SpaceCB-8Mplus-ADV Datasheet and Pinout

Rev. 20250627102840

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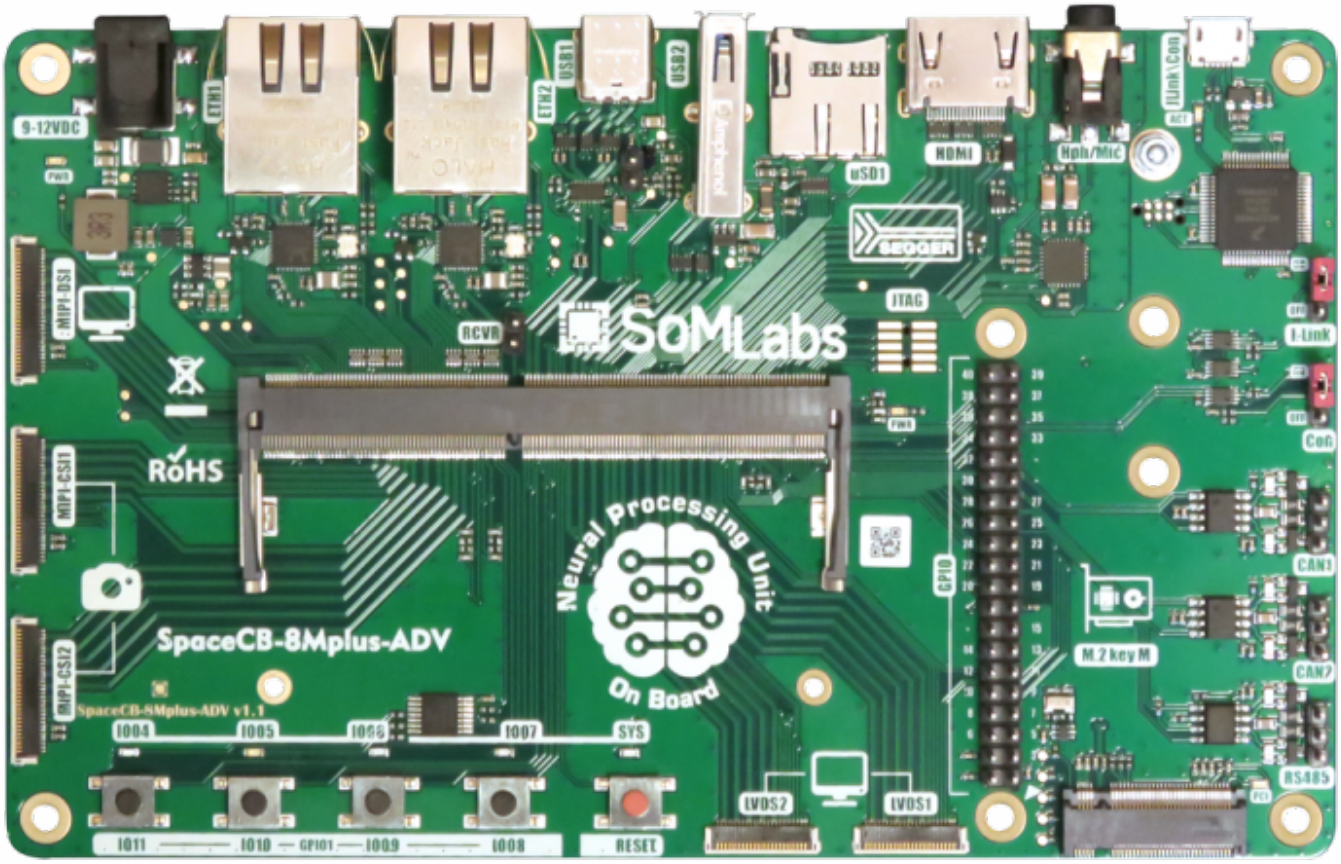
SpaceCB-8Mplus-ADV v.1.1 Datasheet and Pinout

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

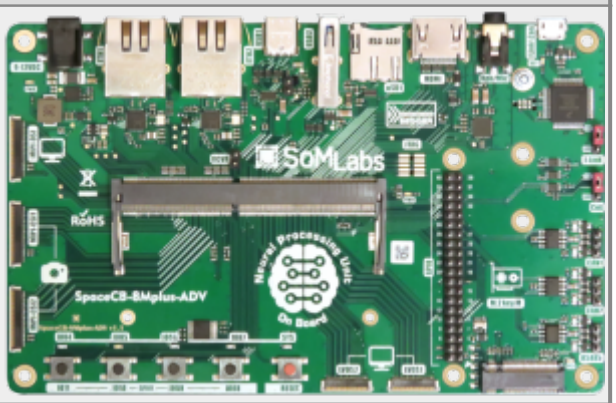
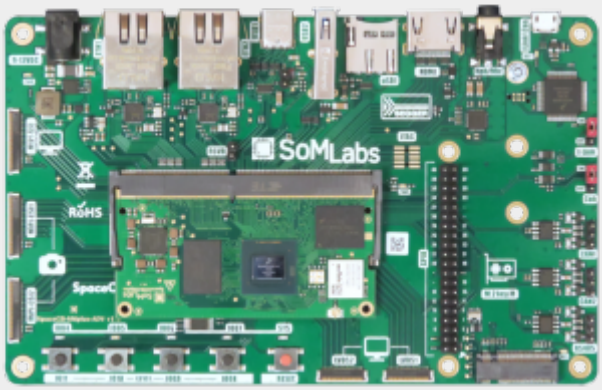
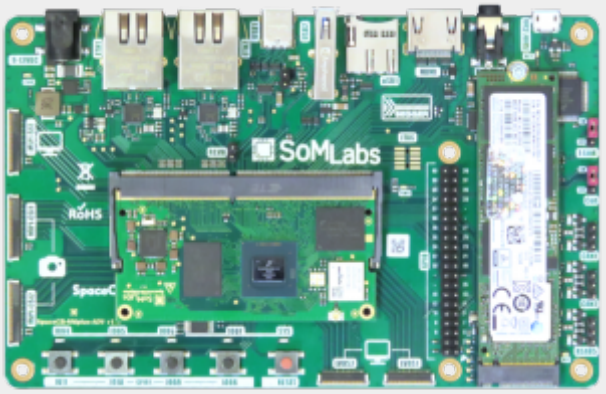
- AI and ML applications
- Machine vision equipment
- Robotics
- Human-machine Interfaces (HMI)
- Multimedia
- Video streaming
- Industrial embedded Linux computer
- Home Automation – Smart Home

- 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: -40 to +85°C
- Board Size: 160mm x 100mm x 25mm

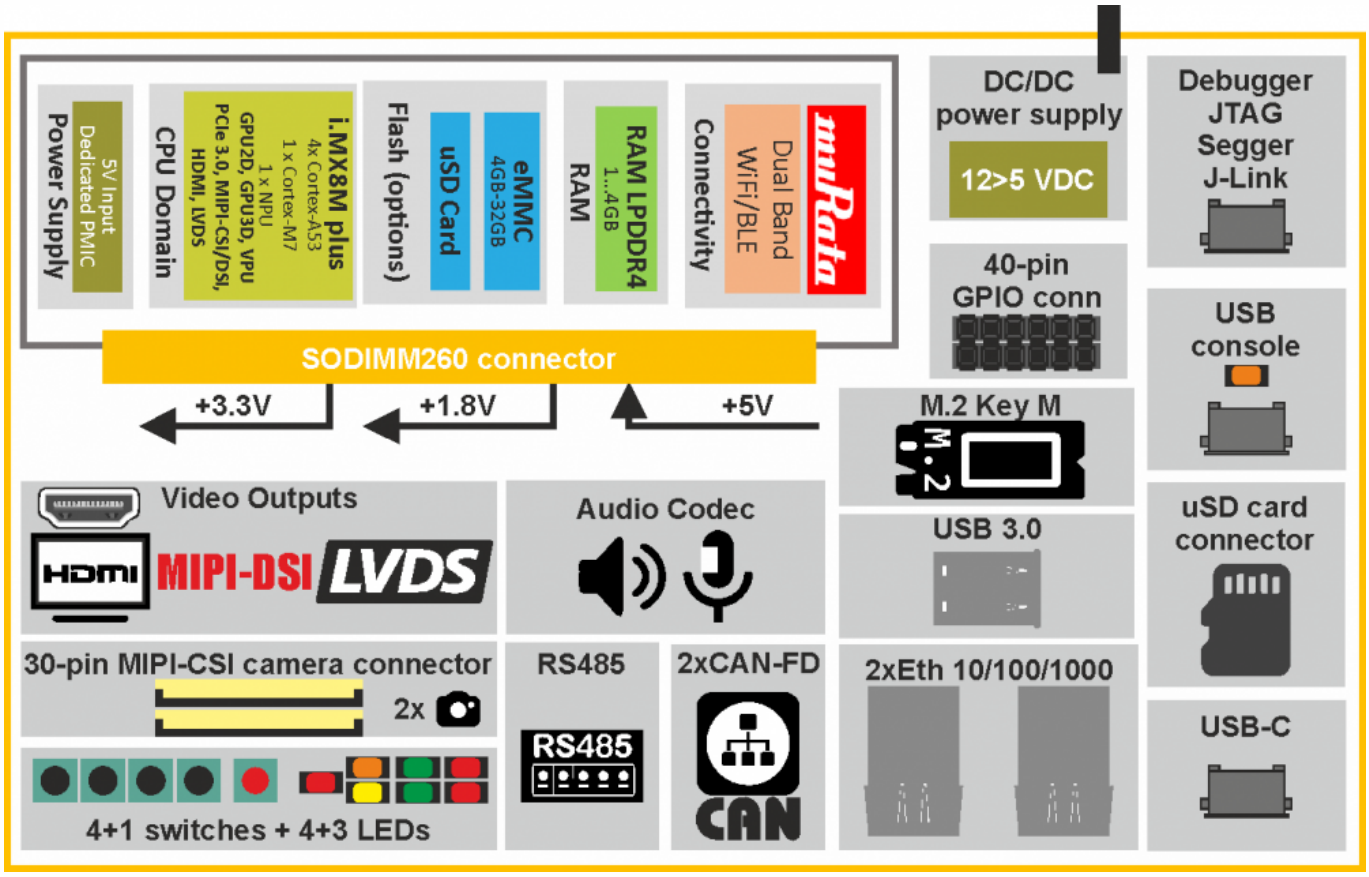
Pictures of SpaceCB-8Mplus-ADV v1.1 board

