Discovery kit with STM32H7S7L8 MCU

Introduction

The STM32H7S78-DK Discovery kit is a complete demonstration and development platform for the Arm® Cortex®-M7 core-based STM32H7S7L8H6H microcontroller.

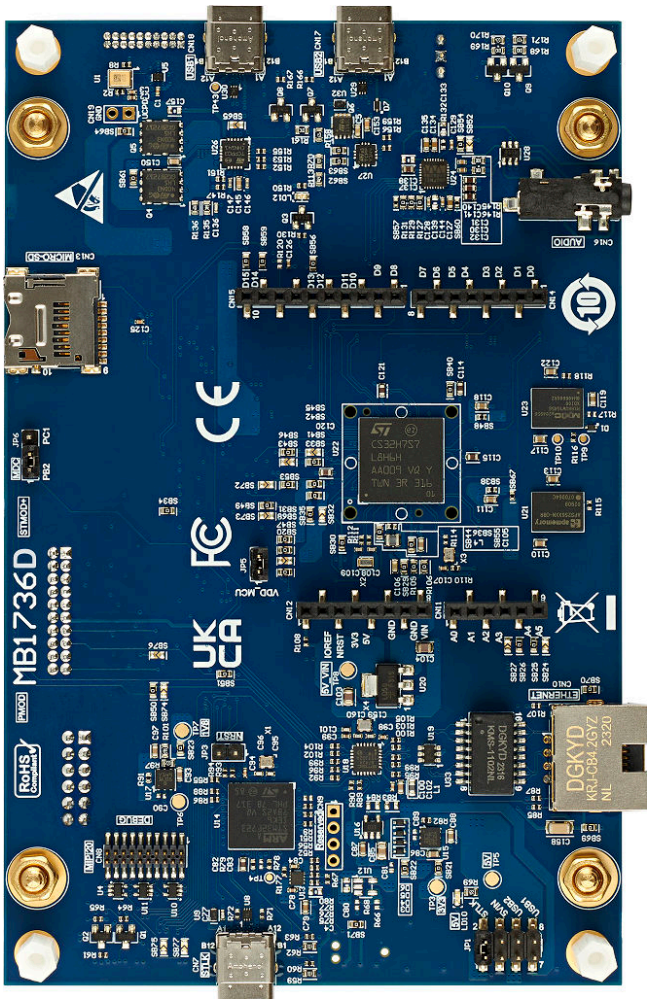
The STM32H7S78-DK Discovery kit includes a full range of hardware features that helps the user to evaluate many peripherals, such as USB Type-C®, Octo-SPI flash memory and Hexadeca-SPI PSRAM devices, audio codec, digital microphones, ADC, flexible extension connectors, and user button. The four flexible extension connectors allow easy and unlimited expansion capabilities for specific applications such as wireless connectivity, analog applications, and sensors.

The STM32H7S7L8H6H microcontroller features three I^2C buses, six SPI ports, three USART ports, two SDMMC ports, two CAN ports, an Ethernet port, two SAI ports, two 12-bit ADCs, an embedded step-down converter, two Octo-SPI memory interfaces, one Hexadeca-SPI interface, USB OTG HS port with power delivery, LCD-TFT controller, flexible memory controller (FMC), 8- to 14-bit DCMI interface, JTAG, and SWD debugging support.

The STM32H7S78-DK Discovery kit integrates an STLINK-V3EC embedded in-circuit debugger and programmer for the STM32 MCU, with a USB Virtual COM port bridge and comes with the comprehensive MCU Package

Figure 1. STM32H7S78-DK top view

Figure 2. STM32H7S78-DK bottom view



Pictures are not contractual.

1 Features

- STM32H7S7L8H6H microcontroller based on the Arm® Cortex®-M7 featuring 64 Kbytes of flash memory and 620 Kbytes of SRAM in a TFBGA225 package
- 5" LCD module with capacitive touch panel
- USB Type-C® with USB 2.0 HS interface, dual-role-power (DRP)
- USB Type-C® with USB 2.0 FS interface, sink only
- Ethernet compliant with IEEE-802.3-2002
- I^2S audio codec
- One ST-MEMS digital microphone
- 1-Gbit Octo-SPI NOR flash memory
- 256-Mbit Hexadeca-SPI PSRAM
- Fan-out daughterboard
- Wi-Fi® module (802.11 b/g/n compliant)
- Four user LEDs
- User and reset push-buttons
- Board connectors:
  - Two USB Type-C®
  - Ethernet RJ45
  - Camera flexible printed circuit (FPC) connector
  - microSD™ card
  - Stereo headset jack including analog microphone input
  - Audio MEMS daughterboard expansion connector
  - ARDUINO® Uno V3 expansion connector
  - STMod+ expansion connector
  - Pmod™ 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 STM32Cube 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 STM32H7S78-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 reference	Target STM32
STM32H7S78-DK	• MB1736(1) • MB1860(2) • MB1400(3) • MB1280(4)	STM32H7S7L8H6H

1. *Main board*
2. *LCD daughterboard*
3. *Wi-Fi®-module daughterboard*
4. *Fan-out daughterboard.*

2.1 Codification

The meaning of the codification is explained in Table 2.

Table 2. Codification explanation

STM32XXYYZ-DK	Description	Example: STM32H7S78-DK
XX	MCU series in STM32 32-bit Arm Cortex MCUs	STM32H7 series
YY	MCU product line in the series	STM32H7R7/7S7 product line
Z	STM32 flash memory size: • 8 for 64 Kbytes	64 Kbytes
DK	Discovery kit	Discovery kit

3 Development environment

3.1 System requirements

- Multi-OS support: Windows® 10, 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*.

4 Conventions

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

Table 3. ON/OFF convention

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
Resistor Rx ON	Resistor soldered
Resistor Rx OFF	Resistor not soldered
Capacitor Cx ON	Capacitor soldered
Capacitor Cx OFF	Capacitor not soldered

5 Quick start

This section describes how to start development quickly using the STM32 Discovery board.

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

For more information on the STM32H7S78-DK Discovery kit and demonstration software, visit the STM32H7S78-DK webpage.

5.1 Getting started

Follow the sequence below to configure STM32H7S78-DK and launch the demonstration application (refer to Figure 4 and Figure 5 for component locations):

1. For correct identification of all device interfaces from the host PC, install the Discovery USB driver available on the STM32H7S78-DK webpage, before connecting to the board.
2. Check the jumper JP5 ON, JP1 is set on STLK. Black switch SW1 is set to 0.
3. Connect a USB Type-A or USB Type-C® to USB Type-C® cable (not included) from the STM32H7S78-DK Discovery board (CN7) to a PC to power the board. The LEDs LD10 (5V power), and LD7 (COM) light up.
4. The LCD module displays a welcome menu, indicating the demonstration application software startup.
5. The demonstration application software and its user manual, as well as other software examples for exploring STM32CubeH7RS features are available on the STM32H7S78-DK webpage.
6. Develop an application using the available examples.

6 Hardware layout and configuration

The STM32H7S78-DK Discovery kit is designed around the STM32H7S7L8H6H microcontroller, in a TFBGA225 package. The hardware block diagram (refer to Figure 3) illustrates the connection between the microcontroller and the peripherals. Figure 4 and Figure 5 help to locate these features on the STM32H7S78-DK Discovery board.

