Evaluation boards with STM32MP157 MPUs

Introduction

The STM32MP157C-EV1 and STM32MP157A-EV1 Evaluation boards (STM32MP157x-EV1) are designed as complete demonstration and development platforms for STMicroelectronics Arm®-based dual -A7 32 bits and Cortex®-M4 32 bits MPUs in the STM32MP1 Series. They leverage the capabilities of STM32MP1 Series microprocessors for the user to develop applications, using STM32 MPU OpenSTLinux Distribution software for the main processor, and STM32CubeMP1 software for the co-processor. They include an ST-LINK embedded debug tool, LEDs, push-buttons, one joystick, 1-Gbps Ethernet, CAN FD, one USB OTG Micro-AB connector, four USB Host Type-A connectors, LCD display with touch panel, camera, stereo headset jack with analog microphone input, four digital microphones, one SPDIF Rx/Tx, Smartcard, microSD™ card, and eMMC, NOR and NAND Flash memories.

STM32MP157x-EV1, shown in Figure 1 and Figure 2, is used as the reference design for user application development, although it is not considered as final application.

To expand the functionality of the STM32MP157C-EV1 and STM32MP157A-EV1 Evaluation boards, two GPIO expansion connectors are also available for motor control and Raspberry Pi® shields.

An ST-LINK/V2-1 is integrated on the board, as embedded in-circuit debugger and programmer for the STM32 MPU and the USB Virtual COM port bridge.

Figure 1. STM32MP157x-EV1 top view

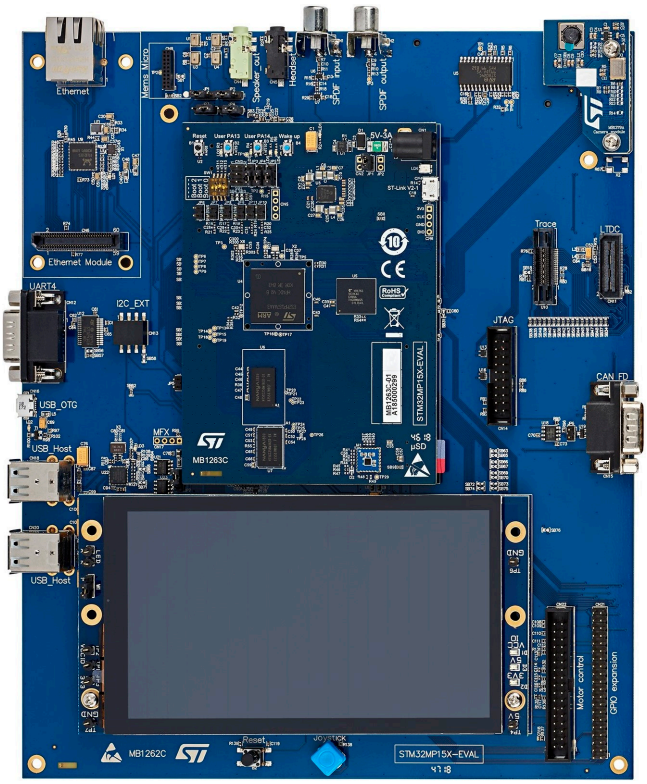
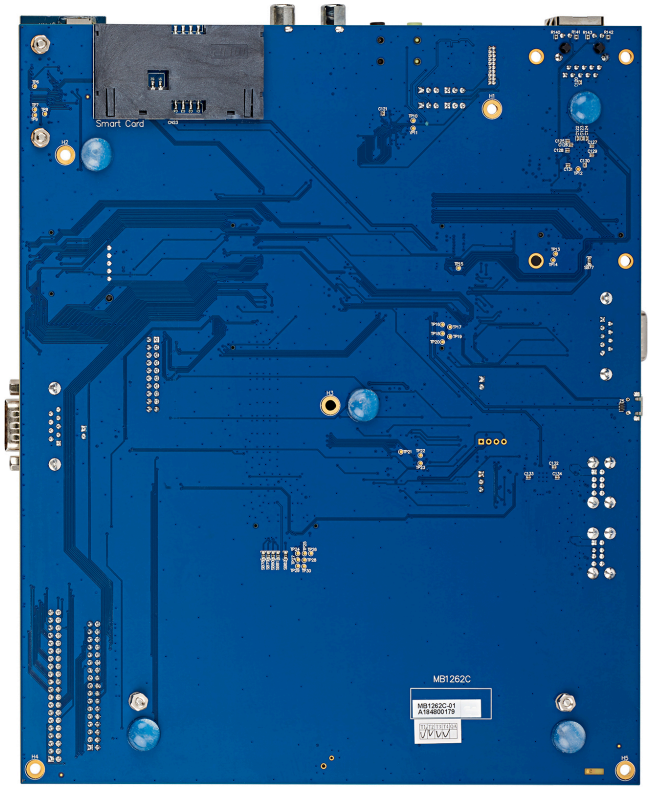


Figure 2. STM32MP157x-EV1 bottom view



Pictures are not contractual.

1 Features

- STM32MP157 Arm®-based dual Cortex®-A7 32 bits + Cortex®-M4 32 bits MPU in LFBGA448 package
- ST PMIC STPMIC1
- 2 × 4-Gbit DDR3L, 16 bits, 533 MHz
- 2 × 512-Mbit Quad-SPI Flash
- 32-Gbit eMMC v5.0
- 8-Gbit SLC NAND, 8 bits, 8-bit ECC, 4-KB PS
- 1-Gbit/s Ethernet (RGMII) compliant with IEEE-802.3ab
- USB Host 4-port hub
- USB OTG HS
- CAN FD
- 5.5" TFT 720×1280 pixels with LED backlight, MIPI DSI℠ interface, and capacitive touch panel
- SAI audio codec
- 5-megapixel, 8-bit camera
- 4 × ST-MEMS digital microphones
- Smartcard
- microSD™ card
- 2 user LEDs
- 2 user and reset push-buttons, 1 wake-up button
- 4-direction joystick with selection button
- 5 V / 4 A power supply
- Board connectors:
  - Ethernet RJ45
  - 4 × USB Host Type-A
  - USB OTG Micro-AB
  - SPDIF RCA input and output
  - CAN FD
  - Stereo headset jack including analog microphone input
  - Audio jack for external speakers
  - Motor control
  - External I^2C
  - LTDC
  - Trace, JTAG, RS-232
  - GPIO expansion connector (Raspberry Pi® shields capability)
  - MEMS-microphone daughterboard expansion connector
- On-board ST-LINK/V2-1 debugger/programmer with USB re-enumeration capability: Virtual COM port and debug port
- STM32CubeMP1 and full mainline open-source Linux® STM32 MPU OpenSTLinux distribution (such as STM32MP1Starter) software and examples
- Support of a wide choice of Integrated Development Environments (IDEs) including IAR™, Keil®, GCC-based IDEs

STM32 Arm Cortex MPUs are based on the Arm® Cortex®-A and Cortex®-M processors.

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

2 Ordering information

To order an STM32MP157 Eval board, refer to Table 1. List of available products. Additional information is available from the datasheet and reference manual of the target STM32.

Table 1. List of available products

Order code	Board reference	Target STM32	Differentiating feature
STM32MP157A-EV1	• MB1262: mother board • MB1263: MPU subsystem daughterboard • MB1230: DSI display board • MB1379: camera board	STM32MP157AAA3	Basic security.
STM32MP157C-EV1		STM32MP157CAA3	Secure Boot and cryptography.

2.1 Product marking

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 design or in production.

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

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

2.2 Codification

The meaning of the codification is explained in Table 2.

Table 2. Codification explanation

STM32MP1XXY-EVZ	Description	Example: STM32MP157C-EV1
STM32MP1	MPU series in STM32MP1 32-bit MPUs	STM32MP1 Series
XX	MPU product line in the series	STM32MP157 line
Y	Security option: • A: basic security • C: Secure Boot and cryptography	Secure Boot and cryptography
EVZ	Eval board configuration • EV1: with PMIC	PMIC

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

3 Development environment

3.1 System requirements

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

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

3.2 Development toolchains

- Keil® MDK-ARM (see note)
- IAR™ EWARM (see note)
- GCC-based IDEs
- GCC

Note: On Windows® only.

3.3 Demonstration software

The STM32 MPU OpenSTLinux distribution and STM32CubeMP1 base demonstration software is preloaded in the microSD™ 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 should be 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 loosen in their sockets or fallen into the plastic bag.

In particular, pay attention to the following components:

1. MB1263 daughterboard connected to the MB1262 mother board
2. microSD card in its MB1263/CN9 receptacle
3. LCD MB1230 daughterboard in MB1262/CN19 DSI connector, and screw, spacer and nut are in place
4. Camera module MB1379 board in MB1262/CN7 connector, and screw, spacer and nut are in place

For product information related with STM32MP157xAA3 microcontroller, visit *www.st.com* website.

6 Hardware layout and configuration

The STM32MP157x-EV1 Evaluation board is designed around the STM32MP157xAA3 target microcontroller in LFBGA 448-pin package. Figure 3 illustrates the STM32MP157x-EV1 hardware block diagram. Figure 4 shows the location of main components on the Evaluation board.

Figure 3. **STM32MP157x-EV1 hardware block diagram**

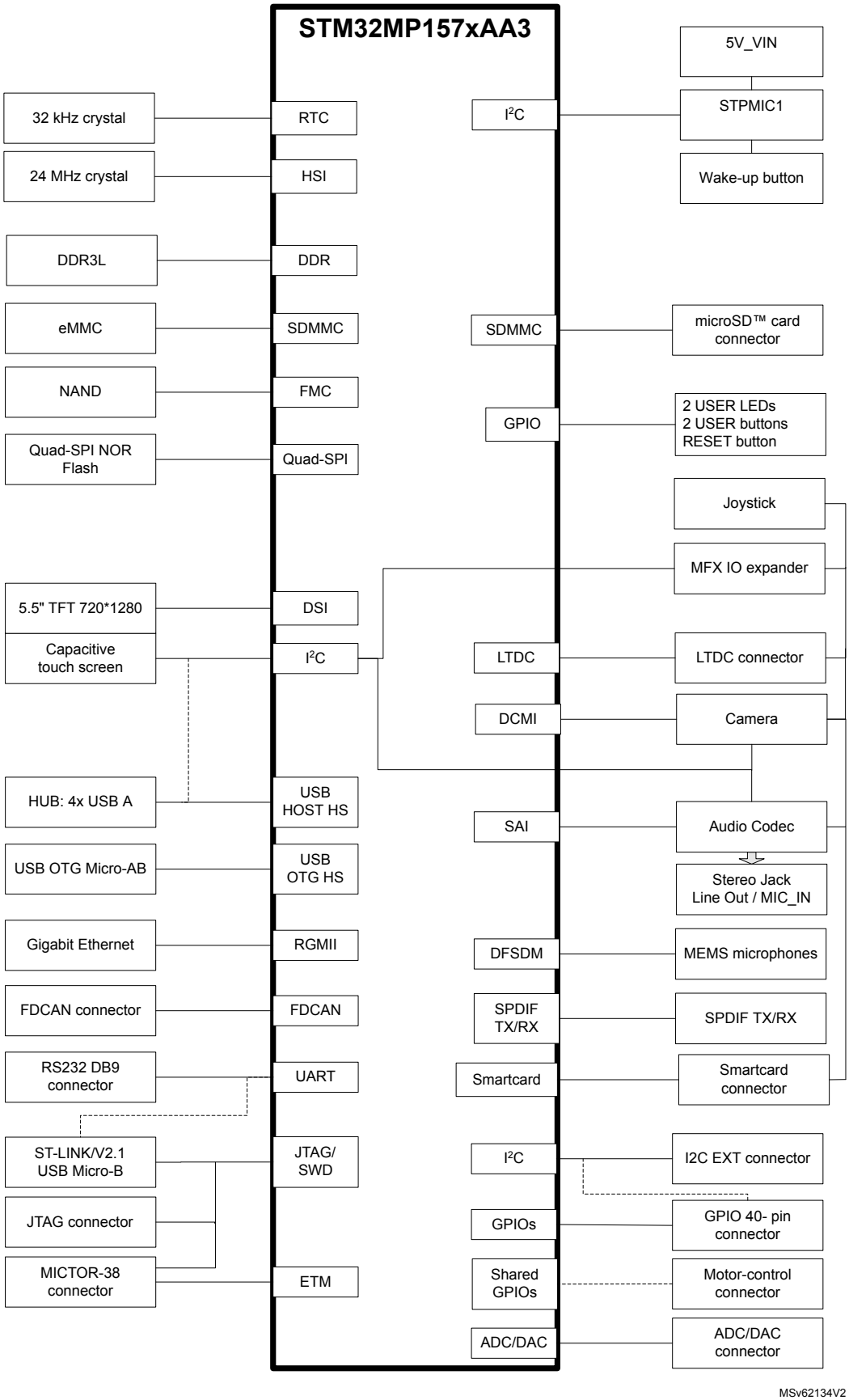
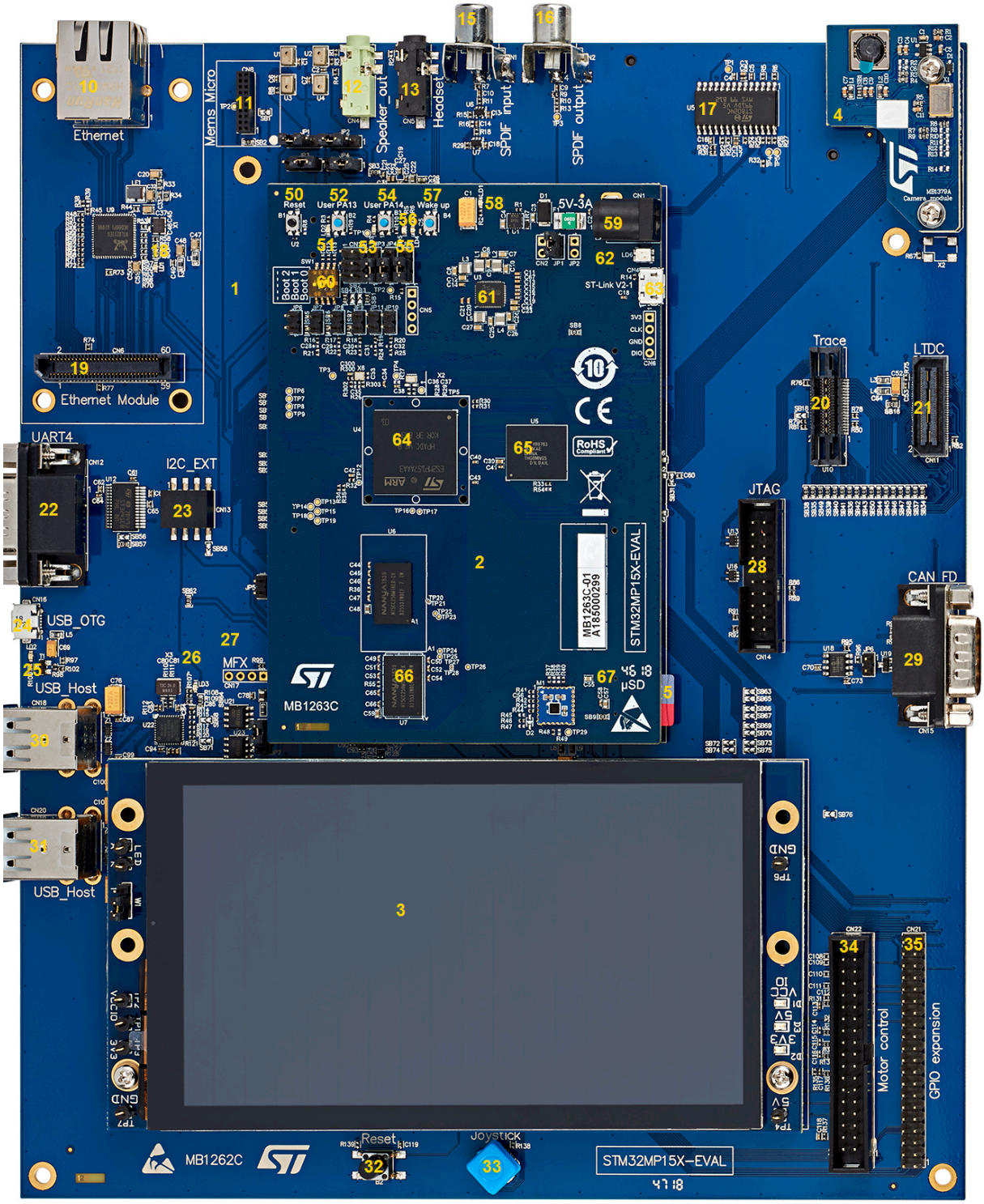


