



USER MANUAL

# VIA SOM-9X20

Ultra-compact solution  
for graphics-intensive  
edge computing applications



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This equipment has been tested and found to comply with the limits for a class A digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his personal expense.

### Notice 1

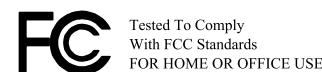
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### Notice 3

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- Do not attempt to force open the battery.
- Do not discard used batteries with regular trash.
- Discard used batteries according to local regulations.



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- Always read the safety instructions carefully.
- Keep this User's Manual 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 cord or plug 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 85°C (185°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 cord.
- Do not cover the ventilation holes. The openings on the enclosure protect the equipment from overheating



## Box Contents

### Items for STK-VT6093-00A1

- 1 x VIA SOM-9X20 module
- 1 x SOMDB2 carrier board
- 1 x VT6093 audio module
- 1 x COM cable
- 1 x AC adapter
- 1 x power cord US type
- 2 x antennas for Wi-Fi and Bluetooth

### Items for STK-VT6093-01A1

- 1 x VIA SOM-9X20 module
- 1 x SOMDB2 carrier board
- 1 x VT6093 audio module
- 1 x COM cable
- 1 x AC adapter
- 1 x power cord US type
- 2 x antennas for Wi-Fi and Bluetooth
- 1 x VT6093-CAM-T Camera-CSI converter board
- 1 x 13MP CMOS camera module
- 1 x FPC cable for CSI connector

## Ordering Information

Part Number	Description
10GWG23Q00020	SOM module with Qualcomm® APQ8096SG Embedded Processor, 64GB UFS, 4GB POP LPDDR4 RAM, HDMI, 2 DSI, 3 CSI, USB 3.0, USB 2.0, UART, GPIO, SDIO, Wi-Fi + Bluetooth 4.1, GPS/GNSS, 2 PCIe 2.0 1-Lane
10GWH00000020	VIA SOMDB2 carrier board
STK-VT6093-00A1	VIA SOM-9X20 module + SOMDB2 carrier board
STK-VT6093-01A1	VIA SOM-9X20 module + SOMDB2 carrier board + 13MP CMOS camera module

## Optional Accessories

Part Number	Description
99G47-01025F	10.1" MIPI 16:10 (WUXGA 1920 x 1200, 16.7M) LCD Touch panel with USB FPC touch cable and MIPI FPC cable



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# 1. Product Overview

The highly-integrated VIA SOM-9X20 module is the first product offering from VIA powered by the Qualcomm® APQ8096SG Embedded Processor that delivers the ideal balance of leading-edge performance and stunning visual and audio capabilities in a versatile and ultra-compact package for jump-starting the development of next-generation Enterprise IoT and embedded devices.

Measuring a mere 82mm x 45mm, the VIA SOM-9X20 is a highly-integrated system-on-module powered by the Qualcomm® APQ8096SG Embedded Processor which features the Qualcomm® Adreno™ 530 GPU that is designed to deliver immersive visual graphics. The VIA SOM-9X20 module also provides a full range of wireless connectivity features including GPS/GNSS, Wi-Fi, and Bluetooth through an integrated combo LGA module featuring three antenna connectors.

The VIA SOM-9X20 module features 64GB UFS 2.1 Flash memory and 4GB LPDDR4 SDRAM onboard and offers rich I/O and display expansion options through its MXM 3.0 314-pin slot, including USB 3.0, USB 2.0, HDMI 2.0, SDIO, PCIe, MIPI CSI, MIPI DSI, and multi-function pins for UART, I<sup>2</sup>C, SPI, and GPIO. The VIA SOM-9X20 features a complete software evaluation image featuring Android 8.0 and Linux kernel 3.18.44.

## 1.1 Key Features

- Powered by a Qualcomm® APQ8096SG Embedded Processor
- Enhanced video decoding supporting 4K@60fps, 8 x 1080p@30fps
- Built-in Wi-Fi 802.11a/b/g/n/ac, Bluetooth 4.1 and GPS/GNSS
- 64GB onboard UFS 2.1 Flash memory
- Supports HDMI, Gigabit Ethernet, USB 3.0 and USB 2.0
- Supports GPIO with 1.8V power
- Compact form factor module with the MXM 3.0 314-pin connector
- Fanless and ultra-low power consumption
- Android 8.0 and Linux kernel 3.18.44 operating systems
- Evaluation carrier board available

## 1.2 Product Specifications

### Processor

- Qualcomm® APQ8096SG Embedded Processor
  - Two high-performance Kryo cores up to 2.342GHz
  - Two low power Kryo cores up to 1.593GHz

### System Memory

- 4GB POP LPDDR4 SDRAM

### Storage

- 64GB UFS 2.1 Flash Memory
- Micro SD card slot

### Graphics

- Qualcomm® Adreno™ 530 GPU
  - 3D graphics accelerator with 64-bit addressing 624MHz
  - Graphics engine supporting OpenGL ES 3.1/GEP, GL4.4, DX11.3/4, OpenCL 2.0, Renderscript-Next
  - Supports H.264, VP8, HEVC 8/10-bit, VP9 video decoding up to: 4K@60fps 1080p@240fps, 8 x 1080p@30fps

### Trusted Platform Module

- TPM1.2 : ST33TPM12I2C

### Wireless Connectivity

- NFA324A-12H32 QCA6174A-1 Wi-Fi 802.11a/b/g/n/ac + BT 4.1 combo LGA module with two antenna connectors
- Qualcomm WGR7640 GPS/GNSS RF receiver with antenna connector

### Audio

- Qualcomm WCD9335 Audio Codec



#### Note:

The SOMDB2 carrier board comes with an audio module which is pre-installed on the bottom side of the carrier board.

### HDMI

- Integrated HDMI 2.0 Transmitter

### Onboard I/O

- 1 x Wi-Fi/BT micro-miniature RF connector
- 1 x Wi-Fi micro-miniature RF connector
- 1 x GPS micro-miniature RF connector

### Supported I/O through MXM 3.0 connector

- 1 x HDMI 2.0 port
- 2 x MIPI DSI 4-Lane connectors
- 3 x MIPI CSI 4-Lane connectors
- 1 x USB 3.0 OTG
- 1 x USB 2.0 host
- 1 x SDIO
- 2 x PCM/MI2S
- 1 x Multi-function pins for UART, I<sup>2</sup>C, SPI, GPIO
- 1 x JTAG
- 2 x PCIe 2.0 (1-Lane)

### Operating System

- Android 8.0, Linux kernel 3.18.44

### Operating Temperature

- -20°C ~ 70°C

### Operating Humidity

- 0% ~ 90% (relative humidity; non-condensing)

### Form Factor

- 82mm x 45mm (3.23" x 1.77")

### Compliance

- RoHS



#### Notes:

1. The operating temperature will be supported with the proper thermal solution which should ensure the Ts (Surface Temperature) on the center of the metal shielding, that covers the processor, is not over 80°C.
2. Please note that the lifespan of the onboard eMMC/UFS memory chip may vary depending on the amount of access. More frequent and larger data access on the eMMC/UFS memory makes its lifespan shorter. Therefore, it is highly recommended to use a replaceable external storage (e.g., Micro SD card) for large data access.

## 1.3 Layout Diagram

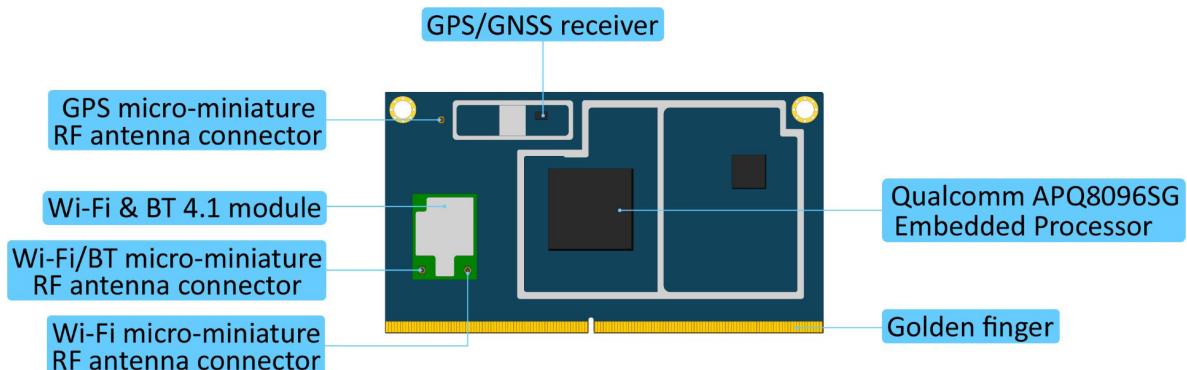


Figure 1: Layout diagram of the VIA SOM-9X20 module (top side)

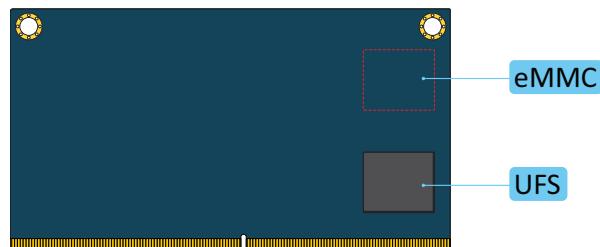


Figure 2: Layout diagram of the VIA SOM-9X20 module (bottom side)

