Discovery kit with STM32H735IG MCU

Introduction

The STM32H735G-DK Discovery kit is designed as a complete demonstration and development platform for STMicroelectronics Arm® Cortex®-M7 core-based STM32H735IG microcontroller. This microcontroller features five I²C, six SPIs with four multiplexed full-duplex I²S interfaces, five USARTs, five UARTs and one ULP UART, one TT/CAN FD, two CAN FDs, two 16-bit ADCs and one 12-bit ADC, two 12-bit DACs, two SAIs, two Octo-SPI interfaces with OTFDEC crypto, FMC interface, two SDMMC controllers, two analog comparators, one SPDIF-RX, DFSDM (8 channels / 4 filters), one USB OTG HS, one USB OTG FS, Ethernet MAC, DCMI interface, TFT LCD controller interface, and JTAG and SWD for debugging support.

The STM32H735G-DK Discovery kit offers everything required by the user to get started quickly and develop applications easily.

The hardware features on the board help to evaluate the following peripherals: USB OTG FS, 10/100-Mbit Ethernet, microSD™, USART, SAI audio codec stereo with two audio jacks for input/output, ST MEMS digital microphone, 128-Mbit HyperRAM™ memory, 512-Mbit Octo-SPI NOR Flash memory, CAN FD, 20-pin microphone MEMS connector with DFSDM interface, 4.3-inch RGB TFT-LCD display with capacitive touch panel. The ARDUINO® Uno V3 compatible connectors, Pmod™, and STMod+ connectors allow easy connection of extension shields or daughterboards for specific applications.

The integrated STLINK-V3E provides an embedded in-circuit debugger and programmer for the STM32 MCU.

Figure 1. STM32H735G-DK Discovery kit (top view)

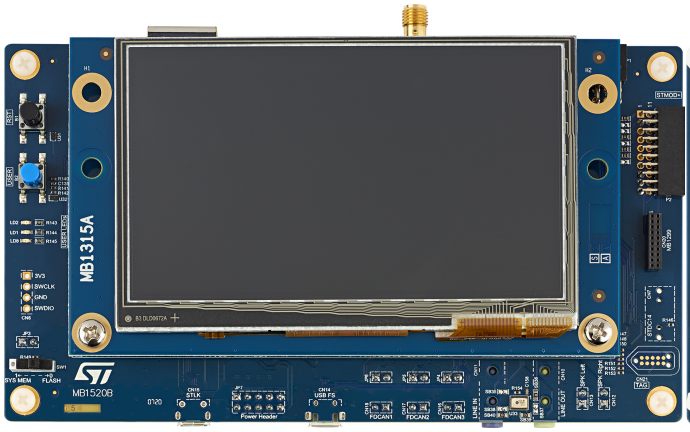
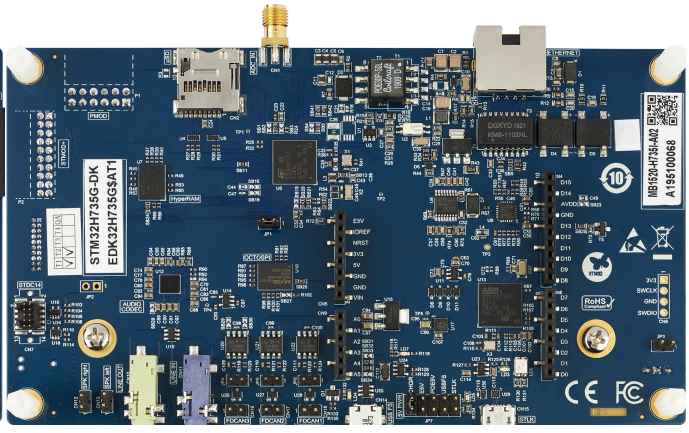


Figure 2. STM32H735G-DK Discovery kit (bottom view)



Pictures are not contractual.

1 Features

- STM32H735IGK6 microcontroller featuring 1 Mbyte of Flash memory and 564 Kbytes of SRAM in UFBGA176+25 package
- 4.3" TFT 480×272 pixels colored LCD module with capacitive touch panel and RGB interface
- Ethernet compliant with IEEE-802.3-2002 and PoE (Power over Ethernet)
- USB OTG FS
- SAI audio codec
- One ST-MEMS digital microphone
- 512-Mbit Octal-SPI NOR Flash memory
- 128-Mbit HyperRAM™
- Two user LEDs
- User and reset push-buttons
- Fan-out daughterboard
- Three CAN FDs
- Board connectors:
  - USB FS Micro-AB
  - USB ST-LINK Micro-B
  - Ethernet RJ45
  - Stereo headset jack including analog microphone input
  - Audio header for external speakers
  - microSD™ card
  - TAG connector 10-pin footprint
  - SMA connector
  - Arm® Cortex® 10-pin 1.27 mm-pitch debug connector over STDC14 footprint
  - ARDUINO® Uno V3 expansion connector
  - STMod+ expansion connector
  - Pmod™ Type-2A and Type-4A expansion connector
  - Audio MEMS daughterboard expansion connector
- Flexible power-supply options:
  - STLINK-V3E USB connector
  - USB OTG FS connector
  - 5 V delivered by RJ45 (Power over Ethernet)
  - 5 V delivered by ARDUINO®
  - USB charger
- On-board STLINK-V3E debugger/programmer with USB re-enumeration capability: mass storage, Virtual COM port, and debug port
- Comprehensive free software libraries and examples available with the STM32CubeH7 MCU Package
- Support of a wide choice of Integrated Development Environments (IDEs) including IAR Embedded Workbench®, MDK-ARM, and STM32CubeIDE

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

2 Ordering information

To order the STM32H735G-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
STM32H735G-DK	• MB1520 • MB1315(1) • MB1280(2)	STM32H735IGK6

1. *LCD board.*
2. *Fan-out board.*

2.1 Codification

The meaning of the codification is explained in Table 2. The order code is mentioned on a sticker placed on the top or bottom side of the board.

Table 2. Codification explanation

STM32TTXXY-DK	Description	Example: STM32H735G-DK
STM32TT	MCU series in STM32 32-bit Arm Cortex MCUs	STM32H7 Series
XX	MCU product line in the series	STM32H725/735
Y	STM32 Flash memory size: • G for 1 Mbyte	1 Mbyte
DK	DK for Discovery kit	Discovery kit

3 Development environment

The STM32H735G-DK Discovery kit runs with the STM32H735IG 32-bit microcontroller based on the Arm® Cortex®-M7 core.

3.1 System requirements

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

Note: macOS® is a trademark of Apple Inc. registered in the U.S. and other countries.
Linux® is a registered trademark of Linus Torvalds.
All other trademarks are the property of their respective owners.

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

5 Delivery recommendations

Before the first use, make sure that no damage occurred to the board during shipment and no socketed components are not firmly fixed in their sockets or loose in the plastic bag.

In particular, pay attention to the following component:

- MB1315 TFT-display daughterboard in the CN19 connector.

For product information related to the STM32H735IGK6 microcontroller, visit the *www.st.com* website.

6 Hardware layout and configuration

The STM32H735G-DK Discovery kit is designed around the STM32H735IGK6 target microcontroller, packaged in TFBGA176+25. The hardware block diagram (Refer to Figure 3) illustrates the connections between the STM32H735IGK6 microcontroller and the peripheral components. Figure 4 and Figure 5 help to locate these features on the STM32H735G-DK Discovery kit. Figure 6 and Figure 7 give the mechanical dimensions of the STM32H735G-DK board.