Figure 4. **STM32MP157x-EV1 board overview**



Note: Numbers in yellow refer to positions explained in Table 4, Table 5, and Table 6.

Table 4. STM32MP157x-EV1 overview

Position	Description
1	MB1262 mother board
2	MB1263 daughterboard
3	MB1230 DSI (MIPI® standard) 720p display
4	MB1379 daughterboard camera
5	microSD™ card

Table 5. MB1263 daughterboard overview

Position	Description	Position	Description
50 (**B1**)	Reset button	59 (**CN1**)	MB1263 power 5 V-3 A
51 (**LD2**)	User LED (red)	60 (**SW1**)	Boot mode selection
52 (**B2**)	User button (PA13)	61 (**U3**)	PMIC (STPMIC1A)
53 (**LD3**)	User LED (green)	62 (**LD6**)	ST-Link LED (bicolor)
54 (**B3**)	User button (PA14)	63 (**CN4**)	USB micro-B (ST-Link V2-1)
55 (**LD5**)	User LED (blue)	64 (**U4**)	STM32MP157xAA3 LFBGA448
56 (**LD4**)	User LED (orange)	65 (**U5**)	eMMC
57 (**B4**)	Wakeup button	66 (**U6/U7**)	2 x DDR3L 16 bits
58 (**LD1**)	Power LED (green)	67 (**µSD**)	microSD 3.0 card (back side slot)

Table 6. MB1262 mother board overview

Position	Description	Position	Description
10 (**CN3**)	Ethernet	11 (**CN8**)	Microphone MEMS daughterboard connector
12 (**CN4**)	Speaker audio output	13 (**CN5**)	Headset audio output
14 (**U8**)	Audio codec (Wolfson WM8994)	15 (**CN1**)	SPDIF RX
16 (**CN2**)	SPDIF TX	17 (**U5**)	Smartcard (back side slot)
18 (**LD1**)	Ethernet LED (green)	19 (**CN6**)	Ethernet daughterboard connector
20 (**U10**)	Trace connector	21 (**CN11**)	LTDC LCD TFT Display Controller (STM32 specific) connector
22 (**CN12**)	RS232 (UART4)	23 (**CN13**)	External E2P connector
24 (**CN16**)	USB micro-AB (USB OTG)	25 (**LD2**)	USB OTG LED (green)
26 (**LD3**)	USB Type-A port LED (red)	27 (**CN17**)	MFX header 4 pins
28 (**CN14**)	JTAG connector	29 (**CN15**)	CAN FD
30 (**CN18**)	2 USB Type-A port (host)	31 (**CN20**)	2 USB Type-A port (host)
32 (**B2**)	Reset button	33 (**B1**)	Joystick
34 (**CN22**)	Motor control connector	35 (**CN21**)	GPIO expansion connector
4 (**CN7**)	Camera sensor connector	-	-

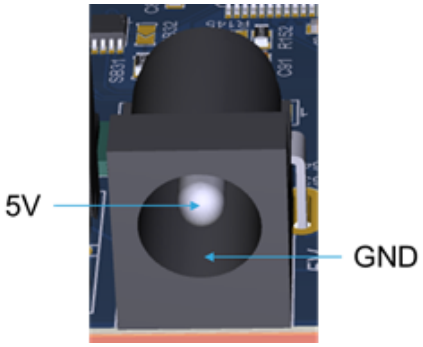
6.1 Power supply management

6.1.1 5 V power supply

STM32MP157x-EV1 Evaluation board is designed to be powered from the 5 V DC power supply provided in the package.

MB1263/LD1 Green LED turns on when this power supply is connected to the power jack MB1263/CN1.

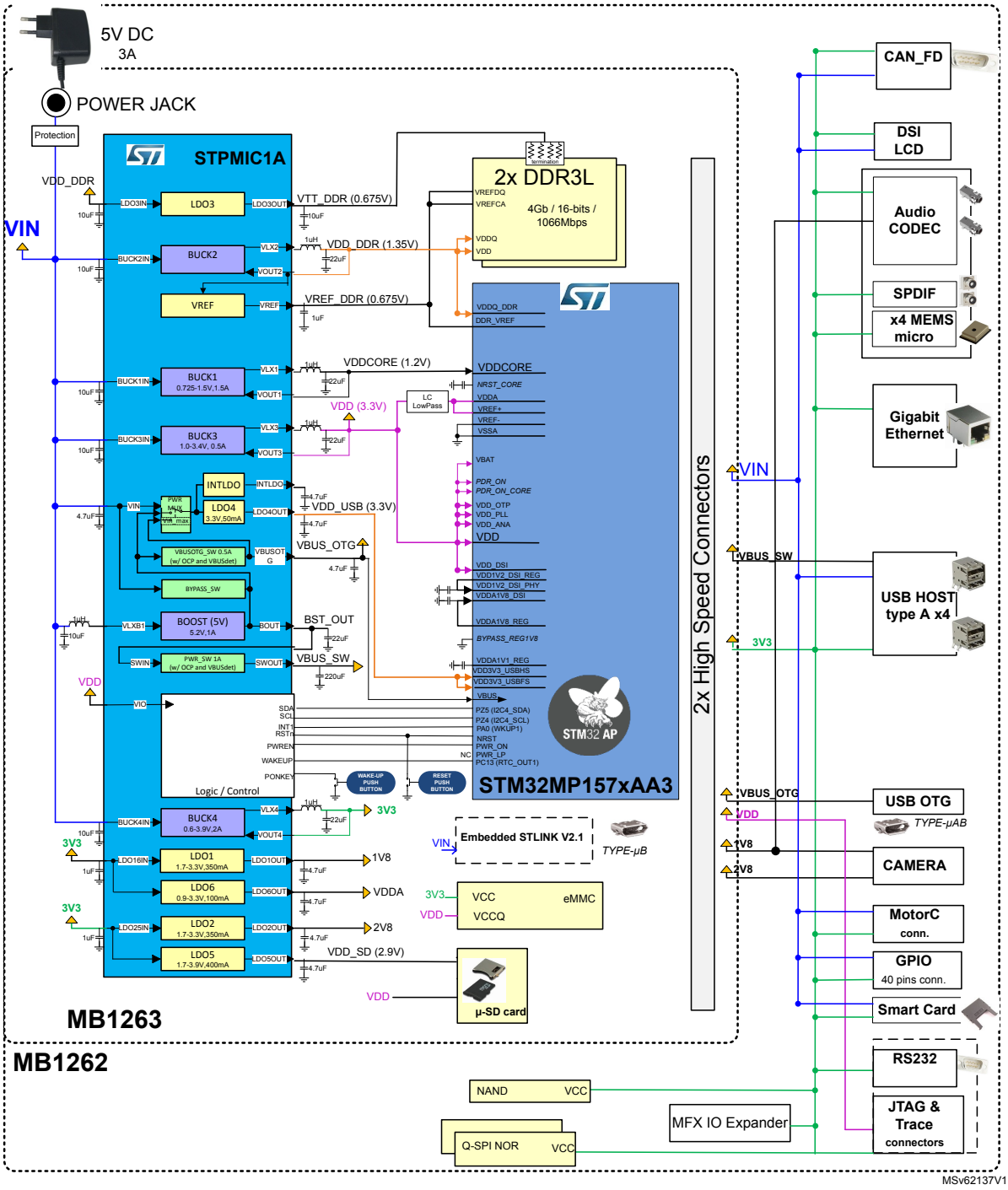
Figure 5. 5 V power supply connector: MB1263/CN1



6.1.2 Platform power tree

All supply lines required for the operation of the components on STM32MP157x-EV1 are derived from the 5 V power source. Indeed this 5 V power source is the input supply of the STPMIC1 that distributes then all the supplies to the sub-systems as described in the power tree Figure 6.

Figure 6. **STM32MP157x-EV1platform power tree**



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6.1.3 STPMIC1

For general information concerning the STPMIC1, please refer to STPMIC1 datasheet at the *www.st.com* website.

6.2 Clocks

Two clocks are available on STM32MP157x-EV1 for STM32MP157xAA3 target microcontroller.

6.2.1 LSE clock

- External 32.768 kHz crystal

6.2.2 HSE clock

- External 24 MHz crystal

6.3 Reset sources

The reset signal of the STM32MP157x-EV1 platform is active low.

Sources of the platform reset are:

- Two reset buttons MB1263/B1 and MB1262/B2 (BLACK buttons)
- STM32MP157xAA3: internal voltage monitor, SW request or Watchdog
- STPMIC1
- JTAG/SWD connector MB1262/CN14
- ETM Trace Mictor-38 connector MB1262/U10
- Embedded ST-LINK/V2-1

The STM32MP157xAA3 also drives a sub system reset, SUB_NRST signal on PD10 IO, to the peripherals: USB Host Hub, MFX, Ethernet, and RGB_LTDC connector.

6.4 User buttons and LEDs

The Table 7 describes the HW configuration for the user buttons and LEDs

Table 7. HW configuration for the user buttons and LEDs

IO	LED color and label	Button label
PD8	PD8 is connected to the ORANGE LD4. Active High	-
PD9	PD9 is connected to the BLUE LD5. Active High	-
PA13	PA13 is connected to RED LD2. Active Low	User PA13
PA14	MFX_IO13 is connected to ORANGE LED LD7. Active Low	User PA14

6.5 Physical input devices: buttons

The STM32MP157x-EV1 board provides a number of input devices for physical human control.

