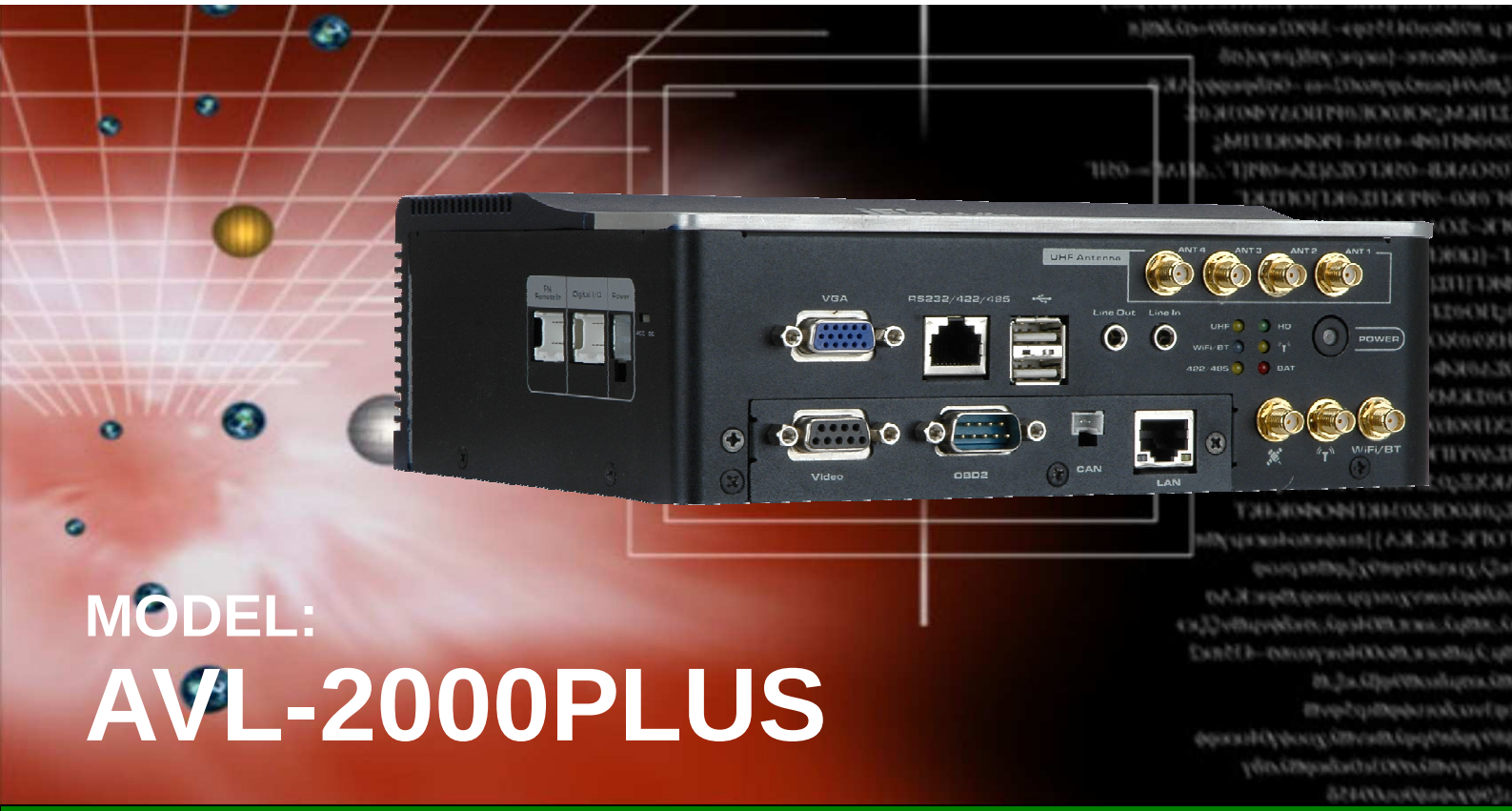
IEI Technology Corp.



MODEL:

AVL-2000PLUS

Auto Data Server with Intel® Atom™ CPU, Gigabit Ethernet, OBD-II, USB, GPS, Wi-Fi, Bluetooth, Video Capture, Audio, RS-232/422/485, RoHS Compliant

User Manual

Rev. 1.00 – 28 June, 2011

RoHS Lead Free

Revision

Date	Version	Changes
28 June, 2011	1.00	Initial release

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Chapter

1

Introduction

1.1 Overview

Figure 1-1: AVL-2000PLUS Auto Data Server

The AVL-2000PLUS is an embedded system for indoor only.

At the heart of the system is the Intel® Atom™ processor, offering low power in a powerful package. The chipset is rounded off with the Intel® US15WP.

The system also offers HSUPA/GPRS/GSM connection, Global Position System (GPS) and On-Board Diagnostic System (OBD) technology. Other peripherals include two USB ports, an RS-232/422/485 port, one GbE port, video capture port and audio line-in and line-out jacks. Wireless networking capabilities include Bluetooth 2.0 and 802.11 b/g.