Figure 3. Hardware block diagram

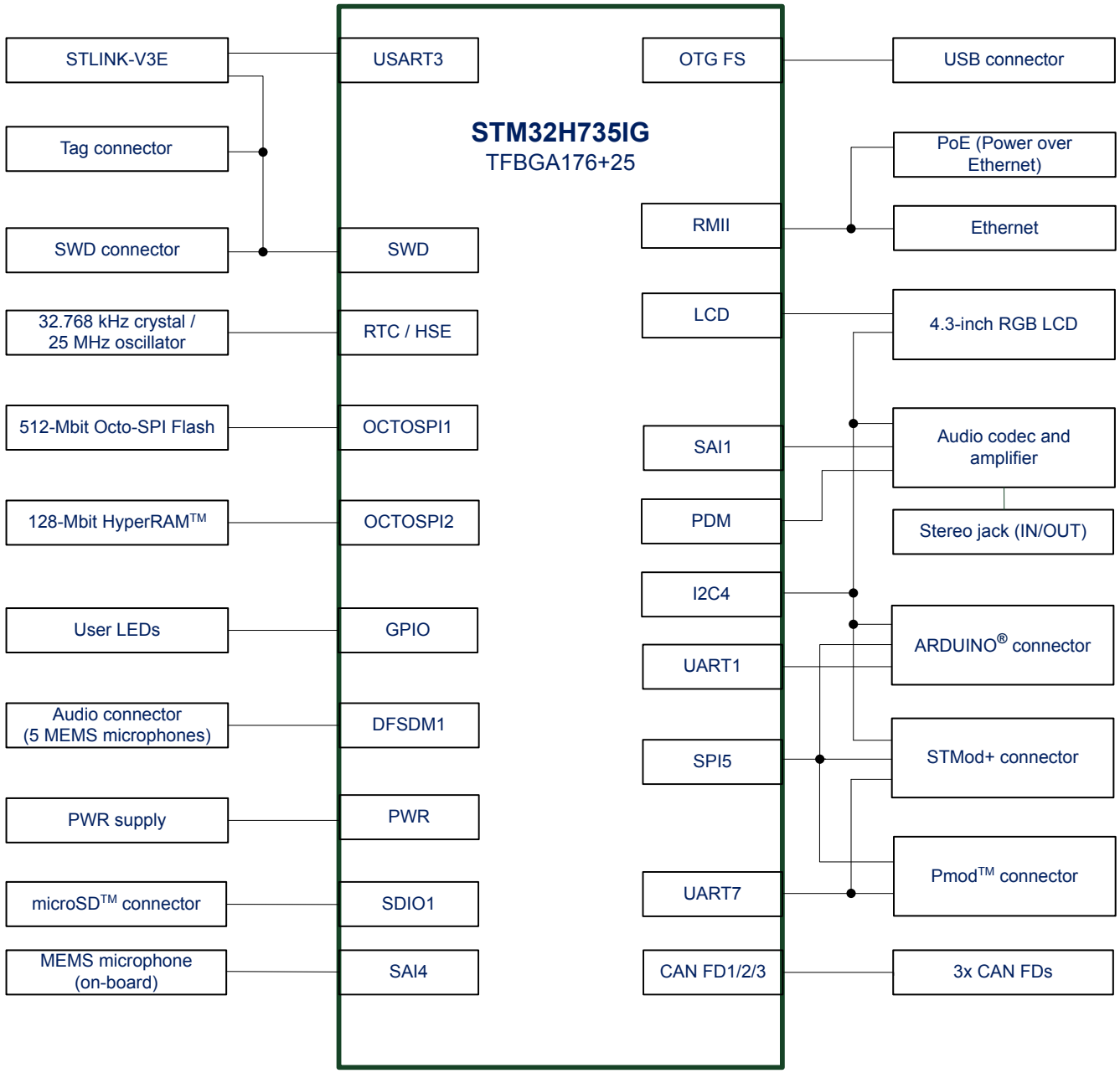


Figure 4. STM32H735G-DK board layout (top view)

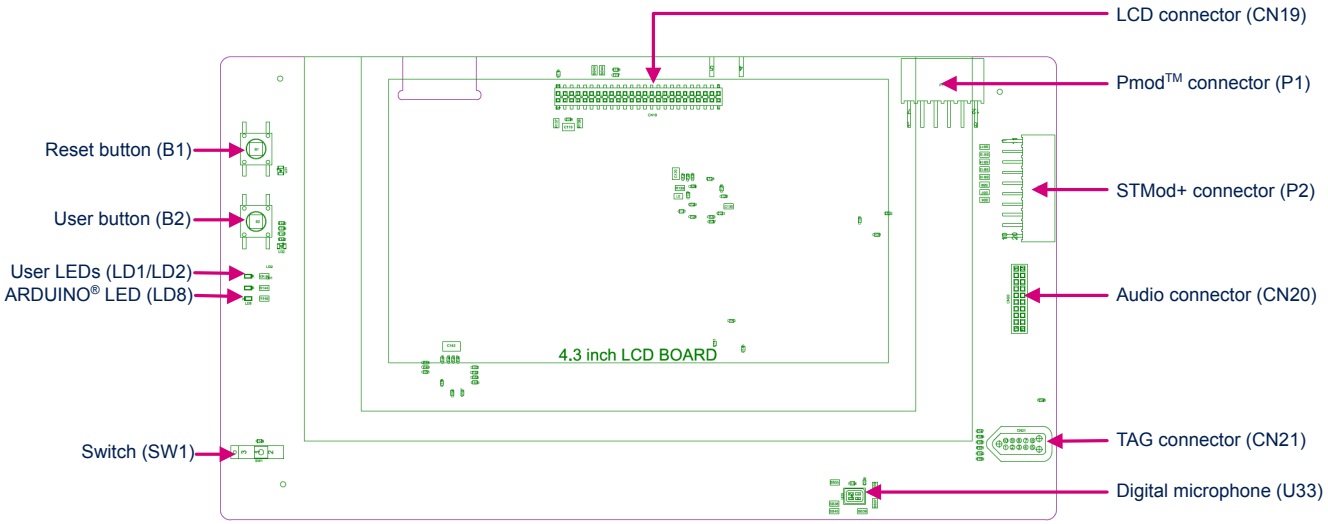


Figure 5. STM32H735G-DK board layout (bottom view)

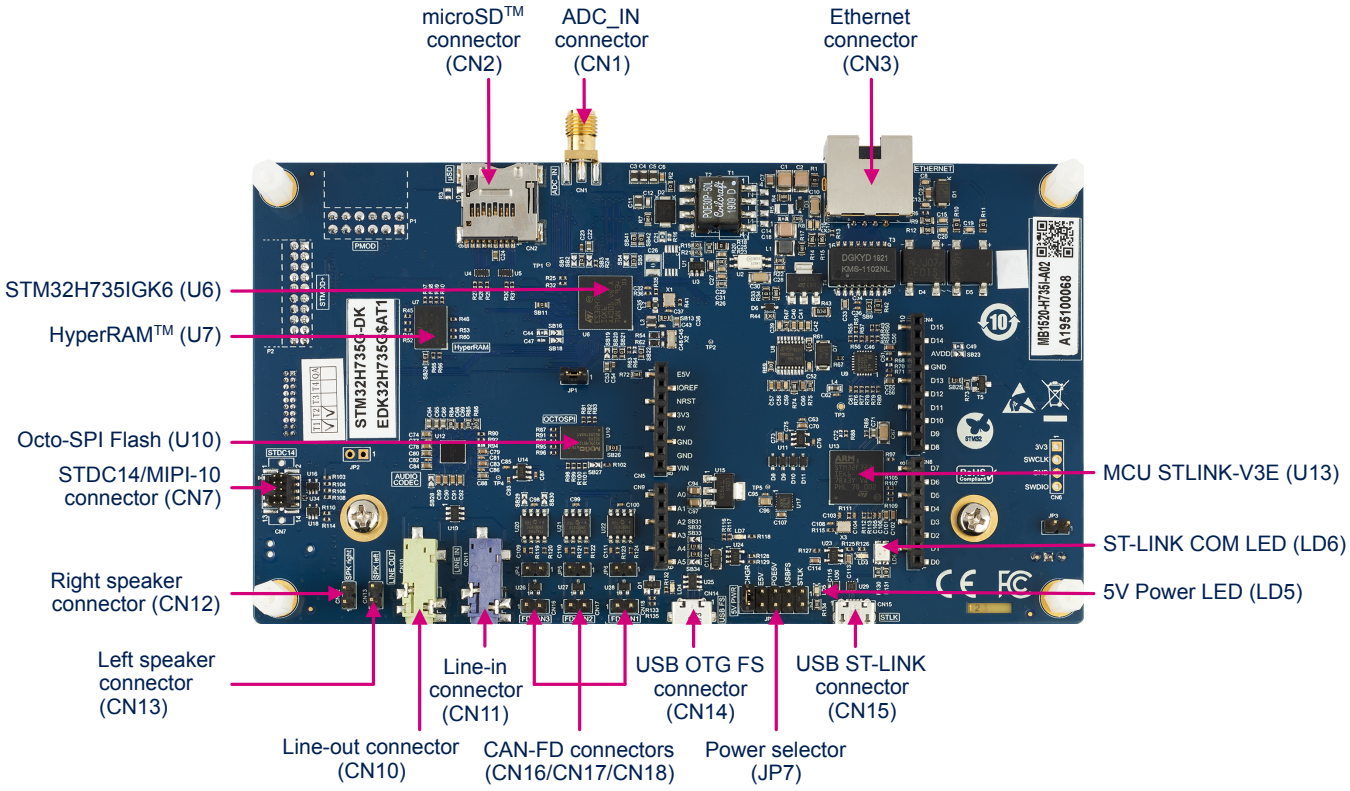


Figure 6. **STM32H735G-DK mechanical dimensions (top view) in millimeters**

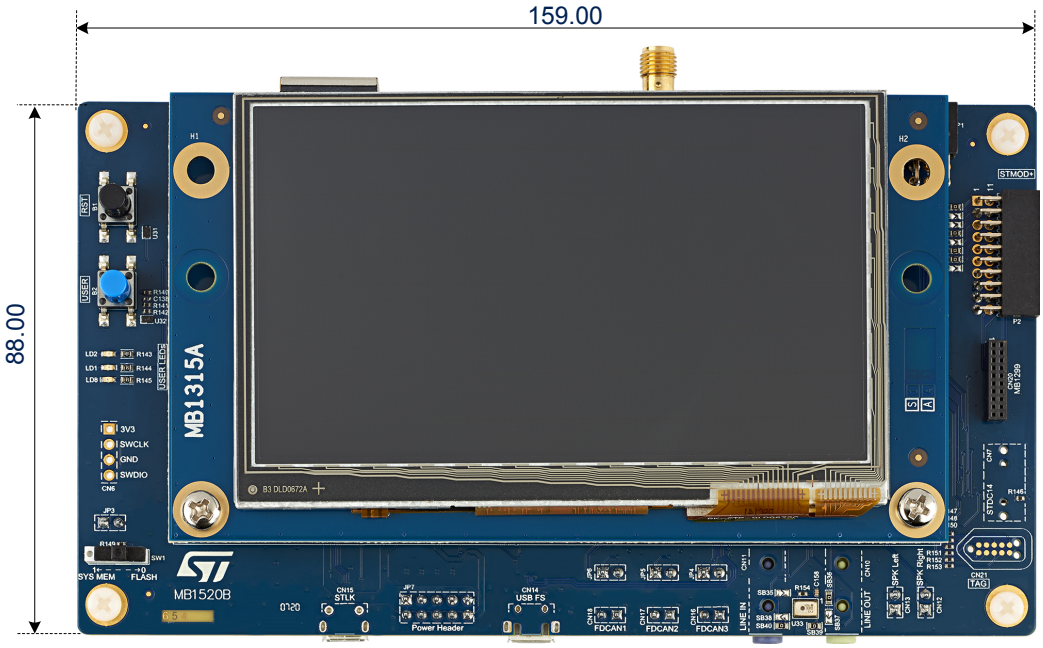
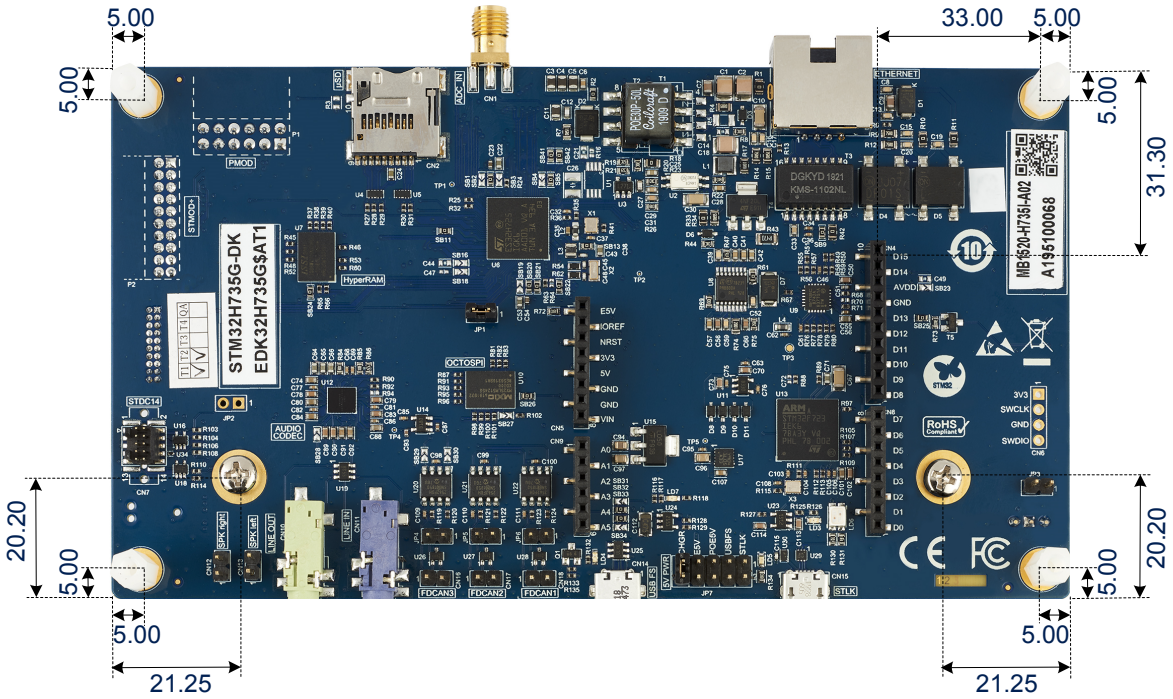