## 1.4 Product Dimensions

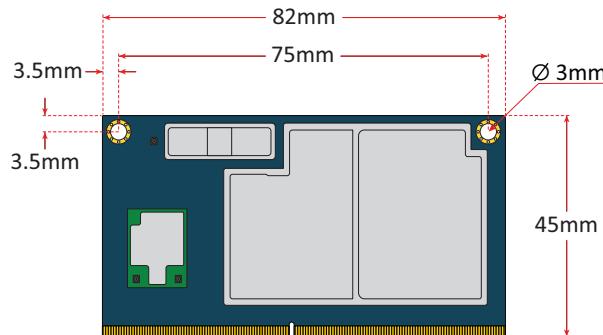


Figure 3: Dimensions of the VIA SOM-9X20 module

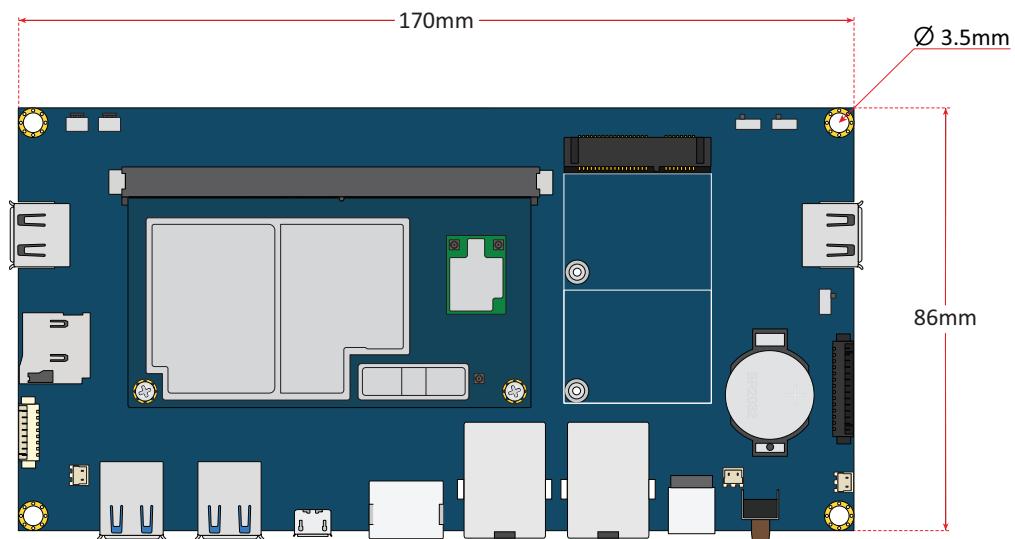


Figure 4: Dimensions of the SOMDB2 carrier board with VIA SOM-9X20 module installed

## 2. Onboard I/O Connector

This chapter provides information about the VIA SOM-9X20's onboard I/O connector and its functionality.

### 2.1 Wi-Fi & Bluetooth Micro-Miniature RF Antenna Connectors

The VIA SOM-9X20 comes with an onboard Wi-Fi + BT 4.1 combo LGA module that has Wi-Fi and Bluetooth micro-miniature RF antenna connectors which connect the Wi-Fi and Bluetooth antenna. The micro-miniature RF antenna connectors are labeled as "ANT1" (Wi-Fi/BT) and "ANT2" (Wi-Fi).

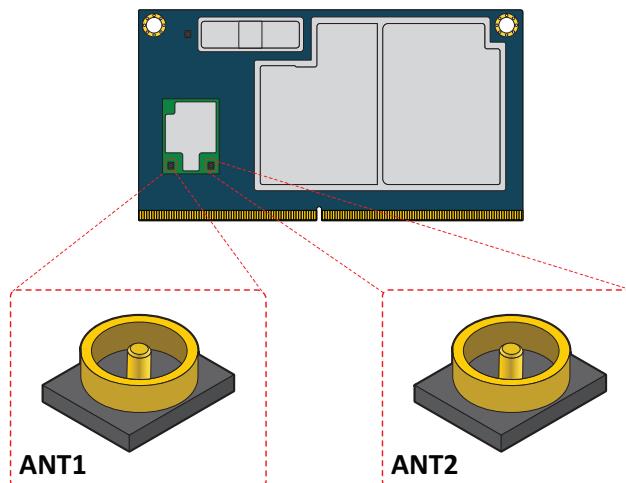


Figure 5: Wi-Fi & Bluetooth micro-miniature RF antenna connectors diagram

**Note:**

The RF connector uses a standard 2x2mm size RF receptacle connector which is to be used in conjunction with the M.2 boards/modules. In addition, the RF receptacle on the module can support either 0.81mm or 1.13mm diameter cable but it is recommended to use 1.13mm diameter cable for lower loss and 1.2mm max. mated height for low profile design. An example of a plug connector is the IPEX 20611-001R.

### 2.2 GPS Micro-Miniature RF Antenna Connector

The VIA SOM-9X20 comes with a GPS micro-miniature RF antenna connector which connects the GPS antenna. The GPS micro-miniature RF antenna connector is labeled as "J2".

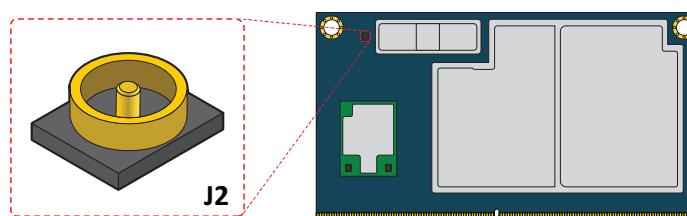


Figure 6: GPS micro-miniature RF antenna connector diagram

**Notes:**

1. An example of a plug connector is the HIROSE X.FL-LP(P)-068 with 1.13mm coaxial cable.
2. The output power is 3.3V/ 50mA for GPS active patch antenna.

## 3. Hardware Installation

This chapter provides information about the hardware installation procedures.

### 3.1 Installing the VIA SOM-9X20 Module on the SOMDB2 Carrier Board

#### Step 1

Align the notch on the VIA SOM-9X20 module with its counterpart on the MXM 3.0 slot on the SOMDB2 carrier board then insert the module at a 30° angle.

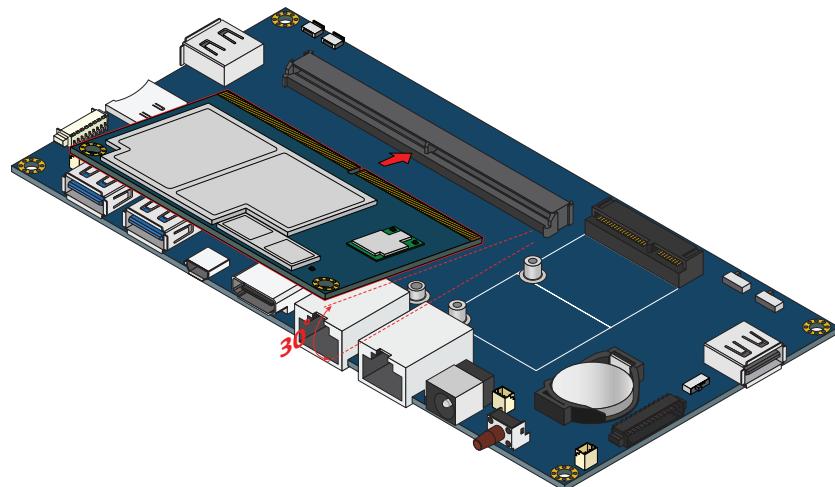


Figure 7:Installing the VIA SOM-9X20 module

#### Step 2

Once the VIA SOM-9X20 module has been fully inserted, push down the module until the screw holes align with the standoff holes and then secure the module with the provided two screws.

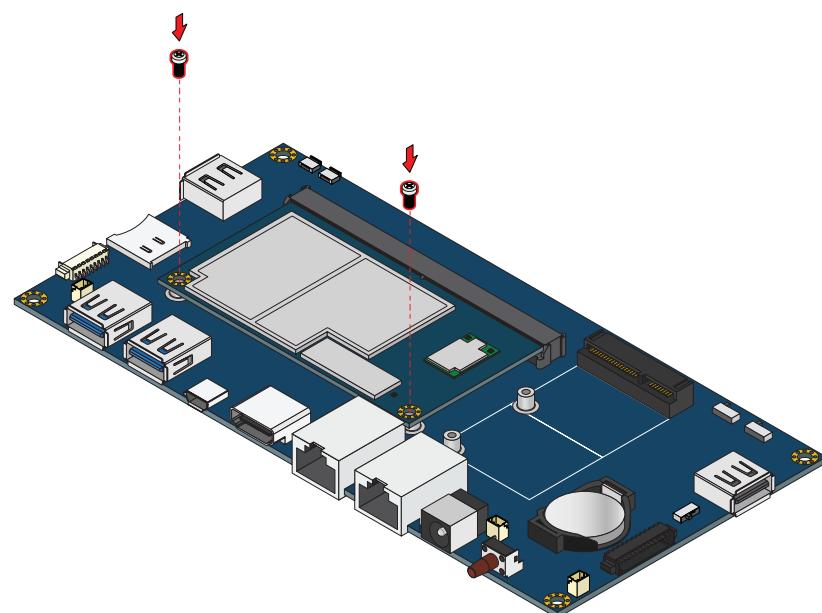


Figure 8:Securing the VIA SOM-9X20 module

## 3.2 Connecting the Antenna Cable to the Onboard Wi-Fi & Bluetooth Module

### Step 1

Prepare the mating/unmating jig. We recommend to use a jig (as shown below) for connecting the plug connector on the antenna cable to the micro-miniature RF antenna connector on the onboard Wi-Fi & Bluetooth module.

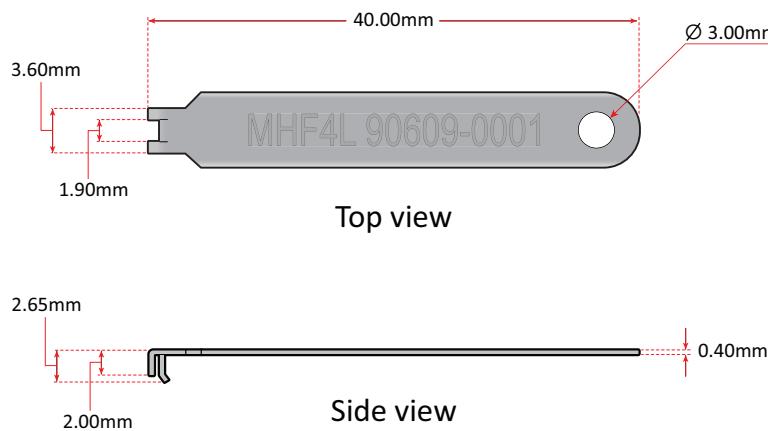


Figure 9: Recommended mating/unmating jig

### Step 2

Using the jig, align the plug connector onto the micro-miniature RF antenna connector. Then push down gently until the plug connector is fully connected. The recommended force must be 30N (maximum).

