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# SpaceCB-8Mplus-ADV Datasheet and Pinout

Rev. 20230315171039

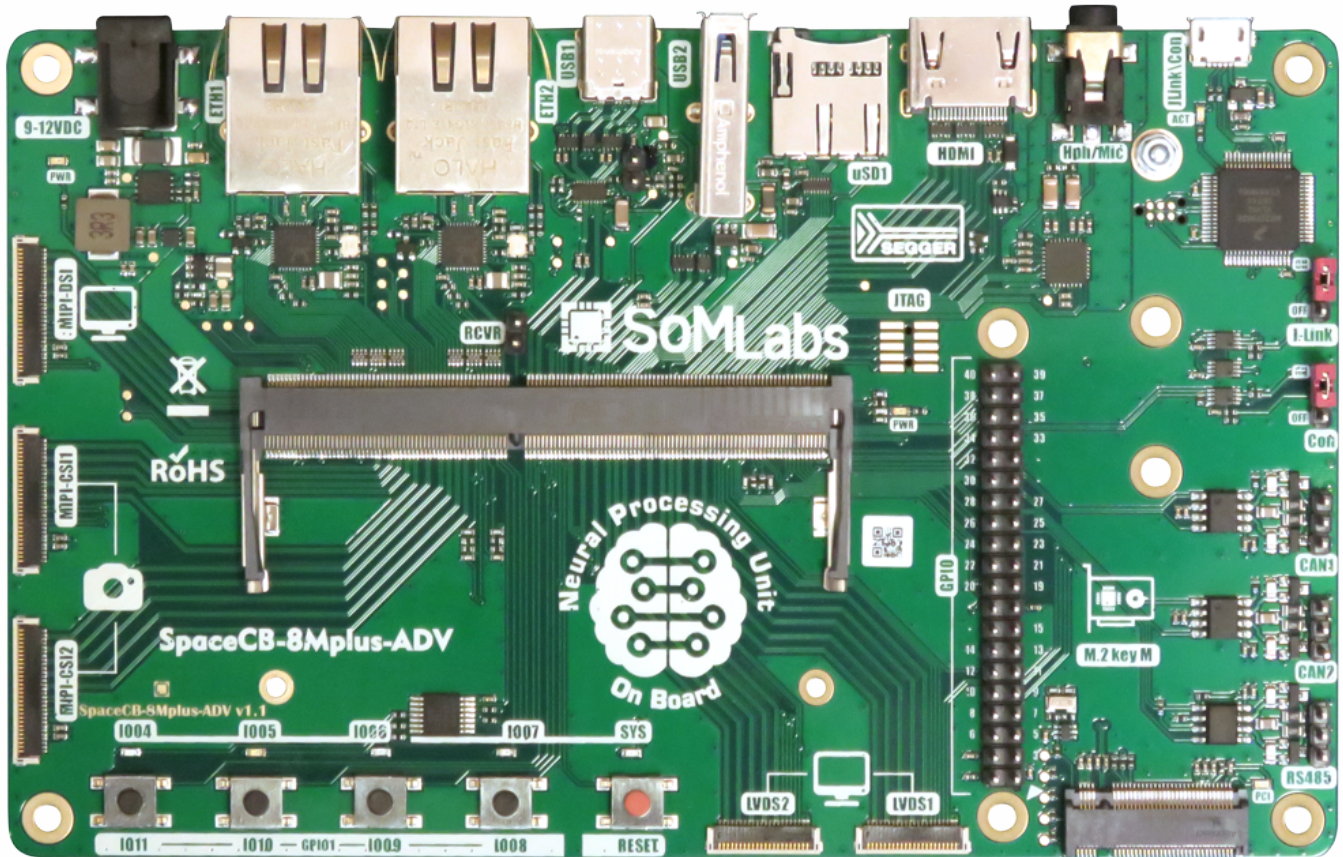
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# SpaceCB-8Mplus-ADV v.1.1 Datasheet and Pinout

## General description



SpaceCB-8Mplus-ADV is a carrier board for the SpaceSOM-8Mplus family of computer-on-modules which are powered by NXP SOC iMX8Mplus (quad core ARM Cortex-A53+ single Cortex-M7 + Neural Processing Unit). A carrier board, together with a System on Module (SoM), makes a complete development platform similar to SBC. The carrier board houses the most common interfaces such as USB 3.0, USB-C, dual gigabit Ethernet, HDMI, PCIe, etc. A large variety of interfaces allows to use it as both a complete development platform or as a stand-alone end-product.

The carrier board connects with the SoM via a standard SODIMM connector.

SpaceCB-8Mplus-ADV carrier board is equipped with HDMI + LVDS + MIPI-DSI video outputs, 24-bit audio codec, PCIe 3.0 (M.2 key M) socket (2242, 2260, 2280), RS-485 and CAN-FD interfaces.

SpaceCB-8Mplus-ADV carrier board is equipped with Segger J-Link debugger and Linux serial console port on USB vCOM.

## Applications

- AI and ML applications
- Machine vision equipment
- Robotics
- Human-machine Interfaces (HMI)
- Multimedia
- Video streaming
- Industrial embedded Linux computer
- Home Automation - Smart Home

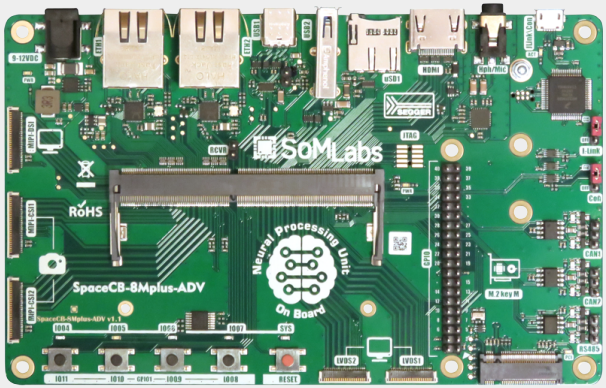
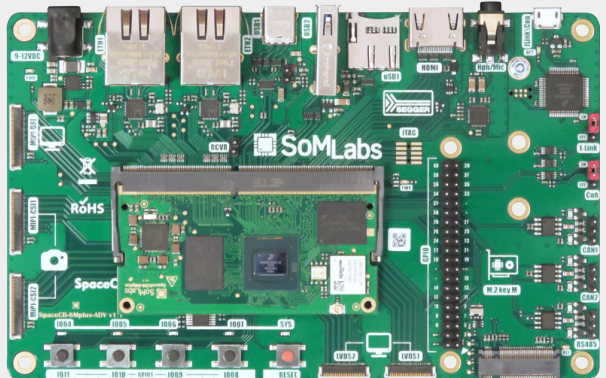
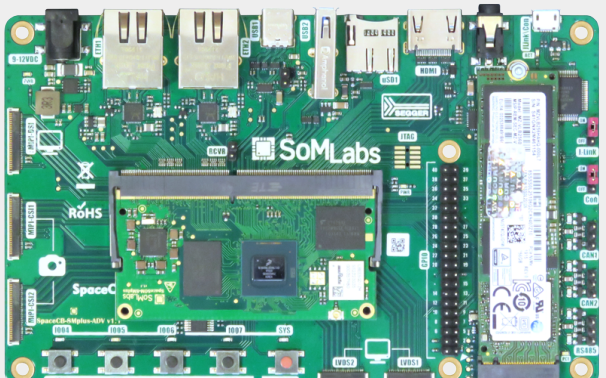
- IoT gateways
- Residential gateways



## Features

- Carrier Board (Base Board) compatible with the SpaceSOM-8Mplus family of modules based on quad core, heterogenous NXP iMX8Mplus application processors
- SoM Interface: SODIMM260
- Debug Interface: built-in Segger J-Link JTAG debugger
- Expansion Connectors:
  - Serial communication/GPIO connector 2x8 Pin Header (Male)
  - MicroSD card socket
- Communication Connectors:
  - PCIe 3.0 (single lane, M.2 key M socket)
  - RS-485 (simplex, 3 pin 2.54mm connector)
  - 2x CAN-FD (3 pin 2.54mm connector)
  - 2x Ethernet 10/100/1000Mbit/s, RJ45
  - 1x USB Host 3.0
  - 1x USB C
  - 1x Console + JTAG MicroUSB B connector
- Display Interface:
  - 1x HDMI
  - 1x MIPI-DSI (FFP/FPC30)
  - 2x LVDS (FFP/FPC22)
- Camera Interface:
  - 2x MIPI-CSI2 (FFC/FPC30)
- User Interface:
  - 24-bit audio codec
  - Line and microphone inputs
  - Speaker or headphone outputs
  - 4+1 Pushbuttons
  - 4+3 LEDs
- External Power Supply 9-12V DC
- Temperature Range: 0 to +70°C
- Board Size: 160mm x 100mm x 25mm