Figure 7. **STM32H735G-DK mechanical dimensions (bottom view) in millimeters**



6.1 Embedded STLINK-V3E

6.1.1 Description

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

- Using the embedded STLINK-V3E
- Using an external debug tool connected to CN7 MIPI-10 connector

The STLINK-V3E programming and debugging tool is integrated into the STM32H735G-DK Discovery kit.

The embedded STLINK-V3E supports only SWD and VCP for STM32 devices. For information about debugging and programming features, refer to the technical note *Overview of ST-LINK derivatives* (TN1235), which describes in detail all the STLINK-V3E features.

Features supported in STLINK-V3E:

- 5 V power supplied by the CN15 USB connector
- USB 2.0 high-speed-compatible interface
- JTAG and serial wire debugging (SWD) specific features:
  - 3 V to 3.6 V application voltage on the JTAG/SWD interface and 5V tolerant inputs
  - JTAG
  - SWD and serial viewer (SWV) communication
- STDC14 (MIPI-10) compatible connector (CN7)
- LD6 status LED (COM) which blinks during communication with the PC
- LD3 fault red LED (OC) alerting on USB overcurrent request
- 5 V / 500 mA output power supply capability (U23) with current limitation and LED
- LD5 5 V power green LED (5V)

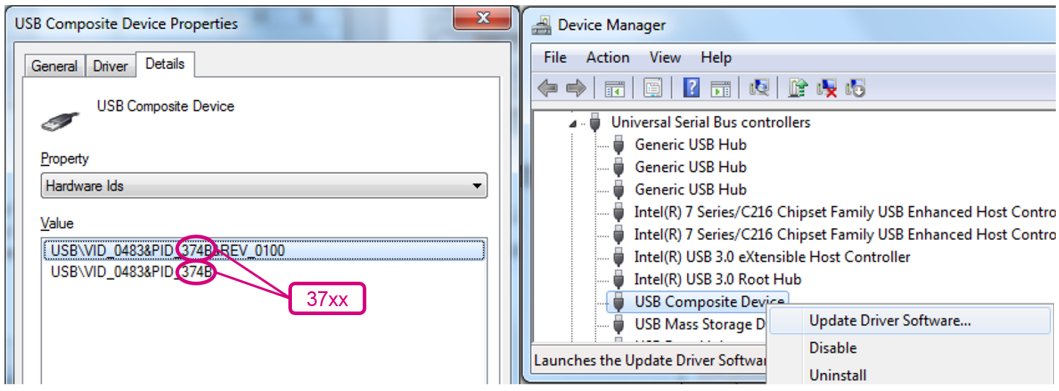
6.1.2 Drivers

Before connecting the STM32H735G-DK board to a Windows® PC via USB, the user must install a driver for the STLINK-V3E (not required for Windows 10®). It is available on the *www.st.com* website.

In case the STM32H735G-DK board is connected to the PC before the driver is installed, some STM32H735G-DK interfaces may be declared as “Unknown” in the PC device manager. In this case, the user must install the dedicated driver files, and update the driver of the connected device from the device manager as shown in Figure 8.

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

Figure 8. USB composite device



Note: 37xx:

- *374E for STLINK-V3E without bridges functions*
- *374F for STLINK-V3E with bridges functions*

6.1.3 STLINK-V3E firmware upgrade

The STLINK-V3E embeds a firmware upgrade mechanism for in-situ upgrades through the USB port. As the firmware may evolve during the lifetime of the STLINK-V3E product (for example new functionalities, bug fixes, support for new microcontroller families), it is recommended to visit the *www.st.com* website before starting to use the STM32H735G-DK Discovery kit and periodically, to stay up-to-date with the latest firmware version.

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

There are 2 basic ways to support an external debug tool:

1. Keep the embedded STLINK-V3E running. Power on the STLINK-V3E at first until the COM LED lights RED. Then connect the external debug tool through CN7 MIPI-10 debug connector.
2. Set the embedded STLINK-V3E in a high-impedance state. When setting the jumper JP3 (STLK_RST) ON, the embedded STLINK-V3E is in RESET state and all GPIOs are in high impedance. Then the user can connect his external debug tool to the CN7 debug connector.

Figure 9. Connecting an external debug tool to program the on-board STM32

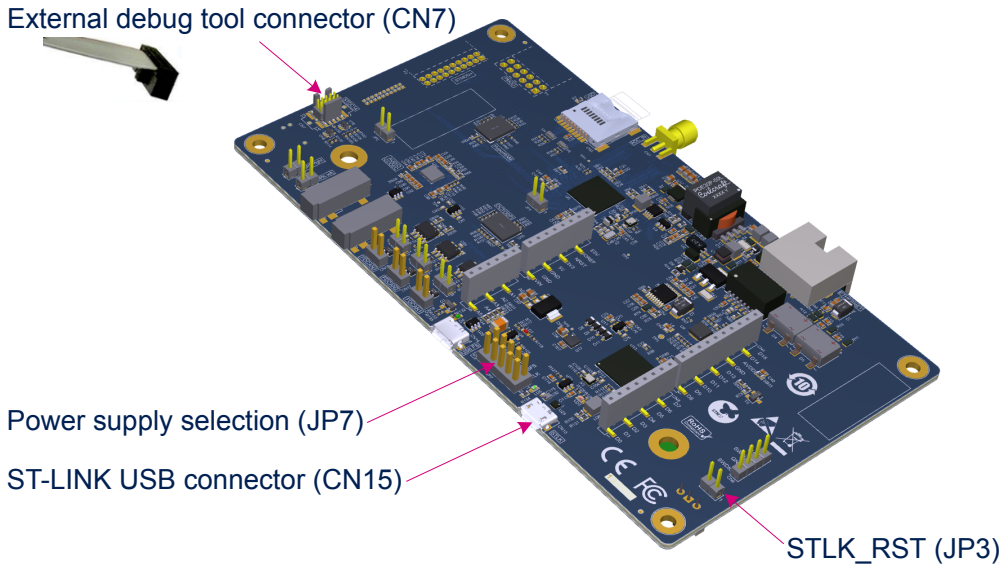


Table 4 describes the CN7 MIPI-10 debug connector pinout.

Table 4. CN7 MIPI-10 debug connector pinout

MIPI-10 pin	STDC14 pin	CN7	Designation
-	1	NC	Reserved
-	2	NC	Reserved
1	3	T_VCC	Target VCC
2	4	T_SWDIO	Target SWDIO using SWD protocol or Target JTMS (T_JTMS) using JTAG protocol
3	5	GND	Ground
4	6	T_SWCLK	Target SWCLK using SWD protocol or Target JCLK (T_JCLK) using JTAG protocol
5	7	GND	Ground
6	8	T_SWO	Target SWO using SWD protocol or Target JTDO (T_JTMS) using JTAG protocol

MIPI-10 pin	STDC14 pin	CN7	Designation
7	9	T_JRCLK	Not used by SWD protocol, Target JRCLK (T_JRCLK) using JTAG protocol, only for specific use
8	10	T_JTDI	Not used by SWD protocol, Target JTDI (T_JTDI) using JTAG protocol, only for external tools
9	11	GNDDetect	GND detect for plug indicator, used on SWD and JTAG neither
10	12	T_NRST	Target NRST using SWD protocol or Target JTMS (T_JTMS) using JTAG protocol
-	13	T_VCP_RX	Target RX used for VCP (must be UART dedicated to Bootloader)
-	14	T_VCP_TX	Target TX used for VCP (must be UART dedicated to Bootloader)

6.2 Power supply

The STM32H735G-DK Discovery kit is designed to be powered by a 5 V DC power source. One of the following five inputs can be used, upon appropriate board configuration:

1. Micro-B USB receptacle CN15 of STLINK-V3E without enumeration: up to 500 mA can be supplied to the board (JP7 jumper setting on ‘CHGR’ position on the silkscreen)
2. Micro-B USB receptacle CN15 of STLINK-V3E with enumeration feature (see Supplying the board through the STLINK-V3E USB port), up to 500 mA can be supplied to the board (JP7 jumper setting ’STLK’ position on the silkscreen)
3. An external 7 to 12V power supply from CN5 pin 8: name VIN on the silkscreen, extension connectors for ARDUINO® Uno shields or daughterboard (JP7 jumper setting on ‘E5V’ on the silkscreen).
4. 48V DC power from RJ45 connector CN3 (Ethernet): In this case, the on-board module POE (Power Over Ethernet) generates the 5 V supply voltage with up to 600 mA. This module is a powered device complying with IEEE 802.3af, class ½ standard. The external power supply must be fully IEEE 802.3af compliant (JP7 jumper setting on ‘POE5V’ on the silkscreen).
5. Micro-AB USB receptacle CN14 of the USB_OTG_FS interface: marked USB OTG FS on the board. (JP7 jumper setting on ‘USBFS’ on the silkscreen).