1.2 Features

There are four models in the AVL-2000PLUS. Both models feature the following:

- Fanless system with 1.1GHz Intel® Atom™ Z510 CPU
- Pre-installed 1 GB 533 MHz DDR2 memory
- Supports Windows XP, Windows 7 Embedded
- Pre-installed 4 GB CF card for OS
- SD card slot for data storage
- VGA output port and NTSC/PAL video capture (120FPS@DI)
- Network connectivity via HSDPA/GPRS/GSM, Wi-Fi and Bluetooth
- RS-232/422/485 serial port (RJ-45 interface)
- 10/100/1000 Mbps Ethernet
- Digital input/output supported
- DIN rail mount support
- Two USB ports
- Audio line-in and line-out

- GPS system
- Optional UHF RFID reader module
- Supports OBD-II/FMS/J1939
- RoHS compliance

1.3 Front Panel

The following are found on the front panel.

- 1 x VGA connector
- 1 x Video capture connector
- 1 x RS-232/422/485 connector (RJ-45)
- 2 x USB ports
- 1 x Gigabit Ethernet RJ-45 port
- 1 x DB-9 connector (connects to OBD-II with included cable)
- 1 x CAN connector
- 1 x Audio line-in jack
- 1 x Audio line-out jack
- 1 x Power button
- 1 x GPS antenna connector
- 1 x 2.5G/3G/3.5G antenna connector
- 1 x Wi-Fi/Bluetooth antenna connector
- 4 x UHF RFID antenna connectors

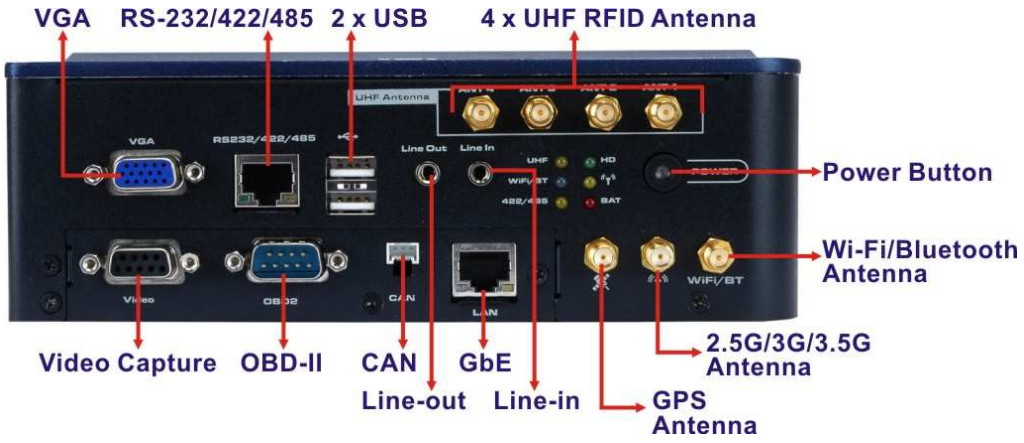

Figure 1-2: Front Panel

1.3.1 LED Indicators

The LED indicators on the front panel show the status of UHF RFID, Wi-Fi/Bluetooth, RS-422/485, GPRS/HSUPA connection as well as CF card and battery activity.

Figure 1-3: LED Indicators

1.4 Rear Panel

The rear panel has VESA mounting screw holes for DIN rail mounting.

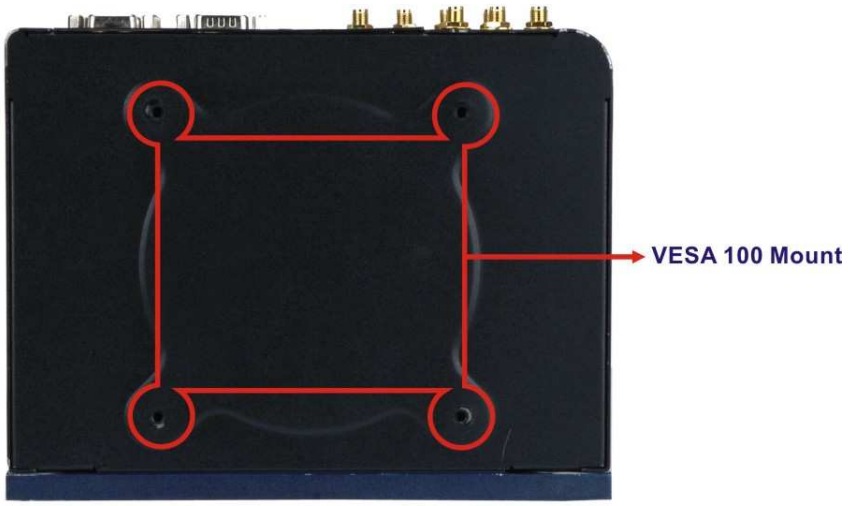

Figure 1-4: Rear View

1.5 Right Panel

The right panel has one remote control connector, one digital I/O connector and one 12 V DC power connector. The ACC/DC power switch is also located on the right panel.