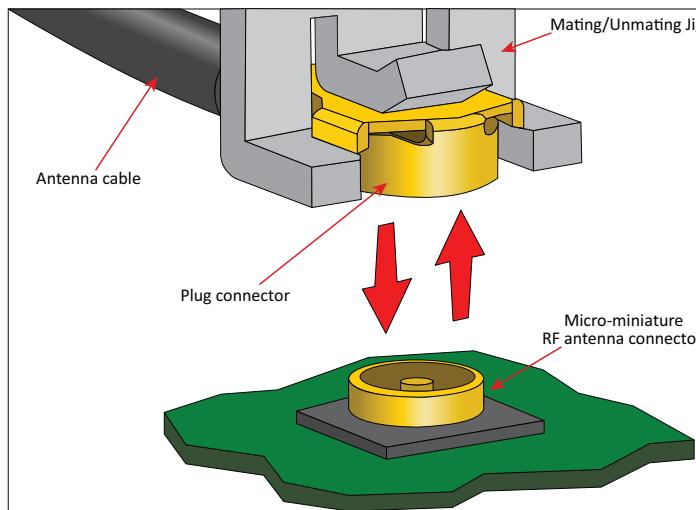


Figure 10: Mating method of plug connector



## 4. Software and Technical Support

### 4.1 Android Support

The VIA SOM-9X20 features a complete software evaluation image featuring the Android 8.0 operating system.

### 4.2 Linux Support

The VIA SOM-9X20 features a complete software evaluation image featuring the Linux kernel 3.18.44 operating system.

### 4.3 Technical Support and Assistance

- For utilities downloads, latest documentation and new information about the VIA SOM-9X20, please visit our website at <https://www.viatech.com/en/boards/modules/som-9x20/>
- For technical support and additional assistance, always contact your local sales representative or board distributor, or go to <https://www.viatech.com/en/support/driver-support-faq/technical-support/> 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. SOMDB2 Carrier Board Reference

## A.1. Board Specification

### LAN

- RealTek RTL8111G Ethernet Controller
- RealTek RTL8365MB LAN Hub

### Onboard I/O

- 1 x MIPI DSI LCD panel connector
- 1 x MIPI CSI Interface for camera module
- 1 x P-Cap Touch connector
- 2 x USB 2.0 ports
- 1 x USB 2.0 OTG switch (for Host mode/Device mode)
- 1 x COM connector (TX/RX only for debugging)
- 1 x GPIO connector (8 GPIO)
- 2 x I<sup>2</sup>C connectors (for light & proximity sensor and NFC module)
- 1 x Front panel connector
- 1 x JTAG connector
- 1 x Mic-in connector
- 2 x 2W speaker connectors
- 2 x Audio module connectors (for VT6093 audio module)
- 2 x Volume buttons
- 1 x Boot switch
- 1 x RTC battery connector
- 1 x Micro SD card slot
- 1 x miniPCIe slot
- 1 x MXM 3.0 slot

### Back Panel I/O

- 1 x HDMI 2.0 port
- 2 x USB 3.0 ports
- 1 x Micro USB 2.0 OTG port (for debugging)
- 2 x Gigabit Ethernet ports
- 1 x Power button
- 1 x 12V DC-in jack

### Operating Temperature

- -20°C ~ 70°C

### Operating Humidity

- 0% ~ 95% (non-condensing)

### Form Factor

- 170mm x 86mm (6.69" x 3.89")

### Compliance

- RoHS

## A.2. SOMDB2 Layout Diagram

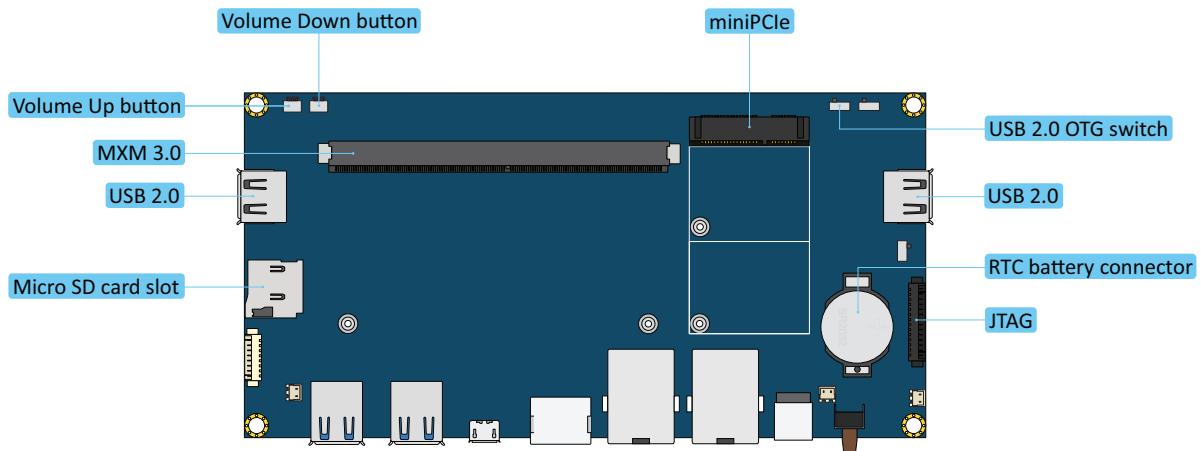


Figure 11: Layout diagram of the SOMDB2 carrier board (top side)

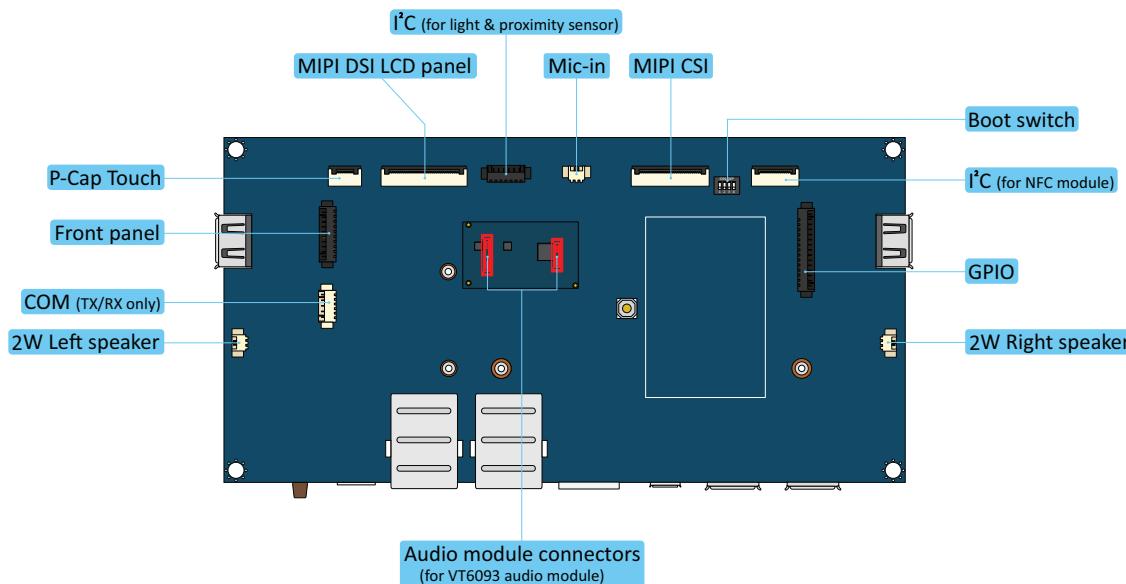


Figure 12: Layout diagram of the SOMDB2 carrier board (bottom side)

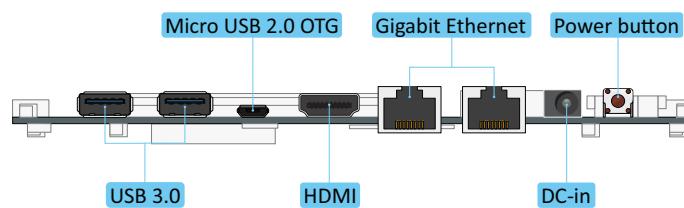


Figure 13: SOMDB2 carrier board back panel I/O

## A.3. SOMDB2 Onboard I/O

### A.3.1. USB 2.0 Port

The SOMDB2 carrier board has two onboard USB 2.0 ports which feature a USB Type A receptacle connector and they are labeled as "USB2\_R" and "USB2\_L". The pinouts of the USB 2.0 ports are shown below.

USB2_R	
Pin	Signal
1	USB2_R
2	HUB_USBDN_DM4_C
3	HUB_USBDN_DP4_C
4	GND

USB2_L	
Pin	Signal
1	USB2_L
2	HUB_USBDN_DM3_C
3	HUB_USBDN_DP3_C
4	GND

Table 1: USB 2.0 ports pinouts

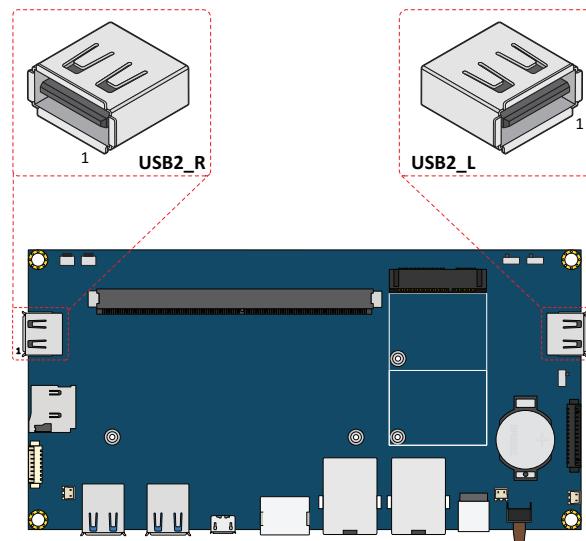


Figure 14: USB 2.0 ports diagram

### A.3.2. JTAG Connector

The SOMDB2 carrier board comes with a set of JTAG signals that allow JTAG debugging equipment to be used. The connector is labeled as "J2". The pinouts of the JTAG connector are shown below.