These are:

- Two Reset buttons (MB1263/B1 and MB1262/B2)
- Four-way joystick controller with select key (MB1262/B1)
- Wake-up button (MB1263/B4)

Table 8. Physical user devices: buttons

Devices	Purpose/IO
Wakeup button (MB1263/B4)	Awakes the platform from low-power modes. Connected to STPMIC1A PONKEY, which generates a wake-up signal on STM32MP1 PA0
Reset buttons (MB1263/B1 or MB1262/B2)	NRST signal
JOY_CENTER: Joystick select key (MB1262/B1 pin2)	MFX_IO0
JOY_DOWN: Joystick down direction (MB1262/B1 pin3)	MFX_IO1

Devices	Purpose/IO
JOY_LEFT: Joystick left direction (MB1262/B1 pin1)	MFX_IO2
JOY_RIGHT: Joystick right direction (MB1262/B1 pin6)	MFX_IO3
JOY_UP: Joystick up direction (MB1262/B1 pin4)	MFX_IO4

6.6 Boot options

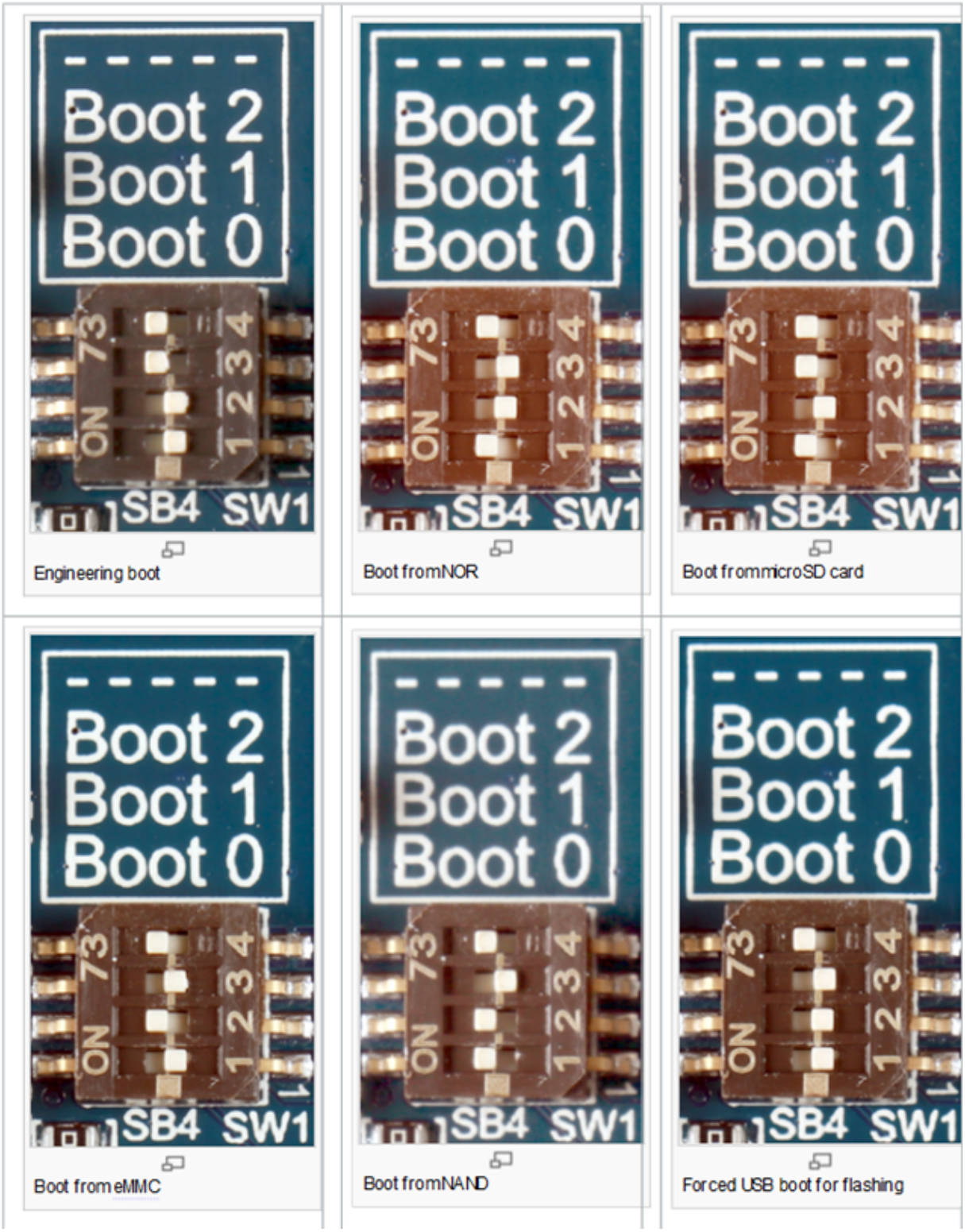
The STM32MP157x-EV1 board may boot from different sources as described in Table 9.

Table 9. HW configuration for the BOOT mode MB1263/SW1

Boot Mode	BOOT2	BOOT1	BOOT0
Serial-NOR	0	0	1
uSD card	1	0	1
eMMC	0	1	0
NAND	0	1	1
UART and USB	0	0	0
	1	1	0
Reserved	1	0	0

The boot related switches (MB1263/SW1) must be configured as illustrated by one of the following pictures:

Figure 7. **STM32MP157x-EV1 boot related switch configuration**



6.7 Embedded ST-LINK/V2-1

The STLINK-V2.1 programming and debugging tool is integrated in the STM32MP157x-EV1 Evaluation board. The embedded STLINK-V2.1 supports JTAG, SWD and VCP for the target STM32 MPU devices.

For information about debugging and programming features refer to STLINK-V2.1 in-circuit debugger/ programmer, User manual (UM1075) available on *www.st.com*, which describes in details all the STLINK-V2.1 features.

Figure 8 shows the STLINK USB µB connector pinout MB1263/CN4.

Figure 8. STLINK USB µB connector pinout MB1263/CN4

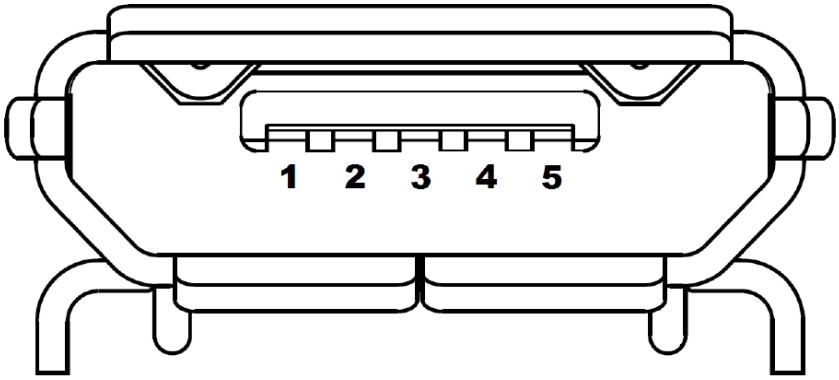


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Table 10 describes STLINK USB µB connector pinout MB1263/CN4.

Table 10. STLINK USB µB connector pinout MB1263/CN4

Pin	Board function	STLINK STM32 pin
1	VBUS Power	-
2	DM	PA11
3	DP	PA12
4	ID	GND
5	GND	GND

As current consumption of the EVAL exceeds permissible current on USB, it is not possible to power the boards through the STLINK-V2.1 USB. To use the STLINK-V2.1 for programming and debugging, it is mandatory to power the board first using the 5V power supply, then connect the STLINK-V2.1 USB cable to the PC. Proceeding this way the USB enumeration succeed thanks to the external power source.

The user must respect the following power sequence procedure:

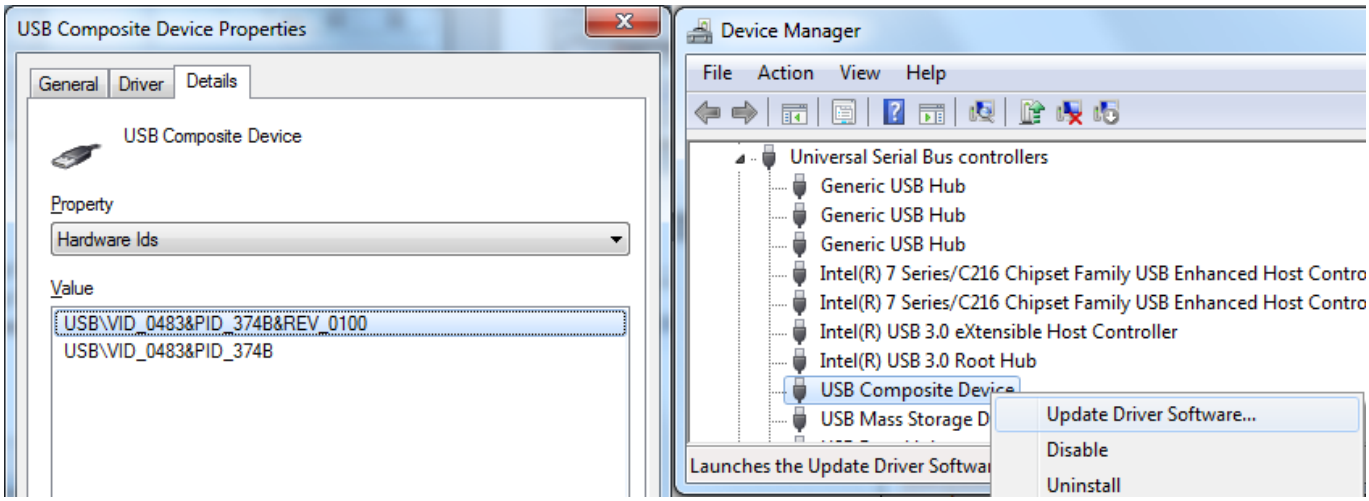
1. Check that MB1263/JP1 is OFF, MB1263/JP4 [2-3] and JP5 [2-3] are ON to connect UART4 as STLINK VCP.
2. Connect the 5 V power source, MB1263/LD1 LED turns green, MB1263/LD6 flashes red.
3. Connect the PC to USB connector MB1263/CN4, MB1263/LD6 is red and becomes green once the connection with the STLINK is established.

6.7.1 Drivers

Before connecting STM32MP157x-EV1 to a Windows (XP, 7, 8 10) PC via USB, a driver for ST-LINK/V2-1 must be installed. It may be downloaded from *www.st.com*.

In case the STM32MP157x-EV1 Evaluation board is connected to the PC before installing the driver, the Windows device manager may report some USB devices found on STM32MP157x-EV1as “Unknown”. To recover from this situation, after installing the dedicated driver downloaded from *www.st.com*, the association of “Unknown” USB devices found on STM32MP157x-EV1 to this dedicated driver must be updated in the device manager manually. It is recommended to proceed using USB Composite Device line, as shown in Figure 9.

Figure 9. **USB composite device**



6.7.2 ST-LINK/V2-1 firmware upgrade

For its own operation, ST-LINK/V2-1 employs a dedicated MCU with Flash memory. Its firmware determines ST-LINK/V2-1 functionality and performance. The firmware may evolve during the life span of STM32MP157x-EV1 to include new functionality, fix bugs or support new target microcontroller families. It is therefore recommended to keep ST-LINK/V2-1 firmware up to date. The latest version is available from *www.st.com*.

6.8 ETM TRACE Mictor-38 connector

The Mictor-38 connector MB1262/U10 may output trace signals used for debug, as well as JTAG signals.
Table 11 describes the HW configuration for the TRACE function.

Table 11. **HW configuration for the TRACE connector MB1262/U10**

IO	Bridge	Setting(1)	Comment
PI14	SB38	**ON**	**PI14 may be used for the trace function TRACE CLK**
		OFF	PI14 is not connected to Trace PI14 may be used for LTDC CLK
PI12	SB43	**ON**	**PI12 may be used for the trace function TRACE_D0**
		OFF	PI12 is not connected to Trace PI12 may be used for LTDC HSYNC
PI13	SB42	**ON**	**PI13 may be used for the trace function TRACE_D1**
		OFF	PI13 is not connected to Trace PI13 may be used for LTDC VSYNC
PJ5	SB36	**ON**	**PJ5 may be used for the trace function TRACE_D2**
		OFF	PJ5 is not connected to Trace PJ5 may be used forLTDC_R6
PJ6	SB41	**ON**	**PJ6 be used for the trace function TRACE_D3**
		OFF	PJ6 is not connected to Trace PJ6 may be used for LTDC_R7
PK1	SB40	**ON**	**PK1 may be used for the trace function TRACE_D4**
		OFF	PK1 is not connected to Trace PK1 may be used for LTDC_G6

IO	Bridge	Setting[1]	Comment
PK2	SB39	**ON**	**PK2 may be used for the trace function TRACE_D5**
		OFF	PK2 is not connected to Trace PK2 may be used for LTDC_G7
PK5	SB49	**ON**	**PK5 may be used for the trace function TRACE_D6**
		OFF	PK5 is not connected to Trace PK5 may be used for LTDC_B6
PK6	SB35	**ON**	**PK6 may be used for the trace function TRACE_D7**
		OFF	PK6 is not connected to Trace PK6 may be used for LTDC_B7
PJ0	SB34	**ON**	**PJ0 may be used for the trace function TRACE_D8**
		OFF	PJ0 is not connected to Trace PJ0 may be used for LTDC_R1
PJ1	SB37	**ON**	**PJ1 may be used for the trace function TRACE_D9**
		OFF	PJ1 is not connected to Trace PJ1 may be used for LTDC_R2
PJ2	SB48	**ON**	**PJ2 may be used for the trace function TRACE_D10**
		OFF	PJ2 is not connected to Trace PJ2 may be used for LTDC_R3
PJ3	SB47	**ON**	**PJ3 may be used for the trace function TRACE_D11**
		OFF	PJ3 is not connected to Trace PJ3 may be used for LTDC_R4
PJ4	SB46	**ON**	**PJ4 may be used for the trace function TRACE_D12**
		OFF	PJ4 is not connected to Trace PJ4 may be used for LTDC_R5
PJ7	SB45	**ON**	**PJ7 may be used for the trace function TRACE_D13**
		OFF	PJ7 is not connected to Trace PJ7 may be used for LTDC_G0
PJ8	SB44	**ON**	**PJ8 may be used for the trace function TRACE_D14**
		OFF	PJ8 is not connected to Trace PJ8 may be used for LTDC_G1
PJ9	SB50	**ON**	**PJ9 may be used for the trace function TRACE_D15**
		OFF	PJ9 is not connected to Trace PJ9 may be used for LTDC_G2

1. *Default configuration is shown in **bold***

Figure 10 shows the TRACE Mictor-38 connector

Figure 10. **TRACE Mictor-38 connector: MB1262/U10**

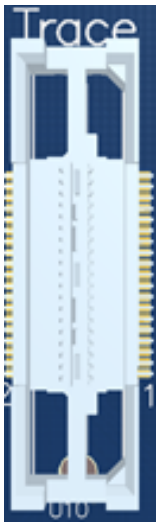


Table 12 describes the MICTOR-38 connector pinout for TRACE and JTAG signals.