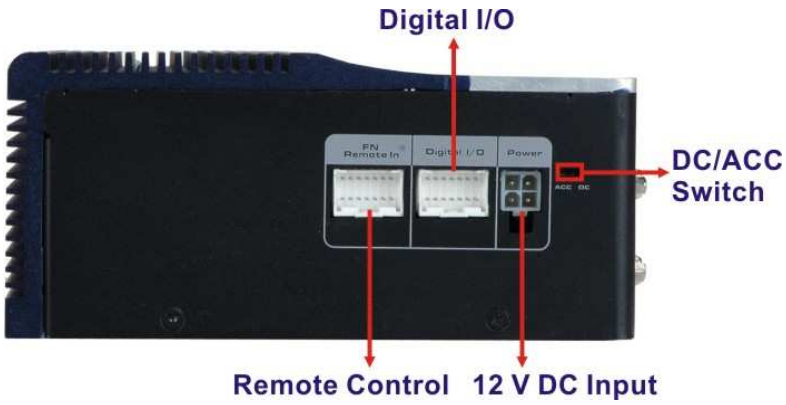

Figure 1-5: Right Panel

1.6 Left Panel

The left panel provide access to the SD card slot, SIM card slot and CF card slot. These slots are protected by a cover. After inset the SD card slot, SIM card slot or CF card shell be closed the cover with screw before operation.

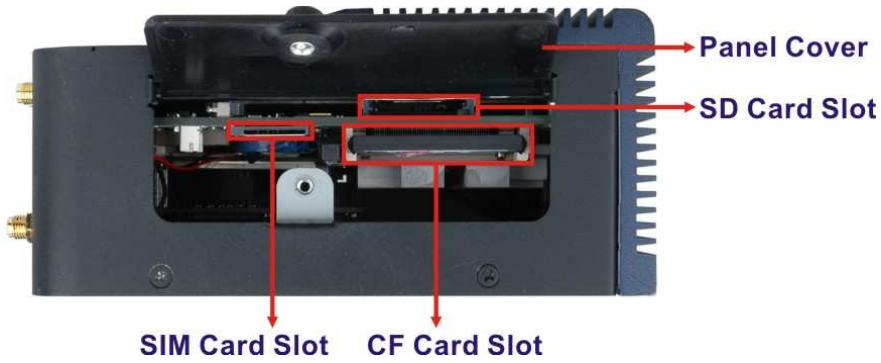

Figure 1-6: Left Panel

1.7 System Specifications

The technical specifications for the AVL-2000PLUS systems are listed in **Table 1-1.**

System	
CPU	1.1 GHz Intel® Atom™ Z510
Chipset	Intel® US15WP
Memory	One 1.0 GB 533 MHz DDR2 pre-installed
OS	Windows 7 Embedded
Storage	1 x 4 GB CompactFlash® card (500x) preinstalled 1 x SD card slot
Audio	Realtek ALC888
Digital I/O	4 inputs / 4 outputs
Communication	
LAN	1 x 10/100/1000 Mbps RJ-45
Wireless LAN	802.11b/g
Bluetooth	Bluetooth 2.0 + EDR Class 1
Data Rate	WCDMA/HSUPA
GPS	Support GPS
Data Collection	
RFID	Optional ISO 18000-6C UHF RFID operation frequency 915MHz 0nly
Video Capture	Video input: 4-channel composite video (NTSC/PAL/SECAM) Frame rate: four channels with 120fps@D1 per channel (NTSC), four channels with 100fps@D1 per channel (PAL/SECAM)
Power	
Power Input	9~30 V DC input
Physical Character	
Mounting	DIN rail mount (VESA 100 mm x 100 mm)
Dimensions (W x D x H)	200 mm x 155 mm x 70 mm
Operation Temperature	-20ºC ~ 40ºC
Storage Temperature	-30ºC ~ 80ºC
Humidity	5% ~ 95% non-condense
Net weight	1.978 kg
Safety	CE, FCC, CCC, E-MARK

Connectors and Buttons	
Antenna Connectors	1 x GPS antenna connector 1 x 2.5G/3G/3.5G antenna connector 1 x Wi-Fi/Bluetooth antenna connector 4 x UHF RFID antenna connectors
I/O Ports and Switches	1 x Power connector 1 x VGA connector 1 x Video capture connector 1 x RS-232/422/485 connector (RJ-45) 2 x USB ports 1 x Gigabit Ethernet RJ-45 port 1 x DB-9 connector (connects to OBD-II with included cable) 1 x CAN connector 1 x Audio line-in jack 1 x Audio line-out jack 1 x Digital I/O connector
Button and Switch	1 x Power button 1 x ACC/DC switch

Table 1-1: Technical Specifications

1.8 Dimensions

The dimensions are shown below.

