VIA SOM-7000

Fanless and low-power Edge AI platform with MediaTek Genio 1200 Octa-Core processor

Copyright

Trademarks

Disclaimer

Regulatory Compliance

FCC-A Radio Frequency Interference Statement

Any changes or modifications not expressly approved by the party responsible for compliance could void your authority to operate the equipment.

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules.

These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:
—Reorient or relocate the receiving antenna.
—Increase the separation between the equipment and receiver.
—Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
—Consult the dealer or an experienced radio/TV technician for help.

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.

RF exposure statements
1. This Transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.
2. This equipment complies with FCC RF radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20 centimeters between the radiator and your body or nearby persons..

Declaration the Restriction of this Limited Module Approval:
According to FCC Part 15 Subpart C Section 15.212, the radio elements of the modular transmitter must have their own shielding. However, due to there is no shielding for this module, this module is granted as a Limited Modular Approval. When this Bluetooth Module is installed into the end product, a Class II Permissive Change or a New FCC ID submission is required to ensure the full compliance of FCC relevant requirements.

Notice to OEM integrator
Must use the device only in host devices that meet the FCC RF exposure category of mobile, which means the device is installed and used at distances of at least 20cm from persons. The end user manual shall include FCC Part 15 compliance statements related to the transmitter as show in this manual.
Host manufacturer is responsible for compliance of the host system with module installed with all other applicable requirements for the system such as Part 15 B. Host manufacturer is strongly recommended to confirm compliance with FCC requirements for the transmitter when the module is installed in the host. Must have on the host device a label showing Contains FCC ID: NCI-SOM-7000

CE

FC Tested To Comply
With FCC Standards
FOR HOME OR OFFICE USE

Battery Recycling and Disposal

- Only use the appropriate battery specified for this product.

- Do not re-use, recharge, or reheat an old battery.

- Do not attempt to force open the battery.

- Do not discard used batteries with regular trash.

- Discard used batteries according to local regulations.
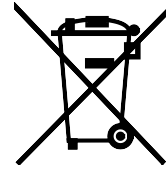
Safety Precautions

- Always read the safety instructions carefully.

- Keep this document for future reference.

- All cautions and warnings on the equipment should be noted.

- Keep this equipment away from humidity.

- Put this equipment on a reliable flat surface before setting it up.

- Check the voltage of the power source and adjust to 110/220V before connecting the equipment to the power inlet.

- Do not place the power cord where people will step on it.

- Always unplug the power cord before inserting any add-on card or module.

- If any of the following situations arise, get the equipment checked by authorized service personnel:

  - The power cable is damaged.

  - Liquid has entered into the equipment.

  - The equipment has been exposed to moisture.

  - The equipment is faulty or you cannot get it work according to User's Manual.

  - The equipment has been dropped and damaged.

  - The equipment has an obvious sign of breakage.

- Do not leave this equipment in extreme temperatures or in a storage temperature above 60°C (140°F). The equipment may be damaged.

- Do not leave this equipment in direct sunlight.

- Never pour any liquid into the opening. Liquid can cause damage or electrical shock.

- Do not place anything over the power cable.

- Do not cover the ventilation holes. The openings on the enclosure protect the equipment from overheating.

Packing List

Items for STK-SOM700-00A0

- 1 x VIA SOM-7000 module
- 1 x VIA SOMDB7 reference carrier board
- 1 x Heatsink
- 1 x Audio cable
- 1 x Power cable
- 1 x Debug console cable

Ordering Information

Part Number	SoC Frequency	Description
10GPZ22M30020	MediaTek Genio 1200 Octa-Core SoC @ 2.2GHz/2.0GHz	VIA SOM-7000 module with 2.2/2.0GHz MediaTek Genio 1200 Octa-Core SoC, 16GB eMMC, 4GB LPDDR4 SDRAM, CSI, audio (headphone out and MIC-in), Wi-Fi 6+ Bluetooth 5.2, 3 Wi-Fi/ Bluetooth antenna I-PEX connectors
STK-SOM700-00A0		VIA SOM-7000 starter kit with VIA SOM-7000 module, VIA SOMDB7 reference carrier board and accessory kit

Optional Accessories

Development Options

Part Number	Description
SOM-ACK-00A0	Development Pack including 5MP CMOS camera, Wi-FI/BT antenna and 12V 3A worldwide AC adapter
99G47-01025F	10.1" 1920x1200 MIPI LCD + touch panel display

Wireless Module Options

Part Number	Description
EMIO-2576-00A0	4G LTE mobile broadband M.2 module with two antennas and assembly

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1. Product Overview

Accelerate your time-to-market for groundbreaking Edge AI devices with the feature-rich VIA SOM-7000 Edge AI module. Propelled by four powerful ARM Cortex® A78 cores (up to 2.2GHz) and four ultra-efficient ARM Cortex® A55 cores (up to 2.0GHz) of the MediaTek Genio 1200 premium SoC, the VIA SOM-7000 module delivers advanced computing, networking, graphics and AI processing performance, plus multiple 4K display support and I/O peripheral integration capabilities on a fanless module. A dual-core AI engine is also integrated in the SoC for deep learning, neural network acceleration, and computer vision applications, including facial recognition, object identification, and OCR.

Measuring just 8.2cm x 8cm (3.22" x 3.15"), the VIA SOM-7000 Edge AI module features onboard 4GB LPDDR4 SDRAM and 16GB eMMC flash memory. Multimedia capabilities include support for hardware-accelerated H.265/H.264 4K video processing, headphone-out and MIC-in, as well as multiple MIPI/HDMI/LVDS displays and CSI cameras - making it the ideal solution for an unlimited array of home, commercial, industrial, and educational applications. High-speed network connectivity is delivered through dual-band Wi-Fi 6, Bluetooth 5.2, alomng with support for Gigabit LAN and 4G LTE mobile broadband. Furthermore, supported I/O and expansion interfaces include three USB 2.0, one USB 3.1, two SPI, two I^2S, three I^2C, two UART, one single-lane PCIe, and one SD card.

To boost Edge AI application development, the VIA SOM-7000 module comes with a Linux BSP that supports Android 11.0 and Yocto 4.0.6 operating systems. Other features of the BSP include a toolchain to make adjustments to the kernel, and to support the VIA SOMDB7 carrier board I/O and other hardware features.

1.1 Key Features

- Powerful and ultra-efficient 2.2GHz/2.0GHz MediaTek Genio 1200 Octa-core SoC with integrated dual-core AI processor

- Onboard 4GB LPDDR4 SDRAM and 16GB eMMC flash memory

- High-speed network connectivity with dual-band Wi-Fi 6 and Bluetooth 5.2

- Supports hardware accelerated H.265/H.264 4K video processing at high frame rates

- Supports Headphone-out and Mic-in

- Supports multiple displays (MIPI DSI/HDMI/LVDS), and cameras (CSI)

- Supports Gigabit Ethernet and 4G LTE.

- Supports three USB 2.0, one USB 3.1, two SPI, two I^2S, three I^2C, two UART, one single-lane PCIe, and SD card.

- Supports Android 11 and Yocto 4.0.6 operating systems

- Carrier board available

1.2   Product Specifications

Processor

- MediaTek Genio 1200 Octa-Core SoC
  - Four Cortex-A78 @ 2.2GHz
  - Four Cortex A55 @ 2.0GHz

System Memory

- 4GB LPDDR4 SDRAM

Storage

- 16GB eMMC Flash Memory

Graphics

- ARM Mali-G57 MCS High Performance GPU
- 3D graphics accelerator capable of processing 17600M pixel/sec @ 880MHz
- Graphics engine supporting OpenGL® ES 3.2, OpenCL ES 2.2, and Vulkan 1.1 hardware acceleration
- Supports H.265 and H.264 video decoding up to 4K@90fps
- Supports H.265 and H.264 video encoding up to 4K@60fps

AI Processor

- MediaTek dual-core AI Processor

Audio

- Supports Cadence® Tensilica® Vision HiFi 4 DSP
- MediaTek MT6365

Wireless Connectivity

- MediaTek MT7921
- Dual-band Wi-Fi 6 with MU-MIMO
- Bluetooth 5.2

Ethernet

- Realtek RTL8211F(I)-CG 10/100/1000M Ethernet Transceiver

HDMI

- Integrated HDMI 2.0 Transmitter

Supported I/O

- 2 x MIPI DSI
- 2 x MIPI CSI (1 x 4-Lane, 1 x 2-Lane)
- 1 x HDMI
- 1 x Display Port
- 1 x USB 3.1
- 3 x USB 2.0
- 1 x GLAN

- 1 x SPI

- 2 x I^{2}S

- 3 I^{2}C

- 2 x UART

- 1 x single-lane PCIe

- 1 x SD card

- 1 x 5V DC-in

Onboard I/O

- 1 x MIPI CSI connector

- 3 x I-PEX connectors for Wi-Fi and Bluetooth antennas

- 1 x Audio connector for Headphone-out and MIC-in

Operating System

- Android 11 and Yocto 4.0.6

System Monitoring and Management

- Watchdog Timer, System Management, Boot Select

Operating Temperature

- 0°C ~ 60°C

Operating Humidity

- 0% ~ 95% (relative humidity ; non-condensing)

Form Factor

- 82mm x 80mm (3.22" x 3.15")

Compliance

- CE, FCC, TELEC, UKCA

Notes:
1. As the operating temperature provided in the specifications is a result of testing performed in a testing chamber, and a number of variables can influence this result. Please note that the working temperature may vary depending on the actual situation and environment. It is highly recommended to execute a solid testing program and take all variables into consideration when building the system. Please ensure that the system is stable under the required operating temperature in terms of the target application.

2. Please note that the lifespan of the onboard eMMC memory chip may vary depending on the amount of access. More frequent and larger data access on the eMMC memory will shorten its lifespan. It is highly recommended to use a replaceable external storage (e.g., MicroSD card) for large data access.

1.3   Layout Diagram

Wi-Fi + BT

PMIC/Audio Codec

I-PEX Antenna
Connectors

MediaTek Genio 1200
Octa-core SoC

eMMC

Audio Connector

MIPI CSI

PMIC

LPDDR4 SDRAM
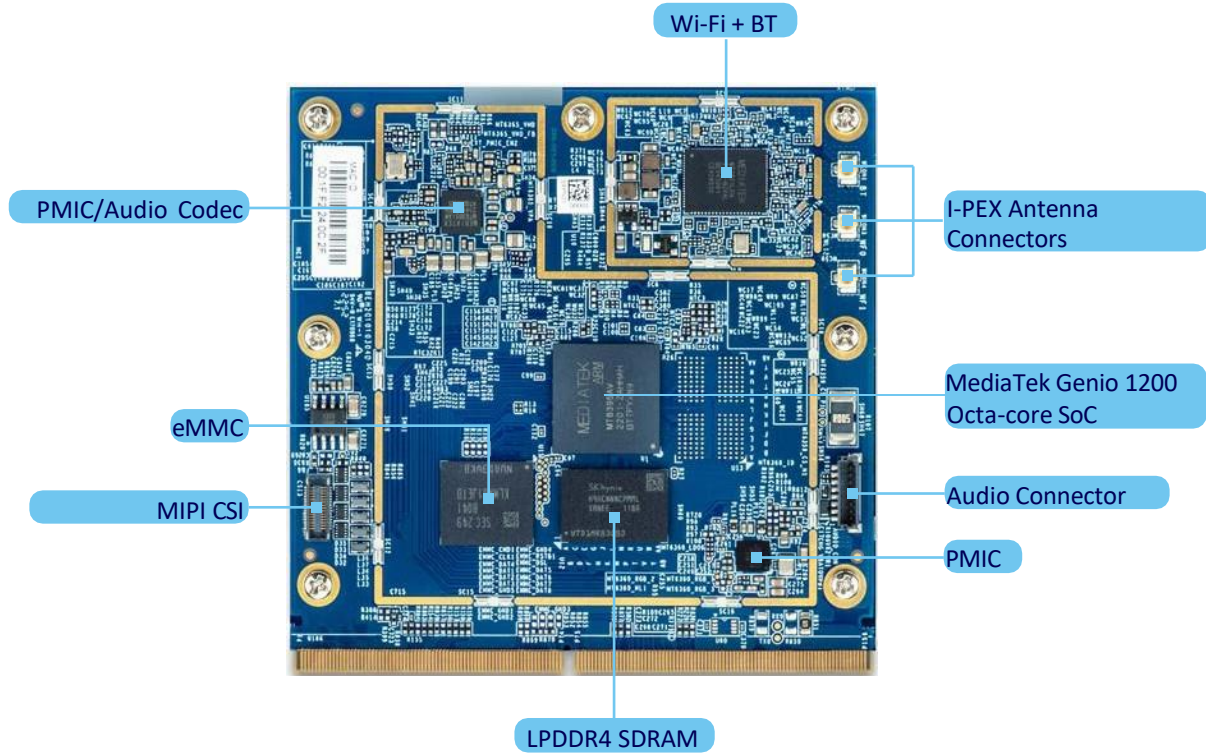
Figure 01: Layout diagram of the VIA SOM-7000 module's top layer