Version	Photo
SpaceCB-8Mplus-ADV v1.1 board only	
SpaceCB-8Mplus-ADV v1.1 with SpaceSOM-8Mplus	
SpaceCB-8Mplus-ADV with SpaceSOM-8Mplus and M.2 SSD drive	

Ordering info

SpaceCB-8Mplus-ADV v1.1

Block Diagram



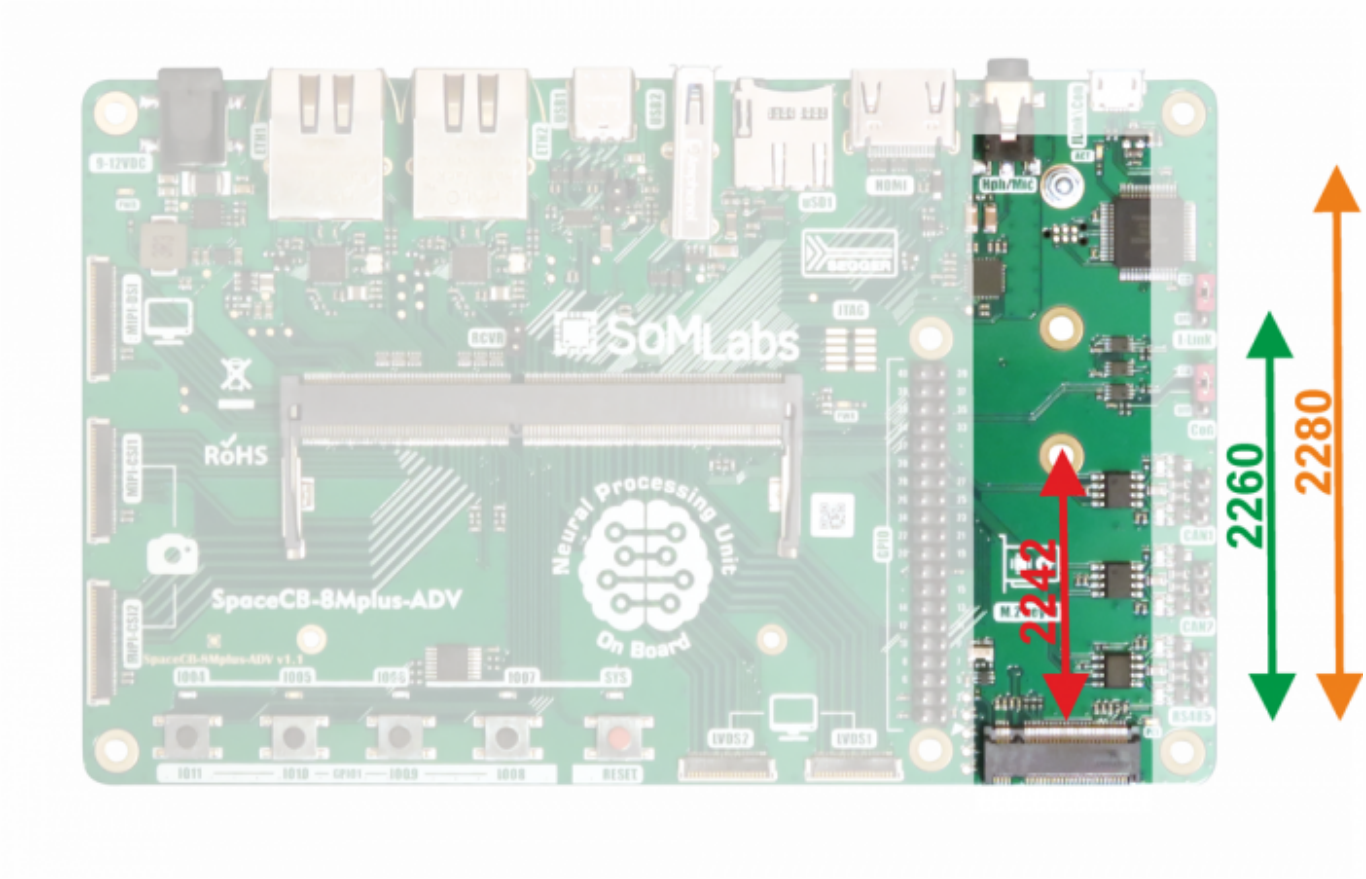
Electrical parameters

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

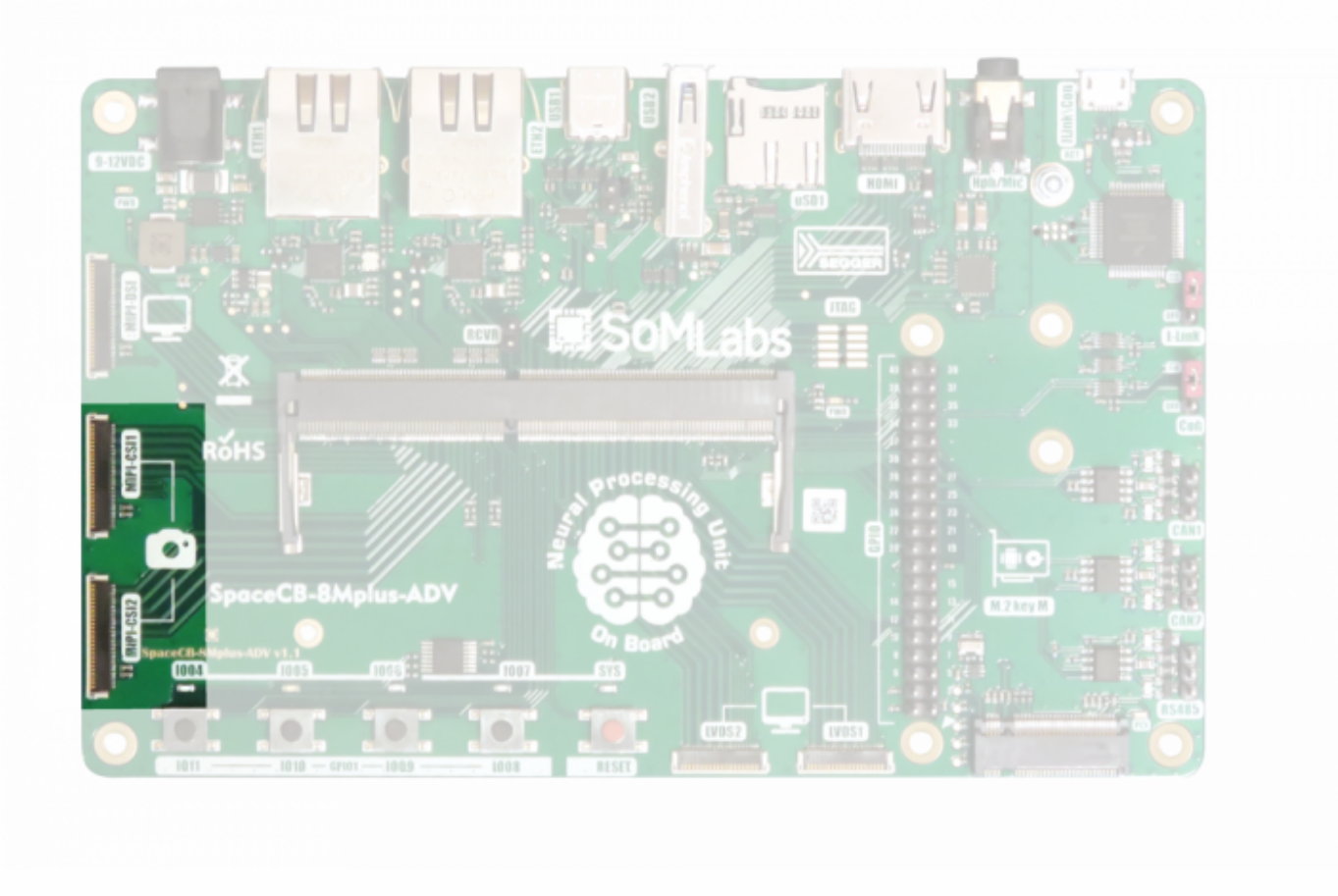
1. The SpaceCB-8M-ADV carrier board is equippped with dual triple-speed 10/100/1000Mb/s Ethernet interface - RTL8211F. Chips are connected to MPU using RGMII interface.
2. The I2C1 interface is common to MIPI-DSI, MIPI-CSI1 and LVDS2 interfaces.
3. The I2C2 interface supports on-board audio codec (NAU88C22YG).
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	Confguration I2C interface with 4.7kOhm pull-up (3.3V)
18	I2C1.SDA	AH7	Confguration 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 (dislpay 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	-	-