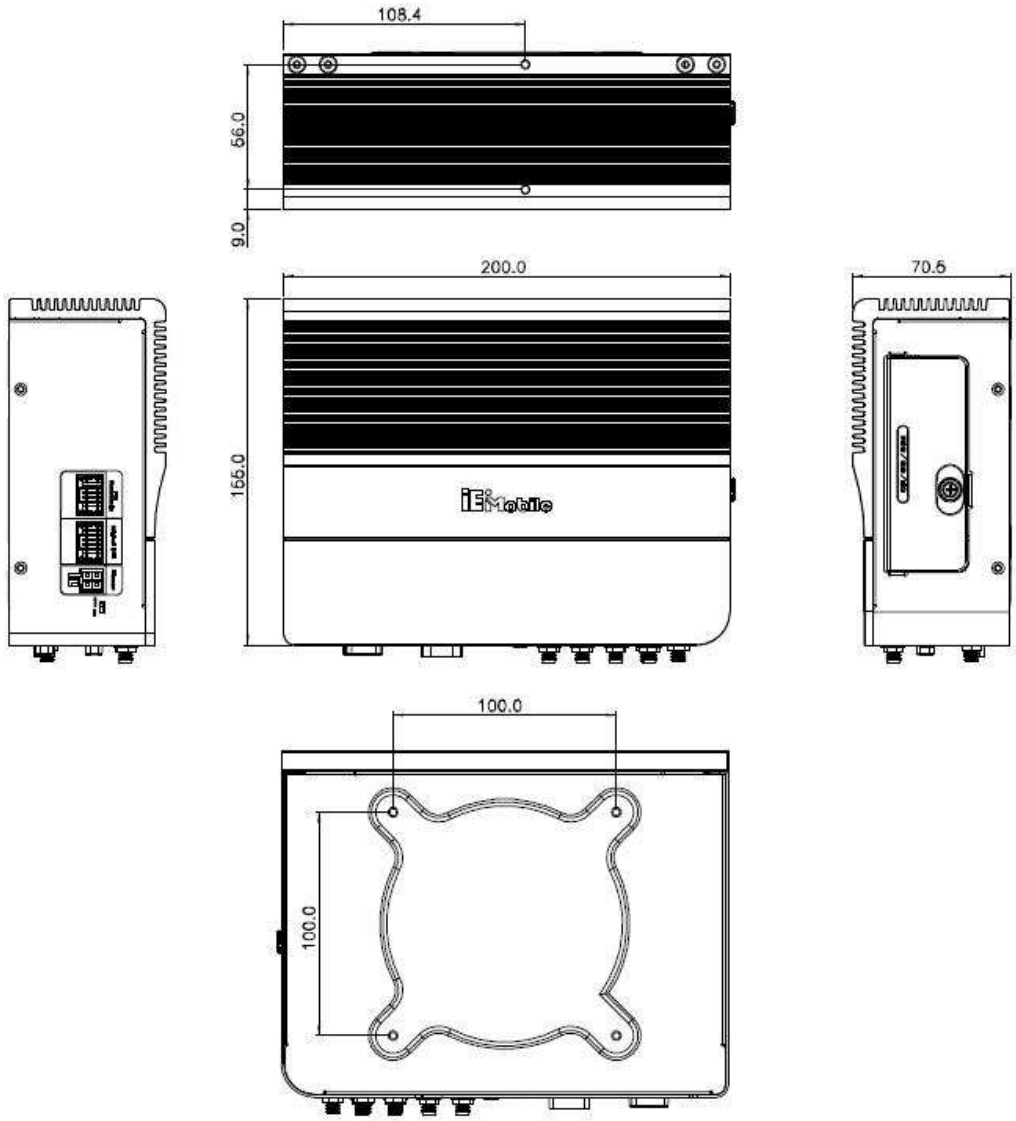

Figure 1-7: Dimensions (unit: mm)

Chapter

2

Unpacking

To unpack the AVL-2000PLUS, follow the steps below:

Step 1: Use box cutters, a knife or a sharp pair of scissors that seals the top side of the external (second) box.

Step 2: Open the external (second) box.

Step 3: Use box cutters, a knife or a sharp pair of scissors that seals the top side of the internal (first) box.

Step 4: Lift the monitor out of the boxes.

Step 5: Remove both polystyrene ends, one from each side.

Step 6: Pull the plastic cover off the AVL-2000PLUS.

Step 7: Make sure all the components listed in the packing list are present.

The AVL-2000PLUS is shipped with the following components:

Quantity	Item	Image
1	AVL-2000PLUS	
1	RS-232 cable (P/N: 32005-000200-200-RS)	
1	Capture cable (P/N: 32007-001400-100-RS)	

Quantity	Item	Image
1	GPS/GSM antenna (P/N: 32506-000100-100-RS)	
1	Wi-Fi/Bluetooth antenna (P/N: 32505-000400-100-RS)	
1	OBD-II cable (P/N: 32025-000300-100-RS)	
1	J1939/FMS cable (P/N: 32025-000400-100-RS)	
1	User manual CD and driver CD	

Table 2-1: Packing List

Item	Image
UHF RFID antenna with cable	

Table 2-2: Optional Items

If any of these items are missing or damaged, contact the distributor or sales representative immediately.

