



# MODEL: **IVS-200-ULT2**

**IEI Fanless Embedded System with Intel® Core™ i5-5350U/Celeron® 3755U Processor, Quad GbE LAN, HDMI, Dual RS-232/422/485, USB 3.2 Gen 1, RoHS Compliant**

## User Manual



# Revision

Date	Version	Changes
July 19, 2021	1.03	Updated Section 2.3: Optional Items
October 28, 2020	1.02	Added Section 1.6 Internal Overview Updated Section 2.3 Optional Items Updated Section 3.8 WLAN/WWAN Module Installation (Optional)
June 30, 2017	1.01	Modified Ethernet connectors (LAN1~LAN4) pinouts
September 17, 2015	1.00	Initial release

# Copyright

## COPYRIGHT NOTICE

The information in this document is subject to change without prior notice in order to improve reliability, design and function and does not represent a commitment on the part of the manufacturer.

In no event will the manufacturer be liable for direct, indirect, special, incidental, or consequential damages arising out of the use or inability to use the product or documentation, even if advised of the possibility of such damages.

This document contains proprietary information protected by copyright. All rights are reserved. No part of this manual may be reproduced by any mechanical, electronic, or other means in any form without prior written permission of the manufacturer.

## TRADEMARKS

All registered trademarks and product names mentioned herein are used for identification purposes only and may be trademarks and/or registered trademarks of their respective owners.

# Manual Conventions



## WARNING

Warnings appear where overlooked details may cause damage to the equipment or result in personal injury. Warnings should be taken seriously.



## CAUTION

Cautionary messages should be heeded to help reduce the chance of losing data or damaging the product.



## NOTE

These messages inform the reader of essential but non-critical information. These messages should be read carefully as any directions or instructions contained therein can help avoid making mistakes.



## HOT SURFACE

This symbol indicates a hot surface that should not be touched without taking care.

# Table of Contents

---

<b>1 INTRODUCTION.....</b>	<b>1</b>
1.1 OVERVIEW.....	2
1.2 BENEFITS .....	2
1.3 FEATURES.....	3
1.4 MODEL VARIATIONS .....	3
1.5 EXTERNAL OVERVIEW.....	4
<i>1.5.1 Front Panel</i> .....	4
<i>1.5.2 Rear Panel</i> .....	5
<i>1.5.3 Bottom Surface</i> .....	6
1.6 INTERNAL OVERVIEW.....	7
1.7 TECHNICAL SPECIFICATIONS .....	7
1.8 DIMENSIONS.....	9
<b>2 UNPACKING .....</b>	<b>10</b>
2.1 UNPACKING.....	11
2.2 PACKING LIST.....	11
2.3 OPTIONAL ITEMS .....	12
<b>3 INSTALLATION .....</b>	<b>13</b>
3.1 ANTI-STATIC PRECAUTIONS .....	14
3.2 INSTALLATION PRECAUTIONS .....	14
<i>3.2.1 High Surface Temperature</i> .....	15
3.3 INSTALLATION PROCEDURE .....	16
3.4 OPENING BOTTOM COVER.....	16
3.5 CONFIGURE THE JUMPER SETTINGS.....	18
<i>3.5.1 Clear CMOS.....</i>	18
<i>3.5.2 AT/ATX Mode Selection .....</i>	19
<i>3.5.3 ACC Mode On/Off.....</i>	19
3.6 SOLID-STATE DRIVE INSTALLATION .....	20
3.7 MSATA/FULL-SIZE PCIE MINI CARD INSTALLATION .....	21
3.8 WLAN/WWAN MODULE INSTALLATION (OPTIONAL) .....	24

3.9 SIM CARD INSTALLATION (OPTIONAL) .....	27
3.10 RS-232/422/485 SERIAL PORT CONNECTION .....	28
3.11 MOUNTING THE SYSTEM .....	29
3.12 POWER-ON PROCEDURE.....	31
<i>3.12.1 Installation Checklist</i> .....	31
<i>3.12.2 Terminal Block Pinouts</i> .....	32
<i>3.12.3 Power-on Procedure</i> .....	32
3.13 AVAILABLE DRIVERS .....	33
<i>3.13.1 Driver Download</i> .....	33
<b>4 BIOS .....</b>	<b>35</b>
4.1 INTRODUCTION.....	36
<i>4.1.1 Starting Setup</i> .....	36
<i>4.1.2 Using Setup</i> .....	36
<i>4.1.3 Getting Help</i> .....	37
<i>4.1.4 Unable to Reboot After Configuration Changes</i> .....	37
<i>4.1.5 BIOS Menu Bar</i> .....	37
4.2 MAIN.....	38
4.3 ADVANCED .....	39
<i>4.3.1 CPU Configuration</i> .....	40
<i>4.3.2 ACPI Settings</i> .....	43
<i>4.3.3 F81866 Super IO Configuration</i> .....	44
<i>4.3.3.1 Serial Port n Configuration</i> .....	44
<i>4.3.4 RTC Wake Settings</i> .....	48
<i>4.3.5 Serial Port Console Redirection</i> .....	49
<i>4.3.5.1 Console Redirection Settings</i> .....	50
<i>4.3.6 iEi Feature</i> .....	52
<i>4.3.7 SATA Configuration</i> .....	53
<i>4.3.8 Intel(R) Rapid Start Technology</i> .....	54
<i>4.3.9 USB Configuration</i> .....	55
<i>4.3.10 iWDD H/W Monitor</i> .....	56
4.4 CHIPSET .....	57
<i>4.4.1 System Agent (SA) Configuration</i> .....	58
<i>4.4.1.1 Graphics Configuration</i> .....	59
<i>4.4.1.2 Memory Configuration</i> .....	60

## IVS-200-ULT2 Embedded System

4.4.2 PCH-IO Configuration .....	61
4.4.2.1 PCI Express Configuration .....	62
4.4.2.2 PCH Azalia Configuration .....	63
4.5 SECURITY .....	64
4.6 BOOT.....	65
4.7 SAVE & EXIT .....	67
<b>5 TROUBLESHOOTING AND MAINTENANCE .....</b>	<b>68</b>
5.1 IVS-200-ULT2 SYSTEM MAINTENANCE OVERVIEW .....	69
5.2 SYSTEM TROUBLESHOOTING.....	69
5.2.1 <i>The System Doesn't Turn On</i> .....	69
5.2.2 <i>The System Doesn't Boot Up</i> .....	70
5.2.3 <i>More Troubleshooting</i> .....	70
5.3 COMPONENT REPLACEMENT PROCEDURE .....	71
5.3.1 <i>SO-DIMM Replacement</i> .....	71
<b>6 INTERFACE CONNECTORS .....</b>	<b>73</b>
6.1 PERIPHERAL INTERFACE CONNECTORS.....	74
6.2 INTERNAL PERIPHERAL CONNECTORS .....	74
6.2.1 <i>Battery Connector (CNI)</i> .....	75
6.2.2 <i>Digital I/O Connector (DIO1)</i> .....	75
6.2.3 <i>Fan Connector (FAN1)</i> .....	76
6.2.4 <i>RS-232 Serial Port Connectors (COM3 ~ COM6)</i> .....	76
6.2.5 <i>SATA Power Connector (SATA_PWR1)</i> .....	76
6.2.6 <i>SPI Flash Connector, BIOS (SPII)</i> .....	77
6.2.7 <i>SPI Flash Connector, EC (JSPII)</i> .....	77
6.3 EXTERNAL INTERFACE PANEL CONNECTORS .....	77
6.3.1 <i>Ethernet Connector (LAN1)</i> .....	77
6.3.2 <i>Ethernet Connectors (LAN2 ~ LAN4)</i> .....	78
6.3.3 <i>RS-232/422/485 DB-9 Serial Ports (COM1, COM2)</i> .....	78
6.3.4 <i>USB 2.0 Connectors (USB_CON2)</i> .....	78
6.3.5 <i>USB 3.2 Gen 1 Connectors (USB_CON1)</i> .....	79
6.3.6 <i>Power Input Terminal Block (DC_IN1)</i> .....	79
6.3.7 <i>VGA Connector (VGA1)</i> .....	79
<b>A REGULATORY COMPLIANCE .....</b>	<b>80</b>

<b>B SAFETY PRECAUTIONS .....</b>	<b>85</b>
B.1 SAFETY PRECAUTIONS .....	86
<i>B.1.1 General Safety Precautions .....</i>	86
<i>B.1.2 Anti-static Precautions .....</i>	87
<i>B.1.3 Product Disposal .....</i>	88
B.2 MAINTENANCE AND CLEANING PRECAUTIONS .....	89
<i>B.2.1 Maintenance and Cleaning.....</i>	89
<i>B.2.2 Cleaning Tools .....</i>	89
<b>C BIOS MENU OPTIONS .....</b>	<b>91</b>
C.1 BIOS CONFIGURATION OPTIONS .....	92
<b>D WATCHDOG TIMER .....</b>	<b>94</b>
<b>E ERROR BEEP CODE.....</b>	<b>97</b>
E.1 PEI BEEP CODES.....	98
E.2 DXE BEEP CODES .....	98
<b>F HAZARDOUS MATERIALS DISCLOSURE.....</b>	<b>99</b>
F.1 RoHS II DIRECTIVE (2015/863/EU) .....	100
F.2 CHINA ROHS .....	101

# List of Figures

Figure 1-1: IVS-200-ULT2 Series Embedded System.....	2
Figure 1-2: Front Panel .....	4
Figure 1-3: Rear Panel.....	5
Figure 1-4: Bottom Surface .....	6
Figure 1-5: Internal Overview .....	7
Figure 1-6: Dimensions (mm) .....	9
Figure 3-1: Bottom Cover Retention Screws .....	17
Figure 3-2: Opening Bottom Cover.....	17
Figure 3-3: Clear CMOS Button.....	18
Figure 3-4: AT/ATX Mode Select Switch Location .....	19
Figure 3-5: ACC Mode On/Off Switch Location .....	19
Figure 3-6: SSD Bracket Retention Screws .....	20
Figure 3-7: Removing SSD Bracket .....	20
Figure 3-8: SSD Retention Screws.....	21
Figure 3-9: SSD Installation .....	21
Figure 3-10: PCIe Mini Slot Location .....	22
Figure 3-11: Removing the Screw and Standoff for Half-size PCIe Mini Card .....	22
Figure 3-12: Removing the Retention Screw .....	23
Figure 3-13: Inserting the Full-size PCIe Mini Card into the Slot at an Angle .....	23
Figure 3-14: Securing the Full-size PCIe Mini Card .....	24
Figure 3-15: Knockout Holes for External Antenna .....	24
Figure 3-16: PCIe Mini Slot Location .....	25
Figure 3-17: Removing the Retention Screw .....	25
Figure 3-18: Inserting the WLAN/WWAN Module .....	26
Figure 3-19: Securing WLAN/WWAN Module and Connecting RF Cable .....	26
Figure 3-20: Securing SMA Connector and External Antenna Installation .....	27
Figure 3-21: Unlock Slot Cover .....	28
Figure 3-22: SIM Card Installation.....	28
Figure 3-23: Removing Foot Pads .....	30
Figure 3-24: Mounting Bracket Retention Screws .....	30
Figure 3-25: Terminal Block Pinouts .....	32

Figure 3-26: Power Button and Power LED .....	32
Figure 3-27: IEI Resource Download Center.....	33
Figure 5-1: SO-DIMM Location .....	72
Figure 5-2: SO-DIMM Installation .....	72
Figure 6-1: Jumper and Connector Locations.....	74

# List of Tables

---

Table 1-1: Model Variations .....	3
Table 1-2: Technical Specifications.....	8
Table 2-1: Package List.....	12
Table 2-2: Optional Items .....	12
Table 3-1: COM1 and COM2 Pinouts .....	29
Table 4-1: BIOS Navigation Keys .....	37
Table 6-1: Peripheral Interface Connectors .....	75
Table 6-2: Battery Connector (CN1) Pinouts .....	75
Table 6-3: Digital I/O Connector (DIO1) Pinouts.....	75
Table 6-4: Fan Connector (FAN1) Pinouts .....	76
Table 6-5: RS-232 Serial Port Connector (COM3 ~ COM6) Pinouts.....	76
Table 6-6: SATA Power Connector (SATA_PWR1) Pinouts .....	76
Table 6-7: SPI Flash Connector (SPI1) Pinouts .....	77
Table 6-8: SPI Flash Connector (JSPI1) Pinouts .....	77
Table 6-9: Ethernet Connector (LAN1) Pinouts .....	77
Table 6-10: Ethernet Connectors (LAN2 ~ LAN4) Pinouts .....	78
Table 6-11: RS-232/422/485 DB-9 Serial Port (COM1, COM2) Pinouts .....	78
Table 6-12: USB 2.0 Connectors (USB_CON2) Pinouts.....	78
Table 6-13: USB 3.2 Gen 1 Connectors (USB_CON1) Pinouts.....	79
Table 6-14: Power Input Terminal Block (DC_IN1) Pinouts.....	79
Table 6-15: VGA Connector (VGA1) Pinouts .....	79

# List of BIOS Menus

BIOS Menu 1: Main .....	38
BIOS Menu 2: Advanced .....	39
BIOS Menu 3: CPU Configuration .....	40
BIOS Menu 4: ACPI Settings .....	43
BIOS Menu 5: F81866 Super IO Configuration .....	44
BIOS Menu 6: Serial Port n Configuration Menu.....	44
BIOS Menu 7: RTC Wake Settings .....	48
BIOS Menu 8: Serial Port Console Redirection .....	49
BIOS Menu 9: Console Redirection Settings.....	50
BIOS Menu 10: iEI Feature.....	52
BIOS Menu 11: SATA Configuration .....	53
BIOS Menu 12: Intel(R) Rapid Start Technology Configuration .....	54
BIOS Menu 13: USB Configuration .....	55
BIOS Menu 14: iWDD H/W Monitor .....	56
BIOS Menu 15: Chipset .....	57
BIOS Menu 16: System Agent (SA) Configuration .....	58
BIOS Menu 17: Graphics Configuration .....	59
BIOS Menu 18: Memory Configuration.....	60
BIOS Menu 19: PCH-IO Configuration .....	61
BIOS Menu 20: PCI Express Configuration .....	62
BIOS Menu 21: PCH Azalia Configuration .....	63
BIOS Menu 22: Security .....	64
BIOS Menu 23: Boot .....	65
BIOS Menu 24: Save & Exit.....	67

Chapter

1

# Introduction

---

## 1.1 Overview



**Figure 1-1: IVS-200-ULT2 Series Embedded System**

The IVS-200-ULT2 fanless embedded system is powered by Intel® Core™ i5-5350U processor or Intel® Celeron® processor 3755U. It is designed for vehicle applications that require minimum installation space.