The LD5 green LED turns ON when the voltage on the power line marked 5V is present. All supply lines required for the operation of the STM32H735G-DK components are derived from this 5V line.

Note: The Discovery board must be powered by a power supply unit or by auxiliary equipment complying with the standard EN-60950-1: 2006+A11/2009, and must be Safety Extra Low Voltage (SELV) with limited power capability.

6.2.1 Supplying the board through the STLINK-V3E USB port: 5 V/500 mA

To power the STM32H735G-DK in this way, the USB host (a PC) gets connected to the Micro-B USB receptacle of the board via a USB cable. The connection event starts with the USB enumeration procedure. In its initial phase, the current supply capability of the USB port is limited to 100 mA. This is sufficient since only the STLINK-V3E part of the STM32H735G-DK draws power at that time: The U23 STMPS2151 power switch is set to the OFF position, which isolates the rest of the board from the power source.

In the next phase of the enumeration procedure, the host PC informs the STLINK-V3E that it can supply current up to 300 mA. If the answer is positive, the STLINK-V3E sets the U23 STMPS2151 switch to the ON position to supply power to the rest of the board. Otherwise, CN5 pin8 (VIN) can be used to supply the board instead. If a short circuit occurs on the board, the STMPS2151 power switch protects the USB port of the host PC against a current demand exceeding 500 mA. In such an event, the LD3 LED lights up.

The STM32H735G-DK board can also be supplied from a USB power source that does not support enumeration, such as a USB charger. In this case, the STLINK-V3E bypasses STMPS2151 power regardless of the enumeration procedure result and passes the power unconditionally to the board. The LD5 green LED turns ON whenever the whole board is powered.

6.2.2 Supplying the board from VIN: 7 V to 12 V/800 mA

The STM32H735G-DK board may require a supply current higher than 500 mA. In such a case, the board can be supplied through pin8 (marked ‘VIN’ on the board) of the CN5 ARDUINO® connector.

Note that using STLINK-V3E for debugging when powering the board with an external power supply, it is important to power the board before connecting the host PC to CN15. This requires the following sequence to be respected:

1. Set the jumper JP7 “E5V” [7-8].
2. Connect the external power source to pin 8 of CN5.
3. Check that the green LED LD5 is turned ON.
4. Connect the host PC to the CN15 USB connector.

If this order is not respected, the board may be powered by V_{BUS} first from STLINK-V3E, and the following risks may be encountered:

1. If more than 500 mA current is needed by the board, the PC may be damaged or the current can be limited by the PC. As a consequence, the board is not powered correctly.
2. 500 mA is requested at the enumeration step, so there is a risk that the request is rejected and enumeration does not succeed if the PC cannot provide such current.

Table 5. External power sources: VIN from 7 to 12V

Input power name	Connector pins	Voltage range	Max current	Limitation
VIN	CN5 pin 8	From 7 V to 12 V	800 mA	From 7 to 12 V only and input current capability is linked to input voltage: • 800 mA input current when VIN = 7 V • 450 mA input current when 7 V < VIN < 9 V • 250 mA input current when 9 V < VIN < 12 V

6.2.3 Supplying the board with an external USB charger: 5 V

When the STM32H735G-DK board is powered by an external USB charger through CN15, refer to Table 6, the jumper must be placed on pin 9-10 of JP7 (“CHGR” on the silkscreen). Note that in this power supply mode, the debug features are not available.

Table 6. External power source: 5V_USB_CHGR

Input power name	Connector pins	Voltage range	Max current
5V_USB_CHGR	CN15	5 V	-

6.2.4 MCU power supply - SMPS or LDO configurations

There are three possible solutions to provide power to the MCU V_{CORE} logic supply: SMPS, LDO, and SMPS with 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 or SMPS with LDO configurations. The hardware modifications are listed below:

- **SMPS mode (default):**
  - SB2, SB13, SB20, SB21, and L3: ON
  - SB1, SB3, SB16, SB18, and SB19: OFF
- **LDO mode:**
  - SB1, SB3, and SB19: ON
  - SB2, SB16, SB18, SB20, SB21, and L3: OFF
- **SMPS with LDO mode:**
  - SB3, SB13, SB19, SB21, and L3: ON
  - SB1, SB2, SB16, SB1, and SB20: OFF

Caution:

If the board SMPS/LDO firmware PWR configuration does not match its hardware configuration, a deadlock occurs. After the reset, the ST-LINK cannot connect to the target anymore.

The firmware PWR configuration must be set as follows in function SystemClock_Config in file main.c:

- If the hardware configuration is Direct SMPS (Default configuration):

```
HAL_PWREx_ConfigSupply(PWR_DIRECT_SMPS_SUPPLY);
```

- If the hardware configuration is LDO:

```
HAL_PWREx_ConfigSupply(PWR_LDO_SUPPLY);
```

If a deadlock occurs because of a mismatch between hardware and firmware PWR settings (SMPS/LDO), the user can recover the board by applying the following procedure:

1. Power off the board.
2. Set SW1 (BOOT0) to 1 (system memory). This changes the BOOT0 pin to 1 instead of 0, thus changing the device boot address to boot address 1 and making the bootloader start in System memory. This avoids starting firmware in the user Flash with a wrong SMPS/LDO configuration versus the hardware board configuration.
3. Power on the board and connect using STM32CubeProgrammer (STM32CubeProg).
4. Erase the user Flash.
5. Power off the board and set SW1 to 0.
6. The board is recovered and can be used normally with matching firmware PWR.

Table 7. Internal SMPS, LDO, and board configuration

(1)	Config1 LDO ON (SMPS OFF)	Config2 SMPS ON (LDO OFF) (Default config)	Config3 *(SMPS and LDO cascaded)* SMPS ON LDO ON
SB1	ON	**OFF**	OFF
SB2	OFF	**ON**	OFF
SB3	ON	**OFF**	ON
SB13	ON	**ON**	ON
SB16	OFF	**OFF**	OFF
SB18	OFF	**OFF**	OFF
SB19	ON	**OFF**	ON
SB20	OFF	**ON**	OFF
SB21	OFF	**ON**	ON
L3	OFF	**ON**	ON

1. *The default setting is in bold.*

6.3 MCU current-consumption measurement

The JP1 jumper allows the current consumption of STM32H735IGK6 to be measured directly by removing the jumper and replacing it with an external ammeter. If there is no ammeter, STM32H735IGK6 is not powered.

6.4 Clock source

Three clock sources are available on the STM32H735G-DK board, as described below:

- X1 25 MHz oscillator for the STM32H735IGK6 HSE system clock and Ethernet PHY
- X2 32.768 kHz crystal for the STM32H735IGK6 embedded RTC
- X3 25 MHz oscillator for the STLINK-V3E

6.5 Reset sources

The general reset of the STM32H735G-DK board is active LOW. The reset sources include:

- B1 Reset button
- Embedded STLINK-V3E
- ARDUINO® Uno shield board through CN5 connector (pin 3)
- STDC14 receiver
- TAG connector

The general reset is connected to the following Peripheral reset function:

- Octo-SPI Flash memory reset
- LCD reset (Option not connected by default)
- HyperRAM™ memory
- Ethernet

7 Board functions

7.1 TFT color LCD 480x272 pixels

The STM32H735G-DK board includes a 4.3-inch 480x272 LCD-TFT board (MB1315), which is connected to the RGB interface of the STM32H735IGK6 through a 50-pin connector (CN19). The MB1315 LCD board uses the RK043FN48H-CT672B TFT-LCD from Rocktech with the driving system, white LED backlight, and capacitive touch panel.

The touchscreen controller interfaces with the STM32H735IGK6 via the bidirectional I2C4 bus, since the TFT LCD reset is controlled by PH6 GPIO (LCD_RST signal) in the default configuration where SB43 is ON and SB44 is OFF. The possibility to control the LCD reset by the NRST general reset is also available on the STM32H735G-DK board. In this case, SB44 must be ON and SB43 OFF.

7.2 USB OTG FS

The STM32H735G-DK board supports USB OTG full-speed communications via the CN14 USB Micro-AB connector. The USB connector can power the STM32H735G-DK board with a 5V DC supply voltage, at a current up to 500 mA. A USB power switch is also connected to V_{BUS} and provides power to CN14. The green LED LD4 is lit when one of the following events occurs:

- The power switch is ON and STM32H735G-DK operates as a USB host.
- V_{BUS} is powered by another USB host when the STM32H735G-DK board works as a USB device.

The red LED LD7 is lit when an overcurrent occurs (Current higher than 500 mA).

Note: The STM32H735G-DK board must be powered by an external power supply when using the OTG function.

