USER MANUAL

VAB-1000

Pico-ITX Cortex-A9 Board

1.12-05182018-160800

Regulatory Compliance

FCC-A Radio Frequency Interference Statement

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

The changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Notice 2

Shielded interface cables and A.C. power cord, if any, must be used in order to comply with the emission limits.

Notice 3

The product described in this document is designed for general use, VIA Technologies assumes no responsibility for the conflicts or damages arising from incompatibility of the product. Check compatibility issue with your local sales representatives before placing an order.

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 User's Manual for future reference.
- ☐ All cautions and warnings on the equipment should be noted.
- ☐ Keep this equipment away from humidity.
- ☐ Lay this equipment on a reliable flat surface before setting it up.
- ☐ Make sure the voltage of the power source and adjust properly 110/220V before connecting the equipment to the power inlet.
- ☐ Place the power cord in such a way that people cannot step on it.
- ☐ Always unplug the power cord before inserting any add-on card or module.
- ☐ If any of the following situations arises, get the equipment checked by authorized service personnel:
  - The power cord or plug is damaged.
  - Liquid has penetrated into the equipment.
  - The equipment has been exposed to moisture.
  - The equipment has not worked well or you cannot get it work according to User's Manual.
  - The equipment has dropped and damaged.
  - The equipment has obvious sign of breakage.
- ☐ Do not leave this equipment in an environment unconditioned 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 cord.
- ☐ Do not cover the ventilation holes. The openings on the enclosure protect the equipment from overheating

Box Contents

- ☐ 1 x VAB-1000 board
- ☐ 1 x VAB-1000-T I/O card
- ☐ 1 x Screw pack for miniPCIe module
- ☐ 1 x Console cable

Ordering Information

Part Number	Description
10GBL100400A0	Pico-ITX board with 1.0GHz VIA Elite E1000 Cortex-A9 SoC, 4GB eMMC, 2GB DDR3 SDRAM, Mini HDMI, LVDS, 2 x USB 2.0, Mini USB 2.0, COM, Gigabit Ethernet, miniPCIe slot, Micro SD card slot, 12V DC-in (Packed with VAB-1000-T I/O card)

Optional Accessories

I/O Expansion Cards

Part Number	Description
10GBN00000020	VAB-1000-L LVDS converter card
10GBQ00000020	VAB-1000-T I/O card for Line-in, Line-out, Mic-in, 2 x USB 2.0 ports, 2 x activity LEDs, Power button

Wireless Accessories

Part Number	Description
00GO27100BU2B0D0	VNT9271 IEEE 802.11 b/g/n USB Wi-Fi dongle
EMIO-1533-00A2	VNT9271 IEEE 802.11 b/g/n USB Wi-Fi module with assembly kit and antenna
EMIO-2550-00A1	3.75G HSPA/UMTS mobile broadband full size miniPCIe module with GPS and SIM card slot, assembly kit and antenna (**Note:** GPS function is not currently supported for VAB-1000)

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1. Product Overview

Based on the ultra-compact Pico-ITX form factor, measuring 100mm x 72mm, the VIA VAB-1000 is powered by a 1.0GHz VIA Elite E1000 Cortex-A9 dual-core SoC. The board features a high-performance graphics and video engine with a Unified Shader Architecture featuring 64 stream processors that provides support for dual independent displays along with the smoothest 3D/2D graphics acceleration and full HD playback support for the most demanding video formats in resolutions up to 1080p.

The ultra-compact VAB-1000 board is optimized for both performance and power to meet the high end demands of advanced industrial, in-vehicle and multimedia applications, boasting a ruggedized design with an extended operating temperature range from 0°C to 60°C, while offering extremely low power consumption.

The VAB-1000 board has integrated dual-channel LVDS panel connector, miniPCIe slot and SATA connector, USB 2.0 connector for USB Wi-Fi module and an SPI connector. In addition, VAB-1000 provides an impressive selection of rear I/O in a compact form factor including Mini HDMI port, Mini USB 2.0 port, Micro SD card slot and Gigabit Ethernet port.

The VIA VAB-1000 board supports an optional VAB-1000-T I/O card. The VAB-1000-T I/O card is connected through onboard pin headers carrying the I/O such as audio jacks, LED indicators, power on/off button, USB 2.0 ports and COM pin header (TX/RX).

1.1. Key Features

- Powered by 1.0GHz VIA Elite E1000 Cortex-A9 dual-core SoC
- Supports integrated graphics processing (GPU) with Unified Shading Architecture
- Dual display support including full HD content and dual channel LVDS
- Small form factor and low power design
- Fanless and ultra-low power consumption
- 4GB onboard eMMC Flash memory
- Supports dual-channel 18/24-bit LVDS panel connector
- Supports miniPCIe slot for 3.75G/3G module
- Supports Micro SD card slot for expandable storage up to 32GB size
- Supports SATA connector for SATA SSD device
- Supports Wi-Fi connectivity through an optional USB Wi-Fi module.
- Android software solution pack available

1.2. Product Specifications

Processor

- 1.0GHz VIA Elite E1000 Cortex-A9 dual-core SoC

System Memory

- 2GB DDR3 SDRAM onboard

Storage

- 4GB eMMC Flash memory
- 1 x SATA connector

Graphics

- Three integrated, independent 3D/2D and video processing units
- Graphics engine supporting OpenGL® ES 3.0 hardware acceleration
- Supports MPEG-2, VC1 and H.264 video decoding up to 1080p

LAN

- Realtek RTL8111G Gigabit Ethernet controller

Audio

- Wolfson WM8960 Audio Codec

HDMI

- Integrated HDMI 1.4 transmitter

Power Management IC's

- Wolfson WM8326GEFL/RV processor power management subsystem

EEPROM

- Flash ROM M25P32-VMW6G 32Mbit/4MB SO8W 8-pin for boot loader

LVDS Transmitter

- Onboard Chrontel CH7305A Single/Dual LVDS transmitter (DVP to LVDS)
- Support pixel rate up to 165M pixel/sec
- Support up to UXGA resolution (1600x1200)
- 18/24-bit LVDS output

Note:

The LVDS transmitter has to be used along with VAB-1000-L LVDS converter card.

Watchdog Timer

- When system hang, the watchdog will reboot the system after timeout

Back Panel I/O

- 1 x Mini HDMI port
- 1 x Mini USB 2.0 port
- 1 x Gigabit Ethernet port
- 1 x Micro SD card slot (support up to 32GB)
- 1 x DC-in jack

Onboard Connectors

- 1 x SATA connector
- 1 x SATA power connector (supports +12V/+5V)
- 1 x RTC battery connector
- 1 x USB 2.0 connector (for USB Wi-Fi module)
- 1 x SPI flash connector (for Boot Loader EEPROM update)
- 1 x miniPCIe slot (for 3.75G/3G module)
- 1 x LVDS panel connector (dual-channel 18/24-bit)
- 1 x JTAG connector

Onboard Pin headers

- 1 x Front panel, USB 2.0 and COM pin header (for two USB 2.0 ports, one COM (TX/RX), power-on and two activity LEDs indicators)
- 1 x SPI and DIO pin header (supports 4-bit GPIO)
- 1 x COM and I^2C pin header (for two COM (TX/RX) ports and two I^2C pair)
- 1 x Front audio pin header (for Line-in, Line-out and Mic-in)
- 1 x VGA pin header (reserved for factory production)

Onboard Pin Jumpers

- 1 x Backlight power jumper
- 1 x Panel power jumper
- 1 x Miscellaneous jumper (for SD write protect, line-out and auto power-on)
- 1 x Clear CMOS jumper
- 1 x miniPCIe version jumper

Operating System

- Android 4.4.2

Operating Temperature

- 0°C ~ 60°C

Operating Humidity

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

Power Supply

- 12V DC-in

Form Factor

- Pico-ITX
- 100mm x 72mm (3.9" x 2.8")

Compliance

- CE
- FCC

Notes:

1. As the operating temperature provided in the specifications is a result of the test performed in VIA's chamber, 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 suggested to execute a solid testing and take all the variables into consideration when building the system. Please ensure that the system runs well under the operating temperature in terms of 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 eMMC 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

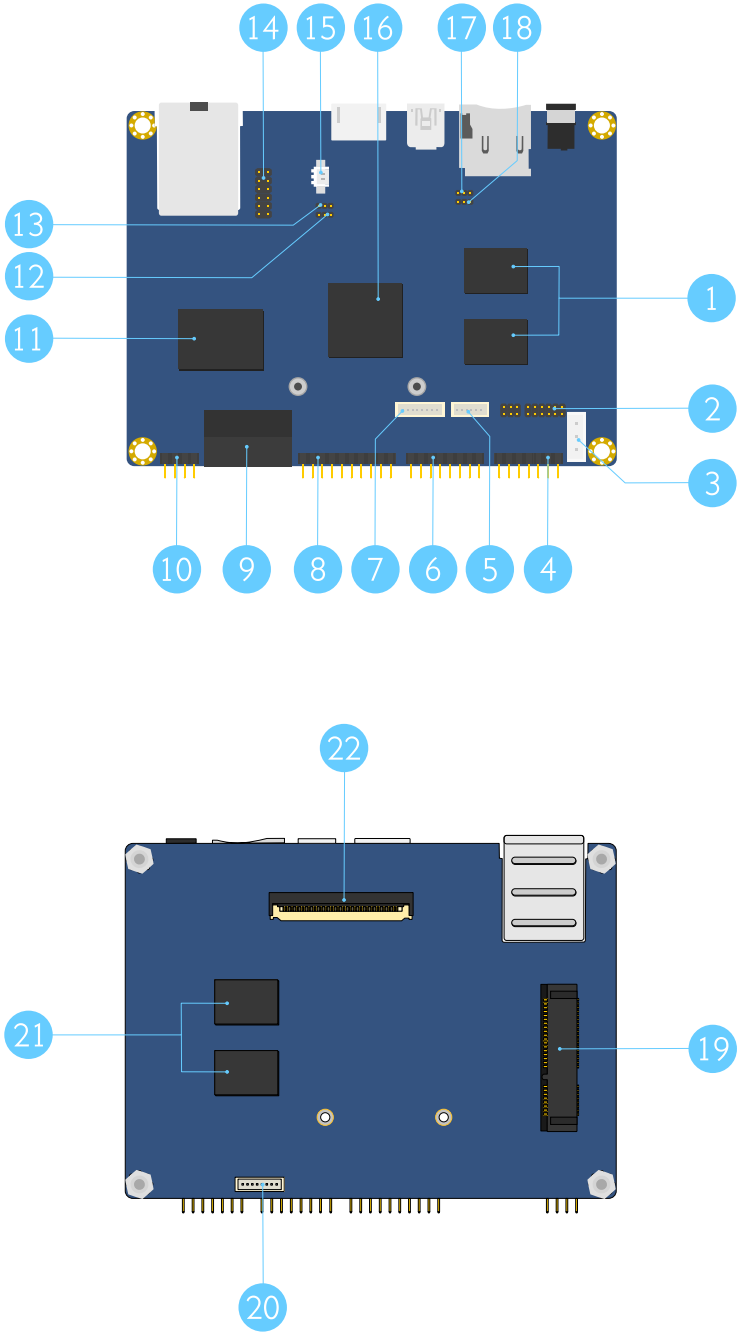


Figure 1: Layout diagram of VAB-1000 (top and bottom view)

Item	Description
1	DDR3 SDRAM
2	JM3: Miscellaneous jumper
3	PWR1: SATA power connector
4	CN9: SPI and GPIO pin header
5	WLAN1: USB 2.0 connector
6	CN8: COM and I²C pin header
7	JSF1: SPI flash connector
8	CN7: Front panel, USB 2.0 and COM pin header
9	SATA1: SATA connector
10	CN6: Front audio pin header
11	4GB eMMC flash memory
12	MPCIE_SET1: miniPCIe revision jumper
13	JM1: Clear CMOS jumper
14	VGA1: VGA pin header
15	BAT1: RTC battery connector
16	1.0GHz VIA Elite E1000 Cortex-A9 dual-core SoC
17	PBL_SET1: Backlight power jumper
18	PVDD_SET1: Panel power jumper
19	MPCIE1: miniPCIe slot
20	JTAG1: JTAG connector
21	DDR3 SDRAM
22	LVDS1: LVDS panel connector

Table 1: Layout diagram description table of VAB-1000

1.4. Product Dimensions

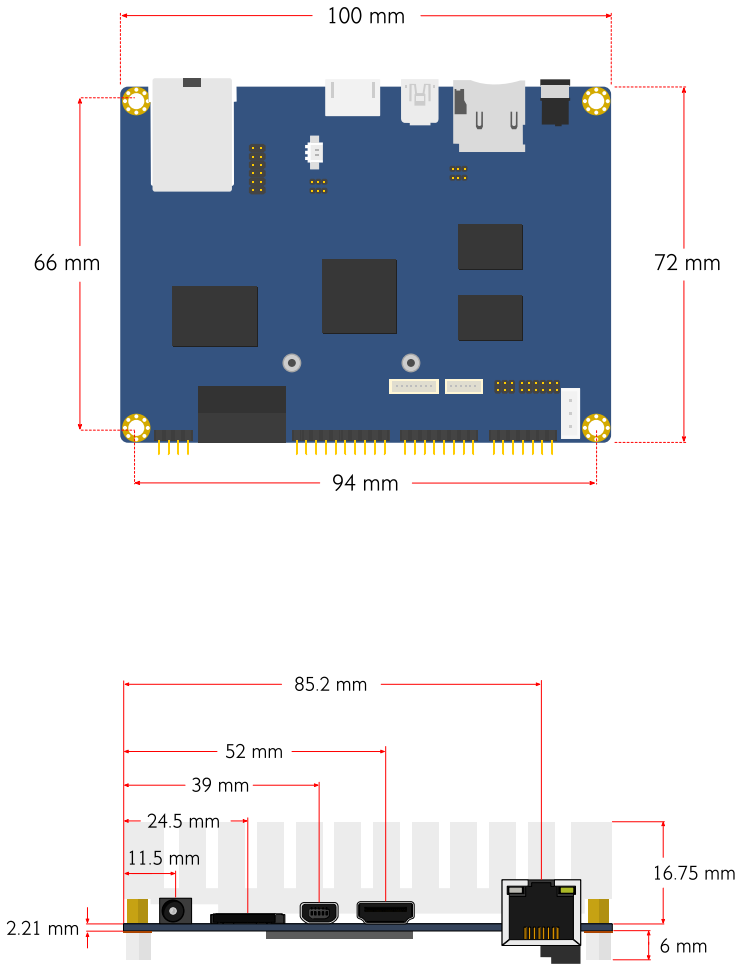
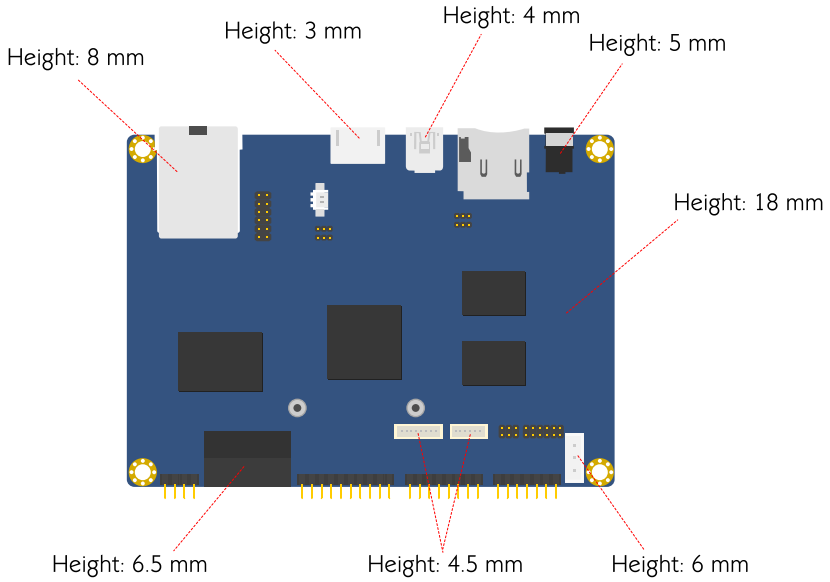


Figure 2: Dimensions of VAB-1000

1.5. Height Distribution



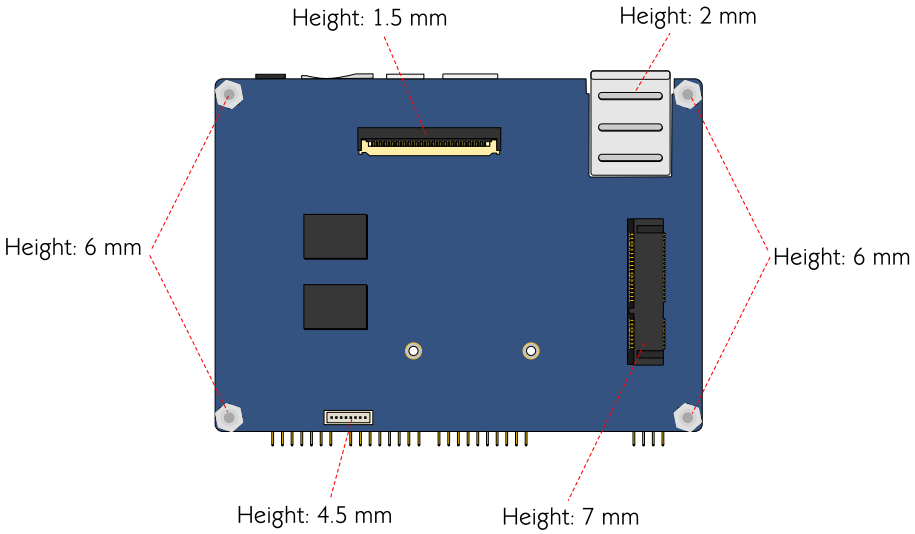


Figure 3: Height distribution of VAB-1000 (top and bottom)

2. I/O Interface

The VIA VAB-1000 has a wide selection of interfaces integrated into the board. It includes a selection of frequently used ports as part of the back panel I/O.