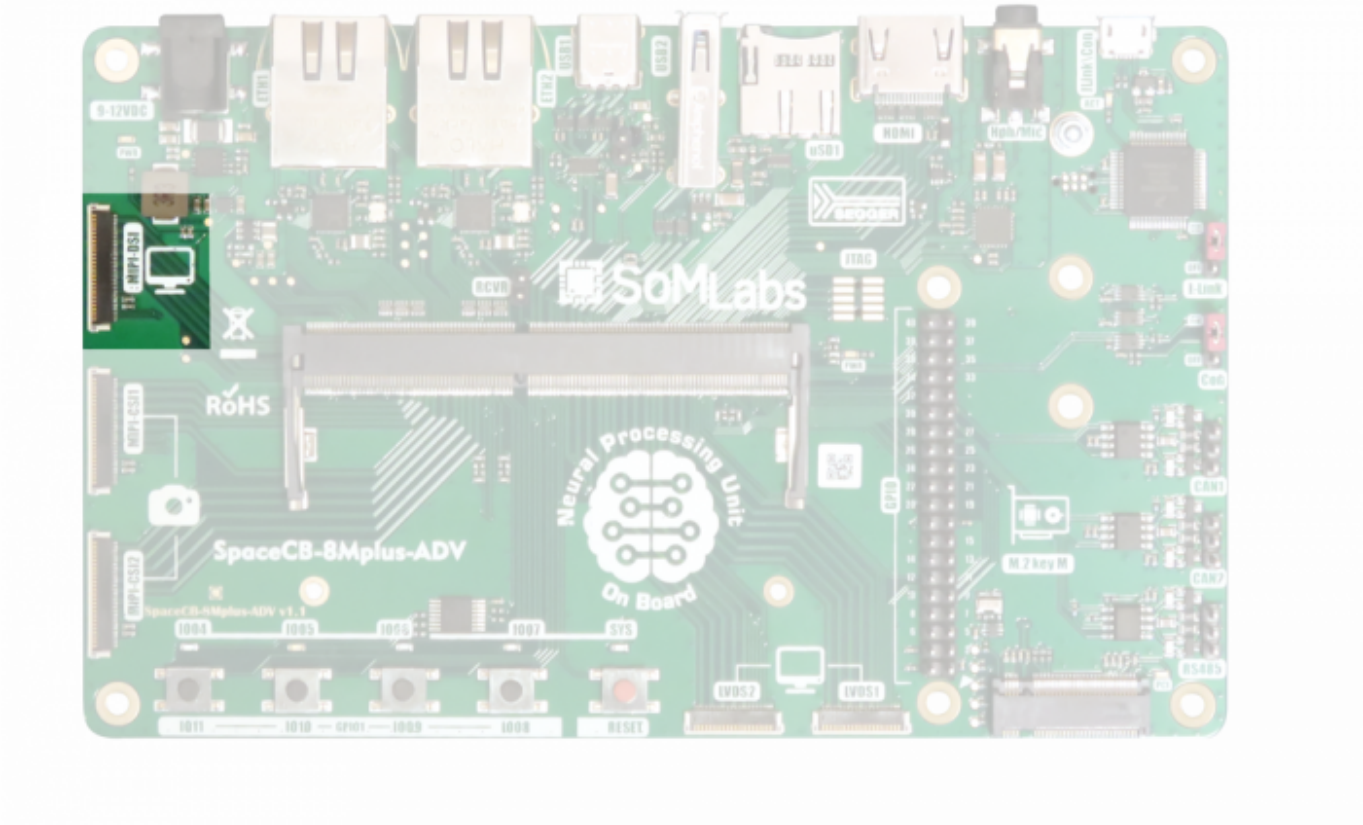
Pin description of J501 (MIPI-CSI2)

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	Confguration I2C interface with 4.7kOhm pull-up (3.3V)
18	I2C4.SDA	AD8	Confguration 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 (dislpay 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)

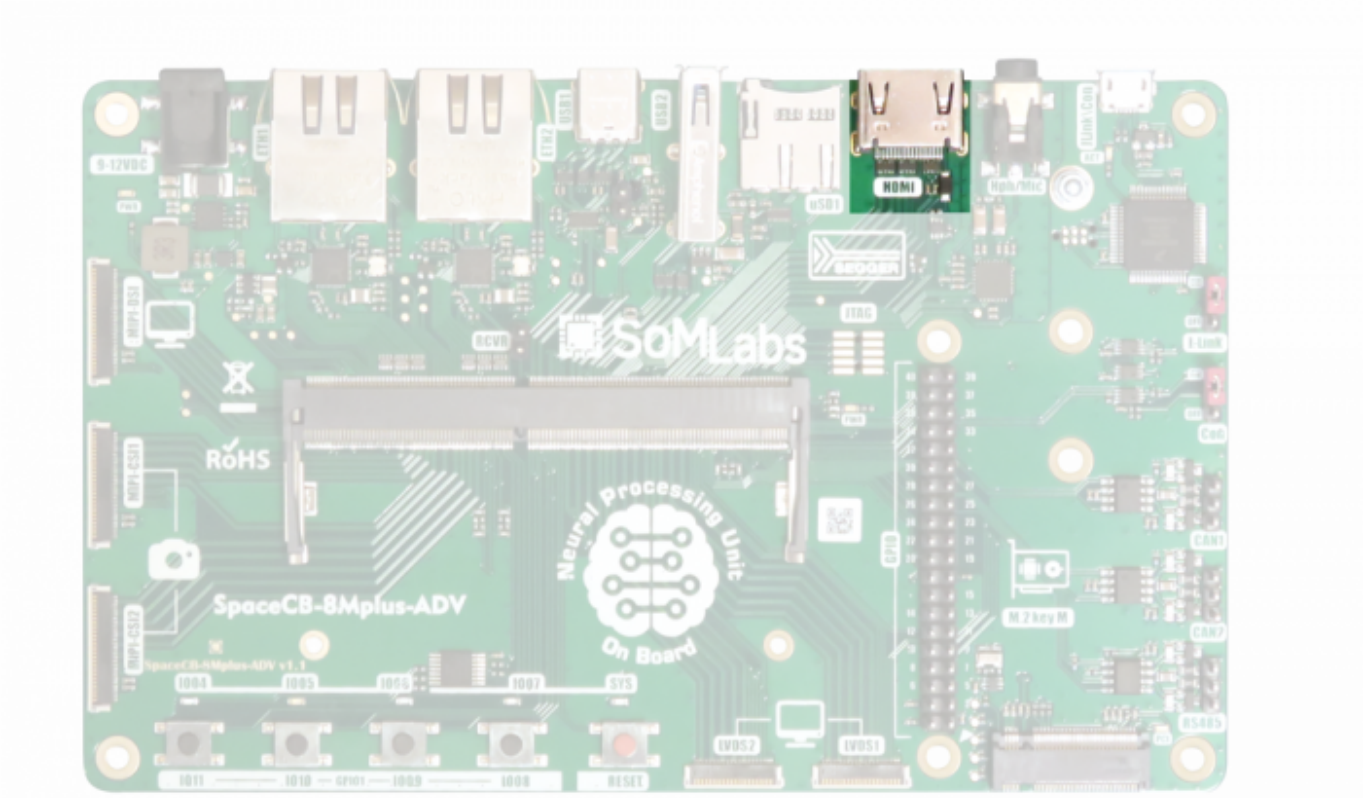


J502 pin	Default MPU pin name	MPU pin	Description
1	GND	-	-
2	DSI-CLK-P	-	-
3	DSI-CLK-P	-	-
4	GND	-	-
5	DSI-DATA0-P	-	-
6	DSI-DATA0-N	-	-
7	GND	-	-
8	DSI-DATA1-P	-	-
9	DSI-DATA1-N	-	-
10	GND	-	-
11	DSI-DATA2-P	-	-
12	DSI-DATA2-N	-	-
13	GND	-	
14	DSI-DATA3-P	-	-
15	DSI-DATA3-N	-	-
16	GND	-	-
17	I2C1.SCL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