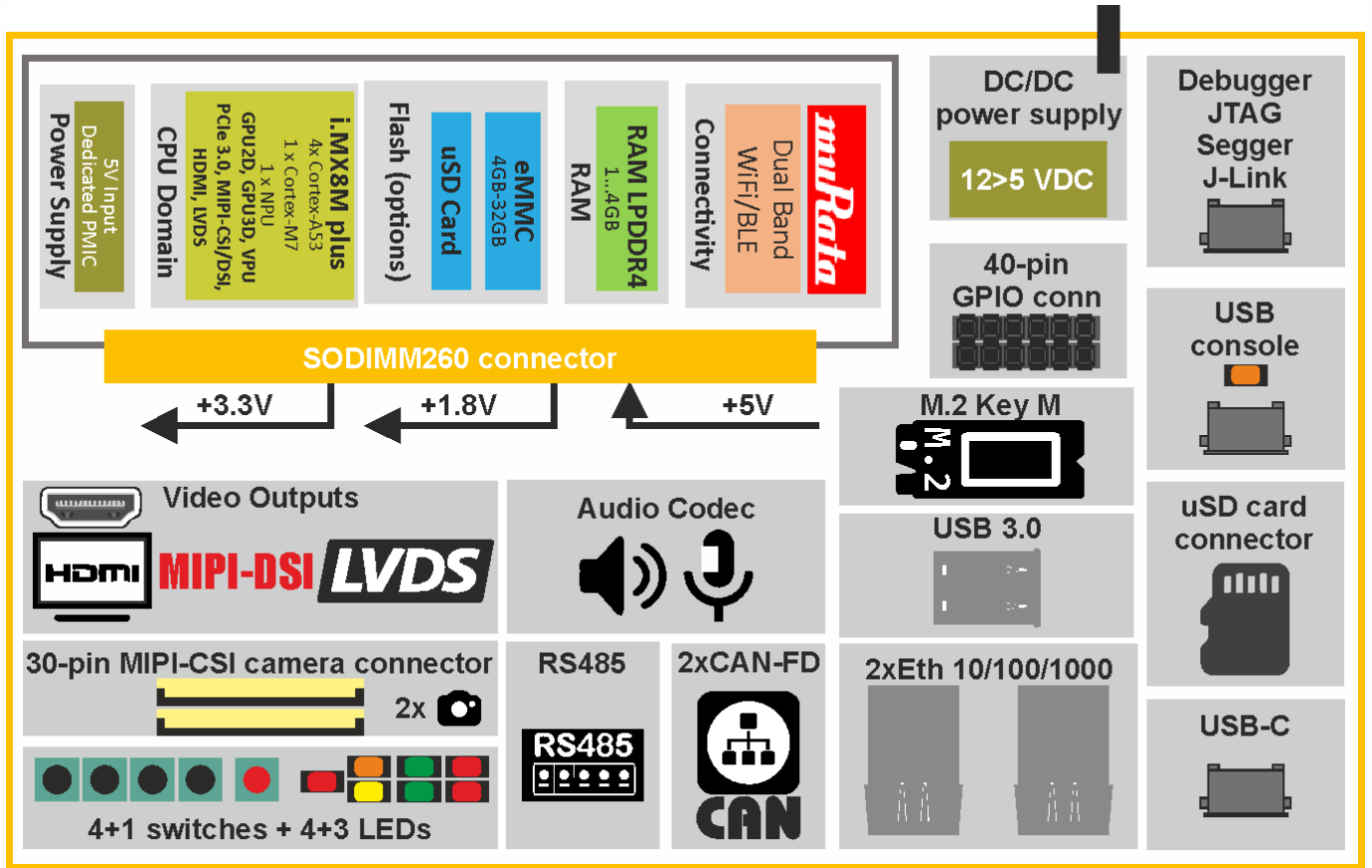
## Pictures of SpaceCB-8Mplus-ADV v1.1 board

Version	Photo
SpaceCB-8Mplus-ADV v1.1 board only	 <p>A photograph of the SpaceCB-8Mplus-ADV v1.1 board. The board is green and features a central 'Neural Processing Unit On Board' with a brain-like logo. It has various connectors including USB, Ethernet, and audio. The SoMLabs logo is visible in the center.</p>
SpaceCB-8Mplus-ADV v1.1 with SpaceSOM-8Mplus	 <p>A photograph of the SpaceCB-8Mplus-ADV v1.1 board with a SpaceSOM-8Mplus module installed. The module is a smaller green board with a black chip, mounted on the main board's carrier.</p>
SpaceCB-8Mplus-ADV with SpaceSOM-8Mplus and M.2 SSD drive	 <p>A photograph of the SpaceCB-8Mplus-ADV v1.1 board with both a SpaceSOM-8Mplus module and an M.2 SSD drive installed. The SSD is a white module mounted on the right side of the board.</p>

## Ordering info

SpaceCB-8Mplus-ADV v1.1

# Block Diagram



## Electrical parameters

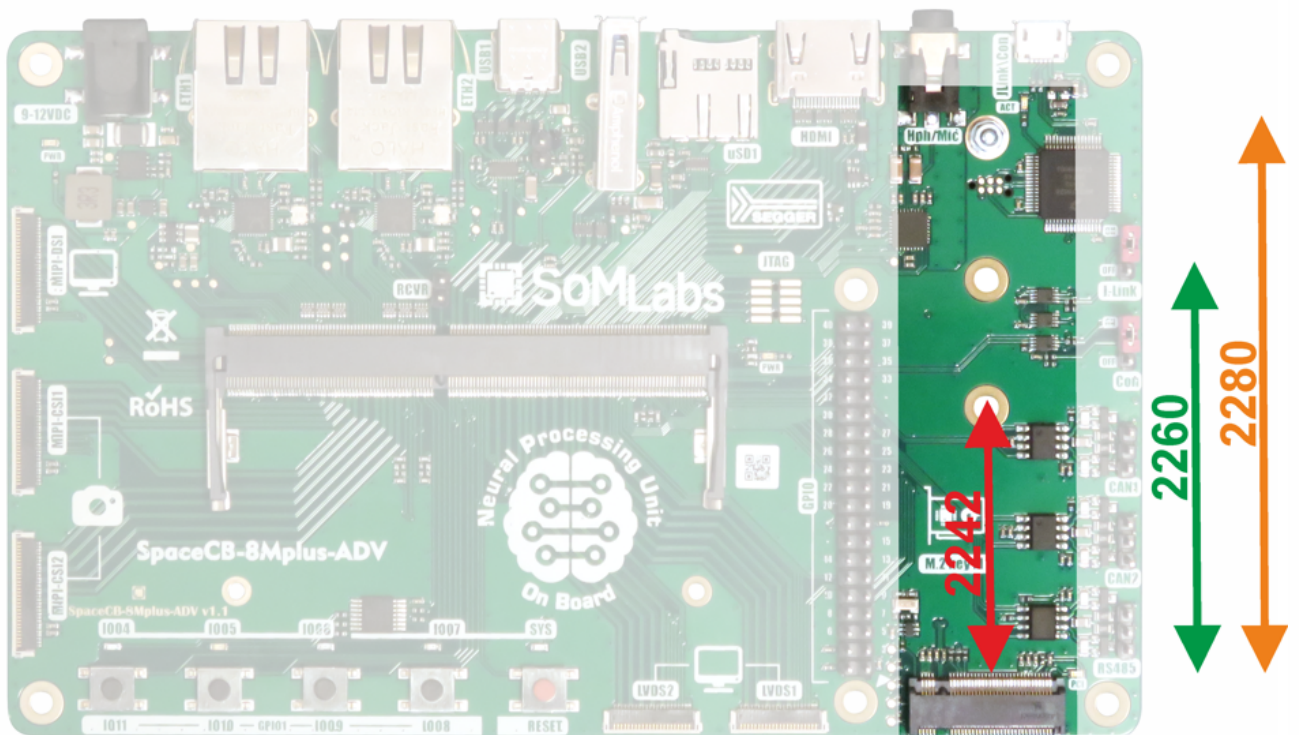
Parameter	Value			Units	Comment
	Min.	Typ.	Max.		
Power Supply	9.0	12.0	15.0	V	Positive pole on central connector of J101
Supply current	-	-	0.8	A	Excluding LCD, USB and another external loads
MIPI-DSI Power Supply (logic)	3.25	3.3	3.35	V	-
MIPI-DSI Power Supply (backlight and aux)	4.85	5	5.1	V	-
LVDS Power Supply (aux, up to 100mA)	4.85	5	5.1	V	-

## Important information

1. The SpaceCB-8M-ADV carrier board is equipped with dual triple-speed 10/100/1000Mb/s Ethernet interface - RTL8211F. Chips are connected to MPU using RGMII interface.
2. The I2C1 interface is common to MIPI-DSI, MIPI-CSI1 and LVDS2 interfaces.
3. The I2C2 interface supports on-board audio codec (NAU88C22YG).
4. The I2C3 interface supports touch-panel controller connected to MIPI-DSI interface (J502).
5. The I2C4 interface is common to MIPI-CSI2 and LVDS1 interfaces.
6. The I2C6 interface supports PI5USB30213A USB-C interface controller. Both I2C6\_SDA and I2C6\_SCL lines are equipped with pull-up resistors (4.7kOhm) installed on SpaceSOM-8Mplus and not on SpaceCB-8Mplus-ADV.
7. The SPI1 interface supports display controller connected to LVDS1 (J550).
8. The SPI2 interface supports display controller connected to LVDS2 (J551).
9. All default I2C interface lines (both: SDA and SCL of I2C1, I2C2, I2C3 and I2C4) have pull-up resistors (4.7kOhm).
10. User LEDs and System LED are connected to MPU using buffers with logical inverters.



