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VisionCB-8M-ADV Datasheet and Pinout

Rev. 20210202114726

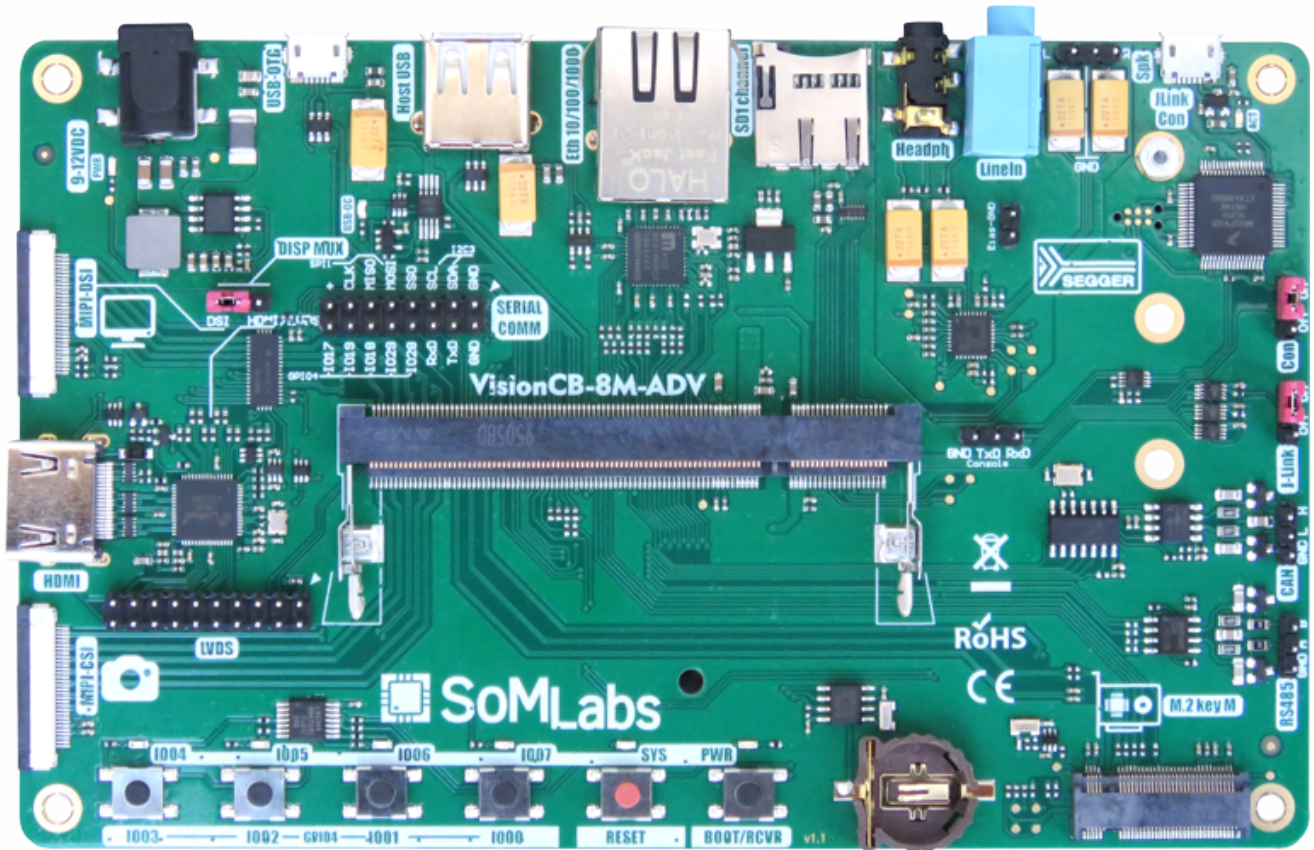
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VisionCB-8M-ADV v.1.1 Datasheet and Pinout

General description



VisionCB-8M-ADV is a carrier board for the VisionSOM-8Mmini family of computer-on-modules which are powered by NXP SOC iMX8Mmini (quad core ARM Cortex-A53+ single Cortex-M4). 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, Ethernet, 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.

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

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

Applications

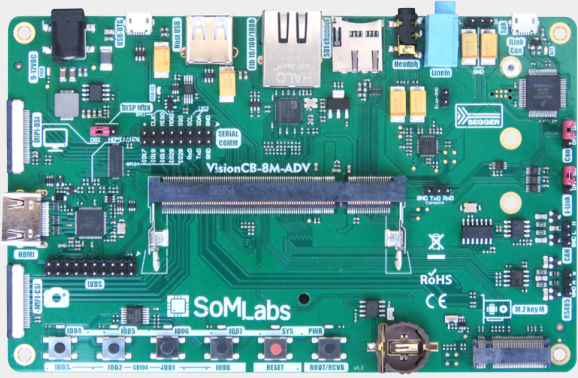
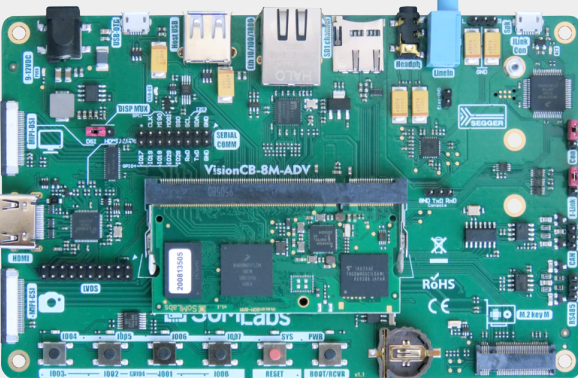
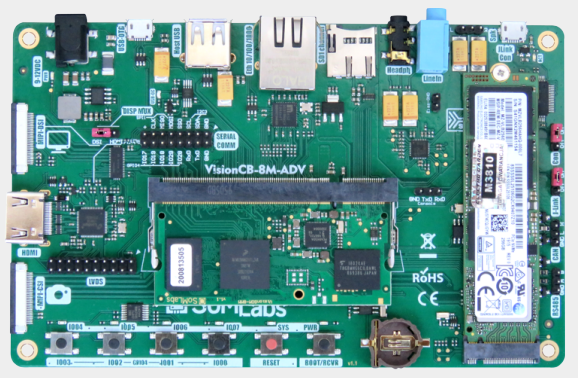
- Multimedia
- Video streaming
- Industrial embedded Linux computer
- Home Appliances
- Home Automation - Smart Home
- Human-machine Interfaces (HMI)
- Point-of-sales (POS) terminals
- Cash Register

- 2D barcode scanners and printers
- IoT gateways
- Residential gateways
- Machine vision equipment
- Robotics
- Fitness/outdoor equipment

Features

- Carrier Board (Base Board) compatible with the VisionSOM-8Mini family of modules based on quad core, heterogenous NXP iMX8Mmini application processors
- SoM Interface: SODIMM200
- 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 (single lane, M.2 key M socket)
 - RS-485 (simplex, 3 pin 2.54mm connector)
 - CAN FD (3 pin 2.54mm connector)
 - 1x Ethernet 10/100/1000Mbit/s, RJ45
 - 1x USB Host Type A connectors
 - 1x USB OTG Micro AB connector
 - 1x Console MicroUSB B connector
- Display Interface:
 - HDMI (muxed with MIPI-DSI)
 - LVDS (20 pin 2.54 mm, muxed with MIPI-DSI)
 - 30-pin FFC/FPC MIPI-DSI (up to 4 lanes)
- Camera Interface:
 - 30-pin FFC/FPC MIPI-CSI2 (up to 4 lanes)
- User Interface:
 - 24-bit audio codec
 - Line and microphone inputs
 - Speaker and headphone outputs
 - 4+2 Pushbuttons
 - 4+2+3 LEDs
- Built-in RTC with battery socket
- External Power Supply 9-12V DC
- Temperature Range: 0 to +70°C
- Board Size: 160mm x 100mm x 18mm