Chapter

3

Installation

3.1 Anti-static Precautions

WARNING:

Failure to take ESD precautions during the maintenance of the AVL-2000PLUS may result in permanent damage to the AVL-2000PLUS and severe injury to the user.

Electrostatic discharge (ESD) can cause serious damage to electronic components, including the AVL-2000PLUS. Dry climates are especially susceptible to ESD. It is therefore critical that whenever the AVL-2000PLUS is accessed internally, or any other electrical component is handled, the following anti-static precautions are strictly adhered to.

- ***Wear an anti-static wristband***: - Wearing a simple anti-static wristband can help to prevent ESD from damaging the board.
- ***Self-grounding***: - Before handling the board touch any grounded conducting material. During the time the board is handled, frequently touch any conducting materials that are connected to the ground.
- ***Use an anti-static pad***: - When configuring the AVL-2000PLUS, place it on an antic-static pad. This reduces the possibility of ESD damaging the AVL-2000PLUS.
- ***Only handle the edges of the PCB***: - When handling the PCB, hold the PCB by the edges.

3.2 Installation Precautions

When installing the AVL-2000PLUS, please follow the precautions listed below:

- **Power turned off**: When installing the AVL-2000PLUS, make sure the power is off. Failing to turn off the power may cause severe injury to the body and/or damage to the system.
- **Certified Engineers**: Only certified engineers should install and modify onboard functionalities.

- **Anti-static Discharge**: If a user open the bottom panel of the AVL-2000PLUS, to configure the jumpers or plug in added peripheral devices, ground themselves first and wear and anti-static wristband.

3.3 Installation and Configuration Steps

The following installation steps must be followed.

Step 1: Unpack the system

Step 2: Install a SIM card or SD card (optional)

Step 3: Connect peripheral devices

Step 4: Mount the system

Step 5: Power up the system

3.4 SIM Card and SD Card Installation

To install a SIM card or a SD card, the cover plate must be removed. To remove the cover plate and install the SIM card or the SD card, follow the instructions below.

Step 1: Remove the retention screw and lift the cover.

Figure 3-1: Panel Retention Screw

Step 2: Locate the SIM card slot or SD card slot. See **Figure 3-2**.

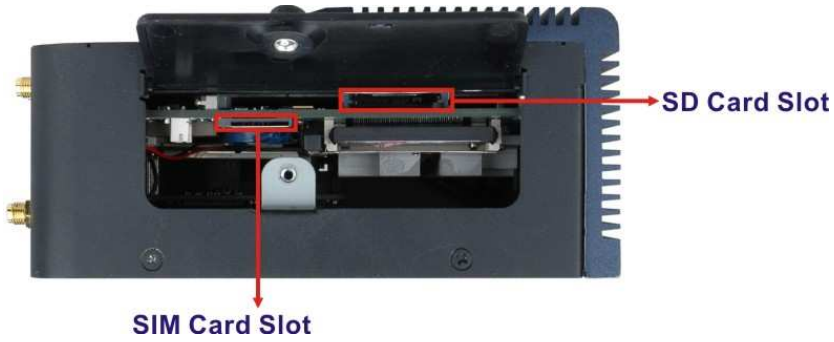

Figure 3-2: Slot Locations

Step 3: Insert the card into the correspondent slot.

3.5 Mounting the System

To mount the system onto a VESA bracket, please follow the steps below.

Step 1: Attach theVESA mounting bracket to the bottom panel of the AVL-2000PLUS. Secure the bracket to the AVL-2000PLUS with the supplied retention screws (**Figure 3-3**).

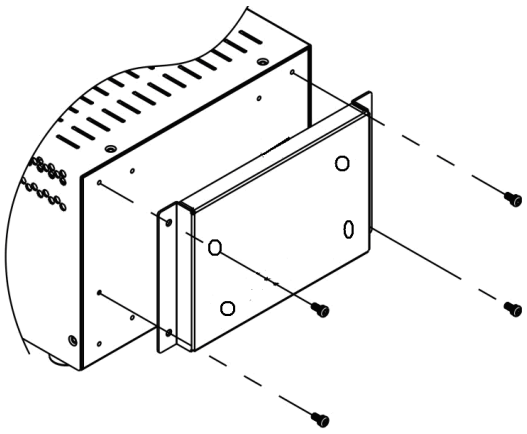

Figure 3-3: VESA Mounting Bracket

3.6 I/O Interface Connectors

This section provides an overview of the I/O interface connectors of the AVL-2000PLUS.

3.6.1 CAN Bus Connection

There is one 3-pin CAN Bus connector. The connector pinouts are shown in

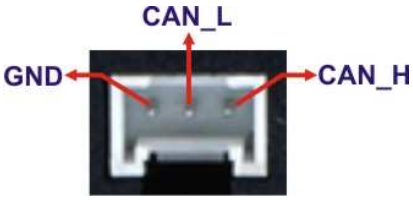

Figure 3-4: CAN Bus Connector Pinouts

3.6.2 Digital I/O Connection

The AVL-2000PLUS right side panel has one 14-pin wafer connector for digital I/O connection. The pinouts for digital I/O connector are listed in the table below.