6.1 Hardware block diagram and board layout

Figure 3. Hardware block diagram

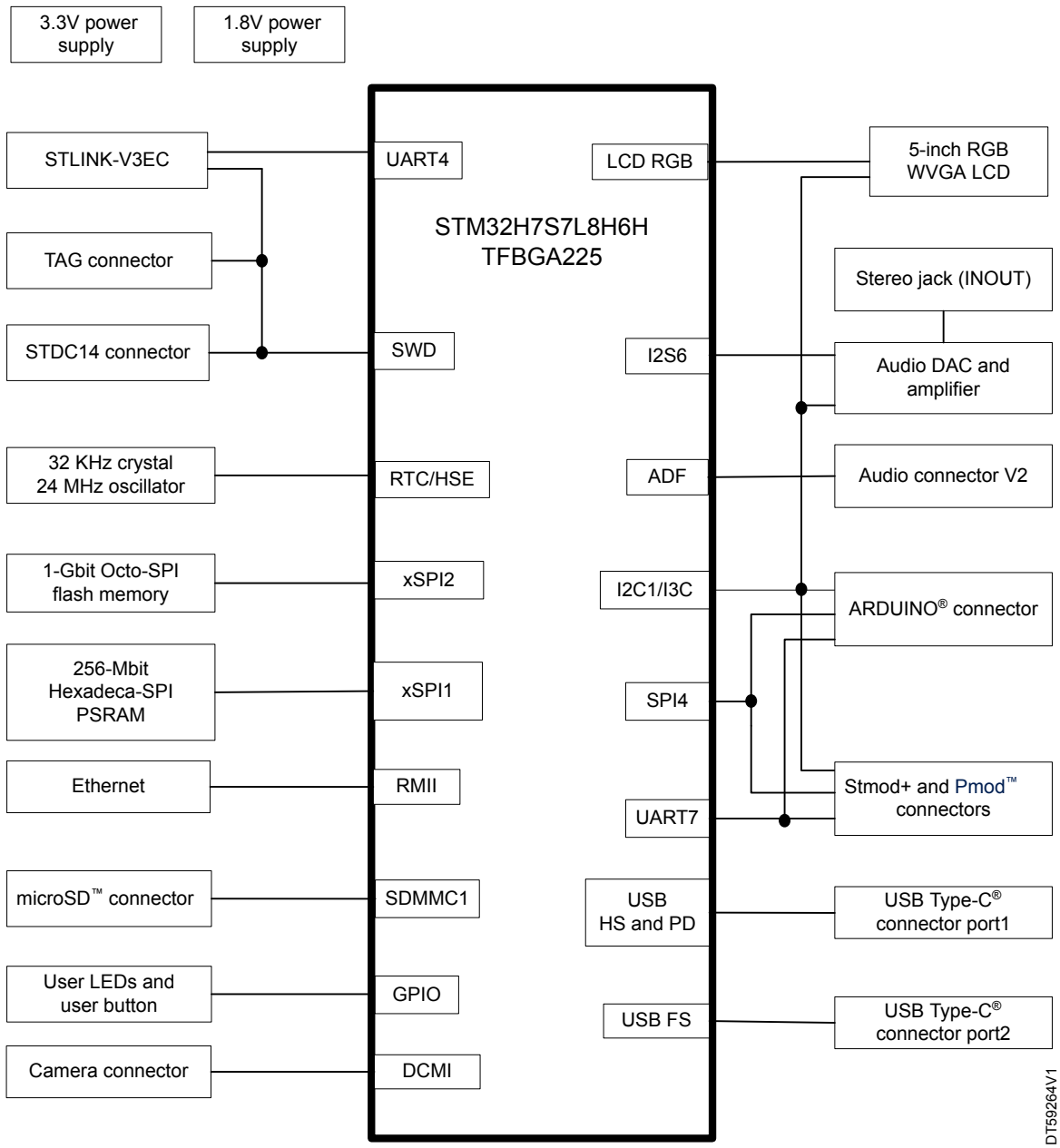


Figure 4. STM32H7S78-DK PCB layout top view

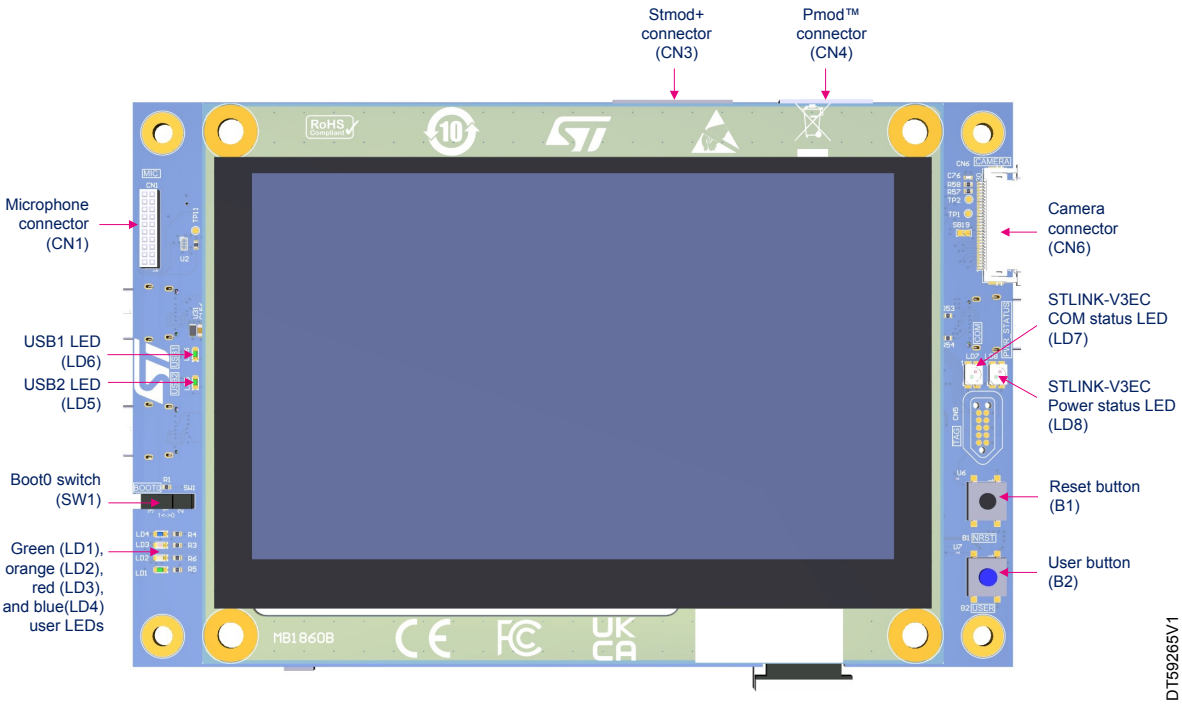
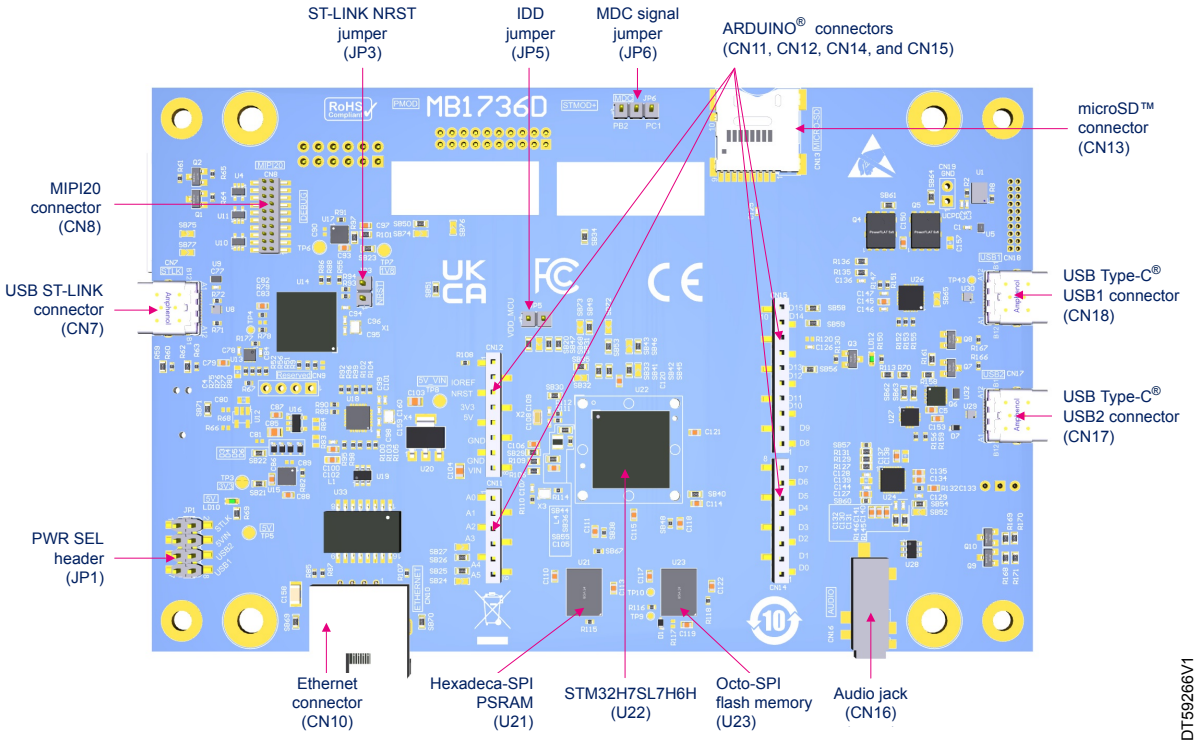
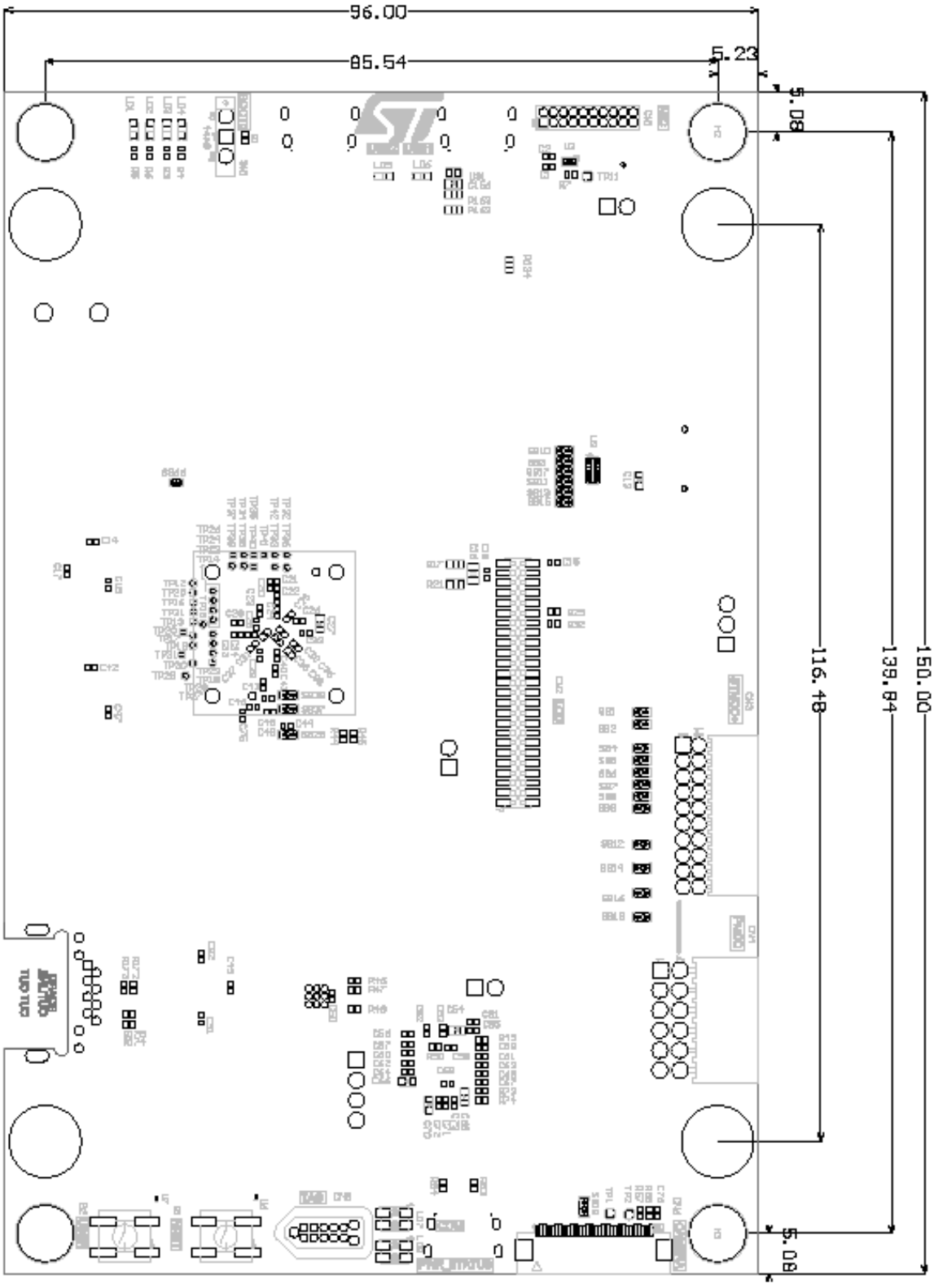


Figure 5. STM32H7S78-DK PCB layout bottom view



6.2 Mechanical drawing

Figure 6. **STM32H7S78-DK board mechanical drawing (in millimeters)**



6.3 Embedded STLINK-V3EC

The new STLINK-V3EC is the embedded version of the STLINK-V3 included in the design of the STM32H7S78-DK Discovery board. It allows access to the program/debug and monitoring functions of the STM32 through the USB ST-LINK connector (CN7).

The STLINK-V3EC facility for debugging and flashing is integrated into the STM32H7S78-DK Discovery board.

The embedded STLINK-V3EC supports only SWD and VCP for STM32 devices.

Features supported in STLINK-V3EC:

- 5 V power supplied by the USB Type-C® connector (CN7)
- USB 2.0 USB high-speed-compatible interface
- Serial Wire Debug (SWD) interface
- MIPI20 compatible connector (CN8)
- COM status LED (LD7), which blinks during communication with the PC
- Power status LED (LD8), which identifies the status of current output to the board

Table 4 describes the USB Type-C® connector (CN7) pinout.