The IVS-200-ULT2 accepts a wide range of DC power input (9 V – 36 V), allowing it to be powered anywhere. Wi-Fi and WWAN capabilities plus four RJ-45 Ethernet connectors ensure smooth connection of the system to an external LAN. The display interface options include VGA and HDMI with two audio jacks.

Two USB 3.2 Gen 1 (5Gb/s) ports, two USB 2.0 ports, two RS-232/422/485 ports, and four D-sub reserved ports provide rich I/O options for various applications. The IVS-200-ULT2 embedded subsystems are all capable of supporting one 2.5" SATA 6Gb/s solid-state drive (SSD) or an mSATA module.

## 1.2 Benefits

The IVS-200-ULT2 embedded system has the following benefits:

- Easy installation saves installation time
- Complete integration saves solution development time and cost
- Secure storage with one SATA SSD and mSATA supported
- Compact size saves space

## IVS-200-ULT2 Embedded System

- Powerful preinstalled Intel® Core™ i5-5350U processor or Intel® Celeron® processor 3755U and motherboard ensures rigorous processing needs can be met

### 1.3 Features

The IVS-200-ULT2 has the following features

- RoHS compliant design
- Fanless system
- Intel® Core™ i5-5350U processor or Intel® Celeron® processor 3755U supported
- Quad GbE LAN for high speed network applications
- Support two RS-232/422/485 ports
- Support four USB ports (two USB 2.0 and two USB 3.2 Gen 1)
- Four D-sub reserved ports (for RS-232 or digital I/O)
- One SATA 6Gb/s SSD and one mSATA module supported
- Supports up to 4096x2304 resolutions with HDMI interface
- One on-board SIM card slot supports WWAN connection
- VESA 100 mount supported
- Optional 802.11b/g/n 1T1R wireless connection

### 1.4 Model Variations

There are two models in the IVS-200-ULT2 embedded system series. The two models are all preinstalled with 4 GB of DDR3 memory. The model variations are listed in **Table 1-1** below.

	Processor
<b>IVS-200-ULT2-i5/4G</b>	Intel® Core™ i5-5350U (dual-core, 1.8 GHz, 15W TDP)
<b>IVS-200-ULT2-C/4G</b>	Intel® Celeron® 3755U (dual-core, 1.7 GHz, 15W TDP)

**Table 1-1: Model Variations**

## 1.5 External Overview

The IVS-200-ULT2 RoHS compliant, fanless embedded system features industrial grade components that offer longer operating life, high shock/vibration resistance and endurance over a wide temperature range. The IVS-200-ULT2 combines these features in an aluminum enclosure, offering system integrators and developers the best selection of robust and high performance computing system platforms for vehicle applications.

### 1.5.1 Front Panel

The IVS-200-ULT2 front panel contains:

- 1 x Audio line-out jack
- 1 x Audio mic-in jack
- 1 x SSD bay
- 1 x HDMI ports
- 2 x RS-232/422/485 serial ports
- 2 x USB 3.2 Gen 1 (5Gb/s) ports
- 1 x HDD LED indicator
- 1 x Power LED indicator
- 1 x Power button

An overview of the front panel is shown in **Figure 1-2** below.



Figure 1-2: Front Panel

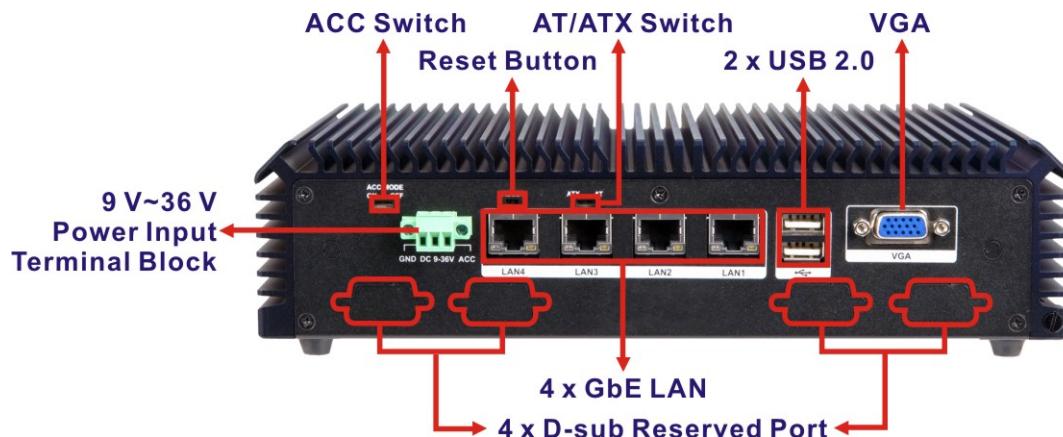
## IVS-200-ULT2 Embedded System

### 1.5.2 Rear Panel

The rear panel of the IVS-200-ULT2 provides access to the following external I/O connectors.

- 1 x 9 V – 36 V DC power input terminal block
- 4 x RJ-45 Ethernet connector
- 4 x D-sub reserved ports (for RS-232 or digital I/O)
- 2 x USB 2.0 port connector
- 1 x VGA connector
- 1 x AT/ATX power switch
- 1 x ACC mode on/off switch
- 1 x Reset button
- 2 x External antenna connector (optional)

An overview of the rear panel is shown in **Figure 1-3**.



**Figure 1-3: Rear Panel**

### 1.5.3 Bottom Surface



#### WARNING:

Never remove the bottom access panel from the chassis while power is still being fed into the system. Before removing the bottom access panel, make sure the system has been turned off and all power connectors unplugged.

The bottom surface of the IVS-200-ULT2 contains four foot pads which can be removed to install two side mounting brackets. The surface also has four retention screw holes for the VESA MIS-D 100 wall-mount kit.



Figure 1-4: Bottom Surface

## IVS-200-ULT2 Embedded System

### 1.6 Internal Overview

An internal overview of the system is shown in **Figure 1-2** below.



**Figure 1-5: Internal Overview**

### 1.7 Technical Specifications

The specifications for the Intel based embedded systems are listed below.

	IVS-200-ULT2
<b>CPU (SoC)</b>	Intel® Core™ i5-5350U (dual-core, 1.8 GHz, 15W TDP) Intel® Celeron® 3755U (dual-core, 1.7 GHz, 15W TDP)
<b>System Memory</b>	2 x 204-pin DDR3 SO-DIMM slot (system max. 16 GB) Preinstalled one 4.0 GB DDR3 SDRAM SO-DIMM
<b>Ethernet</b>	LAN1: PCIe GbE by Intel® I218 GbE PHY LAN2: PCIe GbE by Intel® I211 Ethernet controller LAN3: PCIe GbE by Intel® I211 Ethernet controller LAN4: PCIe GbE by Intel® I211 Ethernet controller
<b>Wireless LAN</b>	Optional 802.11b/g/n 1T1R wireless module
<b>WWAN</b>	1 x SIM card slot (on-board)
<b>Display</b>	1 x VGA port (up to 1920x1200 @ 60 Hz) 1 x HDMI port (up to 4096x2304 @ 24 Hz)

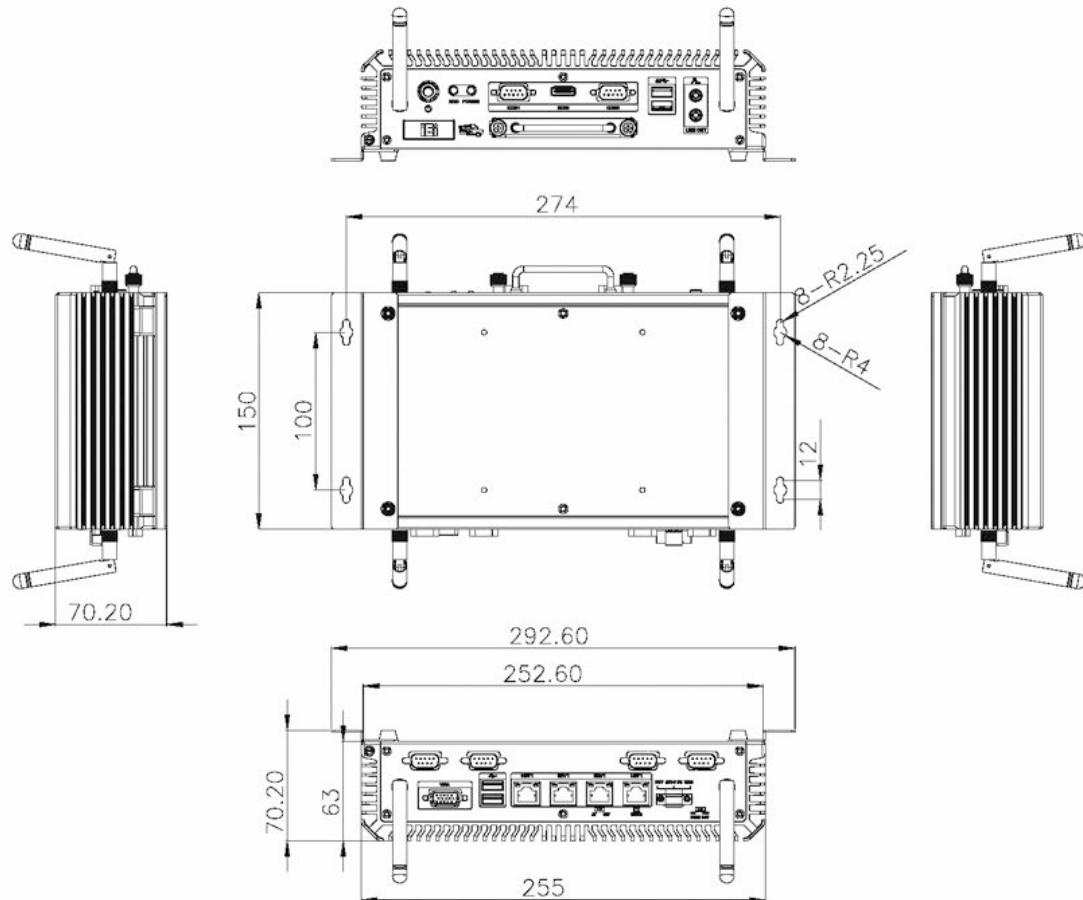
<b>Serial Port</b>	2 x RS-232/422/485
<b>USB</b>	2 x USB 2.0 ports 2 x USB 3.2 Gen 1 (5Gb/s) ports
<b>Audio</b>	1 x Audio line-out 1 x Audio mic-in
<b>Storage</b>	1 x 2.5" SATA 6Gb/s SSD removable drive bay One mSATA module supported
<b>Expansion</b>	1 x Full-size/Half-size PCIe Mini card slot with mSATA support 1 x Full-size/Half-size PCIe Mini card slot 4 x D-sub reserved ports (for RS-232 or digital I/O)
<b>Chassis Construction</b>	Extruded aluminum alloy
<b>Power Input</b>	9 V – 36 V ( $\pm 0.3$ V) DC One power input terminal block
<b>Power Consumption</b>	12V@2.1A (with Intel® Core™ i5-5350U processor and one 4 GB DDR3 memory)
<b>Operating Shock</b>	Half-sine wave shock 5G; 11ms; 3 shocks per axis
<b>Operating Vibration</b>	MIL-STD-810F 514.5C-2 (with SSD)
<b>Operating Temperature</b>	-20°C – 55°C with air flow (with SSD)
<b>Storage Temperature</b>	-30°C – 70°C
<b>Humidity</b>	10% – 95%, non-condensing
<b>Color</b>	Black
<b>Mounting</b>	Mounting with two mounting brackets VESA MIS-D 100 mount
<b>Weight (Net/Gross)</b>	2.2 kg/3.0 kg
<b>Dimensions (W x D x H)</b>	255 mm x 150 mm x 63 mm
<b>EMC</b>	FCC, CE, E-Mark
<b>Supported OS</b>	Microsoft Windows Embedded 8 Microsoft Windows Embedded Standard 7

Table 1-2: Technical Specifications

**IVS-200-ULT2 Embedded System**

## 1.8 Dimensions

The dimensions of the IVS-200-ULT2 are listed below and shown in **Figure 1-6**.



**Figure 1-6: Dimensions (mm)**

Chapter

2

# Unpacking

---

## IVS-200-ULT2 Embedded System

### 2.1 Unpacking

To unpack the embedded system, 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 system out of the boxes.

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

**Step 6:** Make sure all the components listed in the packing list are present.

### 2.2 Packing List



#### NOTE:

If any of the components listed in the checklist below are missing, do not proceed with the installation. Contact the IEI reseller or vendor the IVS-200-ULT2 was purchased from or contact an IEI sales representative directly by sending an email to [sales@ieiworld.com](mailto:sales@ieiworld.com).