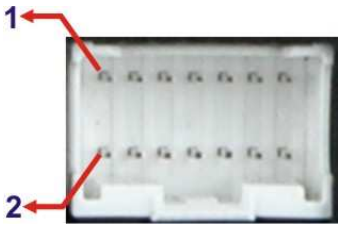

Figure 3-5: Digital I/O Connector Pinouts Location

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	ISO_GND	2	ISO_5V
3	GPI0_ISO	4	GPI1_ISO
5	GPI2_ISO	6	GPI3_ISO
7	GPO0_ISO	8	GPO1_ISO
9	GPO2_ISO#	10	GPO3_ISO
11	GND	12	VCC5

13	SPEED_IN+	14	SPEED_IN-

Table 3-1: Digital I/O Connector Pinouts

3.6.3 LAN Connection

There is one external RJ-45 LAN connector. The RJ-45 connector enables connection to an external network. To connect a LAN cable with an RJ-45 connector, please follow the instructions below.

Step 1: **Locate the RJ-45 connectors** on the bottom panel of the AVL-2000PLUS.

Step 2: **Align the connectors.** Align the RJ-45 connector on the LAN cable with one of the RJ-45 connectors on the bottom panel of the AVL-2000PLUS.

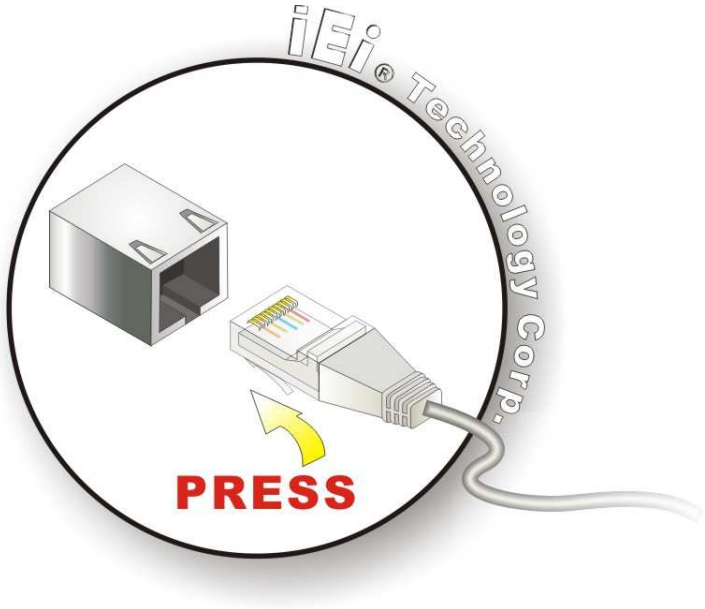

Figure 3-6: LAN Connection

Step 3: **Insert the LAN cable RJ-45 connector.** Once aligned, gently insert the LAN cable RJ-45 connector into the onboard RJ-45 connector.

3.6.4 OBD-II Connector

The AVL-2000PLUS has one DB-9 male connector for OBD-II connection. Use the OBD-II cable or J1939/FMS cable (**Figure 3-7**) in the package to connect the AVL-2000PLUS.

OBD-II Cable **J1939/FMS Cable**

Figure 3-7: OBD-II Cable and J1939/FMS Cable

The pinouts for OBD-II connector are listed in the table below.

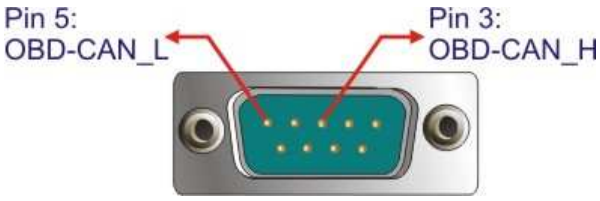

Figure 3-8: OBD-II Connector Pinouts Location

Pin	Description
1	NC
2	NC
3	OBD-CAN_H
4	ISO-9141-2-K
5	OBD-CAN_L
6	J1850-
7	J1850+
8	ISO-9141-2-L
9	NC

Table 3-2: OBD-II Connector Pinouts

The pinout locations of OBD-II cable connector and J1939/FMS cable connector are shown below.