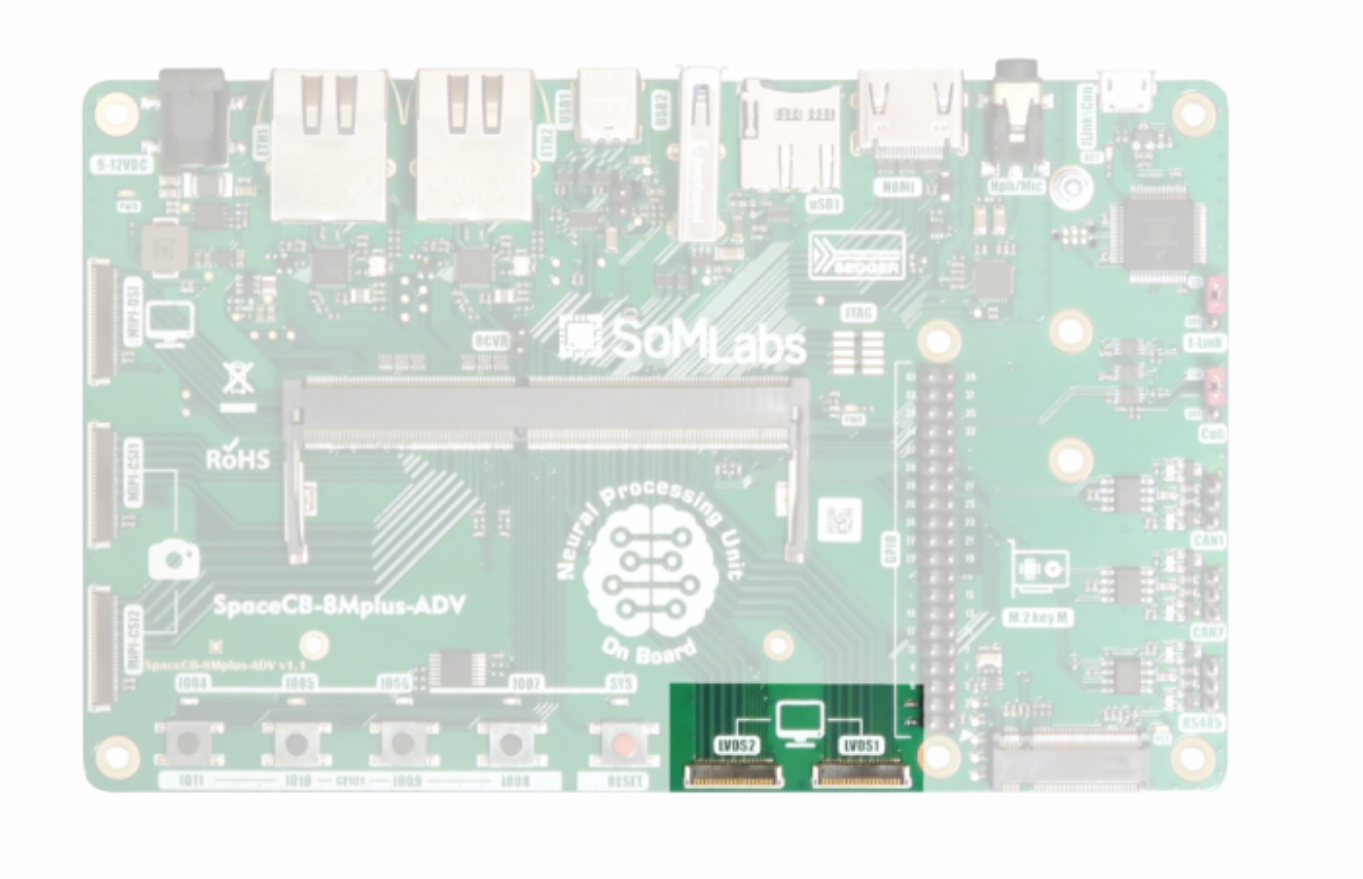
Note:
1. 1st pin of J502 connector is at the top of the image.
2. For configuration purposes is used I2C1 interface.
3. The I2C1 interface is common to MIPI-DSI, MIPI-CSI1 and LVDS2 interfaces.
4. The I2C3 interface supports touch-panel controller connected to MIPI-DSI interface (J502).

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 confguration I2C interface with 4.7kOhm pull-up (3.3V)
20	I2C4.SDA	AD8	Touch-panel confguration I2C interface with 4.7kOhm pull-up (3.3V)

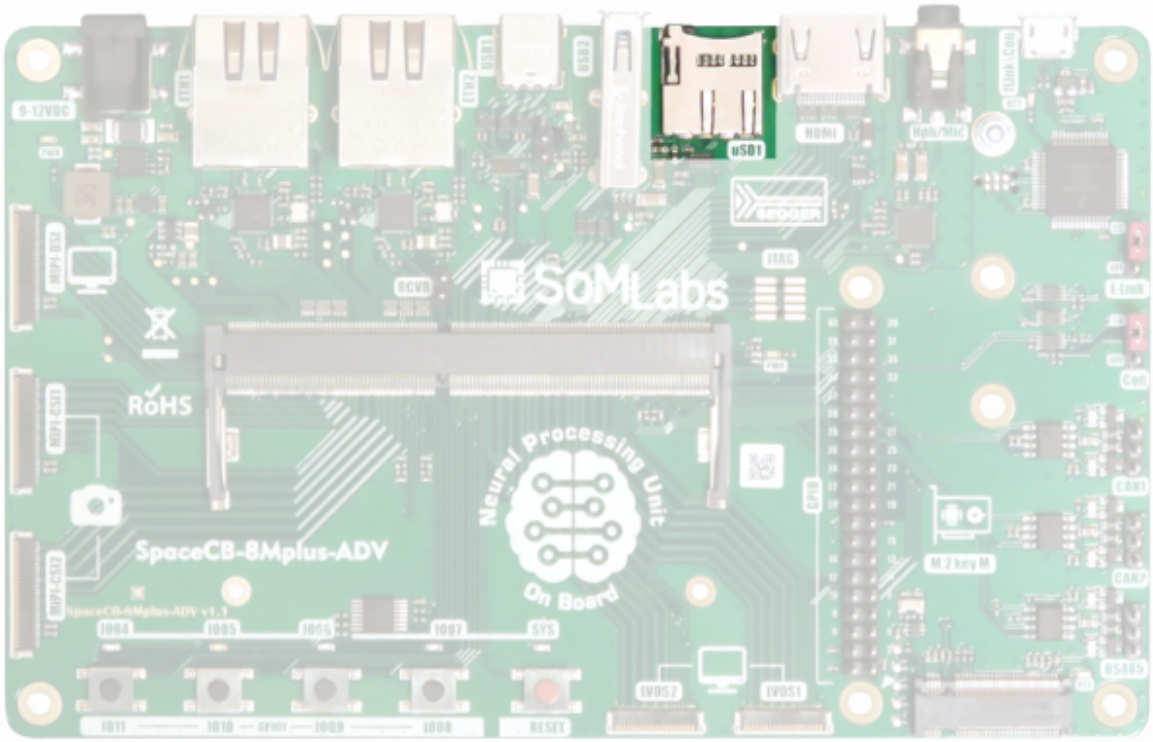
21	+5V	-	Power supply for external devices
22	+5V	-	Power supply for external devices

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 confguration I2C interface with 4.7kOhm pull-up (3.3V)
20	I2C1.SDA	AH7	Touch-panel confguration 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.