1.4   Product Dimensions

82mm

74mm

37mm

4mm

30mm

64mm
80mm

12mm

6.95mm

39mm
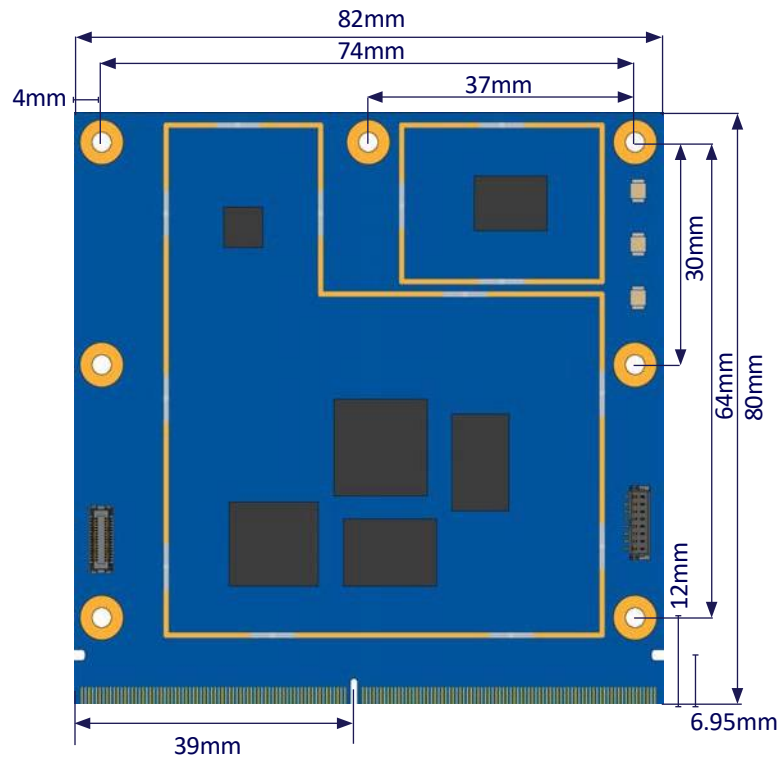
Figure 02: Dimensions of the VIA SOM-7000 module

1.5   Height Distribution
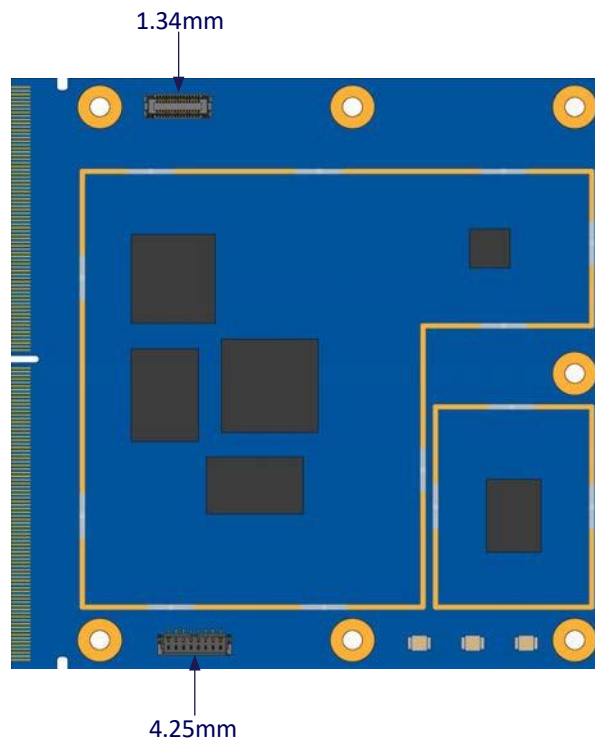
Figure 03: Height distribution on the VIA SOM-7000 module's top layer

2. Onboard I/O Connectors

2.1   4-Lane MIPI CSI Connector

The VIA SOM-7000 module is equipped with a 4-lane MIPI CSI connector labeled 'CSI3' on the top layer, which can be used for connecting a 2-lane or 4-lane MIPI CSI camera. The pinouts of the MIPI CSI connector are shown below.
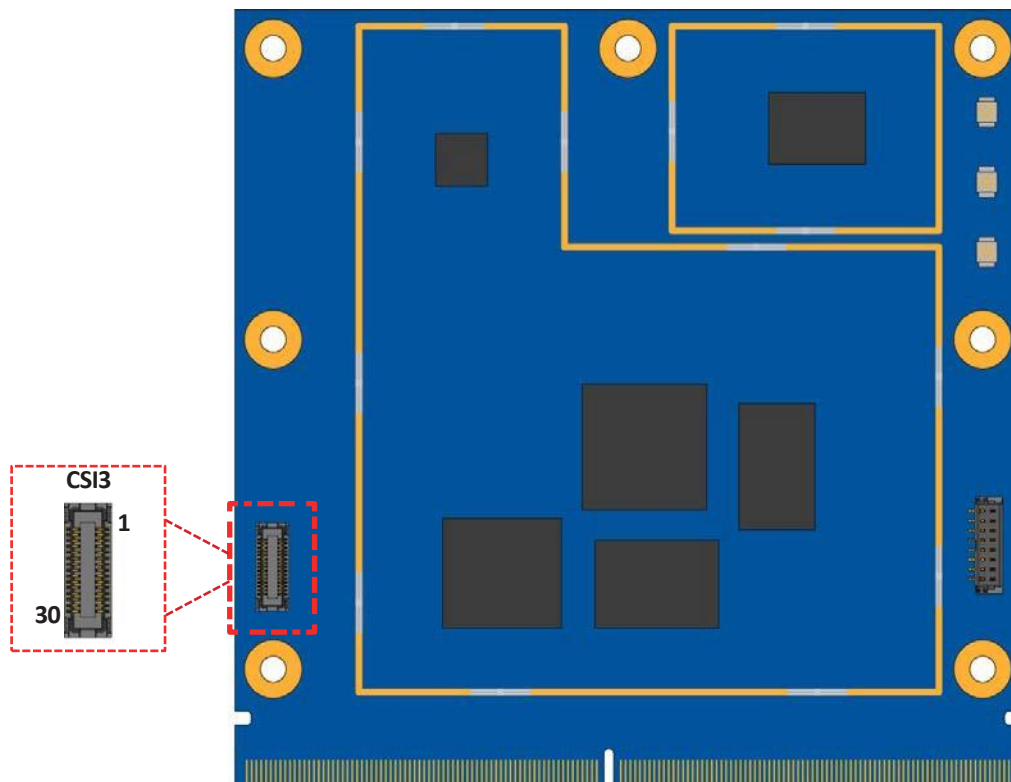
Figure 04: MIPI CSI connector 'CSI3'

Note:
The 4-lane MIPI CSI connector currently only supports the SONY IMX258 CMOS Image Sensor.

CSI3			
Pin	**Signal**	**Pin**	**Signal**
1	XCLK	16	MCN
2	DGND	17	DGND
3	Reset	18	MCP
4	MDN2	19	PAVDD 2.8V
5	NC	20	DGND
6	MDP2	21	AF AVDD 2.8V
7	DOVDD1.8V	22	MDN0
8	DGND	23	AFGND
9	AGND	24	MDP0
10	MDN3	25	DVDD 1.2V
11	DGND	26	DGND
12	MDP3	27	NC
13	SCL	28	MDN1
14	DGND	29	DGND
15	SDA	30	MDP1

Table 01: MIPI CSI connector 'CSI3' pinouts

2.2   I-PEX Antenna Connectors

The VIA SOM-7000 module comes with three I-PEX antenna connectors on the top layer, labeled 'WCON1 BT' for Bluetooth, 'WCON3 WF0' for Wi-Fi MAIN, and 'WCON4 WF1' for Wi-Fi AUX. The diagram of the I-PEX antenna connectors is shown below.
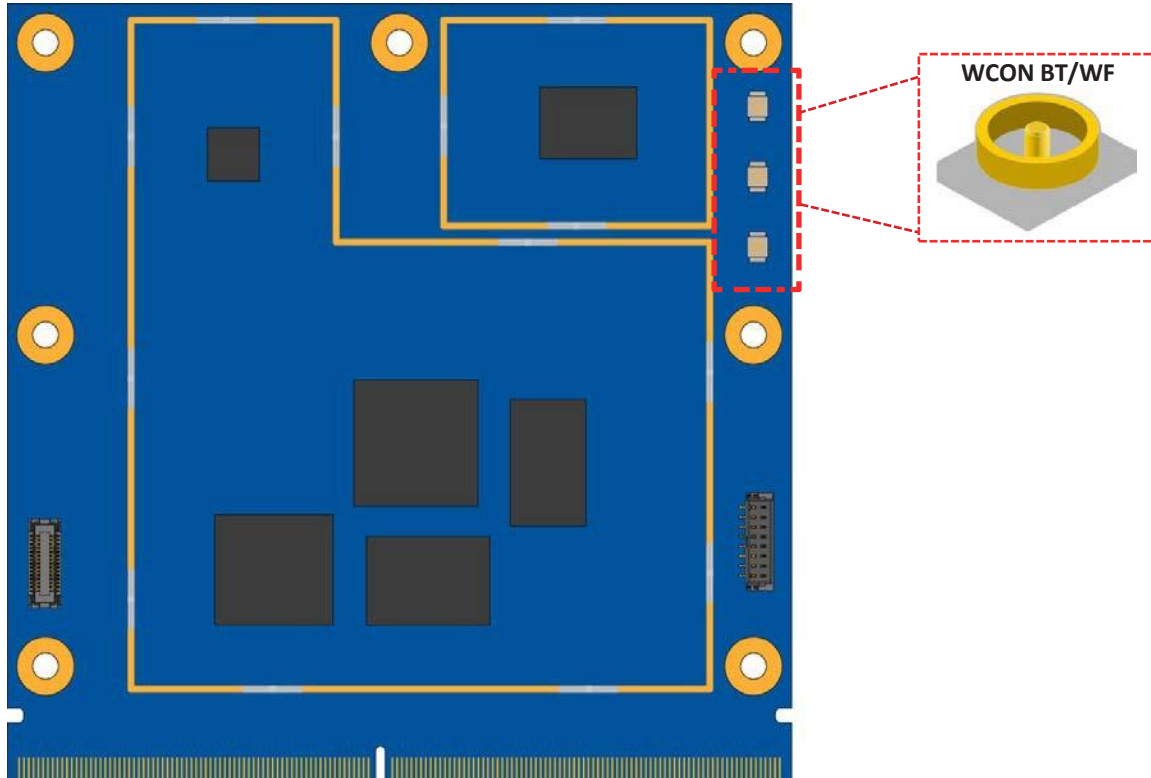
Figure 05: I-PEX antenna connectors

2.3 Audio-Out Connector

The VIA SOM-7000 module is equipped with a stereo audio-out connector labeled 'AUDIO_CON' on the top layer. The audio cable bundled in the VIA SOM-7000 starter kit can be plugged into this connector and the VIA SOMDB7 reference carrier board's audio-in connector.

> **Note:**
> See Appendix section A.6.2 for information on the VIA SOMDB7 reference carrier board's audio-in connector.

The pinouts of the audio-out connector are shown below.
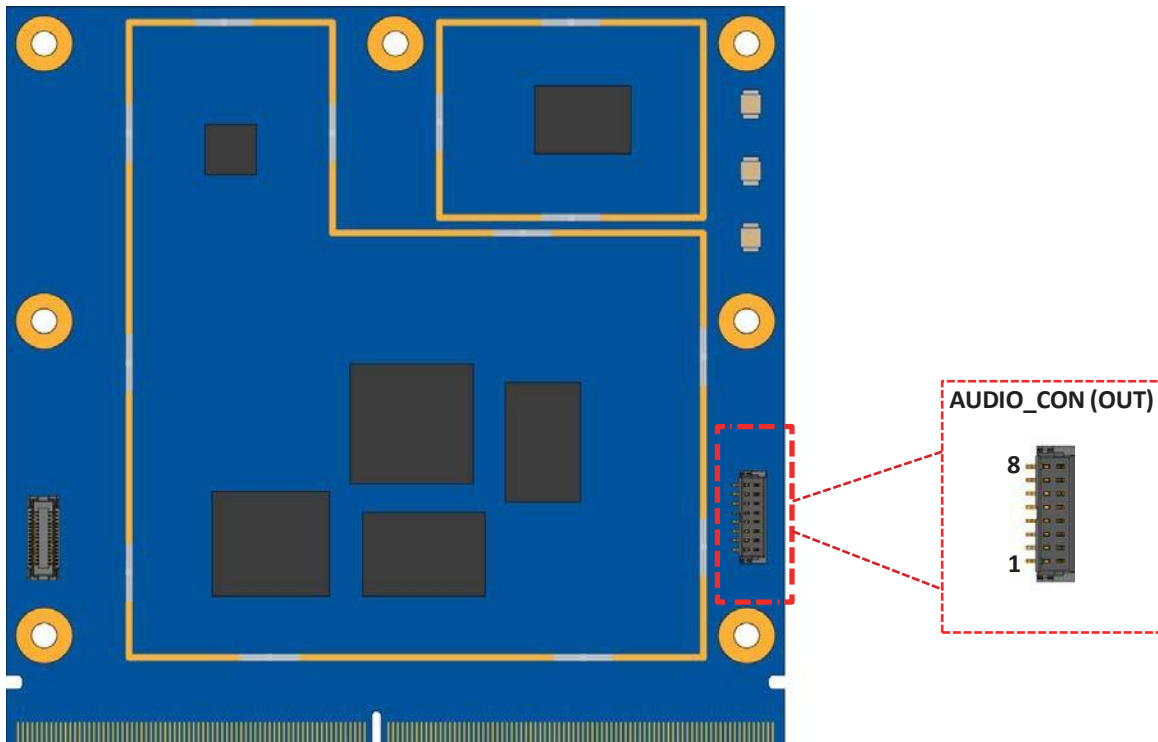
Figure 06: Audio-out connector 'AUDIO_CON'

AUDIO_CON (OUT)	
Pin	Signal
1	AVSS30_AUD
2	EAR_MIC_N
3	EAR_MIC_P
4	D_GND
5	AU_HP_R
6	AU_REFN
7	AU_HP_L
8	HP_EINT

Table 02: Audio-out connector 'AUDIO_CON' pinouts

3. Software and Technical Support

3.1 Android and Yocto Support

The VIA SOM-7000 features a complete software evaluation image featuring the Android 11 and Yocto 4.0.6 operating systems.