2.1. External I/O Ports

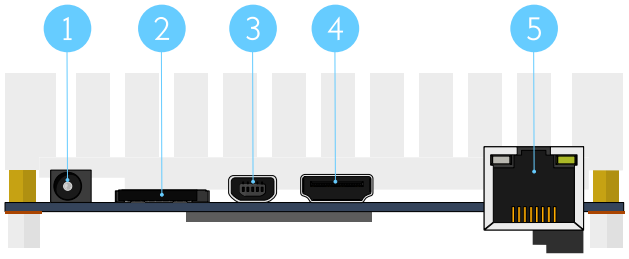


Figure 4: Back panel I/O

Item	Description
1	CN1: DC-in jack
2	SD1: Micro SD card slot
3	USB1: Mini USB 2.0 port
4	HDMIO1: Mini HDMI port
5	LAN1: Gigabit Ethernet port

Table 2: Layout diagram description table of back panel I/O

2.1.1. DC-In Jack

The VAB-1000 comes with a DC-in jack on the back panel adjacent to the Micro SD slot. The DC-in jack carriers 12V DC external power input. The specifications and pinout of power DC-in jack are shown below.

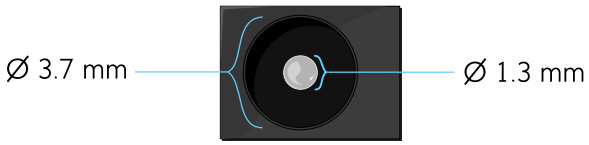


Figure 5: DC-in jack diagram

Physical Specifications	
Outer Diameter	3.7 mm
Inner Diameter	1.3 mm
Barrel Depth	8.25 mm

Electrical Specifications	
Input Voltage	12V

Table 3: DC-in jack specifications

2.1.2. Micro SD Card Slot

The VAB-1000 comes with a Micro SD card slot located on the back panel. Micro SD card slot offers expandable storage up to 32GB.

Figure 6: Micro SD card slot diagram

Pin	Signal
1	SD0DATA2
2	SD0DATA3
3	SD0CMD
4	VDD (3.3V)
5	SD0CLK
6	GND
7	SD0DATA0
8	SD0DATA1
9	SD0_CD

Table 4: Micro SD card slot pinout

2.1.3. Mini USB 2.0 Port

The VAB-1000 is equipped with a Mini USB 2.0 port located on the back panel. The Mini USB 2.0 interface port gives complete Plug and Play and hot swap capability for external devices and it complies with USB UHCI, rev. 2.0. The Mini USB 2.0 port uses the USB Type AB receptacle port connector. The pinout of the Mini USB 2.0 port is shown below.

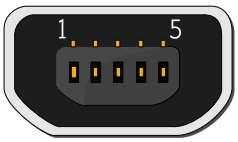


Figure 7: Mini USB 2.0 port diagram

Pin	Signal
1	VCC (+5V)
2	USBH1-
3	USBH1+
4	ID (GND)
5	GND

Table 5: Mini USB 2.0 port pinout

2.1.4. Mini HDMI® Port

The VAB-1000 has Mini HDMI port on the back panel. The Mini HDMI port uses an HDMI Type C receptacle connector. It is used to connect high definition video and digital audio using a single cable. The pinout of the Mini HDMI port is shown below.

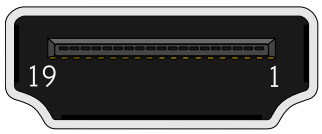


Figure 8: Mini HDMI port diagram

Pin	Signal
1	TMDS Data2 Shield
2	TMDS Data2+
3	TMDS Data2-
4	TMDS Data1 Shield
5	TMDS Data1+
6	TMDS Data1-
7	TMDS Data0 Shield
8	TMDS Data0+
9	TMDS Data0-
10	TMDS Clock Shield
11	TMDS Clock+
12	TMDS Clock-
13	DDC/CEC Ground

14	CEC
15	SCL
16	SDA
17	Reserved
18	+5V Power
19	Hot Plug Detect

Table 6: Mini HDMI port pinout

2.1.5. Gigabit Ethernet Port

The VAB-1000 is equipped with a Gigabit Ethernet port. The Gigabit Ethernet port is using 8 Position 8 Contact (8P8C) receptacle connector or commonly referred to as RJ-45. It is fully compliant with IEEE 802.3 (10BASE-T), 802.3u (100BASE-TX), and 802.3ab (1000BASE-T) standards. The pinout of the Gigabit Ethernet port is shown below.

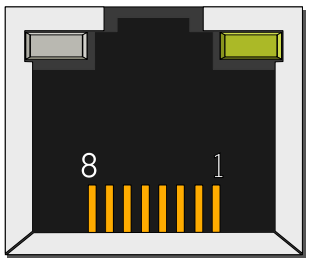


Figure 9: Gigabit Ethernet port diagram

Pin	Signal
1	LAN1_TD0+
2	LAN1_TD0-
3	LAN1_TD1+
4	LAN1_TD1-
5	LAN1_TD2+
6	LAN1_TD2-
7	LAN1_TD3+
8	LAN1_TD3-

Table 7: Gigabit Ethernet port pinout

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

	Left LED	Right LED
Link Off	LED is Off	LED is Off
Speed_10Mbit	The LED is On in Green color (flash)	LED is Off
Speed_100Mbit	The LED is On in Red color (flash)	LED is Off
Speed_1000Mbit	LED is Off	The LED is On in Orange color(flash)

Table 8: Gigabit Ethernet port LED color definition

2.2. Onboard Connectors

2.2.1. RTC Battery Connector

The VAB-1000 is equipped with an onboard RTC battery connector which is 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 "BAT1". The connector pinout is shown below.

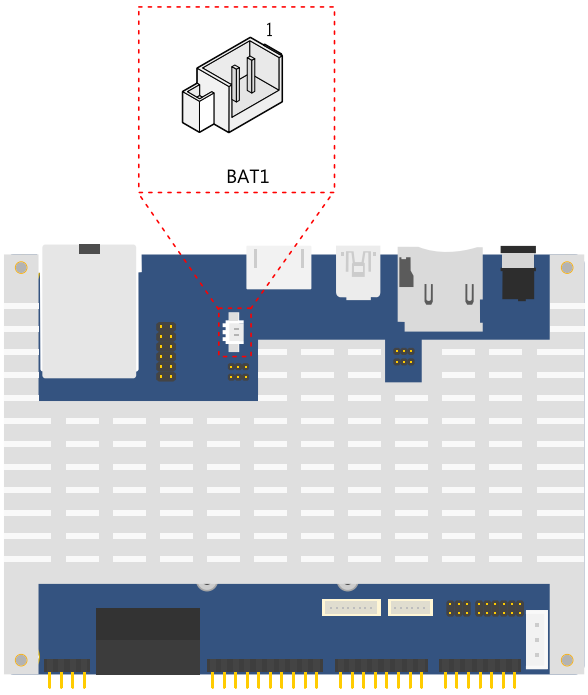


Figure 10: RTC battery connector diagram

Pin	Signal
1	VBAT
2	GND

Table 9: RTC battery connector pinout

2.2.2. SATA Connector

The SATA connector on board can support up to 3Gb/s transfer speeds. The SATA connector is labeled as "SATA1" and it can support 2.5" SATA SSD. The pinout of the SATA connector is shown below.

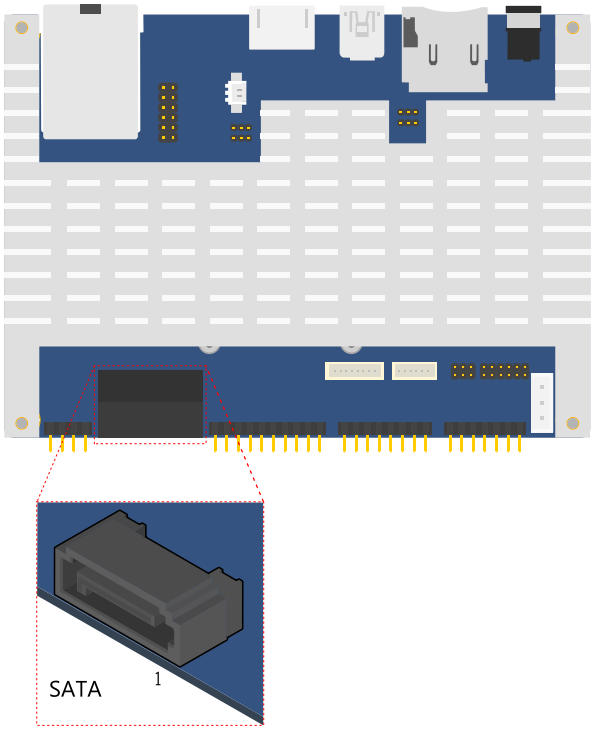


Figure 11: SATA connector diagram

Pin	Signal
1	GND
2	STXP_1
3	STXN_1
4	GND
5	SRXN_1
6	SRXP_1
7	GND

Table 10: SATA connector pinout

2.2.3. SATA Power Connector

The SATA power connector is used for connecting the SATA SSD power cable to power the 2.5" SATA SSD. When connecting the SATA SSD power cable, make sure the power plug is inserted in the proper orientation and pins are properly aligned. The SATA power connector is labeled as "PWR1". The pinout of the SATA power connector is shown below.

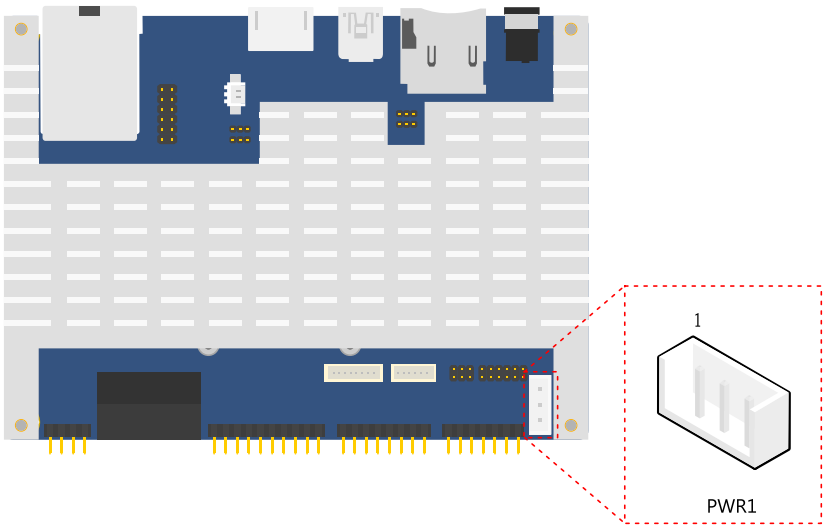


Figure 12: SATA power connector diagram

Pin	Signal
1	VDD5V
2	VDD12V
3	GND

Table 11: SATA power connector pinout

2.2.4. SPI Flash Connector

The VAB-1000 has one 8-pin SPI flash connector. The SPI (Serial Peripheral Interface) flash connector is used to update the Boot Loader EEPROM. The connector is labeled as "JSF1". The pinout of the connector is shown below.

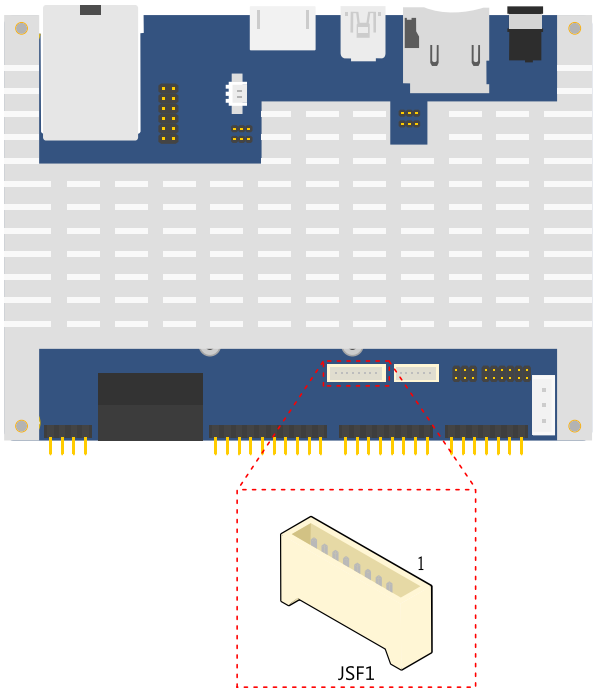


Figure 13: SPI flash connector diagram

Pin	Signal	Pin	Signal
1	VDD33_SF (VDD33_SPI VDD)	2	GND
3	SF_CS0-	4	SF_CLK
5	SF_MISO	6	SF_MOSI
7	NC	8	NC

Table 12: SPI flash connector pinout

Note:

NC represents "No Connection"

2.2.5. USB 2.0 Connector

The VAB-1000 has an onboard USB 2.0 connector designed for connecting the USB Wi-Fi module. The USB 2.0 connector is labeled as "WLAN1". The pinout of USB 2.0 connector is shown below.

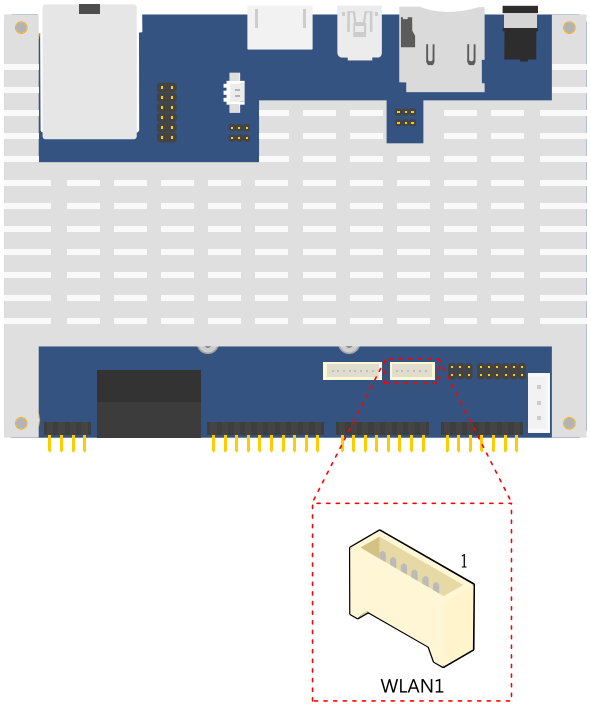


Figure 14: USB 2.0 connector diagram

Pin	Signal
1	NC
2	WLAN_LED
3	GND
4	USBH1_C_2DP_1
5	USBH1_C_20M_1
6	VCC_USB1

Table 13: USB 2.0 connector pinout

Note:
The onboard USB 2.0 connector (WLAN1) shares the same USB signals with miniPCIe slot. Whenever the USB 2.0 connector is connected or in used, the miniPCIe slot is automatically disabled and vice versa. Please refer to section 3.5 "Miscellaneous Jumper" for details about selecting the USB 2.0 connector/miniPCIe slot.

2.2.6. VGA Pin Header

The mainboard has VGA pin header for CRT display. The VGA pin header is labeled as "VGA1". The pinout of the VGA pin header is shown below.