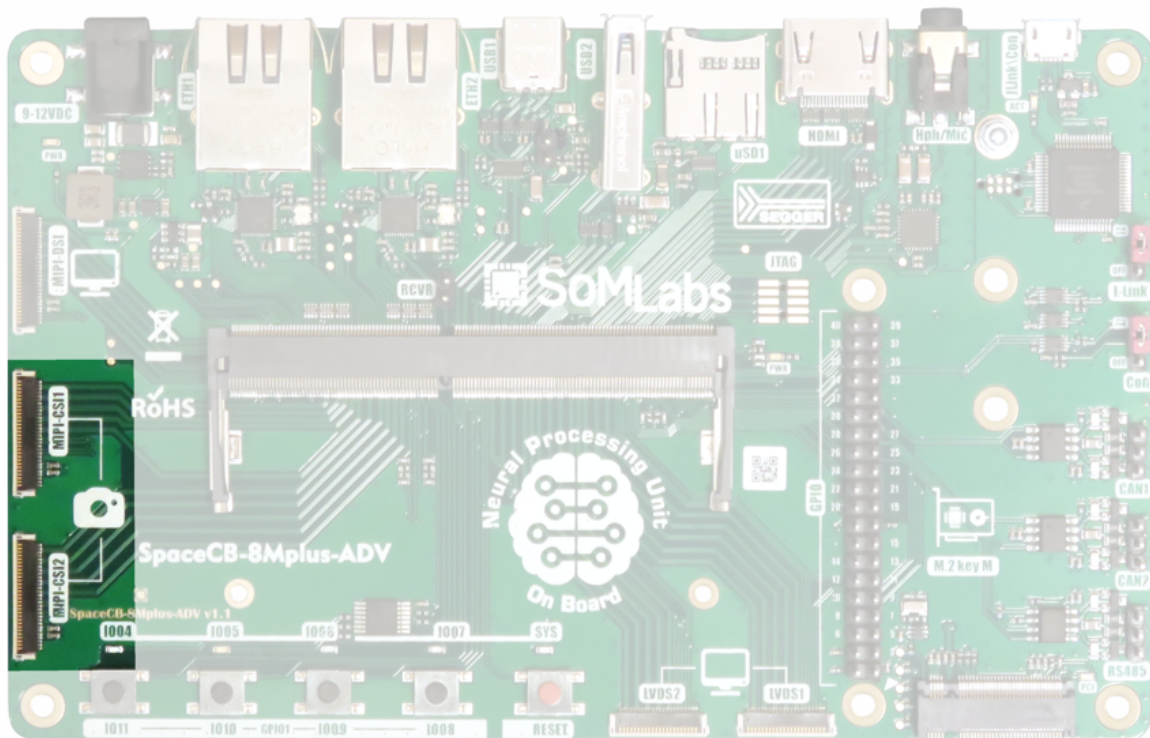
## M.2 socket - key M (PCIe interface, J600)



**Note:**

1. Lines CONFIG0...CONFIG3 of M.2 are permanently connected to +3.3V (CONFIG[3..0]=1111b).
2. Implemented PCIe is single lane interface.
3. M.2 socket is key M type.

## Camera MIPI-CSI interface (J500 and J501, FPC/FFC 0.5mm)



### Pin description of J500 (MIPI-CSI1)

Pin	Default	MPU pin name	MPU pin	Description
1	GND	-	-	
2	CSI-CLK-P	-	-	
3	CSI-CLK-P	-	-	
4	GND	-	-	
5	CSI-DATA0-P	-	-	
6	CSI-DATA0-N	-	-	
7	GND	-	-	
8	CSI-DATA1-P	-	-	
9	CSI-DATA1-N	-	-	
10	GND	-	-	
11	CSI-DATA2-P	-	-	
12	CSI-DATA2-N	-	-	
13	GND	-	-	
14	CSI-DATA3-P	-	-	
15	CSI-DATA3-N	-	-	
16	GND	-	-	
17	I2C1.SCL	AC8		Configuration I2C interface with 4.7kOhm pull-up (3.3V)
18	I2C1.SDA	AH7		Configuration I2C interface with 4.7kOhm pull-up (3.3V)

19	GND	-	-
20	GPIO1_IO0	A7	GPIO1.00 (display RES)
21	GPIO1_IO3	D6	GPIO1.03 (display PWRDN)
22	-	-	-
23	GND	-	-
24	+3.3V	-	Power supply for external devices
25	+3.3V	-	Power supply for external devices
26	+5V	-	Power supply for external devices
27	+5V	-	Power supply for external devices
28	-	-	-
29	-	-	-
30	GND	-	-

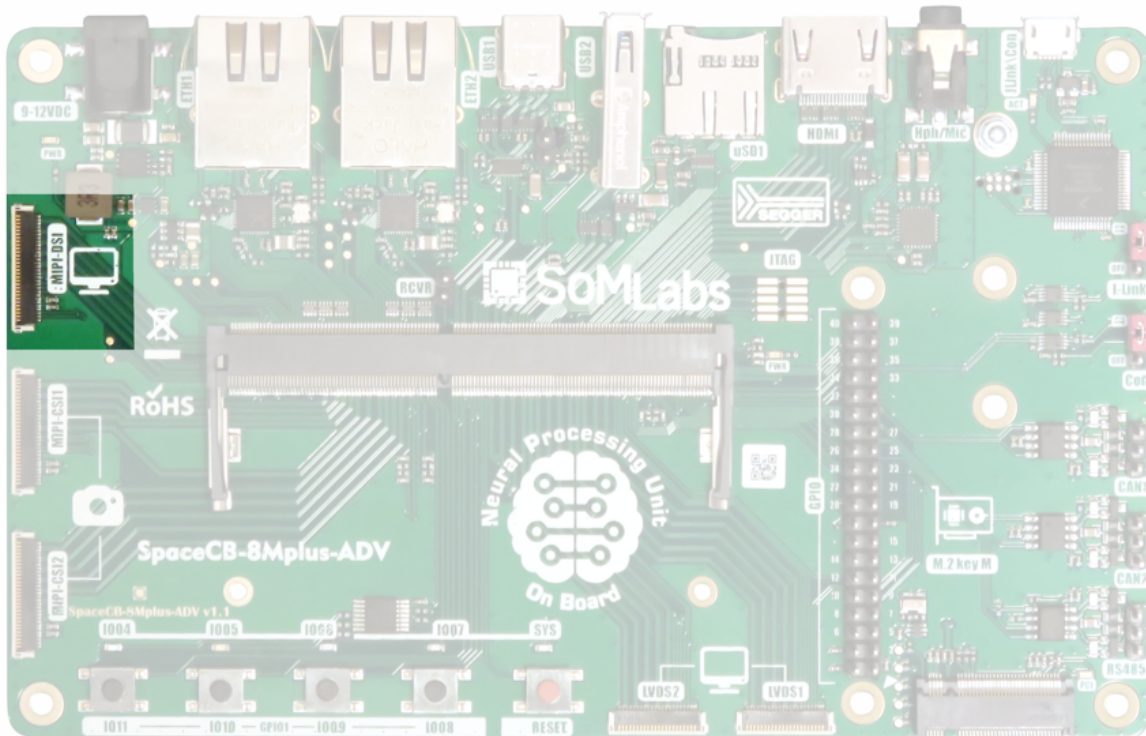
#### Pin description of J501 (MIPI-CSI2)

Pin	Default MPU pin name	MPU pin	Description
1	GND	-	-
2	CSI-CLK-P	-	-
3	CSI-CLK-P	-	-
4	GND	-	-
5	CSI-DATA0-P	-	-
6	CSI-DATA0-N	-	-
7	GND	-	-
8	CSI-DATA1-P	-	-
9	CSI-DATA1-N	-	-
10	GND	-	-
11	CSI-DATA2-P	-	-
12	CSI-DATA2-N	-	-
13	GND	-	-
14	CSI-DATA3-P	-	-
15	CSI-DATA3-N	-	-
16	GND	-	-
17	I2C4.SCL	AF8	Configuration I2C interface with 4.7kOhm pull-up (3.3V)
18	I2C4.SDA	AD8	Configuration I2C interface with 4.7kOhm pull-up (3.3V)
19	GND	-	-
20	UART1_RXD	AD6	GPIO5.22 (display RES)
21	UART1_TXD	AJ3	GPIO5.23 (display PWRDN)
22	-	-	-
23	GND	-	-
24	+3.3V	-	Power supply for external devices
25	+3.3V	-	Power supply for external devices
26	+5V	-	Power supply for external devices
27	+5V	-	Power supply for external devices
28	-	-	-
29	-	-	-
30	GND	-	-

Note:

1. 1st pins of J500/J501 connectors are at the top of the image.
2. J500 is located on the picture first from above (MIPI-CSI1).
3. The I2C1 interface is common to MIPI-DSI, MIPI-CSI1 and LVDS2 interfaces.
4. The I2C4 interface is common to MIPI-CSI2 and LVDS1 interfaces.