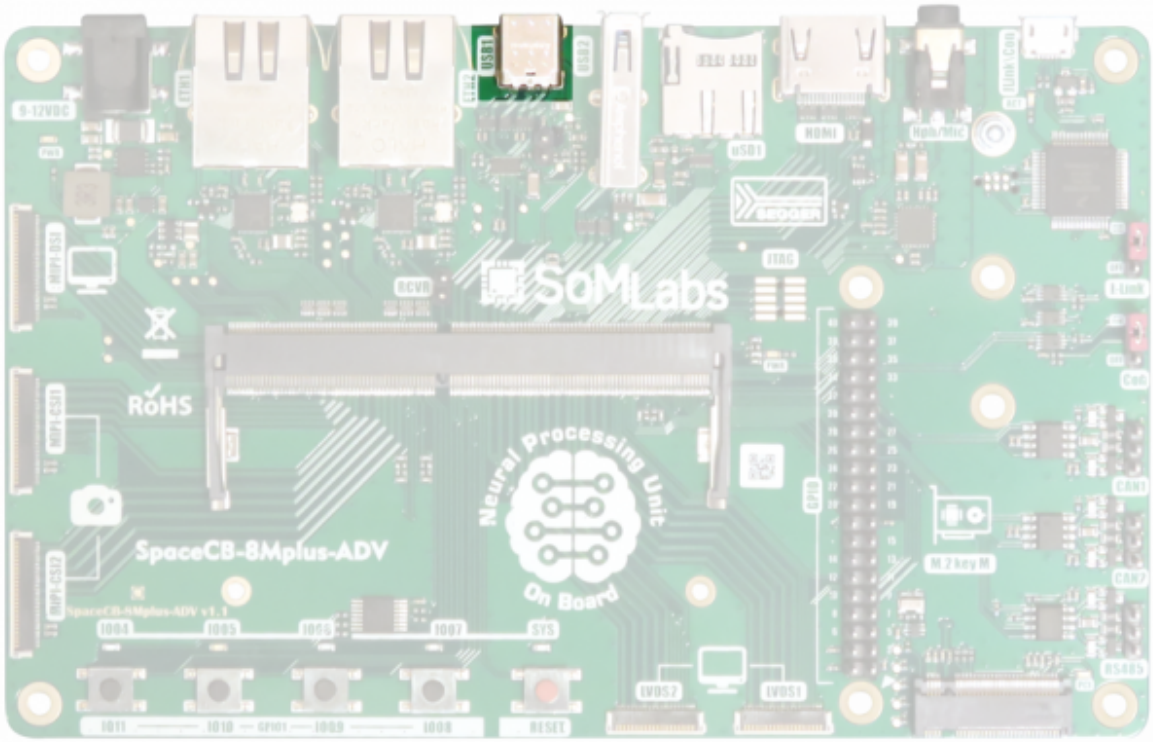
MicroSD card connector (J701)



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

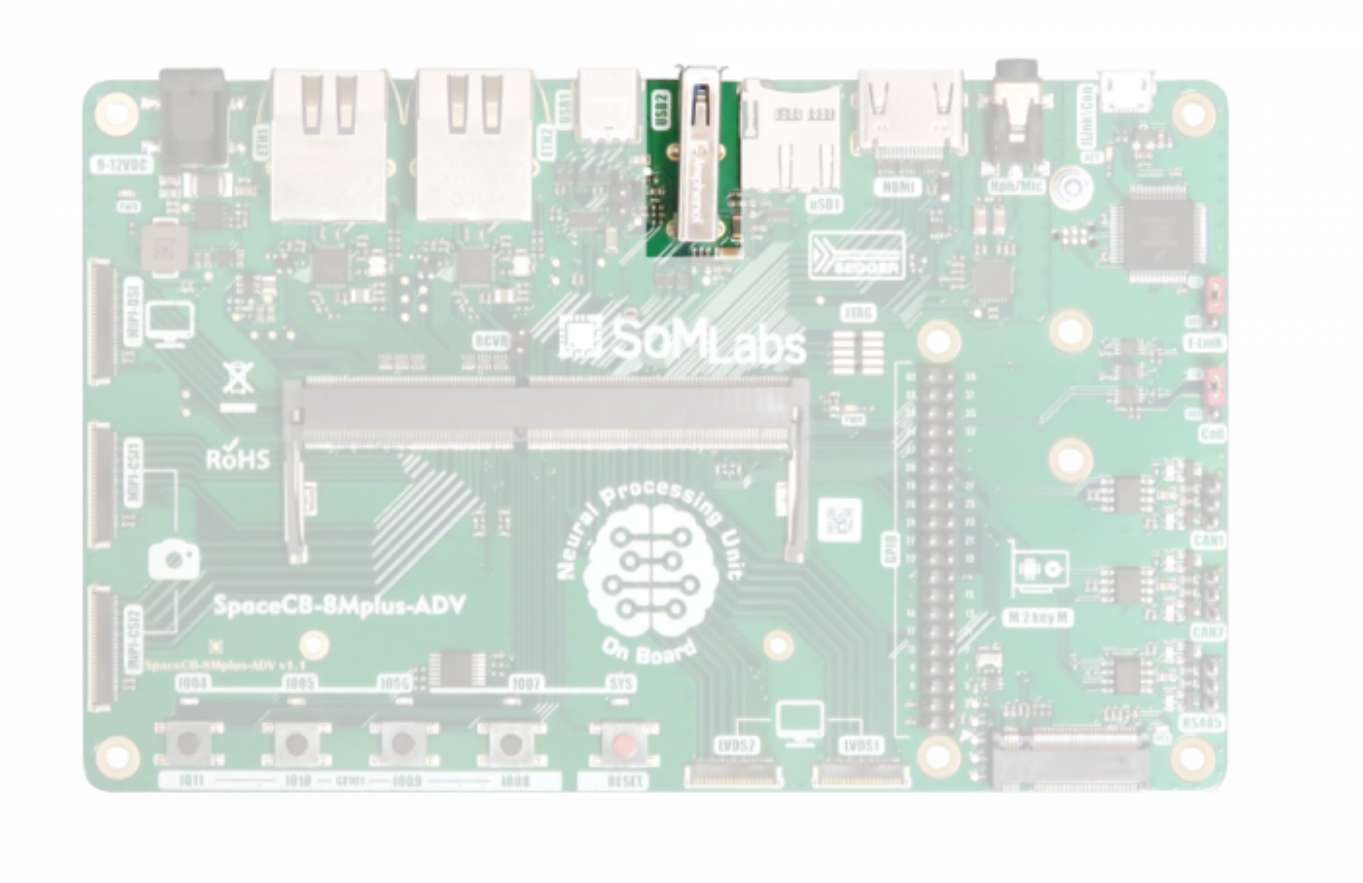
Note:
1. Value of VDD for uSD is selected with SAI5_RXD0 (MPU) pin.

USB-C interface



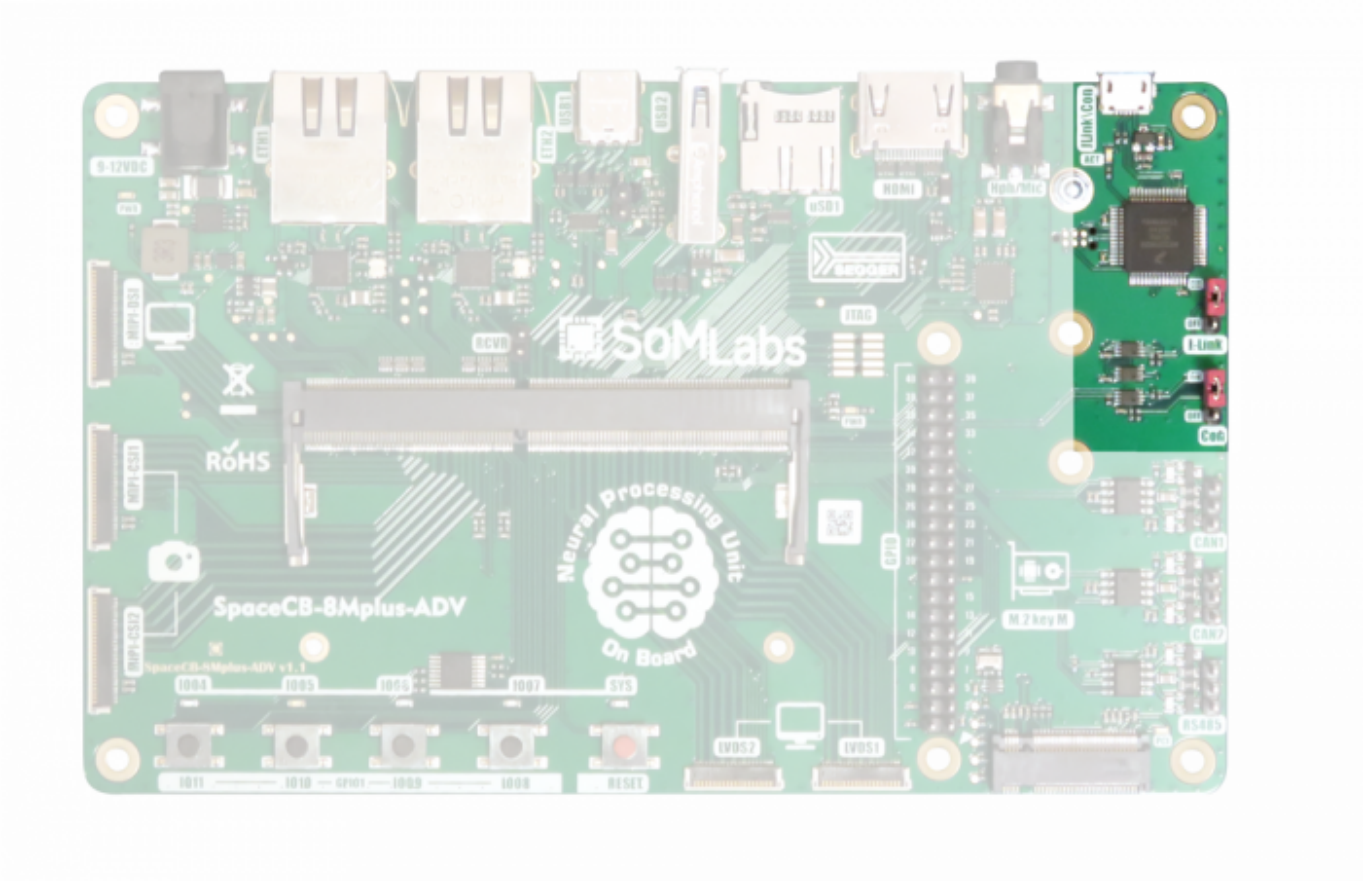
Note:
1. USB-C interface built-in SpaceCB-8Mplus-ADV is connected to USB1 channel.
2. The I2C6 interface supports configuration of PI5USB30213A USB-C controller.