3.2 Technical Support and Assistance

- For utilities downloads and the latest documentation and information about the VIA SOM-7000, please visit our website at https://www.viatech.com/en/edge/SOM-7000/.

- For technical support and additional assistance, always contact your local sales representative or VIA SOM-7000 distributor, or go to https://www.viatech.com/en/support/drivers/ for technical support.

- For OEM clients and system integrators developing a product for long-term production, other code and resources may also be made available. Please visit our website at https://www.viatech.com/en/about/contact/ to submit a request.

Appendix A SOMDB7 Carrier Board Reference

A.1   SOMDB7 Specifications

LVDS

- Chrontel CH7515 eDP/DP to LVDS Converter

Ethernet

- Realtek RTL8153 GbE USB 3.0 Ethernet Network Interface Controller

MCU

- STMicroelectronics STM32L011F4P6 32-bit MCU

Onboard I/O

- 1 x 4-Lane MIPI-DSI connector
- 2 x LVDS dual-channel connectors (up to QSXGA 2560 x 1440 @60Hz)
- 2 x MIPI CSI connectors (1 x 4-Lane, 1 x 2-Lane)
- 1 x touchscreen panel connector (I2C)
- 1 x SIM card slot
- 1 x M.2 B-key slot (supports PCIe x1/USB3.1/USB 2.0/SIM)
- 1 x ADC/GPIO pin header (for multiplexed Analog inputs/GPIOs)
- 1 x RTC battery connector
- 1 x Debug console connector
- 1 x 12V DC-in power connector

Front Panel I/O

- 1 x Download/Volume+ button
- 1 x Volume- button
- 1 x MicroSD card slot

Back Panel I/O

- 1 x HDMI port
- 2 x USB 3.1 ports
- 1 x Micro USB 2.0 port (for image download)
- 2 x GLAN ports
- 1 x 3.5mm phone jack (supports Headphone-out and MIC-in)
- 1 x Reset button
- 1 x Power button with LED

Power Supply

- 1 x 12V DC-in

Operating Temperature

- 0°C ~ 60°C

Operating Humidity

- 0% ~ 95% (relative humidity ; non-condensing)

Form Factor

- 151mm x 134mm (5.94" x 5.28")

Compliance

- CE, FCC, UKCA, TELEC

A.2 SOMDB7 Layout Diagram
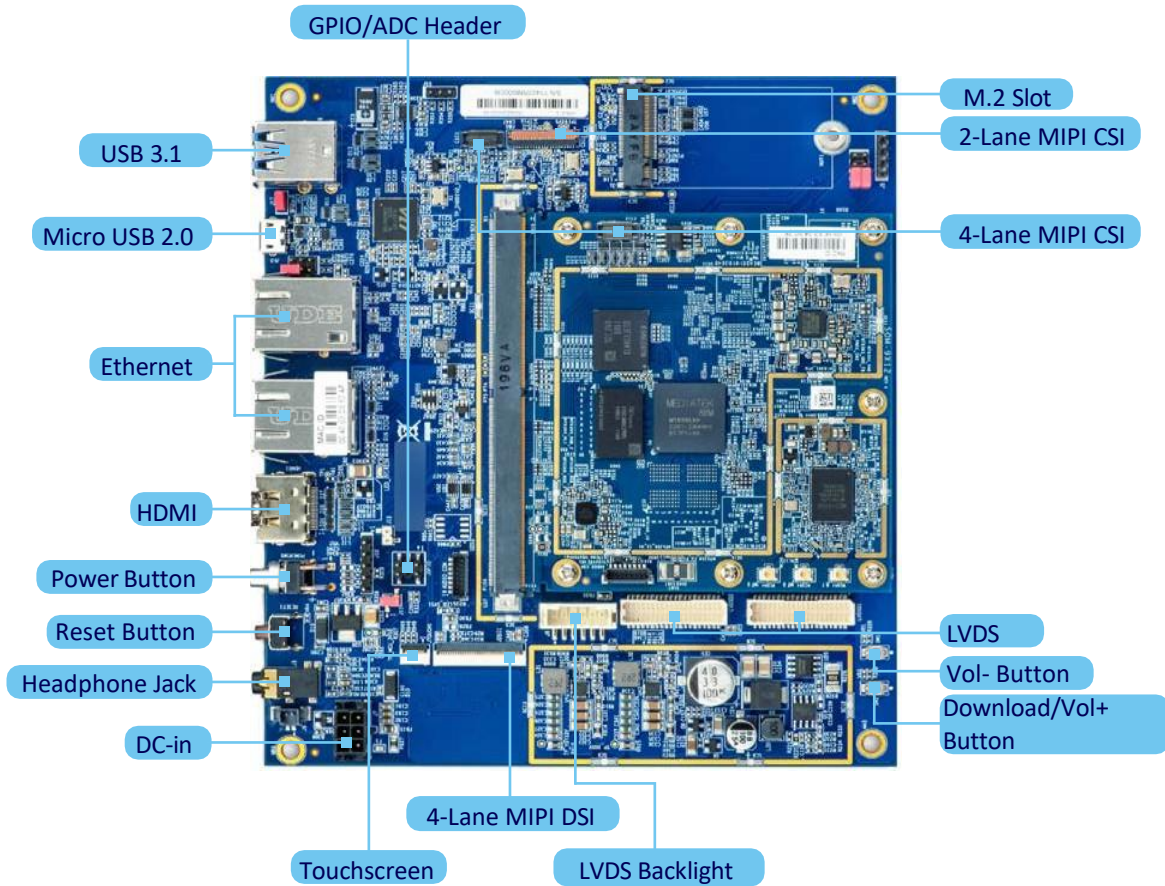
Figure 07: Layout diagram of the SOMDB7 carrier board's top layer I/O
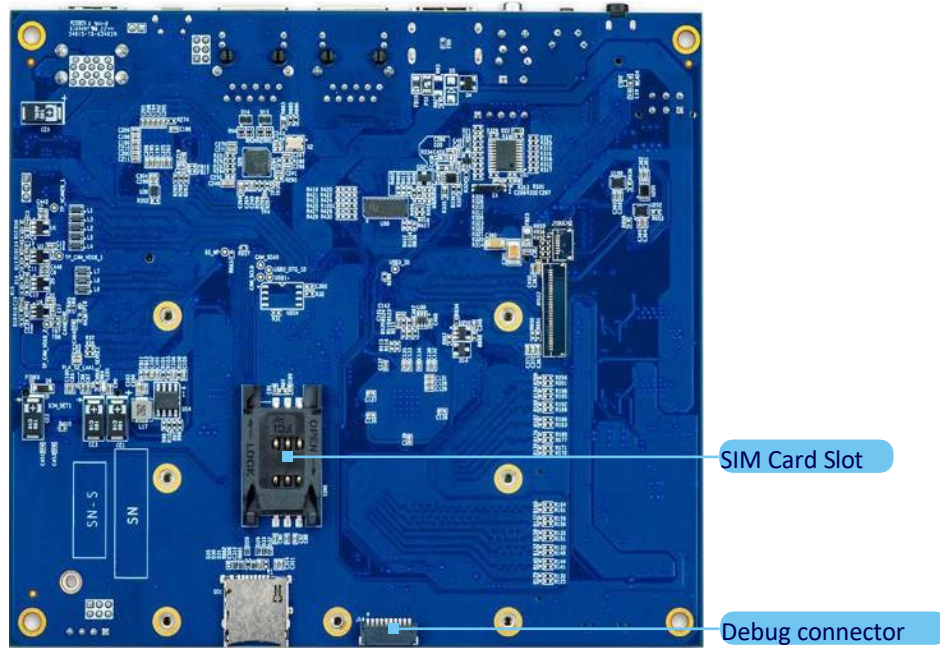
Figure 08: Layout diagram of the SOMDB7 carrier board's bottom layer I/O

MicroSD Card Slot
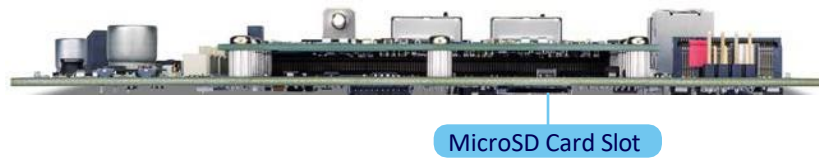
Figure 09: Layout diagram of the SOMDB7 carrier board's front panel I/O

2x USB   2x Gigabit LAN   HDMI   Reset Button

Micro USB   Power Button   Headphone Jack
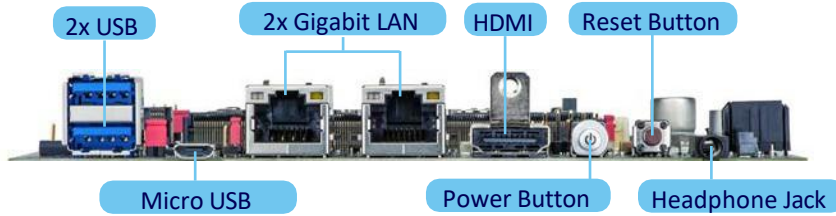
Figure 10: Layout diagram of the SOMDB7 carrier board's back panel I/O

A.3   SOMDB7 Dimensions
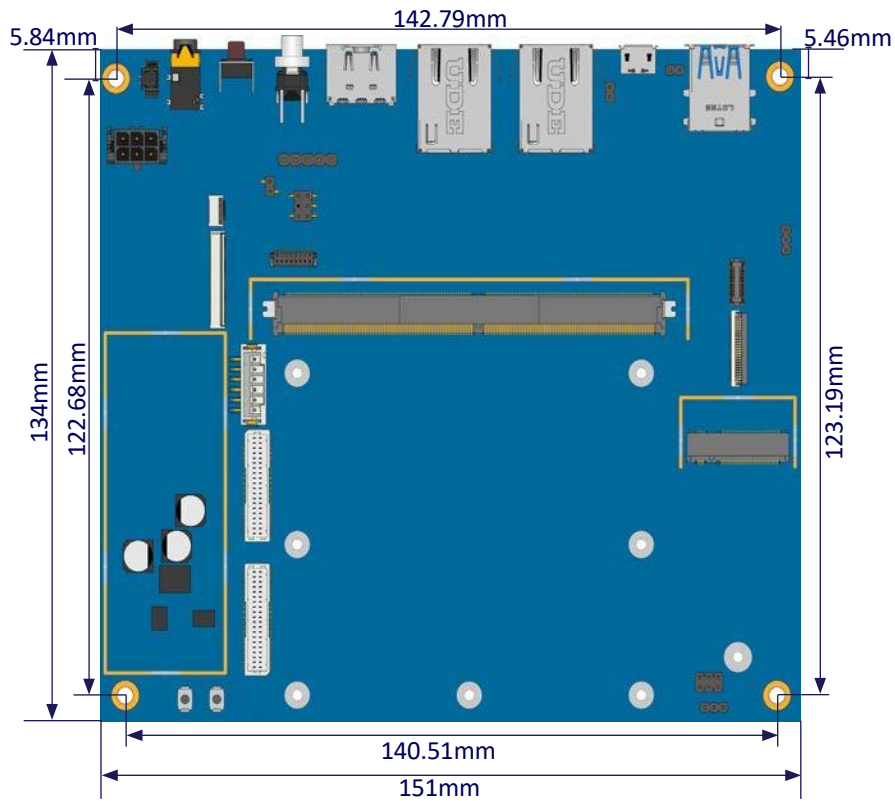
Figure 11: Dimensions of the SOMDB7 carrier board
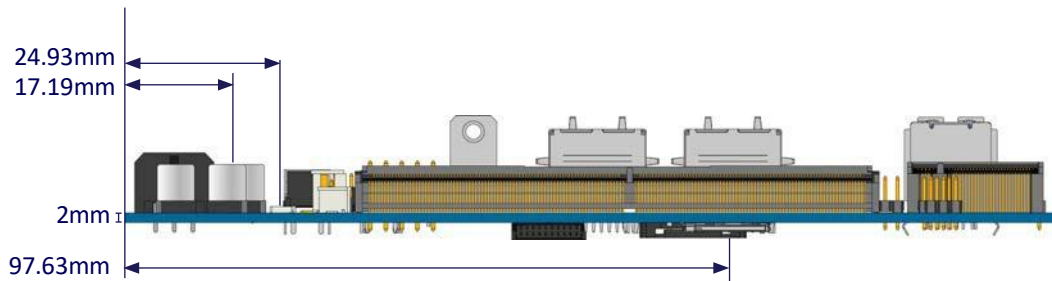
Figure 12: Dimensions of the SOMDB7 carrier board's front panel I/O
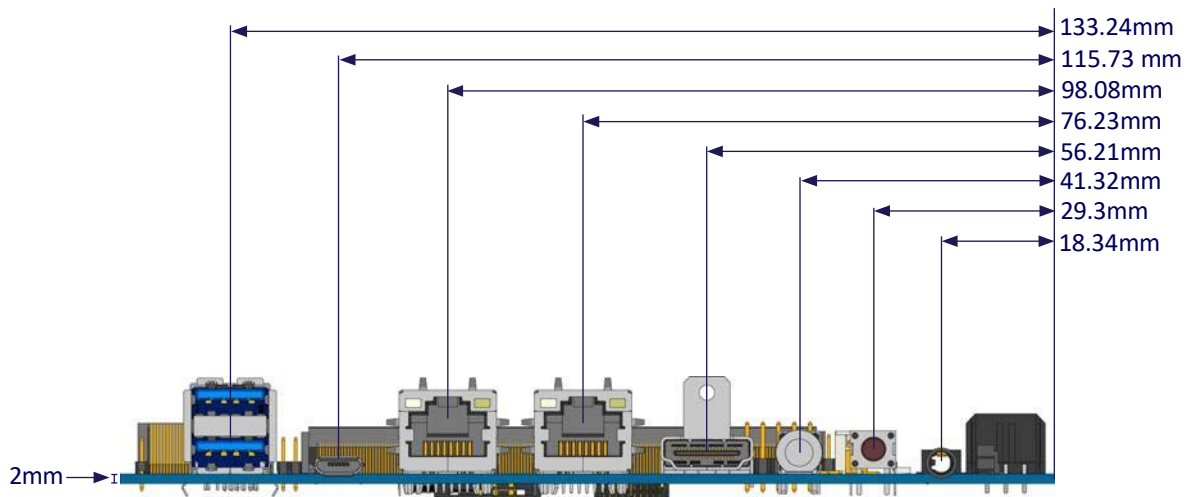
Figure 13: Dimensions of the SOMDB7 carrier board's back panel I/O