Pin	Signal
1	VREG_S4A_1P8
2	N/A
3	JTAG_TRST_N
4	GND
5	JTAG_TDI
6	GND
7	JTAG_TMS
8	JTAG_TCK
9	JTAG_TDO
10	JTAG_SRSTS_N
11	JTAG_PD_1
12	JTAG_PD_2
13	NC
14	JTAG_CONN_DET_N

Table 2: JTAG connector pinouts

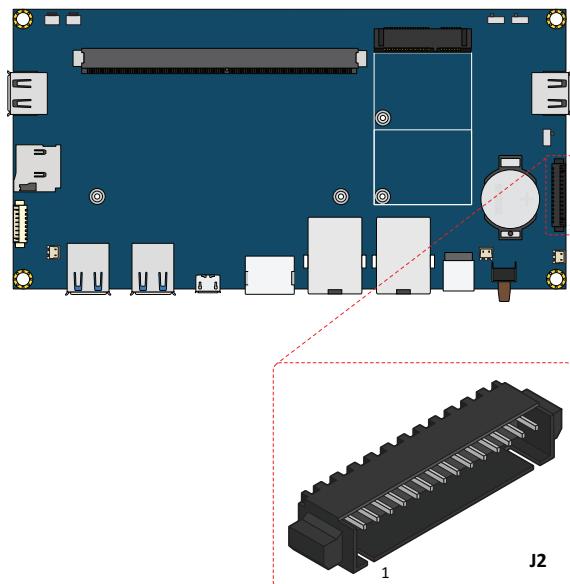


Figure 15: JTAG connector diagram

### A.3.3. RTC Battery Connector

The SOMDB2 carrier board is equipped with an onboard RTC battery connector used for connecting the external cable battery that provides power to the 32.768KHz crystal oscillator for Real Time Clock (RTC). The RTC battery connector is labeled as “RTC1”.

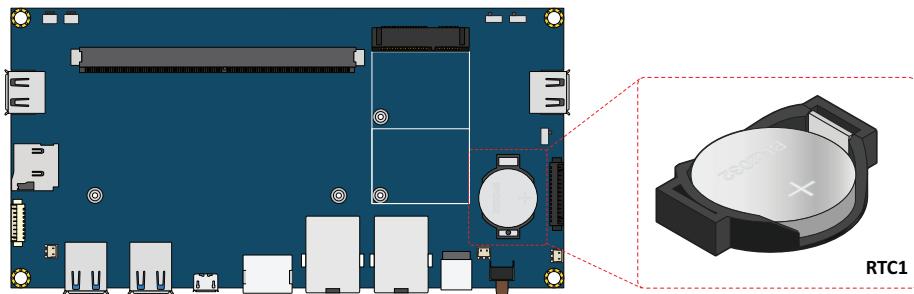


Figure 16: RTC battery connector diagram

### A.3.4. Micro SD Card Slot

The SOMDB2 carrier board comes with a Micro SD card slot located on the front panel with support for a maximum storage capacity of 64GB. The pinouts of the Micro SD card slot are shown below.

Pin	Signal
1	SD_DAT2
2	SD_DAT3
3	SD_CMD
4	SD_VDD
5	SD_CLK
6	GND
7	SD_DATO
8	SD_DAT1
9	SD_CD-

Table 3: Micro SD card slot pinouts

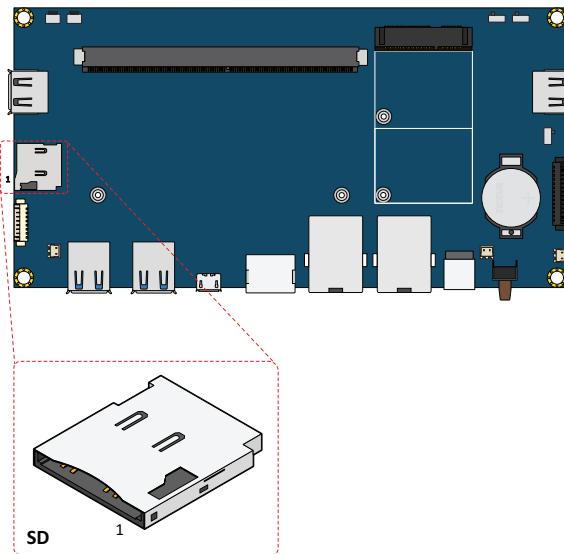


Figure 17: Micro SD card slot diagram

### A.3.5. Volume Button

The SOMDB2 carrier board comes with two volume buttons which are used to control the volume. They are labeled as "VOL\_UP" and "VOL\_DOWN". The diagram of the volume buttons is shown below.

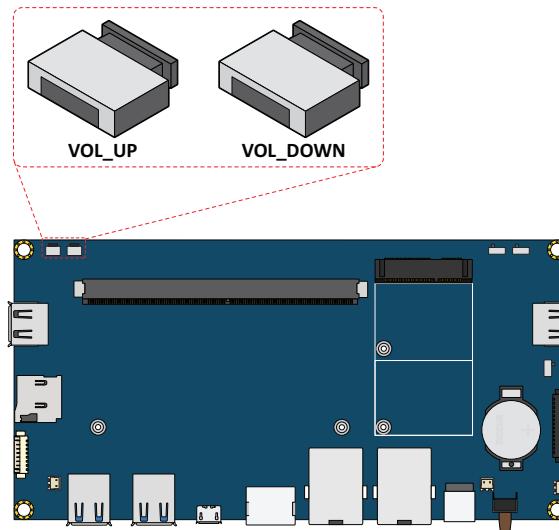


Figure 18: Volume button diagram

### A.3.6. USB 2.0 OTG Switch

The SOMDB2 carrier board comes with a USB 2.0 OTG switch labeled as "USB\_ID\_SET" which enables and disables the OTG function on the Micro USB 2.0 OTG port for Host mode/Device mode. The diagram of the USB 2.0 OTG switch is shown below.

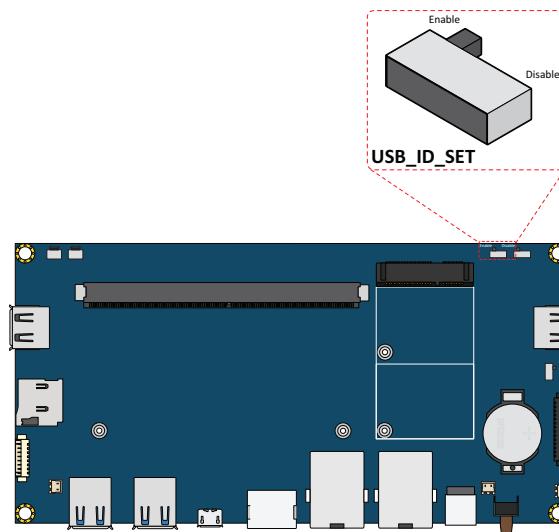


Figure 19: USB 2.0 OTG switch diagram



**Note:**

Once the OTG function is enabled the USB 3.0 ports will be disabled.

### A.3.7. MiniPCIe Slot

The SOMDB2 carrier board is equipped with a miniPCIe slot which is labeled as "MPCIE" and is compatible with all PCIe 2.0 miniPCIe modules that are full length or half-length. The pinouts of the miniPCIe slot are shown below.

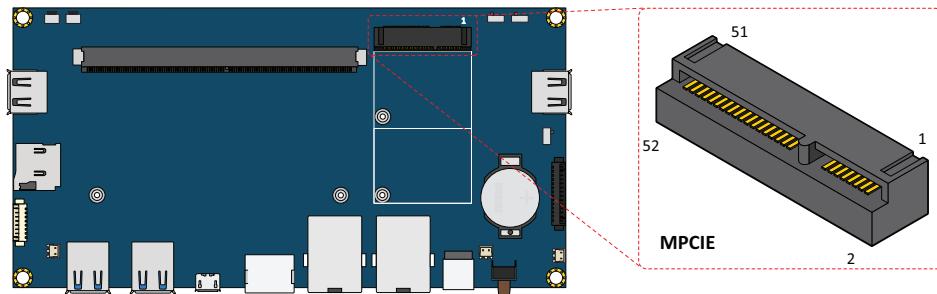


Figure 20: MiniPCIe slot diagram

Pin	Signal	Pin	Signal
1	PCIE1_WAKE_N3V3_C	2	VDD33_MPCIE
3	N/A	4	GND
5	NA	6	VDD1V5
7	PCIE1_CLKREQ_N_3V3_C	8	N/A
9	GND	10	N/A
11	PCIE1_CLK_M	12	N/A
13	PCIE1_CLK_P	14	N/A
15	GND	16	N/A
17	N/A	18	GND
19	N/A	20	PCIE1_W_DISABLE_3V3
21	GND	22	PCIE1_RST_N_3V3_C
23	PCIE1_RX_M	24	VDD3V3_MPCIE
25	PCIE1_RX_P	26	GND
27	GND	28	VDD1V5
29	GND	30	BLSP6_I2C_SCL_3V3_C
31	PCIE1_TX_M	32	BLSP6_I2C_SDA_3V3_C
33	PCIE1_TX_P	34	GND
35	GND	36	HUB_USBDN_DM1_MINI_CARD
37	GND	38	HUB_USBDN_DP1_MINI_CARD
39	VDD3V3_MPCIE	40	GND
41	VDD3V3_MPCIE	42	LED_WWAN-
43	GND	44	LED_WLAN-
45	N/A	46	LED_WPAN-
47	N/A	48	VDD1V5
49	N/A	50	GND
51	N/A	52	VDD3V3_MPCIE

Table 4: MiniPCIe slot pinouts

### A.3.8. MXM 3.0 Slot

The SOMDB2 carrier board comes with a MXM 3.0 slot labeled as “MXM 3.0” which is an onboard slot for connecting the VIA SOM-9X20 module. The MXM 3.0 slot consists of 314-pins. The pinouts of the MXM 3.0 slot are shown below.