## Display MIPI-DSI interface (J502, FPC/FFC 0.5mm)



J502 pin	Default MPU pin name	MPU pin	Description
1	GND	-	-
2	DSI-CLK-P	-	-
3	DSI-CLK-P	-	-
4	GND	-	-
5	DSI-DATA0-P	-	-
6	DSI-DATA0-N	-	-
7	GND	-	-
8	DSI-DATA1-P	-	-
9	DSI-DATA1-N	-	-
10	GND	-	-
11	DSI-DATA2-P	-	-
12	DSI-DATA2-N	-	-
13	GND	-	-
14	DSI-DATA3-P	-	-
15	DSI-DATA3-N	-	-
16	GND	-	-
17	I2C1.SCL	AC8	Display configuration I2C interface with 4.7kOhm pull-up (3.3V)
18	I2C1.SDA	AH7	Display configuration I2C interface with 4.7kOhm pull-up (3.3V)
19	GND	-	-
20	SAI3_TXC	AH19	Optional touch-panel reset signal (CODEC.TXC)

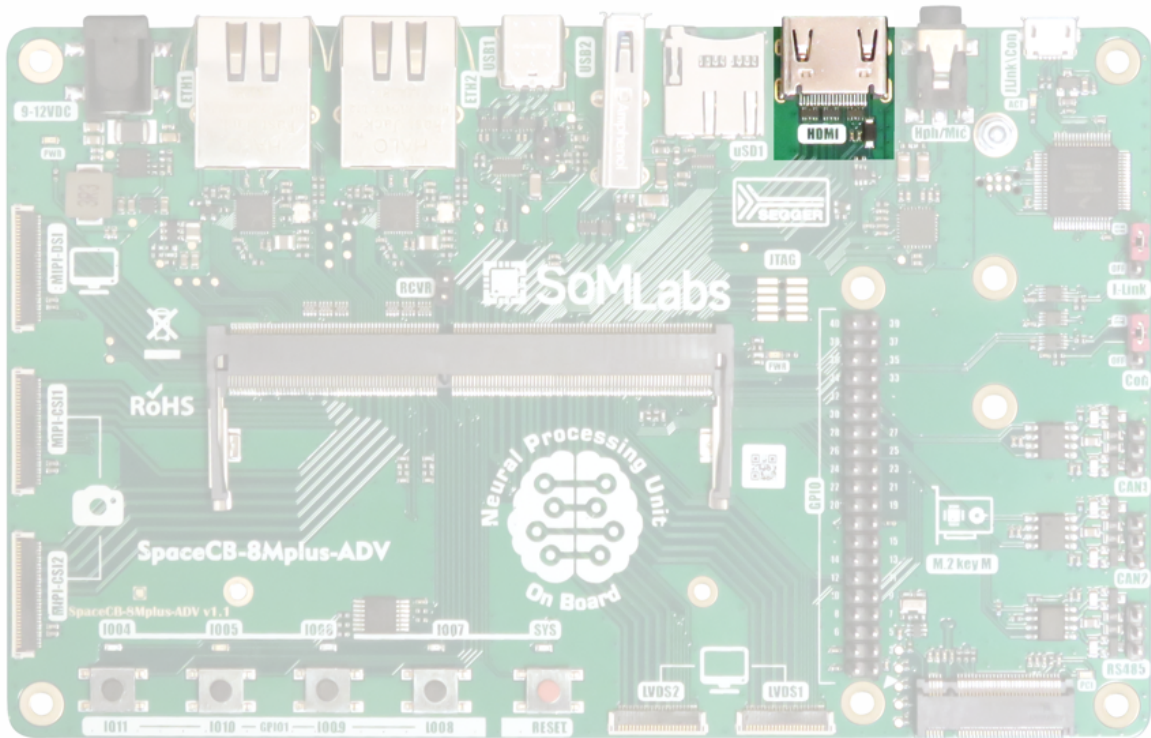
21	I2C3.SDA	F13	Optional touch-panel interrupt signal
22	I2C3.SCL	AF9	Optional touch-panel controller reset
23	GND	-	-
24	+3.3V	-	Power supply for external devices
25	+3.3V	-	Power supply for external devices
26	+5V	-	Power supply for external devices
27	+5V	-	Power supply for external devices
28	GPIO1.01	E8	Optional backlight intensity PWM controller
29	SAI3_TXFS	AC16	Optional backlight enable (CODEC.TXFS)
30	GND	-	-

Note:

1. 1st pin of J502 connector is at the top of the image.
2. For configuration purposes is used I2C1 interface.
3. The I2C1 interface is common to MIPI-DSI, MIPI-CS11 and LVDS2 interfaces.
4. The I2C3 interface supports touch-panel controller connected to MIPI-DSI interface (J502).

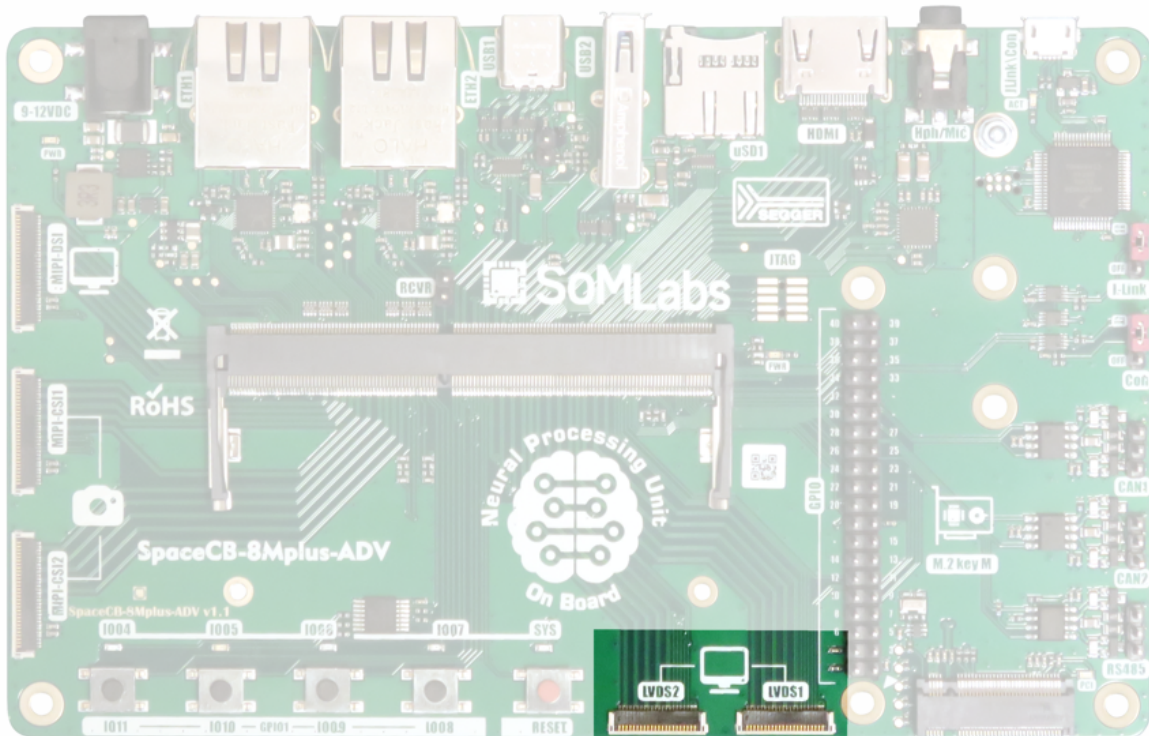


## Display HDMI interface (J552)



J552 pin	Default MPU pin name	MPU pin	Description
1	HDMI_TX2_P	AH27	TMDS_D2_P
2	-	-	GND
3	HDMI_TX2_N	AJ27	TMDS_D2_N
4	HDMI_TX1_P	AH26	TMDS_D1_P
5	-	-	GND
6	HDMI_TX1_N	AJ26	TMDS_D1_N
7	HDMI_TX0_P	AH25	TMDS_D0_P
8	-	-	GND
9	HDMI_TX0_N	AJ25	TMDS_D0_N
10	HDMI_TXC_P	AH24	TMDS_CLK_P
11	-	-	GND
12	HDMI_TXC_N	AJ24	TMDS_CLK_N
13	HDMI_CEC	AD22	CEC
14	EARC_P_UTIL	AJ23	AUX_P
15	HDMI_DDC_SCL	AC22	DDC_CLK
16	HDMI_DDC_SDA	AF22	DDC_DAT
17	-	-	GND
18	-	-	+5V
19	EARC_N_HPD	AH22	HPD/AUX_N