A.4 SOMDB7 Height Distribution
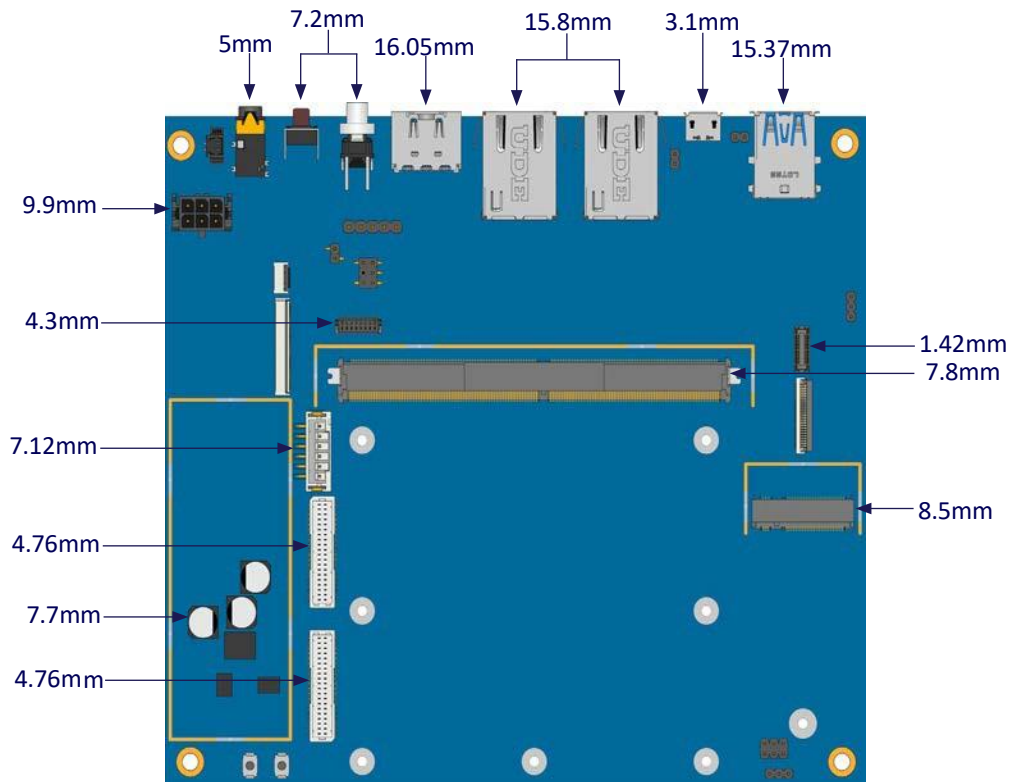
Figure 14: Height distribution on the SOMDB7 carrier board's top layer
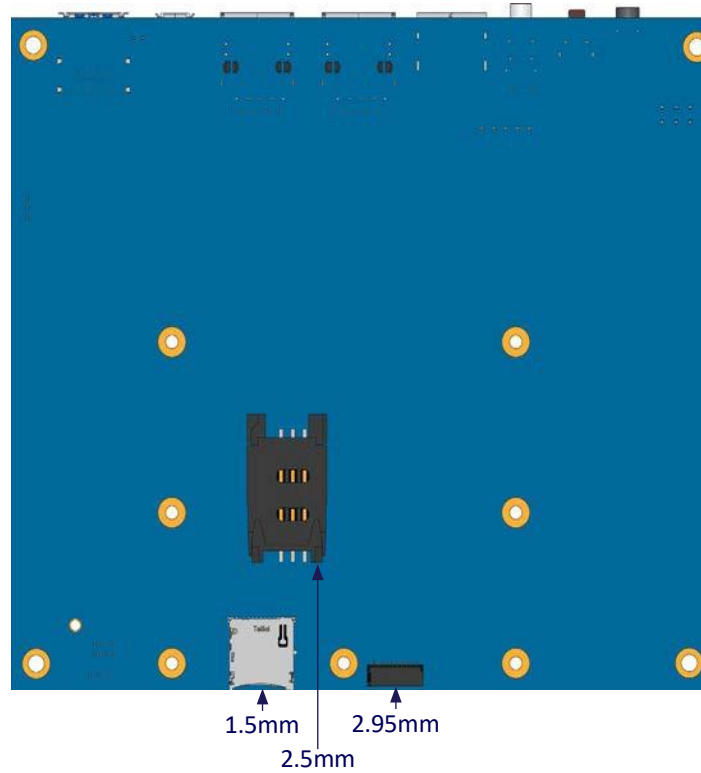
Figure 15: Height distribution on the SOMDB7 carrier board's bottom layer

A.5 SOMDB7 External I/O Pin Descriptions and Functionality

The VIA SOMDB7 carrier board has a wide selection of interfaces, and includes a selection of frequently-used ports as part of the external I/O coastline.

A.5.1 MicroSD Slot

The VIA SOMDB7 carrier board is equipped with a MicroSD Slot on the front I/O panel, to use for storage of data, pictures, video, audio, documents and so on. The pinouts of the MicroSD slot are shown below.

Pin	Signal
1	DAT2
2	DAT3
3	CMD
4	VCC
5	CLK
6	GND
7	DAT0
8	DAT1
9	Card detect

Figure 16: MicroSD card slot diagram

Table 03: MicroSD card slot pinouts

A.5.2 USB 3.1 Ports

The VIA SOMDB7 carrier board is equipped with two USB-A 3.1 Gen 1 ports on the back panel, that have a maximum data transfer rate of up to 5Gbps and are compatible with USB 2.0 specifications. These USB ports provide complete Plug and Play and hot swap capability for external devices. The pinouts of the USB 3.1 ports are shown below.

Pin	Signal
1	VBUS
2	D-
3	D+
4	GND
5	SSRX-
6	SSRX+
7	GND_DRAIN
8	SSTX-
9	SSTX+

Figure 17: USB 3.1 diagram

Table 04: USB 3.1 pinouts

A.5.3   Micro USB 2.0 Port

The VIA SOMDB7 carrier board is equipped with a Micro USB 2.0 port on the back panel, to be used for OS image downloading. The pinouts of the Micro USB 2.0 port are shown below.

Pin	Signal
1	VBUS
2	D-
3	D+
4	ID
5	GND

Table 05: Micro USB 2.0 port pinouts

Figure 18: Micro USB 2.0 port diagram

A.5.4   Gigabit LAN Ports

The VIA SOMDB7 carrier board comes with two Gigabit LAN ports on the back panel. Each Gigabit LAN port uses an 8 Position and 8 Contact (8P8C) receptacle connector commonly known as RJ-45, which is fully compliant with the IEEE 802.3 (10BASE-T), 802.3u (100BASE-TX), and 802.3ab (1000BASE-TX) standards. The pinouts of the Gigabit LAN ports are shown below.

LAN1 and LAN2	
Pin	Signal
1	MDIO0+
2	MDIO0-
3	MDIO1+
4	MDIO1-
5,6	Not used
7	MDIO2+
8	MDIO2-
9	MDIO3+
10	MDIO3-

Table 06: Gigabit LAN port pinouts
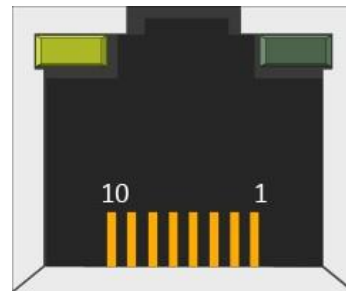
Figure 19: Gigabit LAN port diagram

Each Gigabit LAN port has two individual LED indicators on the front side to show its Active/Link status and Speed status.

	Link LED (Left LED on RJ-45 port)	Active LED (Right LED on RJ-45 port)
Link off	LED is off	LED is off
Speed_10Mbit	LED is off	Yellow flash
Speed_100Mbit	Green is on	Yellow flash
Speed_1000Mbit	Orange is on	Yellow flash

Table 07: Gigabit LAN port LED color definition

A.5.5   HDMI® Port

The VIA SOMDB7 carrier board is equipped with an HDMI type A port on the back panel, which uses an HDMI port Type A receptacle connector to connect High Definition video and digital audio using a single cable. The port supports HDMI 2.0. The pinouts of the HDMI port are shown below.

Pin	Signal	Pin	Signal
1	D2+	11	GND
2	GND	12	CLK-
3	D2-	13	CEC
4	D1+	14	NC
5	GND	15	DDC_CLK
6	D1-	16	DDC_DATA
7	D0+	17	GND
8	GND	18	HDMI_5V
9	D0-	19	PLUG_DET
10	CLK+		

Figure 20: HDMI port diagram

Table 08: HDMI port pinouts

A.5.6   Power Button

The VIA SOMDB7 carrier board comes with a power button on the back panel. The button features a built-in power LED indicator (green light). The power button can support two functions: Power On/Off and System Suspend/Resume. The diagram of the power button is shown below.

Figure 21: Power button diagram

Power Button behavior	
Power On/Off	Press the button for 2 seconds to power on. To power off, press the button for more than 8 seconds.
System Suspend/Resume	In powered on state, quickly press the power button once to suspend. In suspended state, quickly press once to resume.

Table 09: Power button behavior description

A.5.7   Reset Button

The VIA SOMDB7 carrier board comes with a reset button on the back panel to be used for reboots or force-reset. The diagram of the reset button is shown below.
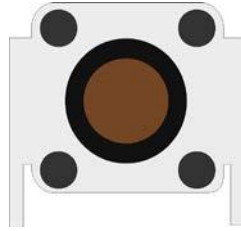
Figure 22: Reset button diagram

A.5.8   Headphone Jack

The VIA SOMDB7 carrier board comes with a 3.5mm headphone jack on the back panel, to use for connecting external speakers or headphones. The diagram of the headphone jack is shown below.
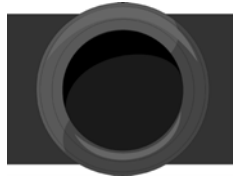
Figure 23: Headphone jack diagram

A.6   SOMDB7 Onboard I/O

This chapter provides information about the onboard I/O connectors and pin headers of the VIA SOMDB7 carrier board.

A.6.1   MXM 3.0 Connector

The VIA SOMDB7 carrier board comes with one 314-pin MXM 3.0 connector labeled 'U37'. The MXM 3.0 connector is used for connecting the SOM module. The pinouts of the MXM 3.0 connector are shown below.
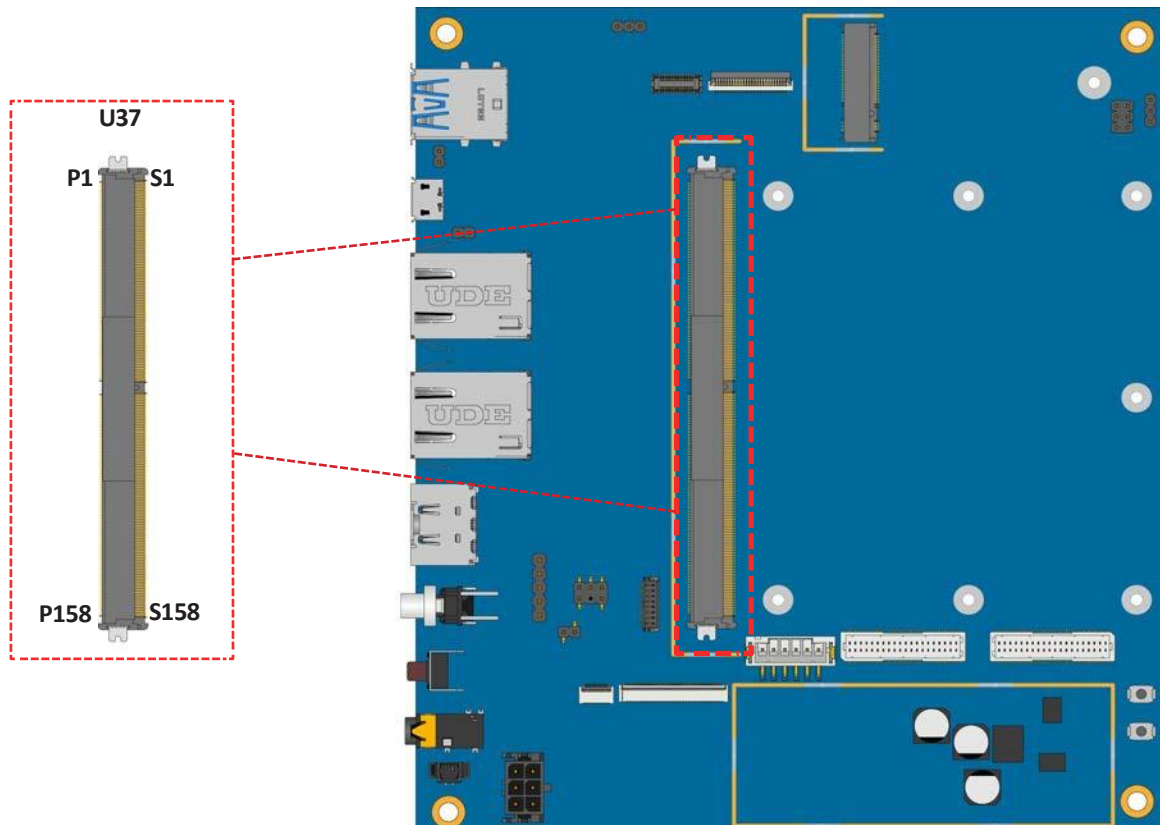
Figure 24: MXM 3.0 connector 'U37'