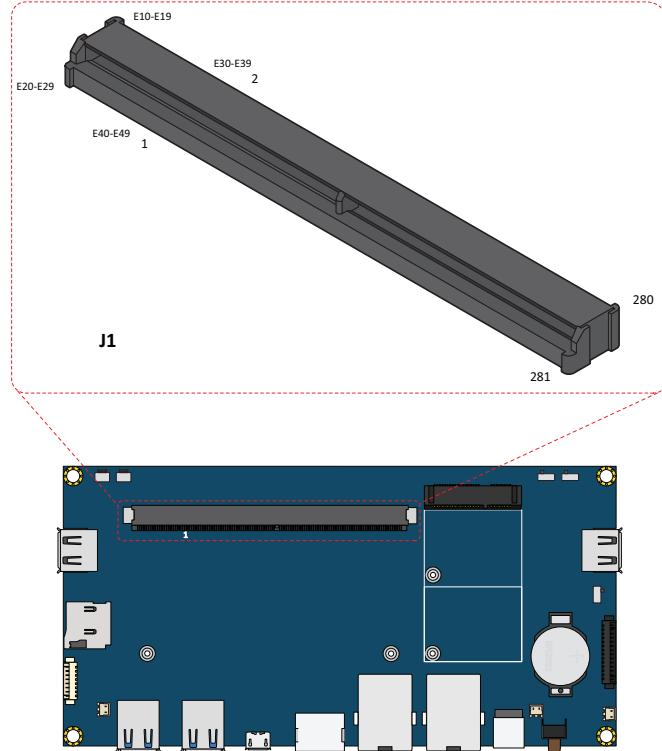


Figure 21: MXM 3.0 slot diagram

Pin	Signal	Pin	Signal
E10	USB3_VBUS	E30	VREG_L21A_2P95
E11	USB3_VBUS	E31	VREG_L21A_2P95
E12	USB3_VBUS	E32	VREG_L13A_2P95
E13	USB3_VBUS	E33	VREG_L13A_2P95
E14	VREG_SMARTBOOST_5V	E34	VPH_PWR
E15	VREG_SMARTBOOST_5V	E35	VPH_PWR
E16	VREG_S4A_1P8	E36	VPH_PWR
E17	VREG_S4A_1P8	E37	VPH_PWR
E18	VREG_S4A_1P8	E38	PM_VCOIN
E19	VREG_S4A_1P8	E39	VOL_DOWN_N
E20	VBATT	E40	VBATT
E21	VBATT	E41	VBATT
E22	VBATT	E42	VREG_WLED
E23	VBATT	E43	WLED1_SINK
E24	VBATT	E44	WLED2_SINK
E25	VBATT	E45	WLED3_SINK
E26	VBATT	E46	WLED4_SINK
E27	VBATT	E47	RED_LED_DRV
E28	VBATT	E48	GREEN_LED_DRV
E29	VBATT	E49	BLUE_LED_DRV



Pin	Signal	Pin	Signal
1	PHONE_ON_N	2	GPIO_57
3	VOL_UP_N	4	GPIO_101
5	PM_GPIO_01	6	GPIO_102
7	PM_GPIO_03	8	GPIO_103
9	PM_PON_RESET_N	10	GPIO_104
11	MSM_RESOUT_N	12	GPIO_39
13	PM_GPIO_22	14	GPIO_92
15	GPIO_88	16	GPIO_93
17	GPIO_87	18	GPIO_94
19	GPIO_10	20	GPIO_96
21	GPIO_134	22	GPIO_99
23	GPIO_135	24	GND
25	PM_GPIO_05	26	SSC_9
27	GPIO_8	28	SSC_8
29	GPIO_11	30	SSC_3
31	GPIO_127	32	SSC_2
33	GPIO_128	34	SSC_5
35	PM_GPIO_04	36	SSC_4
37	GPIO_84	38	SSC_6
39	BATT_THERM	40	SSC_7
41	BATT_ID	42	SSC_14
43	GND	44	SSC_15
45	MIPI_DSIO_CLK_P	46	GPIO_28
47	MIPI_DSIO_CLK_M	48	GPIO_27
49	GND	50	GPIO_49
51	MIPI_DSIO_LANE0_P	52	GPIO_50
53	MIPI_DSIO_LANE0_M	54	GPIO_52
55	GND	56	GPIO_51
57	MIPI_DSIO_LANE1_P	58	HDMI_CEC
59	MIPI_DSIO_LANE1_M	60	HDMI_DDC_CLK
61	GND	62	HDMI_DDC_DATA
63	MIPI_DSIO_LANE2_P	64	HDMI_HOT_PLUG_DET
65	MIPI_DSIO_LANE2_M	66	GND
67	GND	68	MIPI_DSI1_CLK_P
69	MIPI_DSIO_LANE3_P	70	MIPI_DSI1_CLK_M
71	MIPI_DSIO_LANE3_M	72	GND
73	GND	74	MIPI_DSI1_LANE0_P
75	HDMI_TCLK_P	76	MIPI_DSI1_LANE0_M
77	HDMI_TCLK_M	78	GND



Pin	Signal	Pin	Signal
79	GND	80	MIPI_DSI1_LANE1_P
81	HDMI_TX0_P	82	MIPI_DSI1_LANE1_M
83	HDMI_TX0_M	84	GND
85	GND	86	MIPI_DSI1_LANE2_P
87	HDMI_TX1_P	88	MIPI_DSI1_LANE2_M
89	HDMI_TX1_M	90	GND
91	GND	92	MIPI_DSI1_LANE3_P
93	HDMI_TX2_P	94	MIPI_DSI1_LANE3_M
95	HDMI_TX2_M	96	GND
97	GND	98	MIPI_CSIO_CLK_P
99	MIPI_CS1_CLK_P	100	MIPI_CSIO_CLK_M
101	MIPI_CS1_CLK_M	102	GND
103	GND	104	MIPI_CSIO_LANE0_P
105	MIPI_CS1_LANE0_P	106	MIPI_CSIO_LANE0_M
107	MIPI_CS1_LANE0_M	108	GND
109	GND	110	MIPI_CSIO_LANE1_P
111	MIPI_CS1_LANE1_P	112	MIPI_CSIO_LANE1_M
113	MIPI_CS1_LANE1_M	114	GND
115	GND	116	MIPI_CSIO_LANE2_P
117	MIPI_CS1_LANE2_P	118	MIPI_CSIO_LANE2_M
119	MIPI_CS1_LANE2_M	120	GND
121	GND	122	MIPI_CSIO_LANE3_P
123	MIPI_CS1_LANE3_P	124	MIPI_CSIO_LANE3_M
125	MIPI_CS1_LANE3_M		
KEY			
133	GPIO_17	134	GPIO_13
135	GPIO_18	136	GPIO_14
137	GPIO_19	138	GND
139	GPIO_20	140	GPIO_16
141	GND	142	GPIO_15
143	GPIO_58	144	GND
145	GPIO_59	146	MIPI_CS2_CLK_P
147	GPIO_60	148	MIPI_CS2_CLK_M
149	GPIO_30	150	GND
151	GPIO_29	152	MIPI_CS2_LANE0_P
153	GPIO_114	154	MIPI_CS2_LANE0_M
155	GPIO_115	156	GND
157	GPIO_116	158	MIPI_CS2_LANE1_P
159	GND	160	MIPI_CS2_LANE1_M
161	PCIE2_CLK_P	162	GND
163	PCIE2_CLK_M	164	MIPI_CS2_LANE2_P
165	GND	166	MIPI_CS2_LANE2_M



Pin	Signal	Pin	Signal
167	PCIE2_TX_P	168	GND
169	PCIE2_TX_M	170	MIPI_CSI2_LANE3_P
171	GND	172	MIPI_CSI2_LANE3_M
173	PCIE2_RX_P	174	GND
175	PCIE2_RX_M	176	PCIE1_CLK_P
177	GND	178	PCIE1_CLK_M
179	USB3_SS_TX0_M	180	GND
181	USB3_SS_TX0_P	182	PCIE1_TX_P
183	GND	184	PCIE1_TX_M
185	USB3_SS_RX0_M	186	GND
187	USB3_SS_RX0_P	188	PCIE1_RX_P
189	GND	190	PCIE1_RX_M
191	USB3_HS_D_M	192	GND
193	USB3_HS_D_P	194	GPIO_130
195	GND	196	GPIO_131
197	USB2_HS_D_M	198	GPIO_132
199	USB2_HS_D_P	200	GPIO_61
201	GND	202	GPIO_77
203	GPIO_26	204	GPIO_79
205	USB3OTG_VBUS_EN	206	GND
207	USB3_HS_ID	208	SDC2_CLK
209	PMI_GPIO_6	210	SDC2_CMD
211	GPIO_86	212	SDC2_DATA_0
213	GPIO_25	214	SDC2_DATA_1
215	GPIO_56	216	SDC2_DATA_2
217	GPIO_55	218	SDC2_DATA_3
219	GND	220	SD_CARD_DET_N
221	GPIO_80	222	JTAG_SRST_N
223	GPIO_81	224	JTAG_TCK
225	GPIO_82	226	JTAG_TDI
227	GPIO_83	228	JTAG_TDO
229	GND	230	JTAG_TMS
231	BBCLK2	232	JTAG_TRST_N
233	GPIO_12	234	PS_HOLD
235	GPIO_7	236	GPIO_0
237	GPIO_6	238	GPIO_1
239	GPIO_9	240	GPIO_2
241	PM_GPIO_07	242	GPIO_3
243	PM_GPIO_10	244	I2C_SCL
245	GPIO_107	246	I2C_SDA
247	GPIO_4	248	TX_GTR_THRES
249	GPIO_5	250	CODEC_INT1_N
251	GPIO_89	252	CODEC_INT2_N



Pin	Signal	Pin	Signal
253	GPIO_125	254	GND
255	PM_GPIO_06	256	DIVCLK1_CDC
257	WLED_CABC	258	DIVCLK2_CDC
259	GPIO_40	260	GND
261	GPIO_63	262	SLIMBUS_CLK
263	GPIO_78	264	SLIMBUS_DATA0
265	GPIO_117	266	SLIMBUS_DATA1
267	GPIO_118	268	CODEC_RST_N
269	GPIO_119	270	SPKR_AMP_EN1
271	GPIO_120	272	SPKR_AMP_EN2
273	GPIO_121	274	PMI_HAP_PWM_IN
275	GPIO_122	276	GND
277	GPIO_123	278	PMI_HAP_OUT_P
279	GPIO_124	280	PMI_HAP_OUT_M
281	GPIO_129		

Table 5: MXM 3.0 slot pinouts

### A.3.9. MIPI CSI Connector

The SOMSB2 carrier board has a MIPI CSI connector which is used to connect to a camera in order to support a wide range of imaging solutions. The connector is labeled as "CSI". The pinouts of the MIPI CSI connector are shown below.