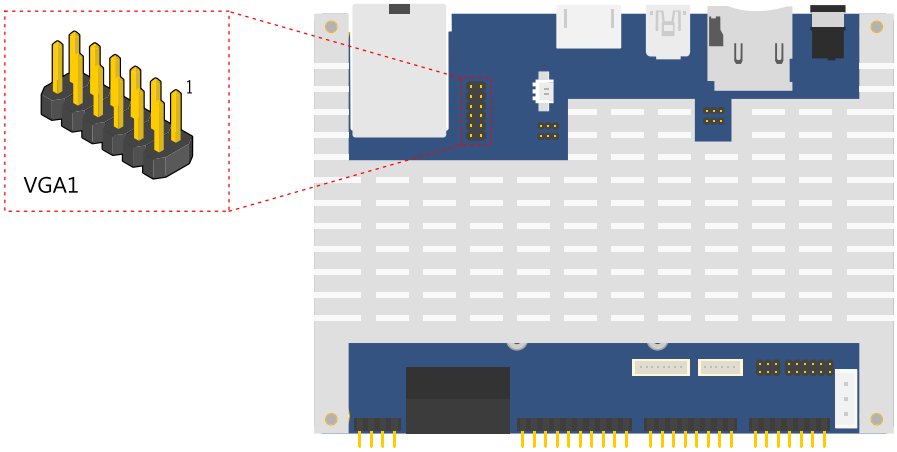


Figure 15: VGA pin header diagram

Pin	Signal	Pin	Signal
1	VGA_R	2	+5VCRT
3	VGA_G	4	GND
5	VGA_B	6	VGA_SDA
7	GND	8	VGA_SCL
9	NC	10	VGA_VSYNC
11	VGA_HSYNC	12	GND

Table 14: VGA pin header pinout

Note:
This function is reserved for factory production only.

2.2.7. Front Audio Pin Header

The VAB-1000 has a front audio pin header for connecting the Line-out, Line-in and Mic-in jacks. The pin header is labeled as "CN6". The pinout of the front audio pin header is shown below.

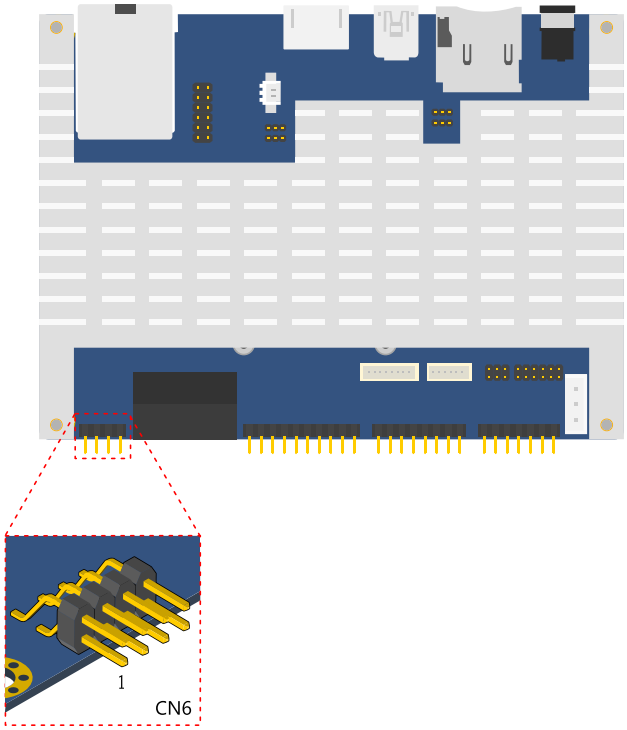


Figure 16: Front audio pin header diagram

Pin	Signal	Pin	Signal
1	LINEIN_R	2	AUD_GND
3	LINEIN_L	4	MICIN1
5	LINEOUT_R	6	MICIN2
7	LINEOUT_L	8	HP_DET-

Table 15: Front audio pin header pinout

2.2.8. Front Panel, USB 2.0 and COM Pin Header

The mainboard includes one Front panel, USB 2.0 and COM pin header block labeled as "CN7". The Front panel, USB 2.0 and COM pin header is used to connect the power button, two USB 2.0 ports, COM (TX/RX) port and two activity LED indicators. The pinout of the pin header is shown below.

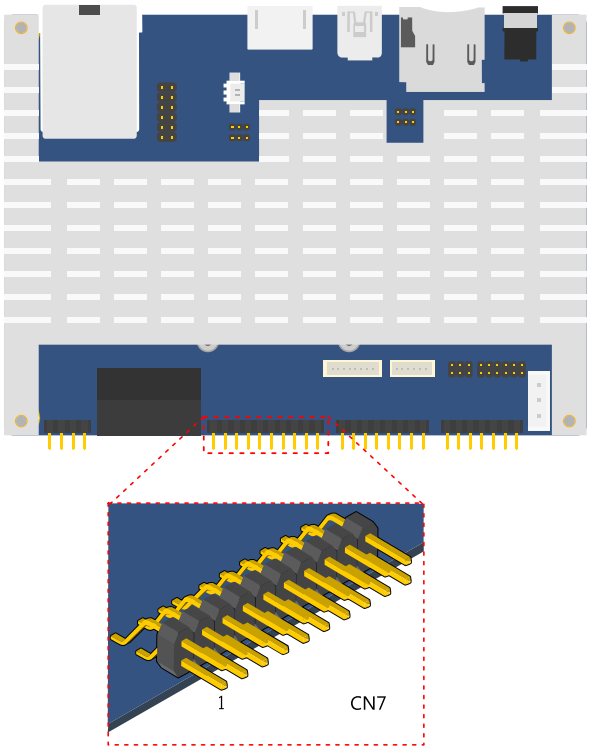


Figure 17: Front panel, USB 2.0 and COM pin header diagram

Pin	Signal	Pin	Signal
1	PWR_LED (Series 470 ohm resistance)	2	VDD33_SUS/0.5A
3	PWR_BUTTON#	4	GND
5	RESET_GD	6	GND
7	-HD_LED1 (Series 470 ohm resistance)	8	VDD50/0.5A
9	VCC_USB2/0.5A	10	VCC_USB3/0.5A
11	USBH2_C_DM	12	USBH3_C_DM
13	USBH2_C_DP	14	USBH3_C_DP
15	GND	16	GND
17	DTE1_TXD_C	18	DTE1_RXD_C
19	HWTP_1	20	USBH123_SW

Table 16: Front panel, USB 2.0 and COM pin header pinout

2.2.9. COM and I²C Pin Header

The COM and I²C pin header block labeled as "CN8" is used for connecting I²C devices and additional COM port that supports TX/RX. The pinout of the COM and I²C pin header is shown below.

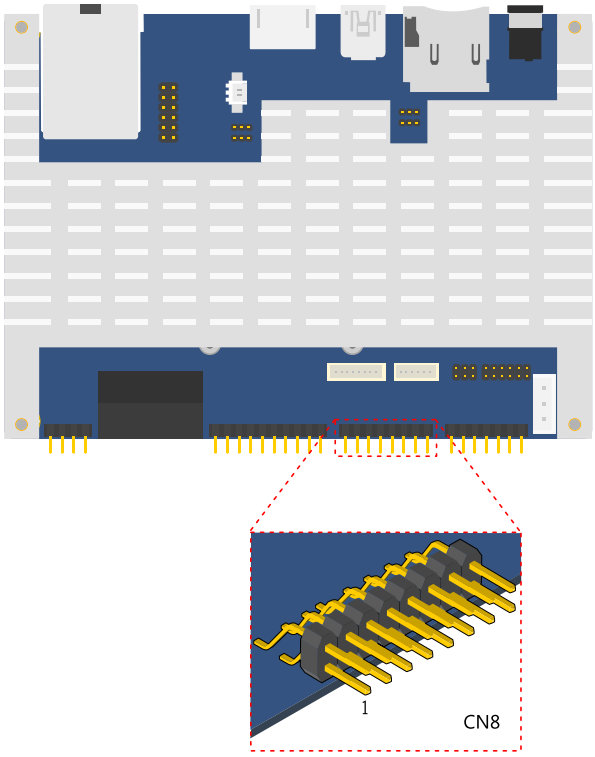


Figure 18: COM and I²C pin header diagram

Pin	Signal	Pin	Signal
1	VDD33_SUS/0.5A	2	VDD33/0.5A
3	DTE0_TXD_C	4	NC
5	DTE0_RXD_C	6	NC
7	GND	8	I²C0_SCL(IPU to VDD33)
9	DTE2_TXD_C	10	I²C0_SDA(IPU to VDD33)
11	DTE2_RXD_C	12	I²C1_SCL(IPU to VDD33)
13	GND	14	I²C1_SDA(IPU to VDD33)
15	PMIC_CONF_SCL	16	PMIC_CONF_SDA

Table 17: COM and I²C pin header pinout

2.2.10. SPI and GPIO Pin Header

The SPI and GPIO pin header block labeled as "CN9" is used for connecting the SPI device, and General Purpose Input and Output. The pinout of the pin header is shown below.

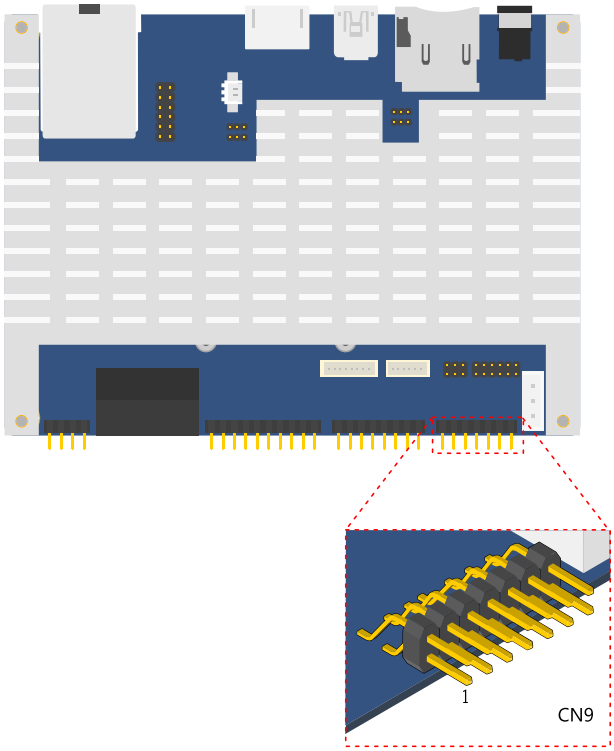


Figure 19: SPI and GPIO pin header diagram

Pin	Signal	Pin	Signal
1	VDD3318_DVP (for GFX GPIO Power)/100mA	2	VDD50_SUS/0.5A
3	GND	4	VDD33 (for GPIO Power)/0.5A
5	NC	6	SPI1_CLK : SPI1 Host Interface Clock GPIO5
7	NC	8	SPI1_MISO : SPI1 Host Interface Master Input, Slave Output GPIO6
9	NC	10	SPI1_MOSI :SPI1 Host Interface Master Output, Slave Input GPIO7
11	NC	12	SPI1 Host Interface Slave Select Active-low. GPIO8
13	GND	14	GND

Table 18: SPI and GPIO pin header pinout

Note:
NC represents "No Connection"

2.2.11. JTAG Connector

The JTAG connector provides a set of JTAG signals that allow JTAG debugging equipment to be used. The connector is labeled as "JTAG1". The pinout of the JTAG connector is shown below.

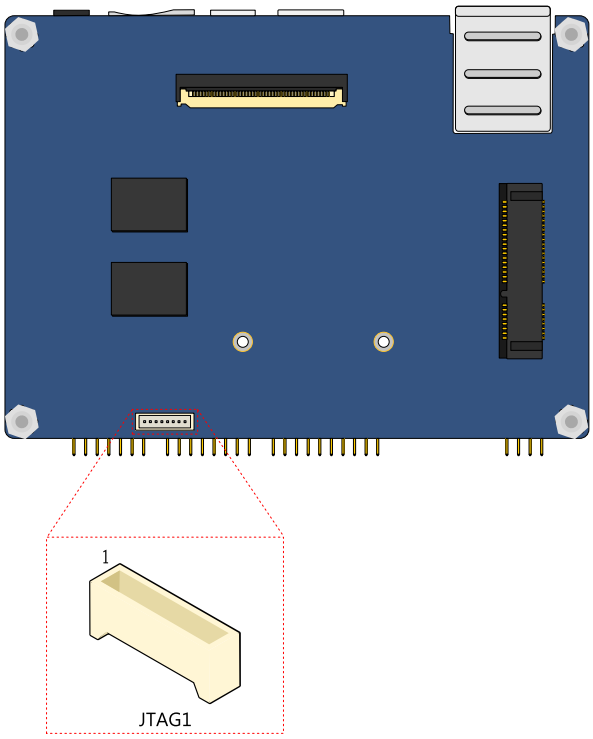


Figure 20: JTAG connector diagram

Pin	Signal	Pin	Signal
1	GND	2	NC
3	JTAG_TRST#	4	JTAG_TD0
5	JTAG_TDI	6	JTAG_TMS
7	JTAG_TCK	8	VDD33

Table 19: JTAG connector pinout

2.2.12. LVDS Panel Connector

The VAB-1000 has one LVDS panel connector on the bottom side of the board. The LVDS panel connector can connect the panel's LVDS cable to support the dual-channel 18/24-bit display. The LVDS panel connector is labeled as "LVDS1". The pinout of the LVDS panel connector is shown below.

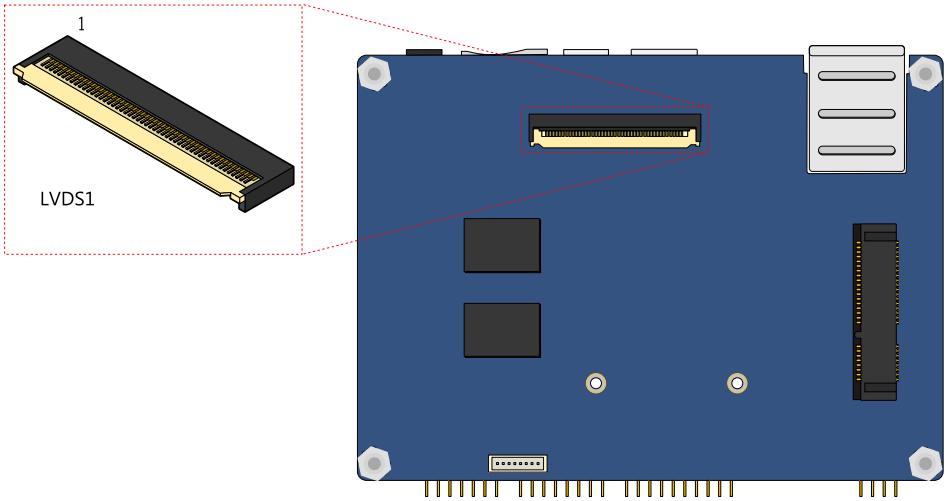


Figure 21: LVDS panel connector diagram

Pin	Signal	Pin	Signal
1	PVDD1 (for Panel VDD +5V or +3.3V)	2	PVDD1 (for Panel VDD +5V or +3.3V)
3	PVDD1 (for Panel VDD +5V or +3.3V)	4	VDD50
5	VDD50	6	VDD_BL (for Panel BL +12V or +5V)
7	VDD_BL (for Panel BL +12V or +5V)	8	VDD_BL (for Panel BL +12V or +5V)
9	GND	10	A0M1
11	A0P1	12	GND
13	A1M1	14	A1P1
15	GND	16	A2M1
17	A2P1	18	GND
19	A3M1	20	A3P1
21	GND	22	CLK1M1
23	CLK1P1	24	GND
25	A4M1	26	A4P1
27	GND	28	A5M1
29	A5P1	30	GND
31	A6M1	32	A6P1
33	GND	34	A7M1
35	A7P1	36	GND
37	CLK2M1	38	CLK2P1
39	VDD33 for EDID Power	40	LCD_CLK (I^2C CLK)
41	LCD_DATA (I^2C DATA)	42	ENABLT1 (Enable BL)
43	BAK_ADJ	44	NC

45	NC	46	NC
47	NC	48	NC
49	NC	50	NC

Table 20: LVDS panel connector pinout

3. Jumpers

Jumper Description

A jumper consists of pair conductive pins used to close in or bypass an electronic circuit to set up or configure 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 jumper size is small or mounted on the crowded location of the board that makes it difficult to access. Therefore, using long-nose pliers in installing and removing the jumper cap is very helpful.