U37			
Pin	Signal	Pin	Signal
P1	NC	S1	I2C_CAM1_CK
P2	GND	S2	I2C_CAM1_DAT
P3	CSI1_CK+	S3	GND
P4	CSI1_CK-	S4	CMMCLK for CSI1 (CAM1)
P5 - P6	NC	S5	I2C_CAM0_CK
P7	CSI1_RX0+	S6	CAM_MCK for CSI0 (CAM0)
P8	CSI1_RX0-	S7	I2C_CAM0_DAT
P9	GND	S8	CSI0_CK+
P10	CSI1_RX1+	S9	CSI0_CK-
P11	CSI1_RX1-	S10	GND
P12	GND	S11	CSI0_RX0+
P13	CSI1_RX2+	S12	CSI0_RX0-

U37			
Pin	Signal	Pin	Signal
P14	CSI1_RX2-	S13	GND
P15	GND	S14	CSI0_RX1+
P16	CSI1_RX3+	S15	CSI0_RX1-
P17	CSI1_RX3-	S16	GND
P18	GND	S16 - S33	NC
P19	GBE0_MDI3-	S34	GND
P20	GBE0_MDI3+	S35 - S37	NC
P21	GBE0_LINK100#	S38	AUDIO_MCK
P22	GBE0_LINK1000#	S39	I2S0_LRCK
P23	GBE0_MDI2-	S40	NC
P24	GBE0_MDI2+	S41	I2S0_SDIN
P25	GBE0_LINK_ACT#	S42	I2S0_CK
P26	GBE0_MDI1-	S43 - S46	NC
P27	GBE0_MDI1+	S47	GND
P28	NC	S48	I2C_GP_CK
P29	GBE0_MDI0-	S49	I2C_GP_DAT
P30	GBE0_MDI0+	S50	I2S2_LRCK
P31	NC	S51	I2S2_SDOUT
P32	GND	S52	NC
P33	SDIO_WP	S53	I2S2_CK
P34	SDIO_CMD	S54 - S60	NC
P35	SDIO_CD#	S61	GND
P36	SDIO_CK	S62	USB3_SSTX+
P37	SDIO_PWR_EN	S63	USB3_SSTX-
P38	GND	S64	GND
P39	SDIO_D0	S65	USB3_SSRX+
P40	SDIO_D1	S66	USB3_SSRX-
P41	SDIO_D2	S67	GND
P42	SDIO_D3	S68	USB3+
P43	SPI0_CS0#	S69	USB3-
P44	SPI0_CK	S70	GND
P45	SPI0_DIN	S71 - S72	NC
P46	SPI0_DO	S73	GND
P47	GND	S74 - S75	NC
P48 - P49	NC	Key	
P50	GND	S76	PCIE_B_RST#
P51 - P52	NC	S77	PCIE_C_RST#
P53	GND	S78	PCIE_C_RX+
P54 - P58	NC	S79	PCIE_C_RX-
P59	GND	S80	GND
P60	USB0+	S81	PCIE_C_TX+
P61	USB0-	S82	PCIE_C_TX-

U37			
Pin	Signal	Pin	Signal
P62 - P64	NC	S83	GND
P59	GND	S84	PCIE_B_REFCK+
P60	USB0+	S85	PCIE_B_REFCK-
P61	USB0-	S86	GND
P62 - P64	NC	S87	PCIE_B_RX+
P65	USB1+	S88	PCIE_B_RX-
P66	USB1-	S89	GND
P67	NC	S90	PCIE_B_TX+
P68	GND	S91	PCIE_B_TX-
P69 - P71	NC	S92	GND
P72	USB_TYPEC_CC1	S93	DP0_LANE0+
P73	USB_TYPEC_CC2	S94	DP0_LANE0-
P74	NC	S95	NC
Key		S96	DP0_LANE1+
P75 - P76	NC	S97	DP0_LANE1-
P77	PCIE_B_CKREQ#	S98	DP0_HPD
P78	NC	S99	DP0_LANE2+
P79	GND	S100	DP0_LANE2-
P80 - P81	NC	S101	GND
P82	GND	S102	DP0_LANE3+
P83 - P84	NC	S103	DP0_LANE3-
P85	GND	S104	NC
P86 - P87	NC	S105	DP0_AUX+
P88	GND	S106	DP0_AUX-
P89 - P90	NC	S107	LCD1_BKLT_EN
P91	GND	S108	DSI1_CLK+
P92	HDMI_D2+	S109	DSI1_CLK-
P93	HDMI_D2-	S110	GND
P94	GND	S111	DSI1_D0+
P95	HDMI_D1+	S112	DSI1_D0-
P96	HDMI_D1-	S113	DSI1_TE
P97	GND	S114	DSI1_D1+
P98	HDMI_D0+	S115	DSI1_D1-
P99	HDMI_D0-	S116	LCD1_VDD_EN
P100	GND	S117	DSI1_D2+
P101	HDMI_CK+	S118	DSI1_D2-
P102	HDMI_CK-	S119	GND
P103	GND	S120	DSI1_D3+
P104	HDMI_HPD	S121	DSI1_D3-
P105	HDMI_CTRL_CK	S122	LCD1_BKLT_PWM
P106	HDMI_CTRL_DAT	S123	GPIO13
P107	NC	S124	GND

U37			
Pin	Signal	Pin	Signal
P108	GPIO0	S125	DSI0_D0+
P109	GPIO1	S126	DSI0_D0-
P110	GPIO2	S127	LCD0_BKLT_EN
P111	GPIO3	S128	DSI0_D1+
P112	GPIO4	S129	DSI0_D1-
P113	GPIO5	S130	GND
P114	GPIO6	S131	DSI0_D2+
P115	GPIO7	S132	DSI0_D2-
P116	GPIO8	S133	LCD0_VDD_EN
P117	GPIO9	S134	DSI0_CLK+
P118	GPIO10	S135	DSI0_CLK-
P119	GPIO11	S136	GND
P120	GND	S137	DSI0_D3+
P121	I2C_PM_CK	S138	DSI0_D3-
P122	I2C_PM_DAT	S139	I2C_LCD_CK
P123 - P126	NC	S140	I2C_LCD_DAT
P127	RESET_IN#	S141	LCD0_BKLT_PWM
P128	POWER_BTN#	S142	GPIO12 / HOME Key / Vol+
P129 - P132	NC	S143	GND
P133	GND	S144	DSI0_TE
P134	SER1_TX	S145	NC
P135	SER1_RX	S146	PCIE_WAKE#
P136	SER2_TX	S147 - S153	NC
P137	SER2_RX	S154	CARRIER_PWR_ON
P138 - P141	NC	S155 - S156	NC
P142	GND	S157	TEST# / Download Key / Vol+
P143 - P146	NC	S158	GND
P147 - P156	VDD_IN		

Table 10: MXM 3.0 connector 'U37' pinouts

A.6.2   Audio-In Connector

The VIA SOMDB7 carrier board is equipped with a stereo audio-in connector labeled 'AUDIO_CON' on the top layer. The audio cable bundled in the VIA SOM-7000 starter kit can be plugged into this connector and the VIA SOM-7000 module's audio-out connector.

> **Note:**
> See section 2.3 for information on the VIA SOM-7000 module's audio-out connector.

The pinouts of the audio-in connector are shown below.
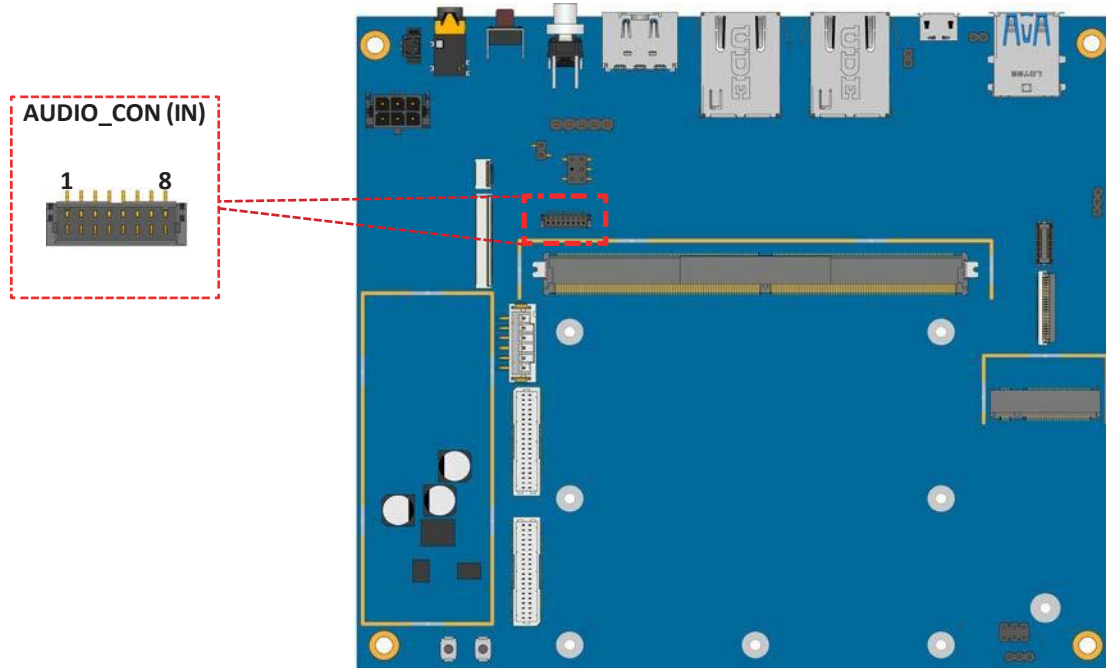
Figure 25: Audio-in connector 'AUDIO_CON'

AUDIO_CON (IN)	
Pin	Signal
1	AVSS30_AUD
2	EAR_MIC_N_to_jack
3	EAR_MIC_P_to_jack
4	D_GND
5	AU_HP_R
6	AU_REFN
7	AU_HP_L
8	HP_EINT

Table 11: Audio-in connector 'AUDIO_CON' pinouts

A.6.3   LVDS Connectors

The VIA SOMDB7 carrier board is equipped with two dual-channel LVDS connectors labeled 'LVDS1' and 'LVDS2' to support upto 8 lanes of data transfer to a connected QSXGA 60Hz LVDS display. The connectors are located on the top layer. The pinouts of the LVDS connectors are shown below.
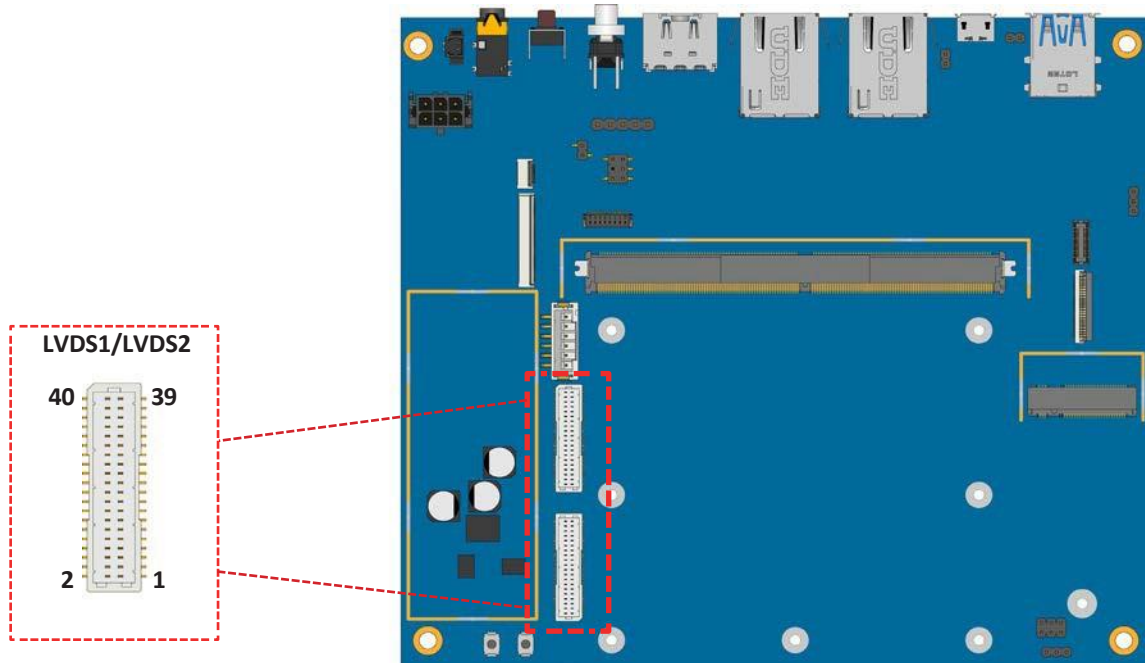
Figure 26: LVDS connectors 'LVDS1' and 'LVDS2'

LVDS1					
Pin	**Signal**	**Pin**	**Signal**	**Pin**	**Signal**
1 - 4	VDD	19	TXC1N	33	TXD1P
5 - 6	GND	20	TXC0N	34	TXD0P
7	TXA1N	21	TXC1P	35 - 36	GND
8	TXA0N	22	TXC0P	37	TXE1N
9	TXA1P	23 - 24	GND	38	TXE0N
10	TXA0P	25	TXCK1N	39	TXE1P
11 - 12	GND	26	TXCK0N	40	TXE0P
13	TXB1N	27	TXCK1P		
14	TXB0N	28	TXCK0P		
15	TXB1P	29 - 30	GND		
16	TXB0P	31	TXD1N		
17 - 18	GND	32	TXD0N		