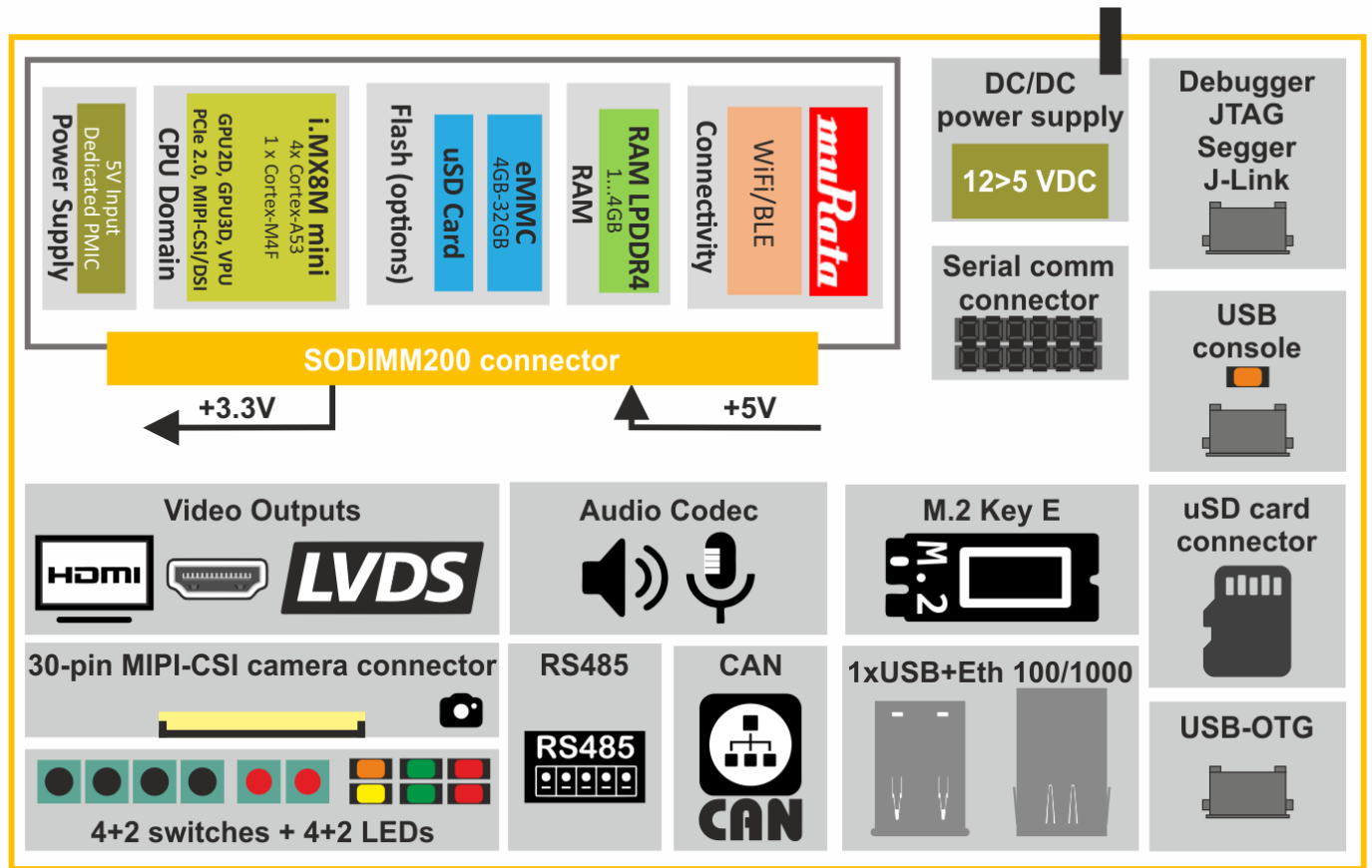
Pictures of VisionCB-8M-ADV v1.1 board

Version	Photo
VisionCB-8M-ADV v1.1 board only	 A photograph of the VisionCB-8M-ADV v1.1 board. The board is green with various components including a USB port, a serial port, a reset button, and a battery. The SoMLabs logo is visible in the center.
VisionCB-8M-ADV v1.1 with VisionSOM-8Mmini	 A photograph of the VisionCB-8M-ADV v1.1 board with a VisionSOM-8Mmini module installed. The module is a small black component with a white label, mounted on the board.
VisionCB-8M-ADV v1.1 with VisionSOM-8Mmini and M.2 SSD drive	 A photograph of the VisionCB-8M-ADV v1.1 board with a VisionSOM-8Mmini module and an M.2 SSD drive installed. The SSD is a small black component with a white label, mounted on the board.

Ordering info

VisionCB-8M-ADV v1.1

Block Diagram



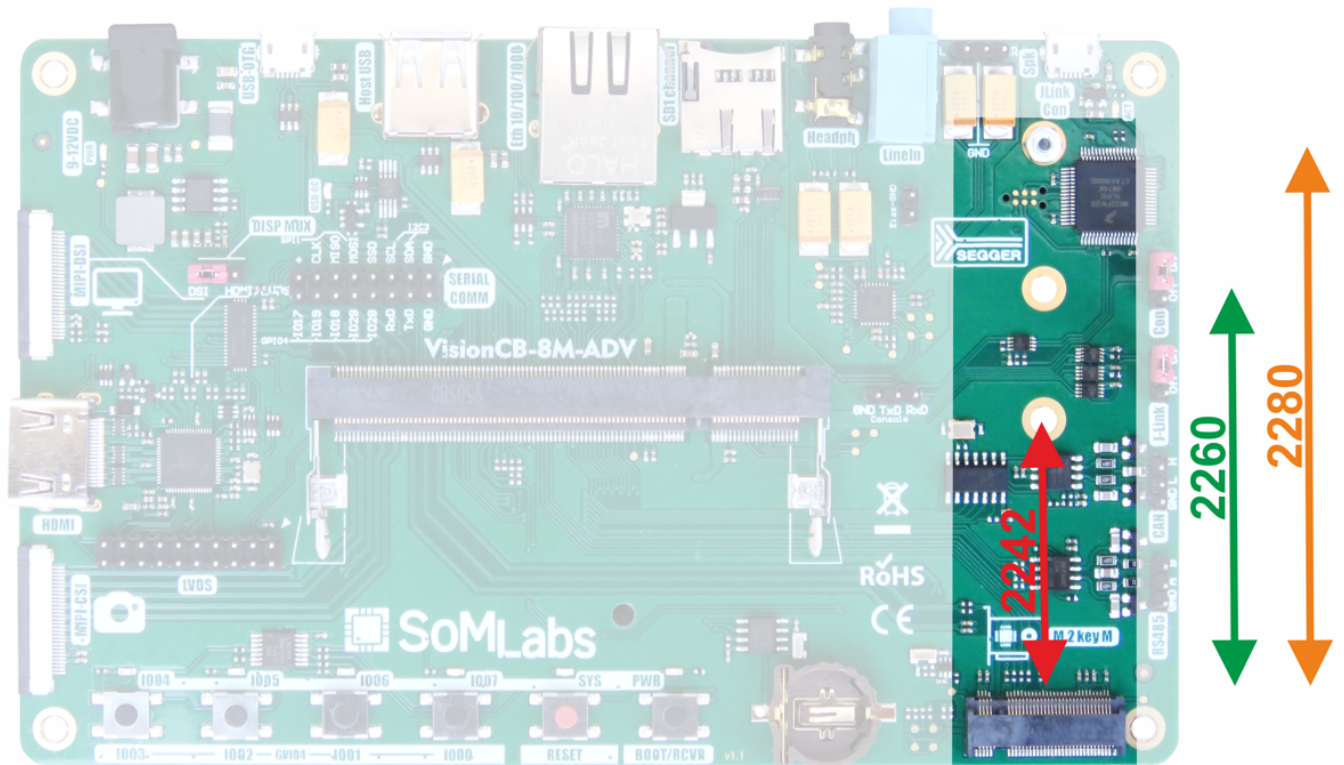
Electrical parameters

Parameter	Value			Units	Comment
	Min.	Typ.	Max.		
Power Supply	9.0	12.0	15.0	V	Positive pole on central connector of J400
Supply current	-	-	0.65	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 VisionCB-8M-ADV carrier board is equipped with triple-speed 10/100/1000Mb/s Ethernet interface - KSZ9031RN. Chip is connected to MPU using RGMII interface.
2. The I2C1 interface is common to MIPI-CSI interface and audio codec.
3. The I2C2 interface is common to onboard RTC, HDMI-DDC, LT8912B bridge configuration and MIPI-DSI display controller.
4. All default I2C interface lines (both: SDA and SCL of I2C1, I2C2 and I2C3) have pull-up resistors (4.7kOhm).
5. Pushbutton input lines (GPIO4-IO00...IO03) are pull-uped with 47kOhm resistors.
6. User LEDs and System LED are connected to MPU using buffers with logical inverters.
7. Built-in RTC can be powered by an CR1220 lithium battery. RTC is equipped with internal switch that automatically selects power source.

M.2 socket - key M (PCIe interface, J100)

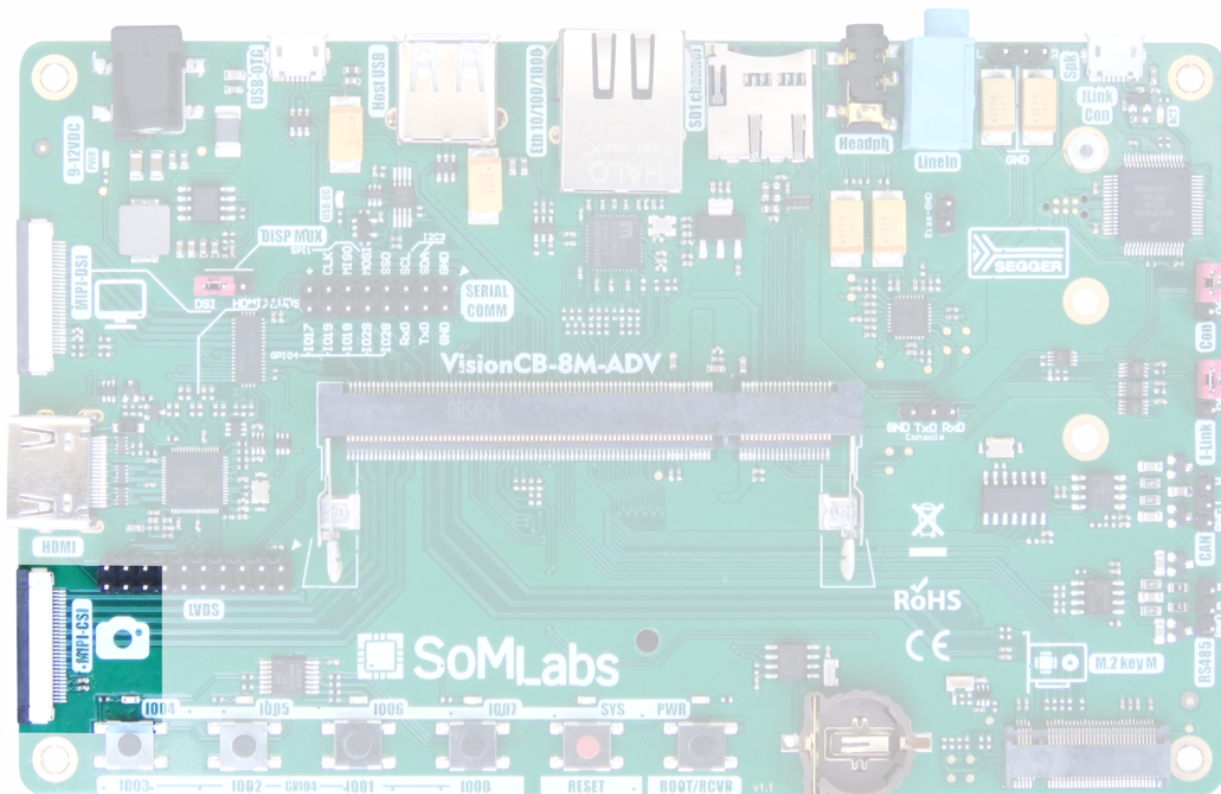


Default MPU pin name	M.2 line
GPIO4_IO11	PEWAKE#
GPIO4_IO12	CLKREQ#
GPIO4_IO13	PERST#
GPIO4_IO14	DEVSLP

Note:

1. IO[14..11] are used optionally.
2. Implemented PCIe is single lane interface.
3. M.2 socket is key M type.
4. By default CONFIG[3..0]=1111b.