Table 4. USB Type-C® connecter (CN7) pinout

Pin	Pin name	Signal name	STLINK-V3E STM32 pin	Function
A4, A9, B4, and B9	VBUS	VBUS_STLK	-	VBUS power
A6 and B6	DP	USB_DEV_HS _P	PB15	DP
A7 and B7	DM	USB_DEV_HS _N	PB14	DM
A5	CC1	UCPD_CC1_C	PC3	Pull-down by 5.1 kΩ
B5	CC2	UCPD_CC2_C	PC4	Pull-down by 5.1 kΩ
A1, A12, B1, and B12	GND	GND	GND	GND

Note: Set JP3 ON to keep STLINK-V3EC in reset mode. It is useful to reduce current consumption for user USB certifications.

6.3.1 Drivers

The installation of drivers is not mandatory from Windows 10® but allocates an ST-specific name to the ST-LINK COM port in the system device manager.

For detailed information on the ST-LINK USB drivers, refer to the technical note *Overview of ST-LINK derivatives* (TN1235).

6.3.2 STLINK-V3EC firmware upgrade

STLINK-V3EC embeds a firmware upgrade (`stsw-link007`) mechanism through the USB-C® port. As the firmware might evolve during the lifetime of the STLINK-V3EC product (for example to add new functionalities, fix bugs, and support new microcontroller families), it is recommended to keep the STLINK-V3EC firmware up to date before starting to use the STM32H7S78-DK board. The latest version of this firmware is available from the *www.st.com* website.

Warning: *ST-LINK SWO signal is exclusive with TFT LCD due to I/O multiplex on PB3. In this case, only two features between SWO, LCD, and Ethernet can be used at the same time. The configurations are shown in Table 5.*

Table 5. SWO, LCD, and Ethernet configuration

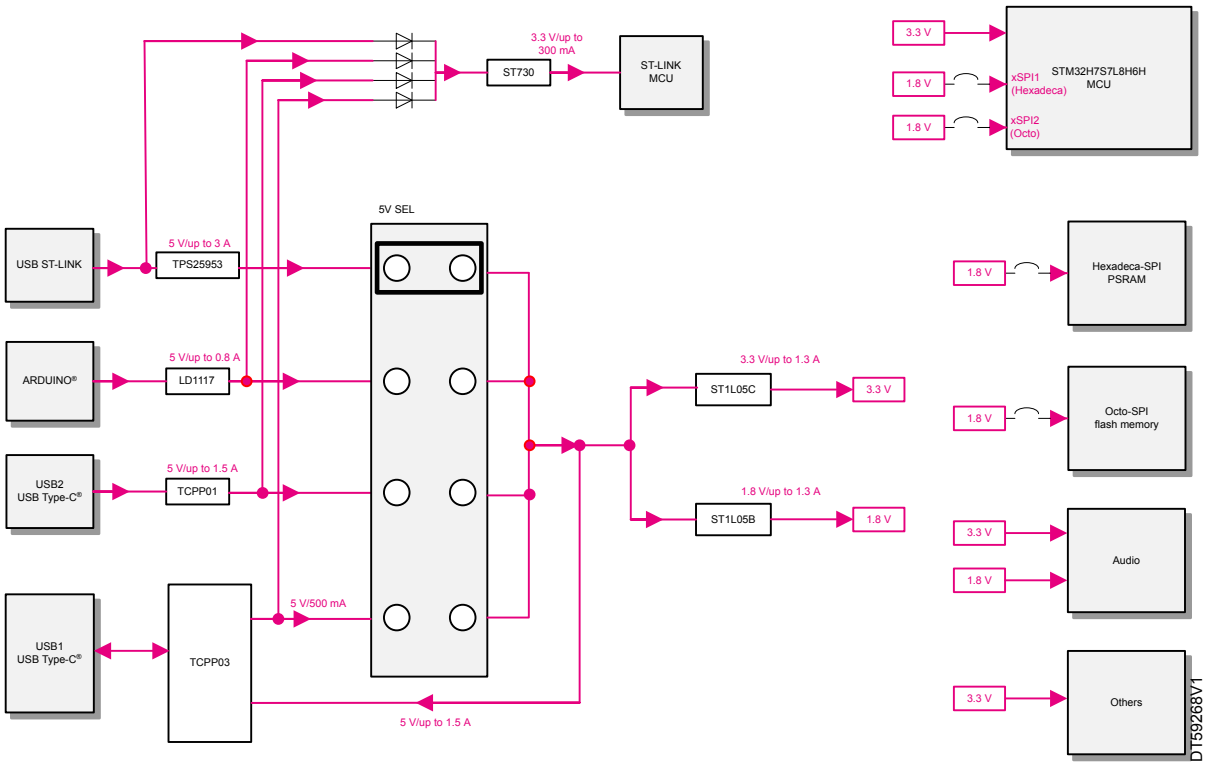
Features	Pin assignment	SB47	SB68	SB20	Comment
LCD and Ethernet(1)	**PB3->LCD_R4** **PA7->RMII_CRS_DV**	**OFF**	**ON**	**ON**	**SWO cannot be used.**
SWO and LCD	PB3->SWO PA7->LCD_R4	ON	OFF	OFF	Ethernet cannot be used.
SWO and Ethernet	PB3->SWO PA7->RMII_CRS_DV	OFF	OFF	ON	LCD cannot be used.

1. The default setting is in bold.

6.4 Power supply

Figure 7 describes the power architecture and the maximum voltage and current limits, under which functions can be safely used on the STM32H7S78-DK product. In any case, ensure the total power budget of the application always conforms to the selected 5 V power source mode, if not malfunction can occur. For detailed configuration, refer to the relevant function description and technical application notes.

Figure 7. Power diagram



6.4.1 Power source selection

A 5 V DC power supply can power the STM32H7S78-DK product. It is possible to configure the Discovery board with the JP1 header to use any of the four sources described in Table 6 for the 5 V DC power supply.

Table 6. 5 V power configurations

Reference	Jumper[1]	Function	Comment
JP1	**STLK**	5 V is supplied from USB STLK CN7	• 5 V (+/- 5%) • 3.5A embedded overcurrent protection • Up to 3 A capable
	5VIN	5 V is supplied from Arduino connector CN12	• 5 V (+/- 5 %) • Up to 0.8 A capable
	USB2	5 V is supplied from USB2 CN17	• 5 V (+/- 5 % at current < 500 mA) • Up to 1.5 A (check USB Type-C® VBUS constraints in that case)
	USB1-PD	5 V is supplied from USB1 CN18	• 5 V (+/- 5 % at current < 500 mA) • Up to 1.5 A (check USB Type-C® VBUS constraints in that case)

1. *The default setting is in bold.*

Note: When the board works abnormally, powering the board with a more powerful source that can provide a larger current is helpful.

6.4.2 STLK (for compatibility with legacy USB Host port)

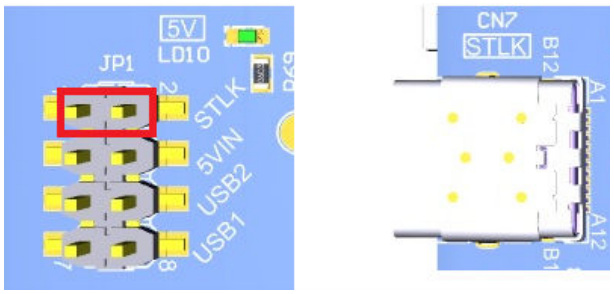
Figure 8 shows the selection of 5V from STLK on JP1, with a power source connected to USB ST-LINK (CN7). It is the default setting.

The CN7 ST-LINK USB Type-C® connector (STLK) can power the STM32H7S78-DK Discovery kit, but the host PC only provides 100 mA to the ST-LINK circuit until the end of the USB enumeration. At the end of the USB enumeration, the STM32H7S78-DK Discovery kit requests a 500 mA current from the host PC.

If the USB enumeration succeeds, a power switch powers the board with a current of up to 500 mA. This power switch also features a 700 mA, 1.8 A, or 3.5 A current limitation to protect the PC in case of overcurrent on the board.

Note: In this mode, in case a wall charger powers the board, there is no USB enumeration. Therefore, the COM LED (LD7) remains OFF permanently, but the 700 mA (or 1.8 A or 3.5 A) protection is still active on the powered board.

Figure 8. JP1 (STLK) from CN7 (USB STLK)

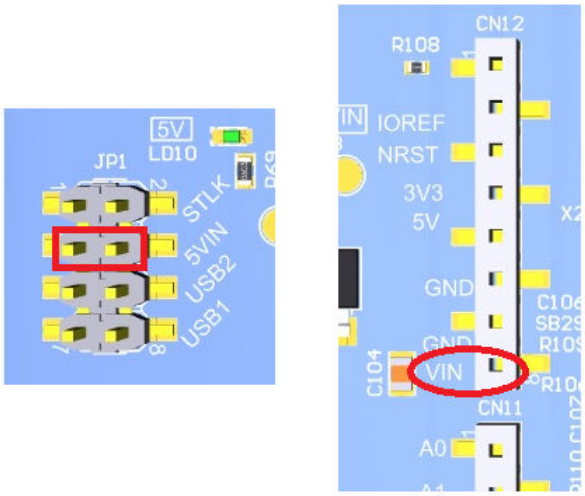


6.4.3 5VIN

Figure 9 shows the selection of 5 V DC power from 5VIN on JP1, with a power source connected to the external VIN on CN12 pin 8 VIN, which is then used by an embedded LDO to generate the 5V_VIN power supply. In this case, the STM32H7S78-DK product must be powered by a power supply unit or auxiliary equipment complying with the standard EN 62368-1:2014/A11:2017 and must be safety extralow voltage (SELV) with limited power capability.

Note: There is no input current protection in this configuration. The recommended maximum current to be drawn from this E5V pin is 800 mA (depending on VIN source voltage and capability).

Figure 9. JP1 (5VIN) from CN12 (VIN)



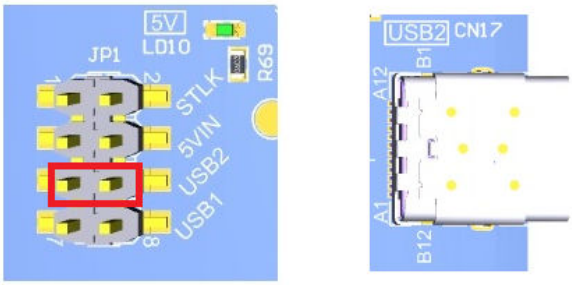
6.4.4 User USB2

Figure 10 shows the selection of 5 V DC power from user USB2 on JP1, with a power source connected to the USB Type-C® connector (CN17). A power switch with TCPP01-M12 circuit is protecting the STM32H7S78-DK Discovery kit from overvoltage on VBUS. The USB Type-C® VBUS nominal voltage must be in the 5 V +/- 5% range.