Table 12: 'LVDS1' connector pinouts

LVDS2					
Pin	**Signal**	**Pin**	**Signal**	**Pin**	**Signal**
1 - 4	VDD	19	TXC3N	33	TXD3P
5 - 6	GND	20	TXC2N	34	TXD2P
7	TXA3N	21	TXC3P	35 - 36	GND
8	TXA2N	22	TXC2P	37	TXE3N
9	TXA3P	23 - 24	GND	38	TXE2N
10	TXA2P	25	TXCK3N	39	TXE3P
11 - 12	GND	26	TXCK2N	40	TXE2P
13	TXB3N	27	TXCK3P		
14	TXB2N	28	TXCK2P		
15	TXB3P	29 - 30	GND		
16	TXB2P	31	TXD3N		
17 - 18	GND	32	TXD2N		

Table 13: 'LVDS2' connector pinouts

A.6.4   LVDS Backlight Connector

The VIA SOMDB7 carrier board is equipped with an LVDS backlight connector labeled 'J6' on the top layer, to support the powering of a connected LVDS display's backlight. The pinouts of the LVDS backlight connector are shown below.
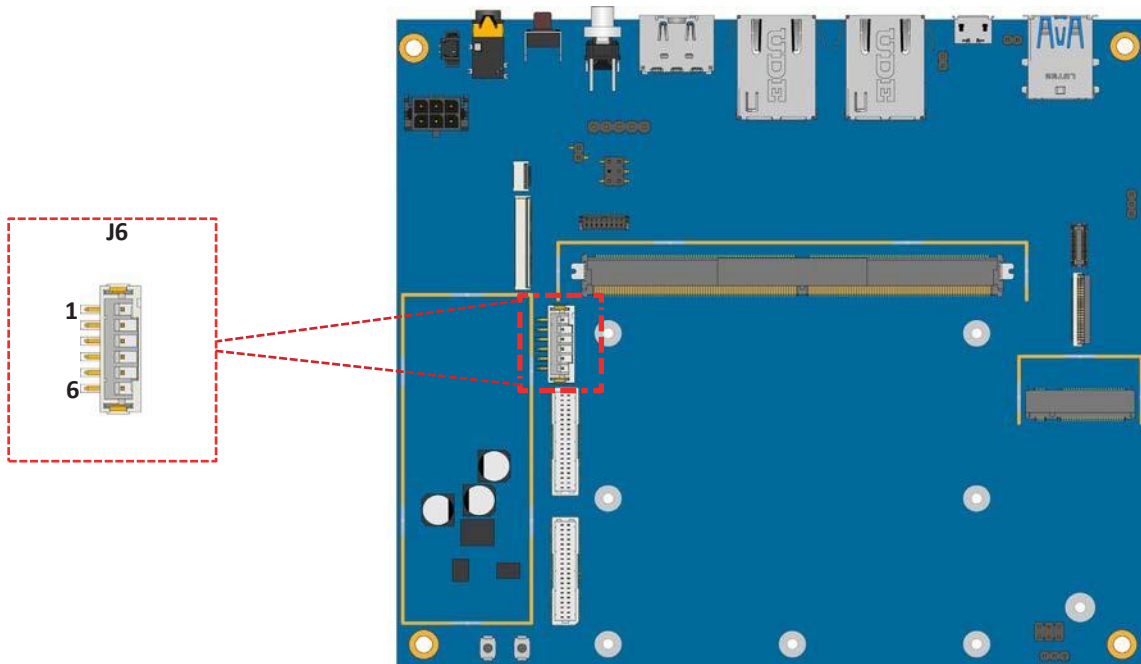

Figure 27: LVDS backlight connector 'J6'

J6	
Pin	**Signal**
1 - 2	VLED-
3 - 4	VLED+
5 - 6	VLED-

Table 14: LVDS backlight connector 'J6' pinouts

A.6.5   4-Lane MIPI DSI Connector

The VIA SOMDB7 carrier board is equipped with a 4-lane MIPI DSI panel connector labeled 'JDSI1' on the top layer, which can be used for connecting a MIPI DSI LCD display. The pinouts of the MIPI DSI connector are shown below.
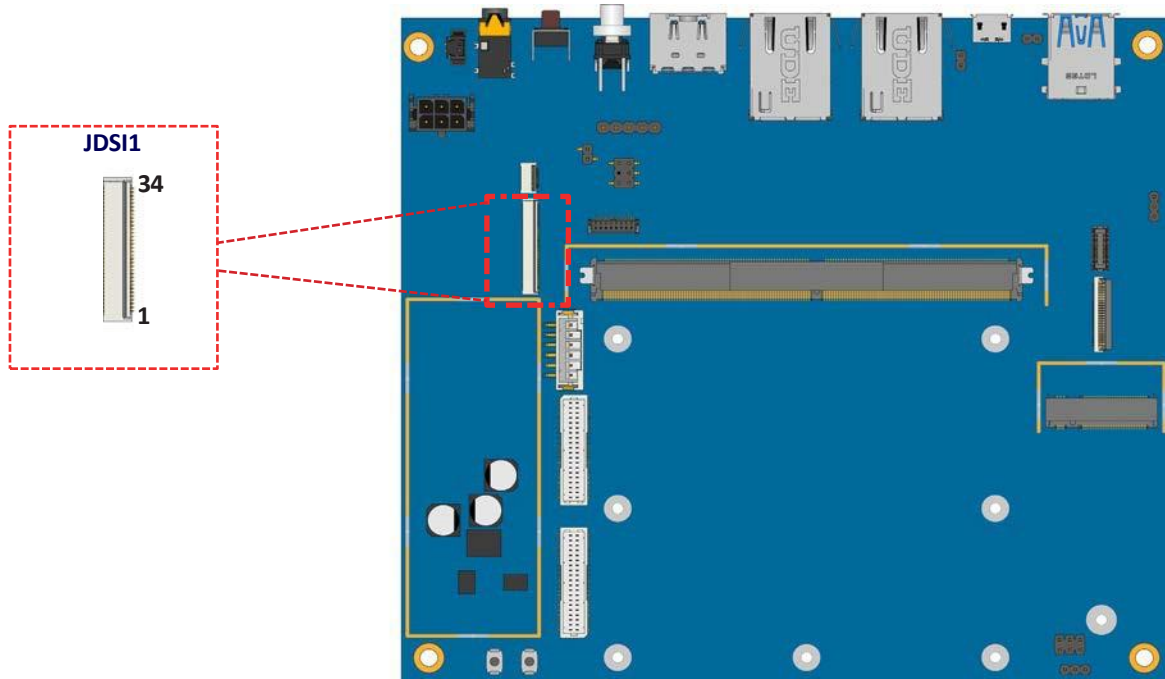

Figure 28: MIPI DSI connector 'JDSI1'

Pin	Signal	Pin	Signal
1	3.3V	18	GND
2	3.3V	19	DSI_D0P
3	NC	20	DSI_D0N
4	LCD VDDEN	21	GND
5	Backlight_PWM	22	DSI_D3P
6	I2C_DATA	23	DSI_D3N
7	I2C_CLK	24	GND
8	NC	25	GND
9	GND	26	GND
10	DSI_D2P	27	GND
11	DSI_D2N	28	NC
12	GND	29	AGING
13	DSI_D1P	30	NC
14	DSI_D1N	31	Backlight power
15	GND	32	Backlight power
16	DSI_CKP	33	Backlight power
17	DSI_CKN	34	Backlight power

Table 15: MIPI DSI connector 'JDSI1' pinouts

Note:
The 4-lane MIPI DSI connector is of the top contact type.

A.6.6   4-Lane MIPI CSI Connector

The VIA SOMDB7 reference carrier board is equipped with a 4-lane MIPI CSI connector labeled 'CSI1' on the top layer, which can be used for connecting a 2-lane or 4-lane MIPI CSI camera. The pinouts of the MIPI CSI connector are shown below.
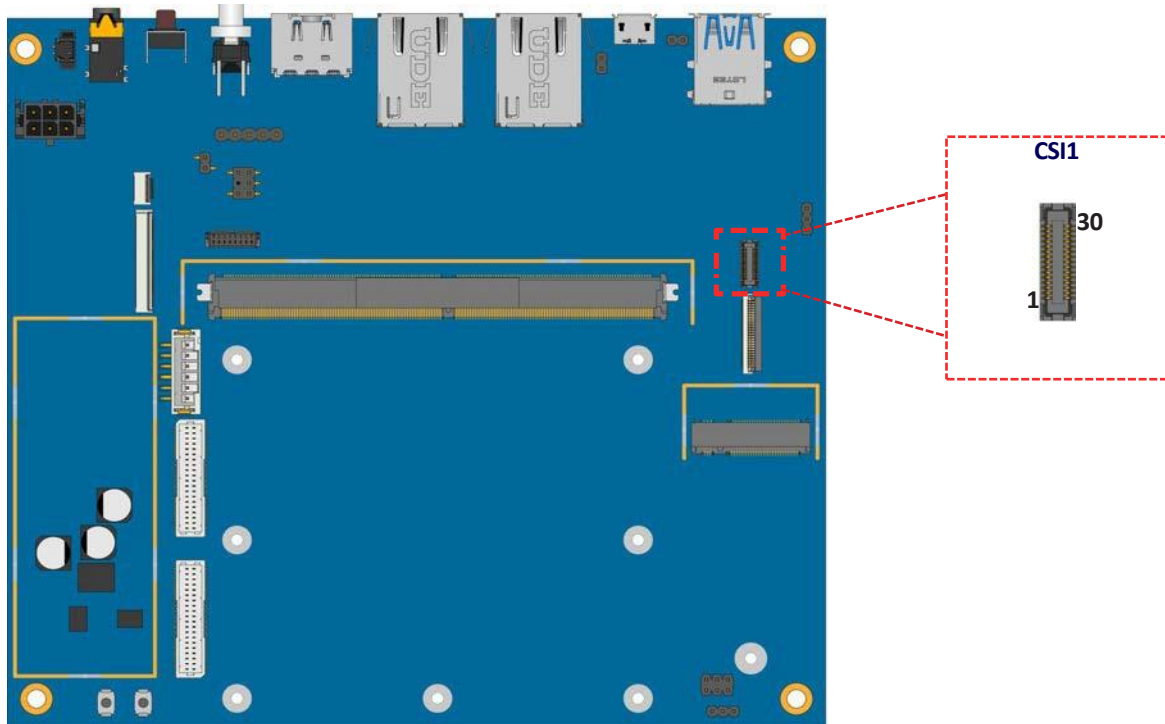

Figure 29: MIPI CSI connector 'CSI1'

Note:
The 4-lane MIPI CSI connector currently only supports the SONY IMX258 CMOS Image Sensor.

CSI1			
Pin	Signal	Pin	Signal
1	XCLK	16	MCN
2	DGND	17	DGND
3	Reset	18	MCP
4	MDN2	19	PAVDD 2.8V
5	NC	20	DGND
6	MDP2	21	AF AVDD 2.8V
7	DOVDD1.8V	22	MDN0
8	DGND	23	AFGND
9	AGND	24	MDP0
10	MDN3	25	DVDD 1.2V
11	DGND	26	DGND
12	MDP3	27	NC
13	SCL	28	MDN1
14	DGND	29	DGND
15	SDA	30	MDP1

Table 16: MIPI CSI connector 'CSI1' pinouts

A.6.7 2-Lane MIPI CSI Connector

The VIA SOMDB7 carrier board comes with a 2-lane MIPI CSI connector labeled 'CSI2' on the top layer. The connector can be used for connecting a 2-lane MIPI CSI camera. The pinouts of the connector are shown below.
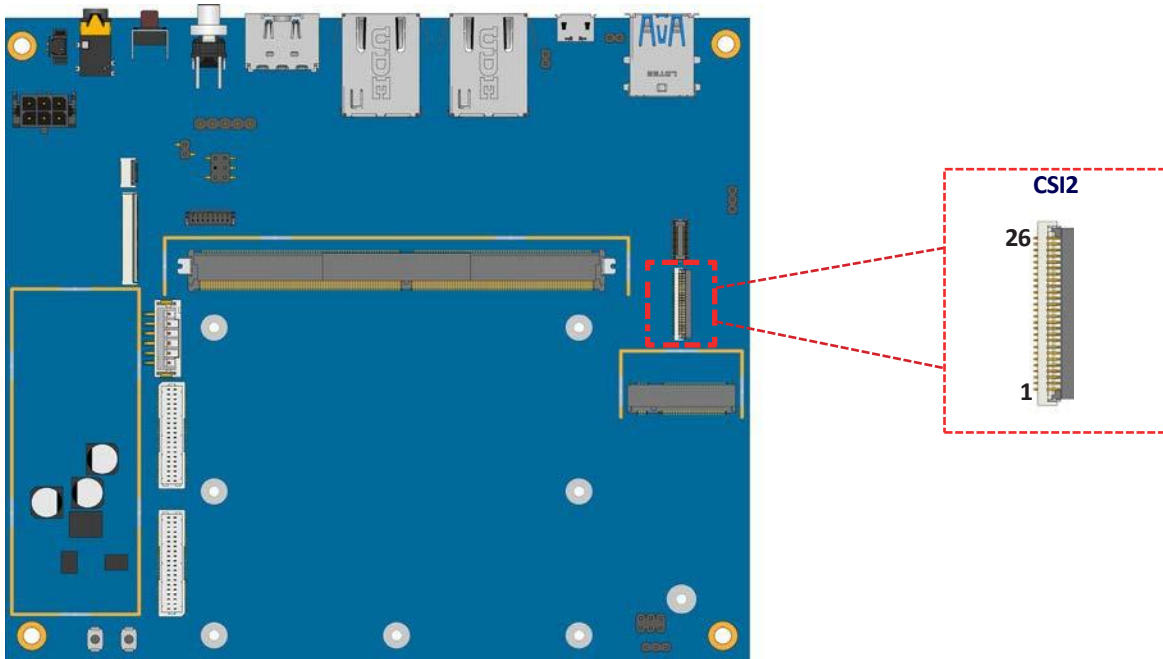

Figure 30: MIPI CSI connector 'CSI2'

CSI2			
Pin	Signal	Pin	Signal
1	MDP0	15	GND
2	MDN0	16	CMMCLK2_con (Camera Main CLK)
3	GND	17	2ND_CAM_XVS (PDN of Camera)
4	MDP1	18	2ND_CAM_RESET_con
5	MDN1	19	CAM_SDA_2ND
6	GND	20	CAM_SCL0_2ND
7 - 8	NC	21	VCAMIO3_PMU
9	GND	22	2ND_DVDD12
10 - 11	NC	23	2ND_AVDD28
12	GND	24	AVDD28_CSI2
13	MCP	25 - 26	GND
14	MCN		

Table 17: MIPI CSI connector 'CSI2' pinouts

Note:
The 2-lane MIPI CSI connector is of the top contact type and supports the Omnivision OV5648 CMOS image sensor.