Table 12. **TRACE MICTOR-38 connector pinout: MB1262/U10**

Board function	Pin	Pin	Board function
NC	1	2	NC
NC	3	4	NC
GND	5	6	TRACE_CLK
Pulldown	7	8	Pulldown
NRST	9	10	Pulldown
TDO/SWO	11	12	VDD
Pulldown	13	14	VDD
TCK/SWCLK	15	16	TRACE_D7
TMS/SWDIO	17	18	TRACE_D6
TDI	19	20	TRACE_D5
NJTRST	21	22	TRACE_D4
TRACE_D15	23	24	TRACE_D3
TRACE_D14	25	26	TRACE_D2
TRACE_D13	27	28	TRACE_D1
TRACE_D12	29	30	GND
TRACE_D11	31	32	GND
TRACE_D10	33	34	VDD
TRACE_D9	35	36	GND
TRACE_D8	37	38	TRACE_D0

6.9 JTAG connector

A JTAG/Serial Wire Debug 20 pins IDC connector (ARM JTAG 20, IDC 2.54mm) MB1262/CN14 outputs the JTAG signals. The JTAG function is a dedicated interface of STM32MP157XAA3.

Table 13 describe the JTAG connector pinout.

Table 13. **MB1262/CN14 JTAG connector pinout**

Board function	Pin	Pin	Board function
Power	**1**	**2**	Power
NJTRST	**3**	**4**	GND
JTDI	**5**	**6**	GND
JTMS/SWDIO	**7**	**8**	GND
JTCK/SWCLK	**9**	**10**	GND
Pull down	**11**	**12**	GND
JTDO/SWO	**13**	**14**	GND
NRST	**15**	**16**	GND
Pull down	**17**	**18**	GND
Pull down	**19**	**20**	GND

6.10 DDR3L

Two 16-bit DDR3L NT5CC256M16ER-EK of 4 Gbytes are implemented in flyby topology in MB1263/U6 and U7 positions. They are connected to the dedicated DDR interface of STM32MP157xAA3. For detailed information concerning the DDR HW design implementation, please refer to the application note AN5122 available on the *www.st.com* website.

6.11 eMMC

The STM32MP157xAA3 SDMMC2 in 8-bit wide bus mode drives a THGBMNG5D1LBAIL 32 Gbits eMMC in MB1263/U5 position.

6.11.1 eMMC IO interface

Table 14 HW configuration for the eMMC interface.

Table 14. **HW configuration for the Quad-SPI interface**

IO	Configuration(1)
PB14	**SDMMC2_D0 connected to MB1263/U5 DAT0**
PB15	SDMMC2_D1 connected to MB1263/U5 DAT1
PB3	SDMMC2_D2 connected to MB1263/U5 DAT2
PB4	SDMMC2_D3 connected to MB1263/U5 DAT3
PA8	SDMMC2_D4 connected to MB1263/U5 DAT4
PA9	SDMMC2_D5 connected to MB1263/U5 DAT5
PE5	SDMMC2_D6 connected to MB1263/U5 DAT6
PD3	SDMMC2_D7 connected to MB1263/U5 DAT7
PE3	**SDMMC2_CK connected to MB1263/U5 CLK**
PG6	**SDMMC2_CMD connected to MB1263/U5 CMD**

1. *Minimum set of signals required by the boot ROM during eMMC boot in **bold***

6.12 NAND Flash

The STM32MP157xAA3 FMC interface is connected to an 8 Gbits SLC NAND, 8-bit, 8-bit ECC, and 4 KBytes PS MT29F8G08ABACAH4 in MB1262/U11 position.

6.12.1 NAND IO interface

Table 15 features the HW configuration for the NAND interface.

Table 15. HW configuration for the Quad-SPI interface

IO	Configuration(1)
PD6	**NAND_NWAIT connected to MB1262/U11 R/B#**
PD11	**NAND_CLE connected to MB1262/U11 CLE**
PD12	**NAND_ALE connected to MB1262/U11 ALE**
PG9	**NAND_NCE connected to MB1262/U11 CE#**
PD5	**NAND_NWE connected to MB1262/U11 WE#**
PD4	**NAND_NOE connected to MB1262/U11 RE#**
PD14	**NAND_D0 connected to MB1262/U11 IO0**
PD15	**NAND_D1 connected to MB1262/U11 IO1**
PD0	**NAND_D2 connected to MB1262/U11 IO2**
PD1	**NAND_D3 connected to MB1262/U11 IO3**
PE7	**NAND_D4 connected to MB1262/U11 IO4**
PE8	**NAND_D5 connected to MB1262/U11 IO5**
PE9	**NAND_D6 connected to MB1262/U11 IO6**
PE10	**NAND_D7 connected to MB1262/U11 IO7**

1. *Minimum set of signals required by the boot ROM during NAND boot in **bold***

6.13 Quad-SPI NOR Flash

The STM32MP157xAA3 Quad-SPI interface is in dual-Serial mode to interface with two NOR Flash memories in parallel. Two MX25L51245G-XD, 3V3/512-Mbit each, are fitted on the STM32MP157x-EV1 MB1262, in MB1262/U14 and MB1262/U15 positions.

6.13.1 Quad-SPI IO interface

Table 16 describes the HW configuration for the Quad-SPI interface

Table 16. HW configuration for the Quad-SPI interface

IO	Configuration(1)
PF8	**QSPI_BK1_IO0 connected to MB1262/U14 SIO0**
PF9	**QSPI_BK1_IO1 connected to MB1262/U14 SIO1**
PF7	QSPI_BK1_IO2 connected to MB1262/U14 SIO2
PF6	QSPI_BK1_IO3 connected to MB1262/U14 SIO3
PB6	**QSPI_BK1_NCS connected to MB1262/U14 CS#**
PH2	**QSPI_BK2_IO0 connected to MB1262/U15 SIO0**
PH3	**QSPI_BK2_IO1 connected to MB1262/U15 SIO1**
PG10	QSPI_BK2_IO2 connected to MB1262/U15 SIO2
PG7	QSPI_BK2_IO3 connected to MB1262/U15 SIO3
PC0	QSPI_BK2_NCS connected to MB1262/U15 CS#
PF10	**QSPI_CLK connected to MB1262/U14 SCLK and MB1262/U15 SCLK**

1. *Minimum set of signals required by the boot ROM during dual-serial NOR boot in **bold***

6.14 microSD card

The MB1263/CN9 slot for microSD card is routed to STM32MP157xAA3 SDMMC1 port. This SD card interface is compliance with SD Memory Card Specification Version 3.01, UHS-I, all operation modes up to SDR104 and DDR50. The SD card interface is compatible with 1.8 V or 2.9 V signal levels.

6.14.1 SD card interface

The SD card interface, SDMMC1, is 4-bit wide with level shifter support, in order to connect to an SD 3.0-compliant bidirectional dual voltage level translator, interfacing with the memory card inserted in the SDCARD connector.

Table 17 describes the IO for the SDMMC1 interface.

Table 17. IO configuration for the SDIO interface

IO	Signal(1)
PC12	**SDMMC1_CK**
PE4	SDMMC1_CKIN
PD2	**SDMMC1_CMD**
PB9	**SDMMC1_CDIR**
PC8	**SDMMC1_D0**
PC9	SDMMC1_D1
PC10	SDMMC1_D2
PC11	SDMMC1_D3
PF2	SDMMC1_D0DIR
PC7	SDMMC1_D123DIR
PF14	uSD_LDO_SEL

1. *Minimum set of signals required by the boot ROM during SD card boot in **bold***

Figure 11 shows the SDCARD connector pinout MB1263/CN9.

Figure 11. SDCARD connector pinout MB1263/CN9

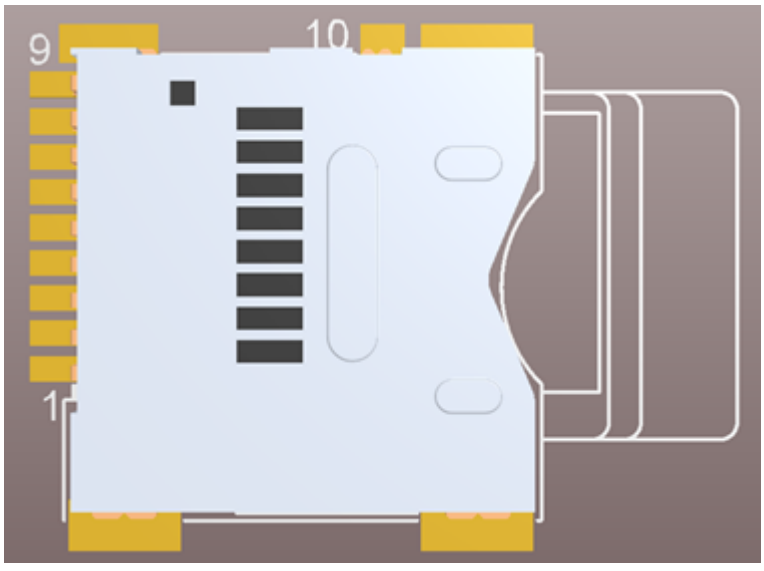


Table 18 describes the SDCARD connector pinout MB1263/CN9.

Table 18. **SDCARD connector pinout MB1263/CN9**

Pin	Board function
1	DATA2_SD
2	DATA3_SD
3	CMD_SD
4	VDD_SD
5	CLK_SD
6	GND
7	DATA0_SD
8	DATA1_SD
9	GND
10	SDCARD_DETECT active LOW

6.15 Audio

A codec WM8994ECS/R connected to an SAI of STM32MP157xAA3 supports TDM feature of the SAI port. TDM feature offers to STM32MP157xAA3 the capability to stream stereo audio channels. There are four digital microphones on STM32MP157x-EV1 board. STM32MP157x-EV1 also offers the possibility to connect a MEMS extension module.

6.15.1 Audio codec interface

The audio codec has two supplies 3V3 and 1V8 provided by STPMIC1.

The audio codec interfaces to the MPU are SAI2 and I2C2. Audio interrupt is connected to the IO-expander MFX.

SAI2A as Tx and SAI2B as Rx are connected to two different analog interfaces of the codec, to independently playback and record.

SAI2 is connected by default to the audio codec, and may be shared via solder bridge configuration with the expansion GPIO connector (refer to paragraph 6.28).

I2C2 is shared with all the peripherals: Audio codec, DSI LCD, RGB LTDC, Camera, and USB Hub. The audio codec I²C address is 0x36

Table 19. **IO configuration for the Audio Codec interface**

IO	Board function
PI5	SAI2_SCKA
PI7	SAI2_FSA
PI6	SAI2_SDA
PF11	SAI2_SDB
PE12	SAI2_SCK_B
PE13	SAI2_FS_B
PE0	SAI2_MCLKA
PE14	SAI2_MCLKB
PH5	I2C2_SDA
PH4	I2C2_SCL
MFX_IO5	AUDIO_INT

6.15.2 Digital microphones

MB1262/U1, U2, U3 and U4 are four MP34DT01TR MEMS digital omnidirectional microphones providing PDM (pulse density modulation) outputs. The implementation allows the beam forming.

Those 4 digital microphones support two stereo inputs connected either to the audio Codec or, by default, connected on two DFSDM odd channels of STM32MP157xAA3: DFSDM_DATA1 and DFSDM_DATA3 synchronized on DFSDM_CKOUT.

The STM32MP157xAA3 DFSDM interface is shared between the 4 embedded digital microphones and the extension module on connector MB1262/CN8.

Table 20 describes the HW configuration for the digital microphones.

Table 20. HW configuration for the digital microphones

Jumpers	HW	Setting	Configuration(1)
MB1262/JP1	U1/U3 stereo output selection	JP1[1-2]	Connected to codec DMICDAT2
		JP1[2-3]	Connected to STM32MP157xAA3 DFSDM_DATA3
MB1262/JP2	U2/U4 stereo output selection	JP2[1-2]	Connected to codec DMICDAT1
		JP2[2-3]	Connected to STM32MP157xAA3 DFSDM_DATA1
MB1262/JP3	U1/U2/U3/U4 CLK selection	**JP3[1-2]**	**Connected to STM32MP157xAA3 DFSDM_CKOUT**
		JP3[2-3]	Connected to codec DMICCLK
MB1262/JP4	U1/U2/U3/U4 VDD selection	**JP4[1-2]**	**3V3**
		JP1[2-3]	Codec MICBIAS1

1. *Default configuration in **bold***

6.15.3 Analog microphone and audio jack headphone

A headset including an analog microphone and a stereo headphone may be connected to the black 3.5 mm headset jack MB1262/CN5.

Figure 12. Audio jack connector MB1262/CN5

Table 21. Audio jack connector pinout MB1262/CN5

Pin	Board function
2	MIC_IN
3	GND
4	OUT_RIGHT
5	N/A
6	OUT_LEFT
7	N/A

6.15.4 Audio speaker out

The codec stereo speaker output is connected to a green 3.5 mm Speaker_out jack MB1262/CN4.