Camera MIPI-CSI interface (J301, FPC/FFC 0.5mm)



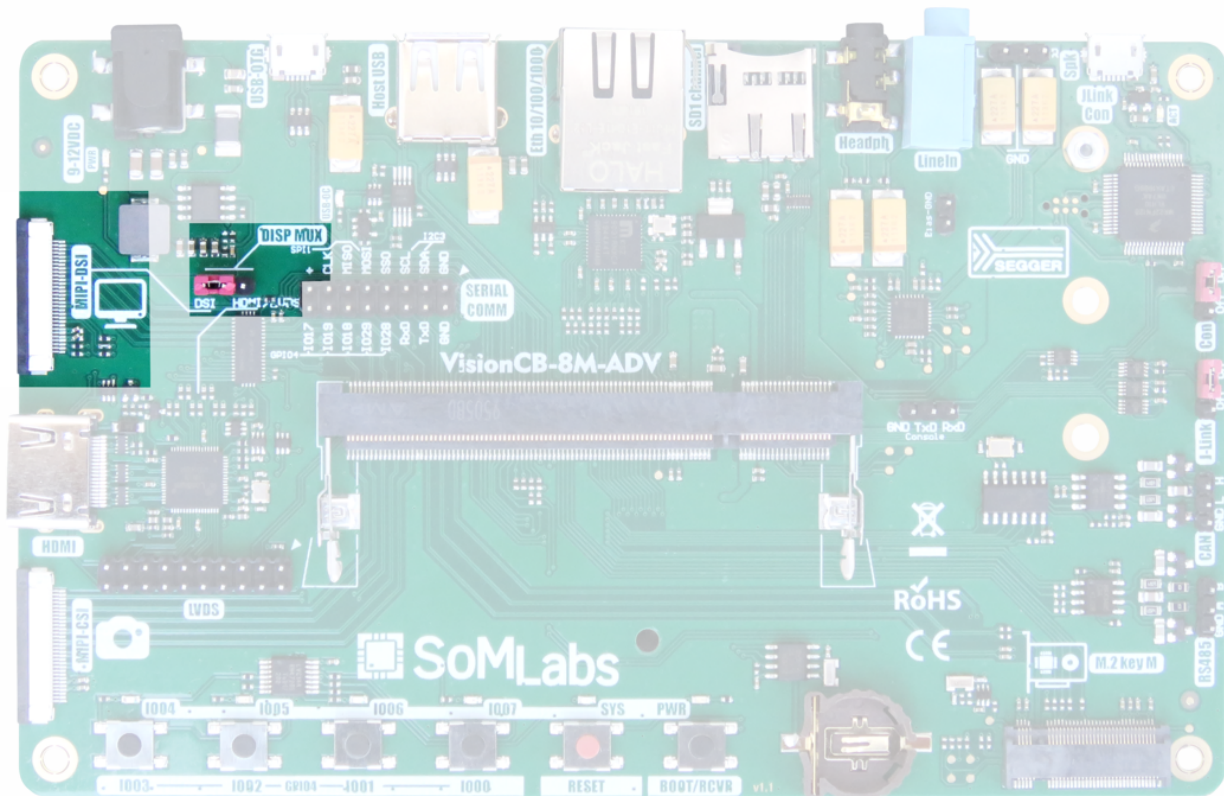
Pin	Default MPU pin name	MPU pin	Description
1	GND	-	-
2	CSI-CLK-P	-	-
3	CSI-CLK-P	-	-
4	GND	-	-
5	CSI-DATA0-P	-	-
6	CSI-DATA0-N	-	-
7	GND	-	-
8	CSI-DATA1-P	-	-
9	CSI-DATA1-N	-	-
10	GND	-	-
11	CSI-DATA2-P	-	-
12	CSI-DATA2-N	-	-
13	GND	-	-
14	CSI-DATA3-P	-	-
15	CSI-DATA3-N	-	-
16	GND	-	-
17	I2C1-SCL	E9	Configuration I2C interface with 4.7kOhm pull-up (3.3V)
18	I2C1-SDA	F9	Configuration I2C interface with 4.7kOhm pull-up (3.3V)
19	GND	-	-
20	RES	AG19	GPIO4-IO08 (SAI1-RXD6)

21	PWRDN	AF19	GPIO4-IO09 (SAI1-RXD7)
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 pin of J301 connector is at the top of the image.
2. The I2C1 interface is common to MIPI-CSI interface and audio codec.

Display MIPI-DSI interface (J900, FPC/FFC 0.5mm)



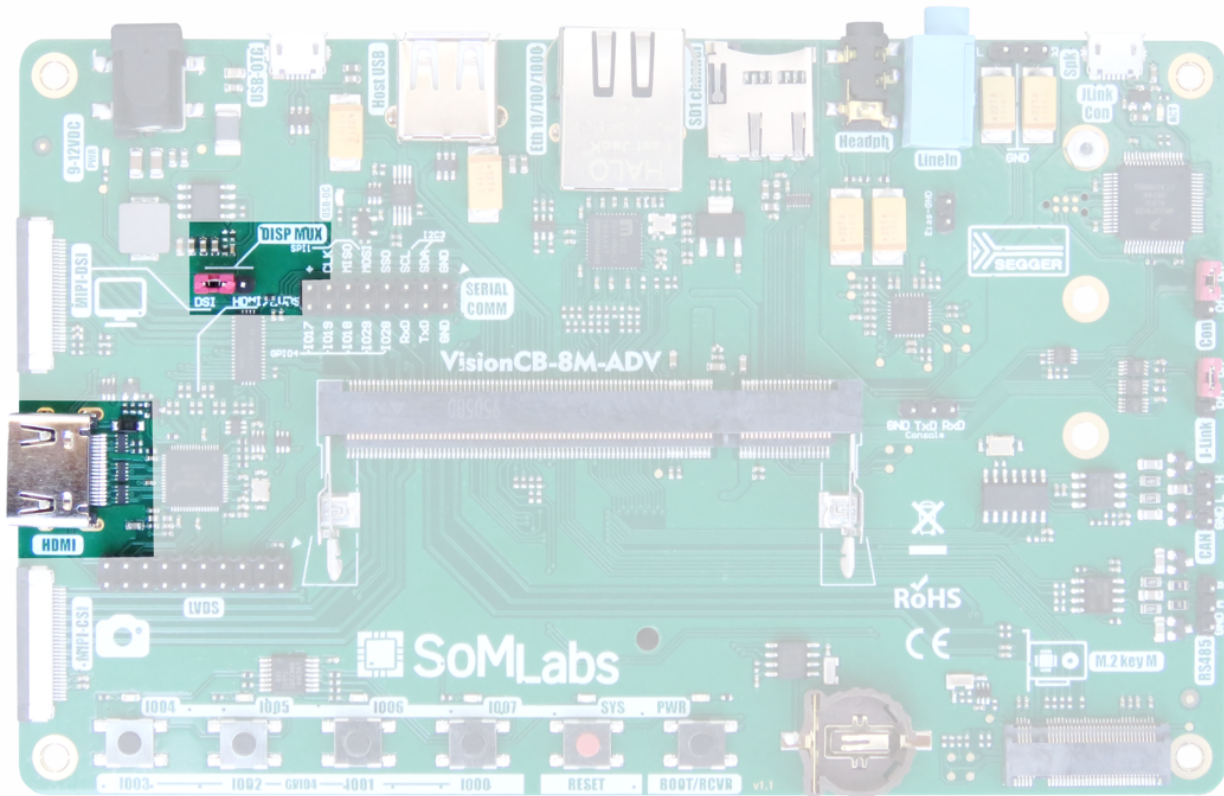
J900 pin	Default MPU pin name	MPU pin	Description
1	GND	-	-
2	DSI-CLK-P	-	-
3	DSI-CLK-P	-	-
4	GND	-	-
5	DSI-DATA0-P	-	-
6	DSI-DATA0-N	-	-
7	GND	-	-
8	DSI-DATA1-P	-	-
9	DSI-DATA1-N	-	-
10	GND	-	-
11	DSI-DATA2-P	-	-
12	DSI-DATA2-N	-	-
13	GND	-	-
14	DSI-DATA3-P	-	-
15	DSI-DATA3-N	-	-
16	GND	-	-
17	I2C2-SCL	D10	Display configuration I2C interface with 4.7kOhm pull-up (3.3V)
18	I2C2-SDA	D9	Display configuration I2C interface with 4.7kOhm pull-up (3.3V)
19	GND	-	-
20	GPIO5-IO22	E14	MIPI-DSI display reset signal (common with MIPI-DSI>HDMI/LVDS bridge)

21	GPIO5-IO23	F13	Optional touch-panel interrupt signal muxed with MIPI-DSI>HDMI/LVDS bridge (with 47k pull-up)
22	SPDIF-TX	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	SPDIF-RX	AG9	Optional backlight intensity PWM controller
29	SPDIF-CLK	AF8	Optional backlight enable
30	GND	-	-

Note:

1. 1st pin of J900 connector is at the top of the image.
2. For configuration purposes is used I2C2 interface.
3. MIPI-DSI interface is muxed with J901 (DISP MUX) between J900 (raw MIPI-DSI output) and HDMI/LVDS converter.
4. The I2C2 interface is common to onboard RTC, HDMI-DDC, LT8912B bridge configuration and MIPI-DSI display controller.