The IVS-200-ULT2 embedded system is shipped with the following components:

Quantity	Item	Image
1	IVS-200-ULT2 embedded system	

4	Screws (M3*4) for SSD installation	
4	Screws (M3*8) for mounting brackets	
2	Mounting brackets	

Table 2-1: Package List

## 2.3 Optional Items

The following are optional component(s) which may be separately purchased:

Wi-Fi kit  (P/N: EMB-WIFI-KIT01-R20)	
RS-232 cable (150 mm)  (P/N: 32205-005400-100-RS)	
Digital I/O cable (150 mm)  (P/N: 32231-000100-200-RS)	

Table 2-2: Optional Items

Chapter

3

# Installation

---

### 3.1 Anti-static Precautions



#### WARNING:

Failure to take ESD precautions during the maintenance of the IVS-200-ULT2 may result in permanent damage to the IVS-200-ULT2 and severe injury to the user.

Electrostatic discharge (ESD) can cause serious damage to electronic components, including the WAFER series motherboard and the power module. (Dry climates are especially susceptible to ESD.) It is therefore critical that whenever the IVS-200-ULT2 is opened and any electrical component 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 IVS-200-ULT2, place it on an anti-static pad. This reduces the possibility of ESD damaging the IVS-200-ULT2.

### 3.2 Installation Precautions

During installation, be aware of the precautions below:

- ***Read the user manual:*** The user manual provides a complete description of the IVS-200-ULT2, installation instructions and configuration options.
- ***DANGER! Disconnect Power:*** Power to the IVS-200-ULT2 must be disconnected during the installation process. Failing to disconnect the power may cause severe injury to the body and/or damage to the system.
- ***Qualified Personnel:*** The IVS-200-ULT2 must be installed and operated only by trained and qualified personnel. Maintenance, upgrades, or repairs may

## IVS-200-ULT2 Embedded System

only be carried out by qualified personnel who are familiar with the associated dangers.

- **Air Circulation:** Make sure there is sufficient air circulation when installing the IVS-200-ULT2. The IVS-200-ULT2's cooling vents must not be obstructed by any objects. Blocking the vents can cause overheating of the IVS-200-ULT2. Leave at least 5 cm of clearance around the IVS-200-ULT2 to prevent overheating.
- **Grounding:** The IVS-200-ULT2 should be properly grounded. The voltage feeds must not be overloaded. Adjust the cabling and provide external overcharge protection per the electrical values indicated on the label attached to the back of the IVS-200-ULT2.

### 3.2.1 High Surface Temperature

---



#### **WARNING:**

Some surfaces of the equipment may become hot during operation.

The surface temperature may be up to several tens of degrees hotter than the ambient temperature. Under these circumstances, the equipment needs to be protected against accidental contact.

---

The equipment is intended for installation in a RESTRICTED ACCESS LOCATION.

- Access can only be gained by SERVICE PERSONS or by USERS who have been instructed about the reasons for the restrictions applied to the location and about any precautions that shall be taken.
- Access is through the use of a TOOL or lock and key, or other means of security, and is controlled by the authority responsible for the location.

### 3.3 Installation Procedure

To properly install the IVS-200-ULT2, the following steps must be followed. Detailed descriptions of these instructions are listed in the sections that follow.

**Step 1:** Unpacking

**Step 2:** Configure the jumper settings

**Step 3:** Install a SATA SSD

**Step 4:** Install an mSATA module or a PCIe Mini card

**Step 5:** Install the WLAN or WWAN module

**Step 6:** Mount the IVS-200-ULT2

**Step 7:** Connect the front panel peripheral connectors

**Step 8:** Power the system up

### 3.4 Opening Bottom Cover



#### WARNING:

Over-tightening bottom cover screws will cause damage to the bottom surface. Maximum torque for cover screws is 5 kg-cm (0.36 lb-ft/0.49 Nm).

Before the jumper settings can be configured and the hard disk drive can be installed, the bottom cover must be opened. To open the bottom cover, please follow the steps below:

**Step 1:** Remove the bottom cover retention screws. The bottom cover is secured to the chassis with six retention screws (four with foot pads attached). All screws and foot pads must be removed (**Figure 3-1**).

**IVS-200-ULT2 Embedded System**

**Figure 3-1: Bottom Cover Retention Screws**

**Step 2:** Gently open the bottom cover from the side.



**Figure 3-2: Opening Bottom Cover**

## 3.5 Configure the Jumper Settings

To configure the jumper settings, please follow the steps below.

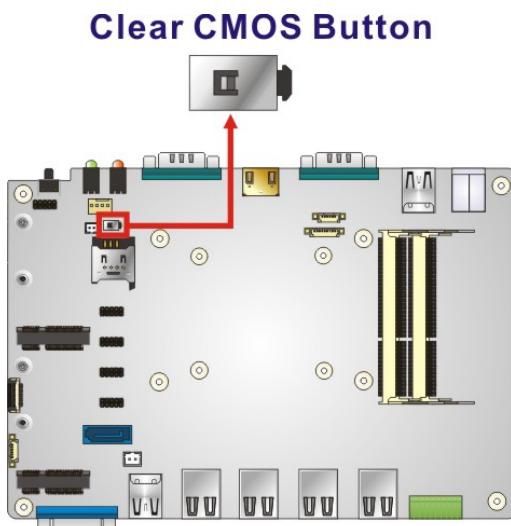
**Step 1:** Open the bottom cover. See **Section 3.4**.

**Step 2:** Locate the jumper settings on the embedded motherboard.

**Step 3:** Make the jumper settings in accordance with the settings described and defined in the following sections.

### 3.5.1 Clear CMOS

If the IVS-200-ULT2 fails to boot due to improper BIOS settings, the clear CMOS button clears the CMOS data and resets the system BIOS information. To do this, push the clear CMOS button for three seconds, and then restart the system. The clear CMOS button location is shown in **Figure 3-3**.



**Figure 3-3: Clear CMOS Button**

If the “CMOS Settings Wrong” message is displayed during the boot up process, the fault may be corrected by pressing the F1 to enter the CMOS Setup menu. Do one of the following:

- Enter the correct CMOS setting
- Load Optimal Defaults

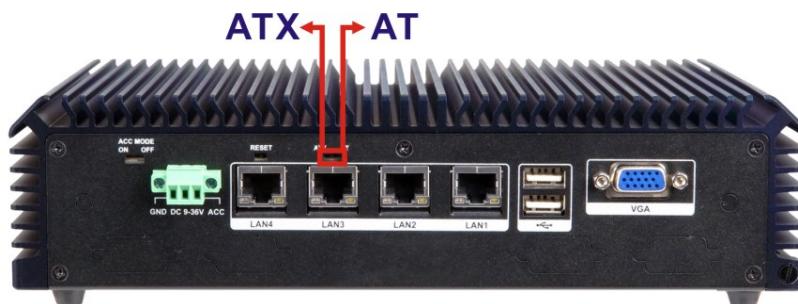
## IVS-200-ULT2 Embedded System

- Load Failsafe Defaults.

After having done one of the above, save the changes and exit the CMOS Setup menu.

### 3.5.2 AT/ATX Mode Selection

AT or ATX power mode can be used on the IVS-200-ULT2. The selection is made through an AT/ATX switch located on the rear panel (**Figure 3-4**).



**Figure 3-4:** AT/ATX Mode Select Switch Location

### 3.5.3 ACC Mode On/Off

ACC mode can be turned on or off. The selection is made through an ACC mode on/off switch located on the rear panel (**Figure 3-4**).



**Figure 3-5:** ACC Mode On/Off Switch Location

### 3.6 Solid-State Drive Installation

One 2.5" SATA drive can be installed in the IVS-200-ULT2. The SATA drive is installed into a removable hard drive bracket on the front panel. To install the SSD into the system, please follow the steps below.

**Step 1:** Loose the two captive screws that secure the bracket on the front panel.



Figure 3-6: SSD Bracket Retention Screws

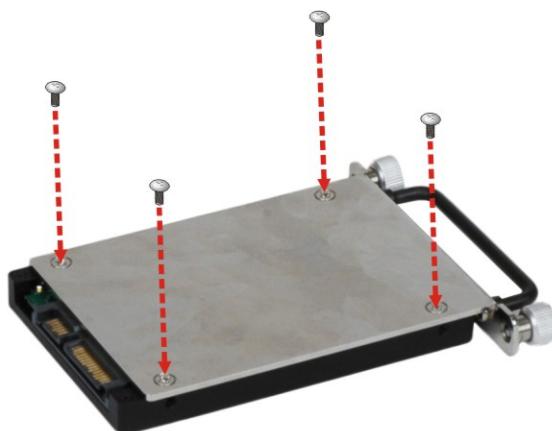
**Step 2:** Pull the bracket out to remove the bracket from the IVS-200-ULT2 (**Figure 3-7**).



Figure 3-7: Removing SSD Bracket

**Step 3:** Place an SSD onto the bracket and secure the SSD with the bracket by inserting four retention screws (M3\*4) into the bottom of the SSD (**Figure 3-8**).

## IVS-200-ULT2 Embedded System



**Figure 3-8: SSD Retention Screws**

**Step 4:** Carefully insert the SSD bracket into the slot on the front panel. Make sure the SATA connector on the SSD is securely connected to the SATA connector inside the chassis.



**Figure 3-9: SSD Installation**

**Step 5:** Tighten the two captive screws to secure the HDD bracket.

### 3.7 mSATA/Full-size PCIe Mini Card Installation

The PCIe Mini slot allows installation of either a full-size or half-size PCIe Mini card. To install a full-size PCIe Mini card or an mSATA module, please follow the steps below.

**Step 1:** Open the bottom cover. See Section 3.4.

**Step 2:** Locate the PCIe Mini slot. If an mSATA module is being installed, please install it in the slot labeled M\_PCIE1 as shown in **Figure 3-10**.

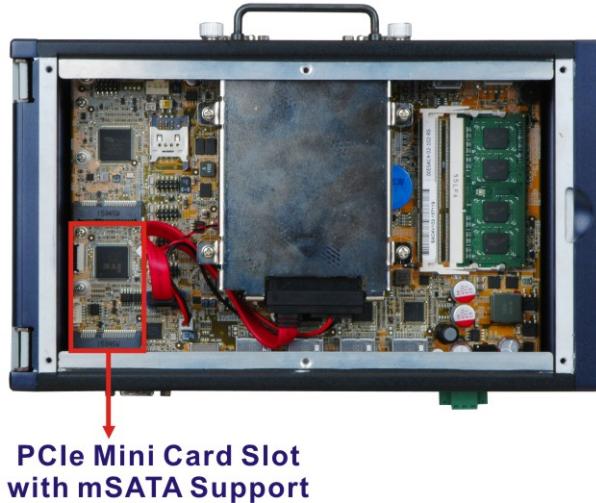


Figure 3-10: PCIe Mini Slot Location

**Step 3:** Remove the retention screw and standoff for a half-size PCIe Mini card. To avoid interference of the board circuit, remove the retention screw and standoff for a half-size PCIe Mini card as shown in **Figure 3-11**.

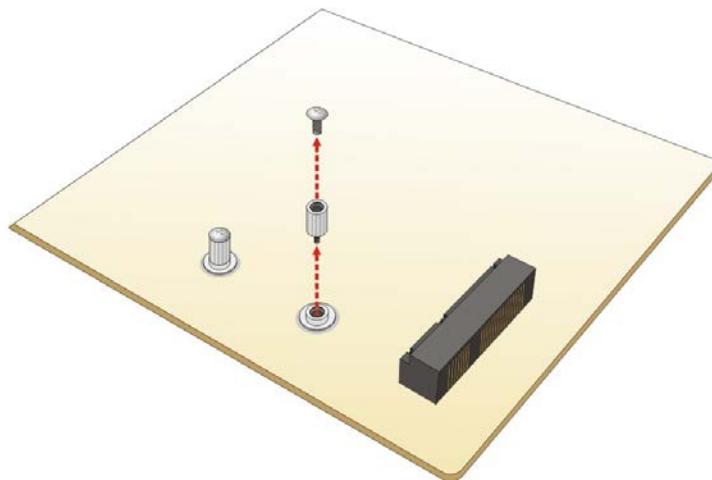
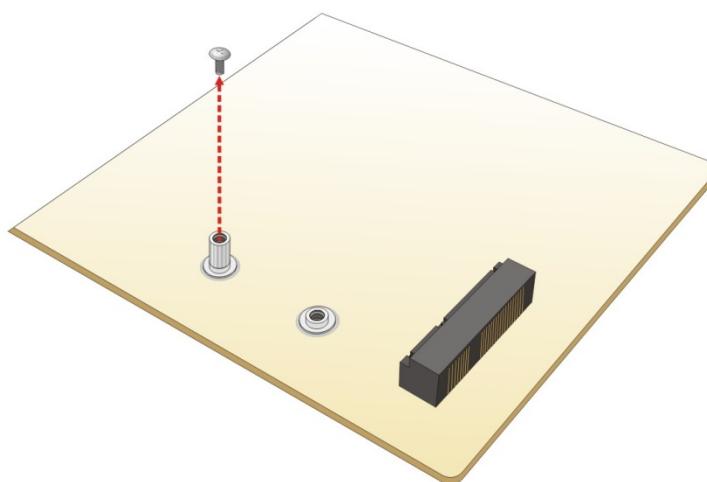


Figure 3-11: Removing the Screw and Standoff for Half-size PCIe Mini Card

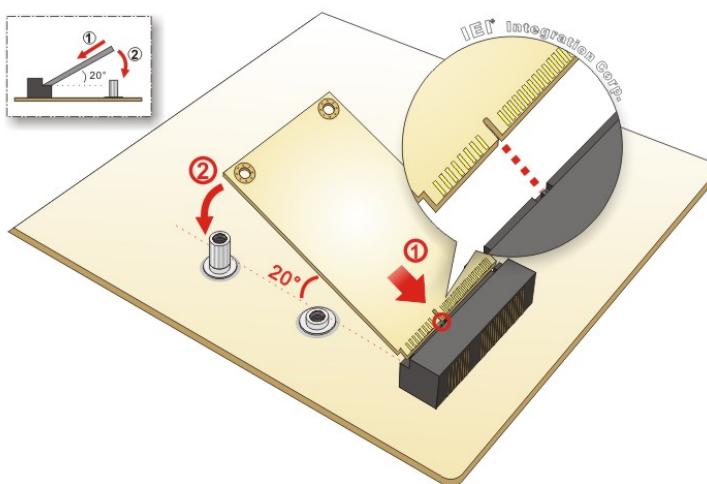
**Step 4:** Remove the retention screw. Remove the retention screw as shown in Figure 3-12.