Figure 13. Audio jack connector MB1262/CN4

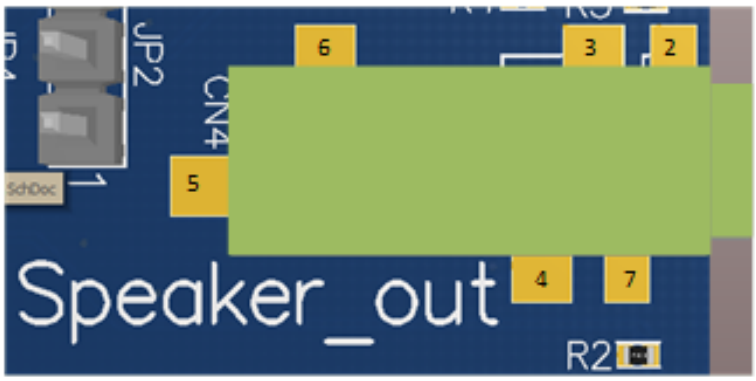


Table 22. Audio jack connector pinout MB1262/CN4

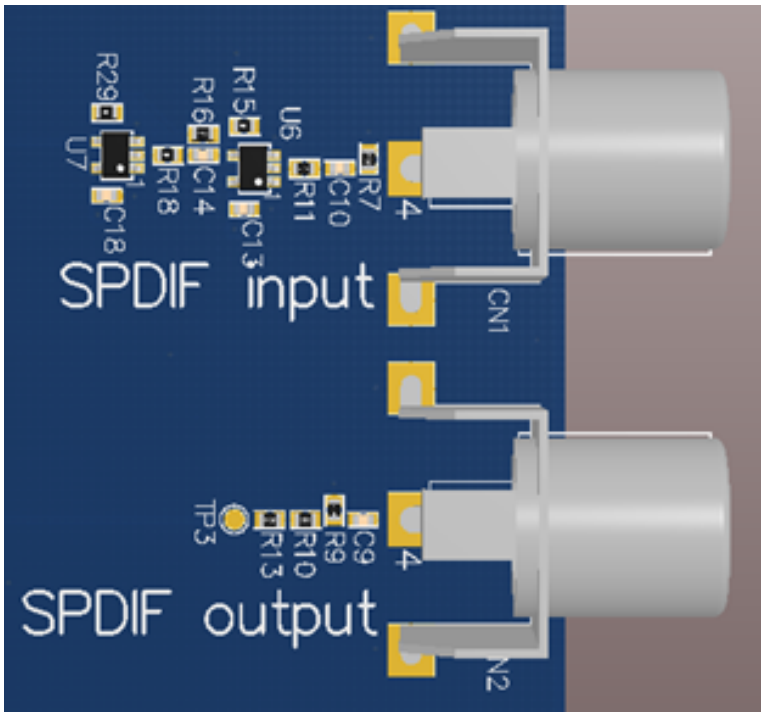
Pin	Board function
2	GND
3	GND
4	OUT_RIGHT
5	N/A
6	OUT_LEFT
7	N/A

6.15.5 SPDIF input and output

An RCA (white) connector MB1262/CN1 followed by an amplifier/filter stage is connected to the STM32MP157xAA3 SPDIF RX_IN.

The STM32MP157xAA3 SAI4_SDA port provides SPDIF_TX data to a RCA (yellow) connector MB1262/CN2.

Figure 14. **SPDIF input MB1262/CN1 and output MB1262/CN2 connectors**



6.15.6 IO restriction to other features

Due to the share of some IO of STM32MP157xAA3 by multiple peripherals, the following limitations apply in using the audio features:

The SAI AUDIO CODEC must not be operated simultaneously with expansion connector MB1262/CN21.
The MEMS DFSDM must not be operated simultaneously with DFSDM of EXT MEMS module MB1262/CN8.

6.16 DSI LCD

Through the MB1262/CN19 connector, a DSI LCD mounted on a daughterboard MB1230 is provided. MB1230 is a 5.5" TFT 720*1280 pixels with LED backlight, MIPI® DSI interface and capacitive touch panel based on RK055AHD042-CT module embedding the LCD driver IC RM68200 and a touch screen controller GT9147.

3V3 and VIN supply MB1230:

- 3V3: for the LCD module (VDD_LCD and VIO_LCD) and Touch screen
- VIN: for the LED backlight of the LCD

6.16.1 DSI LCD interface

MB1230 is connected to the STM32MP157xAA3 through the DSI interface, I2C to control the GT9147, and LCD_BL_CTRL. LCD_INT signal is connected to MFX.

The I2C is I2C2 that is shared with all the peripherals: audio codec, MFX, RGB LTDC, camera, and USB hub. The GT9147 I^2C address is 0xBB.

Table 23 describes the IO configuration for the LCD interface.

Table 23. **IO configuration for the LCD interface**

IO	Configuration
PH4	I2C2_SCL
PH5	I2C2_SDA
DSI_D0P	DSI_D0_P is used as MIPI-DSI data Lane 0 positive
DSI_D0N	DSI_D0_N is used as MIPI-DSI data Lane 0 negative

IO	Configuration
DSI_D1P	DSI_D1_P is used as MIPI-DSI data Lane 1 positive
DSI_D1N	DSI_D1_N is used as MIPI-DSI data Lane 0 negative
DSI_CKP	DSI_CKP is used as clock Lane positive
DSI_DKN	DSI_DKN is used as clock Lane negative
PD13	LCD_BL_CTRL – Backlight Control
PF15	DSI_RESET
PC6	DSI_TE – Tearing Effect
MFX_IO14	LCD_INT - interruption

6.17 Camera

Through the MB1262/CN7 connector, a camera module mounted on a daughterboard MB1379 is provided. MB1379 is a 5 Mpixels, 8-bit color camera module based on OV5640 image sensor, clocked from a 24 MHz crystal (MB1379/X1). It is supplied by 2V8.

6.17.1 Camera interface

MB1379 is connected to the STM32MP157xAA3 through DCMI and I^2C interfaces. RSTI, XSDN, PLUG signals are connected to MFX.

The I2C is I2C2 that is shared with all the peripherals: audio codec, MFX, RGB LTDC, DSI LCD, and USB hub. The camera I²C address is 0x3C.

Table 24 describes the IO configuration for the camera interface.

Table 24. IO configuration for the camera interface

IO	Configuration
PH4	I2C2_SCL
PH5	I2C2_SDA
PH9	DCMI_D0
PH10	DCMI_D1
PH11	DCMI_D2
PH12	DCMI_D3
PH14	DCMI_D4
PI4	DCMI_D5
PB8	DCMI_D6
PE6	DCMI_D7
PI1	DCMI_D8(1)
PH7	DCMI_D9(1)
PI3	DCMI_D10(1)
PH15	DCMI_D11(1)
PB7	DCMI_VSYNC
PH8	DCMI_HSYNC
PA6	DCMI_PIXCLK
MFX_IO12	Camera PLUG detection
MFX_O3	RSTI - Camera RESETB, active low

IO	Configuration
MFX_O2	XSDN – Camera PWDN, active high

1. *Available on the MB1262/CN7 connector, but not used in the MB1379 module*

6.18 1 Gbps Ethernet

The STM32MP157x-EV1 board provides a 1 Gbps Ethernet feature thanks to an external physical interface device (PHY), RTL8211EG-VB-CG. This PHY is connected to the STM32MP157xAA3 Gigabit reduced medium-independent interface (RGMII), and is clocked from a 25 MHz Crystal (X1).

The Ethernet PHY is supplied by 3V3. It generates its own supply 1V05 and Digital/Analog 3V3.

LD1 LED is blinking to indicate the data transmission.

The Ethernet module connector MB1262/CN6 is for STMicroelectronics internal use only.

6.18.1 RGMII interface

Table 25 describes the IO configuration for the Ethernet interface.

Table 25. IO configuration for the Ethernet interface

IO	Configuration
PD10	PD10 (SUB_NRST) is used as PHY_NRST active Low
PA2	PA2 is used as ETH_MDIO
PG0	PG0 is used as ETH_MDINT
PC1	PB11 is used as ETH_MDC
PA7	PA7 is used as ETH_RX_DV(PHY_AD2)
PC4	PC4 is used as ETH_RXD0
PC5	PC5 is used as ETH_RXD1
PB0	PB0 is used as ETH_RXD2
PB1	PB1 is used as ETH_RXD3
PB11	PB11 is used as ETH_TX_EN
PG13	PG13 is used as ETH_TXD0
PG14	PG14 is used as ETH_TXD1
PC2	PB11 is used as ETH_TXD2
PE2	PE2 is used as ETH_TXD3
PA1	PA1 is used as ETH_RX_CLK
PG4	PG4 is used as ETH_GTX_CLK
PG5	PG5 is used as ETH_CLK125

Figure 15. **Ethernet connector MB1262/CN3**

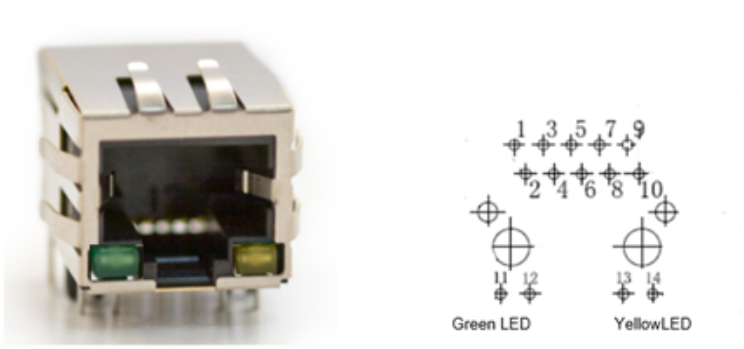


Table 26. **Ethernet connector pinout MB1262/CN3**

Pin number	Pin name	Function
1	TX1+	First Bidirectional pair to transmit and receive data
2	TX1-	
3	TX2+	Second Bidirectional pair to transmit and receive data
4	TX2-	
5	CT1	Common connected to GND
6	CT2	Common connected to GND
7	TX3+	Third Bidirectional pair to transmit and receive data
8	TX3-	
9	TX4+	Fourth Bidirectional pair to transmit and receive data
10	TX4-	
11	GA	Green Led anode
12	GC	Green Led cathode
13	YA	Yellow Led anode
14	YC	Yellow Led cathode
15	GND	GND
16	GND	GND

6.19 USB OTG HS

The STM32MP157x-EV1 board supports USB OTG high speed communication via a USB Micro-AB connector MB1262/CN16. OTG VBUS supply is managed by the STPMIC1. MB1262/LD2 turns green when USB OTG connection is established.

6.19.1 USB OTG interface

Table 27 describes the IO configuration for the USB OTG interface.

Table 27. **IO configuration for the USB OTG interface**

IO	Configuration
PA10	**OTG_ID line detection**
OTG_VBUS	**OTG_VBUS sensing**

IO	Configuration
USB_DP2	USB_DP2
USB_DM2	USB_DM2

Figure 16. USB OTG Type Micro-AB connector MB1262/CN16

Table 28. USB OTG Type Micro-AB connector pinout MB1262/CN16

Pin CN16	Pin name	Signal name	Function
1	**VBUS**	OTG VBUS	VBUS supply and sensing
2	**D-**	DM	USB_DM2
3	**D+**	DP	USB_DP2
4	**ID**	ID	ID
5	**GND**	VBUS	GND

6.20 USB host

The STM32MP157x-EV1 board provides 4 USB host port (2 dual USB Type A connectors MB1262/CN18 and CN20) thanks to a USB hub USB2514B-AEZC. The USB2514B have a full power management for each USB host port. The default configuration of USB2514B is done in HW, thus I2C is not needed by default. However, if required for a specification application, I2C may be accessed through MB1262/SB71 and SB68 to I2C2 as described in Table 29.

6.20.1 USB host interface

Table 29 describes the IO configuration for the USB host interface.

Table 29. IO configuration for the USB Host interface

IO	SB	Setting	Configuration(1)
PH5	MB1262/SB71	**OFF**	**PH5 is not used as I2C2_SDA**
PH4	MB1262/SB68	**OFF**	**PH4 is not used as I2C2_SCL**
PD10	-	-	SUB_NRST
USB_DP1	-	-	USB1_P
USB_DM1	-	-	USB1_N

1. *Default configuration in **bold***

Figure 17. **Dual USB TYPE A connector MB1262/CN18 and CN20**

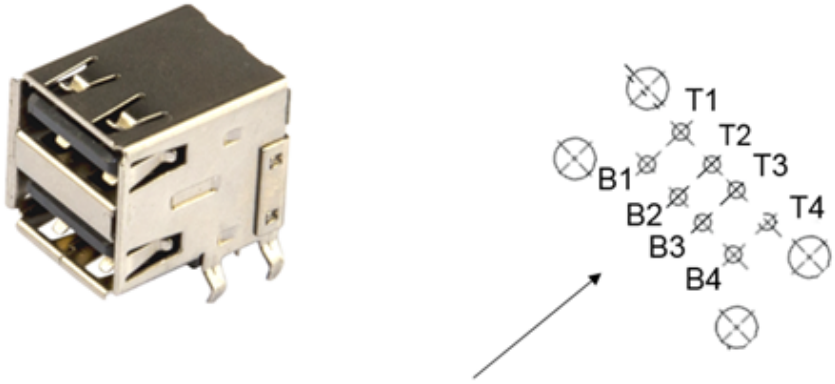


Table 30. **USB Host connector pinout MB1262/CN18**

Pin CN18	Pin name	Function
T1	**T1**	VBUS
T2	**T2**	DM
T3	**T3**	DP
T4	**T4**	GND
B1	**B1**	VBUS
B2	**B2**	DM
B3	**B3**	DP
B4	**B4**	GND

Table 31. **USB Host connector pinout MB1262/CN20**

Pin CN20	Pin name	Function
T1	**T1**	VBUS
T2	**T2**	DM
T3	**T3**	DP
T4	**T4**	GND
B1	**B1**	VBUS
B2	**B2**	DM
B3	**B3**	DP
B4	**B4**	GND

6.21 RS-232 port

The STM32MP157x-EV1 board offers one RS-232 communication port. The RS-232 communication port uses the DB9 male connector MB1262/CN12.