HDMI and LVDS display interface



The VisionCB-8M-ADV board is equipped with MIPI-DSI > HDMI/LVDS hardware bridge (converter) based on Lontium LT8912B.

HDMI signals are available on standard HDMI connector (marked as HDMI), LVDS signals are connected to 20 pin 2.54mm 2 row connector (marked as LVDS).

The VisionCB-8M-ADV board is equipped with jumper (DISP MUX) for selecting displays: MIPI-DSI or HDMI/LVDS.

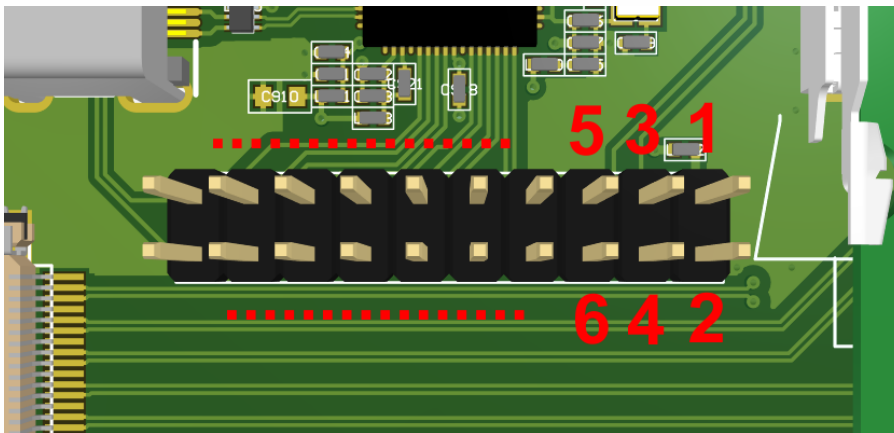
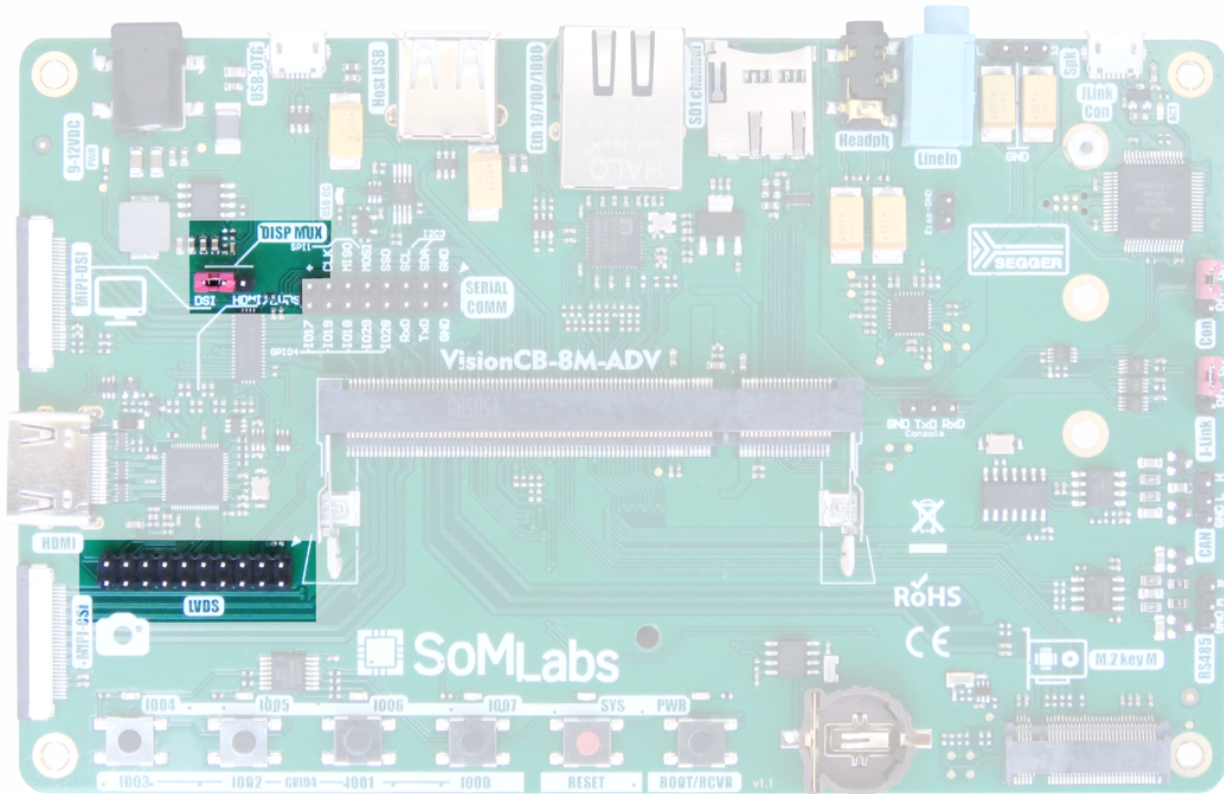
Signals provided to LT8912B

Default MPU pin name	MPU Pin	Description
DSI-CLK-P	-	Signal provided to LT8912B by mux (DISP MUX, J901)
DSI-CLK-P	-	Signal provided to LT8912B by mux (DISP MUX, J901)
DSI-DATA0-P	-	Signal provided to LT8912B by mux (DISP MUX, J901)
DSI-DATA0-N	-	Signal provided to LT8912B by mux (DISP MUX, J901)
DSI-DATA1-P	-	Signal provided to LT8912B by mux (DISP MUX, J901)
DSI-DATA1-N	-	Signal provided to LT8912B by mux (DISP MUX, J901)
DSI-DATA2-P	-	Signal provided to LT8912B by mux (DISP MUX, J901)
DSI-DATA2-N	-	Signal provided to LT8912B by mux (DISP MUX, J901)
DSI-DATA3-P	-	Signal provided to LT8912B by mux (DISP MUX, J901)
DSI-DATA3-N	-	Signal provided to LT8912B by mux (DISP MUX, J901)
HDMI-DETECT	AB19	GPIO4-IO10 (SAI1_MCLK)
HDMI-INT	F13	GPIO5-IO23, signal connected to LT8912B by mux (DISP MUX, J901)
HDMI-RES	E14	GPIO5-IO22 (common with MIPI-DSI reset line)
I2C2-SCL	D10	Display configuration I2C interface with 4.7kOhm pull-up (3.3V)

I2C2-SDA	D9	Display configuration I2C interface with 4.7kOhm pull-up (3.3V)
SPDIF-TX	AF9	Audio output, signal provided to LT8912B by mux (DISP MUX, J901)

Note:

1. The I2C2 interface is common to onboard RTC, HDMI-DDC, LT8912B bridge configuration and MIPI-DSI display controller.
2. MIPI-DSI interface is muxed with J901 (DISP MUX) between J900 (raw MIPI-DSI output) and HDMI/LVDS converter.



LVDS (J902) connector

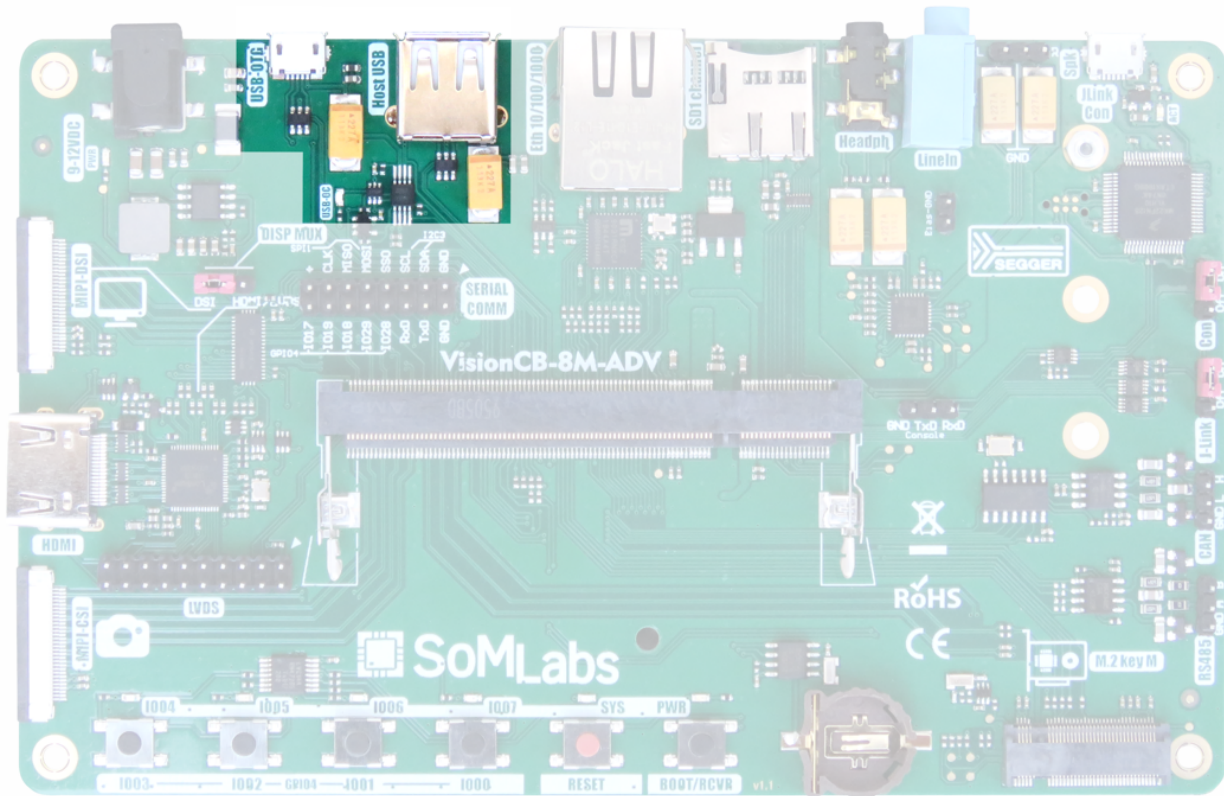
J902 Pin	Signal	MPU pin
1	+5V power supply for external devices	-
2	+5V power supply for external devices	-
3	GPIO4-IO28	AG8 (SAI3-RXFS, optional use) This pin is connected as GPIO to SERIAL COMM connector J303