USB 3.0 interface



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

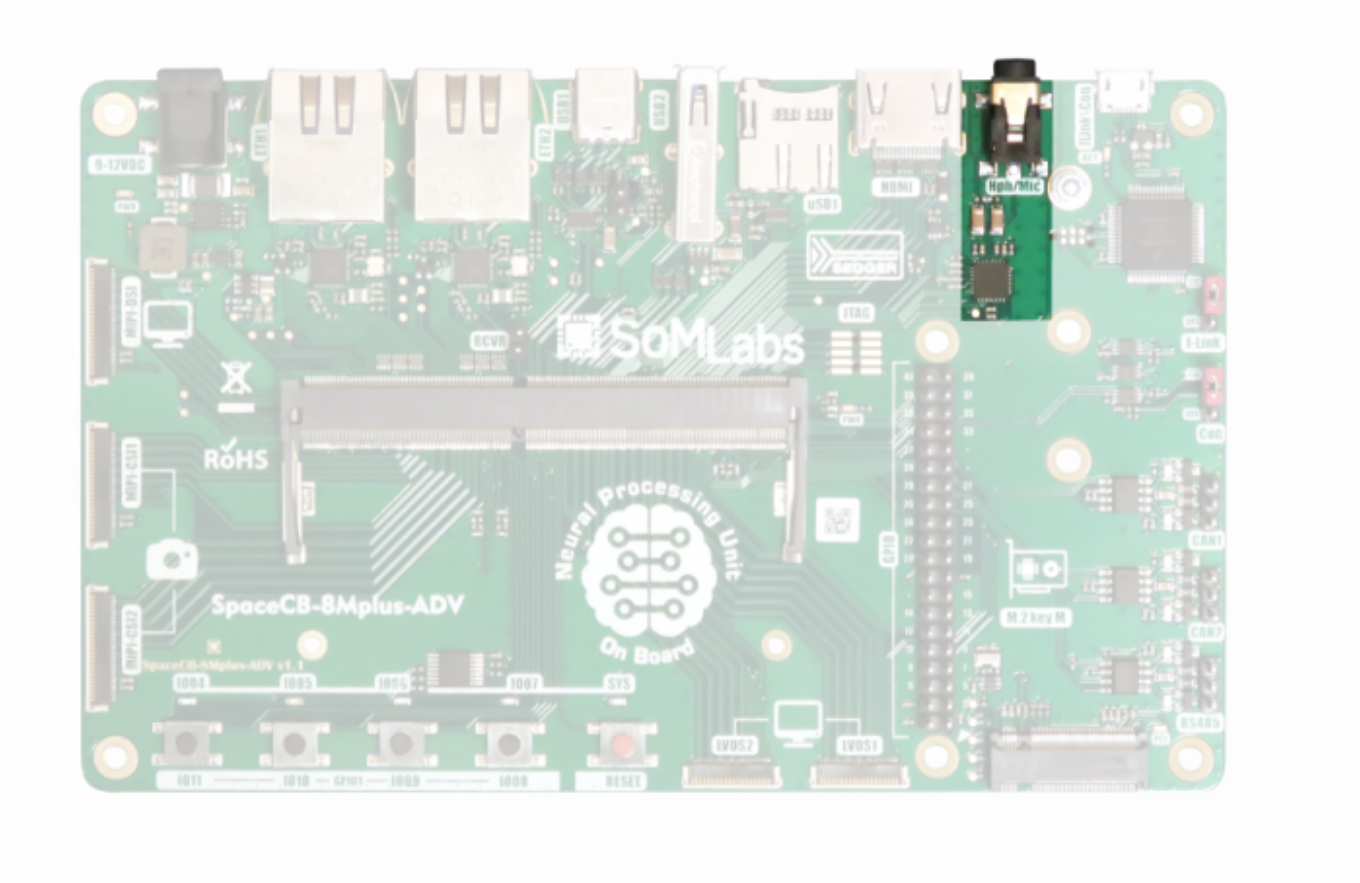
USB Console Port and Segger J-Link debugger



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.

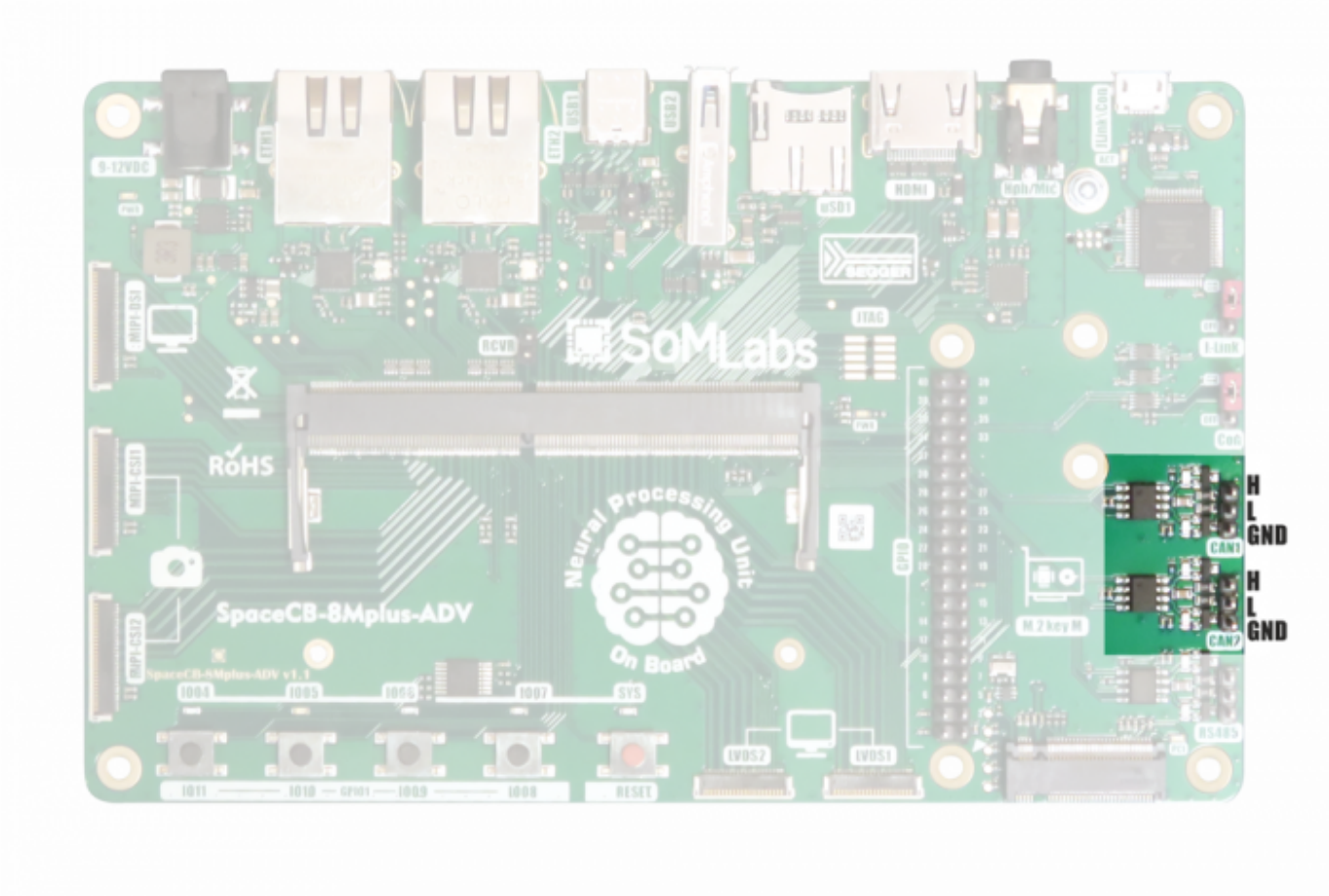
24-bit stereo audio codec



The SpaceCB-8M-ADV board is equipped with 24-bit stereo codec - Nuvoton NAU88C22YG - with integrated audio amplifier. The NAU88C22 is a low power, high quality CODEC for portable and general purpose audio applications. In addition to precision 24-bit stereo ADCs and DACs, NAU88C22YG integrates a broad range of additional functions to simplify implementation of complete audio system solutions. The NAU88C22 includes drivers for speaker, headphone, and differential or stereo line outputs, and integrates preamps for stereo differential microphones,significantly reducing external component requirements.