## LVDS display interfaces (J550 and J551, FPC/FFC 0.5mm)



### Pin description of J550 (LVDS1)

J550 pin	Default MPU pin name	MPU pin	Description
1	GND	-	-
2	LVDS1.DATA0_N	-	-
3	LVDS1.DATA0_P	-	-
4	GND	-	-
5	LVDS1.DATA1_N	-	-
6	LVDS1.DATA1_P	-	-
7	GND	-	-
8	LVDS1.DATA2_N	-	-
9	LVDS1.DATA2_P	-	-
10	GND	-	-
11	LVDS1.CLK_N	-	-
12	LVDS1.CLK_P	-	-
13	GND	-	-
14	LVDS1.DATA3_N	-	-
15	LVDS1.DATA3_P	-	-
16	ECSPI1_MOSI	AC20	Backlight on/off
17	ECSPI1_MISO	AD20	Backlight brightness control (PWM)
18	ECSPI1_CS0	AE20	For optional use
19	I2C4.SCL	AF8	Touch-panel configuration I2C interface with 4.7kOhm pull-up (3.3V)
20	I2C4.SDA	AD8	Touch-panel configuration I2C interface with 4.7kOhm pull-up (3.3V)

21	+5V	-	Power supply for external devices
22	+5V	-	Power supply for external devices

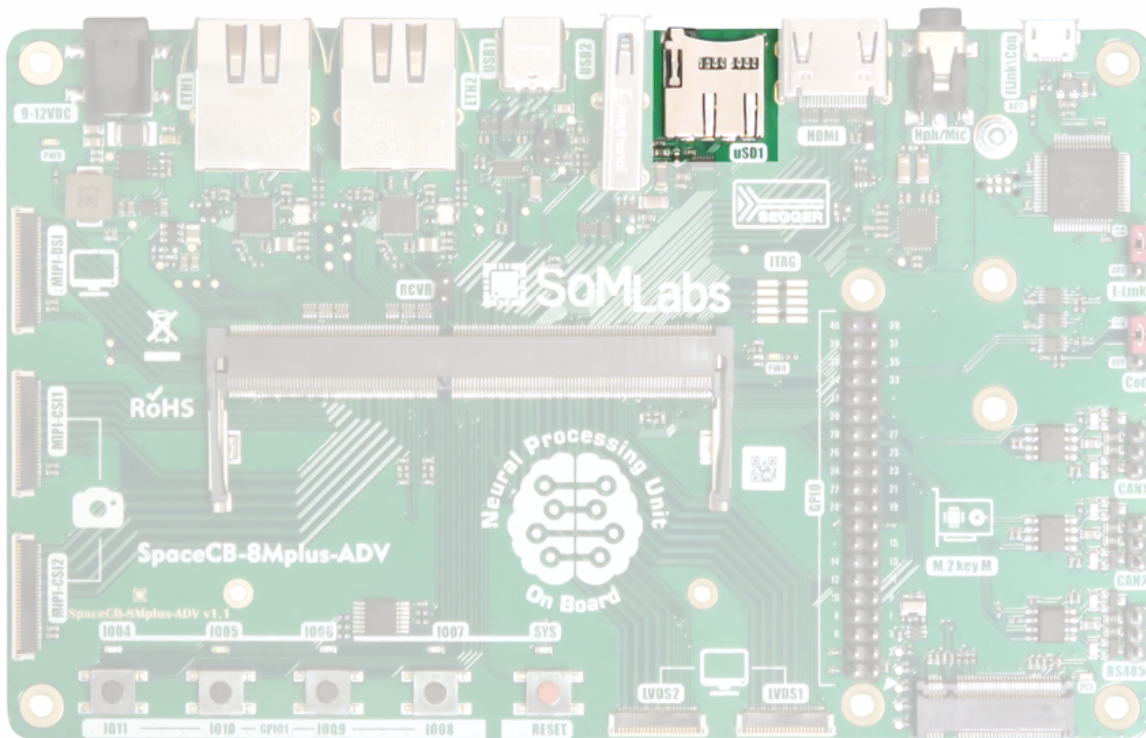
#### Pin description of J551 (LVDS2)

J551 pin	Default MPU pin name	MPU pin	Description
1	GND	-	-
2	LVDS2.DATA0_N	-	-
3	LVDS2.DATA0_P	-	-
4	GND	-	-
5	LVDS2.DATA1_N	-	-
6	LVDS2.DATA1_P	-	-
7	GND	-	-
8	LVDS2.DATA2_N	-	-
9	LVDS2.DATA2_P	-	-
10	GND	-	-
11	LVDS2.CLK_N	-	-
12	LVDS2.CLK_P	-	-
13	GND	-	-
14	LVDS2.DATA3_N	-	-
15	LVDS2.DATA3_P	-	-
16	ECSPI2_CS0	AJ22	Backlight on/off
17	ECSPI2_MOSI	AJ21	Backlight brightness control (PWM)
18	ECSPI2_MISO	AH20	For optional use
19	I2C1.SCL	AC8	Touch-panel configuration I2C interface with 4.7kOhm pull-up (3.3V)
20	I2C1.SDA	AH7	Touch-panel configuration I2C interface with 4.7kOhm pull-up (3.3V)
21	+5V	-	Power supply for external devices
22	+5V	-	Power supply for external devices

Note:

1. 1st pins of LVDS connectors are located on the left.
2. The I2C1 interface is common to MIPI-DSI, MIPI-CSI1 and LVDS2 interfaces.
3. The I2C4 interface is common to MIPI-CSI2 and LVDS1 interfaces.

## MicroSD card connector (J701)



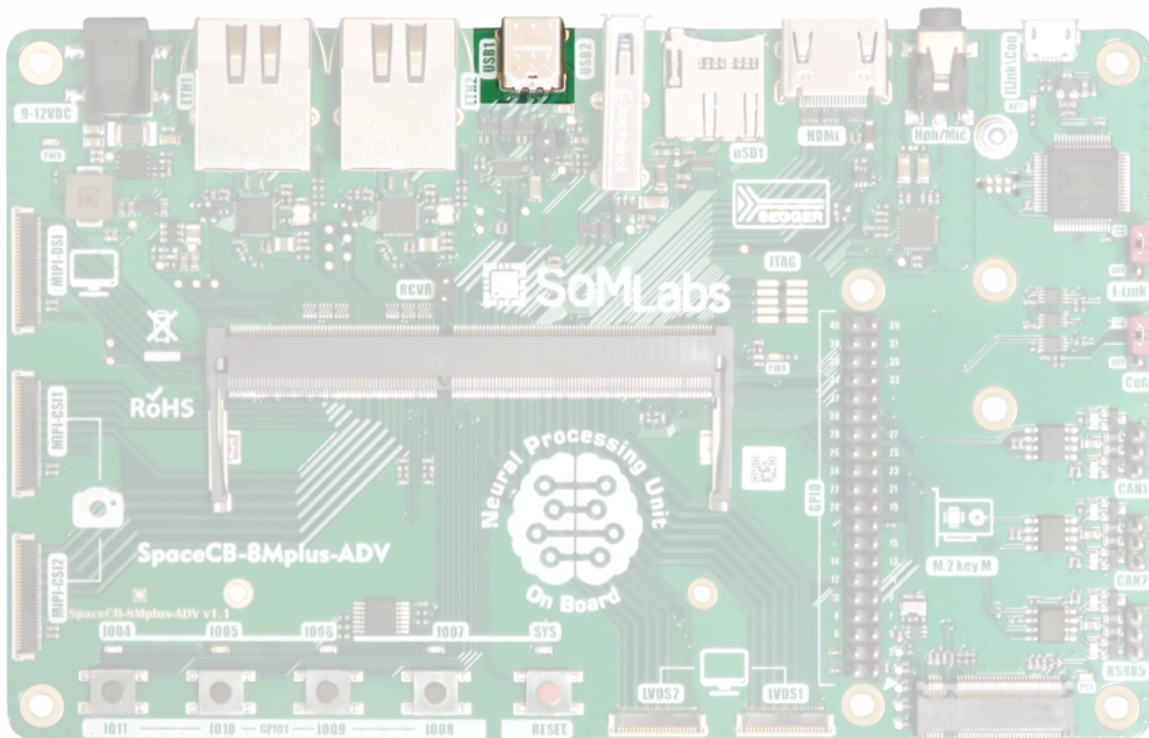
J701 pin	Default MPU pin name	MPU pin	Description
1	SD1_DATA2	V29	DATA2
2	SD1_DATA3	V28	DATA3
3	SD1_SMD	W29	CMD
4	1.8/3.3V	-	VDD (uSD power supply) selected internally with SAI5_RXD0
5	SD1_CLK	W28	CLK
6	-	-	GND
7	SD1_DATA0	Y29	DATA0
8	SD1_DATA1	Y28	DATA1
SW	SD1_RESET_B	W25	Card Detect