4	GPIO4-IO29	AG7 (UART2-CTS, optional use) This pin is connected as GPIO to SERIAL COMM connector J303
5	GND	-
6	GND	-
7	D0n	-
8	D0p	-
9	D1n	-
10	D1p	-
11	D2n	-
12	D2p	-
13	GND	-
14	GND	-
15	CLKn	-
16	CLKp	-
17	D3n	-
18	D3p	-
19	I2C2-SCL, configuration I2C interface with 4.7kOhm pull-up (3.3V)	D10
20	I2C2-SDA, configuration I2C interface with 4.7kOhm pull-up (3.3V)	D9

Note:

1. 1st pin of J902 connector (LVDS) is marked with arrow.
2. The I2C2 interface is common to onboard RTC, HDMI-DDC, LT8912B bridge configuration and MIPI-DSI display controller.
3. MIPI-DSI interface is muxed with J901 (DISP MUX) between J900 (raw MIPI-DSI output) and HDMI/LVDS converter.

USB and USB-OTG interfaces

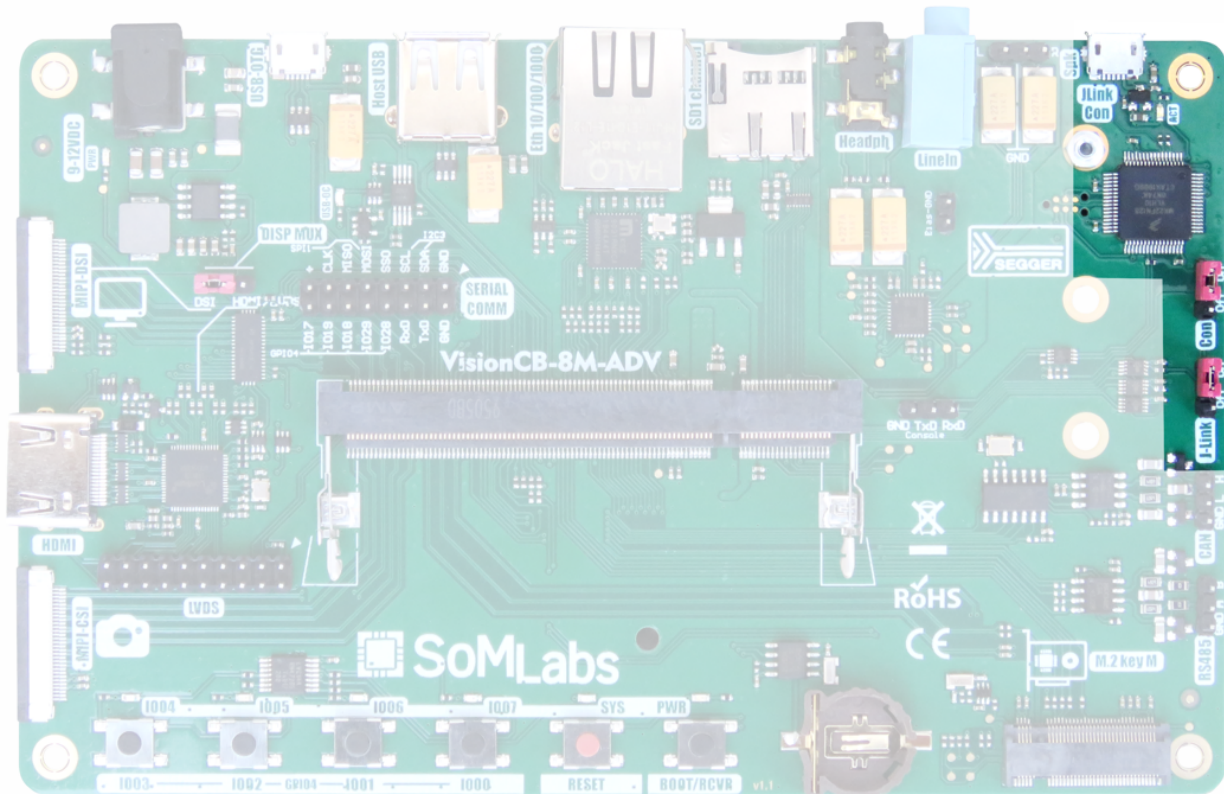


The VisionCB-8M-ADV is equipped with 2 channel of USB:

- USB-OTG (connector J501, microUSB) - connected to MPU's USB1 channel,
- host USB 2.0 (connector J501, USB-A) - connected to MPU's USB2 channel.

In both channels external USB devices are powered with power switch equipped with monitored outputs. In the event of a short circuit the LED-OC lights-up signalling overcurrent.

USB Console Port and Segger J-Link debugger

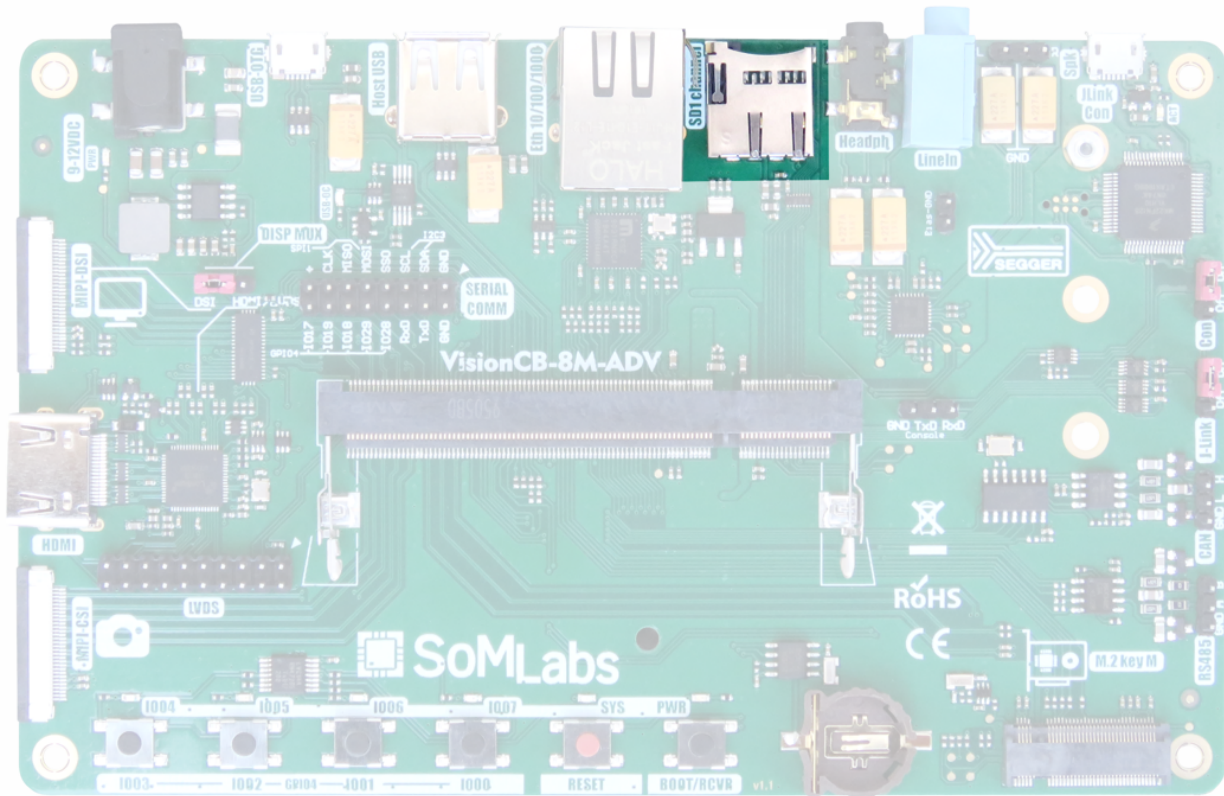


MPU Port	Default MPU pin name	Description
CONSOLE-TXD	UART4-TXD	Signal connected to J304 pin 2
CONSOLE-RXD	UART4-RXD	Signal connected to J304 pin 3

Notes:

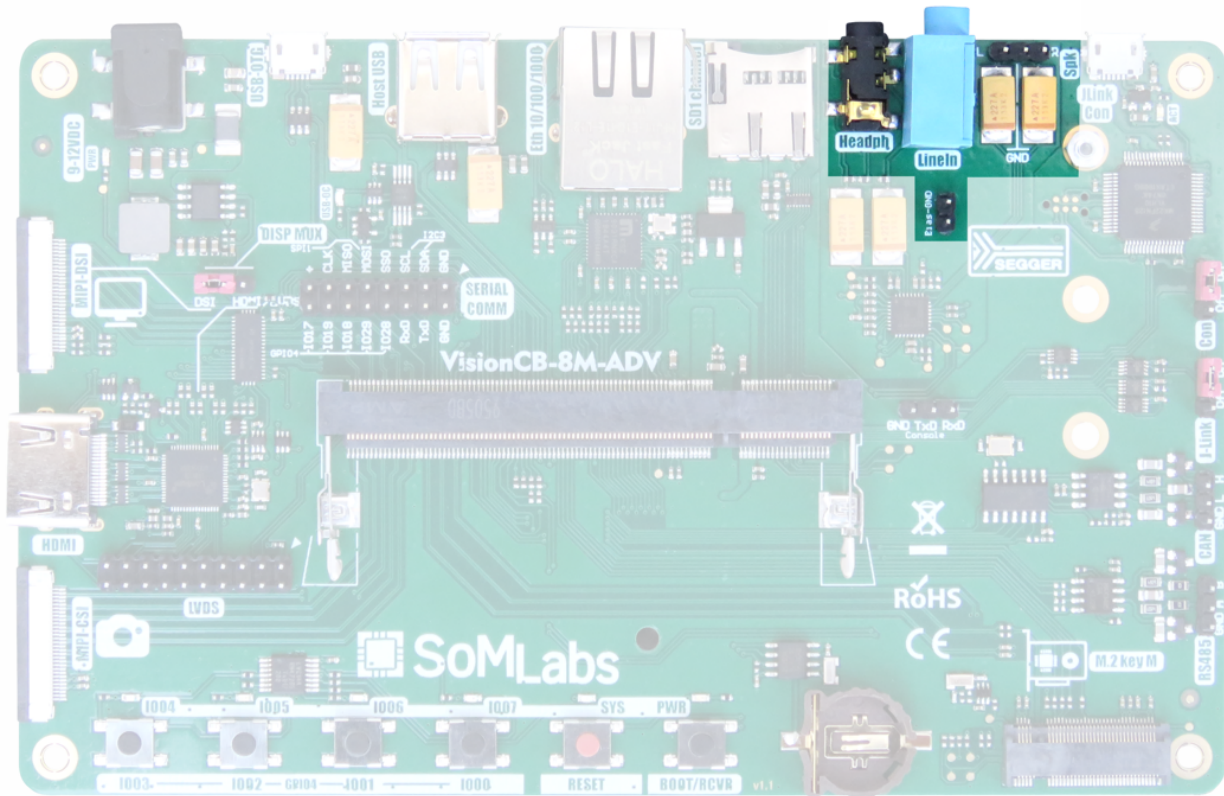
1. Linux console port (UART4 in MPU) uses vCOM interface provided by built-in debugger Segger J-Link.
2. vCOM can be disconnected from MPU with JP801 (jumper CON in position ON or OFF).
3. Lines TXD and RXD of UART4 are easy to monitoring thanks to using J304 gold-pins.
4. Debug JTAG interface can be disconnected from MPU with JP801 (jumper J-LINK in position ON or OFF).
5. J-Link activity is monitored with ACT LED.

MicroSD card interface (J308)



Card connector pin	SD card signal	Default MPU pin name
1	DATA2	SD1-DATA2
2	DATA3	SD1-DATA3
3	CMD	SD1-CMD
4	NVCC-SDIO	Voltage selected 1.8/3.3V by SD1 driver
5	CLK	SD1-CLK
6	GND	-
7	DATA0	SD1-DATA0
8	DATA1	SD1-DATA1
9	CARD-DETECT	SD1-CD

24-bit stereo audio codec



The VisionCB-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.

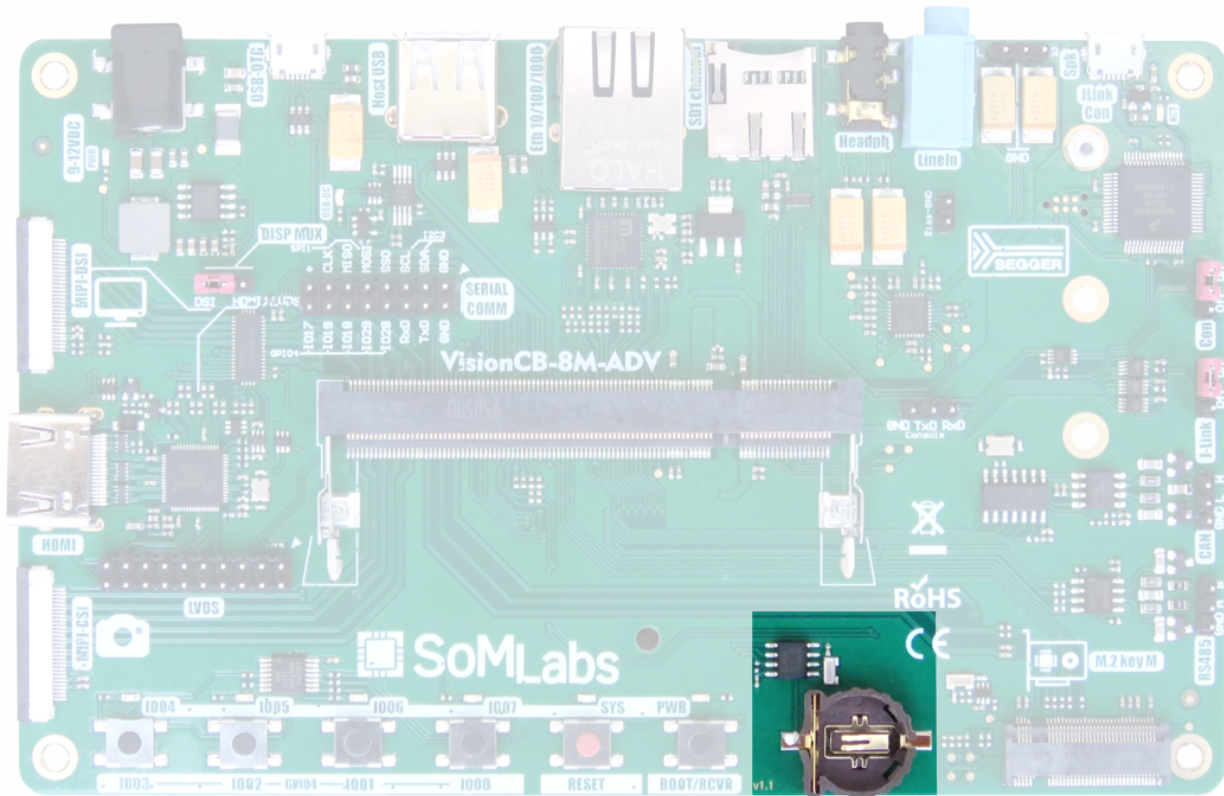
Connector marked Spk can be used as stereo (Left-GND/Right-GND) or mono bridge output (speaker connected to L-R pins).

Default MPU pin name	MPU pin	Description
SAI3-MCLK	AD6	Codec master clock
SAI3-TXC	AG6	Codec BCLK line
SAI3-TXFS	AC6	Codec FS line
SAI3-TXD	AF6	Codec input line
SAI3-RXD	AF7	Codec output line
I2C1-SCL	E9	Configuration I2C interface with 4.7kOhm pull-up (3.3V)
I2C1-SDA	F9	UConfiguration I2C interface with 4.7kOhm pull-up (3.3V)

Note:

1. The I2C1 interface is common to MIPI-CSI interface and audio codec.

On-board RTC



The VisionCB-8M-ADV is equipped with on-board RTC module based on NXP PCF85263AT.

The PCF85263A is a CMOS1 Real-Time Clock (RTC) and calendar optimized for low power consumption and with automatic switching to battery on main power loss.

The RTC can also be configured as a stop-watch (elapsed time counter). Three time log registers triggered from battery switch-over as well as input driven events.

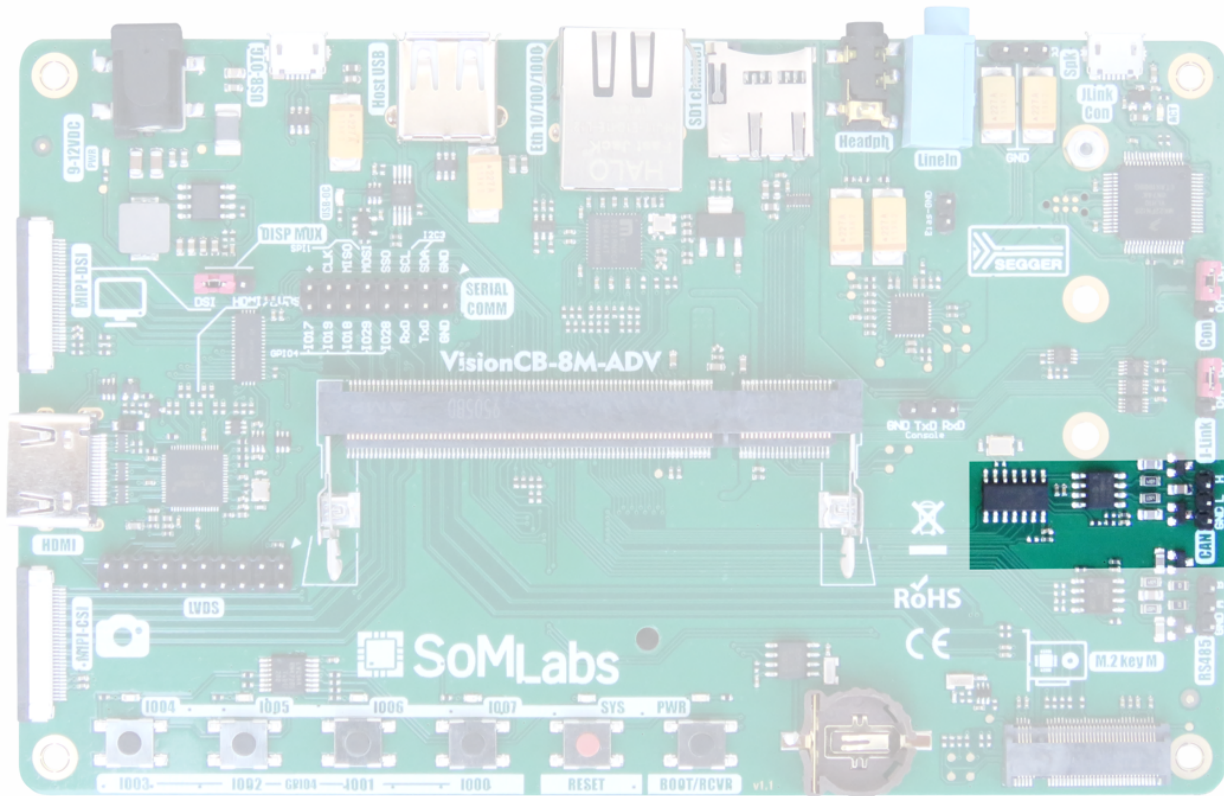
Featuring clock output and two independent interrupt signals, two alarms, I2C interface and quartz crystal calibration. RTC can be powered by an external CR1220 battery (socket J302).