The following constraints apply to the USB Type-C® host types to be used:

- Low-power USB hosts are not supported, and permanent damage may occur (100 mA is not sufficient to start the Discovery product).
- USB 2.0 or USB 3.x legacy hosts might be used if they can provide 500 mA without data communication. In practice, today nearly all of these ports deliver 500 mA without data communication. Prefer using USB ports showing charging port marking in that case (⚡), they enable higher current.
- Any other USB Type-C® source type can supply and start up the STM32H7S78-DK board, up to 1.5 A.

Figure 10. JP1 (USB2) from CN17 (USB2 Type-C)



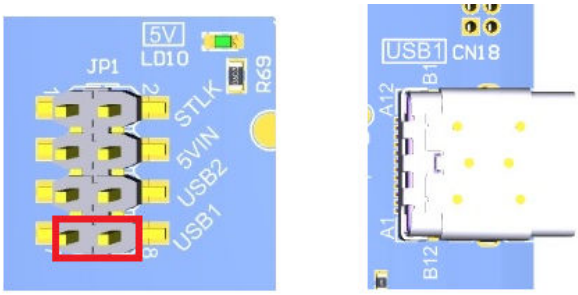
6.4.5 User USB1

Figure 11 shows the selection of 5 V DC power from user USB1 on JP1, with a power source connected to the USB Type-C® connector (CN18).

User USB1 is a DRP port. A power switch with a TCPP03-M20 circuit is protecting the STM32H7S78-DK Discovery kit from overvoltage on VBUS.

When USB1 provides 5V to other devices, the power source is from the power input, which is selected on JP1[1-2] STLK or JP1[5-6] USB2. STLK can provide up to 3 A current and USB2 can provide up to 1.5 A current. The green LED (LD10) is lit when the power source is selected. When USB1 accepts 5 V from other devices, JP1[7-8] must be closed as shown in Figure 11.

Figure 11. JP1 (USB1) from CN18 (USB1 Type-C)



6.4.6 MCU power supply - SMPS or LDO configurations

There are two possible solutions to provide power to the MCU VCORE logic supply: SMPS and LDO. Power consumption in Run mode is significantly improved by generating VCORE from the internal DC/DC converter (SMPS). The default power supply for VCORE logic must be SMPS. Some hardware modifications are required to switch to LDO configurations. The hardware modifications are listed below:

- SMPS mode (default):
  - SB29, SB33, SB36, SB37, SB40, SB41, and SB44: ON
  - SB32 and SB39: OFF
- LDO mode:
  - SB32 and SB39: ON
  - SB29, SB33, SB36, SB37, SB40, SB41, SB44: OFF

Table 7. Internal SMPS, LDO, and board configuration

Solder bridges(1)	Config1 (default) SMPS ON (LDO OFF)	Config2 LDO ON (SMPS OFF)
SB29	**ON**	OFF
SB32	**OFF**	ON
SB33	**ON**	OFF
SB36	**ON**	OFF
SB37	**ON**	OFF
SB39	**OFF**	ON
SB40	**ON**	OFF
SB41	**ON**	OFF
SB44	**ON**	OFF

1. *The default setting is in bold.*

Note: JP5 is used to measure STM32 current consumption manually by a multimeter. The default setting is ON.

6.5 Clock sources

Four clock sources are available on the STM32H7S78-DK board, as described below:

- X3 24 MHz oscillator for the STM32H7S7L8H6H HSE system clock
- X2 32.768 kHz crystal for the STM32H7S7L8H6H embedded RTC
- X1 24 MHz crystal for the STLINK-V3EC
- X4 25 MHz crystal for Ethernet PHY

6.6 Reset sources

The general reset of the STM32H7S78-DK board is active LOW. The reset sources include:

- The reset button (B1)
- The embedded STLINK-V3EC
- The ARDUINO® Uno shield board through the CN12 connector (pin 3)
- The MIPI20 receiver (CN8)
- The TAG connector (CN5)

The general reset is connected to the following peripheral reset functions:

- The Octo-SPI flash memory reset
- The LCD reset
- The Ethernet

6.7 Boot options

Three different boot areas can be selected through the BOOT0 pin on the STM32H7S78-DK board and the NVSTATE as shown in Table 8.

Table 8. BOOT0 related switch

Switch configuration	NVSTATE	Boot space
1<->0  SW1 (Default setting)	OPEN	Boot from user flash memory at address 0x0800 0000
1<->0  SW1	OPEN	Boot from bootloader
X	CLOSE	Boot from RSS in system flash memory at address 0x1FF0 0080

7 Board functions

7.1 TFT color LCD 800×480 pixels

The STM32H7S78-DK board includes a 5-inch 800×480 TFT LCD daughterboard (MB1860), which is connected to the RGB interface of the STM32H7S7L8H6H through a 50-pin connector (CN2). The MB1860 LCD daughterboard uses the RK050HR18-CTG TFT-LCD from Rocktech with a driving system, white LED backlight, and a capacitive touch panel.

The touchscreen controller interfaces with the STM32H7S7L8H6H via the bidirectional I2C1 bus, the I^2C read/write address is `0xBA`/`0xBB`

7.2 USB1 Type_C (HS, DRP)

The STM32H7S78-DK board supports a USB HS 2.0 interface on the USB Type-C® receptacle connector (CN18). It offers compatibility with USB Type-C® rev 1.3, USB PD 3.0, PPS, and USB BC 1.2 on the USB Type-C® receptacle connector (CN18).

CN18 can be used as a DRP (dual-role port). Its VBUS can be managed for supplying other platforms as a Provider, or to be supplied as a Consumer. TCPP03-M20 is used to manage DRP functions. It is compatible with VBUS current up to 1.5 A and VBUS 5 V only.

By default, TCPP03-M20 manages the dead battery (DB) feature of this USB connector. PM2(DB1) and PM3(DB2) of STM32H7S7L8H6H are used as LD3 and LD4 on the STM32H7S78-DK board. If the DB feature of STM32H7S7L8H6H is needed, set SB45 and SB43 ON, and SB46 and SB42 OFF.

The green LED (LD6) is lit when one of the following events occurs:

- Source path is open, and STM32H7S78-DK provides up to 1.5 A 5 V power on CN18.
- VBUS1 is powered by another USB Host when the STM32H7S78-DK board works as a sink device.

7.3 USB2 Type_C (FS, sink only)

The STM32H7S78-DK board also supports USB 2.0 full-speed (FS) communication. The USB2 connector (CN17) is a USB Type-C® connector.

CN17 is used as USB Type-C® sink power mode only and managed by TCPP01-M12. It is compatible with VBUS current up to 1.5 A and VBUS 5 V only.

The green LED (LD5) lights up when VBUS2 is powered by a USB Host.

There is a VBUS detection signal PD4, which is connected to STM32H7S7L8H6H when the STM32H7S78-DK board is powered by other power sources (STLK, 5VIN, or USB1). It can detect a USB cable, which is plugged on CN17.

7.4 Octo-SPI flash memory

The Octo-SPI flash memory has the following characteristics: 1 Gbit, 1.8 V, 200 MHzMHz, DTR, read-while-write. It is connected to the xSPI2 interface of the STM32H7S7L8H6H microcontroller on the STM32H7S78-DK board.

The embedded footprint is also compatible with many references in the BGA24 package. Check the compatibility of the memory datasheet versus the MB1736 schematics.

7.5 Hexadeca-SPI PSRAM

The Hexadeca-SPI PSRAM has the following characteristics: 256 Mbits, ×8×16, 1.8 V, 200 MHz, and DDR. It is connected to the xSPI1 interface of the STM32H7S7L8H6H microcontroller on the STM32H7S78-DK board.

The embedded footprint might also be compatible with other references in the BGA24 package. Check the compatibility of the memory datasheet versus the MB1736 schematics.

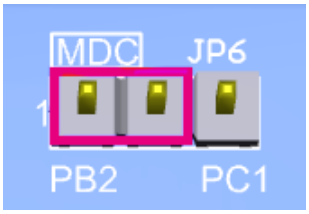
7.6 Ethernet

The STM32H7S78-DK board supports 10/100-Mbit/s Ethernet communication with a PHY and integrates an RJ45 connector (CN10). The Ethernet PHY is connected to the STM32H7S7L8H6H microcontroller via an RMII interface.

The PHY main clock is generated from the X4 25 MHz crystal.

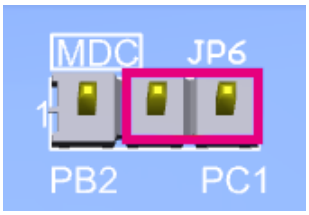
Note: PB2 GPIO needs to simulate RMII_MDC when JP6 pin [1-2] is ON (default setting).

Figure 12. **JP6 (MDC) default setting**



If dedicated RMII_MDC(PC1) is needed, JP6 pin2-3 ON, but the ARDUINO® A5 ADC cannot be used.

Figure 13. **JP6 (MDC) set to PC1**



7.7 microSD™ card

A slot (CN13) for microSD™ cards (SD 2.0 compliant) is available on the STM32H7S78-DK board and is connected to the SDMMC1 interface of the STM32H7S7L8H6H. The uSD_Detect signal (PM14) manages the microSD™ card detection. PM14 must be set as an open-drain signal in STM32H7S7L8H6H. When a microSD™ card is inserted in the slot, the uSD_Detect signal level is LOW, otherwise, it is HIGH.

7.8 Audio

The STM32H7S78-DK features audio characteristics such as:

- An audio codec with the I2S6 interface and a 3.5 mm audio jack connector for stereo earphones and an analog microphone,
- A digital MEMS microphone and microphone daughterboard connector.

7.8.1 Audio codec

The audio codec is driven through an I2C1 interface (100 kHz). The I^2C write-read address is `0x34/0x35`.

An I^2S 5-wire interface is transferring audio data. A dedicated PIO (Audio_INT, PM13) is used to receive interrupts from this audio codec.

7.8.2 MEMS microphone

The digital MEMS microphone (U1) is soldered on the bottom side of the STM32H7S78-DK main board. A microphone daughterboard connector (CN1) is implemented close to U1, to support the STEVAL-MIC008A microphone daughterboard. Two microphones (left and right channels) can be used on this board. By default, U1 is connected to the data signal of SAI_PDM on the STM32H7S7L8H6H microcontroller. When a microphone daughterboard is plugged into CN1, the data signal is switched to the microphone daughterboard automatically.