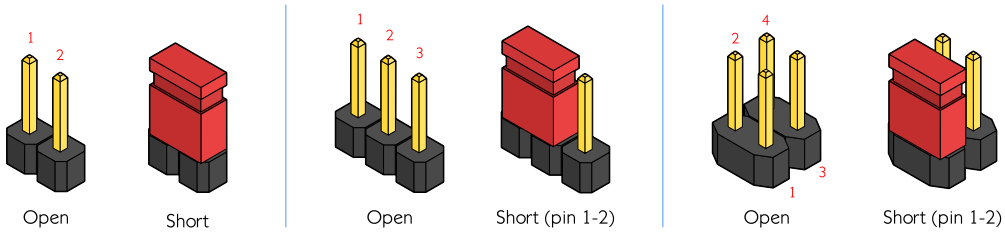


Figure 22: Jumper settings example

Caution:

Make sure to install the jumper cap on the correct pins. Installing it in the wrong pin might cause damage and malfunction.

3.1. Backlight Power Jumper

The mainboard has a jumper that controls the input voltage delivered to the LVDS backlight connector. The jumper is labeled as "PBL_SET1". The jumper settings are shown below.

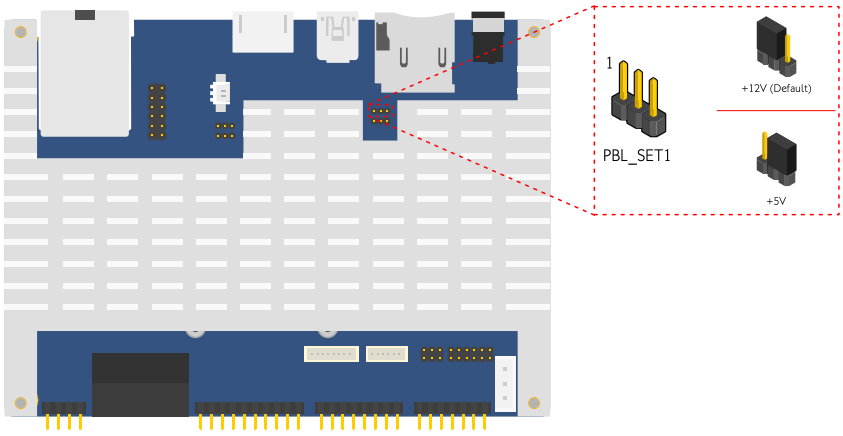


Figure 23: Backlight power jumper diagram

Settings	Pin 1	Pin 2	Pin 3
+12V (Default)	Short	Short	Open
+5V	Open	Short	Short

Table 21: Backlight power jumper settings

3.2. Panel Power Jumper

The mainboard has a jumper that controls the voltage delivered to the LVDS panel connector. The jumper is labeled as "PVDD_SET1". The jumper settings are shown below.

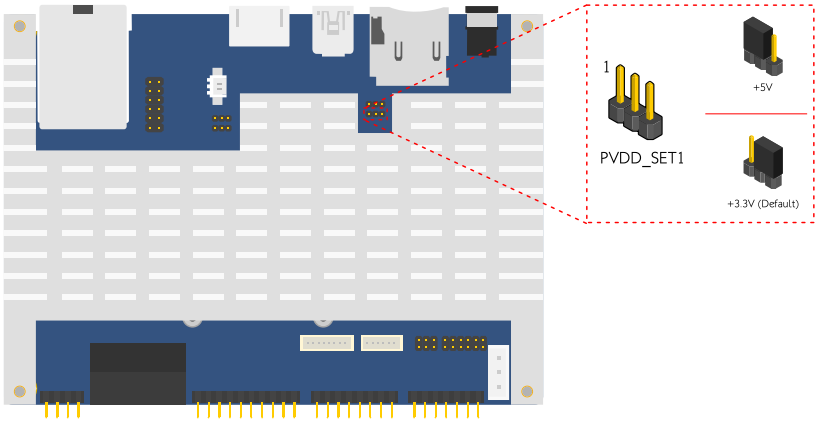


Figure 24: Panel power jumper diagram

Settings	Pin 1	Pin 2	Pin 3
+5V	Short	Short	Open
+3.3V (Default)	Open	Short	Short

Table 22: Panel power jumper settings

3.3. Clear CMOS Jumper

The onboard CMOS RAM stores system configuration data and has an onboard battery power supply. To reset the CMOS settings, set the jumper on pins 2 and 3 while the system is off. Return the jumper to pins 1 and 2 afterwards. Setting the jumper while the system is on will damage the mainboard. The jumper is labeled as "JM1". The default setting is on pins 1 and 2.

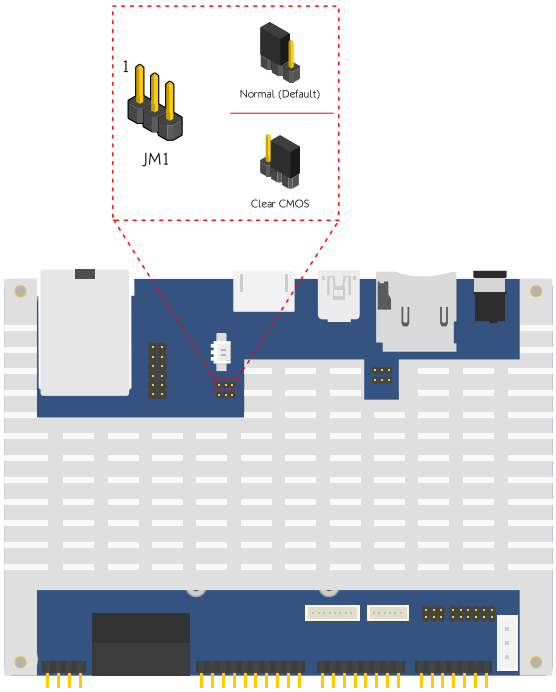


Figure 25: Clear CMOS jumper diagram

Settings	Pin 1	Pin 2	Pin 3
Normal (default)	Short	Short	Open
Clear CMOS	Open	Short	Short

Table 23: Clear CMOS jumper settings

Note:

Except when clearing the CMOS RAM, never remove the cap from the JM1 (Clear CMOS) jumper default position. Removing the cap will cause system boot failure. Avoid clearing the CMOS while the system is on; it will damage the mainboard.

3.4. MiniPCIe Revision Jumper

The mainboard has a miniPCIe revision jumper that determines the supported revision specification of miniPCIe slot. The jumper is labeled as "MPCIE_SET1". The jumper settings are shown below.

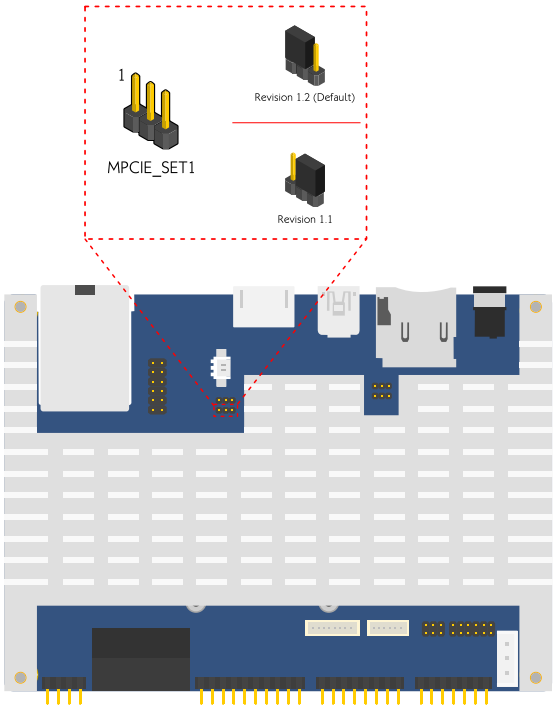


Figure 26: MiniPCIe revision jumper diagram

Settings	Pin 1	Pin 2	Pin 3
Support Revision 1.2 (Default)	Short	Short	Open
Support Revision 1.1	Open	Short	Short

Table 24: MiniPCIe revision jumper settings

3.5. Miscellaneous Jumper

The mainboard has a miscellaneous jumper that is used to enable/disable the SD card write protect, detect the active/inactive audio head phone, select the USB bus and auto power-on function. The jumper is labeled as "JM3". The jumper settings are shown below.

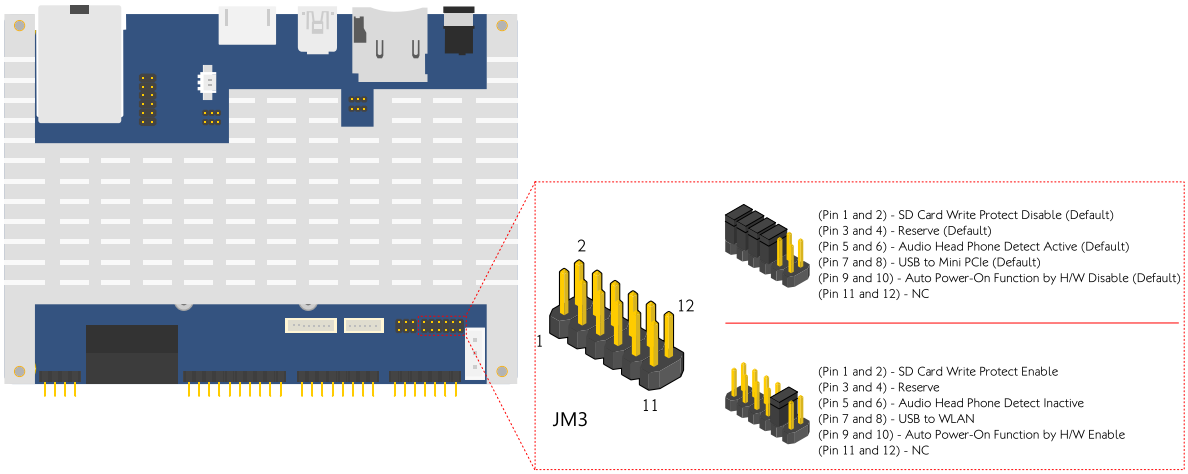


Figure 27: Miscellaneous jumper diagram

SD Card Write Protect Settings	Pin 1-2
Disable (Default)	Short
Enable	Open
Reserved	**Pin 3-4**
(Default)	Short
	Open
Audio Head Phone Detect Settings	**Pin 5-6**
Active (Default)	Short
Inactive	Open
USB Bus Selection Settings	**Pin 7-8**
USB to miniPCIe (Default)	Short
USB to WLAN	Open
Auto Power On Function by H/W Settings	**Pin 9-10**
Enable (Default)	Short
Disable	Open

Table 25: Miscellaneous jumper settings

Note:
In order to enable the Watchdog timer function, Auto Power On Function must be enabled first.

4. Hardware Installation

4.1. Installing into a Chassis

The VAB-1000 board can be fitted into any chassis that has the mounting holes for compatible with the standard Pico-ITX mounting hole locations. Additionally, the chassis must meet the minimum height requirements for specified areas of the board. If the VAB-1000-T I/O card is being used, the chassis will need to accommodate the additional space requirements.

4.1.1. Suggested minimum chassis dimensions

The figure below shows the suggested minimum space requirements that a chassis should have in order to work well with the VAB-1000 board.

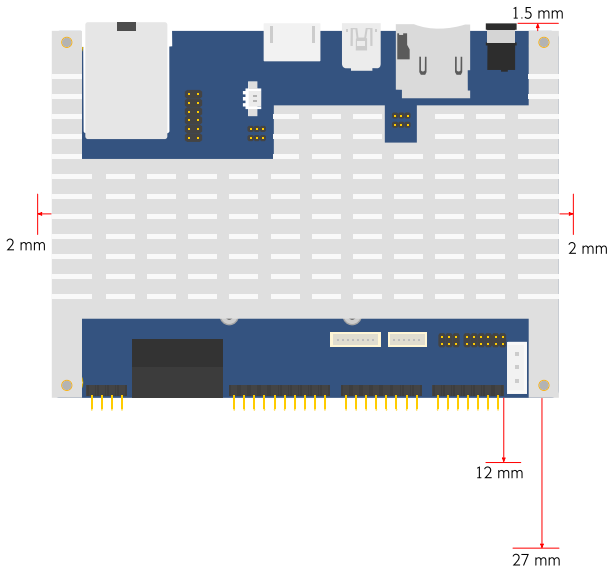


Figure 28: Suggested minimum chassis dimensions

Each side of the board should have a buffer zone from the internal wall of the chassis. The side of the board that accommodates the I/O coastline should have a buffer of 1.5mm. The side on the opposite end of the I/O coastline that has SATA connector and board-to-board pin headers should have a buffer of at least 12mm, or 27mm if the VAB-1000-T I/O card will be used. The two sides adjacent to the I/O coastline should have at least a 2mm buffer.

4.1.2. Suggested minimum chassis height

The figure below shows the suggested minimum height requirements for the internal space of the chassis. It is not necessary for the internal ceiling to be evenly flat. What is required is that the internal ceiling height must be strictly observed for each section that is highlighted.

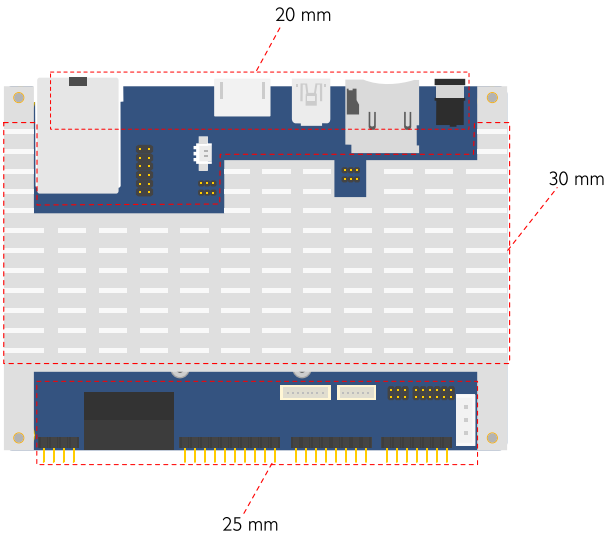


Figure 29: Suggested minimum internal chassis ceiling height

Note:
In getting the minimum height requirements for internal space of the chassis, it is required to consider the heights of the onboard connectors (such as JTAG connector and miniPCIe slot) on the bottom side of the VAB-1000 board.

4.1.3. Suggested keep out areas

The figure below shows the areas of the mainboard that is highly suggested to leave unobstructed.

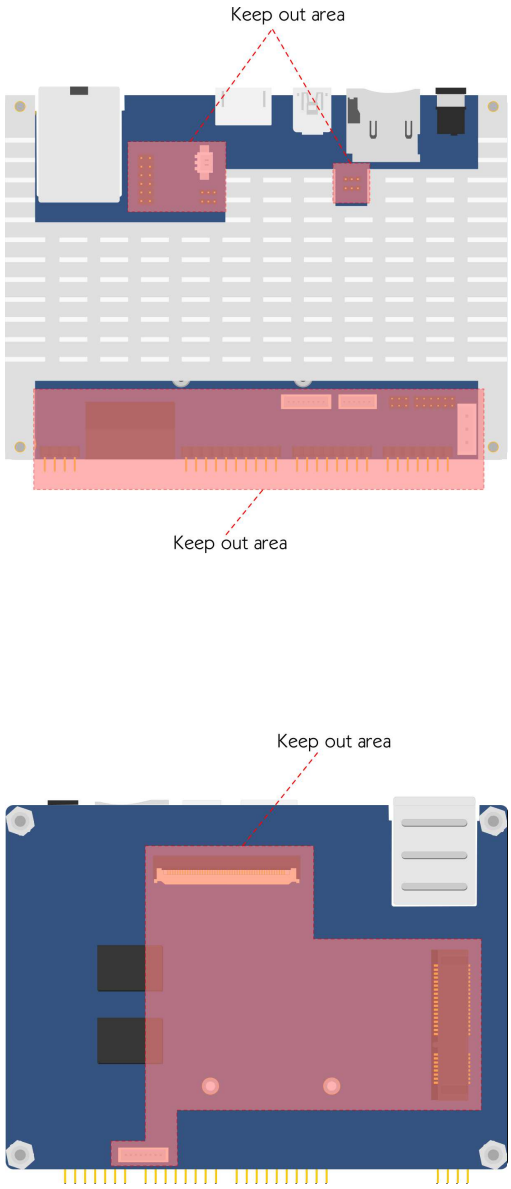


Figure 30: Suggested keep out areas

5. Software and Technical Supports

5.1. Android Support

The VAB-1000 Board Support Package features Android 4.4.2 operating system as well as the VIA Smart ETK comprising a number of APIs.