A.6.8   Touchscreen Panel Connector

The VIA SOMDB7 carrier board comes with a touchscreen panel connector labeled 'JTOUCH1' on the top layer. The connector supports the I^{2}C interface and can be used to connect a touchscreen panel. The pinouts of the touchscreen connector are shown below.
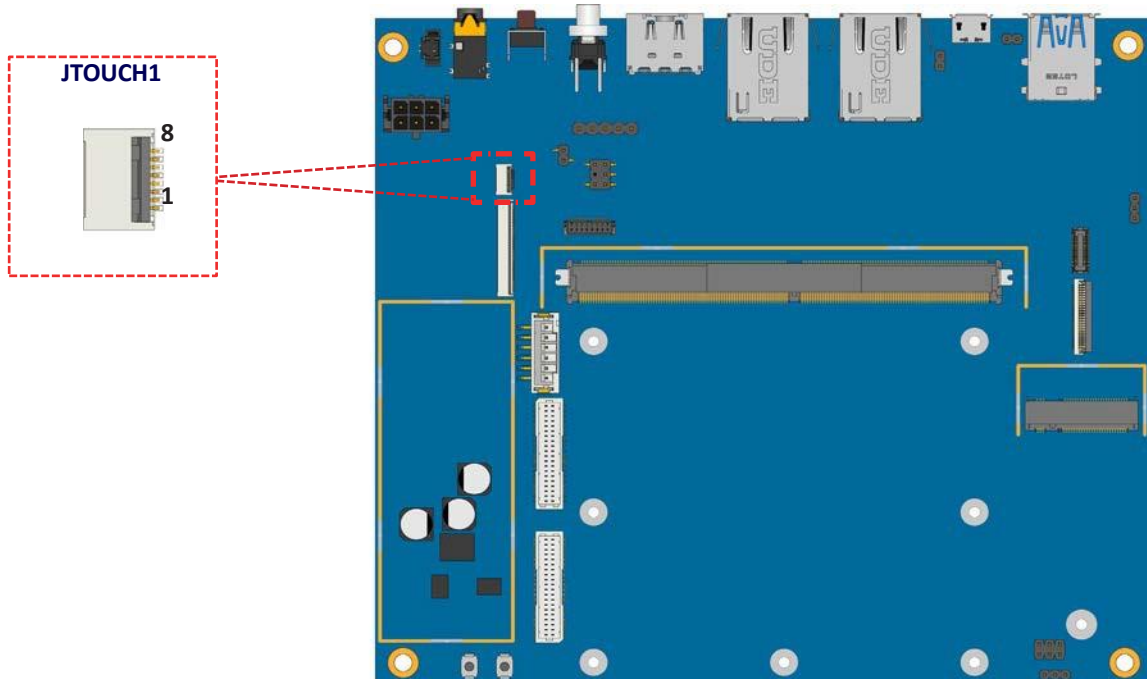

Figure 31: Touchscreen panel connector 'JTOUCH1'

JTOUCH1	
Pin	Signal
1	D_GND
2 - 3	NC
4	INT
5	SCK
6	DAT
7	3.3V
8	Reset

Table 18: Touchscreen panel connector 'JTOUCH1' pinouts

A.6.9 Volume Buttons

The VIA SOMDB7 carrier board comes with two volume buttons for volume control. The volume-up and volume-down buttons are labeled as 'SW2' and 'SW1' respectively.

The volume-up button 'SW2' is also the download key, which can be pressed to start an OS image download. The button is to be kept pressed till the OS image download begins.

Note:
Refer to the Readme file in the OS image package for detailed instructions.

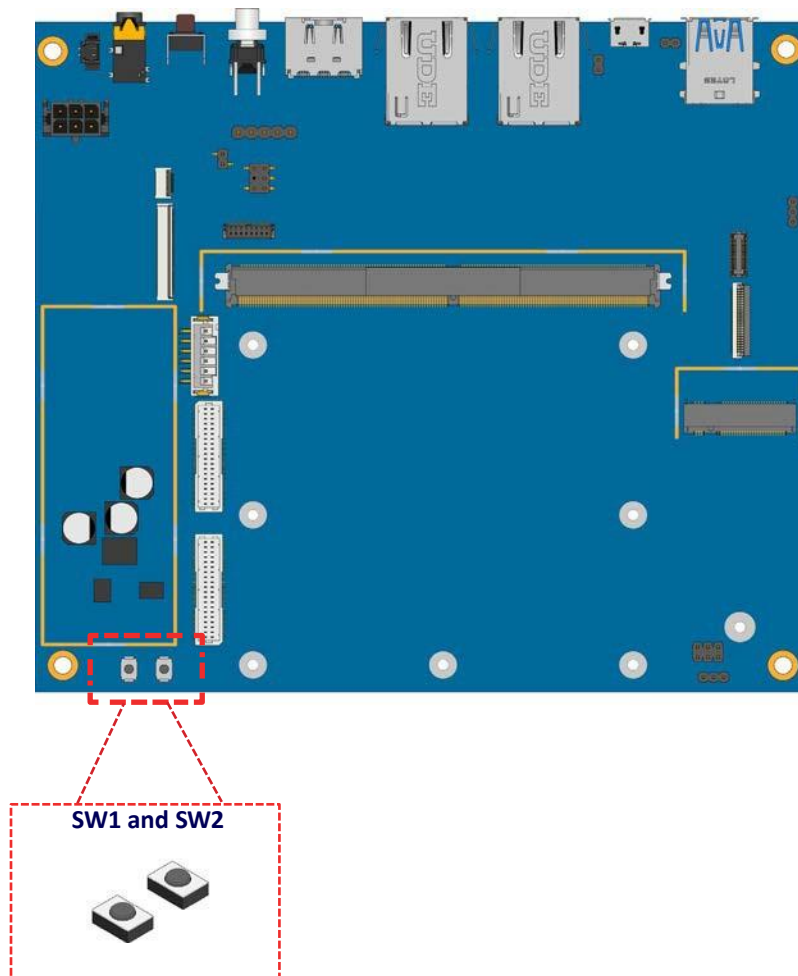The diagram of the volume buttons is shown below.

Figure 32: Volume buttons 'SW1' and 'SW2'

A.6.10 DC-in Power Connector

The VIA SOMDB7 carrier board comes with a DC-in power connector labeled 'J7' on the top layer. The power cable bundled in the VIA SOM-7000 starter kit can be plugged into this connector and connected to a 12V 3A power adapter. The pinouts of the DC-in power connector are shown below.
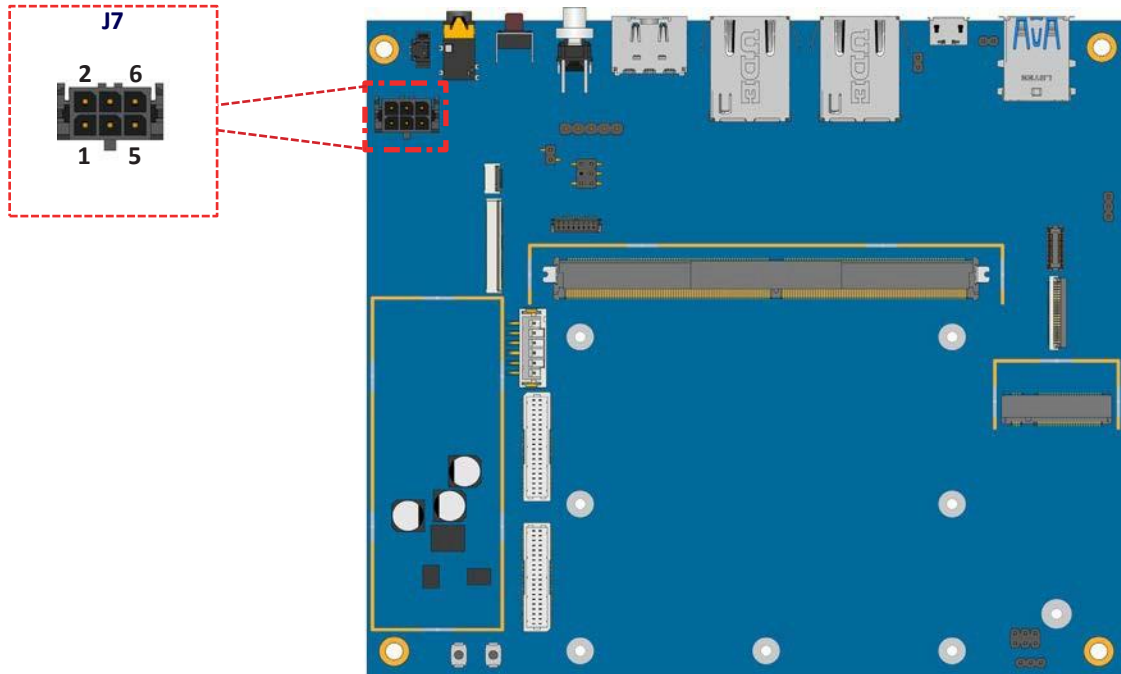

Figure 33: DC-in power connector 'J7'

J7	
Pin	**Signal**
1	12V
2	GND
3	12V
4	GND
5	12V
6	GND

Table 19: DC-in power connector 'J7' pinouts

A.6.11 GPIO/ADC Expansion Header

The VIA SOMDB7 carrier board comes with a GPIO/ADC expansion header labeled as 'JGPIO' on the top layer. The GPIO/ADC header supports three GPIO pins. Pins GPIO1 and GPIO2 can be used for ADC in the 0V ~ 3.3V analog range. Pin GPIO3 can be used for a pure digital signal at the 3.3V level. The pinouts of the GPIO/ADC expansion header are shown below.
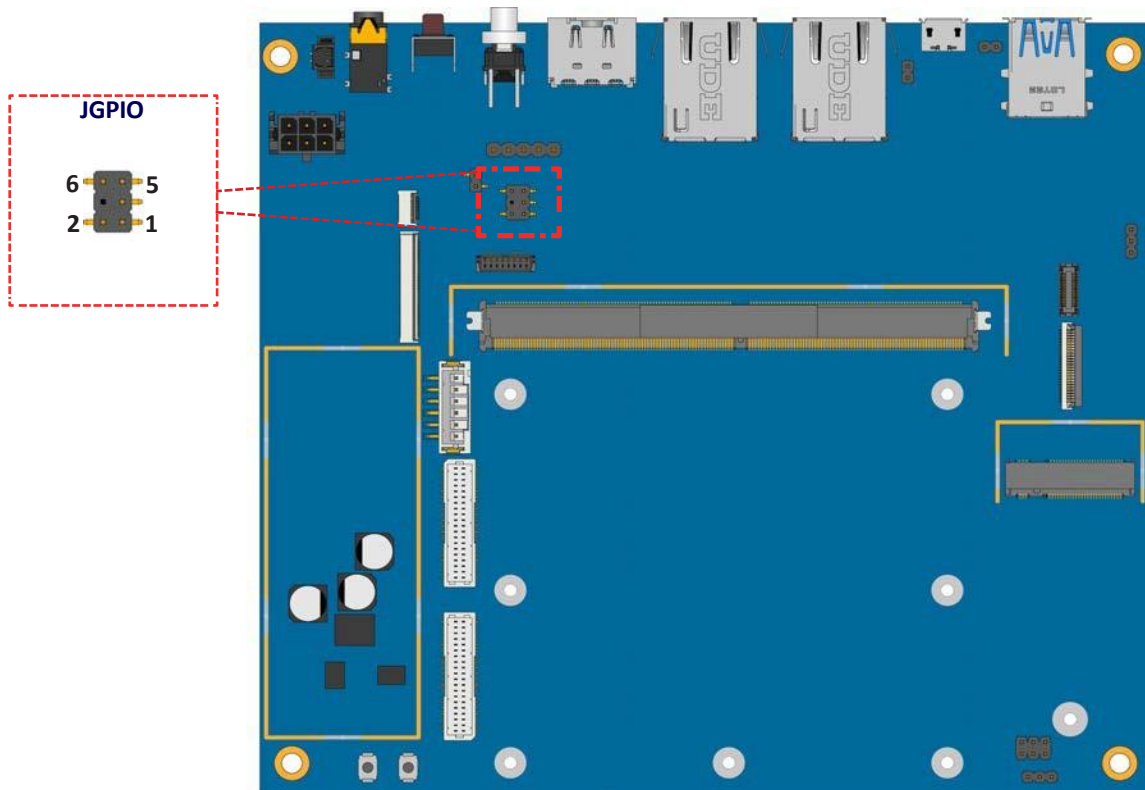