Default MPU pin name	MPU pin	Description
I2C2-SCL	D10	Communication I2C interface with 4.7kOhm pull-up (3.3V)
I2C2-SDA	D9	Communication I2C interface with 4.7kOhm pull-up (3.3V)
GPIO4-IO15	AC6	RTC interrupt line with 4.7kOhm pull-up (3.3V)

Notes:

1. The I2C2 interface is common to onboard RTC, HDMI-DDC, LT8912B bridge configuration and MIPI-DSI display controller.

CAN FD serial interface



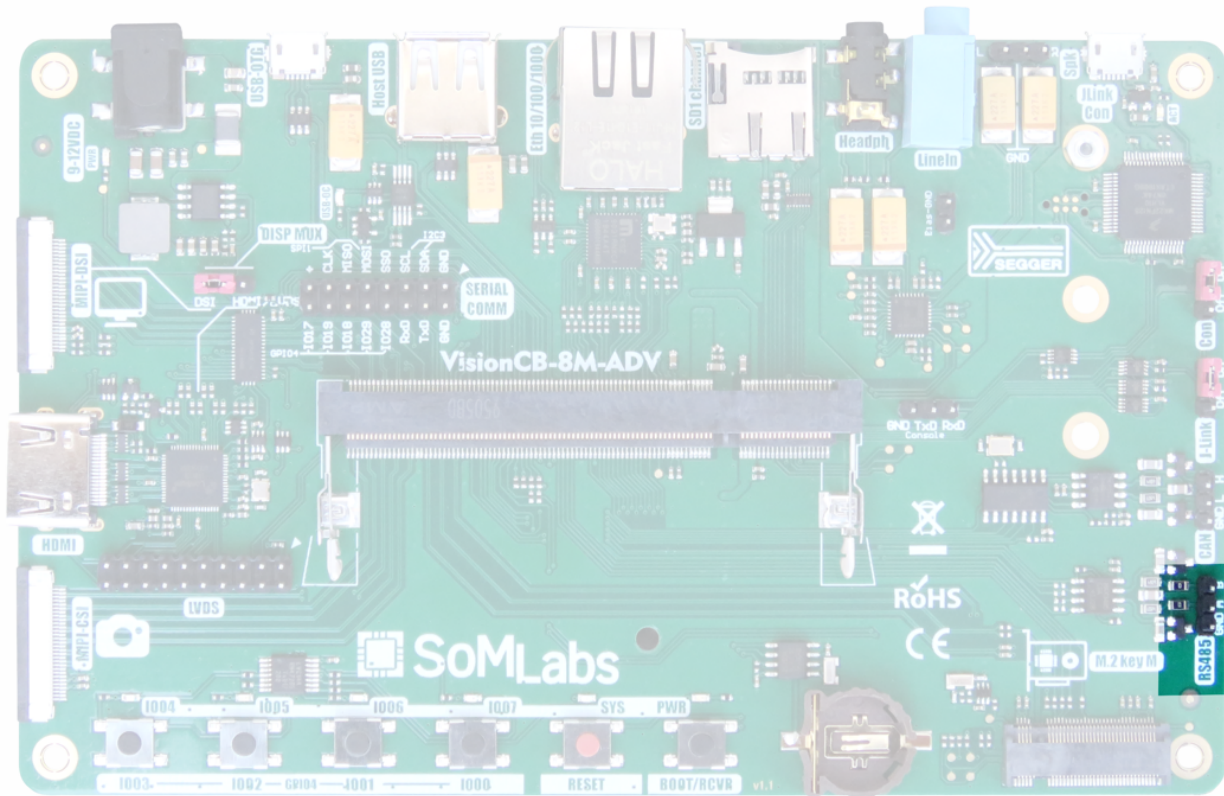
The VisionCB-8M-ADV board is equipped with Microchip CAN FD controller (MCP2518FDT-E/SL) with physical layer interface (MCP2542FD-E/SN).

The MCP2518FD supports both CAN frames in the Classical format (CAN 2.0B) and CAN Flexible Data Rate (CAN FD) format as specified in ISO11898-1:2015.

The MCP2518FD is connected to default SPI2 channel and pins.

Signal	Default MPU pin name	Description
SDO	SPI2-MISO	SPI2 MISO (MCP2518FDT output)
SDI	SPI2-MOSI	SPI2 MOSI (MCP2518FDT input)
SCK	SPI2-SCK	SPI2 clock
CS#	SPI2-SS0	Select MCP2518FDT device
INT#	GPIO4-IO16	Interrupt from MCP2518FDT

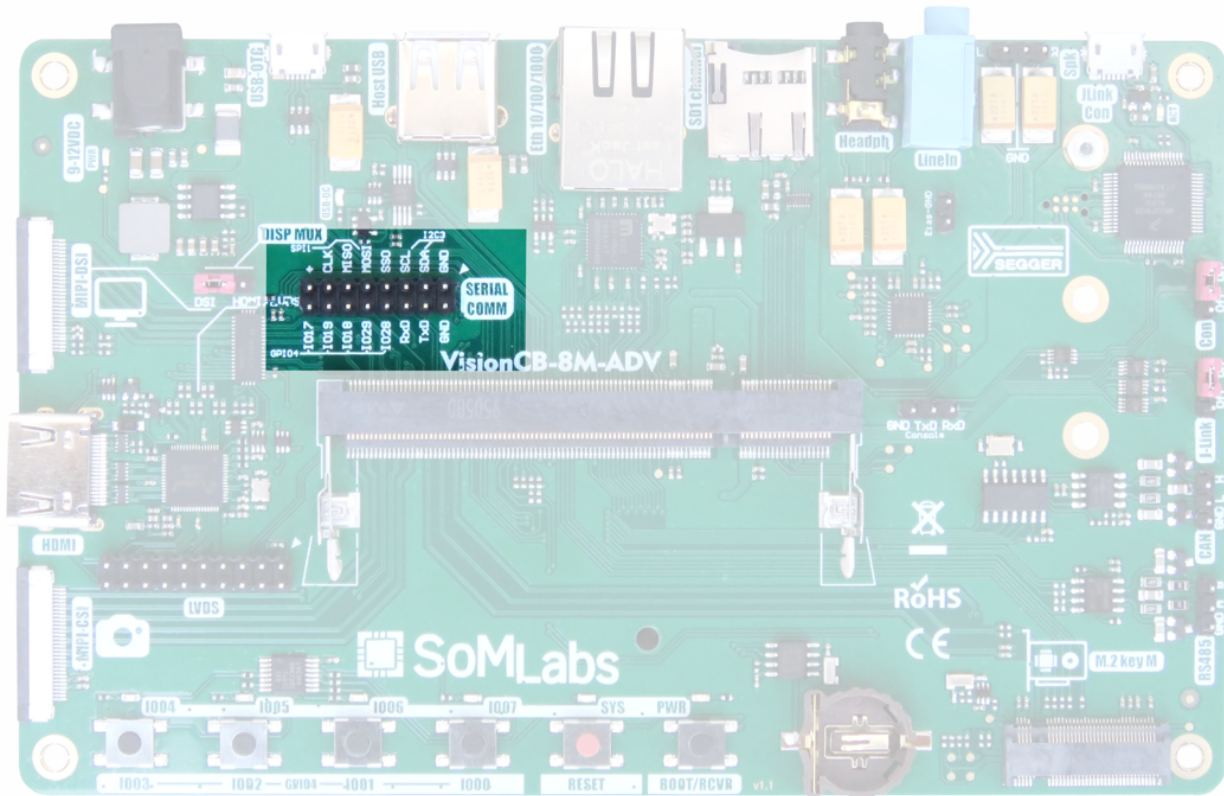
RS-485 simplex serial interface



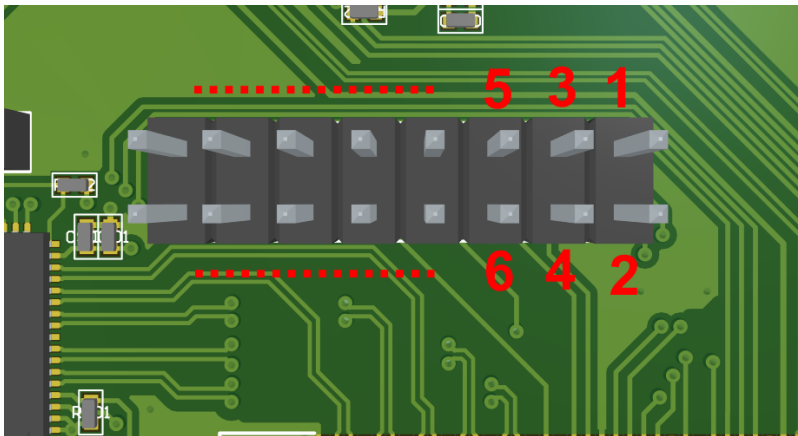
The VisionCB-8M-ADV board is equipped with low-voltage RS-485 physical layer interface MAX3485. The RS-485 is connected to default UART3 (TxD, RxD) channel and pins. Transmission control lines (RE# and DE) are controlled by MPU hardware.

Signal	Default MPU pin name	Description
RO	UART3-RXD	Data received by MPU
DI	UART3-TXD	Data transmitted by MPU
RE#/DE	SPI1-MISO	Receiver Enable (active low)/Transmitter Enable (active high) signal This signal is also connected to J303 (SERIAL COMM connector)

Serial Communication/GPIO header (J303)



Pin numeration, 1st pin of J303 connector SERIAL COMM is marked with arrow (on picture above).