Default MPU pin name	MPU pin	Description
SAI3_MCLK	AJ20	Codec master clock
SAI3_TXC	AH19	Codec BCLK line
SAI3_TXFS	AC16	Codec FS line
SAI3_TXD	AH18	Codec input line
SAI3_RXD	AF18	Codec output line
I2C2_SCL	AH6	Confguration I2C interface with 4.7kOhm pull-up (3.3V)
I2C1_SDA	AE8	Confguration I2C interface with 4.7kOhm pull-up (3.3V)

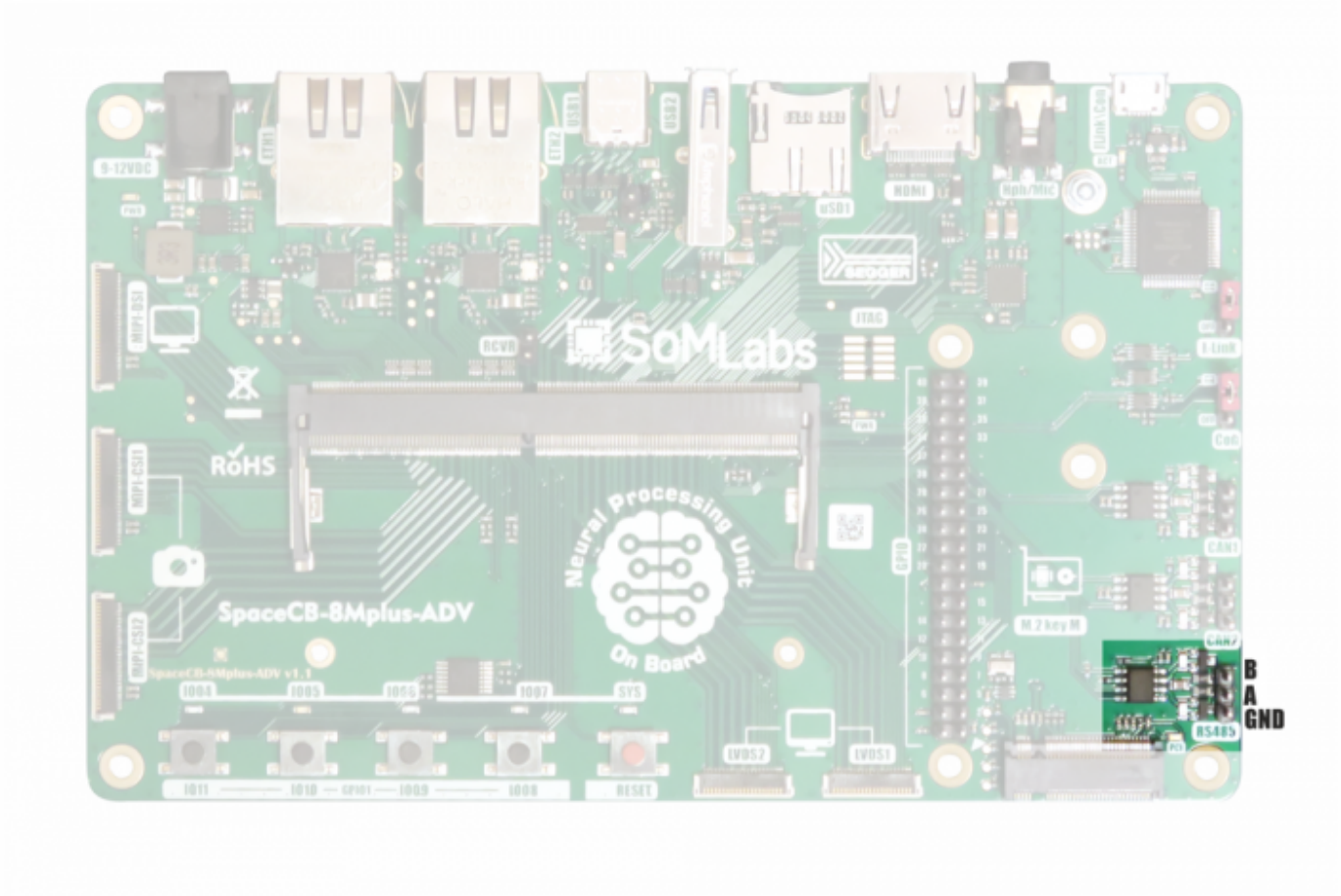
Dual CAN-FD serial interface



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

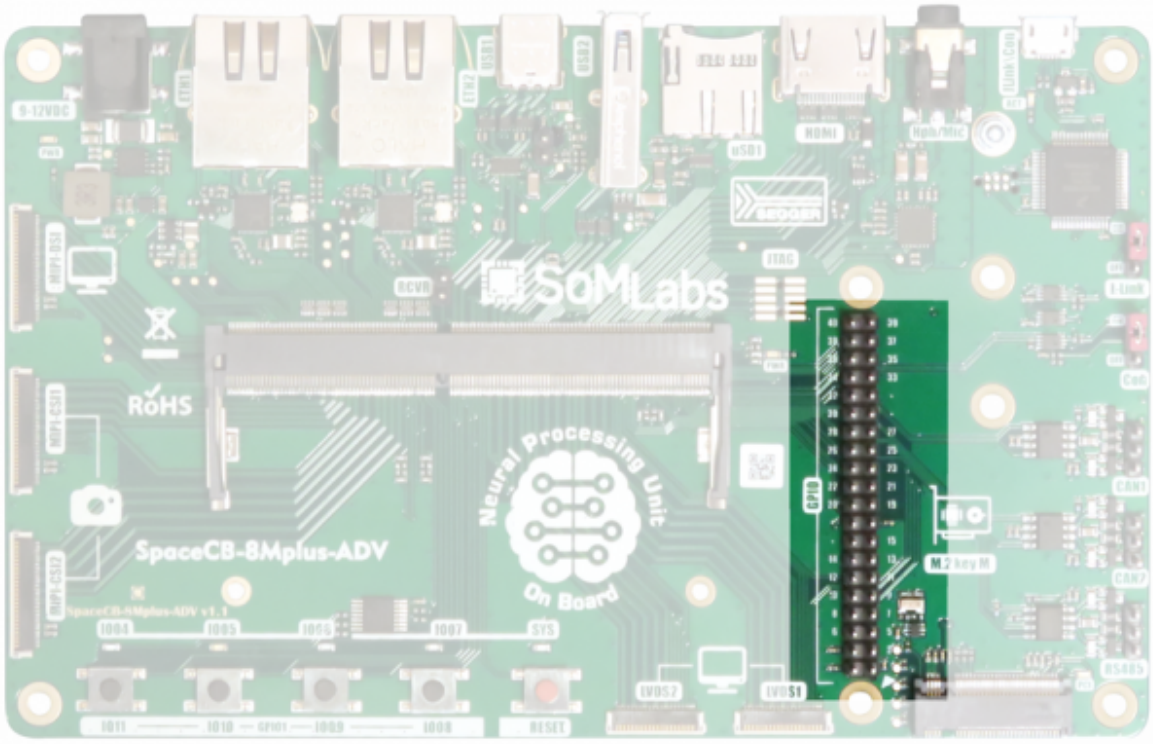


The SpaceCB-8Mplus-ADV board is equipped with low-voltage RS-485 physical layer interface MAX3485.
The RS-485 is connected to default UART2 (TxD, RxD) channel and pins. Transmission control line DE is controlled by MPU GPIO.