## IVS-200-ULT2 Embedded System



**Figure 3-12: Removing the Retention Screw**

**Step 5: Insert into the socket at an angle.** Line up the notch on the card with the notch on the slot. Slide the PCIe Mini card into the socket at an angle of about 20° (Figure 3-13).



**Figure 3-13: Inserting the Full-size PCIe Mini Card into the Slot at an Angle**

**Step 6:** Secure the full-size PCIe Mini card. Secure the full-size PCIe Mini card with the retention screw previously removed (Figure 3-14).

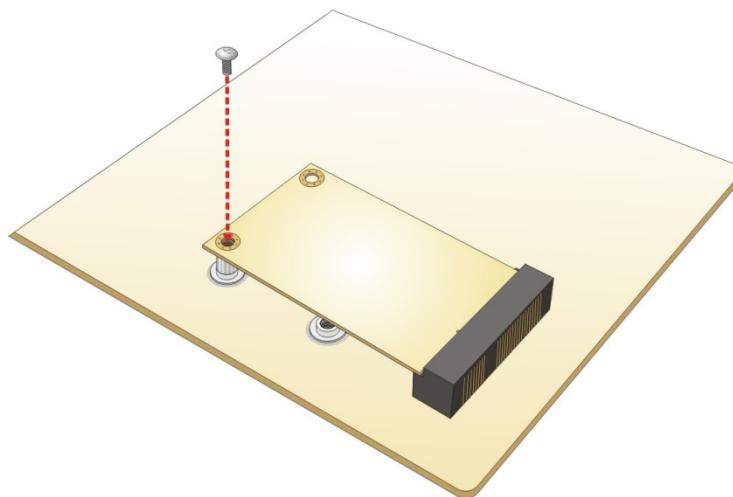


Figure 3-14: Securing the Full-size PCIe Mini Card

### 3.8 WLAN/WWAN Module Installation (Optional)

To install the optional WLAN or WWAN module, please follow the steps below.

**Step 1:** Open the bottom cover. See Section 3.4.

**Step 2:** Remove one of the two knockout holes for antenna installation. The knockout holes are located on the rear panel of the IVS-200-ULT2 as shown in

Figure 3-15.

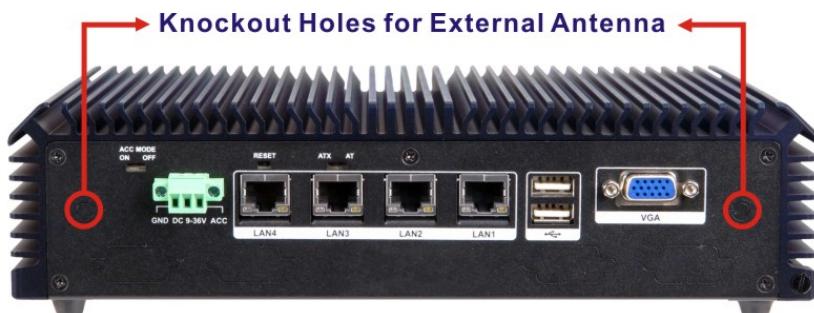
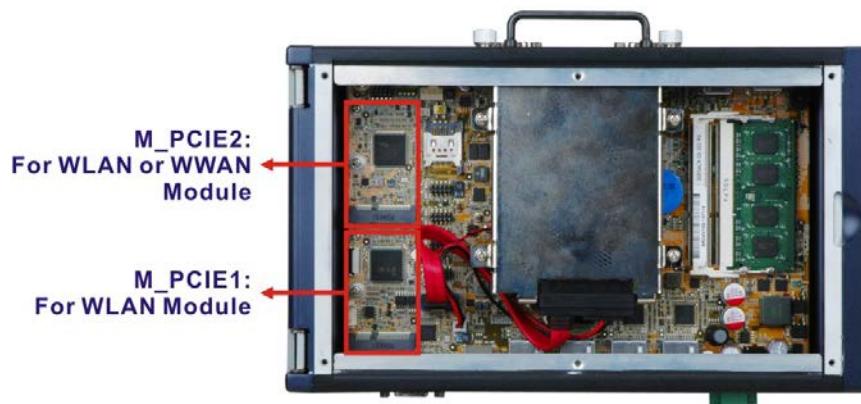
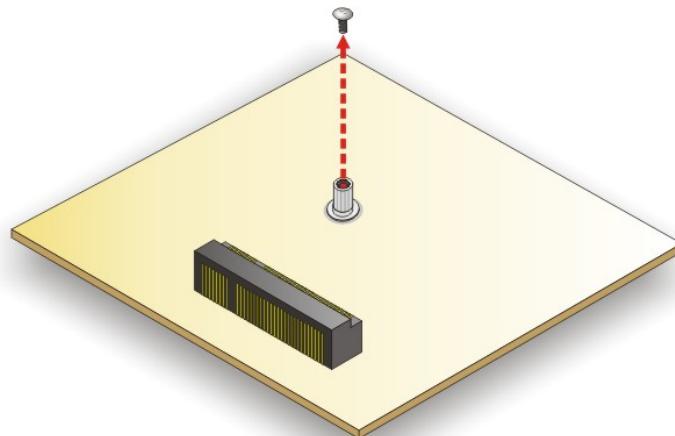


Figure 3-15: Knockout Holes for External Antenna

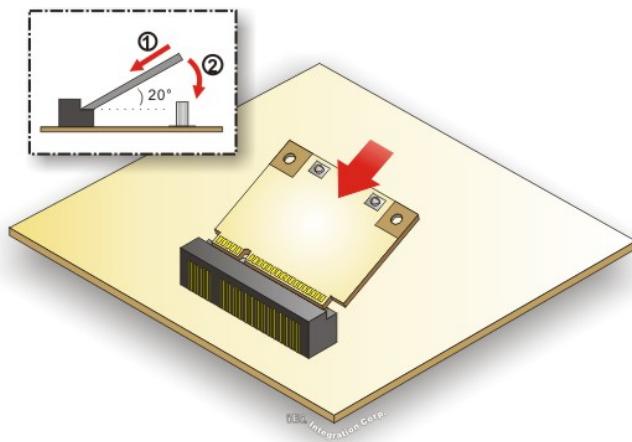
**Step 3:** Locate the PCIe Mini slot that supports the module to be installed (Figure 3-16).

**IVS-200-ULT2 Embedded System****Figure 3-16: PCIe Mini Slot Location**

**Step 4:** Remove the retention screw. Remove the retention screw for WLAN/WWAN module installation as shown in Figure 3-17.

**Figure 3-17: Removing the Retention Screw**

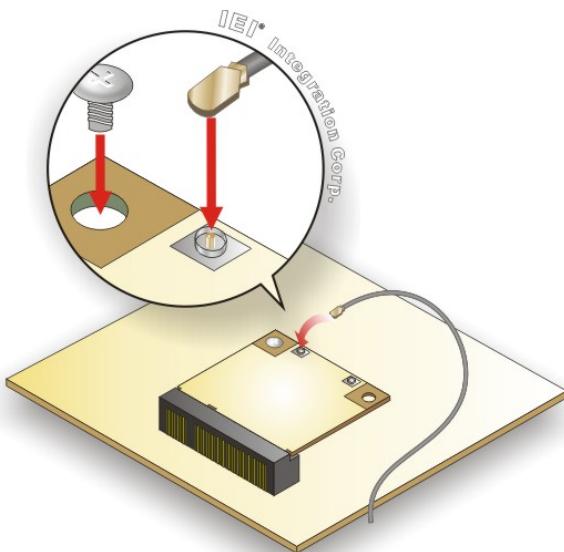
**Step 5: Insert into the socket at an angle.** Line up the notch on the WLAN/WWAN module with the notch on the slot. Slide the WLAN/WWAN module into the slot at an angle of about 20° (**Figure 3-18**).



**Figure 3-18: Inserting the WLAN/WWAN Module**

**Step 6:** Secure the WLAN/WWAN module. Secure the WLAN/WWAN module with the retention screw previously removed (Figure 3-19).

**Step 7:** Connect the RF cable to the antenna connector on the WLAN/WWAN module (Figure 3-19).



**Figure 3-19: Securing WLAN/WWAN Module and Connecting RF Cable**

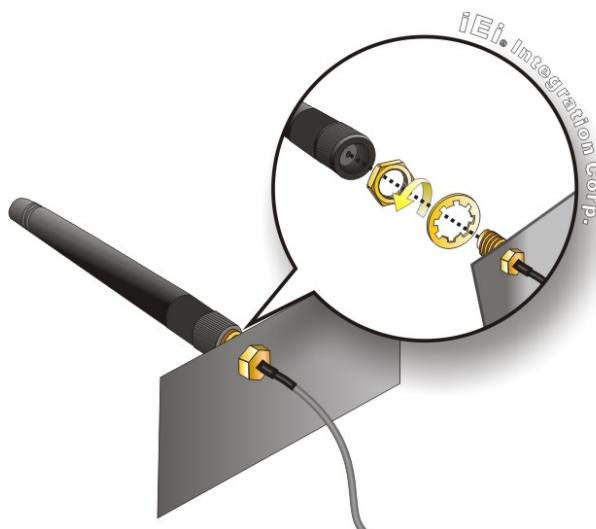
**Step 8:** Remove the nut and washer from the SMA connector at the other end of the RF cable.

## IVS-200-ULT2 Embedded System

**Step 9:** Insert the SMA connector to the antenna connector hole on the rear panel.

**Step 10:** Secure the SMA connector by inserting the washer and tightening it with nut.

**Step 11:** Install the external antenna.



**Figure 3-20: Securing SMA Connector and External Antenna Installation**

### 3.9 SIM Card Installation (Optional)

To be able to use the 3G network connection, a SIM card must be installed in the IVS-200-ULT2. Follow the steps below to install a SIM card.

**Step 1:** Open the bottom cover. See Section 3.4.

**Step 2:** Install a WWAN module into the IVS-200-ULT2. See Section 3.8.

**Step 3:** Locate the SIM card slot.

**Step 4:** **Unlock the slot cover** by pushing it towards the front panel as shown in **Figure 3-21**. Then, open the slot cover.

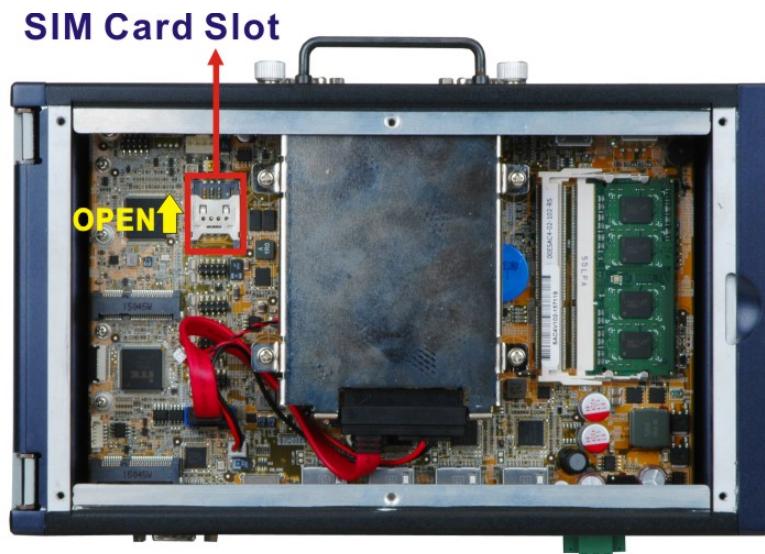


Figure 3-21: Unlock Slot Cover

**Step 5:** Place a SIM card on the slot as shown in Figure 3-22.

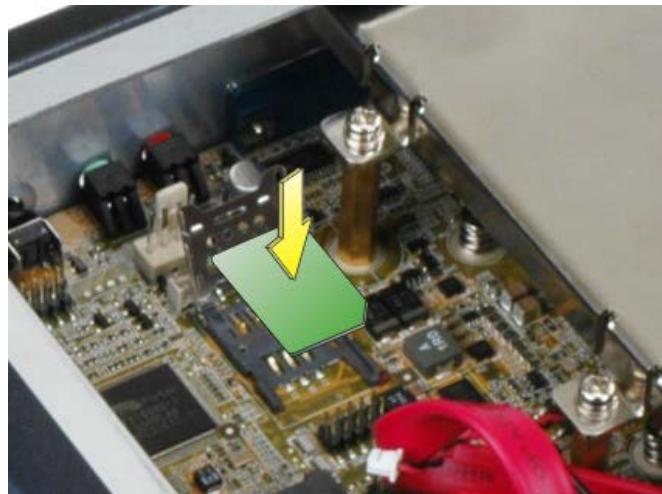


Figure 3-22: SIM Card Installation

**Step 6:** Close the slot cover and lock it.

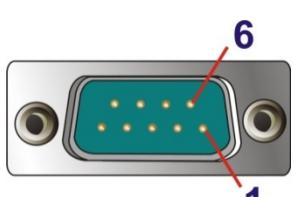
### 3.10 RS-232/422/485 Serial Port Connection

The rear panel of the IVS-200-ULT2 has two D-sub 9 male connectors for RS-232/422/485 connection. The serial communication mode selection can be made

## IVS-200-ULT2 Embedded System

through the BIOS options. Please refer to **Section 4.3.3.1** for detail information. The pinouts of the D-sub 9 connector are listed below.