7.9 Virtual COM port

The serial interface UART4 (PD0/PD1) that supports the bootloader is directly available as a Virtual COM port of the PC connected to the STLINK-V3EC USB connector (CN7). The VCP configuration is the following:

- 115200 bps
- 8-bit data
- No parity
- One-stop bit
- No flow control

7.10 RF module

The STM32H7S78-DK Discovery kit includes one MB1400 Wi-Fi® module, which is based upon a 802.11 b/g/n-compliant chipset.

Figure 14. MB1400 Wi-Fi® module

The MB1400 Wi-Fi® module is addressable over a UART or SPI interface. By default, the MB1400 uses the SPI interface (SPI4) to communicate with the STM32H7S7L8H6H MCU.

The MB1400 Wi-Fi® module does not require any operating system. It contains a complete and integrated TCP/IP protocol stack that only requires AT commands to establish Wi-Fi® network access and to enable STM32H7S78-DK with Wi-Fi® communication.

Note: As the MB1400 Wi-Fi® module firmware might evolve during the lifetime of the Wi-Fi® module product, users must make sure that the MB1400 Wi-Fi® module firmware is up to date before starting to use the Wi-Fi® module. Refer to the X-WIFI-EMW3080B product webpage to find the update procedure and the latest version of the MB1400 Wi-Fi® module firmware.

Main features of the MB1400 Wi-Fi® module:

- Support for 802.11 b/g/n
- Integration of ARM-CM4F, WLAN MAC/Baseband/RF
- 256-Kbyte RAM and 2-Mbyte flash memory
- Maximum transmission rate of up to 72.2 megabits per second with 20 MHz of bandwidth
- Support for WPA/WPA2 PSK/TKIP
- Support for WPA/WPA2 Enterprise
- One SPI interface, one SWD, GPIOs
- Lead-free design, compliant with RoHS requirements
- EMI/EMC metal shield for the best RF performance in noisy environments and accommodation to lower RF emissions/signature for easier FCC compliance
- FCC/ISED/CE compliance certification

Table 9. Wi-Fi® module I/O configuration

STM32H7S7L8H6HI/O	Chipset pin
PE6 (STMO#8-MOSIs)	CHIP_EN
PE13 (SPI4_MISO)	MISO
PE14 (SPI4_MOSI)	MOSI
PE12 (SPI4_SCK)	CK
PE10 (SPI4_CS)	CS

7.11 TAG

One TAG interface footprint (CN5) is reserved on the STM32H7S78-DK board, which can be used for board debugging and programming.

7.12 Buttons and LEDs

The black button (B1) located on the top side is the reset of the STM32H7S7L8H6H microcontroller.

The blue button (B2) located on the top side is to be used as a digital input or as a wake-up-alternate function.

When B2 is depressed the logic state is HIGH, otherwise, the logic state is LOW.

Four LEDs are located on the top side. LD1 (green) and LD2 (orange) are active at the HIGH level, and LD3 (red) and LD4 (blue) are active at the LOW level.

Table 10 summarizes the different buttons and LEDs of theSTM32H7S78-DK Discovery kit and their function:

Table 10. Button and LED control port

Reference	Color	Function	Comment
B1	Black	Reset button	Reset the board
B2	Blue	User button	PC13. Supports wake-up and tamper features
LD1	Green	User LED	PO1. Active HIGH
LD2	Orange	User LED	PO5. Active HIGH
LD3	Red	User LED	PM2. Active LOW
LD4	Blue	User LED	PM3. Active LOW
LD5	Green	User USB2 5V	VBUS2 is present
LD6	Green	User USB1 5V	VBUS1 is present
LD7	BICOLOR (RED/GREEN)	STLINK-V3EC COM	Green when communication is ongoing
LD8	BICOLOR (RED/GREEN)	STLINK-V3EC power status	Indicating power status
LD10	Green	5V	5V power available
LD12	Green	ARDUINO® D13	PE12. Active HIGH

8 Board connectors

8.1 Microphone connector (CN1)

The microphone connector (CN1) is used to connect the STEVAL-MIC008A MEMS microphone daughterboard.

Figure 15. Microphone connector (CN1)

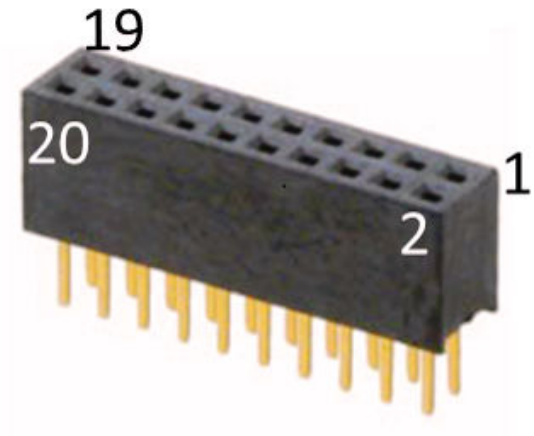


Table 11. Microphone connector (CN1) pinout

Pin number	Description	Pin number	Description
1	GND	2	3V3
3	NC	4	PDM clock (CK-PE2)
5	NC	6	PDM data (D1-PD6)
7	NC	8	NC
9	NC	10	Microphone board detection (PH1)
11	NC	12	3V3
13	NC	14	NC
15	NC	16	NC
17	NC	18	NC
19	3V3	20	GND

8.2 TFT LCD connector (CN2)

The CN2 connector is designed to connect the 5-inch TFT LCD daughterboard.

Figure 16. TFT LCD connector (CN2) top view

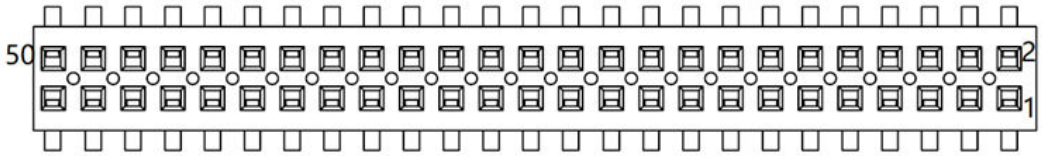


Table 12. Microphone connector (CN2) pinout

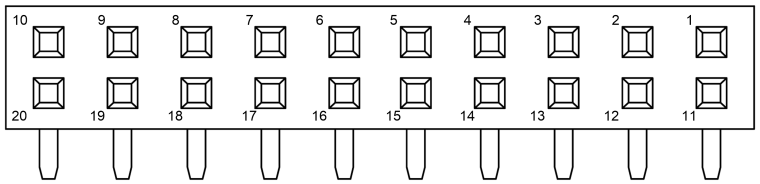
MCU port	Signal name	Pin number		Signal name	MCU port
-	GND	1	2	GND	-
PF9	LCD_R0	3	4	LCD_G0	PF7
PF10	LCD_R1	5	6	LCD_G1	PF15
PF0	LCD_R2	7	8	LCD_G2	PA1
PB4	LCD_R3	9	10	LCD_G3	PA0
PB3/PA7(1)	LCD_R4	11	12	LCD_G4	PB13
PA15	LCD_R5	13	14	LCD_G5	PB12
PG1	LCD_R6	15	16	LCD_G6	PB11
PG0	LCD_R7	17	18	LCD_G7	PB15
-	GND	19	20	GND	-
PF11	LCD_B0	21	22	LCD_DE	PB14
PG14	LCD_B1	23	24	LCD_ON/OFF	PE15
PA12	LCD_B2	25	26	LCD_HSYNC	PG2
PA11	LCD_B3	27	28	LCD_VSYNC	PE11
PA10	LCD_B4	29	30	GND	-
PA9	LCD_B5	31	32	LCD_CLK	PG13
PA8	LCD_B6	33	34	GND	-
PA6	LCD_B7	35	36	NRST	NRST
-	GND	37	38	I2C1_SDA	PB9
PE3	CTP_INT	39	40	I2C1_SCL	PB6
	NC	41	42	NC	-
PG15	LCD_BL_CTRL	43	44	NC	-
-	5V	45	46	NC	-
-	GND	47	48	NC	-
-	GND	49	50	3V3	-

1. *PB3 is used for both LCD_R4 and SWO. If SWO is used together with LCD, LCD_R4 can be moved to PA7. Refer to Table 5 for details.*

8.3 STMod+ connector (CN3)

The standard 20-pin STMod+ connector is available on the STM32H7S78-DK board to increase compatibility with external boards and modules from the ecosystem of microcontrollers. STMod+ includes UART or SPI interface signals for communication with the host MCU and dedicated solder bridges allow configuring the external board with the UART7 or SPI4 serial interface of the STM32H7S7L8H6H MCU.

Figure 17. STMod+ connector (CN3) front view



Front view

Table 13. STMod+ connector configurations

Solder bridge	Setting[1]	Description
SB2, SB6, SB8	**ON**	**SPI4 connected to STMod+**
SB1, SB5, SB7	**OFF**	**UART7 disconnected to STMod+**
SB2, SB6, SB8	OFF	SPI4 disconnected to STMod+
SB1, SB5, SB7	ON	UART7 connected to STMod+
SB4, SB9, SB12, SB14, SB16, SB18	**ON**	**P14-P20 used as normal configuration**
SB3, SB10, SB11, SB13, SB15, SB17	**OFF**	**Not SDMMC signal configuration**
SB4, SB9, SB12, SB14, SB16, SB18	OFF	Not normal configuration
SB3, SB10, SB11, SB13, SB15, SB17	ON	P14-P20 used as SDMMC configuration

1. *The default configuration is in bold.*

By default, it is designed to support an ST-dedicated fan-out board to connect different modules or board extensions from different manufacturers.

The fan-out board also embeds a 3.3 V regulator and I^2C level shifters. For more detailed information on the fan-out board, refer to the user manual *STMod+ fan-out expansion board for STM32 Discovery kits and Evaluation boards* (UM2695).

For details about the STMod+ interface, refer to the technical note *STMod+ interface specification* (TN1238).

The STMod+ connector on the STM32H7S78-DK board supports SDMMC configuration for some daughterboards with SDMMC interface on pins 14, 15, and 17 to 20.

Table 14. STMod+ connector (CN3) pinout

Pin number	Description	Pin number	Description
1	SPI4_CS/USART7_CTS (PE10)	11	INT (PD12)
2	SPI4_MOSI (PE14)/USART7_TX (PE8)	12	RESET (PD13)
3	SPI4_MISO (PE13)/USART7_RX (PE7)	13	ADC (PF13)/SDMMC_D3 (PC11)
4	SPI5_SCK (PE12)/USART7_RTS (PE9)	14	PWM (PF6)/SDMMC_D2 (PC10)
5	GND	15	+5V
6	+5V	16	GND
7	I2C1_SCL (PB6)	17	GPIO (PF1)/SDMMC_CK (PC12)
8	SPI4_MOSIs (PE6)	18	GPIO (PF2)/SDMMC_D0 (PC8)

Pin number	Description	Pin number	Description
9	SPI4_MISOs (PE5)	19	GPIO (PF3)/SDMMC_D1 (PC9)
10	I2C1_SDA (PB9)	20	GPIO (PF4)/SDMMC_CMD (PD2)

Notice: On the STM32H7S78-DK board, signals on STMod+ are shared with Pmod™ and ARDUINO® connectors. The user must make sure that nothing is connected on Pmod™ and ARDUINO® connectors.