Pin	Signal
1	GND
2	MIPI_CSIO_CLK_P
3	MIPI_CSIO_CLK_M
4	GND
5	MIPI_CSIO_LANE2_M
6	MIPI_DSIO_LANE2_P
7	GND
8	MIPI_CSIO_LANE1_P
9	MIPI_CSIO_LANE1_M
10	GND
11	MIPI_CSIO_LANE0_P
12	MIPI_CSIO_LANE0_M
13	GND
14	MIPI_CSIO_LANE3_M
15	MIPI_CSIO_LANE3_P
16	GND
17	CSI_VDD3 (+5V)
18	CSI_VDD2 (+5V)
19	CSI_VDD1 (+5V)
20	CAM1_PWDN_CONN
21	CAM_MCLK0_CONN
22	N/A
23	GND
24	CCI_I2C_SDA0_CONN
25	CCI_I2C_SCL0_CONN
26	GND
27	CAM_MCLK_OSC
28	N/A
29	N/A
30	GND

Table 6: MIPI CSI connector pinouts

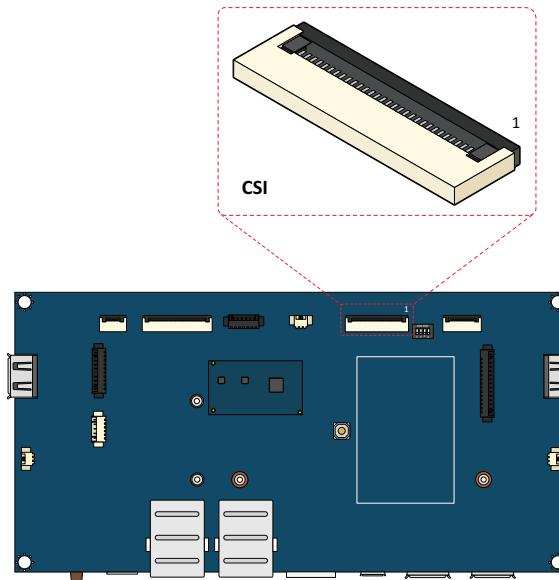


Figure 22: MIPI CSI connector diagram

### A.3.10. MIPI DSI LCD Connector

The SOMDB2 carrier board provides a MIPI DSI LCD panel connector which is used for connecting LCD display. The MIPI DSI LCD panel connector is labeled as "DSI". The pinouts of the MIPI DSI LCD panel connector are shown below.

Pin	Signal
1	PANEL_VDD
2	PANEL_VDD
3	NC
4	PANEL_LED_EN
5	LED_PWM
6	PANEL_EDID_SDA
7	PANEL_EDID_SCL
8	PANEL_NC1
9	GND
10	MIPI_DSIO_LANE2_P
11	MIPI_DSIO_LANE2_M
12	GND
13	MIPI_DSIO_LANE1_P
14	MIPI_DSIO_LANE1_M
15	GND
16	MIPI_DSIO_CLK_P
17	MIPI_DSIO_CLK_M
18	GND
19	MIPI_DSIO_LANE0_P
20	MIPI_DSIO_LANE0_M
21	GND
22	MIPI_DSIO_LANE3_P
23	MIPI_DSIO_LANE3_M
24	GND
25	GND
26	GND
27	GND
28	PANEL_NC2
29	PANEL_AGING
30	PANEL_NC3
31	PANEL_LED+
32	PANEL_LED+
33	PANEL_LED+
34	PANEL_LED+

Table 7: MIPI DSI LCD panel connector pinouts

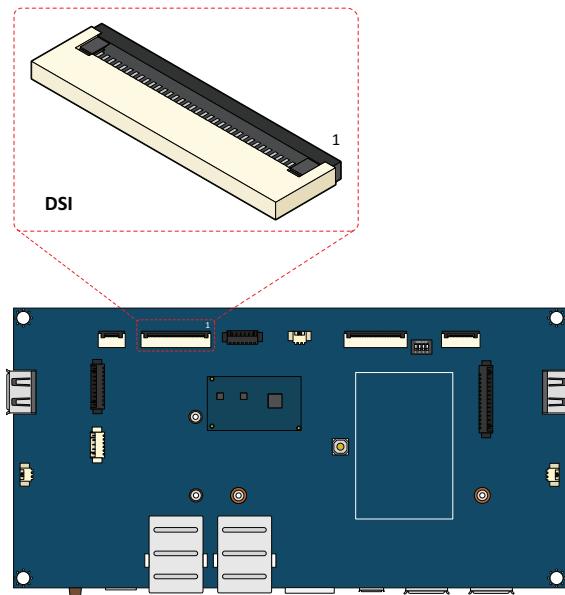


Figure 23: MIPI DSI LCD panel connector diagram

### A.3.11. P-Cap Touch Connector

The SOMDB2 carrier board comes with a P-Cap touch connector labeled as "TS" that is used to connect the touch controller. The pinouts of the P-cap touch panel connector are shown below.

Pin	Signal
1	GND
2	HUB_USBDN_DM2_TOUCH
3	HUB_USBDN_DP2_TOUCH
4	N/A
5	N/A
6	N/A
7	VDD3V3_SUS
8	N/A

Table 8: P-Cap touch connector pinouts

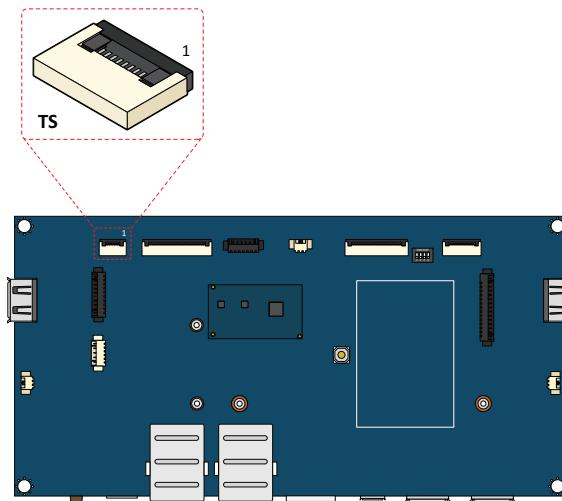


Figure 24: P-Cap touch connector diagram

### A.3.12. Front Panel Connector

The SOMDB2 carrier board has a front panel connector that consists of 10 pins and is labeled as "F\_PANEL1". The pinouts of the front panel connector are shown below.

Pin	Signal
1	VDD5V0
2	VDD3V3
3	VREG_S41P8
4	VOL_DOWN_N
5	VOL_UP_N
6	N/A
7	GPIO_77_WAKEUP
8	GPIO_121_INT
9	GND
10	GND

Table 9: Front panel connector pinouts

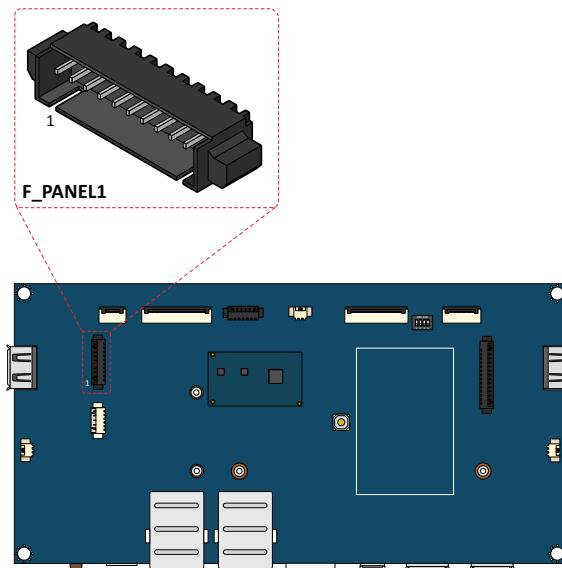


Figure 25: Front panel connector diagram

### A.3.13. COM Connector

The SOMBD2 carrier board is equipped with a COM connector that supports TX/RX for debugging. The pinouts of the COM connector are shown below.

Pin	Signal
1	RS232_TXD
2	RS232_RXD
3	GND
4	N/A
5	N/A

Table 10: COM connector pinouts

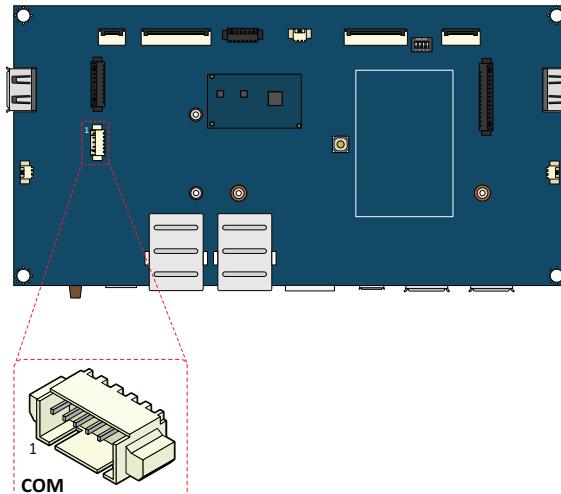


Figure 26: COM connector diagram

### A.3.14. GPIO Connector

The SOMBD2 carrier board provides a GPIO connector labeled as “DIO1”. The digital inputs and outputs can be programmed to read or control devices, with input or output defined. The GPIO pin header supports up to 8 GPI and 8 GPO signals. The pinouts of the GPIO connector are shown below.

Pin	Signal
1	VREG_S4A_1P8
2	PM8996_GPIO6
3	N/A
4	N/A
5	N/A
6	HRM_INT
7	CAP_INT_N
8	HALL_INT_N
9	SSC_IRQ_5_INT
10	SSC_IRO_6_INT
11	ACCEL_INT
12	GYRO_INT
13	MAG_DRDY_INT
14	GPIO_129_WAKEUP
15	GND

Table 11: GPIO connector pinouts

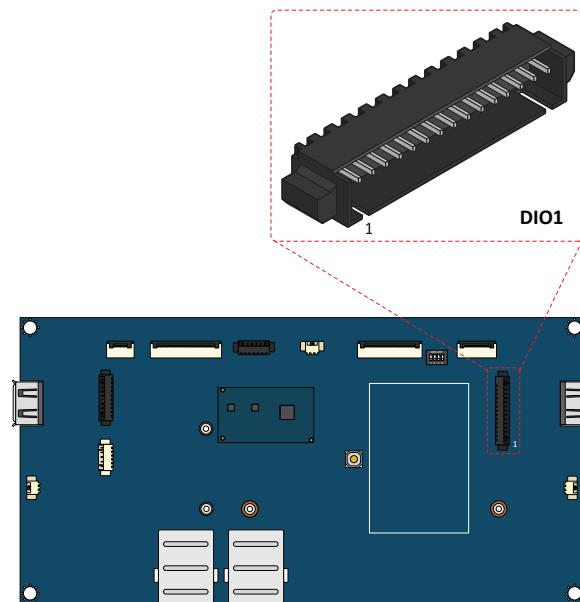


Figure 27: GPIO connector diagram

### A.3.15. I<sup>2</sup>C Connector

The SOMDB2 carrier board comes with two I<sup>2</sup>C connectors which are for connecting to the I<sup>2</sup>C devices, (for light & proximity sensor and NFC module). The pin headers are labeled as “NFC” and “PS1”. The pinouts of the pin headers are shown below.