Pin	RS-232	RS-422	RS-485
1	DCD	TXD422-	TXD485-
2	RX	TXD422+	TXD485+
3	TX	RXD422+	
4	DTR	RXD422-	
5	GND		
6	DSR		
7	RTS		
8	CTS		
9	RI		



The diagram shows a D-sub 9-pin connector with its pins numbered. Pin 1 is at the bottom right, and Pin 6 is at the top center. The connector has two metal shells on either side of the pins.

**Table 3-1: COM1 and COM2 Pinouts**

### 3.11 Mounting the System

To mount the embedded system onto a wall or some other surface using the two mounting brackets, please follow the steps below.

**Step 1:** Turn the embedded system over.

**Step 2:** Remove the four foot pads on the bottom surface by removing the retention screws (**Figure 3-23**).



Figure 3-23: Removing Foot Pads

**Step 3:** Align the two retention screw holes in each bracket with the retention screw holes on the sides of the bottom surface.

**Step 4:** Secure the brackets to the system by inserting two retention screws (M3\*8) into each bracket (**Figure 3-24**).



Figure 3-24: Mounting Bracket Retention Screws

**Step 5:** Drill holes in the intended installation surface.

## IVS-200-ULT2 Embedded System

**Step 6:** Align the mounting holes in the sides of the mounting brackets with the predrilled holes in the mounting surface.

**Step 7:** Insert four retention screws, two in each bracket, to secure the system to the wall.

### 3.12 Power-On Procedure

#### 3.12.1 Installation Checklist

---



##### **WARNING:**

Make sure a power supply with the correct input voltage is being fed into the system. Incorrect voltages applied to the system may cause damage to the internal electronic components and may also cause injury to the user.

---

To power on the embedded system please make sure of the following:

- The bottom cover is installed
- All peripheral devices (VGA monitor, serial communications devices etc.) are connected
- The power cables are plugged in
- The system is securely mounted

### 3.12.2 Terminal Block Pinouts

The IVS-200-ULT2 has a 9 V - 36 V power input terminal block. The terminal block pinouts are shown in **Figure 3-25**.



Figure 3-25: Terminal Block Pinouts

### 3.12.3 Power-on Procedure

To power-on the IVS-200-ULT2 please follow the steps below:

**Step 1:** Connect the power source to the power input terminal block.

**Step 2:** Push the power button until the power LED lights on (**Figure 3-26**).



Figure 3-26: Power Button and Power LED

### 3.13 Available Drivers

All the drivers for the IVS-200-ULT2 are available on IEI Resource Download Center (<https://download.ieeworld.com>). Type IVS-200-ULT2 and press Enter to find all the relevant software, utilities, and documentation.

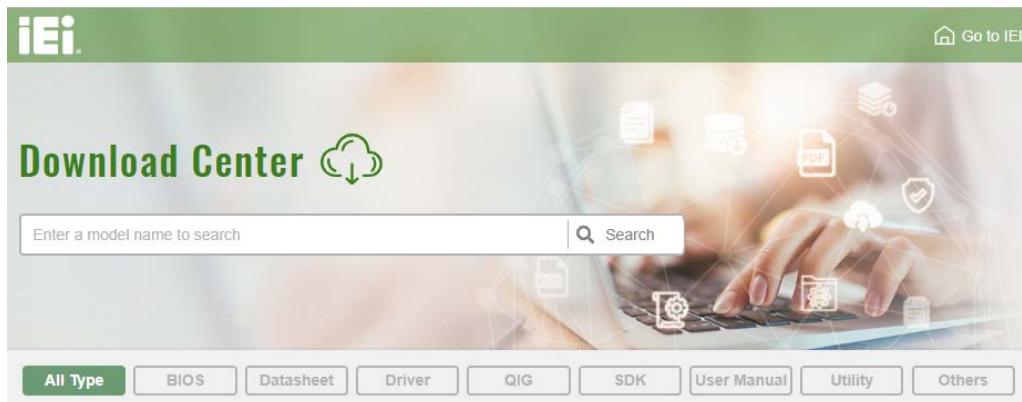
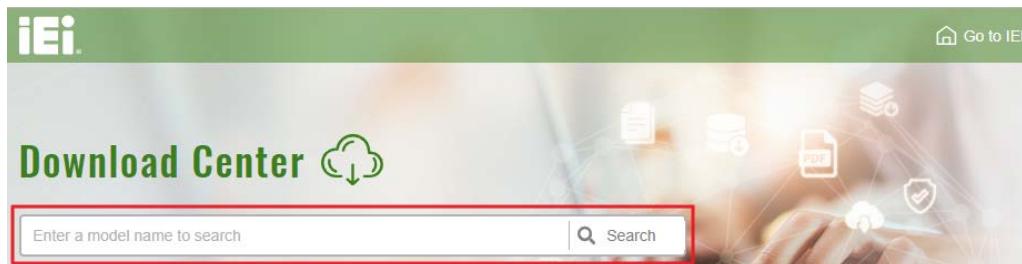


Figure 3-27: IEI Resource Download Center

#### 3.13.1 Driver Download

To download drivers from IEI Resource Download Center, follow the steps below.

**Step 1:** Go to <https://download.ieeworld.com>. Type IVS-200-ULT2 and press Enter.



**Step 2:** All product-related software, utilities, and documentation will be listed. You can choose **Driver** to filter the result.

All Type   BIOS   Datasheet   **Driver**   QIG   SDK   User Manual   Utility   Others

**i** Keyword: "ivs-200", Searching Result : 20 Records.

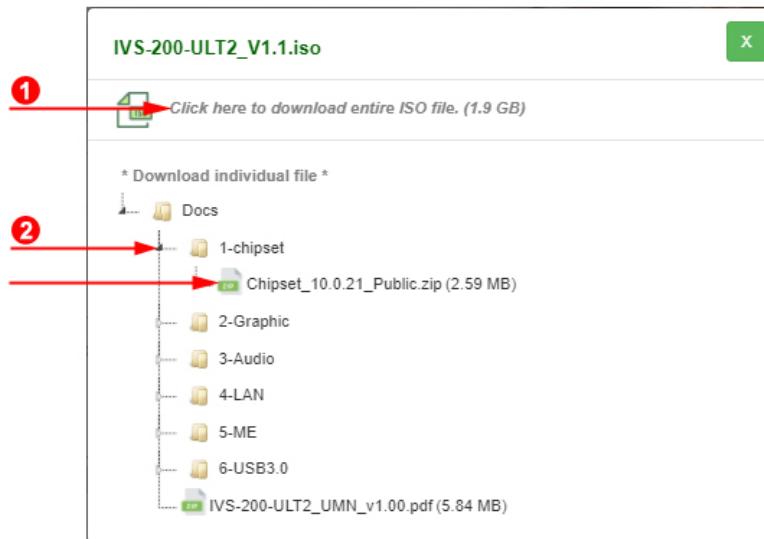
## IVS-200-ULT2

Product Info ▶

Industrial Embedded System > Transportation System Solution > In-vehicle Computer  
Vehicle Surveillance System

File Name	Published	Version	File Checksum
IVS-200-ULT2_V1.1.iso (1.9 GB)	2017/07/10	1.10	6CABFB571601006C004D84DE9DC0FA38

**Step 3:** Click the driver file name on the page and you will be prompted with the following window. You can download the entire ISO file (①), or click the small arrow to find an individual driver and click the file name to download (②).



### NOTE:

To install software from the downloaded ISO image file in Windows 10, double-click the ISO file to mount it as a virtual drive to view its content.

Chapter

4

# BIOS

---

## 4.1 Introduction

The BIOS is programmed onto the BIOS chip. The BIOS setup program allows changes to certain system settings. This chapter outlines the options that can be changed.



### NOTE:

Some of the BIOS options may vary throughout the life cycle of the product and are subject to change without prior notice.

### 4.1.1 Starting Setup

The UEFI BIOS is activated when the computer is turned on. The setup program can be activated in one of two ways.

1. Press the **DELETE** key as soon as the system is turned on or
2. Press the **DELETE** key when the “**Press Delete to enter SETUP**” message appears on the screen.

If the message disappears before the **DELETE** key is pressed, restart the computer and try again.

### 4.1.2 Using Setup

Use the arrow keys to highlight items, press **ENTER** to select, use the PageUp and PageDown keys to change entries, press **F1** for help and press **Esc** to quit. Navigation keys are shown in.

Key	Function
Up arrow	Move to the item above
Down arrow	Move to the item below
Left arrow	Move to the item on the left hand side
Right arrow	Move to the item on the right hand side
+	Increase the numeric value or make changes
-	Decrease the numeric value or make changes
Page up	Move to the next page

Key	Function
Page down	Move to the previous page
Esc	Main Menu – Quit and do not save changes into CMOS Status Page Setup Menu and Option Page Setup Menu -- Exit current page and return to Main Menu
F1 key	General help, only for Status Page Setup Menu and Option Page Setup Menu
F2 key	Load previous values
F3 key	Load optimized defaults
F4 key	Save changes and Exit BIOS

**Table 4-1: BIOS Navigation Keys**

#### 4.1.3 Getting Help

When **F1** is pressed a small help window describing the appropriate keys to use and the possible selections for the highlighted item appears. To exit the Help Window press **Esc** or the **F1** key again.

#### 4.1.4 Unable to Reboot After Configuration Changes

If the computer cannot boot after changes to the system configuration is made, clear CMOS defaults by using the clear CMOS button described in **Section 3.5.1**.

#### 4.1.5 BIOS Menu Bar

The **menu bar** on top of the BIOS screen has the following main items:

- Main – Changes the basic system configuration.
- Advanced – Changes the advanced system settings.
- Chipset – Changes the chipset settings.
- Security – Sets User and Supervisor Passwords.
- Boot – Changes the system boot configuration.
- Save & Exit – Selects exit options and loads default settings

The following sections completely describe the configuration options found in the menu items at the top of the BIOS screen and listed above.

## 4.2 Main

The **Main** BIOS menu (**BIOS Menu 1**) appears when the **BIOS Setup** program is entered.

The **Main** menu gives an overview of the basic system information.

Aptio Setup Utility - Copyright (C) 2015 American Megatrends, Inc.		
Main	Advanced	Chipset Security Boot Save & Exit
BIOS Information		Set the Date. Use Tab to switch between Data elements.
BIOS Vendor	American Megatrends	
Core Version	5.010	
Compliance	UEFI 2.4; PI 1.3	
Project Version	SEJ3AR02.ROM	
Build Date and Time	07/13/2015 10:45:51	
Processor Information		
Name	Broadwell ULT	
Brad String	Intel(R) Core(TM) i7-5650U CPU @ 2.20GHz	
Frequency	3100 MHz	
Processor ID	306d4	
Stepping	E	
Number of Processors	2Core(S)/4Thread(S)	
Microcode Revision	d	
GT Info	GT3 (600 MHz)	
IGFX VBIOS Version	1028	
Memory RC Version	2.1.0.0	
Total Memory	4096 MB (DDR3)	
Memory Frequency	1600 Mhz	
PCH Information		
Name	WildcatPoint-LP	
PCH SKU	Premium SKU(BDW-U)	
Stepping	03/B2	
LAN PHY Revision	B1	
ME FW Version	10.0.26.1000	
ME Firmware SKU	5MB	
SPI Clock Frequency		
D0FR Support	Supported	
Read Status Clock Frequency	50 MHz	
Write Status Clock Frequency	50 MHz	
Fast Read Status Clock Frequency	50 MHz	
iWDD Vendor	iEI	
iWDD Version	SEJ3ER02.bin	
System Date	[Mon 08/17/2015]	
System Time	[11:10:27]	
Version 2.17.1245. Copyright (C) 2015 American Megatrends, Inc.		

**BIOS Menu 1: Main**

## IVS-200-ULT2 Embedded System

The **Main** menu has two user configurable fields:

→ **System Date [xx/xx/xx]**

Use the **System Date** option to set the system date. Manually enter the day, month and year.

→ **System Time [xx:xx:xx]**

Use the **System Time** option to set the system time. Manually enter the hours, minutes and seconds.

### 4.3 Advanced

Use the **Advanced** menu (**BIOS Menu 2**) to configure the CPU and peripheral devices through the following sub-menus:



#### WARNING!

Setting the wrong values in the sections below may cause the system to malfunction. Make sure that the settings made are compatible with the hardware.

Aptio Setup Utility - Copyright (C) 2015 American Megatrends, Inc.

Main   Advanced   Chipset   Security   Boot   Save & Exit	System ACPI Parameters ----- →←: Select Screen ↑↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit
---	---

> CPU Configuration  
> ACPI Settings  
> F81866 Super IO Configuration  
> RTC Wake Settings  
> Serial Port Console Redirection  
> iEi Feature  
> SATA Configuration  
> Intel(R) Rapid Start Technology  
> USB Configuration  
> iWDD H/W Monitor

Version 2.17.1245. Copyright (C) 2015 American Megatrends, Inc.

**BIOS Menu 2: Advanced**

### 4.3.1 CPU Configuration

Use the **CPU Configuration** menu (**BIOS Menu 3**) to view detailed CPU specifications and configure the CPU.

Aptio Setup Utility - Copyright (C) 2015 American Megatrends, Inc.	
Advanced	
CPU Configuration	
Intel(R) Core(R) i7-5650U CPU @ 2.20GHz	
CPU Signature	306d4
Microcode Patch	d
Max CPU Speed	2200 MHz
Min CPU Speed	500 MHz
CPU Speed	3100 MHz
Processor Cores	2
Intel HT Technology	Supported
Intel VT-x Technology	Supported
Intel SMX Technology	Supported
64-bit	Supported
EIST Technology	Supported
CPU C3 State	Supported
CPU C6 State	Supported
CPU C7 State	Supported
-----	
L1 Data Cache	32 KB x 2
L1 Code Cache	32 KB x 2
L2 Cache	256 KB x 2
L3 Cache	4 MB
L3 Cache	Not Present
Hyper-threading	[Enabled]
Active Processor Cores	[All]
Intel Virtualization Technology	[Enabled]
EIST	[Enabled]
Intel TXT(LT) Support	[Disabled]
→←: Select Screen ↑↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit	
Version 2.17.1245. Copyright (C) 2015 American Megatrends, Inc.	