**Note:**

1. Value of VDD for uSD is selected with SAI5\_RXD0 (MPU) pin.



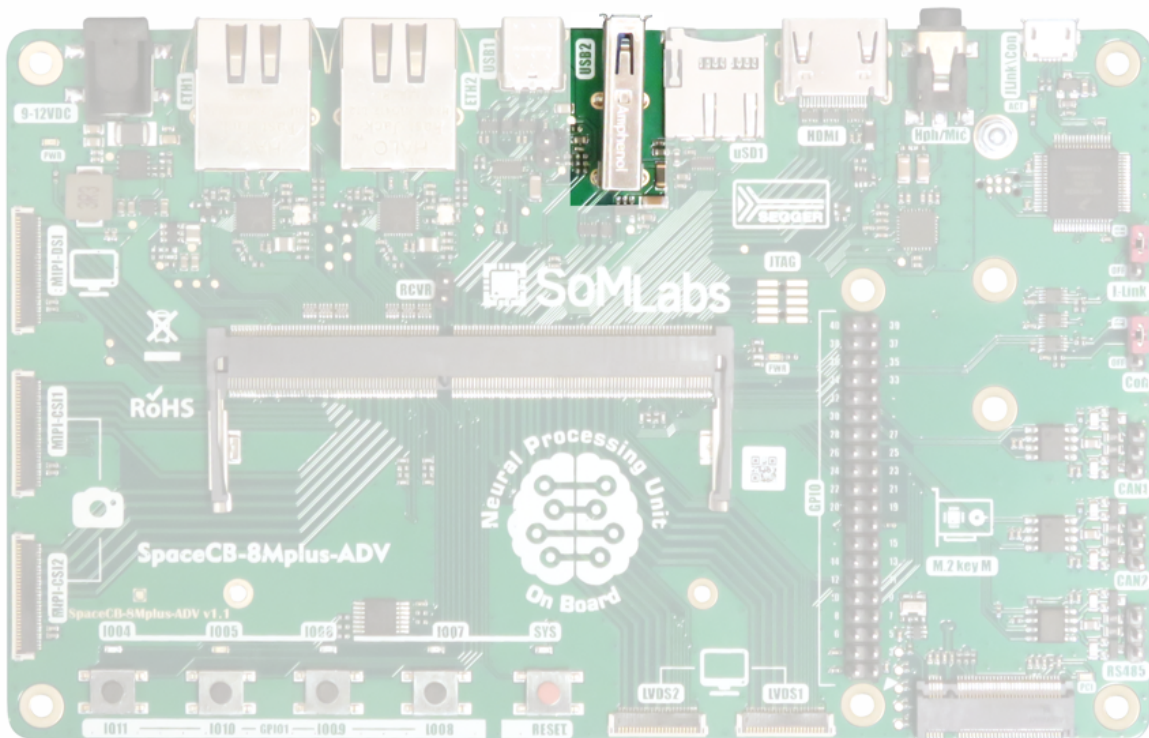
## USB-C interface



**Note:**

1. USB-C interface built-in SpaceCB-8Mplus-ADV is connected to USB1 channel.
2. The I2C6 interface supports configuration of PI5USB30213A USB-C controller.

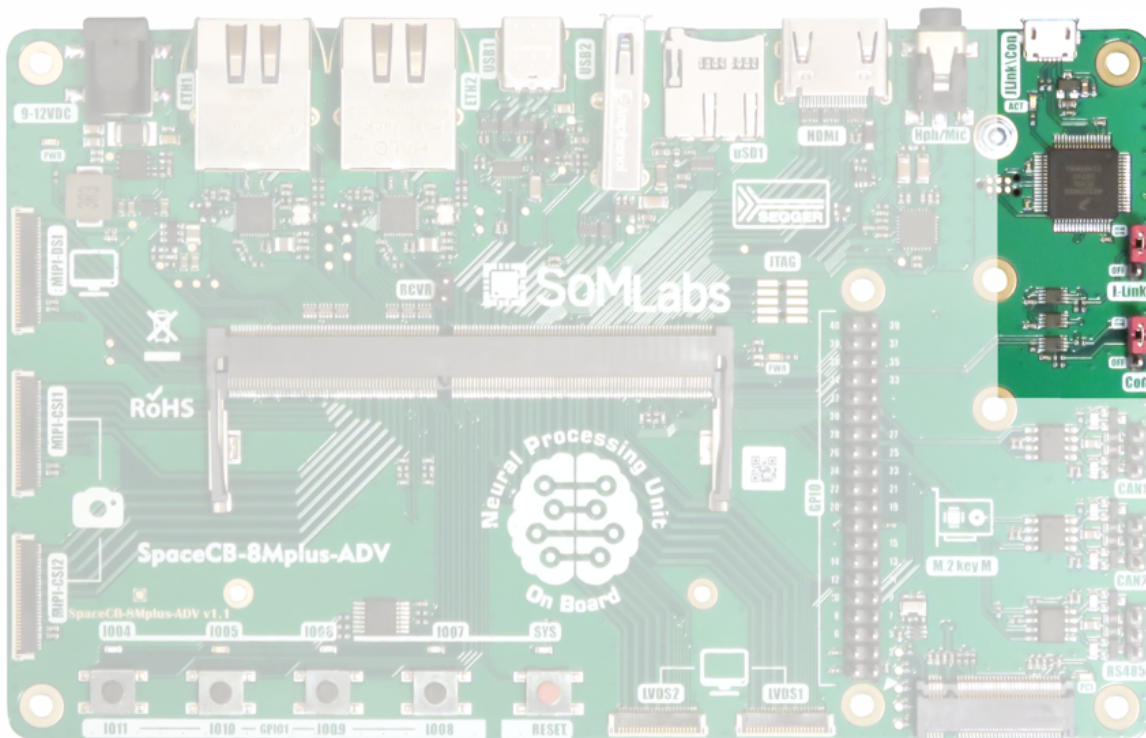
## USB 3.0 interface



USB 3.0 interface built-in SpaceCB-8Mplus-ADV is connected to USB2 channel.



## USB Console Port and Segger J-Link debugger



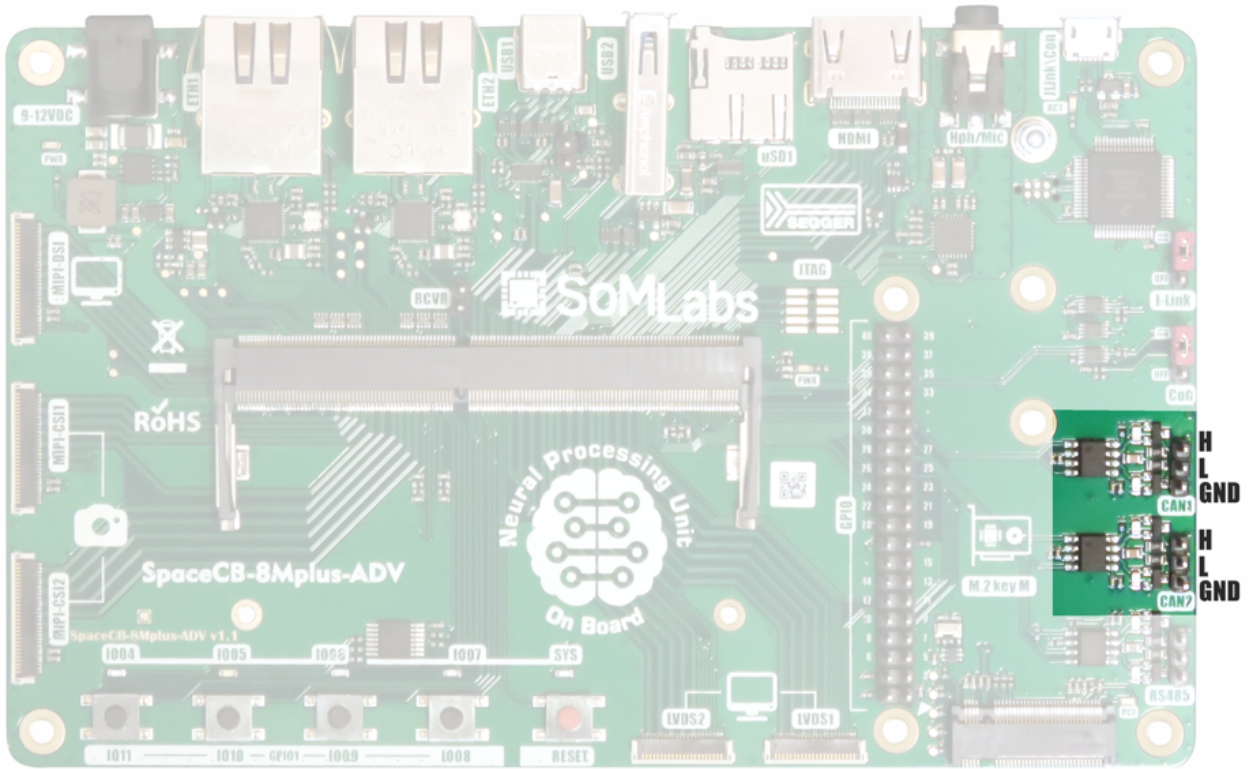
MPU Port	Default MPU pin name	Description
CONSOLE-TXD	UART4-TXD	TXD line of console port
CONSOLE-RXD	UART4-RXD	RXD line of console port

### Notes:

1. Linux console port (UART4 in MPU) uses vCOM interface provided by built-in debugger Segger J-Link.
2. vCOM can be disconnected from MPU with jumper CON (position ON or OFF).
3. Debug JTAG interface can be disconnected from MPU with jumper J-LINK (position ON or OFF).
4. J-Link activity is monitored with ACT LED.



