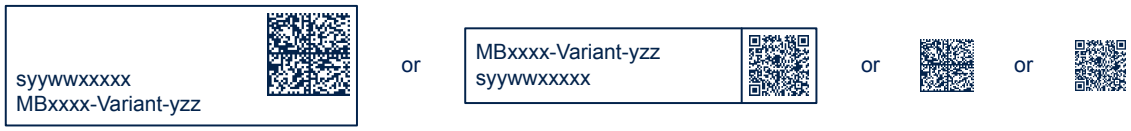
  

  Dual-sticker example:

- Other boards if any: board reference with revision and serial number.

  Examples:

On the main board sticker, the first line provides the product order code, and the second line the product identification.

On all board stickers, the line formatted as *"MBxxxx-Variant-yzz"* shows the board reference *"MBxxxx"*, the mounting variant *"Variant"* when several exist (optional), the PCB revision *"y"*, and the assembly revision *"zz"*, for example B01. The other line shows the board serial number used for traceability.

Products and parts labeled as *"ES"* or *"E"* are not yet qualified or feature devices that are not yet qualified. STMicroelectronics disclaims any responsibility for consequences arising from their use. Under no circumstances will STMicroelectronics be liable for the customer's use of these engineering samples. Before deciding to use these engineering samples for qualification activities, contact STMicroelectronics' quality department.

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

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

Some boards feature a specific STM32 device version, which allows the operation of any bundled commercial stack/library available. This STM32 device shows a *"U"* marking option at the end of the standard part number and is not available for sales.

To use the same commercial stack in their applications, the developers might need to purchase a part number specific to this stack/library. The price of those part numbers includes the stack/library royalties.

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10.2 STM32H5F5J-DK product history

Table 21. Product history

Order code	Product identification	Product details	Product change description	Product limitations
STM32H5F5J-DK	DK32H5F5J$KR1	MPU: STM32H5F5LJH7Q silicon revision "Z"	Initial revision	No limitation
		MCU errata sheet: *STM32H5Ex/H5Fx device errata* (ES0639)		
		Boards: • MB2114-H5F5LJ-C01 (main board) • MB2274-LCD43-RGB-A02 (LCD board)		

10.3 Board revision history

Table 22. Board revision history

Board reference	Board variant and revision	Board change description	Board limitations
MB2114 (main board)	H5F5LJ-C01	Initial revision	No limitation
MB2274 (LCD board)	LCD43-RGB-A02	Initial revision	No limitation

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11 Compliance statements and conformity declarations

11.1 Federal Communications Commission (FCC) compliance statement

Part 15.19

This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Part 15.21

Any changes or modifications to this equipment not expressly approved by STMicroelectronics may cause harmful interference and void the user's authority to operate this equipment.

Part 15.105

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at their own expense.

Note: Use only shielded cables.

Responsible Party - U.S. Contact Information:

Francesco Doddo
STMicroelectronics, Inc.
200 Summit Drive | Suite 405 | Burlington, MA 01803
USA
Telephone: +1 781-472-9634

11.2 Innovation, Science and Economic Development Canada (ISED) compliance statement

This product complies with the ICES-003 standard class A of the ISED regulation.

ISED Canada ICES-003 Compliance Label: CAN ICES (A)/NMB (A).

Note: Use only shielded cables.

Ce produit est conforme à la norme NMB-003 classe A de la ISDE.

Étiquette de conformité à la NMB-003 d'ISDE Canada : CAN ICES (A) / NMB (A).

Note: Utiliser uniquement des câbles blindés.

11.3 UKCA conformity

Simplified UK declaration of conformity

Hereby, the manufacturer STMicroelectronics, declares that the equipment type STM32H5F5J-DK is in compliance with the UK Electromagnetic Compatibility Regulations 2016 (UK SI 2016 No. 1091) and with the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012 (UK SI 2012 No. 3032).

Note: Use only shielded cables.

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11.4 CE conformity

11.4.1 Simplified EU declaration of conformity

Hereby, STMicroelectronics declares that the equipment type STM32H5F5J-DK is in compliance with directives 2011/53/EU and 2015/863/EU (RoHS), and 2014/30/EU (EMC).

Note:
- *RoHS: Restriction of hazardous substances*
- *EMC: Electromagnetic compatibility*

Warning

This device is compliant with Class A of EN55032/CISPR32. In a residential environment, this equipment may cause radio interference.

Note: Use only shielded cables.

11.4.2 Déclaration de conformité UE simplifiée

STMicroelectronics déclare que l'équipement électrique du type STM32H5F5J-DK est conforme aux directives 2011/53/UE et 2015/863/UE (LdSD), et à la directive 2014/30/UE (CEM).

Note:
- *LdSD : directive sur la limitation de l'utilisation des substances dangereuses*
- *CEM : compatibilité électromagnétique*

Avertissement

Cet équipement est conforme à la Classe A de la EN55032 / CISPR 32. Dans un environnement résidentiel, cet équipement peut créer des interférences radio.

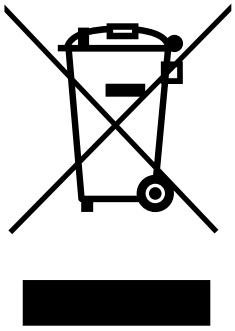
Note: Utiliser uniquement des câbles blindés.

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12 Product disposal

Disposal of this product: WEEE (Waste Electrical and Electronic Equipment)

(Applicable in Europe)



This symbol on the product, accessories, or accompanying documents indicates that the product and its electronic accessories must not be disposed of with household waste at the end of their working life.

To prevent possible harm to the environment and human health from uncontrolled waste disposal, separate these items from other types of waste and recycle them responsibly at a designated collection point to promote the sustainable reuse of material resources.

Household users:

Contact the retailer that you purchased the product from or your local authority for details of your nearest designated collection point.

Business users:

Contact your dealer or supplier for further information.

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Revision history

Table 23. **Document revision history**

Date	Revision	Changes
24-Feb-2026	1	Initial release.

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