6.21.1 RS-232 interface

The RS-232 transceiver MB1262/U12 supply is 3V3. The RS-232 interface is connected to the STM32MP157xAA3 UART4 that is shared exclusively with the USB micro-B/ST-LINK v2-1 VCP as described in Table 32.

Table 32. HW configuration for the RS-232 interface

Jumpers	IO	Setting	Configuration(1)
MB1263/JP4	UART4_TX	**JP4[1-2]**	**connected to RS232 CN12**
		JP4[2-3]	Connected to ST-Link V2-1 VCP RX
MB1263/JP5	UART4_RX	**JP5[1-2]**	**connected to RS232 CN12**
		JP5[2-3]	Connected to ST-Link V2-1 VCP TX

1. *Default configuration in **bold***

Figure 18. HW configuration for the RS-232 interface

Figure 19. RS-232 connector pinout MB1262/CN12

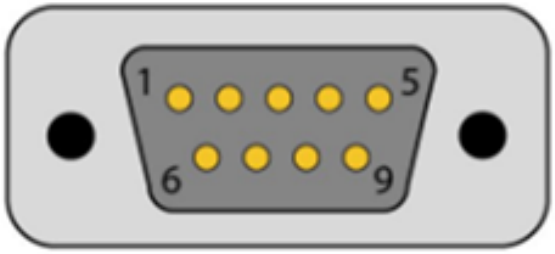


Table 33 RS-232 connector pinout MB1262/CN12

Table 33. RS-232 connector pinout MB1262/CN12

Board function	Pin	Pin	Board function
NC	**1**	**6**	DSR
RXD	**2**	**7**	NC
TXD	**3**	**8**	CTS

Board function	Pin	Pin	Board function
NC	**4**	**9**	NC
GND	**5**	-	

6.21.2 IO restriction to other features

The RS-232 must not be operated simultaneously with the STLINK-VCP.

6.22 FDCAN

The STM32MP157x-EV1 board supports one FDCAN compliant with ISO-11898-1 version 2.0 part A, B. The MB1262/CN15 DB9 male connector is available as FDCAN interface.

6.22.1 Operating voltage

A 5V/3v3 IO compliant high speed FDCAN transceiver is fitted between the MB1262/CN15 connector and the CAN controller port of STM32MP157xAA3.

6.22.2 FDCAN interface

Table 34 describes the IO for the CAN interface.

Table 34. IO configuration for the SDIO interface

IO	Signal
PG3	CAN_STBY
PH13	CAN_TX
PI9	CAN_RX

Figure 20 shows the FDCAN connector pinout MB1262/CN15.

Figure 20. FDCAN connector pinout CN15

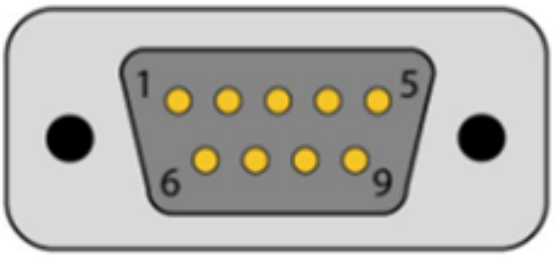


Table 35 describes the FDCAN interface and connector pinout CN17.

Table 35. FDCAN interface and connector pinout CN17

CAN transceiver	Board function	Pin	Pin	Board function	CAN transceiver
-	NC	**1**	**6**	GND	-
CANL	CANL	**2**	**7**	CANH	CANH
GND	GND	**3**	**8**	NC	-
-	NC	**4**	**9**	NC	-
-	GND	**5**	-		

6.23 Smartcard

The STM32MP157x-EV1 board supports one Smartcard interface. The MB1262/CN23 Smartcard connector is used as card reader.

6.23.1 Smartcard interface

A 3V3 Smartcard interface MB1262/U5 is used between the card reader connector MB1262/CN23 and the Smartcard controller port of STM32MP157xAA3.

The Smartcard interface is connected for some IO to the STM32MP157xAA3 and for other IO to the MFX IO expander.

Table 36. HW configuration for the Smartcard interface

IO	Configuration
PZ7	PZ7 is connected to Smartcard interface as SMARTCARD_IO
PZ6	PZ6 is connected to Smartcard interface as SMARTCARD_CLK
MFX_IO6	MFX_IO6 used as SMARTCARD_3/5V
MFX_IO7	MFX_IO7 used as SMARTCARD_OFF
MFX_IO8	MFX_IO8 used as SMARTCARD_RST
MFX_IO9	MFX_IO9 used as SMARTCARD_CMDVCC

Figure 21. Smartcard connector pinout MB1262/CN23

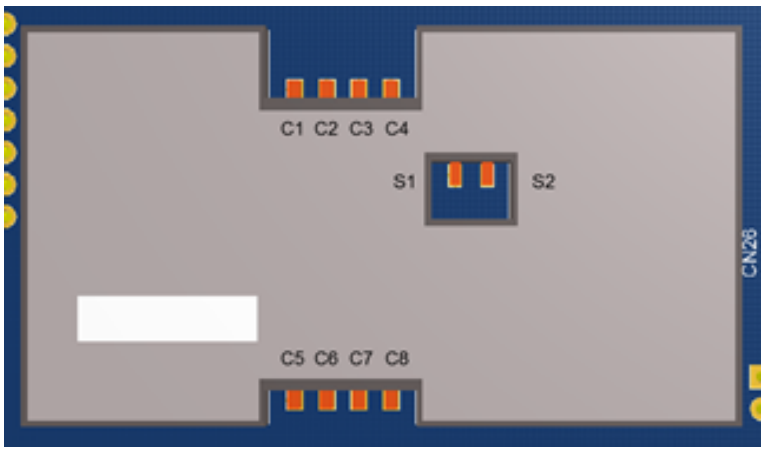


Table 37 describes the Smartcard interface MB1262/U5 and connector pinout MB1262/CN23.

Table 37. Smartcard interface MB1262/U5 and connector pinout MB1262/CN23

Pin	Board function	U5 Smartcard interface pin
C1	VCC: Card supply	U5-17
C2	RST: Card Reset	U5-16
C3	CLK: Card CLK	U5-15
C4	NC	U5-13
C5	GND: CARD GND	U5-14
C6	SWIO	-

Pin	Board function	U5 Smartcard interface pin
C7	I/O CARD DATA	U5-11
C8	NC	U5-12
S1	GND: CAR GND	GND
S2	DETECT: CARD-Detect (LOW)	U5-9

6.24 ADC/DAC

The STM32MP157x-EV1 provides some on-board analog-to-digital converters ADC and digital-to-analog converters DAC:

- 2x ADC/DAC
- 2x Fast ADC
- 1x Slow ADC

6.24.1 ADC/DAC IO interface

The STM32MP157xAA3 port PA4 may be configured to operate either as ADC input or as DAC output. PA4 is routed to two-way headers MB1263/JP11, to fetch signals to or from MB1263/JP11, or grounded it by fitting a jumper into MB1263/JP11. Same situation for PA5 and its related MB1263/JP10 header.

Parameters of the ADC/DAC low-pass filters formed with MB1263/R24, C31, R19 for PA4 and MB1263/R25, C32, R20 for PA5 may be modified by replacing these components according to application requirements (Default configuration is: R24/R19/R25/R20=0 Ohm, C31/C32 not fitted).

6.24.2 Fast ADC

ANA0 may be configured as a fast ADC channel routed to MB1263/JP8. MB1263/SB6, closed by default, should be opened.

ANA1 may be configured as a fast ADC channel routed to MB1263/JP9. MB1263/SB7, closed by default, must be opened.

Parameters of the low-pass filters formed with MB1263/R22, C29, and R17 for ANA0 and MB1263/R23, C30 and R18 for ANA1 may be modified by replacing these components according to application requirements (Default configuration is: R22/R17/R23/R18=0 Ohm, C29/C30 not fitted).

6.24.3 Slow ADC

The port PF12 may be configured as slow ADC channel, routed to MB1263/JP7. MB1263/SB5, closed by default, must be opened.

Parameters of the low-pass filters formed with MB1263/R21, C28, and R16 may be modified to application requirements (Default configuration is R21/R16=0 Ohm, C28 not fitted).

The VREF+ terminal of STM32MP157xAA3 is used as reference voltage for both ADC and DAC. By default, it is connected on board to VDDA through MB1263/R96, which may be removed to apply directly an external voltage to VREF+ for specific purposes.

Figure 22 ADC/DAC connectors MB1263/JP7, JP8, JP9, JP10, and JP11

Figure 22. ADC/DAC connectors MB1263/JP7, JP8, JP9, JP10, and JP11

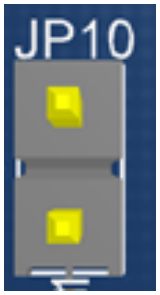


Table 38. **ADC/DAC connectors JP7/JP8/JP9/JP10/JP11 pinout**

Signal name	Pin	Pin	Signal name
ADC/DAC	**1**	**2**	GND

6.24.4 Limitations

Due to the share of some IO of STM32MP157xAA3 by multiple peripherals, the following limitations apply in using the PMOD Button features:

The fast ADC ANA0/ANA1 and slow ADC PF12 may not be operated simultaneously with motor control function.

6.25 I2C_EXT connector

I2C_EXT connector MB1262/CN13 may be connected to I²C bus daughterboard. CN13 connector pin 5 is connected to 3V3, so external module must be compliant with 3V3.

MFX_GPIO0 of MFX MCU provides EXT_RESET.

6.25.1 I2C_EXT IO interface

Table 39. **HW configuration for the I2C_EXT interface**

IO	Bridge	Setting[1]	Comment
PA11	MB1262/ SB51	**ON**	**PA11 ,used as I2C5_SCL, is connected to EXT_SCL**
		OFF	PA11 is not connected to EXT_SCL PA11 may be connected to the GPIO expansion connector through MB1262/ SB52
PA12	MB1262/ SB54	**ON**	**PA12 ,used as I2C5_SDA, is connected to EXT_SDA**
		OFF	PA12 is not connected to EXT_SDA PA12 may be connected to the GPIO expansion connector through MB1262/ SB55
MFX_GPIO0	-	-	**Connected to EXT_RESET**

1. *Default configuration is shown in **bold***

Figure 23 shows the I2C_EXT connector pinout MB1262/CN13.

Figure 23. **I2C_EXT connector pinout MB1262/CN13**

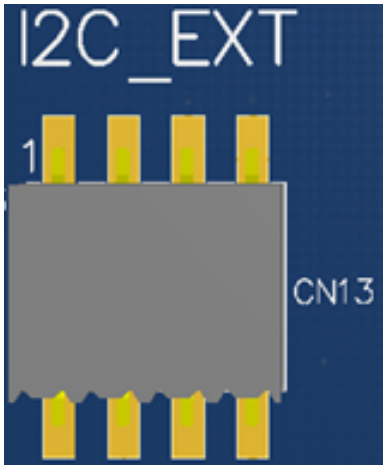


Table 40 describes the I2C_EXT connector pinout MB1262/CN13.

Table 40. **I2C_EXT connector pinout MB1262/CN13**

Signal name	Pin	Pin	Signal name
EXT_SDA	**1**	**2**	NC
EXT_SCL	**3**	**4**	EXT_RST
3V3	**5**	**6**	NC
GND	**7**	**8**	NC

6.26 MFX MCU

The MFX: Multi-Function eXpander MCU is used as a GPIO expander, in position MB1262/U20.

6.26.1 MFX IO expander

Supplied by 3V3.

The communication interface between MFX and STM32MP157xAA3 is I2C bus, and an IRQOUT pin.

The I2C is I2C2 that is shared with all the peripherals: Audio codec, DSI LCD, RGB LTDC, Camera, and USB Hub.

The MFX I²C address is 0x42h.

Table 41. **HW configuration for the MFX interface**

IO	SB	Setting	Configuration(1)
PI8	R127	**ON**	**MFX_IRQ_OUT is connected to PI8**
PH5	R124	**ON**	**PH5 is used as I2C2_SDA**
PH4	R125	**ON**	**PH4 is used as I2C2_SCL**
PD10	-	-	SUB_NRST

1. *Default configuration in **bold***

Table 42. **IO signals driven by the MFX**

Pin number	Pin name	Signal name	Function
18	GPIO0	JOY_CENTER	MB1262/B1 Joystick selection
19	GPIO1	JOY_DOWN	MB1262/B1 Joystick down direction
20	GPIO2	JOY_LEFT	MB1262/B1 Joystick left direction
39	GPIO3	JOY_RIGHT	MB1262/B1 Joystick right direction
40	GPIO4	JOY_UP	MB1262/B1 Joystick up direction
15	GPIO5	Audio_INT	MB1262/U8 audio codec interrupt
16	GPIO6	SMARTCARD_3V/5V	MB1262/U5 Smart card 3 V 5 V selection
17	GPIO7	SMARTCARD_OFF	MB1262/U5 Smart Card OFF
29	GPIO8	SMARTCARD_RST	MB1262/U5 Smart Card RESET
30	GPIO9	SMARTCARD_CMDVCC	MB1262/U5 smartcard VCC command
31	GPIO10	MIC_MEMS_LED	MB1262/CN8 pin12
32	GPIO11	-	-
33	GPIO12	CAMERA_PLUG	Camera plug detection
26	GPIO13	-	-
27	GPIO14	LCD_INT	DSI or LTDC interrupt

Pin number	Pin name	Signal name	Function
28	GPIO15	-	-

6.27 Motor control

The STM32MP157x-EV1 board supports both asynchronous and synchronous 3-phase brushless motor control via a 34-pin connector MB1262/CN22, which provides all required control and feedback signals, to and from motor power-driving board.