5.2. Technical Supports and Assistance

- For utilities downloads, latest documentation and new information about the VAB-1000, go to https://www.viatech.com/en/boards/pico-itx/vab-1000/
- For technical support and additional assistance, always contact your local sales representative or board distributor, or go to http://www.viatech.com/en/about/contact/ to fill up the form request.
- For OEM clients and system integrators developing a product for long term production, other code and resources may also be made available. Contact VIA to submit a request.

Appendix A. VAB-1000-T I/O Card

A.1. Specifications

Front Panel I/O

- 3 x Audio jacks (Line-in, Line-out and Mic-in)
- 1 x SSD activity LED indicator
- 1 x USB/COM LED indicator
- 2 x USB 2.0 ports
- 1 x Power on/off button with built-in LED
  - Supports three modes:
    - System Suspend/Resume (press the button once)
    - Popup power control menu (press the button for 4 seconds)
    - System Off (press the button for 8 seconds)

Onboard Connectors and Jumper

- 1 x Front panel, USB 2.0 and COM board-to-board connector
- 1 x Audio board-to-board connector
- 1 x COM pin header (for RS-232/Console)
- 1 x USB/COM jumper

Dimensions

- 100mm x 21mm

A.2. Layout Diagram

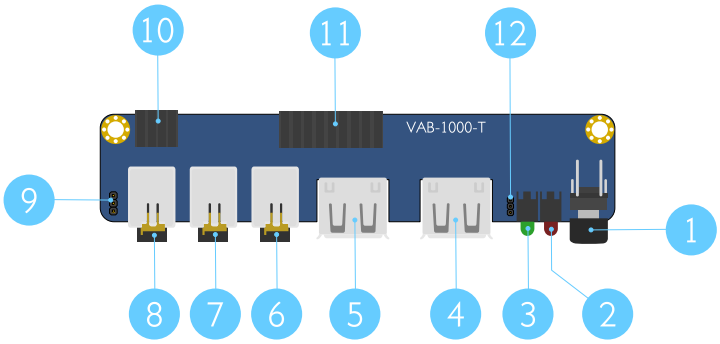


Figure 31: VAB-1000-T layout

Item	Description
1	PW_SW: Power on/off button with built-in LED
2	HD_LED: SSD activity LED indicator
3	USB/COM_LED: USB/COM indicator LED
4	USB2: USB 2.0 port
5	USB1: USB 2.0 port
6	LINE-IN: Line-in jack
7	LINE-OUT: Line-out jack
8	MIC-IN: Mic-in jack
9	COM1: COM pin header
10	B2B_AUDIO: Audio board-to-board connector
11	B2B_FRONT_USB_COM: Front panel, USB 2.0 and COM board-to-board connector
12	USB_COM_SEL: USB/COM jumper

Table 26: Layout diagram description table of VAB-1000-T

A.3. Dimensions

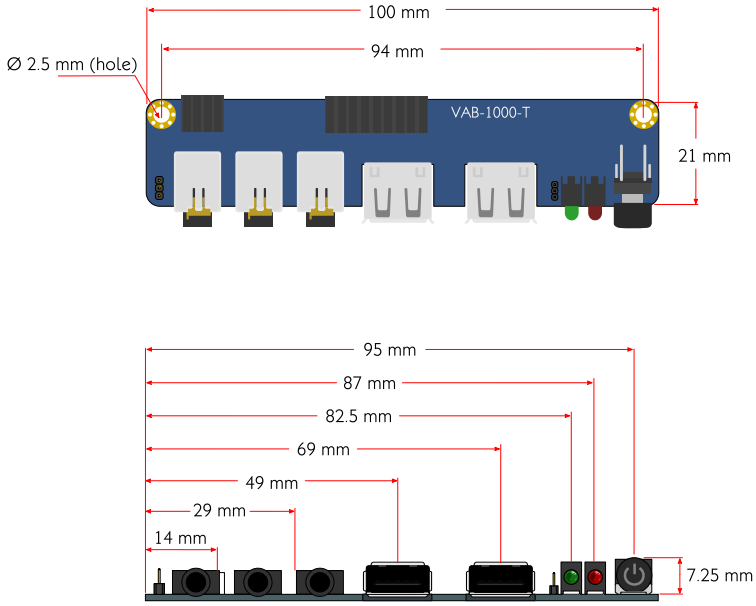


Figure 32: VAB-1000-T dimensions

A.4. Onboard Connectors and Jumper

A.4.1. Audio Board-to-Board Connector

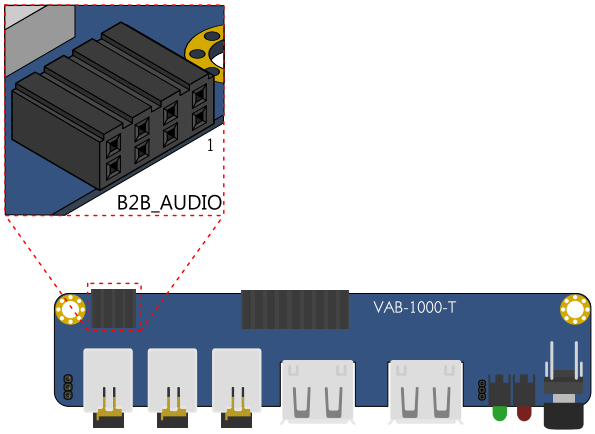


Figure 33: Audio board-to-board connector diagram

Pin	Signal	Pin	Signal
1	LINEIN_R	2	GND_AUDIO
3	LINEIN_L	4	MICIN1
5	LINEOUT_R	6	MINI2
7	LINEOUT_L	8	HP_DET-

Table 27: Audio board-to-board connector pinout

A.4.2. Front Panel, USB 2.0 and COM Board-to-Board Connector

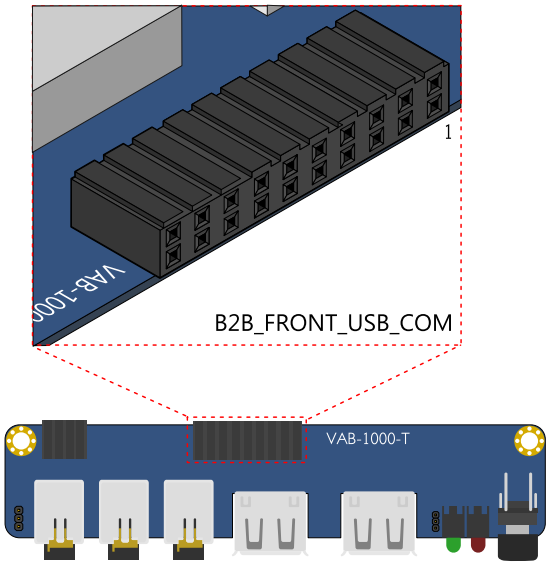


Figure 34: Front panel, USB 2.0 and COM board-to-board connector diagram

Pin	Signal	Pin	Signal
1	PWR_LED	2	VDD33_SUS
3	PWR_BUTTON-	4	GND
5	RESET_GND	6	GND
7	-HD_LED1	8	VDD50
9	VCC_USB2	10	VCC_USB3
11	USBH2_C_DM	12	USBH3_C_DM
13	USBH2_C_DP	14	USBH3_C_DP
15	GND	16	GND
17	DTE1_TXD_C	18	DTE1_RXD_C
19	HWTP_1	20	USBH123_SW

Table 28: Front panel, USB 2.0 and COM board-to-board connector pinout

A.4.3. COM Pin Header

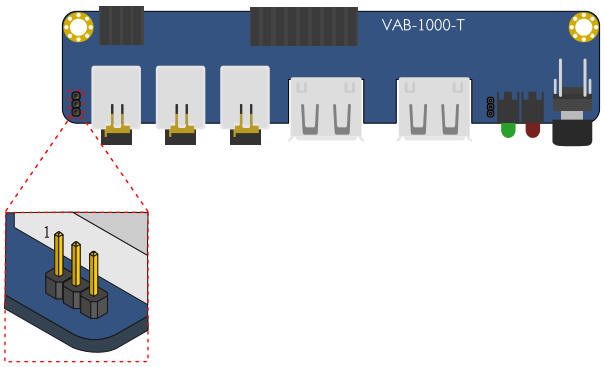


Figure 35: COM pin header diagram

Pin	Signal
1	DTE1_TXD
2	DTE1_RXD_C
3	GND

Table 29: COM pin header pinout

Note:
Please use the Console cable provided for connection.

A.4.4. USB/COM Jumper

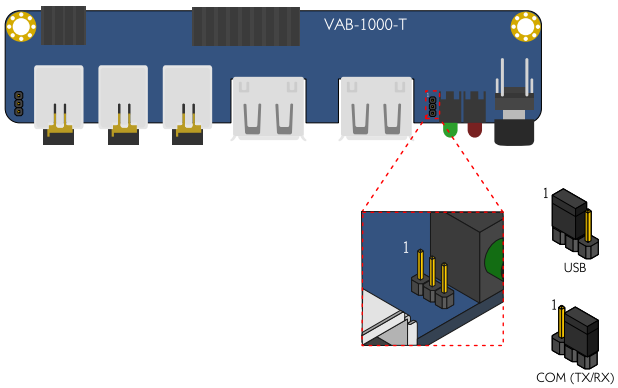


Figure 36: USB/COM jumper diagram

Settings	Pin 1	Pin 2	Pin 3
USB (Default)	Short	Short	Open
COM (TX/RX)	Open	Short	Short

Table 30: USB/COM jumper settings

Appendix B. VAB-1000-L LVDS Converter Card

B.1. Specifications

Onboard Connectors

- 1 x Board-to-Board LVDS connector
- 1 x 1-Channel LVDS panel connector
- 1 x 1-Channel Backlight connector
- 1 x 2-Channel LVDS panel connector
- 1 x 2-Channel Backlight connector
- 1 x DC-in connector

Dimensions

- 68mm x 47mm

B.2. Layout Diagram

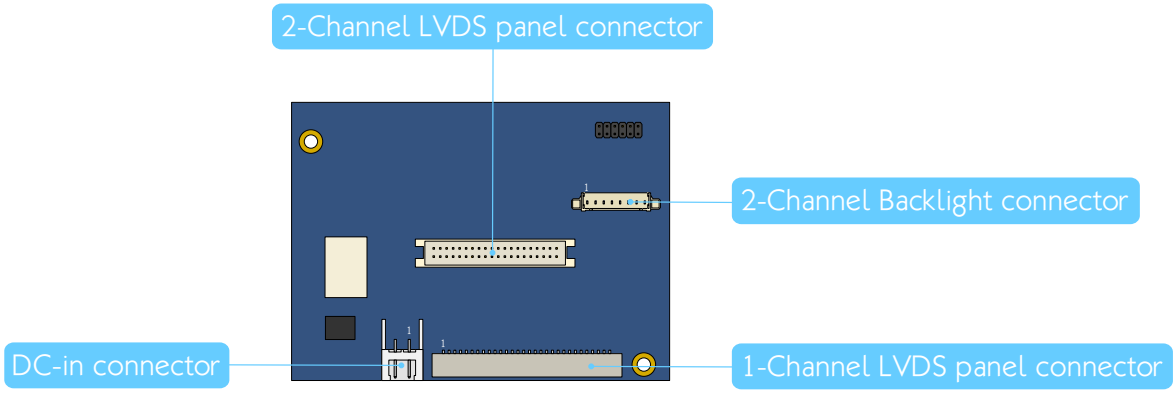


Figure 37: VAB-1000-L layout (top side)

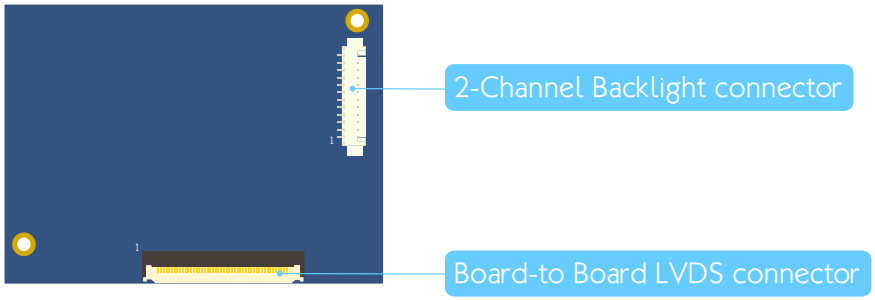


Figure 38: VAB-1000-L layout (bottom side)

B.3. Dimensions

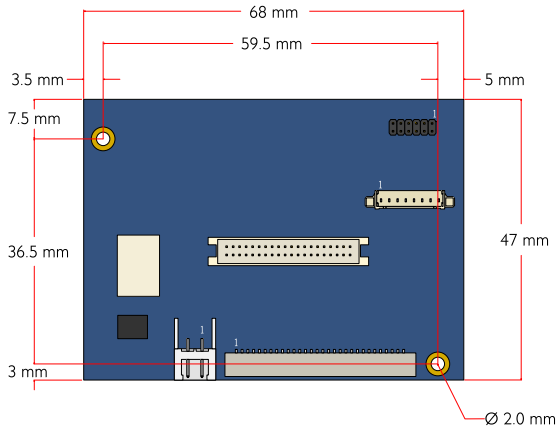


Figure 39: VAB-1000-L dimensions (top view)

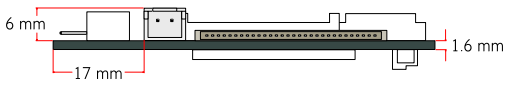


Figure 40: VAB-1000-L dimensions (side view)

B.4. VAB-1000-L Onboard Connectors

B.4.1. Board-to-Board LVDS Connector

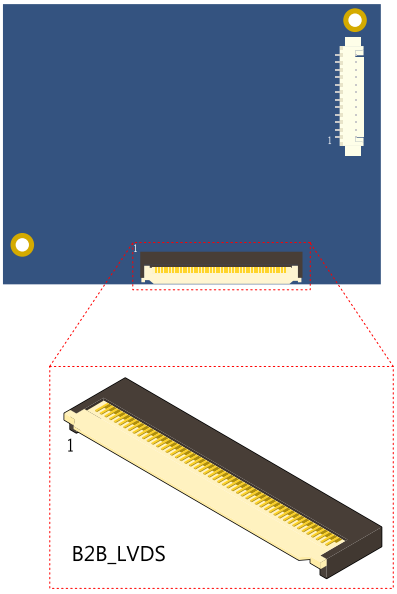


Figure 41: Board-to-board LVDS connector diagram

Pin	Signal	Pin	Signal
1	GND	2	NC
3	NC	4	NC
5	NC	6	NC
7	NC	8	BAK_ADJ
9	ENABLT1	10	LCD_DATA
11	LCD_CLK	12	VDD33
13	CLK2P1	14	CLK2M1
15	GND	16	A7P1
17	A7M1	18	GND
19	A6P1	20	A6M1
21	GND	22	A5P1
23	A5M1	24	GND
25	A4P1	26	A4M1
27	GND	28	CLK1P1
29	CLK1M1	30	GND
31	A3P1	32	A3M1
33	GND	34	A2P1
35	A2M1	36	GND
37	A1P1	38	A1M1
39	GND	40	A0P1
41	A0M1	42	GND

43	VDD_BL	44	VDD_BL
45	VDD_BL	46	VDD50
47	VDD50	48	PVDD1
49	PVDD1	50	PVDD1

Table 31: Board-to-board LVDS connector pinout

B.4.2. 2-Channel LVDS Panel Connector

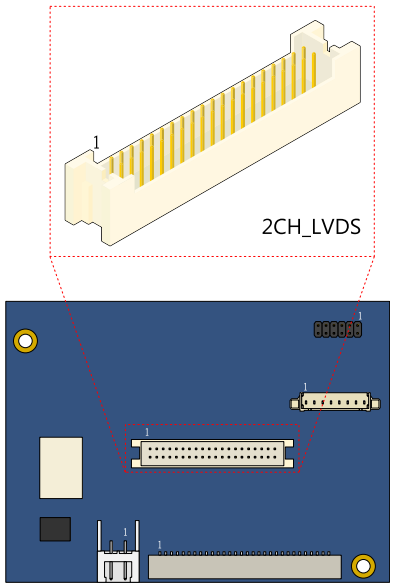


Figure 42: 2-Channel LVDS panel connector diagram

Pin	Signal	Pin	Signal
1	2CH_1LDC4-	2	PVDD1
3	2CH_1LDC4+	4	PVDD1
5	GND	6	GND
7	2CH_1LDC5-	8	GND
9	2CH_1LDC5+	10	2CH_1LDC0-
11	GND	12	2CH_1LDC0+
13	2CH_1LDC6-	14	GND
15	2CH_1LDC6+	16	2CH_1LDC1-
17	GND	18	2CH_1LDC1+
19	2CH_1LCLK2-	20	GND
21	2CH_1LCLK2+	22	2CH_1LDC2-
23	GND	24	2CH_1LDC2+
25	2CH_1LDC7-	26	GND
27	2CH_1LDC7+	28	2CH_1LCLK1-
29	NC	30	2CH_1LCLK1+
31	GND	32	GND
33	+3.3V	34	2CH_1LDC3-
35	NC	36	2CH_1LDC3+
37	Reserved	38	LCD_CLK
39	SEL68	40	LCD_DAT