Figure 34: GPIO/ADC header 'JGPIO'

JGPIO	
Pin	Signal
1	ADC_GPIO1
2	ADC_GPIO2
3	GPIO3
4	N/A
5 - 6	GND

Table 20: GPIO/ADC header 'JGPIO' pinouts

A.6.12 M.2 Slot

The VIA SOMDB7 carrier board is equipped with an M.2 format 3042 key B slot labeled 'J2' on the top layer, for wireless networking options such as a 4G LTE M.2 module. The interface is based on USB 2.0, USB 3.1, and PCIe. The pinouts of the M.2 slot are shown below.
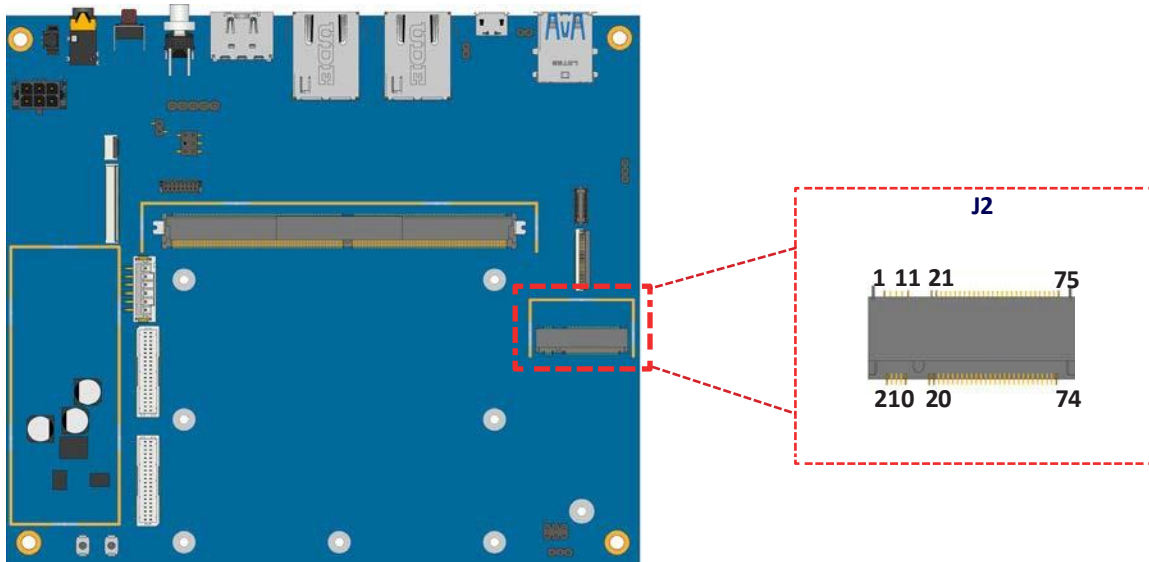

Figure 35: M.2 B-key slot ' J2'

J2							
Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
1	NC	25	DPR	42	NC	59	ANTCTL0
2	3.3 V	26	GPIO_10	43	SATA-B-/PERp0	60	NC
3	GND	27	GND	44	NC	61	ANTCTL1
4	3.3 V	28	GPIO_8	45	GND	62	NC
5	GND	29	PERn1 / USB RX-/SSIC-RxN	46	NC	63	ANTCTL2
6	FULL_CARD_POWER_OFF#	30	UIM-RESET	47	SATA-A-/PETn0	64	NC
7	USB_D+	31	PERp1 / USB RX+/ SSIC-RxP	48	NC	65	ANTCTL3
8	W_DISABLE#	32	UIM-CLK	49	SATA-A+/PETp0	66	SIM DETECT
9	USB D-	33	GND	50	PERST#	67	RESET#
10	GPIO_9/DAS/DSS	34	UIM-DATA	51	GND	68	SUSCLK
11	GND	35	PETn1 / USB TX-/SSIC-TxN	52	CLKREQ#	69	NC
12 - 19	Key	36	UIM-PWR	53	REFCLKN	70	3.3V / VBAT
20	GPIO_5	37	PETp1 / USB TX+/SSIC-TxP	54	PEWAKE#	71	GND
21	NC	38	DEVSLP	55	REFCLKP	72	3.3V / VBAT
22	GPIO_6	39	GND	56	NC	73	GND
23	GPIO_11	40	NC	57	GND	74	3.3V / VBAT
24	GPIO_7	41	SATA-B+/PERn0	58	NC	75	NC

Table 21: M.2 B-key slot 'J2' pinouts

A.6.13 SIM Card Slot

The VIA SOMDB7 carrier board is equipped with a SIM card slot labeled 'SIM1' on the bottom layer. It supports 4G SIM cards. SIM card usage requires that a 4G LTE M.2 module be installed in the M.2 slot described in the previous Appendix A.6.12, otherwise the SIM card slot will be disabled. The SIM card slot is designed for use with 4G LTE modules that do not support built-in SIM card slots. The pinouts of the SIM card slot are shown below.
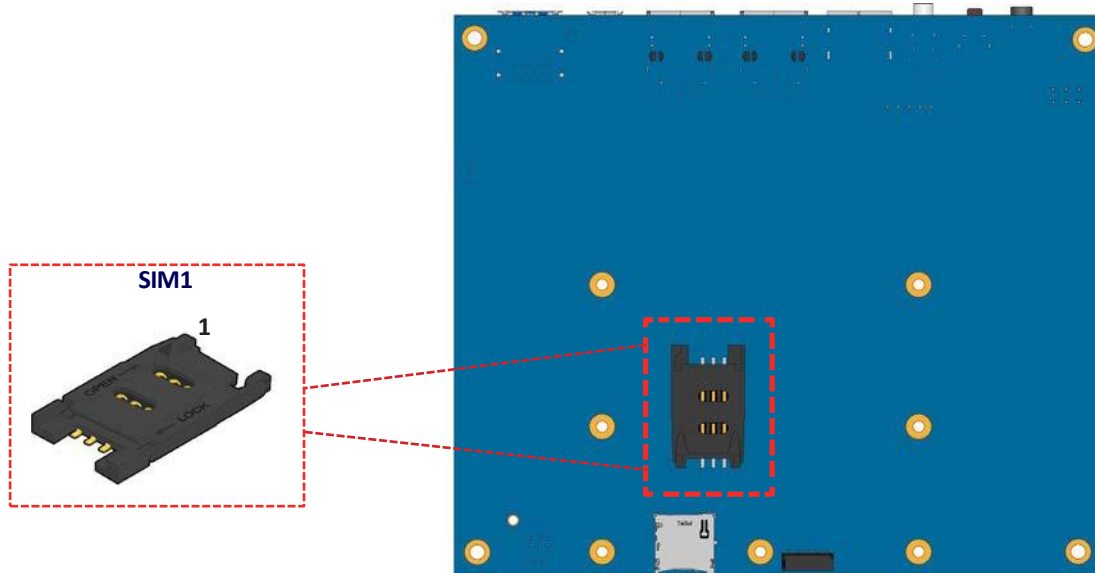

Figure 36: SIM card slot 'SIM1'

Pin	Signal
1	USIM_VCC
2	USIM_RST1
3	USIM_CLK1
4	N/A
5	GND
6	UIM_VPP1
7	USIM_DATA1

Table 22: SIM card slot 'SIM1' pinouts

Note:
Refer to instructions in the VIA SOM-7000 Starter Kit Quick Start Guide for installing the optional 4G LTE M.2 wireless module kit and an activated 4G SIM card.

A.6.14 Debug Console Connector

The VIA SOMDB7 carrier board is equipped with a debug console connector labeled 'J14' on the bottom layer. The debug console cable bundled in the VIA SOM-7000 starter kit can be plugged into this connector and a developer PC to perform software debugging. The pinouts of the debug console connector are shown below.
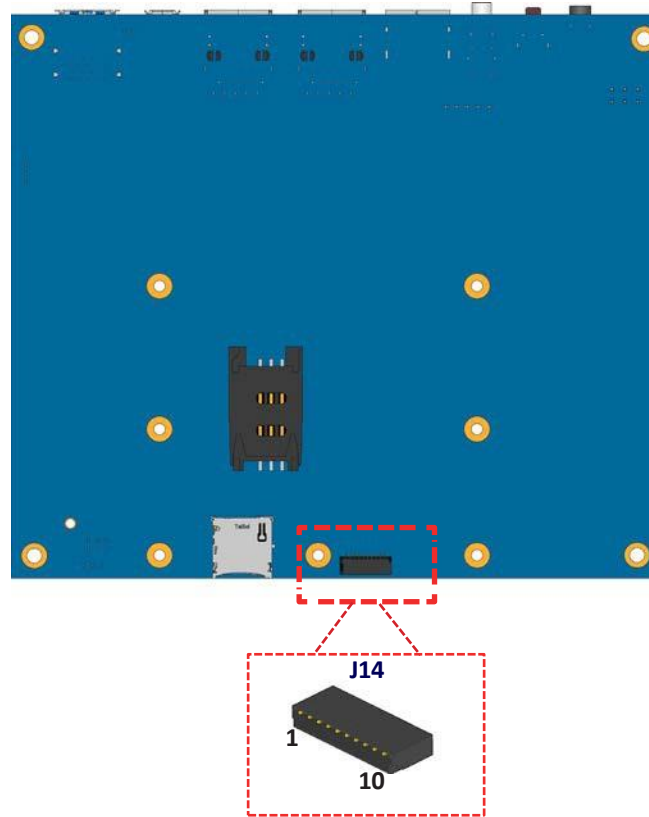

Table 23: Debug console connector 'J14'

J14	
Pin	**Signal**
1	NC
2	RS232_RXD (PC to SOC)
3	RS232_TXD (SOC PC)
4	MDN2
5	NC
6	GND
7 - 10	NC

Table 24: Debug console connector 'J14' pinouts

A.7 SOMDB7 Onboard Jumpers

Jumper Description

A jumper consists of a pair of conductive pins used to close in or bypass an electronic circuit to set up or configure a particular feature using a jumper cap. The jumper cap is a small metal clip covered by plastic. It performs like a connecting bridge to short (connect) the pair of pins. The usual colors of the jumper cap are black/red/blue/white/yellow.

Jumper Setting

There are two settings of the jumper pin: 'Short' and 'Open'. The pins are 'Short' when a jumper cap is placed on the pair of pins. The pins are 'Open' if the jumper cap is removed.

In addition, there are jumpers that have three or more pins, and some pins are arranged in series. In case of a jumper with three pins, place the jumper cap on pin 1 and pin 2 or pin 2 and 3 to Short it.

Some jumpers' sizes are small or mounted on a crowded location on the VIA SOMDB7 carrier board that makes it difficult to access. Therefore, using a long-nose plier in installing and removing the jumper cap is very helpful.
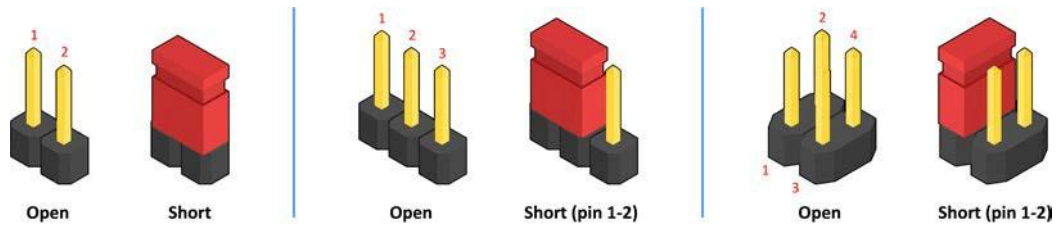

Figure 37: Jumper settings example

> **Caution:**
> Make sure to install the jumper cap on the correct pins. Installing it on the wrong pins might cause damage and malfunction.

A.7.1   Watchdog Jumper

The VIA SOMDB7 carrier board comes with a watchdog jumper labeled as 'J11'. The watchdog jumper is used to enable or disable the watchdog function on the VIA SOMDB7 carrier board. The watchdog jumper settings are shown below.
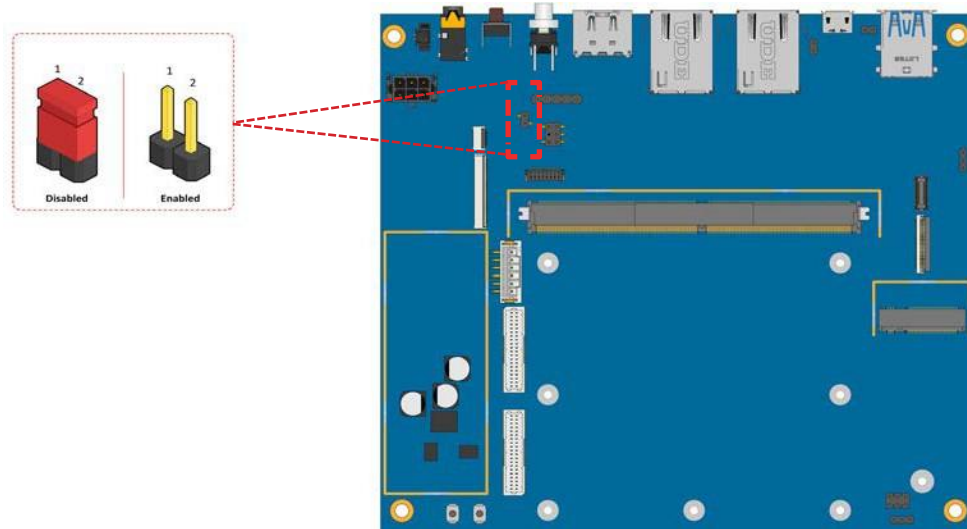

Figure 38: Watchdog jumper diagram

Settings	Pin 1	Pin 2
Disabled (default)	Short	Short
Enabled	Open	Open

Table 25: Watchdog jumper settings