## Dual CAN-FD serial interface

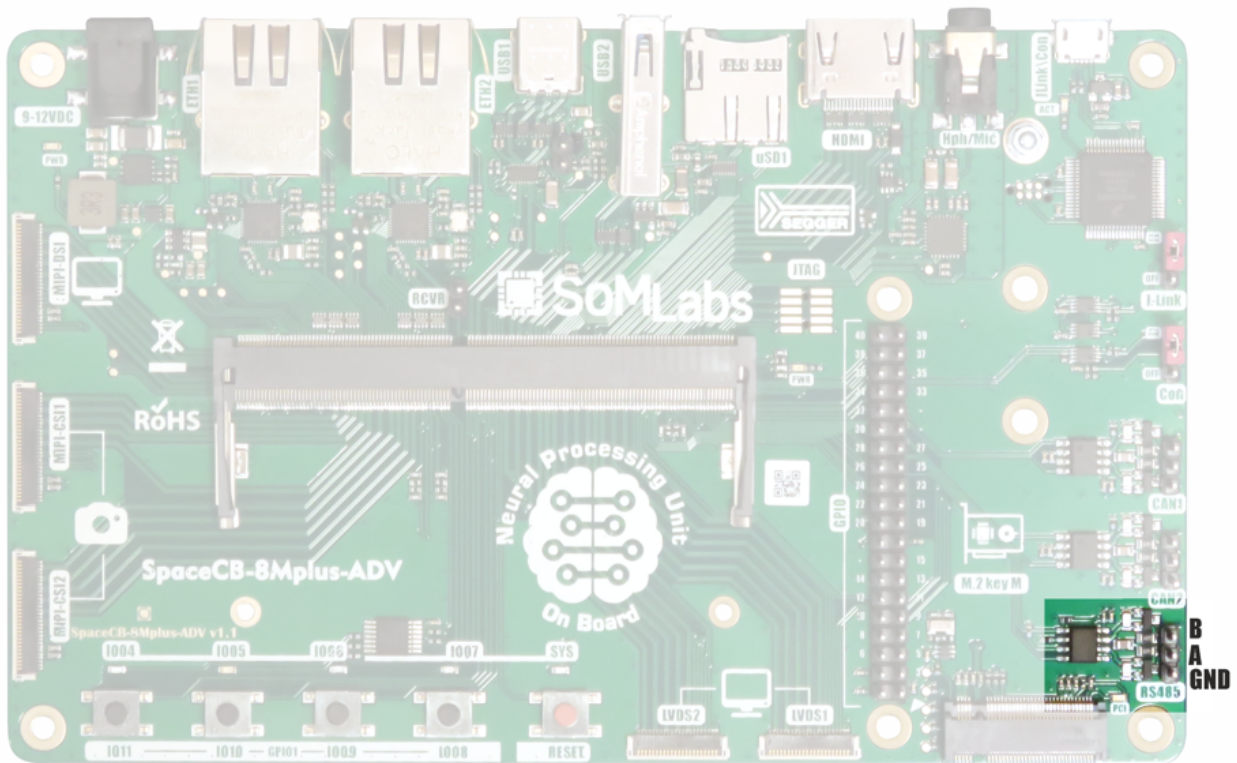


The SpaceCB-8Mplus-ADV board is equipped with Microchip CAN-FD with physical layer interfaces MCP2542FD-E/SN, connected to internal CAN1 and CAN2 channels.

Signal	Default MPU pin name	MPU pin
CAN1.TX	SPDIF_TX	AE18
CAN1.RX	SPDIF_RX	AD18
CAN2.TX	SAI2_RXC	AH16
CAN2.RX	SAI2_MCLK	AJ15



## RS-485 semiduplex serial interface



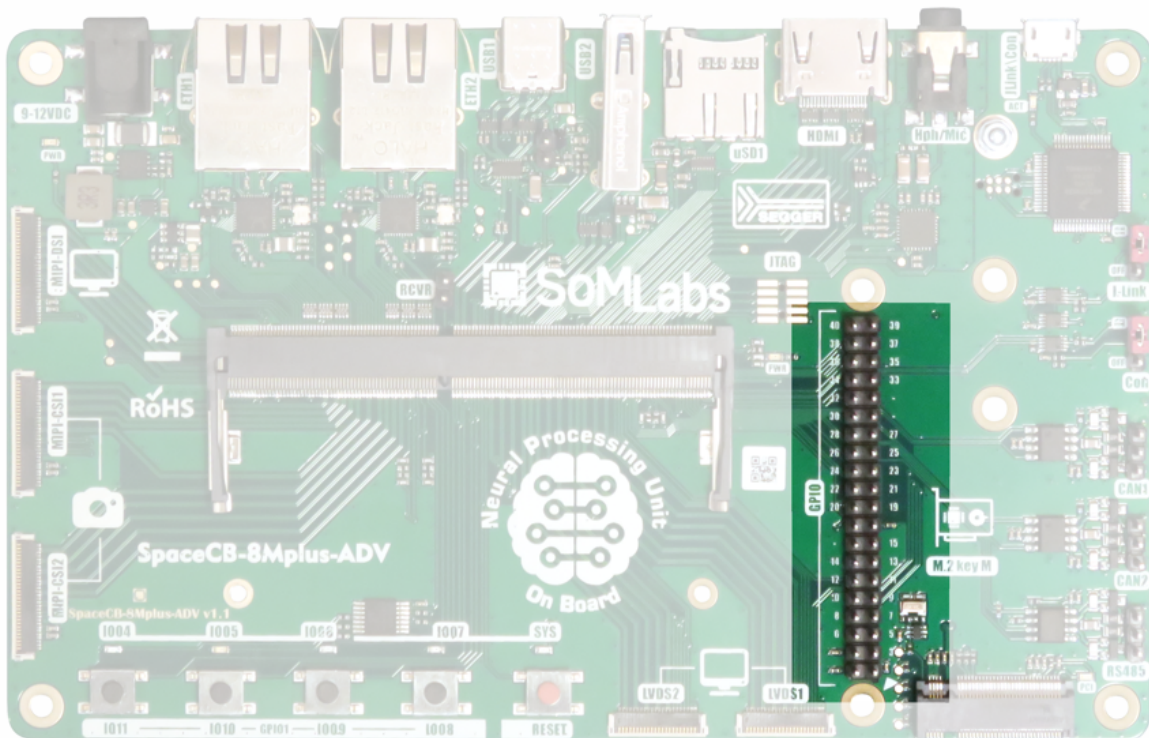
The SpaceCB-8Mplus-ADV board is equipped with low-voltage RS-485 physical layer interface MAX3485. The RS-485 is connected to default UART2 (TxD, RxD) channel and pins. Transmission control line DE is controlled by MPU GPIO.

Signal	Default MPU pin name	Description
RO	UART2_RXD	Data received by MPU
DI	UART2_TXD	Data transmitted by MPU
DE	GPIO5.05	Transmitter Enable (active high) signal

Note:

1. nRE line of MAX3485 is permanently connected to GND.