7.3 Ethernet

The STM32H735G-DK board supports 10/100-Mbit Ethernet communication with a MICROCHIP LAN8742A-CZ-TR PHY and integrates an RJ45 connector CN3. The Ethernet PHY is connected to the STM32H735IGK6 microcontroller via an RMII interface.

The PHY 25 MHz clock is generated from the X1 oscillator, while the PHY RMII_REF_CLK generates the 50 MHz clock for the STM32H735IGK6.

7.4 Power over Ethernet

The STM32H735G-DK board integrates a power module that uses Ethernet. This module is an IEEE802.3af compliant, class 1 / 2 PoE converter based on the simple diode rectified Flyback topology around the PM88800A component from ST. This module “Powered Device” accepts an input voltage of 48 V and can provide 5 V with 600 mA.

7.5 microSD™ card

A slot (CN2) for microSD™ card (SD 2.0 compliant) is available on the STM32H735G-DK board and is connected to the SDOI1 interface of the STM32H735IGK6. The microSD™ card detection is managed by the uSD_Detect signal (PF5). When a microSD™ card is inserted in the slot, the uSD_Detect signal level is LOW, otherwise, it is HIGH.

7.6 Audio

An audio codec WM8994ECS/R from CIRRUS with four DACs and two ADCs is connected to the STM32H735IGK6 SAI1 interface.

It communicates with the STM32H735IGK6 microcontrollers via an I²C-bus shared with the touch panel of the RGB LCD and the STMod+ connector. The I²C-bus address of the coded WM8994ECS/R is `0011010`.

Several audio connections are available on the STM32H735G-DK board:

- The analog input line is connected to the WM8994ECS/R ADC through the blue audio jack (CN11).
- The analog output line is connected to the WM8994ECS/R DAC via the green audio jack (CN10).
- Two external speakers can be connected to the WM8994ECS/R via CN13 for the left speaker and CN12 for the right speaker. The STM32H735G-DK board features one digital MP34DT05-A microphone (ST-MEMS microphone). It is connected to the input digital microphone of the STM32H735IGK6and is managed by the PDM functionality.

Limitation:

On the STM32H735G-DK board, SAI1 signals are sharing the same I/Os with SPI5 and UART7 signals. As a consequence, when using the SAI1 interface for the audio codec, the user must make sure that there is nothing connected on STMod+ (1,2,3,4 pins), Pmod™ (1,2,3,4 pins) and ARDUINO® (D10, D11, D12, D13 pins) connectors.

DIGITAL microphone

The U33 on the STM32H735G-DK board is STMicroelectronics MP34DT05-A MEMS digital omnidirectional microphone providing PDM (pulse density modulation) output. The microphone is supplied with a programmable clock generated directly by the STM32H735IGK6 (SAI4_CK2 signal) or the audio codec (DMICCLK signal).

As an option, the microphone can be connected to U12 (Wolfson WM8994 audio codec device). In that configuration, WM8994 also supplies the PDM clock to the microphone. Regardless of the microphone routing (STM32H735IGK6 or WM8994 codec), the power can be supplied either by the 3V3 or the MICBIAS1 output of the WM8994 codec device.

Table 8 shows the settings of all solder bridges associated with the digital microphone on the board.

Table 8. Digital microphone – Solder bridge configuration

Solder bridge	Setting(1)	Configuration
SB40, SB39 SB38, SB28	SB40, SB39 OFF SB38, SB28 ON	The PDM clock for the digital microphone is provided by the WM8994 codec.
	SB40, SB39 ON **SB38, SB28 OFF**	**The PDM clock for the digital microphone is provided by the STM32H735IGK6 MCU**
SB36, SB37	SB36 OFF SB37 ON	The power supply of the digital microphone is generated by the WM8994 codec (MICBIAS1).
	SB36 ON **SB37 OFF**	**The power supply of the digital microphone is 3V3**

1. *The default setting is in bold.*

7.7 CAN FD

The STM32H735G-DK board supports three channels of CAN-FD-compliant (Flexible data-rate CAN) bus based on the 3V3 CAN transceiver.

Limitation:

On the STM32H735G-DK board, the CAN-FD3 signals are sharing with SPI5 and UART7 signals. As a consequence, when using the CAN-FD3 interface, the user must make sure that there is nothing connected on STMod++ (1,2,3,4 pins), Pmod™ (1,2,3,4 pins), and ARDUINO® (D10, D11, D12, D13 pins) connectors.

Table 9. CAN-FD3 - Solder bridge configuration

Solder bridge	Setting(1)	Configuration
SB29, SB30	SB29, SB30 ON	MCD2562FD TXD and RXD are connected to PF7 (FDCAN3_TX) and PF6 (FDCAN3_RX) of STM32H735IGK6 MCU.
	SB29, SB30 OFF	**(CAN-FD3 bus not connected)** **TXD and RXD of MCD2562FD are disconnected to PF7 (FDCAN3_TX) and PF6 (FDCAN3_RX) of STM32H735IGK6 MCU.**

1. *The default setting is in bold.*

7.8 Octo-SPI NOR Flash memory

The STM32H735G-DK board includes a 512-Mbit Octo-SPI NOR Flash memory device (MX25LM51245GXDI00 from MACRONIX), which is connected to the OCTOSPI1 interface of the STM32H735IGK6 microcontroller.

MX25LM51245GXDI00 operates in a single transfer rate (STR) or double transfer rate (DTR) mode.

The RESETn of the Flash memory is connected to the general reset (NRST) of the STM32H735G-DK board.

7.9 HyperRAM™ memory

The STM32H735G-DK board adds an external 128-Mbit HyperRAM™ (S70KL1281DABHI023 from Cypress®) that is connected to the STM32H735IGK6 via the OCTOSPI2 interface.

As alternative solutions to S70KL1281DABHI023, other memories can be used such as APS12808L-3OBM from AP Memory or IS66WVH16M8DBLL-100B1LI from ISSI.

7.10 Virtual COM port

The serial interface USART3 (PD8/PD9) that supports the bootloader is directly available as a Virtual COM port of the PC connected to the CN15 STLINK-V3E USB connector. The VCP configuration is the following:

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

7.11 TAG

One TAG interface footprint (CN21) is reserved on the STM32H735G-DK board, which can be used for the board debugging and programming.

7.12 Buttons and LEDs

The black button (B1) located on the top side is the reset of the STM32H735IGK6 microcontroller.

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

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

Two LEDs located on the top side, the red LD2 and the green LD1 (refer to Figure 4), are available for the user. To light a LED, a low-logic state HIGH must be written in the corresponding GPIO register. Table 10 shows the assignment of the control ports to the LED indicators.

Table 10. Button and LED control port

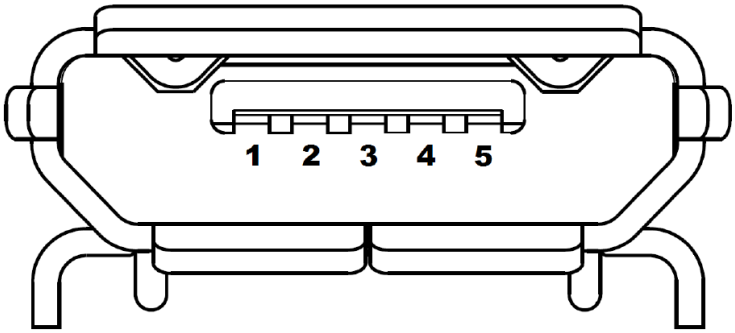
Reference	Color	Name	Comment
B1	BLACK	RESET	-
B2	BLUE	USER	Wake-up alternate function
LD7	RED	USB_FS_OVCR	PG13
LD6	BICOLOR (RED/GREEN)	STLINK-V3E COM	Green when communication ongoing
LD3	RED	STLINK-V3E Over Current	-
LD4	GREEN	VBUS USB FS	PA9
LD5	GREEN	POWER	5V power supply available
LD2	RED	USER2	PC2
LD1	GREEN	USER1	PC3
LD8	GREEN	ARDUINO	PF7

8 Board connectors

8.1 CN15 STLINK-V3E USB Micro-B connector

The CN15 USB connector is used to connect the embedded STLINK-V3E to the PC for programming and debugging purposes.

Figure 10. CN15 Micro-B connector (Front view)



The related pinout for the USB ST-LINK connector is listed in Table 11.

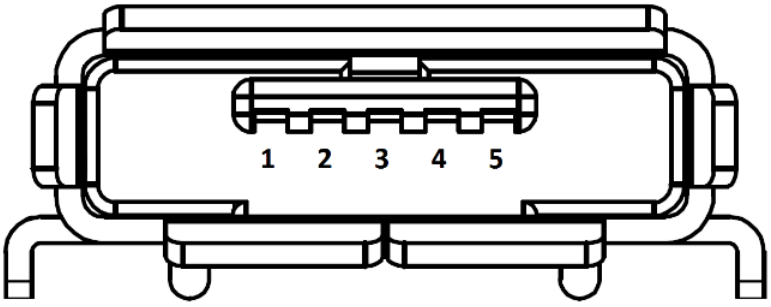
Table 11. CN15 USB Micro-B connector pinout

Connector	Pin number	Pin name	Signal name	ST-LINK MCU pin	Function
CN15	1	VBUS	5V_USB_CHARGER	-	5 V power
	2	DM	USB_DEV_HS_CN_N	PB14	USB differential pair M
	3	DP	USB_DEV_HS_CN_P	PB15	USB differential pair P
	4	ID	-	-	-
	5	GND	-	-	GND

8.2 CN14 USB OTG FS Micro-AB connector

A USB OTG full-speed communication link is available at the CN14 USB Micro-AB receptacle connector. Micro-AB receptacle enables USB Host and USB Device features.

Figure 11. CN14 USB OTG FS Micro-AB connector (Front view)



The related pinout for the USB OTG FS connector is listed in Table 12.