Pin	Signal
1	GND
2	NFC_VDD_IO
3	VDD3V3
4	N/A
5	NFC_DLW_REQ_3V3
6	NFC_VEN_3V3
7	GND
8	NFC_I2C_SCL_3V3
9	NFC_I2C_SDA_3V3
10	GND
11	NFC_IRO_3V3
12	N/A
13	N/A
14	GND
15	VDD3V3

Table 12: I<sup>2</sup>C connector (for NFC module) pinouts

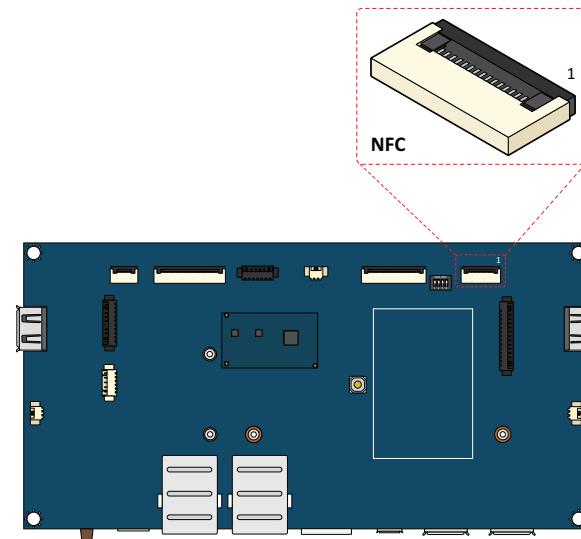


Figure 28: I<sup>2</sup>C connector (for NFC module) diagram

Pin	Signal
1	GND
2	PS_I2C_SCL_1V8
3	PS_I2C_SDA_1V8
4	INT_PS_1V8
5	VDD3V3
6	VDD3V3

Table 13: I<sup>2</sup>C connector (for light & proximity sensor) pinouts

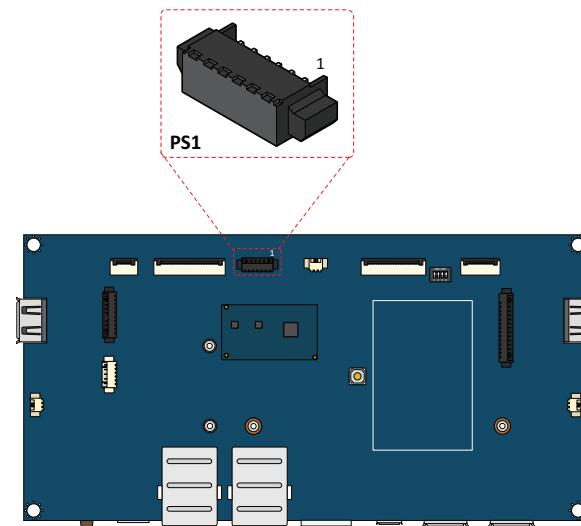


Figure 29: I<sup>2</sup>C connector (for light & proximity sensor) diagram

### A.3.16. Mic-In Connector

The SOMDB2 carrier board comes with a Mic-in connector for connecting a microphone. A cable must be used to connect the devices to the connector. The connector is labeled as “MIC”. The pinouts of the Mic-in connector are shown below.

Pin	Signal
1	MIC-IN
2	GND

Table 14: Mic-in connector pinouts

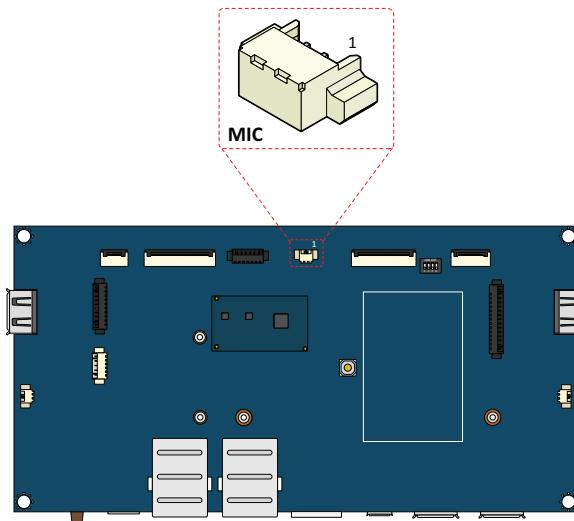


Figure 30: Mic-in connector diagram

### A.3.17. 2W Speaker Connector

The SOMDB2 carrier board is equipped with two 2W speaker connectors for the right and left speakers respectively. The speaker connectors are labeled as “SPK\_L” and “SPK\_R”. The pinouts of the speaker connectors are shown below.

Pin	Signal
1	SPKR_OUT_P
2	SPKR_OUT_M

Table 15: 2W Speaker connectors pinouts

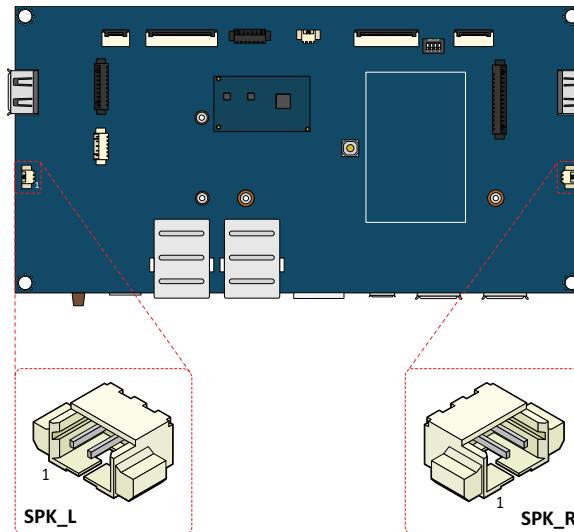


Figure 31: 2W Speaker connectors diagram

### A.3.18. Audio Module Connector

The SOMDB2 carrier board comes with two audio module connectors for connecting the VT6093 audio module. The audio module connectors are labeled as "B2B\_1" and "B2B\_2". The pinouts of the audio module connectors are shown below.

Pin	Signal	Pin	Signal
1	MIC_BIAS1	2	CDC_HPH_SW_L
3	CDC_IN1_P	4	CDC_HPH_SW_R
5	CDC_IN1_M	6	HPH_GND_SENSE
7	MIC_BIAS2	8	CDC_DMIC_CLK0
9	CDC_IN2_P	10	CDC_DMIC_DATA0
11	CDC_IN2_M	12	GND
13	MIC_BIAS3	14	CDC_DMIC_CLK1
15	CDC_IN3_P	16	CDC_DMIC_DATA1
17	CDC_IN3_M	18	GND
19	MIC_BIAS4	20	CDC_DMIC_CLK2
21	CDC_IN4_P	22	CDC_DMIC_DATA2
23	CDC_IN4_M	24	CODEC_INT1_N
25	GND	26	DODEC_INT2_N
27	CDC_IN5_P	28	CDC_IN6_P
29	CDC_IN5_M	30	CDC_IN6_M

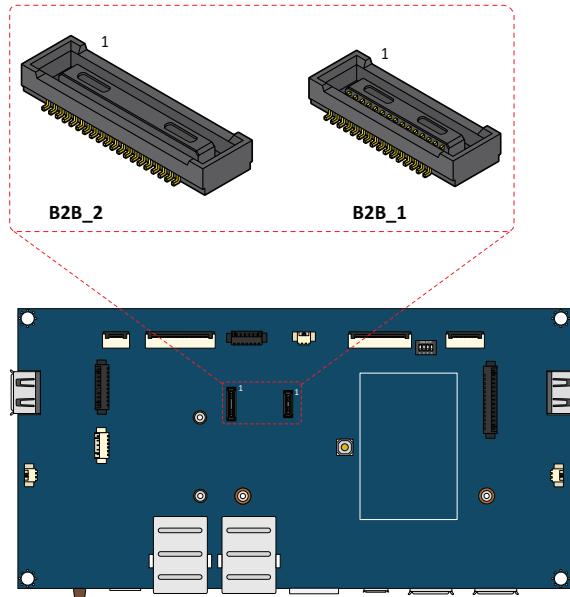


Figure 32: Audio module connectors diagram

Table 16: Audio module connector pinouts (B2B\_1)

Pin	Signal	Pin	Signal
1	CDC_LINE_OUT1_P	2	DIVCLK1_CDC
3	CDC_LINE_OUT1_M	4	DIVCLK2_CDC
5	GND	6	GND
7	CDC_LINE_OUT2_P	8	SLIMBUS_CLK
9	CDC_LINE_OUT2_M	10	SLIMBUS_DATA0
11	GND	12	SLIMBUS_DATA1
13	CDC_EAR_P	14	GND
15	CDC_EAR_M	16	CODEC_RST_N
17	HAPTICS_CDC_LOUT3	18	TS_GTR_THRES
19	GND	20	MBHC
21	SPKR_OUT_1_P	22	VPH_PWR_AUDIO
23	SPKR_OUT_2_M	24	VPH_PWR_AUDIO
25	GND	26	VPH_PWR_AUDIO
27	SPKR_OUT_2_P	28	VPH_PWR_AUDIO
29	SPKR_OUT_2_M	30	VREG_S4A_1P8
31	GND	32	VREG_S4A_1P8
33	SPKR_AMP_EN1	34	VREG_S4A_1P8
35	SPKR_AMP_EN2	36	VERG_S4A_1P8
37	GND	38	VREG_S4A_1P8
39	GND	40	VREG_S4A_1P8

Table 17: Audio module connector pinouts (B2B\_2)

### A.3.19. Boot Switch

The SOMDB2 carrier board comes with a boot switch which is used to select where the system will be booted from. The switch is labeled as “BOOT 1”. The settings of the boot switch are shown below.