#### BIOS Menu 3: CPU Configuration

The CPU Configuration menu (**BIOS Menu 3**) lists the following CPU details:

- CPU Signature: Lists the CPU signature value.
- Microcode Patch: Lists the microcode patch being used.
- Max CPU Speed: Lists the maximum CPU processing speed.
- Min CPU Speed: Lists the minimum CPU processing speed.
- CPU Speed: Lists the CPU speed.

## IVS-200-ULT2 Embedded System

- Processor Cores: Lists the number of the processor core
- Intel HT Technology: Indicates if Intel HT Technology is supported by the CPU.
- Intel VT-x Technology: Indicates if Intel VT-x Technology is supported by the CPU.
- Intel SMX Technology: Indicates if Intel SMX Technology is supported by the CPU.
- 64-bit: Indicates if 64-bit system is supported by the CPU.
- Intel EIST Technology: Indicates if Intel SpeedStep Technology is supported by the CPU.
- CPU C3 state: Indicates if the C3 state is supported by the CPU.
- CPU C6 state: Indicates if the C6 state is supported by the CPU.
- CPU C7 state: Indicates if the C7 state is supported by the CPU.
- L1 Data Cache: Lists the amount of data storage space on the L1 cache.
- L1 Code Cache: Lists the amount of code storage space on the L1 cache.
- L2 Cache: Lists the amount of storage space on the L2 cache.
- L3 Cache: Lists the amount of storage space on the L3 cache.
- L4 Cache: Lists the amount of storage space on the L4 cache.

### → Hyper-threading [Enabled]

Use the **Hyper-threading** BIOS option to enable or disable the Intel Hyper-Threading Technology.

- ➔ **Disabled** Disables the Intel Hyper-Threading Technology.
- ➔ **Enabled DEFAULT** Enables the Intel Hyper-Threading Technology.

### → Active Processor Cores [All]

Use the **Active Processor Cores** BIOS option to enable numbers of cores in the processor package.

- ➔ **All DEFAULT** Enable all cores in the processor package.
- ➔ **1** Enable one core in the processor package.

**→ Intel Virtualization Technology [Enabled]**

Use the **Intel Virtualization Technology** option to enable or disable virtualization on the system. When combined with third party software, Intel® Virtualization technology allows several OSs to run on the same system at the same time.

- Disabled** **DEFAULT** Disables Intel Virtualization Technology.
- Enabled** **DEFAULT** Enables Intel Virtualization Technology.

**→ EIST [Enabled]**

Use the **EIST** option to enable or disable the Enhanced Intel® SpeedStep Technology (EIST).

- Disabled** **DEFAULT** Disables Enhanced Intel® SpeedStep Technology
- Enabled** **DEFAULT** Enables Enhanced Intel® SpeedStep Technology

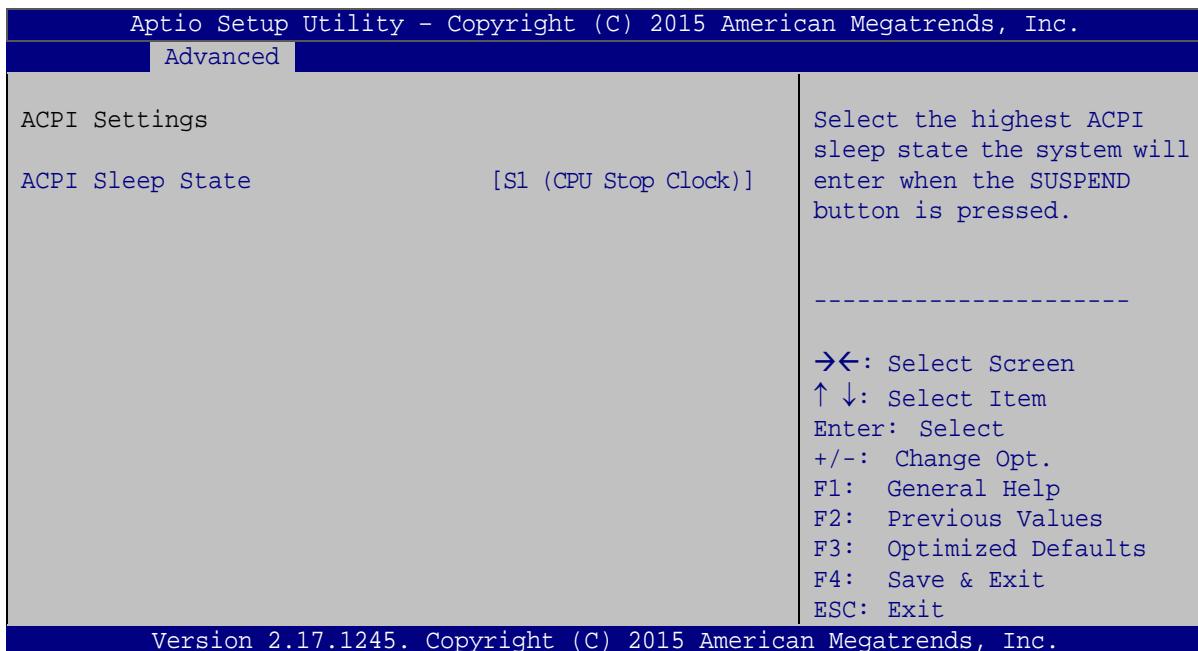
**→ Intel TXT(LT) Support [Disabled]**

Use the **Intel TXT(LT) Support** option to enable or disable the Intel Trusted Execution Technology.

- Disabled** **DEFAULT** Disables Intel Trusted Execution Technology.
- Enabled** **DEFAULT** Enables Intel Trusted Execution Technology.

### 4.3.2 ACPI Settings

The **ACPI Settings** menu (**BIOS Menu 4**) configures the Advanced Configuration and Power Interface (ACPI) options.



#### BIOS Menu 4: ACPI Settings

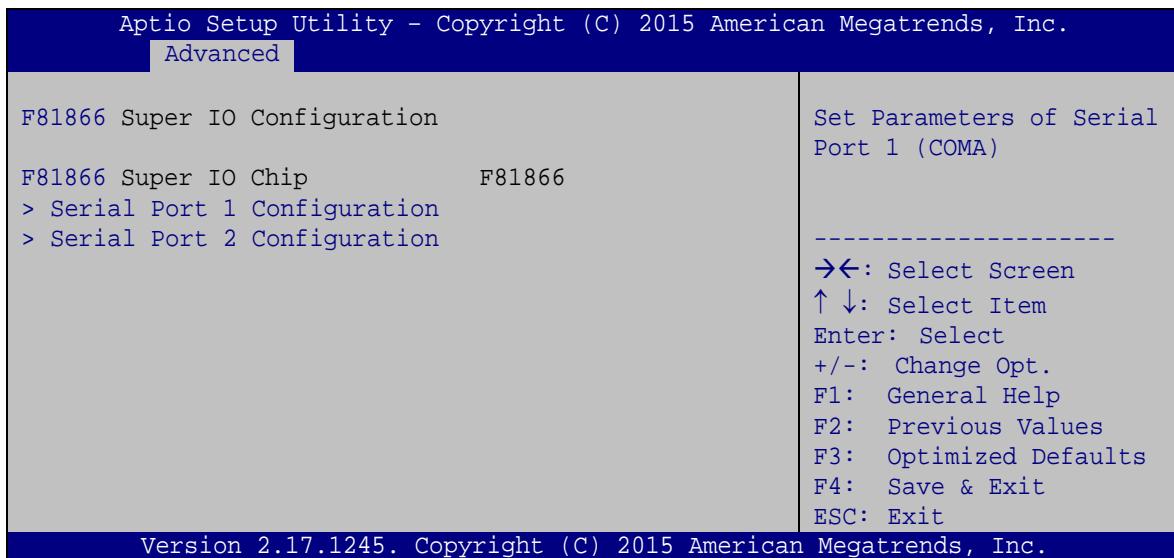
##### → **ACPI Sleep State [S1 (CPU Stop Clock)]**

Use the **ACPI Sleep State** option to specify the sleep state the system enters when it is not being used.

- **S1 (CPU Stop DEFAULT Clock)** The system enters S1 (POS) sleep state. The system appears off. The CPU is stopped; RAM is refreshed; the system is running in a low power mode.
- **S3 only (Suspend to RAM)** The caches are flushed and the CPU is powered off. Power to the RAM is maintained. The computer returns slower to a working state, but more power is saved.

### 4.3.3 F81866 Super IO Configuration

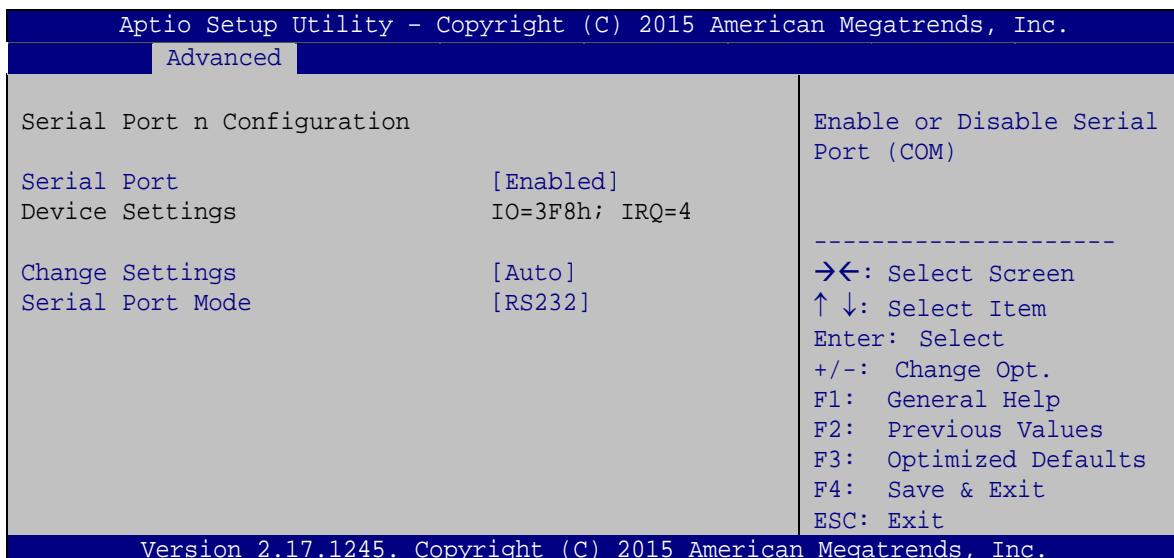
Use the **F81866 Super IO Configuration** menu (**BIOS Menu 5**) to set or change the configurations for the serial ports.



**BIOS Menu 5: F81866 Super IO Configuration**

#### 4.3.3.1 Serial Port n Configuration

Use the **Serial Port n Configuration** menu (**BIOS Menu 6**) to configure the serial port n.



**BIOS Menu 6: Serial Port n Configuration Menu**

#### 4.3.3.1.1 Serial Port 1 Configuration

##### → Serial Port [Enabled]

Use the **Serial Port** option to enable or disable the serial port.

→ **Disabled** Disable the serial port

→ **Enabled** **DEFAULT** Enable the serial port

##### → Change Settings [Auto]

Use the **Change Settings** option to change the serial port IO port address and interrupt address.

→ **Auto** **DEFAULT** The serial port IO port address and interrupt address are automatically detected.

→ **IO=3F8h;**  
**IRQ=4** Serial Port I/O port address is 3F8h and the interrupt address is IRQ4

→ **IO=3F8h;**  
**IRQ=3, 4,**  
**7, 9, 10, 11** Serial Port I/O port address is 3F8h and the interrupt address is IRQ3, 4, 7, 9, 10, 11

→ **IO=2F8h;**  
**IRQ=3, 4,**  
**7, 9, 10, 11** Serial Port I/O port address is 2F8h and the interrupt address is IRQ3, 4, 7, 9, 10, 11

→ **IO=3E8h;**  
**IRQ=3, 4,**  
**7, 9, 10, 11** Serial Port I/O port address is 3E8h and the interrupt address is IRQ3, 4, 7, 9, 10, 11

→ **IO=2E8h;**  
**IRQ=3, 4,**  
**7, 9, 10, 11** Serial Port I/O port address is 2E8h and the interrupt address is IRQ3, 4, 7, 9, 10, 11

→ **Serial Port Mode [RS232]**

Use the **Serial Port Mode** option to select the Serial Port 1 signaling mode.

- **RS232**      **DEFAULT**      Serial Port 1 signaling mode is RS-232
- **RS422**                              Serial Port 1 signaling mode is RS-422
- **RS485**                              Serial Port 1 signaling mode is RS-485

#### 4.3.3.1.2 Serial Port 2 Configuration

→ **Serial Port [Enabled]**

Use the **Serial Port** option to enable or disable the serial port.

- **Disabled**                              Disable the serial port
- **Enabled**      **DEFAULT**      Enable the serial port

→ **Change Settings [Auto]**

Use the **Change Settings** option to change the serial port IO port address and interrupt address.