Table 12. CN14 USB OTG FS Micro-AB connector pinout

Connector	Pin number	Pin name	Signal name	Function
CN14	1	VBUS	USB_FS_VBUS (PA9)	5 V power
	2	DM	USB_FS_DM (PA11)	Data-
	3	DP	USB_FS_DP (PA12)	Data+
	4	ID	USB_FS_ID (PA10)	ID
	5	GND	-	GND

8.3 CN2 microSD™ card connector

microSD™ cards with 4 Gbytes or more capacity can be inserted in the receptacle CN2. Four data bits of the SDIO1 interface, CLK and CMD signals of the STM32H735IGK6 are used to communicate with the microSD™ card. The card insertion is detected by the µSD_Detect signal. When a microSD™ card is inserted, the µSD_Detect level is LOW, otherwise, it is HIGH.

Figure 12. CN2 microSD™ card connector

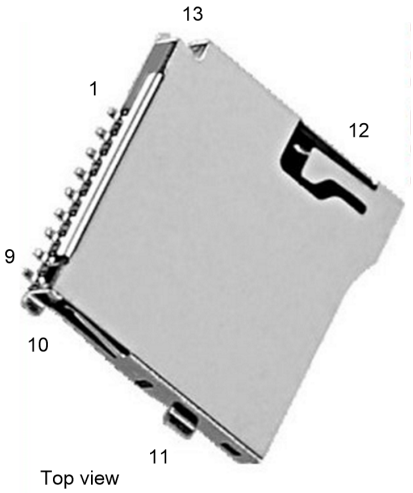


Table 13. CN2 microSD™ connector pinout

Pin number	Description	MCU port	Pin number	Description	MCU port
1	SDIO1_D2	PC10	6-9	GND	-
2	SDIO1_D3	PC11	7	SDIO1_D0	PC8
3	SDIO1_CMD	PD2	8	SDIO1_D1	PC9
4	VDD (3V3)	-	10	µSD_Detect	PF5
5	SDIO1_CK	PC12	11-12-13-14	GND (casing)	-

8.4 P2 STMod+ connector

The standard 20-pin STMod+ connector is available on the STM32H735G-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 to be controlled by the UART7 or SPI5 serial interface of the STM32H735IGK6 MCU.

Table 14. P2 STMod+ connector pinout

Solder bridge	Setting[1]	Description
SB6, SB10, SB14, and SB15	**ON**	**UART7 connected to STMod+**
SB7, SB8, SB12, and SB17	**OFF**	**SPI5 disconnected to STMod+**
SB6, SB10, SB14, and SB15	OFF	UART7 disconnected to STMod+STMod+
SB7, SB8, SB12, and SB17	ON	SPI5 connected to STMod+

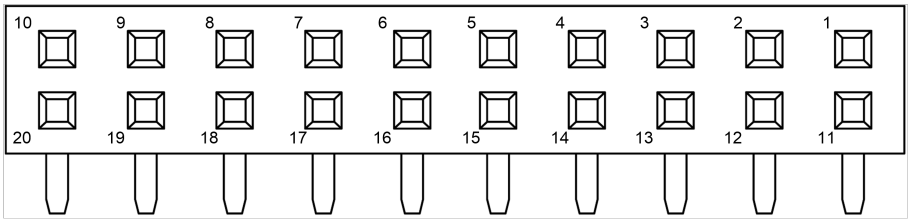
1. *The default configuration is in bold.*

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).

Figure 13. P2 STMod+ connector



Front view

Table 15. P2 STMod+ connector pinout

Pin number	Description	Pin number	Description
1	SPI5_NSS / USART7_CTS (PF6/PF9)	11	INT (PH12)
2	SPI5_MOSI / USART7_TX (PF9/PF7)	12	RESET (PH1)
3	SPI5_MISO / USART7_RX (PF8/PF6)	13	ADC (PA5)
4	SPI5_SCK / USART7_RTS (PF7/PF8)	14	PWM (PD14)
5	GND	15	+5V
6	+5V	16	GND
7	I2C4_SCL (PF14)	17	DFSDM1-DATIN2 (PE7)
8	SPI5_MOSIs (PF11)	18	DFSDM1-CKOUT (PE9)
9	SPI5_MISOs (PH7)	19	DFSDM1-DATIN4 (PE10)
10	I2C4_SDA (PF15)	20	DFSDM1-DATIN6 (PF13)

Limitations:

On the STM32H735G-DK board, SPI5 and UART7 signals are sharing the same IOs with SAI1. As a consequence, when using SPI5 or UART7 signals to control a device connected to STMod+, the audio codec cannot be used. Same, the user must make sure that nothing is connected on Pmod™ (1,2,3,4 pins) and ARDUINO® (D10, D11, D12, D13 pins) connectors.

8.5 P1 Pmod™ connector

The standard 12-pin Pmod™ connector is available on the STM32H735G-DK Discovery board to support low frequency, low I/O pin count peripheral modules. The Pmod™ interface which is implemented on STM32H735IGK6 Discovery board is compatible with the Pmod™ type 2A and 4A I/O signal assignment convention.

Figure 14. P1 Pmod™ connector

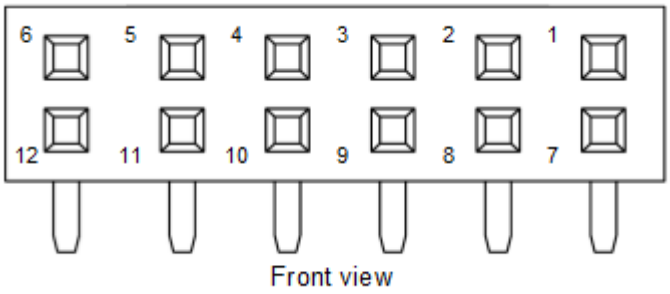


Table 16. P1 Pmod™ connector pinout

Pin number	Description	Pin number	Description
1	SPI5_NSS / USART7_CTS (PF6/PF9)	7	INT (PH12)
2	SPI5_MOSI / USART7_TX (PF9/PF7)	8	RESET (PH1)
3	SPI5_MISO / USART7_RX (PF8/PF6)	9	NA
4	SPI5_SCK / USART7_RTS (PF7/PF8)	10	NA
5	GND	11	GND
6	3V3	12	3V3

Limitations:

On the STM32H735G-DK board, SPI5 and UART7 signals are sharing the same IOs with SAI1. As a consequence, when using SPI5 or UART7 signals to control a device connected to Pmod™, the audio codec cannot be used. Same, the user must make sure that nothing is connected on STMod+ (1,2,3,4 pins) and ARDUINO® (D10, D11, D12, D13 pins) connectors.

8.6 CN21 TAG connector

The CN21 TAG connector footprint is used to connect the STM32H735IGK6 microcontroller for programming or debugging the board.

Figure 15. CN21 TAG connector

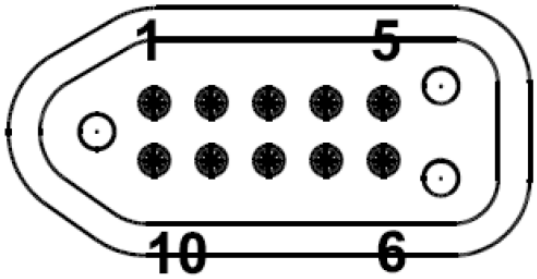


Table 17. CN21 TAG connector pinout

Pin number	Description	Pin number	Description
1	VDD (3V3)	10	NRST (PH3)
2	SWDIO / JTMS (PA13)	9	NJTRST (PB4)
3	GND	8	JTDI (PA15)
4	SWCLK / JTCK (PA14)	7	NC
5	GND	6	SWO / JTDO (PB3)

8.7 CN20 audio connector

The 2x10-male-pin 1.27 mm-pitch audio connector, 20021311-00020T4LF from AMPHENOL FCI, is used for audio MEMS expansion daughterboard using the DFSDM interface. The reference to be used is the MB1299 MEMS microphones daughterboard. The MB1299 embeds five digital MEMS microphones MP34DT01TR-M from STMicroelectronics.

Figure 16. CN20 audio connector

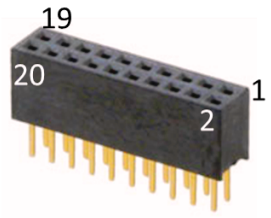


Table 18. CN20 audio connector pinout

Pin number	Function / MCU port	Pin number	Function / MCU port
1	GND	2	3V3
3	DFSDM1_CKOUT (PE9)	4	DFSDM1_CKOUT (PE9)
5	DFSDM1_DATIN4 (PE10)	6	DFSDM1_DATIN2 (PE7)
7	DFSDM_DATIN6 (PF13)	8	NC
9	NC	10	DETECTn (PD1)
11	NC	12	MEMS_LED (PG8)

Pin number	Function / MCU port	Pin number	Function / MCU port
13	NC	14	NC
15	NC	16	NC
17	NC	18	NC
19	3V3	20	GND

Limitations:

On the STM32H735G-DK board, DFSDM1 signals are sharing the same IOs with some IOS used in STMod+. As a consequence, when using DFSDM1 signals to control an extension audio module connected to the CN20 audio connector, the user must make sure that nothing is connected on STMod+ (1,2,3,4 pins) connector.

8.8 CN19 TFT LCD connector

The CN19 connector is designed to connect the 4.3-inch TFT LCD touchscreen board. Table 19 shows the assignment of CN19 and STM32H735IGK6 terminals.