8.4 Pmod™ connector (CN4)

The standard 12-pin Pmod™ connector is available in the STM32H7S78-DK Discovery board to support low frequency and low I/O pin count peripheral modules. The Pmod™ interface, which is implemented in the STM32H7S78-DK Discovery board is compatible with the Pmod™ type 2A and 4A I/O signal assignment convention.

Figure 18. Pmod™ connector (CN4) front view

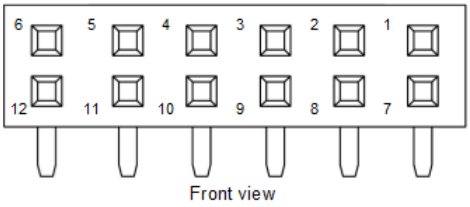


Table 15. Pmod™ connector (CN4) pinout

Pin number	Description	Pin number	Description
1	SPI4_CS/USART7_CTS (PE10)	7	INT (PD12)
2	SPI4_MOSI (PE14)/USART7_TX (PE8)	8	RESET (PD13)
3	SPI4_MISO (PE13)/USART7_RX (PE7)	9	NA
4	SPI5_SCK (PE12)/USART7_RTS (PE9)	10	NA
5	GND	11	GND
6	3V3	12	3V3

Notice: On the STM32H7S78-DK board, signals on Pmod™ are shared with STMod+ and ARDUINO® connectors. The user must make sure that nothing is connected on STMod+ and ARDUINO® connectors.

8.5 TAG connector (CN5)

The TAG connector footprint (CN5) is used to connect the STM32H7S7L8H6H microcontroller for programming or debugging the board.

Figure 19. TAG connector (CN5) top view

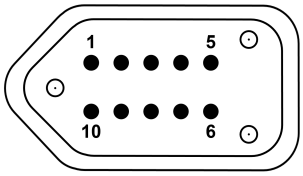


Table 16. TAG connector (CN5) pinout

Pin number	Description	Pin number	Description
1	VDD (3V3)	10	NRST
2	SWDIO (PA13)	9	NC
3	GND	8	JTDI (PA15)(1)
4	SWCLK (PA14)	7	NC
5	GND	6	SWO (PB3)

1. *JTDI is not connected by default. Refer to Table 20 for more details.*

8.6 Camera connector (CN6)

An 8-bit camera module function is supported thanks to the 30-pin dedicated ZIF connector (CN6). The camera module adaptor board (MB1683) can be connected to the STM32H7S78-DK Discovery board through a flexible cable. And the camera daughterboard is plugged into MB1683.

Figure 20. Camera connector (CN6) top view

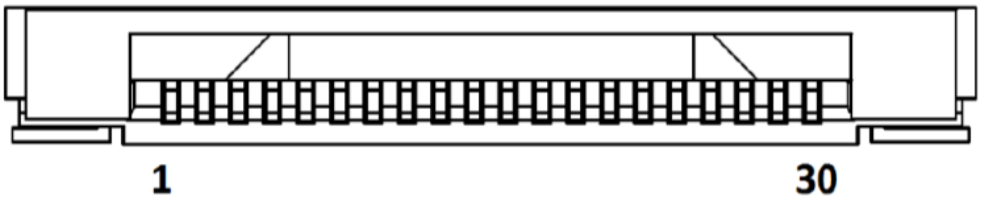


Table 17. Camera connector (CN6) pinout

Pin number	Description	Pin number	Description
1	GND	16	GND
2	SPI4_CLK (PE12)	17	DCMI_HSYNC (PG3)
3	SPI4_MOSI (PE6)	18	NC
4	DCMI_D0 (PC6)	19	DCMI_VSYNC (PB7)
5	DCMI_D1 (PC7)	20	3V3
6	DCMI_D2 (PE0)	21	Camera_CLK (OSC_24M, TP1)
7	DCMI_D3 (PE1)	22	PULLDOWN (PN12-open drain)
8	DCMI_D4 (PE4)	23	GND

Pin number	Description	Pin number	Description
9	DCMI_D5 (PD3)	24	SHUTTER (TP2)
10	DCMI_D6 (PB8)	25	DCMI_PWR_EN (PF5)
11	DCMI_D7 (PD14)	26	RESET (PN7-open drain)
12	SPI_CS (PF8-Default not connected)(1)	27	I2C1_SDA (PB9)
13	SPI4_MISO (PE13)	28	I2C1_SCL (PB6)
14	GND	29	GND
15	DCMI_PIXCK (PD5)	30	3V3

1. *PF8 conflicts with D10 on ARDUINO® connectors, if PF8 is used on CN6, SB19 must be closed and there is nothing on ARDUINO® connectors.*

8.7 STLINK-V3EC USB Type-C® connector (CN7)

The USB connector (CN7) is used to connect the embedded STLINK-V3EC to the PC for programming and debugging purposes.

Figure 21. STLINK-V3EC connector (CN7) front view

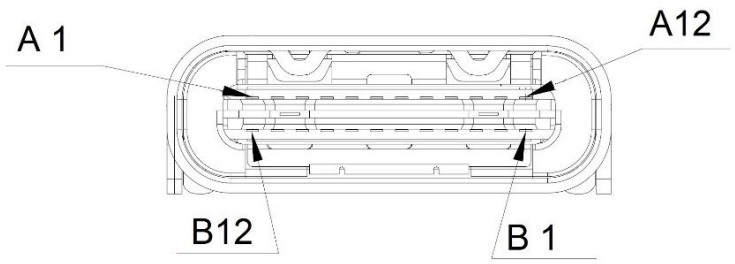


Table 18. STLINK-V3EC connector (CN7) pinout

Pin number	Description	Pin number	Description
A1	GND	B1	GND
A2	NC	B2	NC
A3	NC	B3	NC
A4	VBUS_STLK	B4	VBUS_STLK
A5	CC1 (STLINK MCU PC3)	B5	CC2 (STLINK MCU PC4)
A6	D+ (STLINK MCU PB15)	B6	D+ (STLINK MCU PB15)
A7	D- (STLINK MCU PB14)	B7	D- (STLINK MCU PB14)
A8	NC	B8	NC
A9	VBUS_STLK	B9	VBUS_STLK
A10	NC	B10	NC
A11	NC	B11	NC
A12	GND	B12	GND

8.8 MIPI20 debug connector (CN8)

The MIPI20 debug connector is implemented to program and debug the STM32H7S7L8H6H microcontroller. The SWD protocol must be used by default. Trace signals and JTDI are not connected to MIPI20 by default because they are shared with other peripherals. Solder bridges must be set when these signals are used on MIPI20.

Figure 22. MIPI20 debug connector (CN8) top view

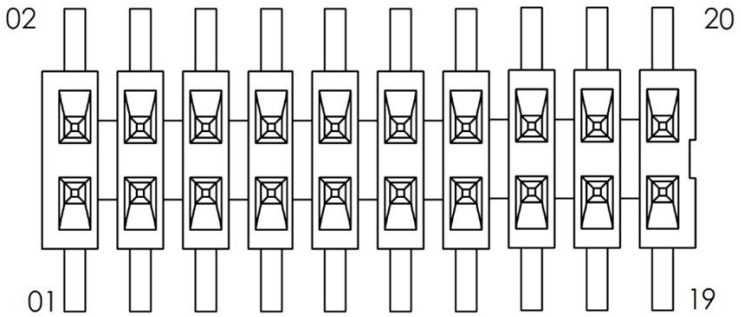


Table 19. MIPI20 debug connector (CN8) pinout

Pin number	Description	Assignment	Pin number	Description	Assignment
1	VDD power	VDD	2	SWDIO/JTMS	MCU.SWDIO (PA13)
3	GND	GND	4	SWCLK/JTCK	MCU.SWCLK (PA14)
5	GND	GND	6	SWO/JTDO	MCU.SWO (PB3)
7	KEY	-	8	JTDI	MCU.JTDI (PA15)
9	GND	GND	10	RESET	NRST
11	GND	GND	12	TRACE_CLK	PE2
13	GND	GND	14	TRACE_D0	PC1
15	GND	GND	16	TRACE_D1	PE4
17	GND	GND	18	TRACE_D2	PE5
19	GND	GND	20	TRACE_D3	PE6

Trace signals and JTDI are not connected to MIPI20 by default because they are shared with other peripherals. Solder bridges must be set when these signals are used on MIPI20 as shown in Table 20.

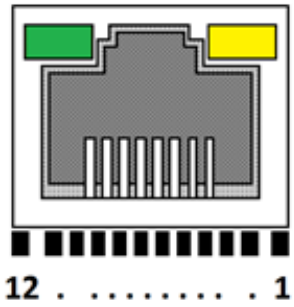
Table 20. Debug signal configuration

Pin number	Signal	Description	Description	Comment
8	PA15	JTDI	SB72 ON, SB53 OFF	LCD does not work when SB53 OFF
12	PE2	TRACE_CLK	SB73 ON, SB49 OFF	Digital MIC does not work when SB49 OFF
14	PC1	TRACE_D0	SB74 ON. No jumper on JP6 [2-3]	PC1 cannot be used as MDC
16	PE4	TRACE_D1	SB75 ON. No camera on CN6	-
18	PE5	TRACE_D2	SB76 ON. No board on STMod+	-
20	PE6	TRACE_D3	SB77 ON. No camera on CN6 and no board on STMod+	-

8.9 Ethernet connector (CN10)

The STM32H7S78-DK board supports 10/100 Mbps Ethernet communications a PHY (U18), and the RJ45 connector (CN10). The Ethernet PHY is connected to the STM32H7S7L8H6H microcontroller through an RMII interface.

Figure 23. Ethernet RJ45 connector (CN10) front view



1. *Green LED: Ethernet traffic*
2. *Yellow LED: Ethernet connection*

Table 21. Ethernet RJ45 connector (CN10) pinout

Pin number	Description	Pin number	Description
1	TX+	7	-
2	TX-	8	-
3	RX+	9	Cathode yellow LED
4	-	10	Anode yellow LED
5	-	11	Cathode green LED
6	RX-	12	Anode green LED

8.10 ARDUINO® Uno V3 connectors (CN11, CN12, CN14, and CN15)

The ARDUINO® Uno connectors (CN11, CN12, CN14, and CN15) are female connectors compatible with the ARDUINO® Uno revision 3 standard. Most shields designed for ARDUINO® Uno V3 fit the STM32H7S78-DK board.