Table 32: 2-Channel LVDS panel connector pinout

B.4.3. 1-Channel LVDS Panel Connector

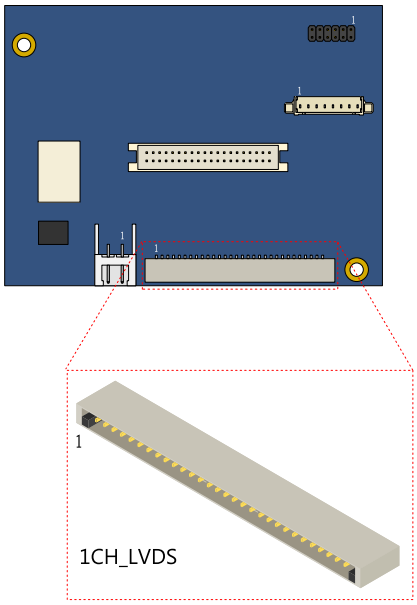


Figure 43: 1-Channel LVDS panel connector diagram

Pin	Signal	Pin	Signal
1	NC	2	PVDD1
3	PVDD1	4	GND
5	GND	6	NC
7	1CH_1LDC0+	8	1CH_1LDC0-
9	GND	10	1CH_1LDC1+
11	1CH_1LDC1-	12	GND
13	1CH_1LDC2+	14	1CH_1LDC2-
15	GND	16	1CH_1LCLK1+
17	1CH_1LCK1-	18	GND
19	1CH_1LDC3+	20	1CH_1LDC3-
21	GND	22	NC
23	NC	24	GND
25	NC	26	PVDD1
27	NC	28	NC
29	NC	30	NC

Table 33: 1-Channel LVDS panel connector pinout

B.4.4. 2-Channel Backlight Connector

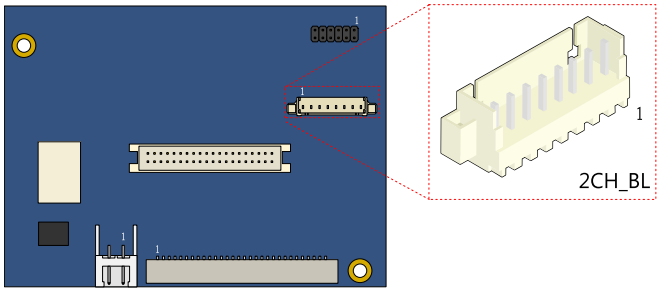


Figure 44: 2-Channel backlight connector diagram

Pin	Signal	Pin	Signal
1	VDD_BL_C	2	VDD_BL_C
3	ENABLT1	4	NC
5	NC	6	BL_CTL
7	GND	8	GND

Table 34: 2-Channel backlight connector pinout

B.4.5. 1-Channel Backlight Connector

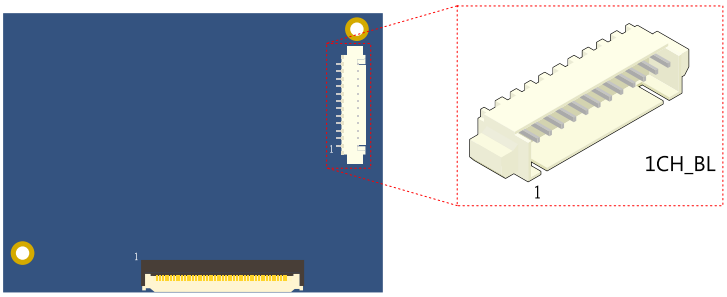


Figure 45: 1-Channel backlight connector diagram

Pin	Signal	Pin	Signal
1	NC	2	NC
3	BAK_ADJ	4	ENABLT1
5	NC	6	NC
7	NC	8	GND
9	GND	10	VDD_BL_C
11	VDD_BL_C	12	VDD_BL_C

Table 35: 1-Channel backlight connector pinout

B.4.6. DC-in Connector

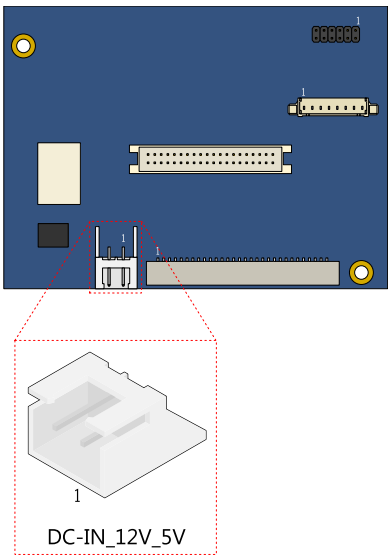


Figure 46: DC-in connector diagram

Pin	Signal
1	GND
2	DCIN

Table 36: DC-in connector pinout

Note:
A panel that carries voltage lower than 12V does not need to externally connect to a DC-in connector.

Appendix C. Installing I/O Expansion Card

C.1. Installing the VAB-1000-T I/O Card

The VAB-1000 board comes with a VAB-1000-T I/O card. The VAB-1000-T I/O card is an extender card, which adds multiple I/O interfaces, including audio jacks, USB 2.0 ports, LED indicators, power on/off button and COM pin header for one COM port (TX/RX support only) as well as board-to-board connectors.

Step 1

Align the Audio and Front panel, USB 2.0 and COM board-to-board connectors on the VAB-1000-T I/O card with the CN6 and CN7 pin header block on the VAB-1000 board.

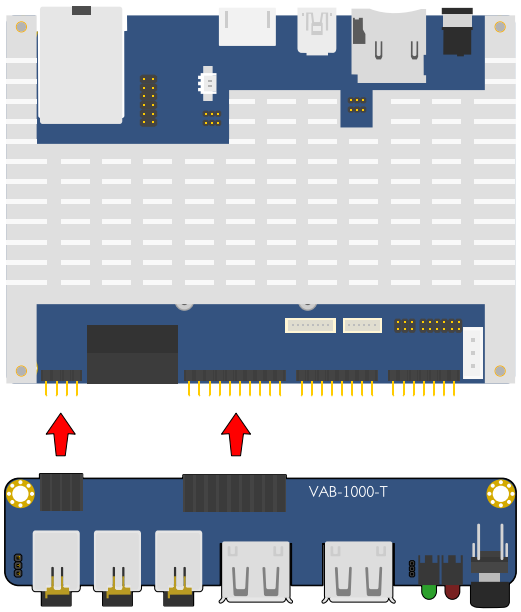


Figure 47: Installing the VAB-1000-T I/O card

Step 2

Gently apply even pressure until the pins on the VAB-1000 board have been fully inserted into the Audio and Front panel, USB 2.0, and COM board-to-board connectors of the VAB-1000-T I/O card.

Step 3

Secure the VAB-1000-T I/O card to the standoffs with two screws.

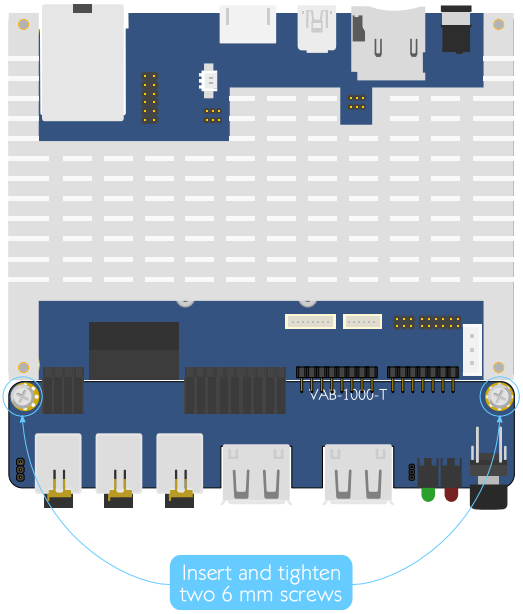


Figure 48: Securing the VAB-1000-T I/O card

C.2. Installing VAB-1000-L LVDS Converter Card (optional)

Step 1

Connect one end of the LVDS flat flex cable into the LVDS panel connector on the VAB-1000 board, then connect the other end of the cable to the board-to-board LVDS connector on the VAB-1000-L LVDS converter card.

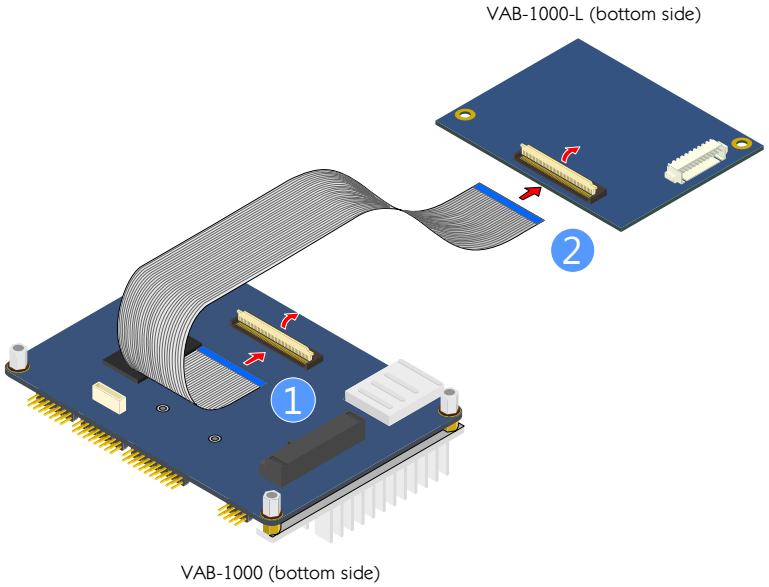


Figure 49: Connecting the LVDS flat flex cable

Step 2

Install the VAB-1000-L LVDS converter card to a suitable surface on the chassis and secure it with two screws.

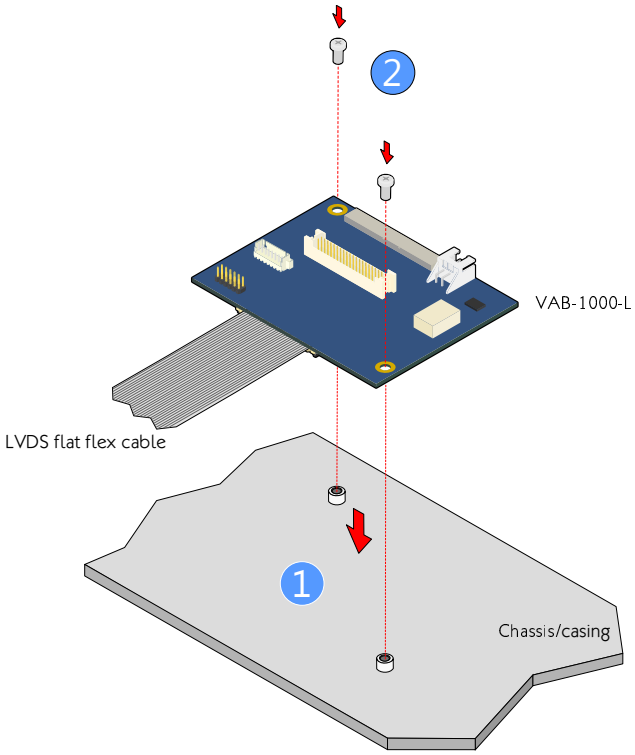


Figure 50: Installing the VAB-1000-L LVDS converter card on the chassis

Step 3

Connect the 2-Channel backlight cable into the 2-Channel backlight connector on the VAB-1000-L LVDS converter card, and then connect the other end of the cable into the 10.4" LVDS panel display.

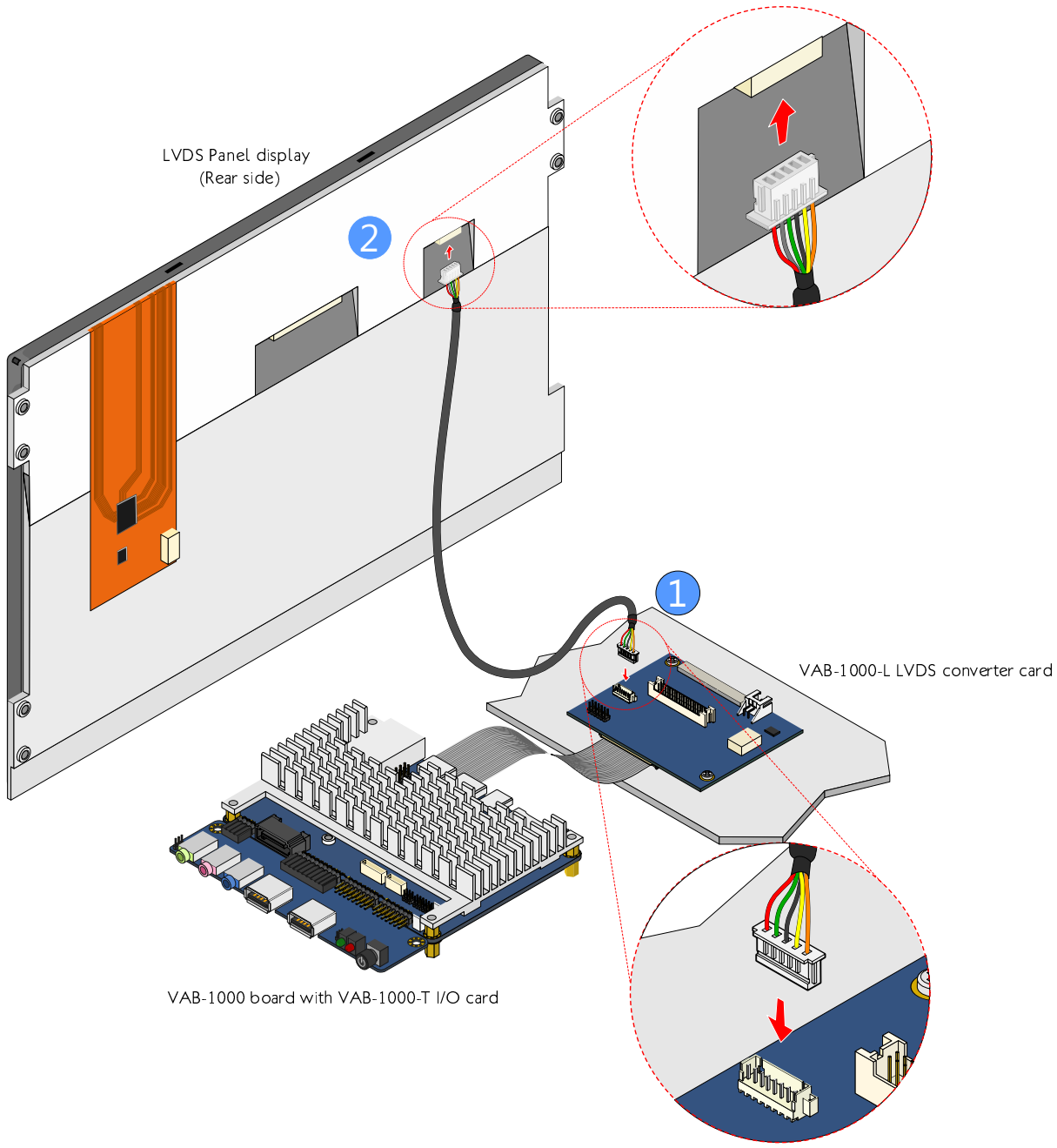


Figure 51: Connecting the 2-Channel backlight cable

Step 4

Connect the 2-Channel LVDS cable into the 2-Channel LVDS panel connector on the VAB-1000-L LVDS converter card, and then connect the other end of the cable into the 10.4" LVDS panel display.