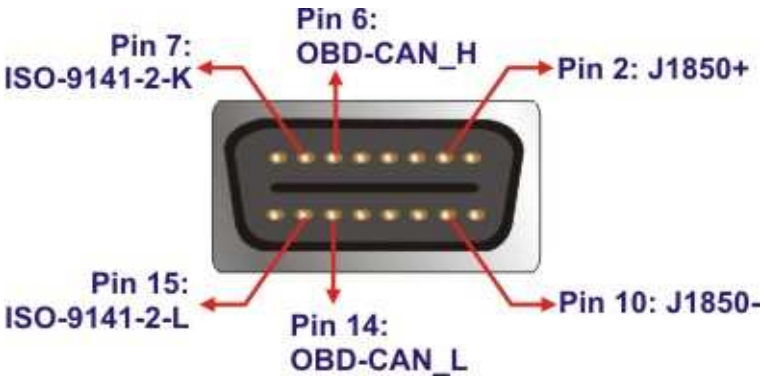

Figure 3-9: OBD-II Connector Pinouts

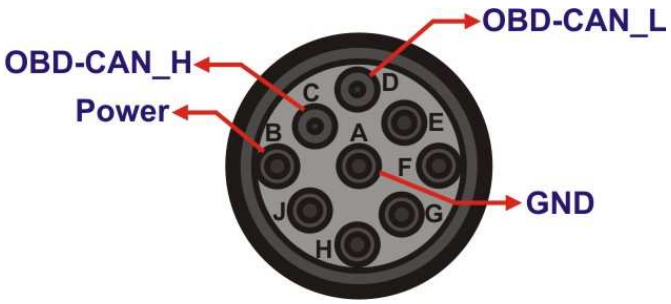

Figure 3-10: J1939/FMS Connector Pinouts

3.6.5 Power Input Connection

The AVL-2000PLUS has one 12 V DC input connector on the right panel.

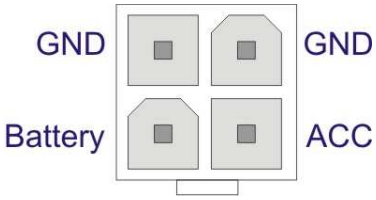

Figure 3-11: Power Input Connector

3.6.6 Remote Control Connection

The AVL-2000PLUS right side panel has one 14-pin wafer connector for the optional remote control connection. The pinouts for remote control connector are listed in the table below.

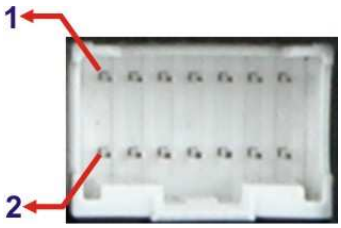

Figure 3-12: Remote Control Connector Pinouts Location

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	PWR_BTN	2	GND
3	FU1	4	GND
5	FU2	6	GND
7	FU3	8	GND
9	PW_BAT_LED#	10	GND
11	HDD_LED	12	3.5G_LED
13	BT_LED	14	WIFI_LED

Table 3-3: Remote Control Connector Pinouts

3.6.7 Serial Device Connection

The AVL-2000PLUS has one male RJ-45 connector on the bottom panel for serial devices to be connected. Follow the steps below to connect a serial device to the AVL-2000PLUS.

Step 1: **Locate the RJ-45 connector**. The location of the RJ-45 serial port connector is shown in **Chapter 1**. The RJ-45 connectors for the serial ports can be identified easily as the RJ-45 for the network has two LEDs on the port, while the connectors for the serial cables don't.

Step 2: **Insert the RJ-45 to DB-9 cable.**

Step 3: **Insert the serial connector**. Insert the DB-9 connector of a serial device into the DB-9 connector on the cable. See **Figure 3-13**.

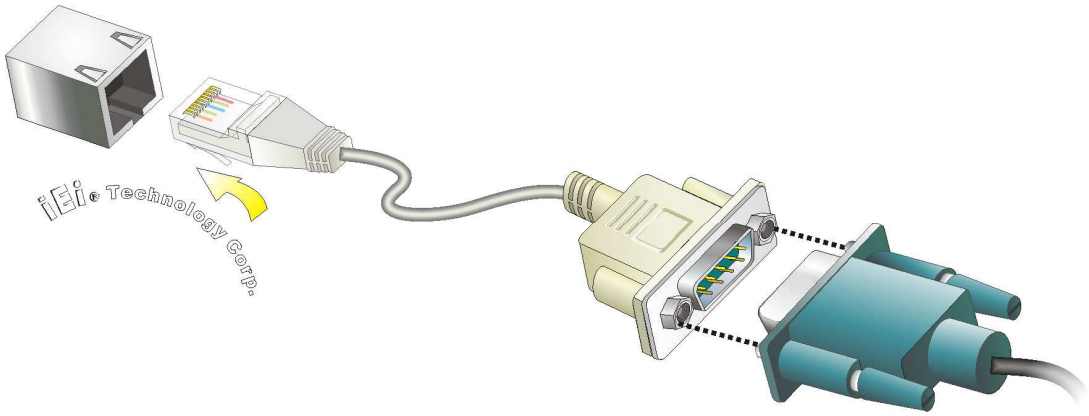

Figure 3-13: Serial Device Connector

Step 4: **Secure the connector**. Secure the serial device connector to the external interface by tightening the two retention screws on either side of the connector.

3.6.7.1 COM1 Pinouts

The COM1 connector can be set as RS-232 (default), RS-422 or RS-485 in BIOS. The pinouts for COM1 are listed in the table below.