Important: *The STM32 microcontroller I/Os are 3.3 V compatible instead of 5 V for ARDUINO® Uno.*

Table 22. **ARDUINO® Uno V3 connectors pinout**

Left connectors					Right connectors				
Connector	Pin number	Pin name	MCU pin	Function	Function	MCU pin	Pin name	Pin number	Connector
CN12 Power	1	-	-	5V_IN test	I2C1_SCL	PB6	D15	10	CN15 Digital
	2	IOREF	-	3V3 ref	I2C1_SDA	PB9	D14	9	
	3	RESET	NRST	Reset	AVDD	-	AVDD	8	
	4	+3V3	-	3.3 V output	Ground	-	GND	7	
	5	+5V	-	5 V output	SPI4_SCK	PE12	D13	6	
	6	GND	-	Ground	SPI1_MISO	PE13	D12	5	
	7	GND	-	Ground	TIM1_CH4/ SPI4_MOSI	PE14	D11	4	
	8	VIN	-	Power input	TIM13_CH1/ SPI_CS	PF8	D10	3	
CN11 Analog	1	A0	PC0	ADC12_INP10	TIM16_CH1	PF6	D9	2	
	2	A1	PC2	ADC12_INP12	-	PF4	D8	1	
	3	A2	PC3	ADC12_INP13	-	PF3	D7	8	CN14 Digital
	4	A3	PF12	ADC1_INP6	TIM4_CH4	PD15	D6	7	
	5	A4	PF13 or PB9(1)	ADC2_IN2 (PF13) or I2C1_SDA (PB9)	TIM4_CH2	PD13	D5	6	
	6	A5	PC1 or PB6(2)	ADC12_INP11 (PC1) or I2C1_SCL (PB6)	-	PF2	D4	5	
					TIM4_CH1	PD12	D3	4	
					-	PF1	D2	3	
					UART7_TX	PE8	D1	2	
					UART7_RX	PE7	D0	1	

1. *PF13 is used when SB26 is ON and SB27 is OFF (default). PB9 is used when SB26 is OFF and SB27 is ON.*
2. *PC1 is used when SB25 is ON and SB24 is OFF (default). PB6 is used when SB25 is OFF and SB24 is ON.*

8.11 microSD™ card connector (CN13)

microSD™ cards with 4 Gbytes or more capacity can be inserted in the receptacle (CN13). Four data bits of the SDMMC1 interface, CLK, and CMD signals of STM32H7S7L8H6H are used to communicate with the microSD™ card. The SD_Detect signal detects the card insertion. When a microSD™ card is inserted, the SD_Detect level is LOW, otherwise, it is HIGH.

Figure 24. microSD™ card connector (CN13) top view

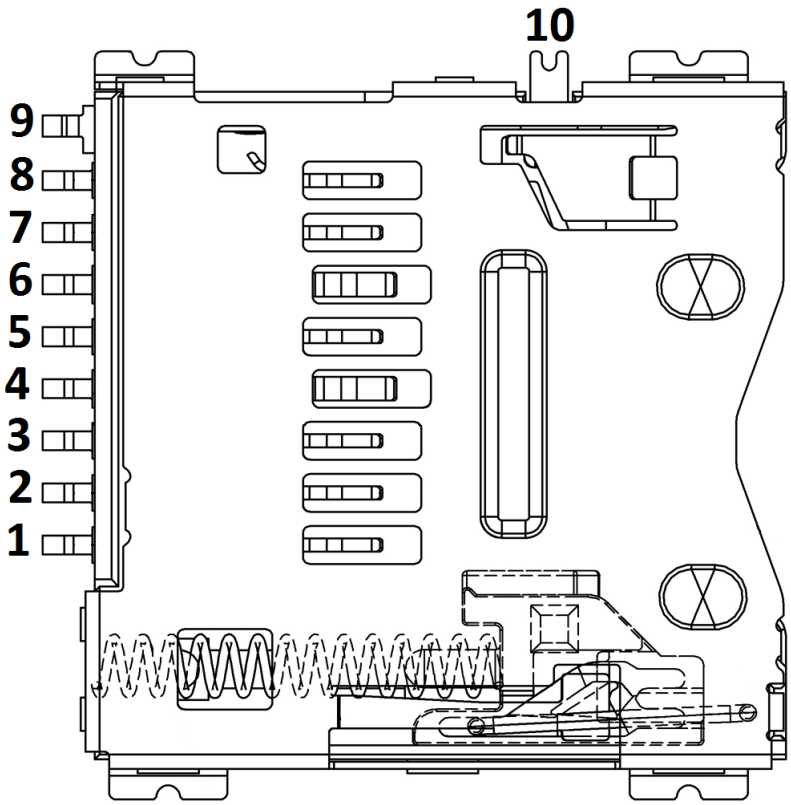


Table 23. microSD™ card connector (CN13) pinout

Pin number	Description	Pin number	Description
1	SDMMC1_D2 (PC10)	6	GND
2	SDMMC1_D3 (PC11)	7	SDMMC1_D0 (PC8)
3	SDMMC1_CMD (PD2)	8	SDMMC1_D1 (PC9)
4	VDD (3V3)	9	GND
5	SDMMC1_CK (PC12)	10	SD_Detect (PM14)

8.12 Audio jack (CN16)

A 3.5 mm standard stereo audio jack is available on the STM32H7S78-DK board to support stereo headphones and an analog microphone.

Figure 25. Audio jack (CN16)

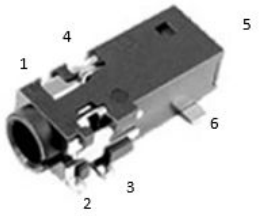


Table 24. Audio jack (CN16) pinout

Pin number	Description	Stereo headset with microphone pinning
6	OUT_Left	
4	OUT_Right	
3	GND	
2	MIC_IN	

8.13 User USB2 Type-C connector (CN17)

CN17 is a USB Type-C® connector (sink only). For more details, refer to Section 7.3.

Figure 26. User USB2 Type-C connector (CN17) front view

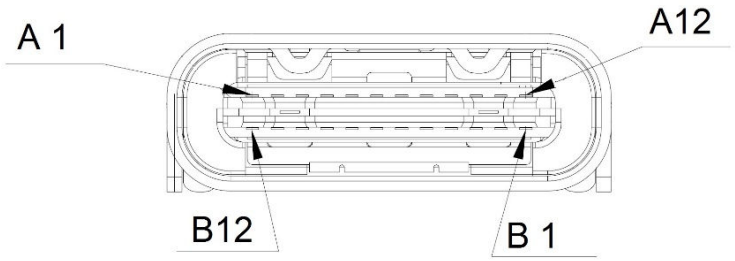


Table 25. User USB2 Type-C connector (CN17) pinout

Pin number	Description	Pin number	Description
A1	GND	B1	GND
A2	NC	B2	NC
A3	NC	B3	NC
A4	VBUS2	B4	VBUS2
A5	CC1 (TCPP01)	B5	CC2 (TCPP01)
A6	D+ (PM11)	B6	D+ (PM11)
A7	D- (PM12)	B7	D- (PM12)
A8	NC	B8	NC
A9	VBUS2	B9	VBUS2
A10	NC	B10	NC
A11	NC	B11	NC
A12	GND	B12	GND

8.14 User USB1 Type-C connector (CN18)

CN18 is a USB Type-C® connector (DRP). For more details, refer to Section 7.2.

Figure 27. User USB1 Type-C connector (CN18) front view

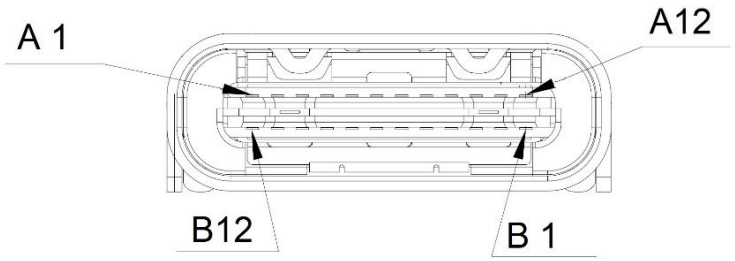


Table 26. User USB1 Type-C connector (CN18) pinout

Pin number	Description	Pin number	Description
A1	GND	B1	GND
A2	NC	B2	NC
A3	NC	B3	NC
A4	VBUS1	B4	VBUS1
A5	CC1 (PM0)	B5	CC2 (PM1)
A6	D+ (PM6)	B6	D+ (PM6)
A7	D- (PM5)	B7	D- (PM5)
A8	NC	B8	NC
A9	VBUS1	B9	VBUS1
A10	NC	B10	NC
A11	NC	B11	NC
A12	GND	B12	GND

9 STM32H7S78-DK I/O assignment

Table 27. **STM32H7S78-DK I/O assignment**

Pin number	Pin name	On-board peripheral signals	ARDUINO® signals	STMod+ signals
M1	PA0	LCD G3	-	-
M2	PA1	LCD G2	-	-
L4	PA2	RMII MDIO	-	-
N1	PA3	I2S6 MCK	-	-
M3	PA4	I2S6 WS	-	-
N2	PA5	I2S6 CK	-	-
P1	PA6	LCD B7	-	-
M4	PA7	RMII RX_DV/LCD_R4	-	-
F12	PA8	LCD B6	-	-
D14	PA9	LCD B5	-	-
E13	PA10	LCD B4	-	-
C15	PA11	LCD B3	-	-
C14	PA12	LCD B2	-	-
E12	PA13	JTMS-SWDIO	-	-
D13	PA14	JTCK-SWCLK	-	-
G11	PA15	LCD R5 / JTDI	-	-
P2	PB0	RMII TXD0	-	-
R2	PB1	RMII TXD1	-	-
N4	PB2	RMII MDC (GPIO)	-	-
C4	PB3	LCD_R4 / JTDO-SWO	-	-
D5	PB4	LCD R3	-	-
B3	PB5	I2S6 SDO	-	-
E5	PB6	I2C1/I3C SCL	D15-I2C1/I3C SCL	P7-I2C1/I3C SCL
D4	PB7	DCMI VSYNC	-	-
B1	PB8	DCMI D6	-	-
C2	PB9	I2C1/I3C SDA	D14-I2C1/I3C SDA	P10-I2C1/I3C SDA
P15	PB10	RMII RX_ER	-	-
N14	PB11	LCD G6	-	-
L12	PB12	LCD G5	-	-
N15	PB13	LCD G4	-	-
M13	PB14	LCD DE	-	-
M14	PB15	LCD G7	-	-
K3	PC0	-	A0-ADC12 INP10	-
L1	PC1	RMII MDC / TRACE_D0	A5-ADC12 INP11	-
L2	PC2	-	A1-ADC12 INP12	-
L3	PC3	-	A2-ADC12 INP13	-
L5	PC4	RMII RXD0	-	-