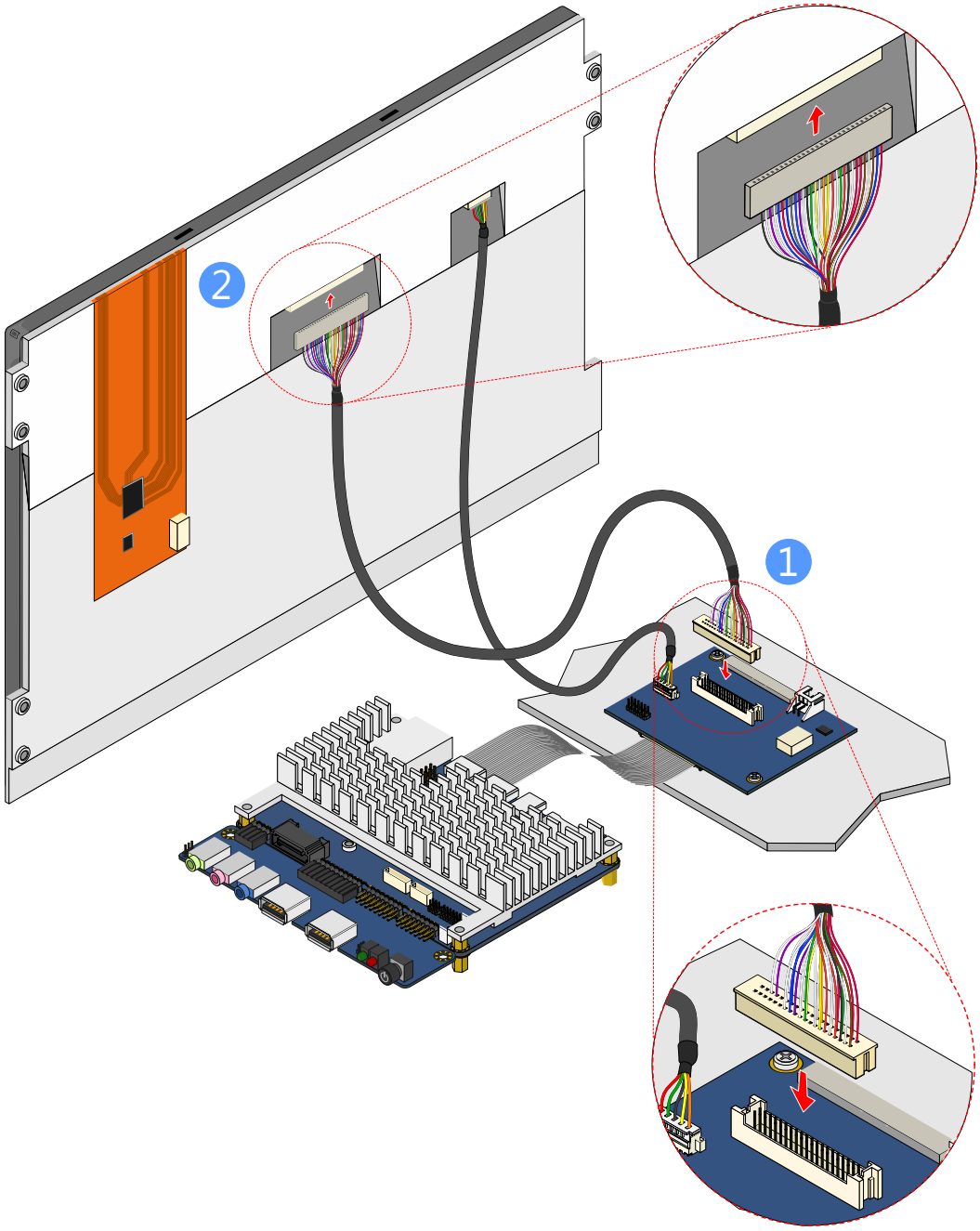


Figure 52: Connecting the 2-Channel LVDS cable

Step 5

Connect the USB touch panel cable into the 10.4" LVDS panel display, and then connect the other end of the cable into one of the USB 2.0 port on the VAB-1000 board.

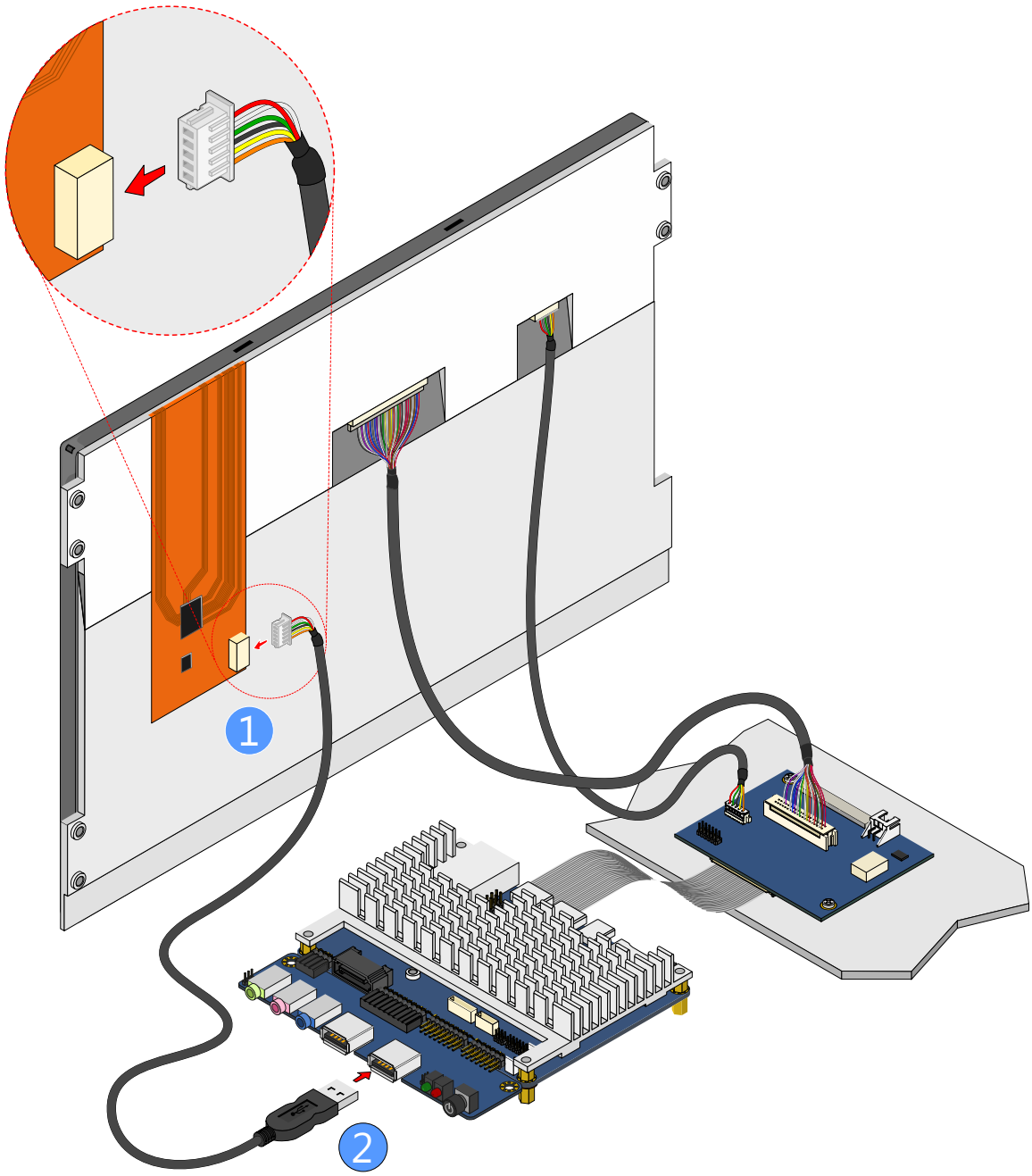


Figure 53: Connecting the USB touch panel cable

Step 4

Connect the DC-in cable into the DC-in connector on the VAB-1000-L LVDS converter card.

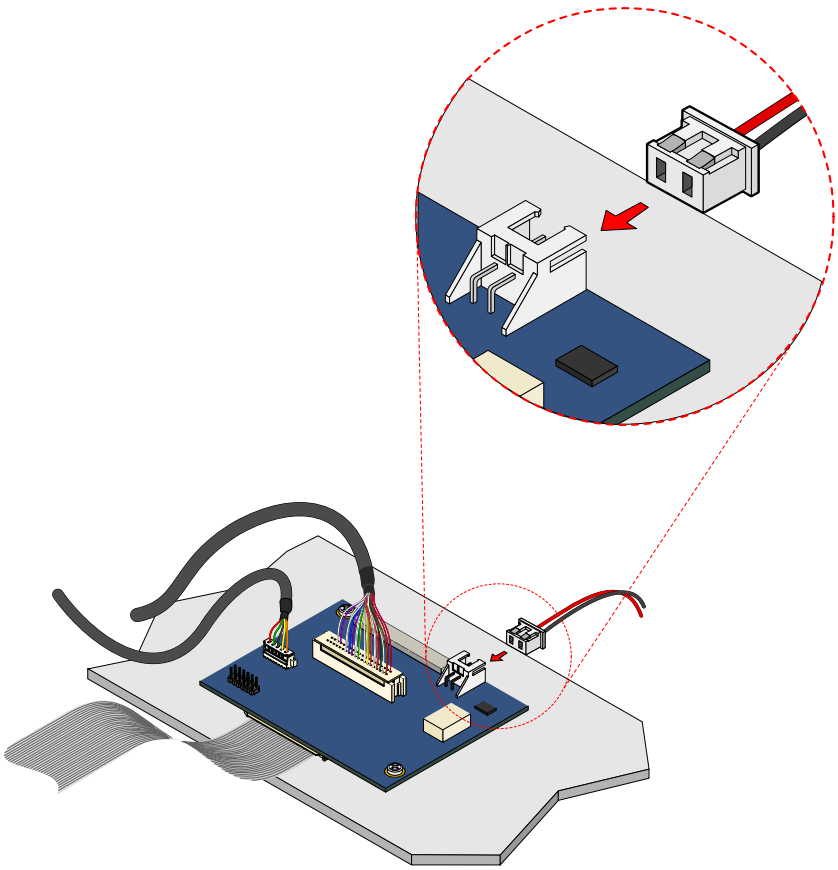


Figure 54: Connecting the DC-in cable

Appendix D. Installing Wireless Accessories

This section provides information on how to install the optional wireless accessories to provide wireless connection such as Wi-Fi, Bluetooth and 3G.

D.1. Installing the VNT9271 USB Wi-Fi Dongle

Step 1

Locate a USB 2.0 port on the front panel.

Step 2

Insert the VNT9271 dongle in one of the USB 2.0 port.

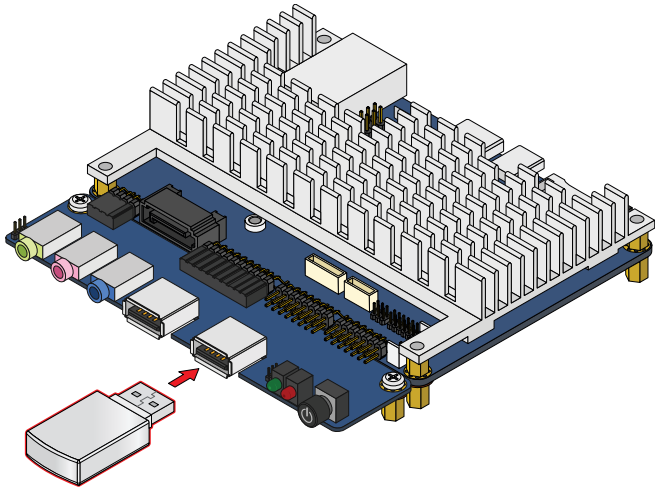


Figure 55: Inserting VNT9271 USB Wi-Fi dongle

D.2. Installing the EMIO-1533 USB Wi-Fi Module

Step 1

Mount the EMIO-1533 module to the prepared standoff on the chassis. Align the two mounting holes on the EMIO-1533 module with the mounting holes on the standoffs, then secure the EMIO-1533 module in place with two screws.

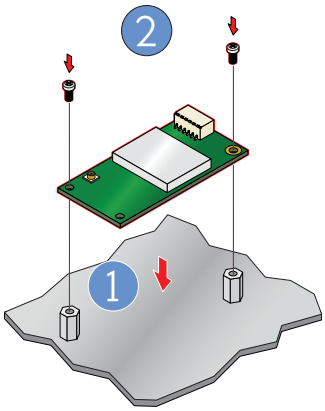


Figure 56: Installing EMIO-1533 module

Step 2

Connect one end of the USB Wi-Fi cable to the onboard USB 2.0 connector (WLAN1), and then connect the other end of the cable to the EMIO-1533 module.

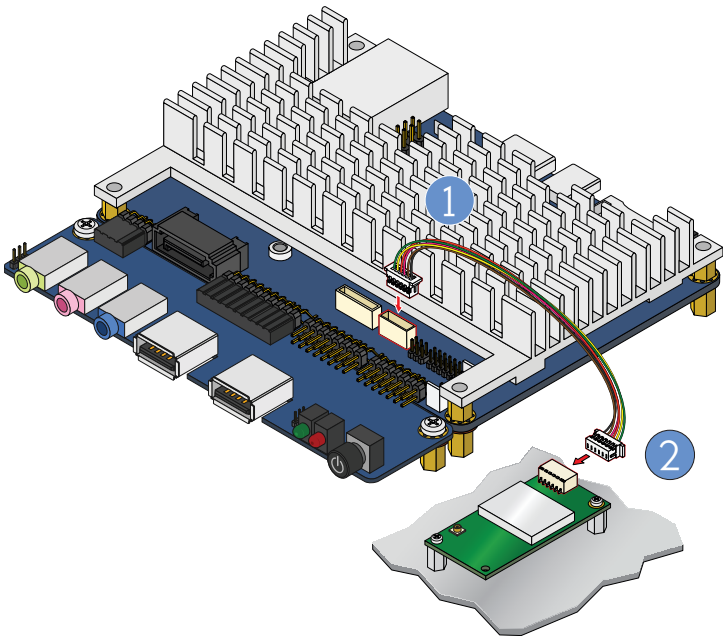


Figure 57: Connecting the USB Wi-Fi cable diagram

Step 3

Insert the Wi-Fi antenna cable into the antenna hole from the inside of the panel I/O plate. Insert the toothed washer, fasten it with the nut and install the external antenna.

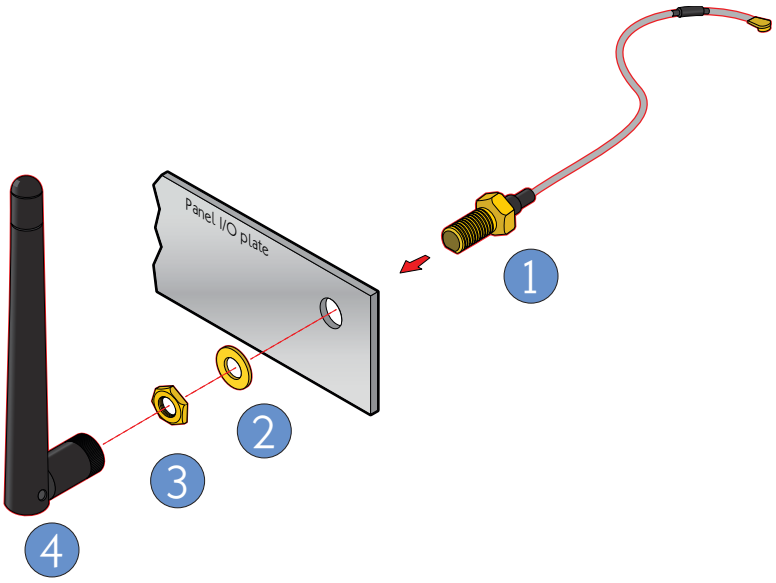


Figure 58: Installing Wi-Fi antenna cable diagram

Step 4

Connect the other end of the Wi-Fi antenna cable to the micro-RF connector labeled "IPEX" on the EMIO-1533 module.