Setting	1	2	3	4
eMMC	Off	Off	Off	Off
UFS	Off	Off	On	Off
Micro SD	On	Off	On	Off

Table 18: Boot switch settings

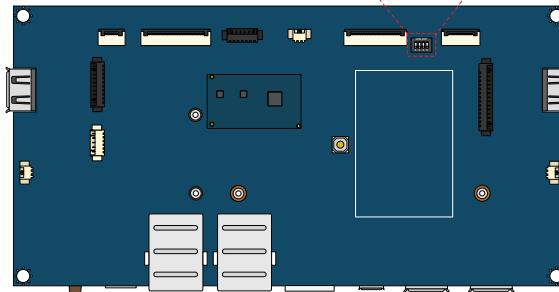
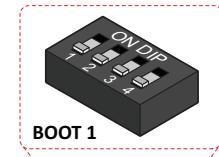


Figure 33: Boot switch diagram

## A.4. SOMDB2 External I/O

### A.4.1. HDMI® Port

The SOMDB2 carrier board has an HDMI port on the back panel which uses a HDMI port Type A receptacle connector to connect high definition video and digital audio using a single cable. The pinouts of the HDMI port are shown below.

Pin	Signal	Pin	Signal
1	TX2+	11	GND
2	GND	12	CLK-
3	TX2-	13	CEC
4	TX1+	14	NA
5	GND	15	SCL
6	TX1-	16	SDA
7	TX0+	17	GND
8	GND	18	VDD50
9	TX0-	19	HDP
10	CLK+		

Table 19: HDMI port pinouts



Figure 34: HDMI port diagram

### A.4.2. USB 3.0 Port

The SOMDB2 carrier board is equipped with two USB 3.0 ports on the back panel which have a maximum data transfer rate of up to 5Gbps and are compatible with USB 2.0 specifications. This USB port gives complete Plug and Play and hot swap capability for external devices. The pinouts of the USB 3.0 port are shown below.

Pin	Signal
1	VCC_USB
2	USB_D-
3	USB_D+
4	GND
5	USB_SSRX-
6	USB_SSRX+
7	GND
8	USB_SSTX-
9	USB_SSTX+

Table 20: USB 3.0 pinouts

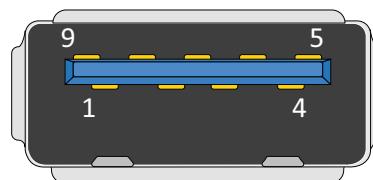


Figure 35: USB 3.0 diagram

### A.4.3. Micro USB 2.0 OTG Port

The SOMDB2 carrier board is equipped with a Micro USB 2.0 OTG port on the back panel which gives complete Plug and Play and hot swap capability for external devices. The USB interface complies with USB UHCI, Rev. 2.0. The pinouts of the USB 2.0 OTG port are shown below.

Pin	Signal
1	USB_VBUS0
2	USB_HD0-
3	USB_HD0+
4	USBID0
5	GND



Figure 36: Micro USB 2.0 OTG port diagram

Table 21: Micro USB 2.0 OTG port pinouts

### A.4.4. Gigabit Ethernet Port

The SOMDB2 carrier board comes with two Gigabit Ethernet ports on the back panel which has an 8 position and 8 contact (8P8C) receptacle connector commonly known as RJ-45. It is fully compliant with IEEE 802.3 (10BASE-T), 802.3u (100BASE-TX), and 802.3ab (1000BASE-T) standards. The pinouts of the Gigabit Ethernet port are shown below.

Pin	Signal
1	GND
2	MX0+
3	MX0-
4	MX1+
5	MX1-
6	GND
7	MX2+
8	MX2-

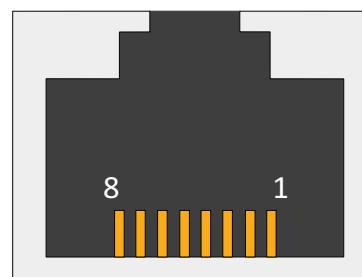


Figure 37: Gigabit Ethernet ports diagram

Table 22: Gigabit Ethernet port pinouts

### A.4.5. Power Button

The SOMDB2 carrier board comes with a power button on the back panel which allows the user to turn the system on and off.

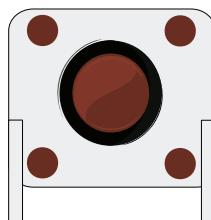


Figure 38: Power button diagram

Power Button behavior	
Suspend/Resume System	Quickly press the power button once to suspend. While in suspend mode quickly press once to resume.
Pop-up power control menu	Occurs when the power button is pressed for longer than 3 seconds.
Restart	Occurs when the power button is pressed for longer than 10 seconds.

Table 23: Power button behavior description

### A.4.6. DC-In Jack

The SOMDB2 carrier board comes with a DC-in jack that carries a 12V DC external power input. The specification and pinouts of the power DC-in jack are shown below.

Pin	Signal
1	VDD120_IN
2	GND
3	GND

Table 24: DC-in jack pinouts

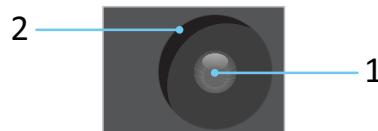


Figure 39: DC-in jack diagram

Physical Specification	
Outer Diameter	6.0mm
Inner Diameter	2.0mm
Barrel Depth	8.2mm
Electrical Specification	
Input Voltage	+12V

Table 25: DC-in jack specification

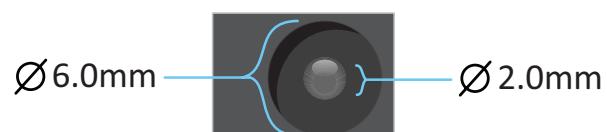


Figure 40: DC-in jack specification diagram

## A.5. SOMDB2 Dimensions

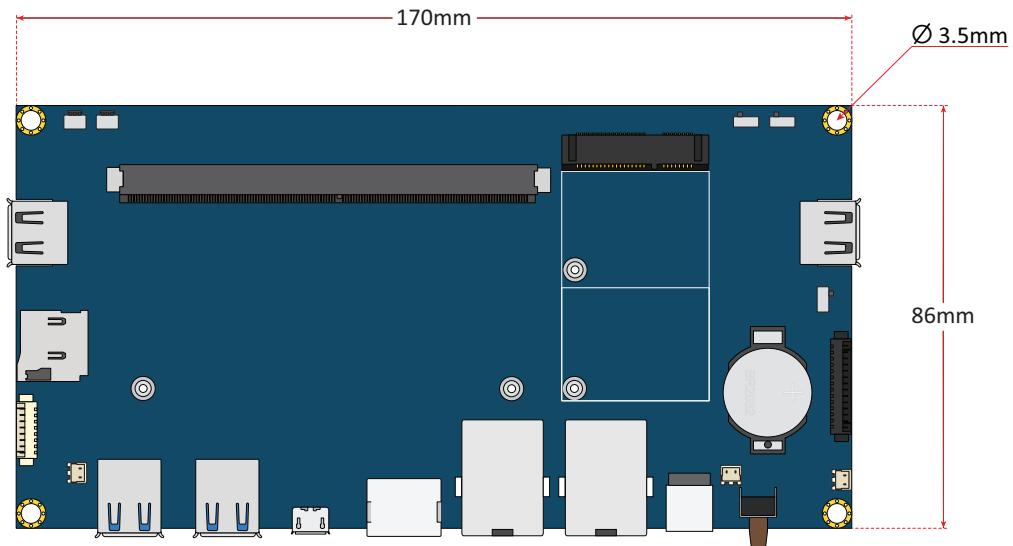


Figure 41: Dimensions of the SOMDB2 carrier board

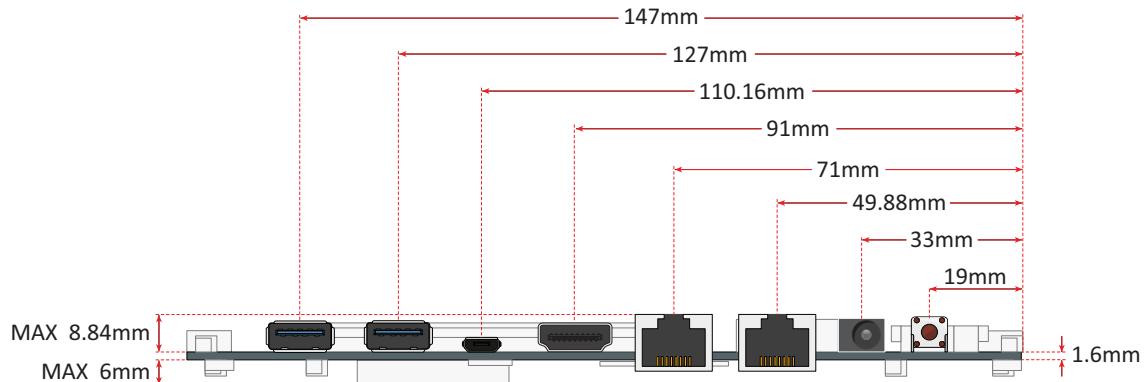


Figure 42: Dimensions of the SOMDB2 back panel I/O



## Appendix B. SOMDB2 Mating Connector Vendors List

The following table lists the mating connector vendors for the SOMDB2 carrier board.

Connector	VIA P/N	Vendor	P/N
J1	99H30-071137	FOXCONN	AS0B826-S55BB-7H
J2	99H30-170982	ACES	50271-01401-001
USB2_OPT	99G30-170542	ACES	85204-0800L
USB2_L/USB2_R	99G30-060962	CHUNFENG	C023620-01
DSI	99G30-03304A1	PINREX	979-43-93480A
CSI	99G30-03305A1	PINREX	979-43-93080A
NFC	99G30-03306A1	PINREX	979-43-91580A
PS1	99G30-170252	ACES	50271-0060N-001
TS	99G30-03307A1	PINREX	979-43-90880A
F_PANEL1	99H30-171682	ACES	5027-0100N-001
COM	99G30-170572	ACES	85204-0500L
SPK_L/SPK_R	99G30-170512	ACES	85204-0200L
MIC	99G30-170512	ACES	85204-0200L
D1O1	99H3-171382	ACES	50271-0150N-001
B2B_1	99G30-161569	HIROSE	DF40C-30DS-0.4V(51)
B2B_2	99G30-161579	HIROSE	DF40C-40DS-0.4V(51)

Table 26: SOMDB2 mating connector vendors list



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Fax: 886-2-2218-9860  
Email: [embedded@via.com.tw](mailto:embedded@via.com.tw)

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Fremont, CA 94539,  
USA  
  
Tel: 1-510-687-4688  
Fax: 1-510-687-4654  
Email: [embedded@viatech.com](mailto:embedded@viatech.com)

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3-15-7 Ebisu MT Bldg. 6F,  
Higashi, Shibuya-ku  
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Email: [embedded@viatech.co.jp](mailto:embedded@viatech.co.jp)

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