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)

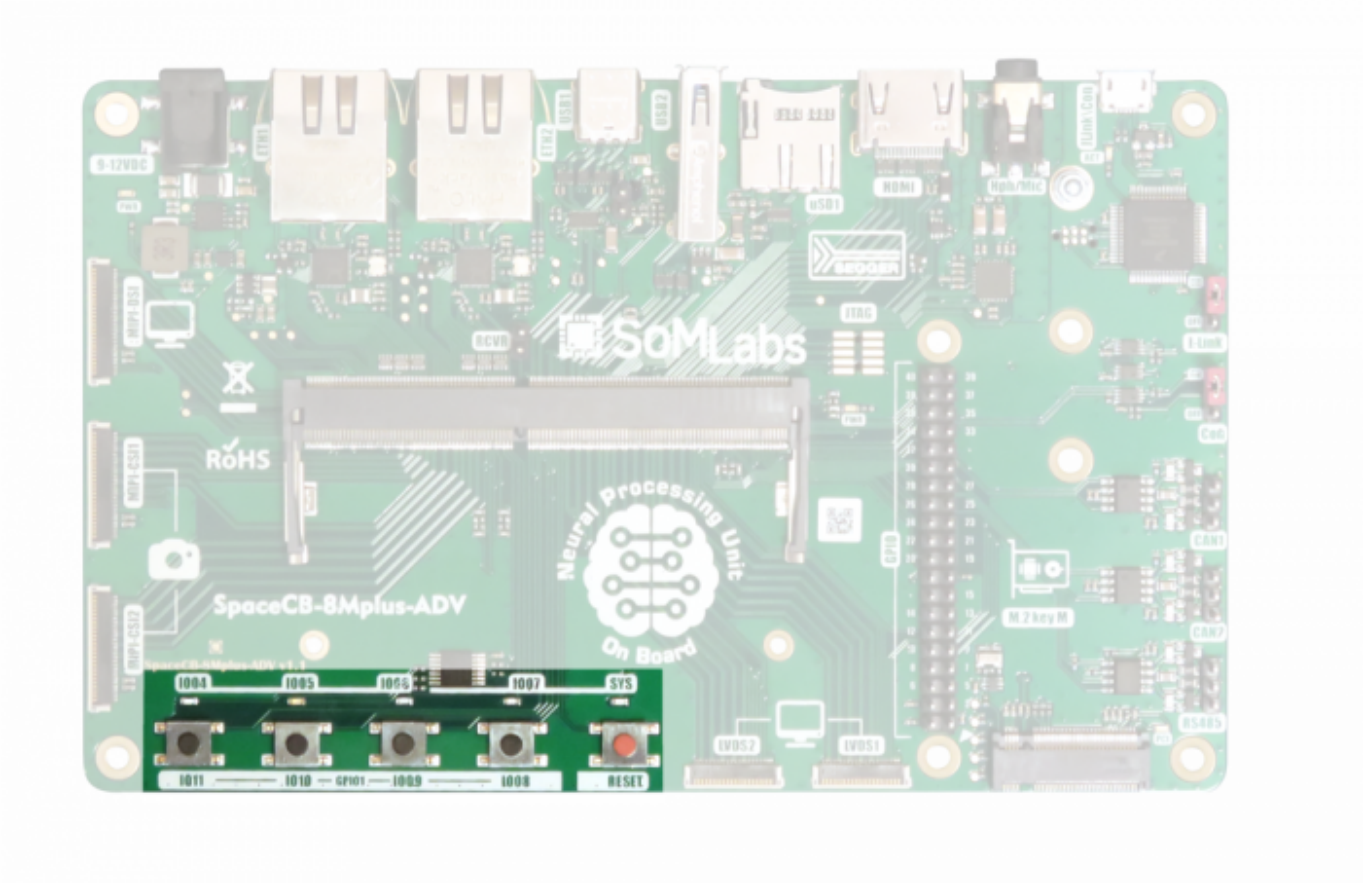


J702 pin	Default pin name	Description
1	-	+3.3V
2	-	+5V
3	I2C1_SDA	I2C interface with 4.7kOhm pull-up (3.3V)
4	-	+5V
5	I2C1_SCL	I2C interface with 4.7kOhm pull-up (3.3V)
6	-	GND
7	GPIO1.04	-
8	UART3_TXD	-
9	-	GND
10	UART3_RXD	-
11	GPIO1.05	-
12	I2C3_SCL	I2C interface with 4.7kOhm pull-up (3.3V)
13	GPIO1_06	-
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

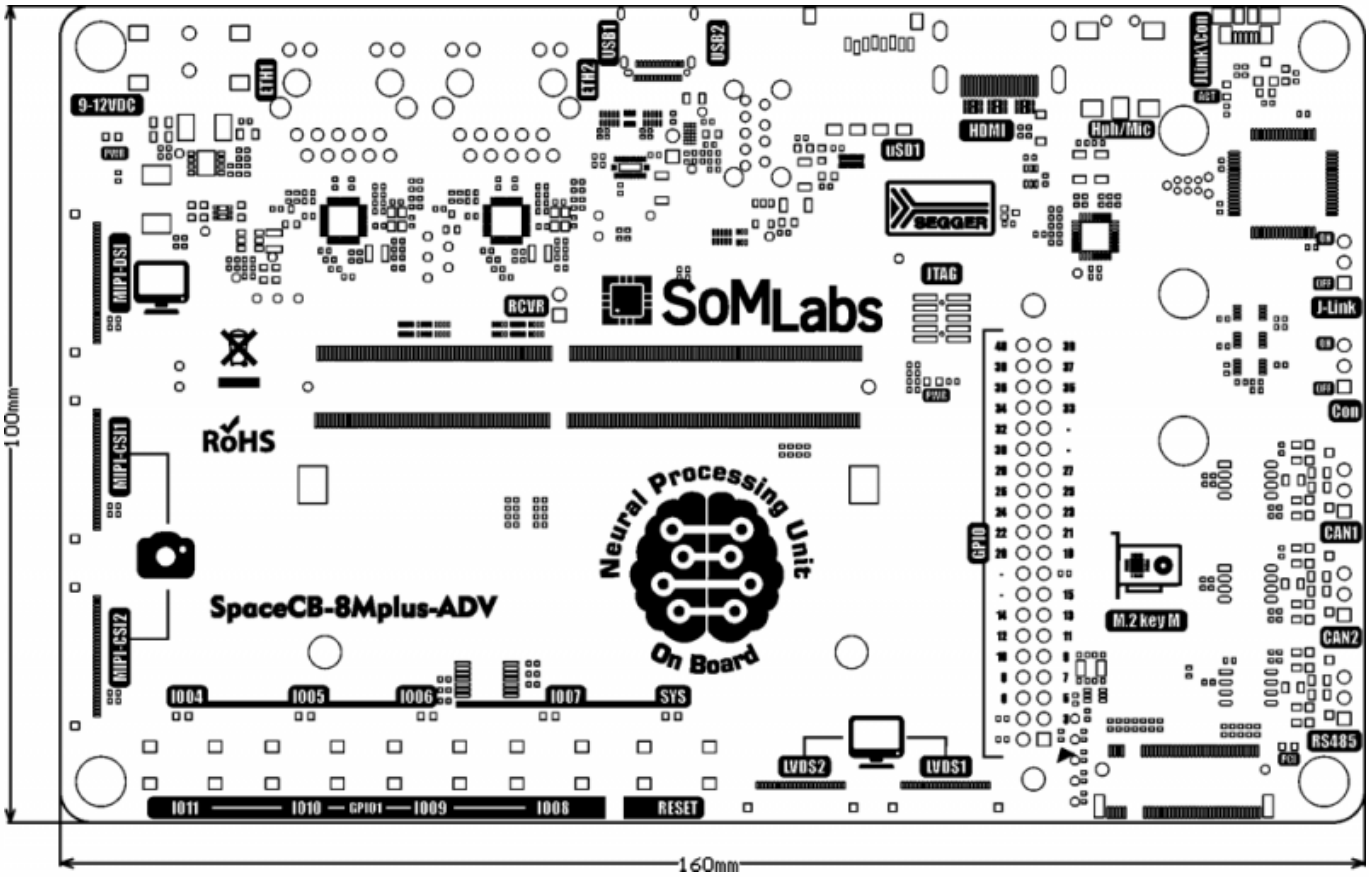
LED	GPIO	Description
D703 (most on the left)	GPIO1_IO06	User LED1 buffered with inverter
D702	GPIO1_IO05	User LED2 buffered with inverter
D701	GPIO4_IO04	User LED3 buffered with inverter
D700 (most on the right)	GPIO1_IO07	User LED4 buffered with inverter

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


100mm
160mm
9-12VDC
ETH1
ETH2
USB1
USB2
HDMI
Hph/Mic
uSD1
SEGGER
JTAG
RCVR
MIPI-DSI
MIPI-CSI1
MIPI-CSI2
RoHS
SoMLabs
Neural Processing Unit
On Board
SpaceCB-8Mplus-ADV
GPIO
M.2 key M
J-Link
Con
CAN1
CAN2
RS485
LVDS2
LVDS1
I004
I005
I006
I007
SYS
I011
I010
GPIO1
I009
I008
RESET

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