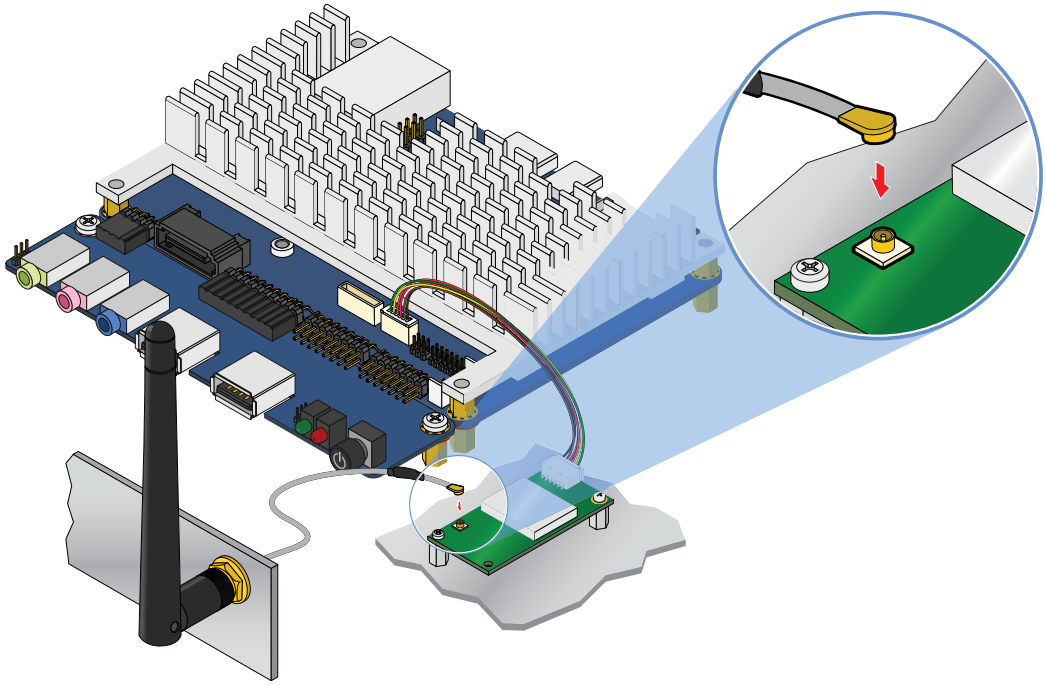


Figure 59: Connecting the Wi-Fi antenna cable to EMIO-1533 module

D.3. Installing the EMIO-1541 miniPCIe Wi-Fi Module

Step 1

Locate the miniPCIe slot and install the hex standoff screw provided.

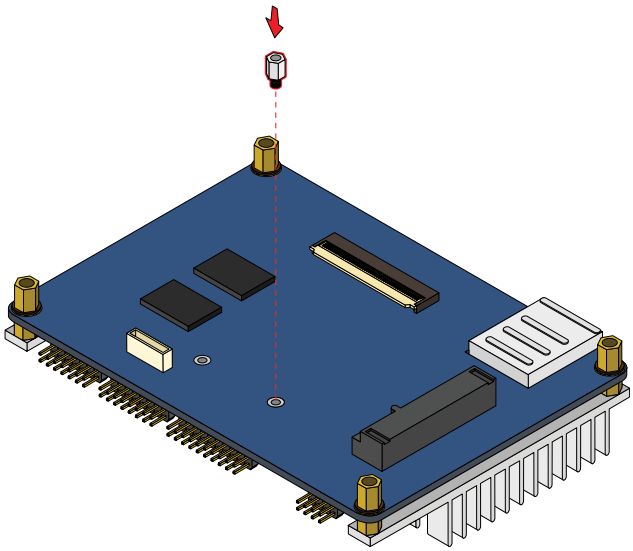


Figure 60: Installing the hex standoff screw for EMIO-1541 module

Step 2

Align the notch on the EMIO-1541 module with the protruding wedge on the miniPCIe slot then insert the module at 30° angle.

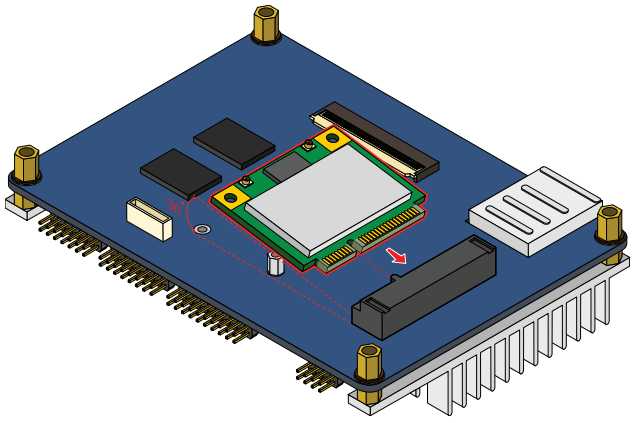


Figure 61: Installing the EMIO-1541 module

Step 3

Once the module has been inserted, push down the module until the screw hole align with the mounting hole on the hex standoff. Secure the module with screw to the standoff.

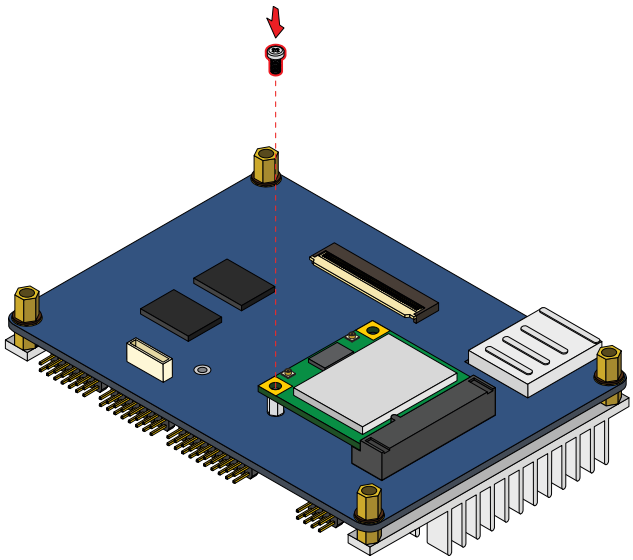


Figure 62: Securing the EMIO-1541 module

Step 4

Insert the Wi-Fi antenna cable into the antenna hole from inside of the chassis. Insert the washer, and fasten it with the nut. Then install the external antenna.

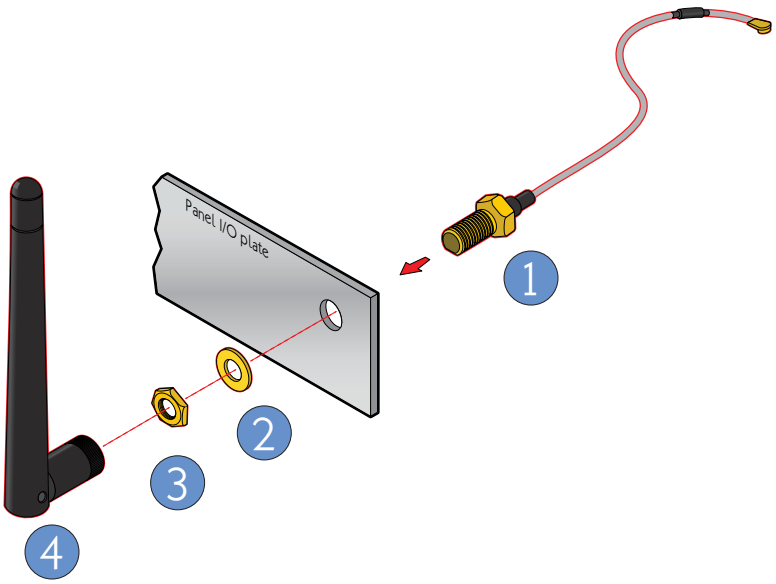


Figure 63: Installing the Wi-Fi antenna of EMIO-1541 module

Step 5

Connect the other end of the Wi-Fi antenna cable onto the micro-RF connector labeled "TRX" on the EMIO-1541 module.

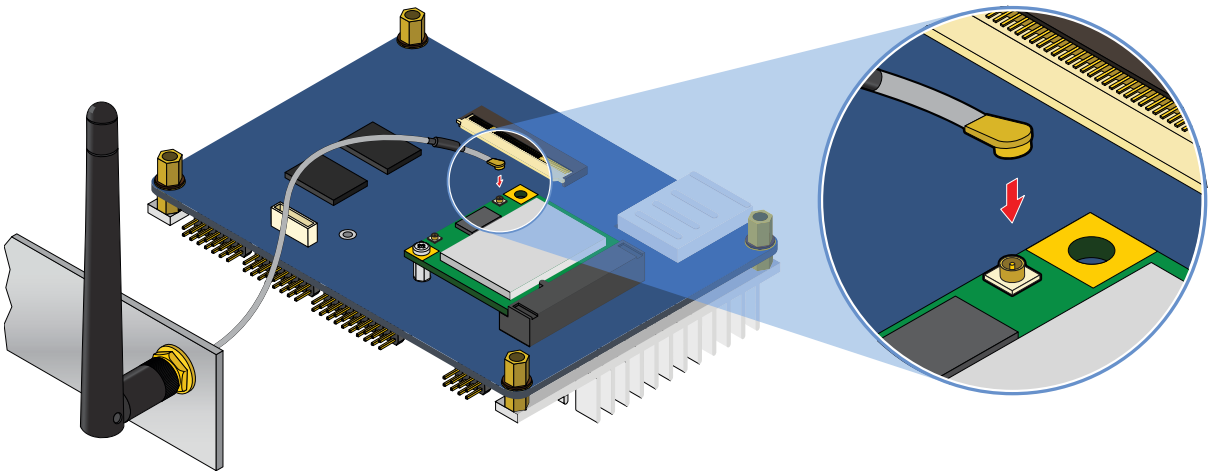


Figure 64: Connecting the Wi-Fi antenna cable to EMIO-1541 module

D.4. Installing the EMIO-2550 miniPCIe Mobile Broadband Module

Step 1

Insert the SIM card on the bottom side of the EMIO-2550 module. (EMIO-2550-00A1)

Step 2

Locate the miniPCIe slot and install the hex standoff screw provided.

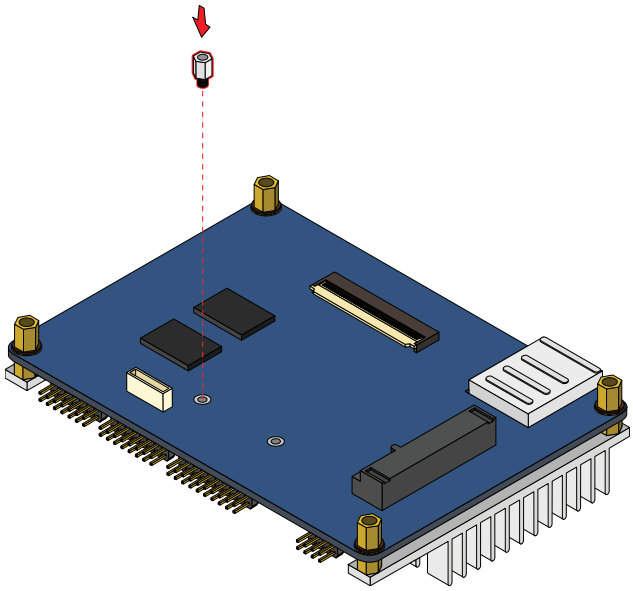


Figure 65: Installing the hex standoff screw for EMIO-2550 module

Step 3

Align the notch on the EMIO-2550 module with the protruding wedge on the miniPCIe slot then insert the module at 30° angle.

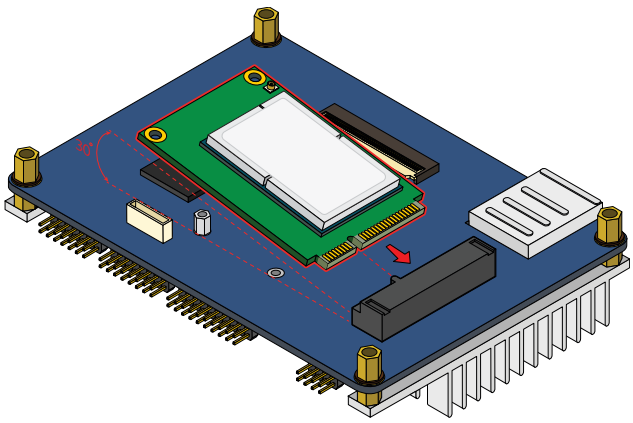


Figure 66: Installing the EMIO-2550 module

Step 4

Once the module has been inserted, push down the module until the screw hole align with the mounting hole on the standoff. Secure the module with the screw to the standoff.

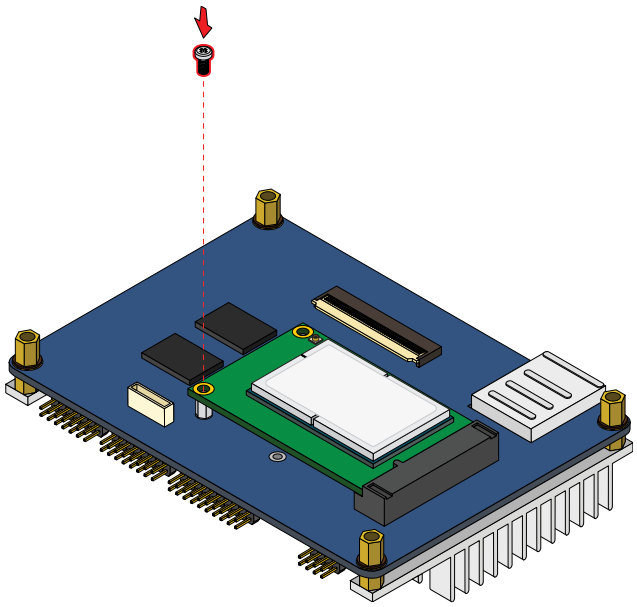


Figure 67: Securing the EMIO-2550 module

Step 5

Insert the 3G antenna cable into the antenna hole from the inside of the panel I/O plate. Insert the toothed washer, fasten it with the nut and install the external 3G antenna.

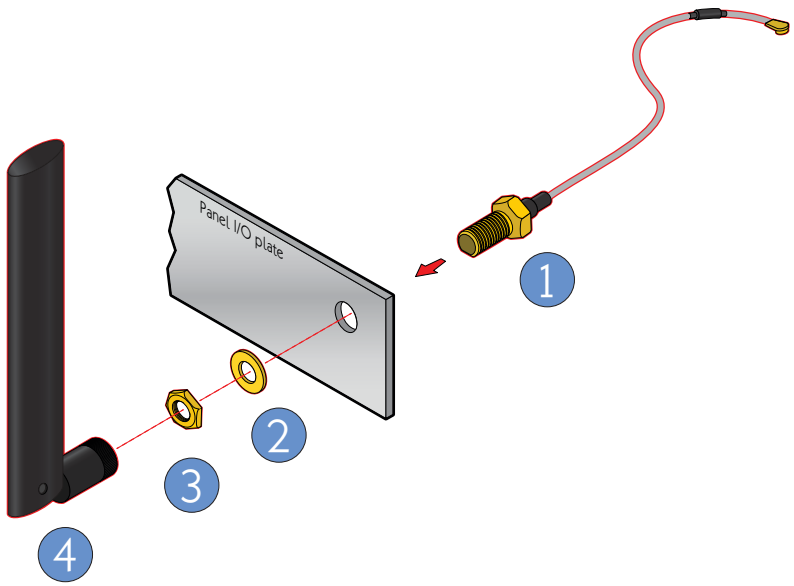


Figure 68: Installing the 3G antenna cable diagram

Step 6

Connect the other end of the 3G antenna cable onto the micro-RF connector labeled "MAN" on the EMIO-2550 module.

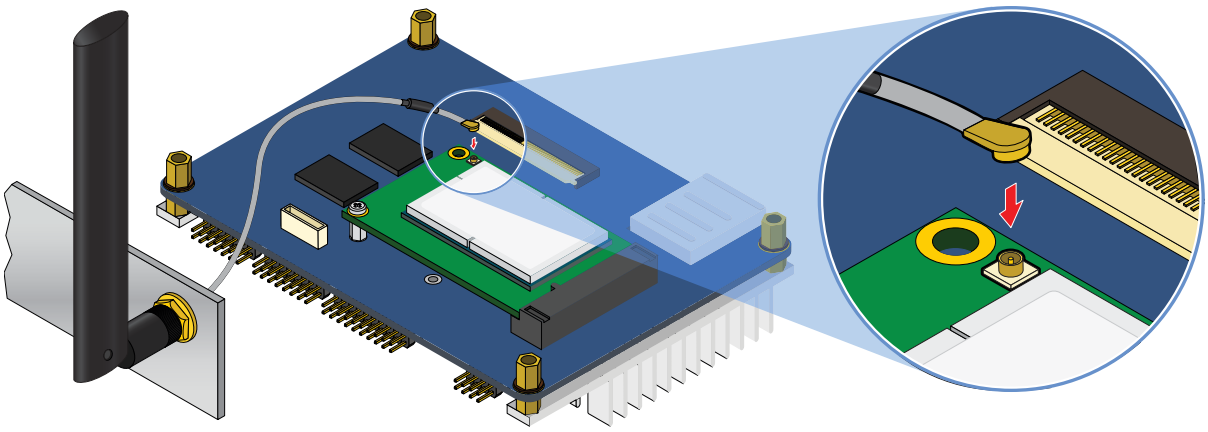


Figure 69: Connecting the 3G antenna cable to EMIO-2550 module

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