Available signals on this connector includes emergency stop, motor speed, 3-phase motor current, bus voltage, heatsink temperature coming from the motor driving board and 6 channels of PWM control signal (MC-xH/L) going to the motor driving circuit.

6.27.1 Motor control IO interface

Because of IO consuming limitation, the motor control IO interface is not enabled by default. As described below, some board modifications are needed to connect the motor control interface.

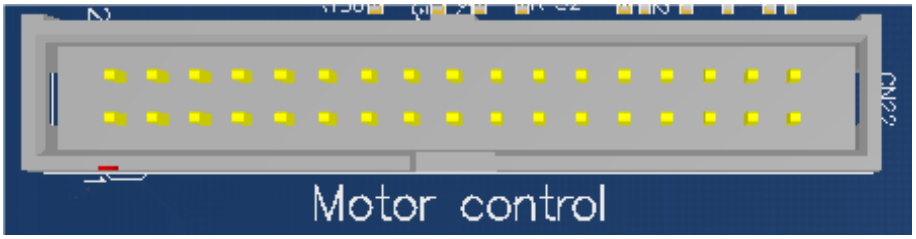
Table 43 describes the assignment of the MB1262/CN22 motor control interface and the IO function associated from the STM32MP157xAA3.

Table 43. Motor control terminal and IO function assignment

Motor Control connector CN22		STM32MP157xAA3 microcontroller			
Terminal	Terminal name	Port name	Function	Alternate function	Board configurations to enable Motor Control
1	Emergency Stop	PA6	TIM8_BKIN	DCMI_PIXCLK	Close MB1262/SB22
2	GND	-	-	-	-
3	MC_UH	PI5	TIM8_CH1	SAI_2_SCK_A	Close MB1262/SB67 Open MB1262/SB9 and SB66
4	GND	-	-	-	-
5	MC_UL	PH13	TIM8_CH1N	CAN_1_TX	Close MB1262/SB76
6	GND	-	-	-	-
7	MC_VH	PI6	TIM8_CH2	SAI_2_SD_A	Close MB1262/SB75 Open MB1262/SB10 and SB73
8	GND	-	-	-	-
9	MC_VL	PH14	TIM8_CH2N	DCMI_D4	Close MB1262/SB21
10	GND	-	-	-	-
11	MC_WH	PI7	TIM8_CH3	SAI_2_FS_A	Close MB1262/SB65 Open MB1262/SB11 and SB63
12	GND	-	-	-	-
13	MC_WL	PH15	TIM8_CH3N	DCMI_D11	Close MB1262/SB33
14	Bus Voltage	PA3	ADC_1_IN15	GPIO6_TIM2_CH4	Close MB1262/SB14
15	PhaseA current	PF12	ADC_1_IN6	-	Close MB1262/SB20
16	GND	-	-	-	-
17	PhaseB current	ANA0	ADC_1_IN0	ADC_2_IN0	Close MB1262/SB12
18	GND	-	-	-	-
19	PhaseC current	ANA1	ADC_2_IN1	-	Close MB1262/SB13
20	GND	-	-	-	-
21	NTC Bypass	PF3	GPIO	GPIO7	Close MB1262/SB19

Motor Control connector CN22		STM32MP157xAA3 microcontroller			
Terminal	Terminal name	Port name	Function	Alternate function	Board configurations to enable Motor Control
22	GND	-	-	-	-
23	Dissipative Brake	PH6	TIM12_CH1	GPIO12_TIM12_CH1	Close MB1262/SB29
24	GND	-	-	-	-
25	5V	-	-	-	-
26	Heatsink Temp.	PF11	ADC_1_IN2	SAI_2_SD_B	Close MB1262/SB70 Open MB1262/SB8 and SB69
27	PFC Sync	PE0	TIM4_ETR	SAI_2_MCLK_A	Close MB1262/SB53 Open MB1262/SB7
28	3V3	-	-	-	-
29	PFC PWM	PB8	TIM4_CH3	DCMI_D6	Close MB1262/SB24
30	GND	-	-	-	-
31	Encoder A	PH10	TIM5_CH1	DCMI_D1	Close MB1262/SB28
32	GND	-	-	-	-
33	Encoder B	PH11	TIM5_CH2	DCMI_D2	Close MB1262/SB30
34	Encoder Index	PH12	TIM5_CH3	DCMI_D3	Close MB1262/SB26

Figure 24. Motor control connector MB1262/CN22



6.27.2 Limitations

Due to the share of some IO of STM32MP157xAA3 by multiple peripherals, the following limitations apply in using the Motor control features:

The Motor control may not be operated simultaneously with the camera, audio Codec, CAN and GPIO expansion (GPIO6, 7 and 12).

6.28 GPIO 40-pin expansion connector

A 2x20-pin, 2.54 mm, GPIO connector is implemented on MB1262/CN21.

28 pins are GPIO, 8 are GND, 2x 5V DC and 2x 3V3 DC are provided on this connector.

This GPIO 40-pin expansion connector has a Raspberry Pi shields support capability.

Figure 25. MB1262/CN21 connector

Please note the pin1 position that is on the bottom right on MB1262/CN21.

Table 44 describes the MB1262/CN21 connector pinout.

Table 44. MB1262/CN21 connector pinout

STM32 pin	Board function	Pin	Pin	Board function	STM32 pin
-	3V3	**1**	**2**	5V	-
PA12	I2C5_SDA	**3**	**4**	5V	-
PA11	I2C5_SCL	**5**	**6**	GND	-
PI11	MCO1	**7**	**8**	USART3_TX	PB10
-	GND	**9**	**10**	USART3_RX	PB12
PG8	USART3_RTS	**11**	**12**	SAI2_SCKA	PI5
PD7	SDMMC3_D3	**13**	**14**	GND	GND
PG15	SDMMC3_CK	**15**	**16**	SDMMC3_CMD	PF1
-	3V3	**17**	**18**	SDMMC3_D0	PF0
PZ2	SPI1_MOSI	**19**	**20**	GND	GND
PZ1	SPI1_MISO	**21**	**22**	SDMMC3_D1	PF4
PZ0	SPI1_SCK	**23**	**24**	SPI1_NSS	PZ3
-	GND	**25**	**26**	GPIO	-
PH5	I2C2_SDA	**27**	**28**	I2C2_SCL	PH4
PG2	MCO2	**29**	**30**	GND	-
PA3	TIM2_CH4	**31**	**32**	TIM12_CH1	PH6
PI2	TIM8_CH4	**33**	**34**	GND	-
PI7	SAI2_FSA	**35**	**36**	USART3_CTS	PI10
PF5	SDMMC3_D2	**37**	**38**	SAI2_SDA	PI6
-	GND	**39**	**40**	SAI2_SDB	PF11

SAI2 on the GPIO connector supports PCM signals. SAI2 is shared between the audio codec and this GPIO expansion connector. By default, SAI2 is connected to the audio codec. I2C5 is connected by default to the I2C_EXT connector.

The following HW board modifications are needed to enable SAI2 and I2C5 on the GPIO expansion connector, as described in Table 45.

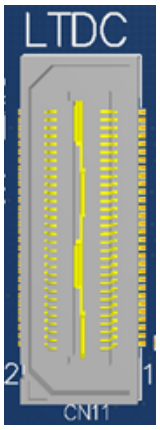
Table 45. HW configurations to enable SAI2 on the GPIO connector

STM32 pin	Board function	Board modifications to enable SAI2 on the GPIO connector
PI5	SAI2_SCKA	Open MB1262/SB9 and SB67. Close MB1262/SB66
PI7	SAI2_FSA	Open MB1262/SB11 and SB65. Close MB1262/SB63
PI6	SAI2_SDA	Open MB1262/SB10 and SB75. Close MB1262/SB73
PF11	SAI2_SDB	Open MB1262/SB8 and SB70. Close MB1262/SB69
PA12	I2C5_SDA	Open MB1262/SB54. Close MB1262/SB55
PA11	I2C5_SCL	Open MB1262/SB51. Close MB1262/SB52

6.29 RGB LTDC connector

A 2x30-pin RGB LTDC connector is implemented on MB1262/CN11.

Figure 26. MB1262/CN11 connector



A 24-bit RGB interface, LCD control signals (INT, Backlight BL_CTRL, LCD_RESET, I2C), HDMI_CEC and SPDIF_TX are available as described in the connector pinout Section 6.29 .

Table 46. MB1262/CN21 connector pinout

IO	Board function	Pin	Pin	Board function	IO
PK7	LTDC_DE	**1**	**2**	LTDC_R7	PJ6
-	-	**3**	**4**	LCD_INT	MFX_IO14
-	-	**5**	**6**	LTDC_B7	PK6
PJ4	LTDC_R5	**7**	**8**	-	-
PI12	LTDC_HSYNC	**9**	**10**	LTDC_VSYNC	PI13
-	-	**11**	**12**	-	-
MFX_O1	HDMI_PD	**13**	**14**	LTDC_R0	PI15
-	-	**15**	**16**	-	-
PJ0	LTDC_R1	**17**	**18**	LTDC_R2	PJ1
-	-	**19**	**20**	-	-
PJ2	LTDC_R3	**21**	**22**	LTDC_R4	PJ3
PK0	LTDC_G5	**23**	**24**	LTDC_G6	PK1
PJ4	LTDC_R5	**25**	**26**	LTDC_R6	PJ5
PK3	LTDC_B4	**27**	**28**	LTDC_B5	PK4
PJ6	LTDC_R7	**29**	**30**	LTDC_G0	PJ7
PK5	LTDC_B6	**31**	**32**	-	-
PJ8	LTDC_G1	**33**	**34**	LTDC_G2	PJ9
-	-	**35**	**36**	-	-
PJ10	LTDC_G3	**37**	**38**	LTDC_G4	PJ11
PJ12	LTDC_B0	**39**	**40**	LTDC_B1	PJ13
PJ14	LTDC_B2	**41**	**42**	LTDC_B3	PJ15
-	-	**43**	**44**	-	-

IO	Board function	Pin	Pin	Board function	IO
-	-	**45**	**46**	LCD_RESET (SUB_NRST)	PD10
-	3V3	**47**	**48**	5V	-
PK2	LTDC_G7	**49**	**50**	GND	-
PA15	HDMI_CEC	**51**	**52**	-	-
PH4	I2C2_SCL	**53**	**54**	SPDIF_TX	PB5
PH5	I2C2_SDA	**55**	**56**	GND	-
-	LCD_BL_CTRL	**57**	**58**	LTDC_CLK	PI14
-	-	**59**	**60**	GND	-

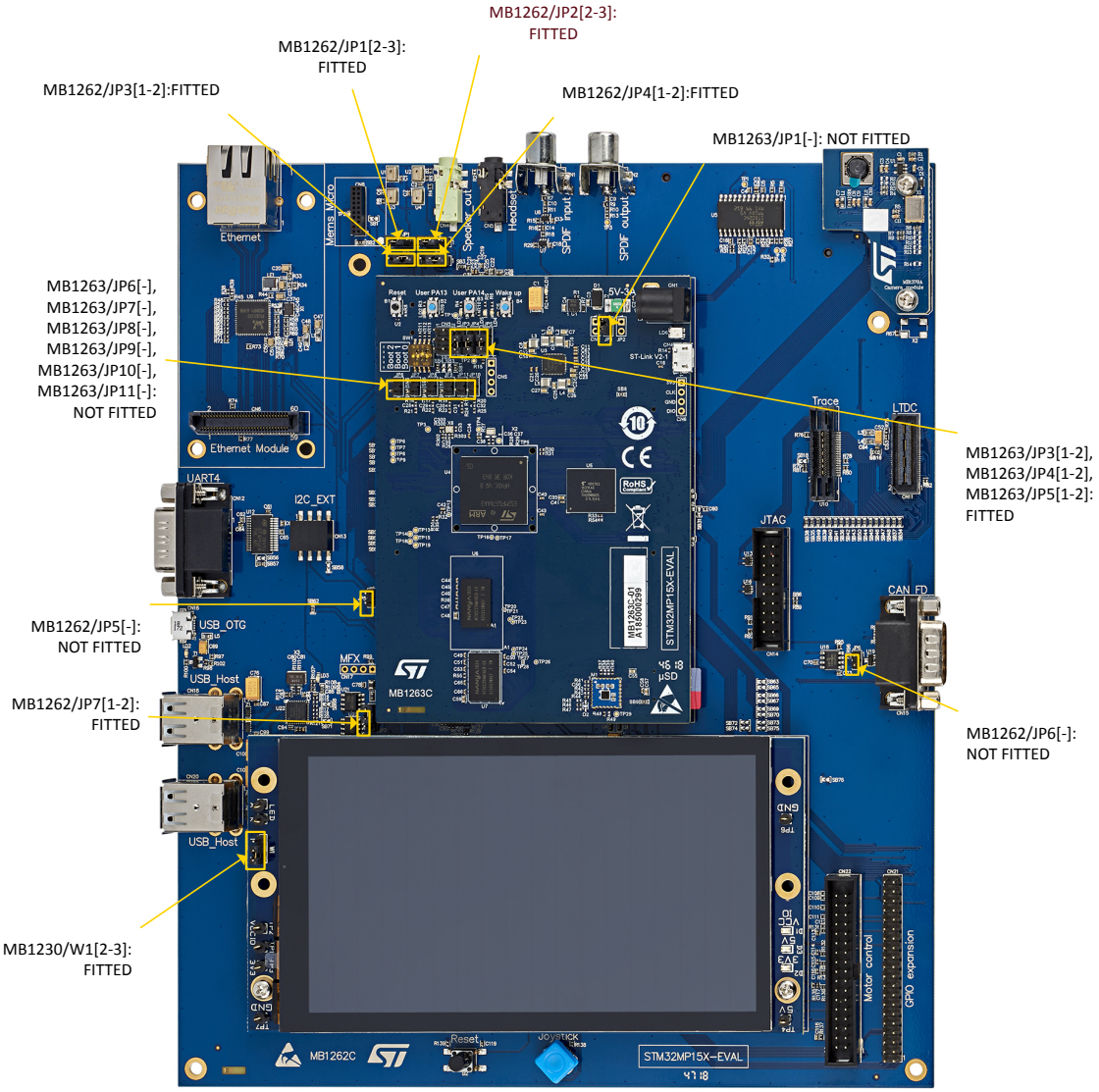
6.29.1 Limitations

LCD_INT, LCD_BL_CTRL are shared exclusively with the DSI.