- **Auto**      **DEFAULT**      The serial port IO port address and interrupt address are automatically detected.
- **IO=2F8h;**  
**IRQ=3**                                      Serial Port I/O port address is 2F8h and the interrupt address is IRQ3
- **IO=3F8h;**  
**IRQ=3, 4,**  
**7, 9, 10, 11**                              Serial Port I/O port address is 3F8h and the interrupt address is IRQ3, 4, 7, 9, 10, 11
- **IO=2F8h;**  
**IRQ=3, 4,**  
**7, 9, 10, 11**                              Serial Port I/O port address is 2F8h and the interrupt address is IRQ3, 4, 7, 9, 10, 11

## IVS-200-ULT2 Embedded System

- ➔ IO=3E8h;  
IRQ=3, 4,  
7, 9, 10, 11  
Serial Port I/O port address is 3E8h and the interrupt address is IRQ3, 4, 7, 9, 10, 11
- ➔ IO=2E8h;  
IRQ=3, 4,  
7, 9, 10, 11  
Serial Port I/O port address is 2E8h and the interrupt address is IRQ3, 4, 7, 9, 10, 11

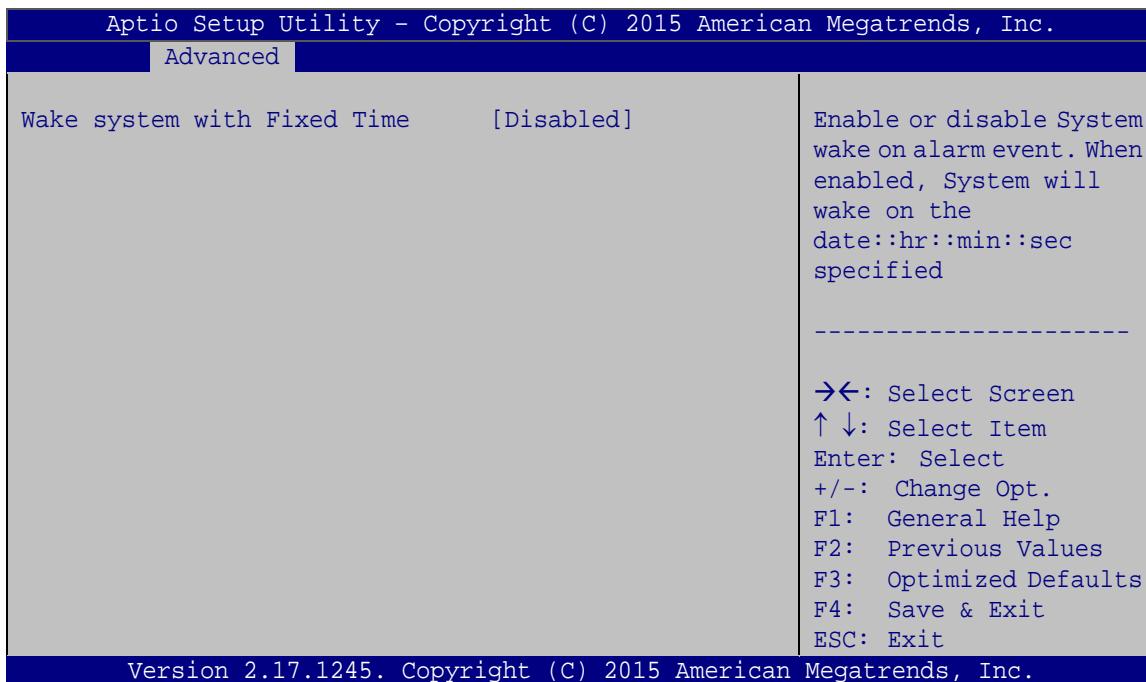
### ➔ Serial Port Mode [RS232]

Use the **Serial Port Mode** option to select the Serial Port 2 signaling mode.

- ➔ RS232      **DEFAULT**      Serial Port 2 signaling mode is RS-232
- ➔ RS422      Serial Port 2 signaling mode is RS-422
- ➔ RS485      Serial Port 2 signaling mode is RS-485

#### 4.3.4 RTC Wake Settings

The **RTC Wake Settings** menu (**BIOS Menu 7**) enables the system to wake at the specified time.



#### BIOS Menu 7: RTC Wake Settings

##### → Wake system with Fixed Time [Disabled]

Use the **Wake system with Fixed Time** option to enable or disable the system wake on alarm event.

→ **Disabled**    **DEFAULT**    The real time clock (RTC) cannot generate a wake event

→ **Enabled**    If selected, the **Wake up every day** option appears allowing you to enable to disable the system to wake every day at the specified time. Besides, the following options appear with values that can be selected:

Wake up date

Wake up hour

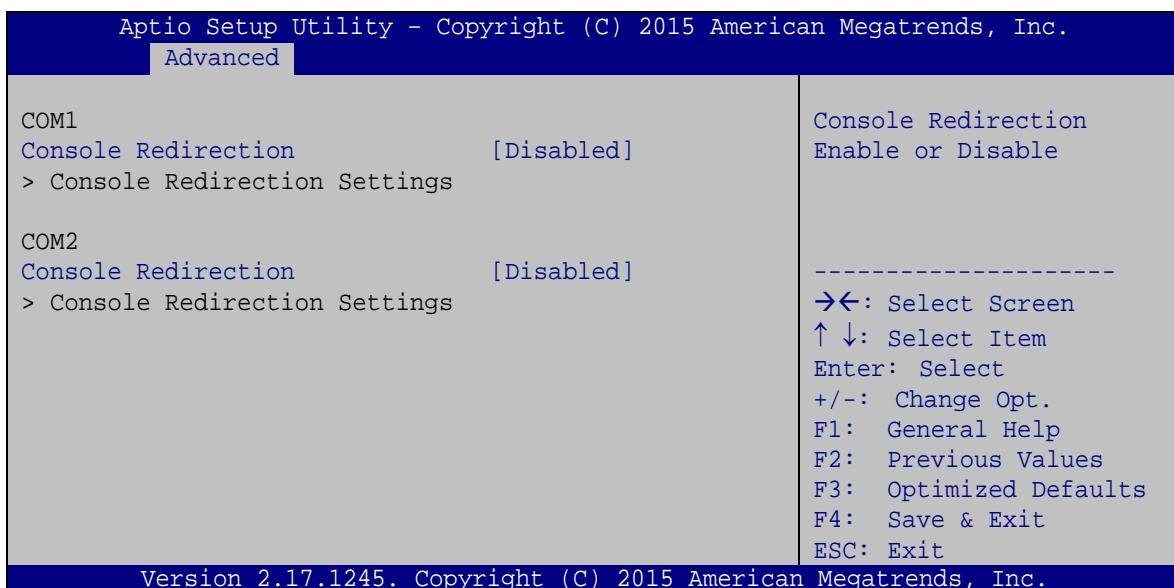
Wake up minute

Wake up second

After setting the alarm, the computer turns itself on from a suspend state when the alarm goes off.

#### 4.3.5 Serial Port Console Redirection

The **Serial Port Console Redirection** menu (**BIOS Menu 8**) allows the console redirection options to be configured. Console redirection allows users to maintain a system remotely by re-directing keyboard input and text output through the serial port.



##### BIOS Menu 8: Serial Port Console Redirection

###### → **Console Redirection [Disabled]**

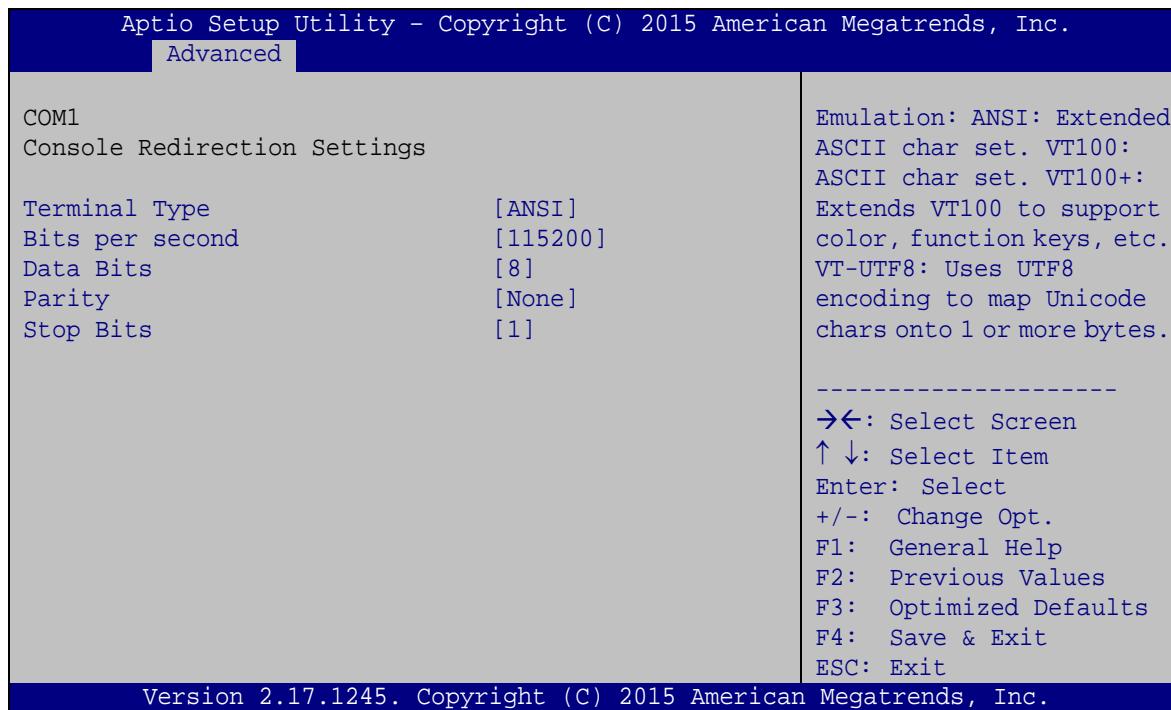
Use **Console Redirection** option to enable or disable the console redirection function.

→ **Disabled**    **DEFAULT**    Disabled the console redirection function

→ **Enabled**                      Enabled the console redirection function

#### 4.3.5.1 Console Redirection Settings

Use the **Console Redirection Settings** menu (**BIOS Menu 9**) to configure console redirection settings of the specified serial port. This menu appears only when the Console Redirection is enabled.



#### BIOS Menu 9: Console Redirection Settings

##### → Terminal Type [ANSI]

Use the **Terminal Type** option to specify the remote terminal type.

- **VT100** The target terminal type is VT100
- **VT100+** The target terminal type is VT100+
- **VT-UTF8** The target terminal type is VT-UTF8
- **ANSI      DEFAULT** The target terminal type is ANSI

##### → Bits per second [115200]

Use the **Bits per second** option to specify the serial port transmission speed. The speed must match the other side. Long or noisy lines may require lower speeds.

## IVS-200-ULT2 Embedded System

- ➔ **9600** Sets the serial port transmission speed at 9600.
- ➔ **19200** Sets the serial port transmission speed at 19200.
- ➔ **38400** Sets the serial port transmission speed at 39400.
- ➔ **57600** Sets the serial port transmission speed at 57600.
- ➔ **115200** **DEFAULT** Sets the serial port transmission speed at 115200.

### ➔ **Data Bits [8]**

Use the **Data Bits** option to specify the number of data bits.

- ➔ **7** Sets the data bits at 7.
- ➔ **8** **DEFAULT** Sets the data bits at 8.

### ➔ **Parity [None]**

Use the **Parity** option to specify the parity bit that can be sent with the data bits for detecting the transmission errors.

- ➔ **None** **DEFAULT** No parity bit is sent with the data bits.
- ➔ **Even** The parity bit is 0 if the number of ones in the data bits is even.
- ➔ **Odd** The parity bit is 0 if the number of ones in the data bits is odd.
- ➔ **Mark** The parity bit is always 1. This option does not provide error detection.
- ➔ **Space** The parity bit is always 0. This option does not provide error detection.

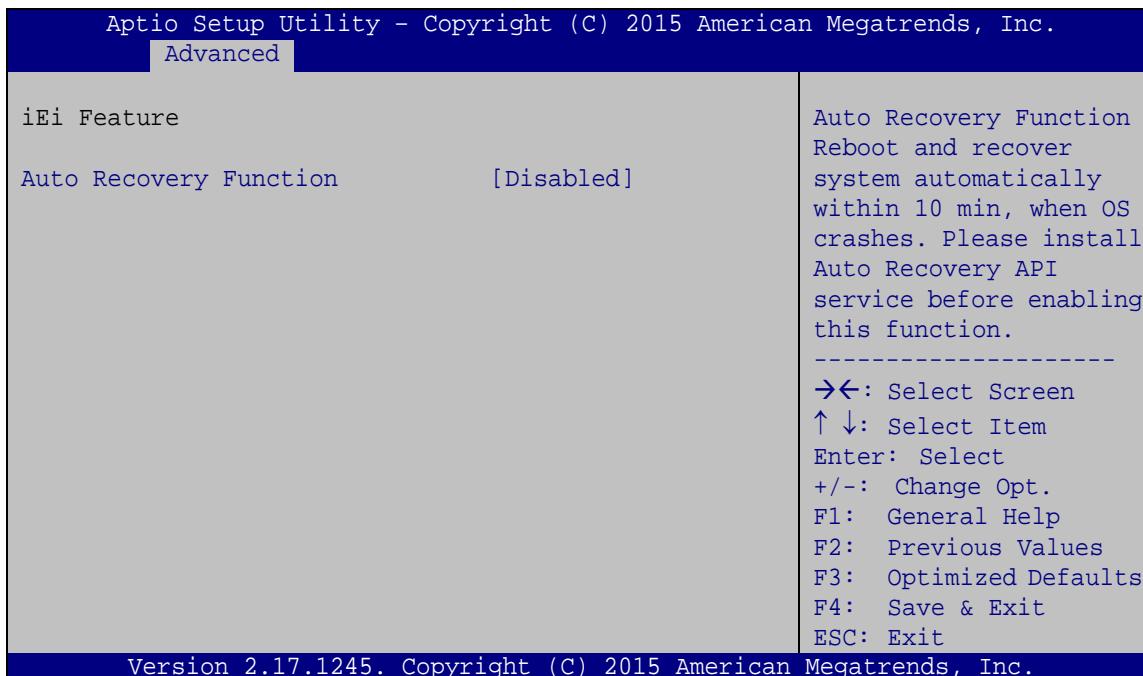
### ➔ **Stop Bits [1]**

Use the **Stop Bits** option to specify the number of stop bits used to indicate the end of a serial data packet. Communication with slow devices may require more than 1 stop bit.