Figure 17. CN19 TFT LCD connector

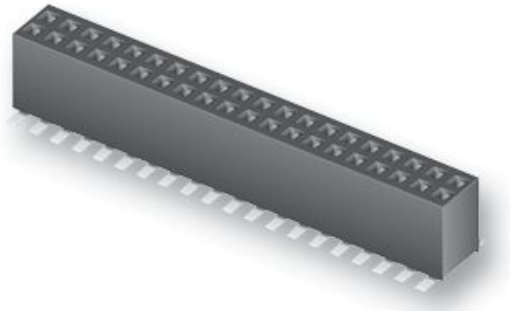


Table 19. CN19 TFT LCD connector

MCU port	Signal name	CN19 pin number		Signal name	MCU port
-	GND	1	2	GND	-
PE0	LCD_R0	3	4	LCD_G0	PB1
PH3	LCD_R1	5	6	LCD_G1	PB0
PH8	LCD_R2	7	8	LCD_G2	PA6
PH9	LCD_R3	9	10	LCD_G3	PE11
PH10	LCD_R4	11	12	LCD_G4	PH15
PH11	LCD_R5	13	14	LCD_G5	PH4
PE1	LCD_R6	15	16	LCD_G6	PC7
PE15	LCD_R7	17	18	LCD_G7	PD3
-	GND	19	20	GND	-
PG14	LCD_B0	21	22	LCD_DE	PE13
PD0	LCD_B1	23	24	LCD_DISP	PD10
PD6	LCD_B2	25	26	LCD_HSYNC	PC6
PA8	LCD_B3	27	28	LCD_VSYNC	PA4
PE12	LCD_B4	29	30	GND	-
PA3	LCD_B5	31	32	LCD_CLK	PG7

MCU port	Signal name	CN19 pin number		Signal name	MCU port
PB8	LCD_B6	33	34	GND	-
PB9	LCD_B7	35	36	NRST	NRST
				LCD_RST(1)	**PH6**
-	GND	37	38	I2C4_SDA	PF15
PG2	CTP_INT	39	40	I2C4_SCL	PF14
-	NC	41	42	NC	-
PG15	LCD_BL_CTRL	43	44	NC	-
-	5V	45	46	NC	-
-	GND	47	48	NC	-
-	GND	49	50	3V3	-

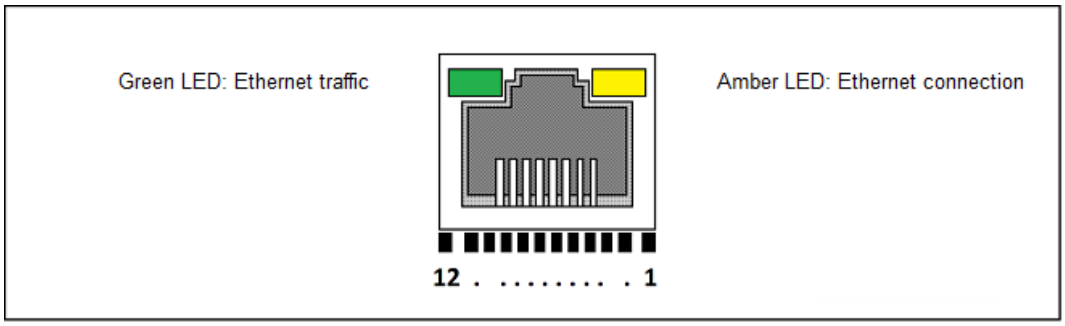
1. *The default configuration is shown in bold. Refer to Section 7.1 on solder bridge configuration for CN19 pin 36 affectation.*

8.9 CN3 Ethernet RJ45 connector

The STM32H735G-DK board supports 10Mbps/100Mbps Ethernet communications with the U9 MICROCHIP LAN8742A-CZ-TR PHY, and the CN3 integrated RJ45 connector. The Ethernet PHY is connected to the STM32H735IGK6 microcontroller through an RMII interface.

The PHY 25 MHz clock is generated from the X1 oscillator, while the STM32H735IGK6 50 MHz clock is generated by the PHY RMII_REF_CLK.

Figure 18. CN3 Ethernet RJ45 connector



The related pinout for the Ethernet connector is listed inTable 20.

Table 20. CN3 Ethernet connector pinout

Connector	Pin number	Description	Pin number	Description
CN3	1	TX+	7	NC
	2	TX-	8	NC
	3	RX+	9	Cathode yellow LED
	4	NC	10	Anode yellow LED
	5	NC	11	Cathode green LED
	6	RX-	12	Anode green LED

8.10 CN10 audio green jack - line out

A CN10 3.5 mm stereo audio green jack output is available on the STM32H735G-DK board to support headphones.

Figure 19. CN10 audio jack connector

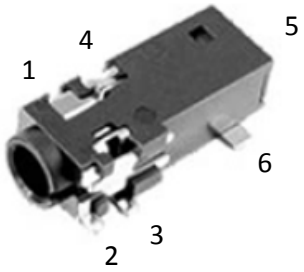


Table 21. CN10 audio jack connector pinout

Pin number	Description	Stereo headset with microphone pinning	
1	NC	NA	
2	NC	NA	
3	GND	GND	
4	OUT_Right	SPK_R (33 Ω typical)	
5	NC	NA	
6	OUT_Left	SPK_L (33 Ω typical)	

8.11 CN11 audio blue jack - line in

A CN11 3.5 mm stereo audio blue jack input is available on the STM32H735G-DK board for audio line input.

8.12 CN1 50 Ω SMA connector for ADC input

A CN1 50 Ω SMA connector is available on the STM32H735G-DK board. It can be connected either to a 16-bit ADC input or to a 12-bit ADC input of the STM32H735IGK6 microcontroller. To get good ADC performances, a low noise signal generator is recommended to provide an input signal.

Figure 20. CN1 50 Ω SMA connector

Limitations:

On the STM32H735G-DK board, PA0_C input is connected either to ARD_A2 signal (CN9 ARDUINO® connector) or to ADC_IN signal (CN1 SMA connector), thanks to solder bridge configuration. As a consequence, when using ADC_IN line, the user must make sure that ARD_A2 is unconnected and vice versa.

Table 22. CN1 ADC input - Solder bridge configuration

Solder bridge	Setting[1]	Description
SB4, SB5 (16-bit ADC)	ON, OFF	PA0_C connected to ADC_IN (CN1 SMA) PA0_C not connected to ARD_A2 (CN9 ARDUINO®)
	OFF, ON	**PA0_C not connected to ADC_IN** **PA0_C connected to ARD_A2 (CN9 ARDUINO®)**
SB41, SB42 (12-bit ADC)	ON, OFF	PC2_C connected to ADC_IN (CN1 SMA) PC2_C not connected to ARD_A4 (CN9 ARDUINO®)
	OFF, ON	**PC2C_C not connected to ADC_IN** **PC2_C connected to ARD_A4 (CN9 ARDUINO®)**

1. *The default configuration is shown in bold*

8.13 CN4, CN5, CN8, and CN9 ARDUINO® Uno V3 connectors

CN4, CN5, CN8, and CN9 ARDUINO® Uno V3 connectors are female connectors compatible with ARDUINO® Uno Revision 3 standard. Most shields designed for ARDUINO® Uno V3 fit the STM32H735G-DK board.

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

Limitations:

On the STM32H735G-DK board, SPI5 signals are sharing the same IOs with SAI1 and UART7. As a consequence, when using SPI5 signals on the ARDUINO® connector, the audio codec SAI1 interface cannot be used. Same, the user must make sure that nothing is connected on STMod+ (1,2,3, and 4 pins) and Pmod™ (1,2,3, and 4 pins) connectors.

Table 23. ARDUINO® Uno V3 compatible connectors

Left connectors					Right connectors				
Conn. name	Pin number	Pin name	MCU pin	Function	Function	MCU pin	Pin name	Pin number	CN No.
-					I2C4_SCL	PF14	D15	10	CN4 Digital
					I2C4_SDA	PF15	D14	9	
					AVDD	-	AVDD	8	
					Ground	-	GND	7	
CN5 Power	1	-	-	5V_IN test	SPI5_SCK	PF7	D13	6	
	2	IOREF	-	3V3 Ref	SPI5_MISO	PF8	D12	5	
	3	NRST	NRST	Reset	TIM23_CH4, SPI5_MOSI	PF9	D11	4	
	4	3V3	-	3V3 output	TIM23_CH1, SPI5_NSS	PF6	D10	3	
	5	5V	-	5V I/O	TIM4_CH2	PB7	D9	2	
	6	GND	-	Ground	-	PE3	D8	1	
	7	GND	-	Ground	-				
	8	VIN	-	Power input	-	PG5	D7	8	CN8 Digital
-					TIM4_CH4	PD15	D6	7	
CN9 Analog	1	A0	PC0	ADC123_INP10	TIM1_CH4	PE14	D5	6	
	2	A1	PH2	ADC3_INP13	-	PG4	D4	5	
	3(1)	A2	PA0_C	ADC12_INP0	TIM5_CH1	PA0	D3	4	
	4(1)	A3	PA1_C	ADC12_INP1	-	PG3	D2	3	
	5(1)	A4	PC2_C or PF15(2)	ADC3_INP0 or I2C4_SDA(2)	UART1_TX	PB14	D1	2	
	6(1)	A5	PC3_C or PF14(2)	ADC3_INP1 or I2C4_SCL(2)	UART1_RX	PB15	D0	1	

1. *Supports analog input only. The current capability is limited to 1 mA when used as digital input or output.*
2. *By default, Pin 5 and Pin 6 of connector CN9 are connected to ADC MCU input ports PC2_C and PC3_C respectively, thanks to the configuration of solder bridges: SB32 and SB33 ON, and SB31 and SB34 OFF. In case it is necessary to connect I^2C interface signals on pins 5 and 6 of CN9 instead of ADC inputs, the configuration is: SB32 and SB33 OFF, SB31 and SB34 ON.*

Before using any ARDUINO® Uno V3 shield, it is important to refer to Section 6.2.1 Supplying the board through the STLINK-V3E USB port: 5 V/500 mA for a correct jumper configuration.

9 STM32H735G-DK board information

9.1 Product marking

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

- Product order code and product identification for the first sticker
- Board reference with revision, and serial number for the second sticker

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.

Evaluation tools marked as “ES” or “E” are not yet qualified and therefore not ready to be used as reference design or in production. Any consequences deriving from such usage will not be at ST charge. In no event, ST will be liable for any customer usage of these engineering sample tools as reference designs or in production.