Appendix A STM32MP157x-EV1 jumper summary

Figure 27 summarizes the jumper default setting of the STM32MP157x-EV1.

Figure 27. Jumper default setting of the STM32MP157x-EV1



Appendix B STM32MP157x-EV1 I/O Assignment

Table 47. **STM32MP157x-EV1 I/O Assignment**

LFBGA448 ball	IO Port	Main function	Motor Control connector
AA3	PA0	WAKE_UP	-
V4	PA1	ETH_RX_CLK	-
AB2	PA2	ETH_MDIO	-
T4	PA3	TIM2_CH4	Bus Voltage
V6	PA4	ADC1_IN18_DACOUT1	-
U5	PA5	ADC1_IN19_DACOUT2	-
W9	PA6	DCMI_PIXCLK	Emergency Stop
Y9	PA7	ETH_RX_DV	-
B13	PA8	SDMMC2_D4	-
A11	PA9	SDMMC2_D5	-
Y17	PA10	OTG_ID	-
Y16	PA11	I2C5_SCL	-
W16	PA12	I2C5_SDA	-
W3	PA13	PA13 GPIO	-
R3	PA14	PA14 GPIO	-
E11	PA15	HDMI_CEC	-
AB5	PB0	ETH_RXD2	-
AA5	PB1	ETH_RXD3	-
V13	PB2	UART4_RX	-
A12	PB3	SDMMC2_D2	-
C13	PB4	SDMMC2_D3	-
AA8	PB5	SPDIF_TX	-
W13	PB6	QSPI_BK1_NCS	-
F11	PB7	DCMI_VSYNC	-
AB8	PB8	DCMI_D6	PFC PWM
F12	PB9	SDMMC1_CDIR	-
V9	PB10	USART3_TX	-
Y5	PB11	ETH_TX_EN	-
AA7	PB12	USART3_RX	-
V10	PB13	DFSDM_CKOUT	-
A13	PB14	SDMMC2_D0	-
B12	PB15	SDMMC2_D1	-
U10	PC0	QSPI_BK2_NCS	-
AB3	PC1	ETH_MDC	-
Y1	PC2	ETH_TXD2	-
U3	PC3	DFSDM_DATA1	-
AB6	PC4	ETH_RXD0	-

LFBGA448 ball	IO Port	Main function	Motor Control connector
AA6	PC5	ETH_RXD1	-
E13	PC6	DSI_TE	-
D13	PC7	SDMMC1_D123DIR	-
E14	PC8	SDMMC1_D0	-
D14	PC9	SDMMC1_D1	-
F14	PC10	SDMMC1_D2	-
D15	PC11	SDMMC1_D3	-
E12	PC12	SDMMC1_CK	-
N2	PC13	PMIC_WAKEUP	-
P1	PC14	LSE_IN	-
P2	PC15	LSE_OUT	-
C10	PD0	NAND_D2	-
B10	PD1	NAND_D3	-
D12	PD2	SDMMC1_CMD	-
B11	PD3	SDMMC2_D123DIR	-
C9	PD4	NAND_NOE	-
A9	PD5	NAND_NWE	-
L3	PD6	NAND_NWAIT	-
F10	PD7	SDMMC3_D3	-
M1	PD8	NAND_D13	-
M2	PD9	NAND_D14	-
A8	PD10	NAND_D15	-
AB9	PD11	NAND_CLE	-
W12	PD12	NAND_ALE	-
V14	PD13	LCD_BL_CTRL	-
M3	PD14	NAND_D0	-
L1	PD15	NAND_D1	-
C5	PE0	SAI2_MCLKA	PFC Sync
D7	PE1	-	-
Y2	PE2	ETH_TXD3	-
A10	PE3	SDMMC2_CK	-
F15	PE4	SDMMC1_CKIN	-
C12	PE5	SDMMC2_D6	-
E9	PE6	DCMI_D7	-
W10	PE7	NAND_D4	-
Y12	PE8	NAND_D5	-
W11	PE9	NAND_D6	-
W14	PE10	NAND_D7	-
D5	PE11	uSD_LS_EN	-
E4	PE12	SAI2_SCKB	-

LFBGA448 ball	IO Port	Main function	Motor Control connector
A4	PE13	SAI2_FSB	-
B4	PE14	SAI2_MCLKB	-
C4	PE15	-	-
E10	PF0	SDMMC3_D0	-
B9	PF1	SDMMC3_CMD	-
F13	PF2	SDMMC1_D0DIR	-
V3	PF3	GPIO	NTC Bypass
F9	PF4	SDMMC3_D1	-
D9	PF5	SDMMC3_D2	-
AA11	PF6	QSPI_BK1_IO3	-
AA10	PF7	QSPI_BK1_IO2	-
AB10	PF8	QSPI_BK1_IO0	-
AB11	PF9	QSPI_BK1_IO1	-
V12	PF10	QSPI_CLK	-
W8	PF11	SAI_2_SDB	Heatsink Temp.
V8	PF12	SLOW ADC	PhaseA current
W7	PF13	DFSDM_DATA3	-
V7	PF14	uSD_LDO_SEL	-
W6	PF15	DSI_RESET	-
W5	PG0	ETH_MDINT	-
Y4	PG1	uSD_DETECT	-
W4	PG2	MCO2	-
U4	PG3	CAN_STBY	-
AB4	PG4	ETH_GTX_CLK	-
U8	PG5	ETH_CLK125	-
D11	PG6	SDMMC2_CMD	-
Y11	PG7	QSPI_BK2_IO3	-
Y8	PG8	USART3_RTS	-
W15	PG9	NAND_NCE	-
AA9	PG10	QSPI_BK2_IO2	-
U11	PG11	UART4_TX	-
J4	PG12	SPDIF_RX	-
AA1	PG13	ETH_TXD0	-
AA2	PG14	ETH_TXD1	-
D10	PG15	SDMMC3_CK	-
T1	PH0	HSE_IN	-
T2	PH1	HSE_OUT	-
AB7	PH2	QSPI_BK2_IO0	-
Y6	PH3	QSPI_BK2_IO1	-
A3	PH4	I2C2_SCL	-

LFBGA448 ball	IO Port	Main function	Motor Control connector
A2	PH5	I2C2_SDA	-
V11	PH6	TIM12_CH1	Dissipative Brake
W2	PH7	DCMI_D9	-
D6	PH8	DCMI_HSYNC	-
E6	PH9	DCMI_D0	-
B1	PH10	DCMI_D1	Encoder A
B3	PH11	DCMI_D2	Encoder B
F5	PH12	DCMI_D3	Encoder Index
D3	PH13	CAN_TX	MC_UL
C2	PH14	DCMI_D4	MC_VL
C1	PH15	DCMI_D11	MC_WL
D1	PI0	-	-
E2	PI1	DCMI_D8	-
E1	PI2	TIM8_CH4	-
E3	PI3	DCMI_D10	-
J6	PI4	DCMI_D5	-
F2	PI5	SAI2_SCKA	MC_UH
G5	PI6	SAI2_SDA	MC_VH
F1	PI7	SAI2_FSA	MC_WH
N1	PI8	MFX_IRQ_OUT	-
J5	PI9	CAN_RX	-
W1	PI10	USART3_CTS	-
T3	PI11	MCO1	-
H2	PI12	LTDC_HSYNC	TRACE_D0
H1	PI13	LTDC_VSYNC	TRACE_D1
D2	PI14	LTDC_CLK	TRACE_CLK
F3	PI15	LTDC_R0	-
J2	PJ0	LTDC_R1	TRACE_D8
L6	PJ1	LTDC_R2	TRACE_D9
K4	PJ2	LTDC_R3	TRACE_D10
J1	PJ3	LTDC_R4	TRACE_D11
K2	PJ4	LTDC_R5	TRACE_D12
K1	PJ5	LTDC_R6	TRACE_D2
L5	PJ6	LTDC_R7	TRACE_D3
L4	PJ7	LTDC_G0	TRACE_D13
H6	PJ8	LTDC_G1	TRACE_D14
L2	PJ9	LTDC_G2	TRACE_D15
J3	PJ10	LTDC_G3	-
K6	PJ11	LTDC_G4	-
B8	PJ12	LTDC_B0	-

LFBGA448 ball	IO Port	Main function	Motor Control connector
A7	PJ13	LTDC_B1	-
B7	PJ14	LTDC_B2	-
C7	PJ15	LTDC_B3	-
D8	PK0	LTDC_G5	-
E7	PK1	LTDC_G6	TRACE_D4
E8	PK2	LTDC_G7	TRACE_D5
B6	PK3	LTDC_B4	-
A6	PK4	LTDC_B5	-
C6	PK5	LTDC_B6	TRACE_D6
A5	PK6	LTDC_B7	TRACE_D7
B5	PK7	LTDC_DE	-
G2	PZ0	SPI1_SCK	-
H5	PZ1	SPI1_MISO	-
K5	PZ2	SPI1_MOSI	-
F4	PZ3	SPI1_NSS	-
G1	PZ4	I2C4_SCL	-
H4	PZ5	I2C4_SDA	-
G3	PZ6	SMARTCARD_CLK	-
H3	PZ7	SMARTCARD_IO	-

Appendix C Federal Communications Commission (FCC) and Industry Canada (IC) Compliance Statements

C.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.

FCC ID

FCC ID: YCP-MB1263-000.

C.2 IC Compliance Statement

This device complies with FCC and Industry 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 Industry 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.

Industry Canada ICES-003 Compliance Label: CAN ICES-3 (A)/NMB-3(A).

Déclaration de conformité

Avis: Le présent appareil est conforme aux CNR d'Industrie 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'Industrie Canada: CAN ICES-3 (A)/NMB-3(A).

Appendix D CE conformity

D.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.

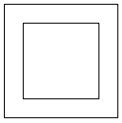
D.2 Simplified declaration of conformity

Hereby, STMicroelectronics declares that the radio equipment types STM32MP157A-EV1 and STM32MP157C-EV1 are in compliance with Directive 2014/53/EU.

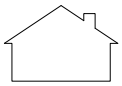
Appendix E Safety instructions

E.1 Safety instructions

- The STM32MP157x-EV1 Evaluation board is designed to be powered from the 5 V DC power supply unit provided in the package. The power supply acting as a disconnection device must remain easily accessible in case of issue.
- Marking observed on the power supply unit:

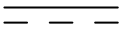


Marking for Class II product. Such product does not require a safety connection to electrical earth.



For indoor use only.

This marking indicates that the product operates with an alternating current (AC) source (mains). It is completed by afferent values (voltage, frequency and max current).



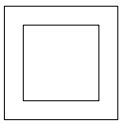
This marking indicates that the terminal is suitable for direct current (DC) only. It is completed by afferent values (voltage and max current).

The associated symbol means that WEEE and waste batteries must not be thrown away but collected separately and recycled.

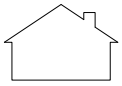
- Do not expose it to heat from any source.
- Do not expose it to water, moisture or place on a conductive surface while in operation.

E.2 Sicherheitshinweise

- Das Evaluierungsboard STM32MP157x-EV1 ist ausgelegt für den Betrieb mit dem im Lieferumfang enthaltenen 5V DC Netzteil. Das Netzteil muss frei zugänglich sein damit es jederzeit im Fall einer Gefahr oder einer Störung vom Netz getrennt werden kann.
- Kennzeichnung am Netzteil beachtet:

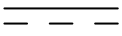


Kennzeichnung für Produkte der Klasse II. Für ein solches Produkt ist keine Erdung erforderlich.



Nur für den Innengebrauch.

Diese Markierung zeigt an, dass das Produkt nur mit einer Wechselspannung (Netz) betrieben werden darf.



Diese Markierung zeigt an, dass das Terminal nur für Gleichstrom (DC) geeignet ist. Das Netzteil versorgt das Terminal mit der angepassten Spannung.

Das zugehörige Symbol bedeutet, dass Elektro- und Elektronik-Altgeräte nicht weggeworfen, sondern getrennt gesammelt und recycelt werden müssen.

- Setzen Sie es keiner Wärmequelle aus.
- Setzen Sie es während des Betriebs weder Wasser noch Feuchtigkeit aus und legen Sie es nicht auf eine leitfähige Oberfläche.

Revision history

Table 48. **Document revision history**

Date	Version	Changes
20-Feb-2019	1	Initial release.
22-Aug-2019	2	Added certification appendices Federal Communications Commission (FCC) and Industry Canada (IC) Compliance Statements, CE conformity, and Safety instructions.

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