## GPIO header (J702)



J702 pin	Default pin name	Description
1	-	+3.3V
2	-	+5V
3	I2C1_SDA	I2C interface with 4.7kOhm pull-up (3.3V)
4	-	+5V
5	I2C1_SCL	I2C interface with 4.7kOhm pull-up (3.3V)
6	-	GND
7	GPIO1.04	-
8	UART3_TXD	-
9	-	GND
10	UART3_RXD	-
11	GPIO1.05	-
12	I2C3_SCL	I2C interface with 4.7kOhm pull-up (3.3V)
13	GPIO1_06	-
14	-	GND
15	GPIO1_07	-
16	NC	Not connected
17	-	+3.3V
18	NC	Not connected
19	ECSPi2_MOSI	-

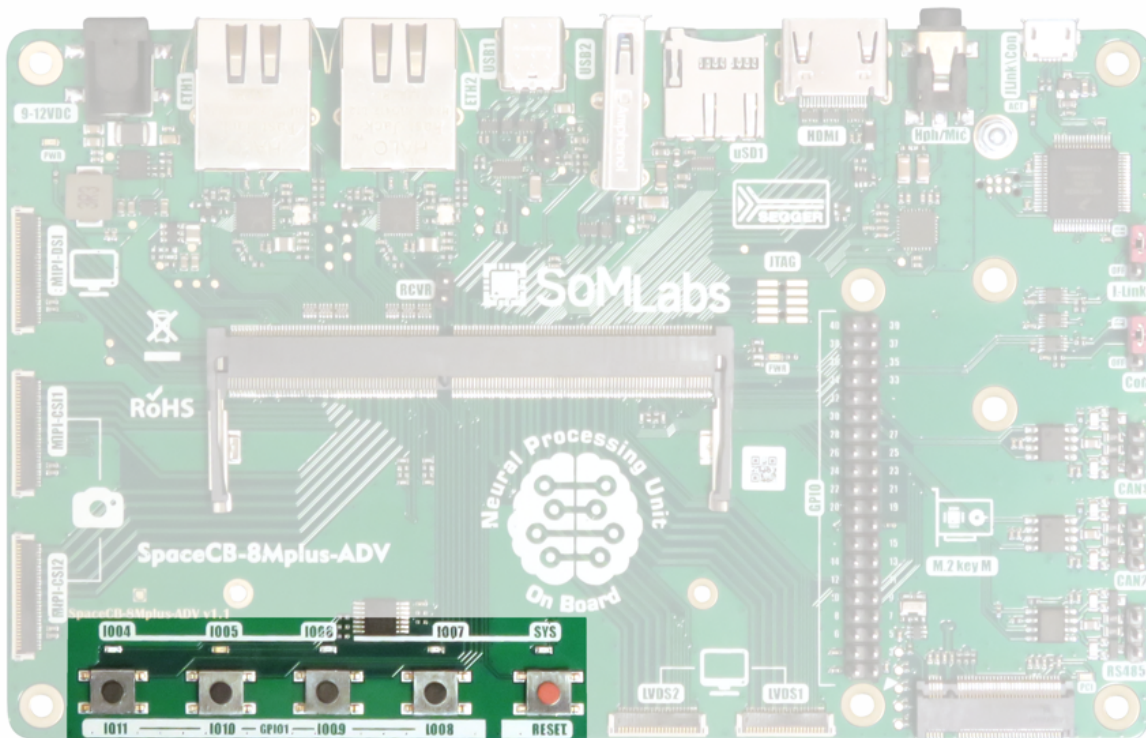
20	-	GND
21	ECSPI2_MISO	-
22	GPIO1_08	-
23	ECSPI2_SCLK	-
24	ECSPI2_CS0	-
25	-	GND
26	GPIO1_09	-
27	I2C4_SDA	I2C interface with 4.7kOhm pull-up (3.3V)
28	I2C4_SCL	I2C interface with 4.7kOhm pull-up (3.3V)
29	NC	Not connected
30	-	GND
31	NC	Not connected
32	GPIO1_10	-
33	I2C3_SDA	I2C interface with 4.7kOhm pull-up (3.3V)
34	-	GND
35	ECSPI1_MISO	-
36	GPIO1_11	-
37	ECSPI1_CS0	-
38	ECSPI1_MOSI	-
39	-	GND
40	ECSPI1_SCLK	-

Note:

1. The I2C1 interface is common to MIPI-DSI, MIPI-CSI1 and LVDS2 interfaces.
2. The I2C3 interface supports touch-panel controller connected to MIPI-DSI interface (J502).
3. The I2C4 interface is common to MIPI-CSI2 and LVDS1 interfaces.



## User Interface (switches and LEDs)



### User switches

Switch	GPIO	Description
S700 (black, most on the left)	GPIO1_IO11	-
S701	GPIO1_IO10	-
S702	GPIO1_IO09	-
S703 (black, most on the right)	GPIO1_IO08	-

### System switches

Switch	Signal name	Description
S704 (red)	Reset	-

### User LEDs

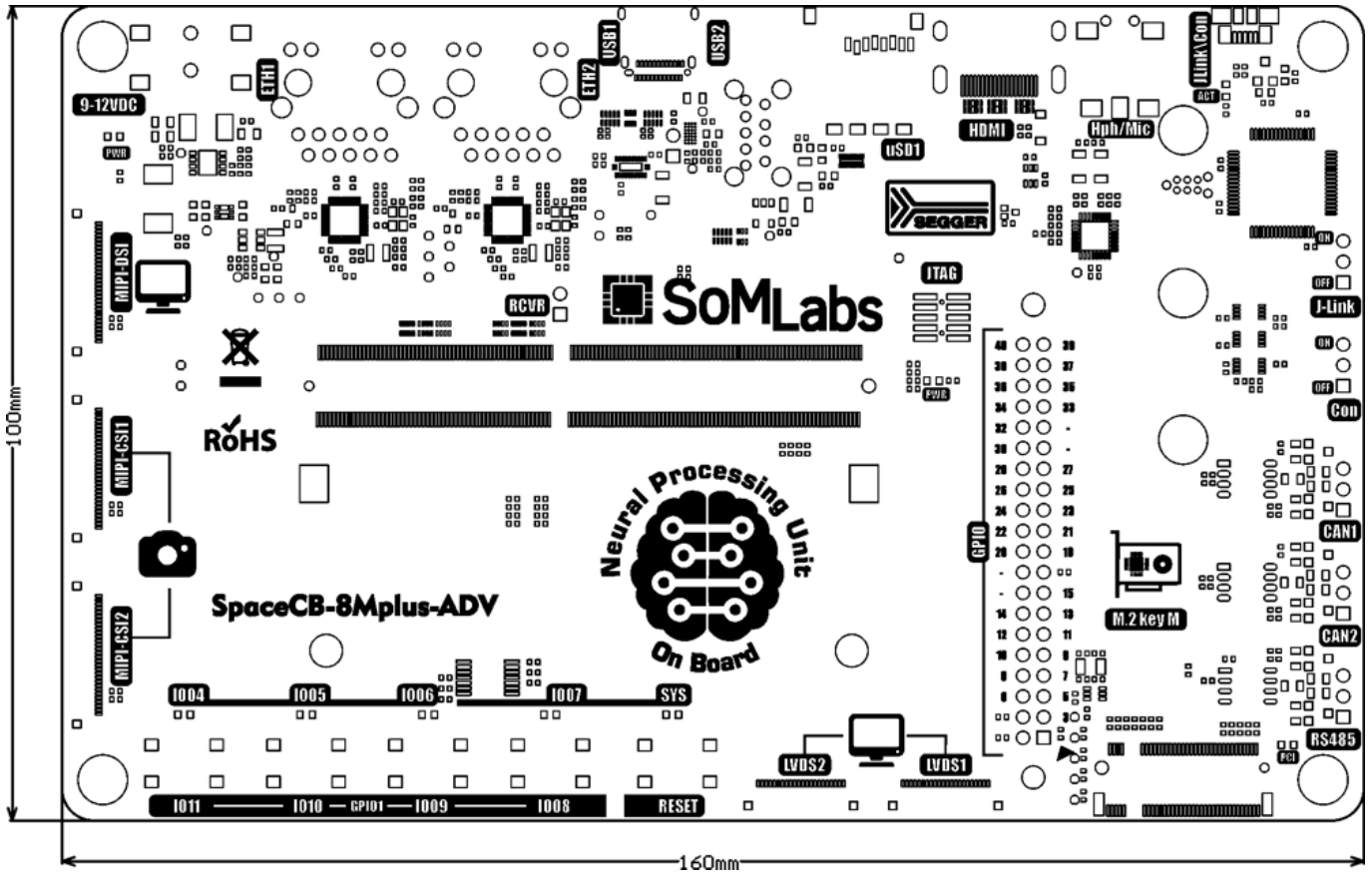
LED	GPIO	Description
D703 (most on the left)	GPIO1_IO06	User LED1 buffered with inverter
D702	GPIO1_IO05	User LED2 buffered with inverter
D701	GPIO4_IO04	User LED3 buffered with inverter
D700 (most on the right)	GPIO1_IO07	User LED4 buffered with inverter

**Note: version 1.1 of the SpaceCB-8Mplus has incorrect LEDs description - IO6 and IO4 are changed on PCB top overlay!**

### System LEDs

LED	GPIO	Description
D704	SAI2_TXC	System function monitoring (heartbeat) connected to SAI2_TXC (AH15 pin of MPU)
D705	-	Power LED (3.3V)

## Dimensions





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