“E” or “ES” marking examples of location:

- On the 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.

In order to use the same commercial stack in his application, a developer may need to purchase a part number specific to this stack/library. The price of those part numbers includes the stack/library royalties.

9.2 STM32H735G-DK product history

9.2.1 Product identification DK32H735G$AT1

This product identification is based on the MB1520-H735I-B02 mother board.

It embeds the STM32H735IGK6 microcontroller with silicon revision code "Z". The limitations of this silicon revision are detailed in the errata sheet *STM32H72xx/73xx device errata* (ES0491).

Product limitations

Fixing holes of the MB1315 LCD daughterboard are not connected to the ground of the MB1520 mother board impacting radiated performances only.

9.2.2 Product identification DK32H735G$AT2

This product identification is based on the MB1520-H735I-C02 mother board.

It embeds the STM32H735IGK6 microcontroller with silicon revision code "Z". The limitations of this silicon revision are detailed in the errata sheet *STM32H72xx/73xx device errata* (ES0491).

Product limitations

No limitation identified for this product identification.

9.3 Board revision history

9.3.1 Board MB1520 revision B-02

The revision B-02 is the initial release of the MB1520 mother board.

Board limitations

Fixing holes of the MB1315 LCD daughterboard are not connected to the ground of the MB1520 mother board impacting radiated performances.

9.3.2 Board MB1520 revision C-02

The revision C-02 removes the limitations of the B-02 revision.

Board limitations

No limitation identified for this board revision.

9.3.3 Board MB1315 revision A-01

The revision A-01 is the initial release of the MB1315 LCD daughterboard.

Board limitations

No limitation identified for this board revision.

9.3.4 Board MB1280 revision C-01

The revision C-01 is the initial release of the MB1280 fanout daughterboard for the STM32H735G-DK product.

Board limitations

No limitation identified for this board revision.

Appendix A STM32H735G-DK I/O assignment

Table 24. **STM32H735G-DK I/O assignment**

Pin number	GPIO port	Signal or label	Comment
P1	PA0	ARD_D3	TIM5_CH1
P2	PA1	RMII_REF_CLK	-
R2	PA2	RMII_MDIO	-
N5	PA3	LCD_B5	-
P5	PA4	LCD_VSYNC	-
P6	PA5	STMOD#13-ADC	ADC12_INP19 II DAC1_OUT2
R7	PA6	LCD_G2	-
N6	PA7	RMII_CRS_DV	-
B14	PA8	LCD_B3	-
D13	PA9	USB_FS_VBUS	-
C14	PA10	USB_FS_ID	-
C15	PA11	USB_FS_DM	-
B15	PA12	USB_FS_DP	-
B13	PA13	JTMS	SWDIO
A12	PA14	JTCK	SWCLK
A11	PA15	JTDI	-
R8	PB0	LCD_G1	-
M8	PB1	LCD_G0	-
P7	PB2	OCSPI1_DQS	-
A6	PB3	JTDO/TRACESWO	-
B6	PB4	NJTRST	-
C6	PB5	FDCAN2_RX	-
A5	PB6	FDCAN2_TX	-
B5	PB7	ARD_D9	TIM4_CH2
A2	PB8	LCD_B6	-
B3	PB9	LCD_B7	-
N12	PB10	RMII_RX_ER	-
P10	PB11	RMII_TX_EN	-
M15	PB12	RMII_TXD0	-
L15	PB13	RMII_TXD1	-
K15	PB14	ARD_D1	USART1_TX
K14	PB15	ARD_D0	USART1_RX
L2	PC0	ARD_A0	ADC123_INP10
L3	PC1	RMII_MDC	-
M1	PC2	USER_LED2	-
M2	PC3	USER_LED1	-
R6	PC4	RMII_RXD0	-
M7	PC5	RMII_RXD1	-

Pin number	GPIO port	Signal or label	Comment
E14	PC6	LCD_HSYNC	-
D15	PC7	LCD_G6	-
D14	PC8	SDIO1_D0	-
E13	PC9	SDIO1_D1	-
C12	PC10	SDIO1_D2	-
C11	PC11	SDIO1_D3	-
B11	PC12	SDIO1_CK	-
C1	PC13	WAKEUP	-
D2	PC14-OSC32_IN	OSC32_IN	-
D1	PC15-OSC32_OUT	OSC32_OUT	-
C10	PD0	LCD_B1	-
A10	PD1	DETECTn	-
B10	PD2	SDIO1_CMD	-
A9	PD3	LCD_G7	-
C9	PD4	OCSPI1_IO4	-
B9	PD5	OCSPI1_IO5	-
D9	PD6	LCD_B2	-
B8	PD7	OCSPI1_IO7	-
L14	PD8	T_VCP_TX	USART3_TX
K13	PD9	T_VCP_RX	USART3_RX
L13	PD10	LCD_DISP	-
J13	PD11	OCSPI1_IO0	-
J15	PD12	OCSPI1_IO1	-
H15	PD13	OCSPI1_IO3	-
H14	PD14	STMOD#14-PWM	-
J12	PD15	ARD_D6	TIM4_CH4
B4	PE0	LCD_R0	-
C4	PE1	LCD_R6	-
C3	PE2	OCSPI1_IO2	-
B2	PE3	ARD_D8	-
B1	PE4	SAI4_D2	-
D3	PE5	SAI4_CK2	-
E3	PE6	SAI1_SD_A	-
P9	PE7	STMOD#17	IO II DFSDM1_DATIN2
N8	PE8	Audio_Int	-
R11	PE9	STMOD#18	IO II DFSDM1_CKOUT
R9	PE10	STMOD#19	IO II DFSDM1_DATIN4
R12	PE11	LCD_G3	-
P12	PE12	LCD_B4	-
P13	PE13	LCD_DE	-
M12	PE14	ARD_D5	TIM1_CH4

Pin number	GPIO port	Signal or label	Comment
P14	PE15	LCD_R7	-
F4	PF0	OCSPI2_IO0	-
F3	PF1	OCSPI2_IO1	-
G3	PF2	OCSPI2_IO2	-
H4	PF3	OCSPI2_IO3	-
H2	PF4	OCSPI2_CLK	-
H3	PF5	µSD_Detect	-
H1	PF6	STMOD#1 ARD_D10 SAI1_SD_B	SPI5_NSS II UART7_RX II SAI1_SD_B
J3	PF7	STMOD#2 ARD_D13 SAI1_MCLK_B	SPI5_SCK II UART7_TX II SAI1_MCLK_B
J2	PF8	STMOD#3 ARD_D12 SAI1_SCK_B	SPI5_MISO II UART7_RTS II SAI1_SCK_B
J4	PF9	STMOD#4 ARD_D11 SAI1_FS_B	SPI5_MOSI II UART7_CTS II SAI1_FS_B
K3	PF10	OCSPI1_CLK	-
N7	PF11	STMOD#8-MOSIs	SPI5_MOSI
P11	PF12	OCSPI2_DQS	-
N11	PF13	STMOD#20	IO II DFSDM1_DATIN6
R10	PF14	STMOD#7-SCL	I2C4_SCL
N10	PF15	STMOD#10-SDA	I2C4_SDA
P8	PG0	OCSPI2_IO4	-
N9	PG1	OCSPI2_IO5	-
G15	PG2	CTP_INT	-
H13	PG3	ARD_D2	-
G14	PG4	ARD_D4	-
F15	PG5	ARD_D7	-
F14	PG6	OCSPI1_NCS	-
G13	PG7	LCD_CLK	-
G12	PG8	MEMS_LED	-
A8	PG9	OCSPI1_IO6	-
C8	PG10	OCSPI2_IO6	-
A7	PG11	OCSPI2_IO7	-
D8	PG12	OCSPI2_NCS	-
B7	PG13	USB_FS_OVCR	-
C7	PG14	LCD_B0	-
D7	PG15	LCD_BL_CTRL	-
J1	PH0	OSC_25M	-

Pin number	GPIO port	Signal or label	Comment
K1	PH1	STMOD#12-RST	-
N4	PH2	ARD_A1	ADC3_INP13
R4	PH3	LCD_R1	-
P4	PH4	LCD_G5	-
R5	PH5	USB_FS_PWR_EN	-
P15	PH6	LCD_RST	-
M11	PH7	STMOD#9-MISOs	SPI5_MISO
N13	PH8	LCD_R2	-
M14	PH9	LCD_R3	-
N14	PH10	LCD_R4	-
M13	PH11	LCD_R5	-
N15	PH12	STMOD#11-INT	-
C13	PH13	FDCAN1_TX	-
B12	PH14	FDCAN1_RX	-
D12	PH15	LCD_G4	-
R3	PA0_C	ADC_IN ARD_A2	ADC12_INP0
P3	PA1_C	ARD_A3	ADC12_INP1
N1	PC2_C	ARD_A4	ADC3_INP0
N2	PC3_C	ARD_A5	ADC3_INP1
L1	NRST	NRST	-
C5	BOOT0	BOOT0	-
D4	PDR_ON	PDR_ON	-

Appendix B Federal Communications Commission (FCC) and Innovation, Science and Economic Development Canada (ISED) Compliance Statements

B.1 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 his own expense.

Responsible party (in the USA)

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B.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.

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 (A) / NMB-3 (A).

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 (A) / NMB-3 (A).

Appendix C CE conformity

C.1 Warning

EN 55032 / CISPR32 (2012) Class A product

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

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.

Revision history

Table 25. **Document revision history**

Date	Revision	Changes
30-Apr-2020	1	Initial release.
3-Dec-2020	2	Added alternative memory solutions to *Section 7.9 HyperRAM memory*.
23-Mar-2021	3	Added *Section 9 STM32H735G-DK board information* with updated *Product marking*.
17-May-2021	4	Updated *Table 19* footnote on CN19 pin 36 configuration.
16-Sep-2021	5	Updated Table 23 regarding limitation to analog input usage for CN9 A2 to A6 pins

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