Pin number	Pin name	On-board peripheral signals	ARDUINO® signals	STMod+ signals
N3	PC5	RMII RXD1	-	-
E15	PC6	DCMI D0	-	-
F13	PC7	DCMI D1	-	-
D15	PC8	SDMMC1 D0	-	-
E14	PC9	SDMMC1 D1	-	-
B14	PC10	SDMMC1 D2	-	-
B15	PC11	SDMMC1 D3	-	-
D12	PC12	SDMMC1 CK	-	-
E4	PC13	BUTTON TAMPIN1/WKUP3	-	-
D2	PC14	OSC32 IN	-	-
D1	PC15	OSC32 OUT	-	-
C13	PD0	VCP-UART4 RX	-	-
B13	PD1	VCP-UART4 TX	-	-
A14	PD2	SDMMC1 CMD	-	-
A12	PD3	DCMI D5	-	-
C11	PD4	USB2_VBUS_DET(GPIO)	-	-
D7	PD5	DCMI PIXCLK	-	-
E7	PD6	SAI-MEM1 D1	-	-
B6	PD7	RMII REF CLK	-	-
N13	PD12	-	D3-TIM4 CH1	P11-INT
P14	PD13	-	D5-TIM4 CH2	P12-RESET
L14	PD14	DCMI D7	-	-
L13	PD15	-	D6-TIM4 CH4	-
A2	PE0	DCMI D2	-	-
C3	PE1	DCMI D3	-	-
B2	PE2	SAI-MEM1 CK1 / TRACE_CLK	-	-
F5	PE3	LCD INT(GPIO)	-	-
E2	PE4	DCMI D4 / TRACE_D1	-	-
F4	PE5	TRACE_D2	-	P9-SPI4 MISO
E1	PE6	SPI4 MOSI / TRACE_D3	-	P8-SPI4 MOSI
M6	PE7	-	D0-UART7 RX	P3-UART7 RX
R4	PE8	-	D1-UART7 TX	P2-UART7 TX
P5	PE9	-	-	P4-UART7 RTS
R5	PE10	-	-	P1-UART7 CTS / P1-SPI CS
C12	PE11	LCD VSYNC	-	-
E11	PE12	SPI4 SCK	D13-SPI4 SCK	P4-SPI4 SCK
B12	PE13	SPI4 MISO	D12-SPI4 MISO	P3-SPI4 MISO
A13	PE14	-	D11-TIM1 CH4 / SPI4 MOSI	P2-SPI4 MOSI
D11	PE15	LCD ON/OFF(GPIO)	-	-
B5	PF0	LCD R2	-	-

Pin number	Pin name	On-board peripheral signals	ARDUINO® signals	STMod+ signals
C5	PF1	-	D2	P17-GPIO
A4	PF2	-	D4	P18-GPIO
A3	PF3	-	D7	P19-GPIO
B4	PF4	-	D8	P20-GPIO
G3	PF5	CAM XSDN(GPIO)	-	-
H5	PF6	-	D9-TIM16 CH1	P14-TIM16 CH1
H4	PF7	LCD G0	-	-
H3	PF8	SPI4 CS (GPIO)	D10-TIM13_CH1 / SPI_CS	-
J2	PF9	LCD R0	-	-
J3	PF10	LCD R1	-	-
M5	PF11	LCD B0	-	-
R3	PF12	-	A3-ADC1 INP6	-
P3	PF13	-	A4-ADC2 INP2	P13-ADC2 INP2
P4	PF14	USB1 VSENSE (ADC2 INP6)	-	-
N5	PF15	LCD G1	-	-
B11	PG0	LCD R7	-	-
E10	PG1	LCD R6	-	-
C6	PG2	LCD HSYNC	-	-
A5	PG3	DCMI HSYNC	-	-
F3	PG11	RMII TX_EN	-	-
F2	PG12	I2S6 SDI	-	-
G5	PG13	LCD CLK	-	-
F1	PG14	LCD B1	-	-
G4	PG15	LCD BL CTRL(GPIO)	-	-
K1	PH0	OSC IN	-	-
K2	PH1	MIC DET(GPIO)	-	-
D10	PM0	USB1 CC1	-	-
C10	PM1	USB1 CC2	-	-
B10	PM2	USB1 DB1 / LED3 (GPIO)	-	-
A10	PM3	USB1 DB2 / LED4 (GPIO)	-	-
B9	PM5	USB1 HS DM	-	-
A9	PM6	USB1 HS DP	-	-
C9	PM8	USB1 INT1 (GPIO)	-	-
B8	PM9	USB1 EN1 (GPIO)	-	-
B7	PM11	USB2 FS DP	-	-
A7	PM12	USB2 FS DM	-	-
C7	PM13	AUDIO INT (GPIO)	-	-
C8	PM14	SD DET (GPIO)	-	-
G14	PN0	OCTOSPI P2 DQS0	-	-
F14	PN1	OCTOSPI P2 NCS0	-	-

Pin number	Pin name	On-board peripheral signals	ARDUINO® signals	STMod+ signals
H15	PN2	OCTOSPI P2 IO0	-	-
G13	PN3	OCTOSPI P2 IO1	-	-
K14	PN4	OCTOSPI P2 IO2	-	-
K15	PN5	OCTOSPI P2 IO3	-	-
J14	PN6	OCTOSPI P2 CLK	-	-
J13	PN7	CAM RSTI (GPIO)	-	-
K13	PN8	OCTOSPI P2 IO4	-	-
H14	PN9	OCTOSPI P2 IO5	-	-
H13	PN10	OCTOSPI P2 IO6	-	-
G15	PN11	OCTOSPI P2 IO7	-	-
L15	PN12	CAM PLUG (GPIO)	-	-
R13	PO0	OCTOSPI P1 NCS0	-	-
P7	PO1	LED1 (GPIO)	-	-
N11	PO2	OCTOSPI P1 DQS0	-	-
M11	PO3	OCTOSPI P1 DQS1	-	-
R10	PO4	OCTOSPI P1 CLK	-	-
P10	PO5	LED2 (GPIO)	-	-
P11	PP0	OCTOSPI P1 IO0	-	-
N12	PP1	OCTOSPI P1 IO1	-	-
N9	PP2	OCTOSPI P1 IO2	-	-
P9	PP3	OCTOSPI P1 IO3	-	-
R8	PP4	OCTOSPI P1 IO4	-	-
N10	PP5	OCTOSPI P1 IO5	-	-
R11	PP6	OCTOSPI P1 IO6	-	-
P12	PP7	OCTOSPI P1 IO7	-	-
P13	PP8	OCTOSPI P1 IO8	-	-
R14	PP9	OCTOSPI P1 IO9	-	-
M12	PP10	OCTOSPI P1 IO10	-	-
P6	PP11	OCTOSPI P1 IO11	-	-
N6	PP12	OCTOSPI P1 IO12	-	-
R7	PP13	OCTOSPI P1 IO13	-	-
N7	PP14	OCTOSPI P1 IO14	-	-
P8	PP15	OCTOSPI P1 IO15	-	-

10 STM32H7S78-DK product information

10.1 Product marking

The stickers located on the top or bottom side of all PCBs provide product information:

- First sticker: product order code and product identification, generally placed on the main board featuring the target device.
  Example:

  Product order code
  Product identification

- Second sticker: board reference with revision and serial number, available on each PCB.
  Example:

  MBxxxx-Variant-yzz
  syywwxxxxx

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

On the second sticker, the first 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 line shows the board serial number used for traceability.

Parts marked as *"ES"* or *"E"* are not yet qualified and therefore not approved for use in production. ST is not responsible for any consequences resulting from such use. In no event will ST be liable for the customer using any of these engineering samples in production. ST's Quality department must be contacted prior to any decision to use these engineering samples to run a qualification activity.

"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 evaluation tool ordering part number 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.

10.2 STM32H7S78-DK product history

Table 28. **Product history**

Order code	Product identification	Product details	Product change description	Product limitations
STM32H7S78-DK	DK32H7S78$KR1	MCU: • STM32H7S7L8H6H silicon revision "Y"	Initial revision	No limitation
		MCU errata sheet: • *STM32H7Rxx/Sxx device errata* (ES0596)		
		Board: • MB1736-H7S7L8-D01 (main board) • MB1860-RK050HR18C-B01 (LCD daughterboard) • MB1400-STMod+_SPI-C01 (Wi-Fi®-module daughterboard) • MB1280-3V3-C01 (fan-out daughterboard)		

10.3 Board revision history

Table 29. **Board revision history**

Board reference	Board variant and revision	Board change description	Board limitations
MB1736 (main board)	H7S7L8-D01	Initial revision	No limitation
MB1860 (LCD daughterboard)	RK050HR18C-B01	Initial revision	No limitation
MB1400 (Wi-Fi®-module daughterboard)	STMod+_SPI-C01	Initial revision	No limitation
MB1280 (fan-out daughterboard)	3V3-C01	Initial revision	No limitation

11 Federal Communications Commission (FCC) and ISED Canada Compliance Statements

11.1 FCC Compliance Statement

Contains FCC ID: P53-EMW3080.

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 B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception which can be determined by turning the equipment off and on, the user is encouraged to try to correct interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Note: Use only shielded cables.

Responsible party (in the USA)

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

11.2 ISED Compliance Statement

This device complies with FCC and ISED Canada RF radiation exposure limits set forth for general population for mobile application (uncontrolled exposure). This device must not be collocated or operating in conjunction with any other antenna or transmitter.

Contains/Contient IC ID: 23507-EMW3080.

Compliance Statement

Notice: This device complies with ISED Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

ISED Canada ICES-003 Compliance Label: CAN ICES-3 (B) / NMB-3 (B).

Déclaration de conformité

Avis: Le présent appareil est conforme aux CNR d'ISDE Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Étiquette de conformité à la NMB-003 d'ISDE Canada : CAN ICES-3 (B) / NMB-3 (B).

12 RED Compliance Statement

Déclaration de conformité CE simplifiée :

STMicroelectronics déclare que l'équipement radioélectrique du type "STM32H7S78-DK" est conforme à la directive 2014/53/UE. Le texte complet de la déclaration UE de conformité est disponible à l'adresse internet suivante: *www.st.com*.

Simplified EU compliance statement

Hereby, STMicroelectronics declares that the radio equipment type "STM32H7S78-DK" is in compliance with Directive 2014/53/EU. The full text of the EU declaration of conformity is available at the following internet address: *www.st.com*.

13 UKCA Compliance Statement

Simplified UKCA Compliance Statement

Hereby, the manufacturer STMicroelectronics, declares that the radio equipment type "STM32H7S78-DK" is in compliance with the UK Radio Directive 2017 (UK S.I. 2017 No. 1206). The full text of the UK declaration of conformity is available at the following internet address: *www.st.com*.

Revision history

Table 30. **Document revision history**

Date	Revision	Changes
09-Feb-2024	1	Initial release.

Contents

List of tables

List of figures