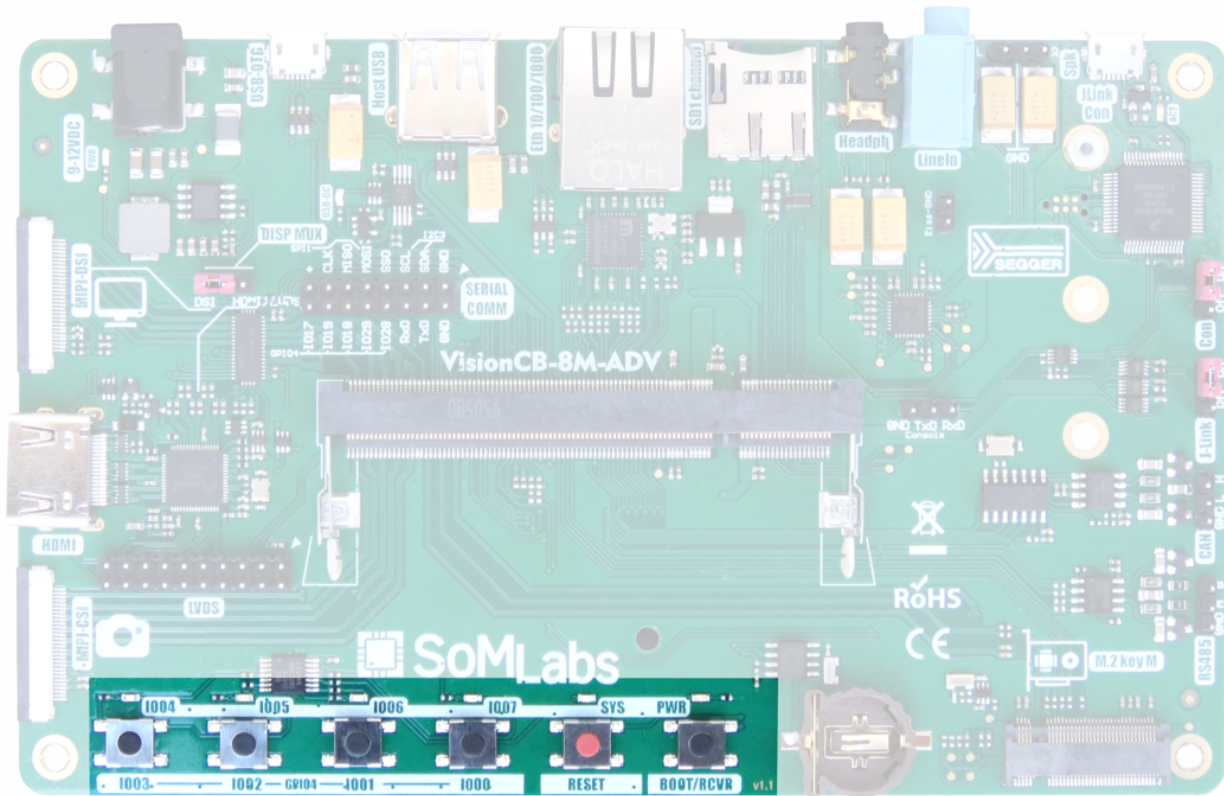
Pin	Default pin name	Description
1	GND	-
2	GND	-
3	I2C3-SDA	By default: I2C interface with 4.7kOhm pull-up (3.3V)
4	UART2-TXD	By default: UART2-TXD or universal GPIO with 3.3V logic levels
5	I2C3-SCL	By default: I2C interface with 4.7kOhm pull-up (3.3V)
6	UART2-RXD	By default: UART2-RXD or universal GPIO with 3.3V logic levels

7	SPI1-SS0	By default: SPI1-SS0 or universal GPIO with 3.3V logic levels
8	GPIO4-IO28	By default: GPIO4-IO28 or universal GPIO with 3.3V logic levels Optionally can be used in LVDS channel
9	SPI1-MOSI	By default: SPI1-MOSI or universal GPIO with 3.3V logic levels
10	GPIO4-IO29	By default: GPIO4-IO29 or universal GPIO with 3.3V logic levels Optionally can be used in LVDS channel
11	SPI1-MISO	By default: SPI1-MISO or universal GPIO with 3.3V logic levels This signal is used as RE#/DE signal in RS-485 communication channel
12	GPIO4-IO18	By default: GPIO4-IO18 or universal GPIO with 3.3V logic levels
13	SPI1-CLK	By default: SPI1-CLK or universal GPIO with 3.3V logic levels
14	GPIO4-IO19	By default: GPIO4-IO19 or universal GPIO with 3.3V logic levels
15	+3.3V	+3.3V generated by DC/DC built-in SOM (limited current load)
16	GPIO4-IO17	By default: GPIO4-IO17 or universal GPIO with 3.3V logic levels

Note:

1. 1st pin of J303 connector SERIAL COMM is marked with arrow.

User Interface (switches and LEDs)



User switches

Switch	GPIO	Description
S305 (black, most on the left)	GPIO4-IO03	47k pull-up
S304	GPIO4-IO02	47k pull-up
S303	GPIO4-IO01	47k pull-up
S302 (black, most on the right)	GPIO4-IO00	47k pull-up

System switches

Switch	Signal name	Description
S301 (left, red)	Reset	-
S300 (right)	BOOT-RECOVERY	-

User LEDs

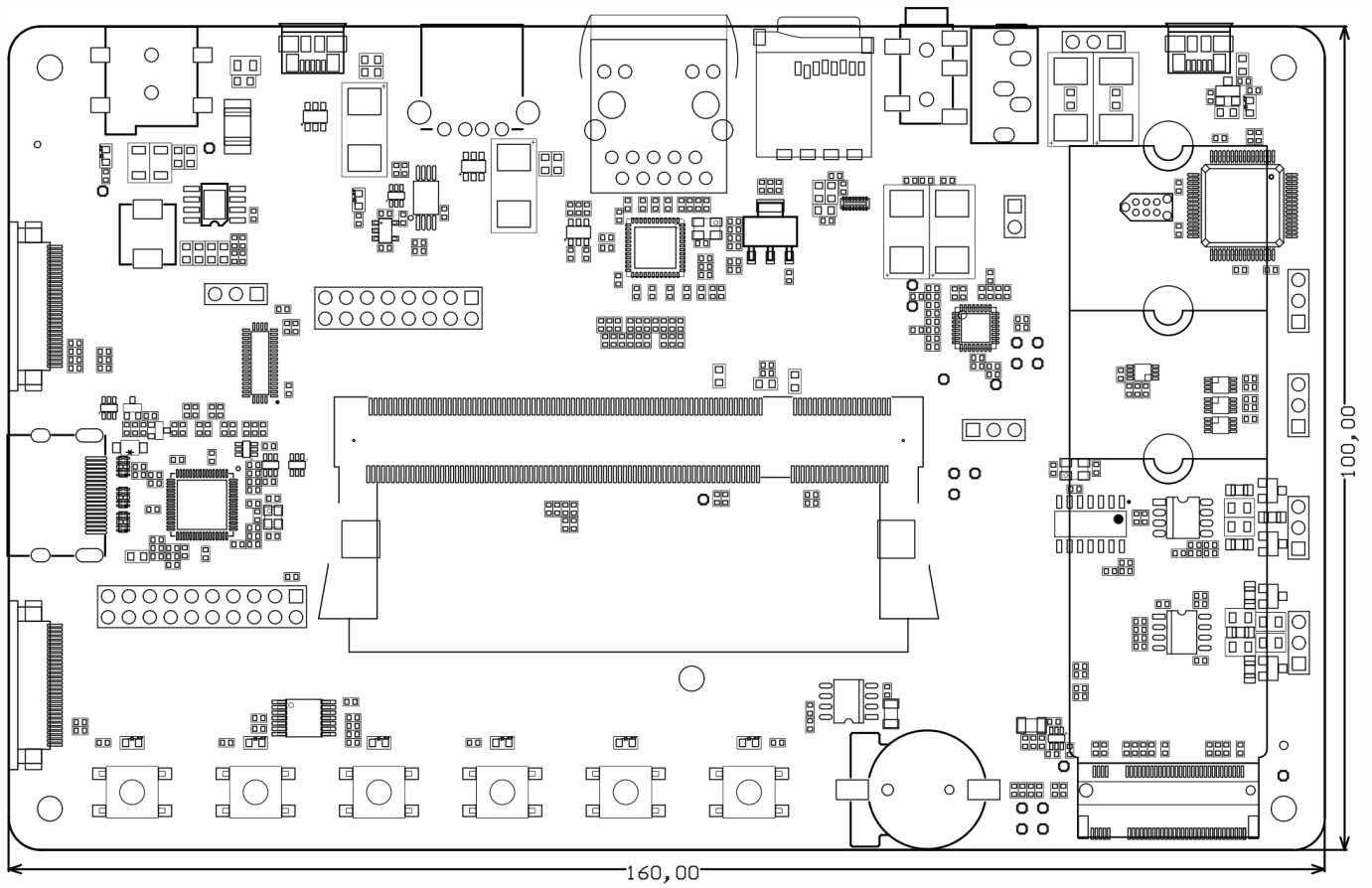
LED	GPIO	Description
D303 (most on the left)	GPIO4-IO04	User LED1, buffered with inverter
D302	GPIO4-IO05	User LED2, buffered with inverter
D301	GPIO4-IO06	User LED3, buffered with inverter

D300 (most on the right)	GPIO4-IO07	User LED4, buffered with inverter
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System LEDs

LED	GPIO	Description
D304	SYS-LED	System function monitoring
D305	-	Power LED (3.3V)

Dimensions



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