Pin	RS-232	RS-422	RS-485
1	NRI1		
2	NDTR1		
3	NCTS1		
4	NTX1	TX-	DATA-
5	NRTS1	TX+	DATA+
6	NRX1	RX+	
7	NDSR1		
8	NDCD1	RX-	
9	GND	GND	GND

Table 3-4: COM1 Connector Pinouts

3.6.8 USB Device Connection

There are two external USB connectors. To connect a USB device, please follow the instructions below.

Step 1: **Located the USB connectors**. The locations of the USB connectors are shown in **Chapter 2**.

Step 2: **Align the connectors.** Align the USB device connector with one of the connectors on the bottom panel.

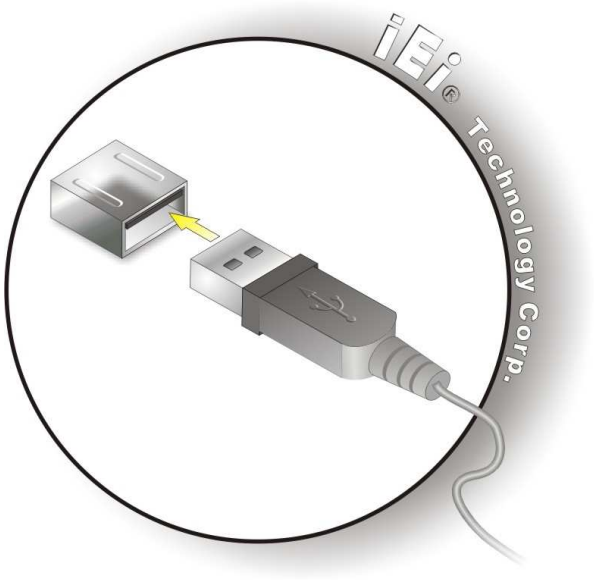

Figure 3-14: USB Device Connection

Step 3: **Insert the device connector.** Once aligned, gently insert the USB device connector into the onboard connector.

3.6.9 Video Capture Connection

The AVL-2000PLUS has one DB-9 female connector for video capture connection. Use the video cable (**Figure 3-7**) in the package to connect the AVL-2000PLUS with the device.

Figure 3-15: Video Capture Cable

The pinouts for video connector are listed in the table below.

Figure 3-16: Video Connector Pinouts Location

Pin	Description
1	CN1_A
2	CN1_B
3	CN1_C
4	CN1_D
5	SIN1_A
6	GND
7	GND
8	GND
9	GND

Table 3-5: Video Connector Pinouts

3.6.10 VGA Monitor Connection

The AVL-2000PLUS has a single female DB-15 connector on the external peripheral interface panel. The DB-15 connector is connected to a CRT or VGA monitor. To connect a monitor to the AVL-2000PLUS, please follow the instructions below.

Step 1: **Locate the female DB-15 connector**. The location of the female DB-15 connector is shown in **Chapter 3**.

Step 2: **Align the VGA connector**. Align the male DB-15 connector on the VGA screen cable with the female DB-15 connector on the external peripheral interface.

Step 3: **Insert the VGA connector** Once the connectors are properly aligned with the insert the male connector from the VGA screen into the female connector on the AVL-2000PLUS. See Figure 3-17.

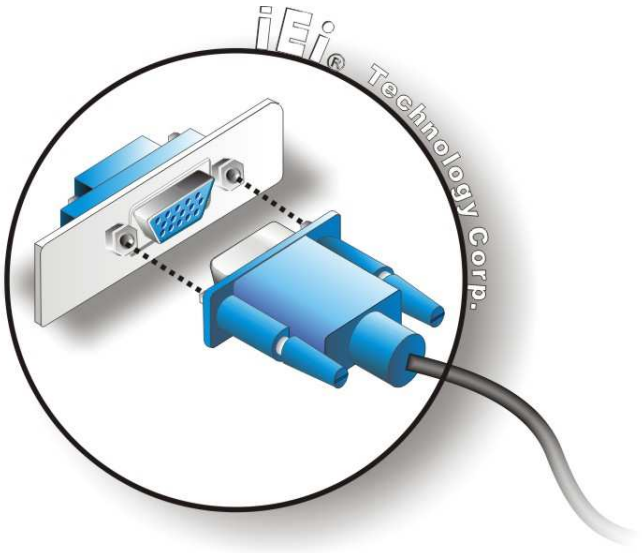

Figure 3-17: VGA Connector

Step 4: **Secure the connector**. Secure the DB-15 VGA connector from the VGA monitor to the external interface by tightening the two retention screws on either side of the connector.

3.7 System Maintenance

If the components of the AVL-2000PLUS fail, they must be replaced. Please contact the system reseller or vendor to purchase the replacement parts.

NOTE:

A user cannot replace a motherboard. If the motherboard fails it must be shipped back to IEI to be replaced. Please contact the system vendor, reseller or an IEI sales person directly.

Federal Communication Commission Interference Statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

FCC Caution: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Radiation Exposure Statement:

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.