- ➔ 1      **DEFAULT**      Sets the number of stop bits at 1.
- ➔ 2      Sets the number of stop bits at 2.

#### 4.3.6 iEI Feature

Use the **iEI Feature** menu (**BIOS Menu 10**) to configure One Key Recovery function.



#### BIOS Menu 10: iEI Feature

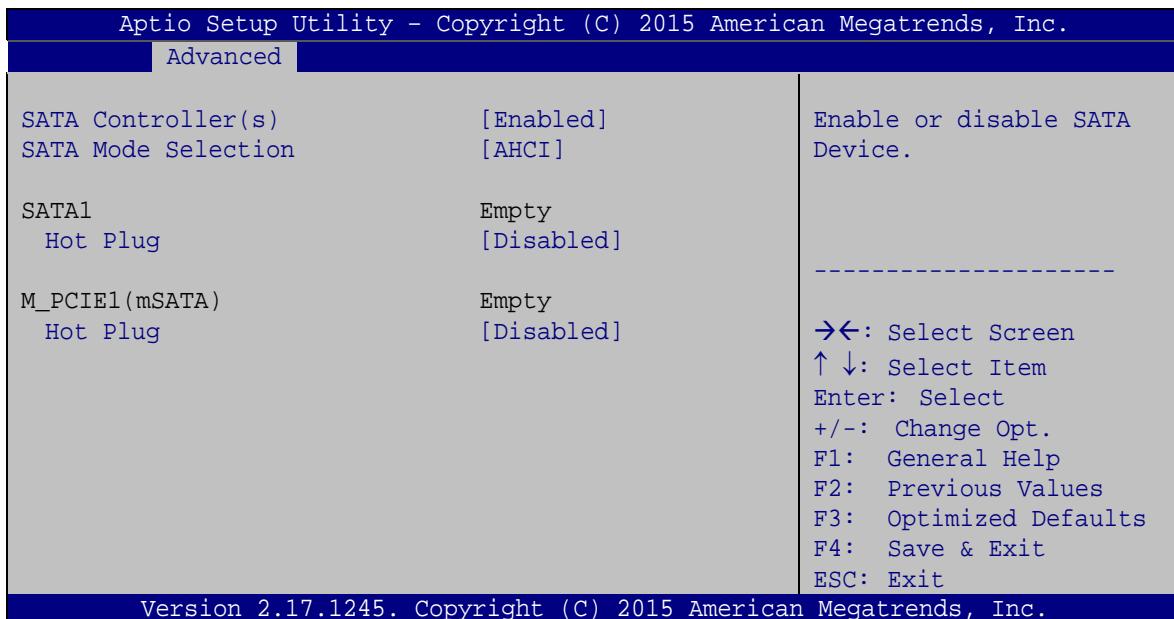
- ➔ **Auto Recovery Function [Disabled]**

Use the **Auto Recovery Function** BIOS option to enable or disable the auto recovery function of the IEI One Key Recovery.

- ➔ **Disabled**      **DEFAULT**      Auto recovery function disabled
- ➔ **Enabled**      Auto recovery function enabled

#### 4.3.7 SATA Configuration

Use the **SATA Configuration** menu (**BIOS Menu 11**) to change and/or set the configuration of the SATA devices installed in the system.



##### BIOS Menu 11: SATA Configuration

###### → **SATA Controller(s) [Enabled]**

Use the **SATA Controller(s)** option to configure the SATA controller.

→ **Enabled**      **DEFAULT**      Enable SATA controller.

→ **Disabled**      Disable SATA controller.

###### → **SATA Mode Selection [AHCI]**

Use the **SATA Mode Selection** option to determine how SATA devices operate.

→ **AHCI**      **DEFAULT**      Configures SATA devices as AHCI device.

→ **RAID**      Configures SATA devices as RAID device.

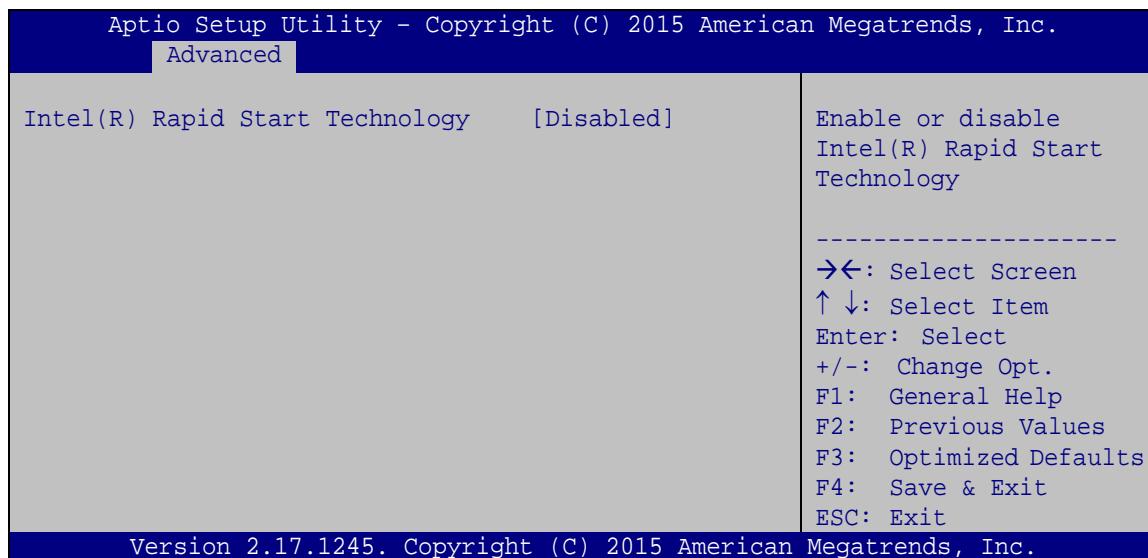
→ Hot Plug [Disabled]

Use the **Hot Plug** option to enable or disable the hot plug function of the SATA port.

- **Disabled**      **DEFAULT**      Disables the hot plug function of the SATA port.
- **Enabled**                  Enables the hot plug function of the SATA port.

#### 4.3.8 Intel(R) Rapid Start Technology

Use the **Intel(R) Rapid Start Technology** menu (**BIOS Menu 12**) to configure Intel® Rapid Start Technology support.



#### BIOS Menu 12: Intel(R) Rapid Start Technology Configuration

→ **Intel(R) Rapid Start Technology [Disabled]**

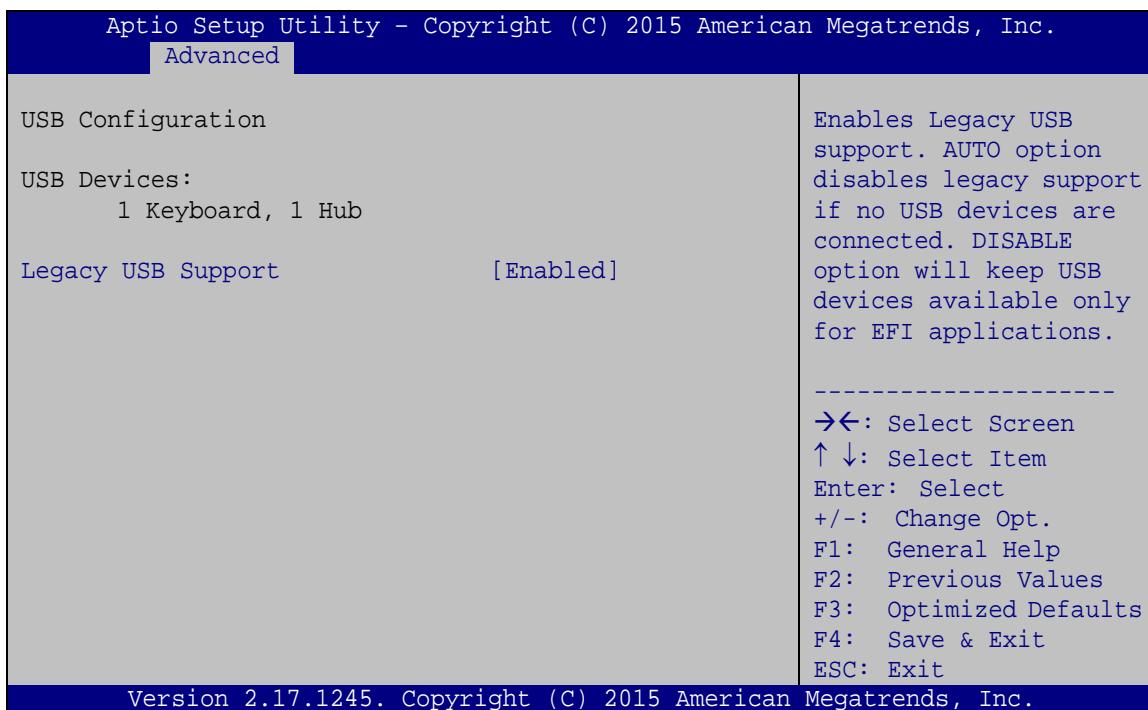
Use **Intel(R) Rapid Start Technology** option to enable or disable the Intel® Rapid Start Technology function.

- **Disabled**      **DEFAULT**      Intel® Rapid Start Technology is disabled
- **Enabled**                  Intel® Rapid Start Technology is enabled

## IVS-200-ULT2 Embedded System

### 4.3.9 USB Configuration

Use the **USB Configuration** menu (**BIOS Menu 13**) to read USB configuration information and configure the USB settings.



#### BIOS Menu 13: USB Configuration

##### → **USB Devices**

The **USB Devices** field lists the USB devices that are enabled on the system

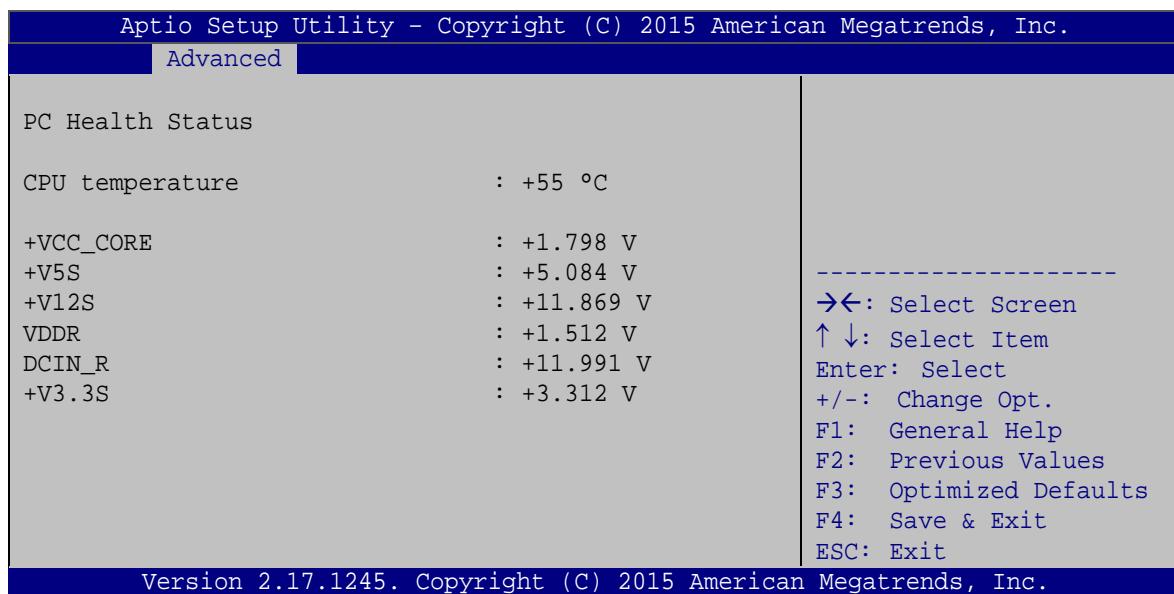
##### → **Legacy USB Support [Enabled]**

Use the **Legacy USB Support** BIOS option to enable USB mouse and USB keyboard support. Normally if this option is not enabled, any attached USB mouse or USB keyboard does not become available until a USB compatible operating system is fully booted with all USB drivers loaded. When this option is enabled, any attached USB mouse or USB keyboard can control the system even when there is no USB driver loaded onto the system.

- ➔ **Enabled**      **DEFAULT**      Legacy USB support enabled
- ➔ **Disabled**      Legacy USB support disabled
- ➔ **Auto**      Legacy USB support disabled if no USB devices are connected

#### 4.3.10 iWDD H/W Monitor

The **iWDD H/W Monitor** menu (**BIOS Menu 14**) displays operating temperature and fan speeds.



#### BIOS Menu 14: iWDD H/W Monitor

##### ➔ **PC Health Status**

The following system parameters and values are shown. The system parameters that are monitored are:

- CPU Temperature
- Voltages:
  - +VCC\_CORE
  - +V5S
  - +V12S
  - VDDR

## IVS-200-ULT2 Embedded System

- DCIN\_R
- +V3.3S

### 4.4 Chipset

Use the **Chipset** menu (**BIOS Menu 15**) to access the PCH-IO and System Agent (SA) configuration menus.



#### WARNING!

Setting the wrong values for the Chipset BIOS selections in the Chipset BIOS menu may cause the system to malfunction.

Aptio Setup Utility - Copyright (C) 2015 American Megatrends, Inc.

Main	Advanced	<b>Chipset</b>	Security	Boot	Save & Exit
------	----------	----------------	----------	------	-------------

> System Agent (SA) Configuration  
> PCH-IO Configuration

System Agent (SA)  
Parameters

---

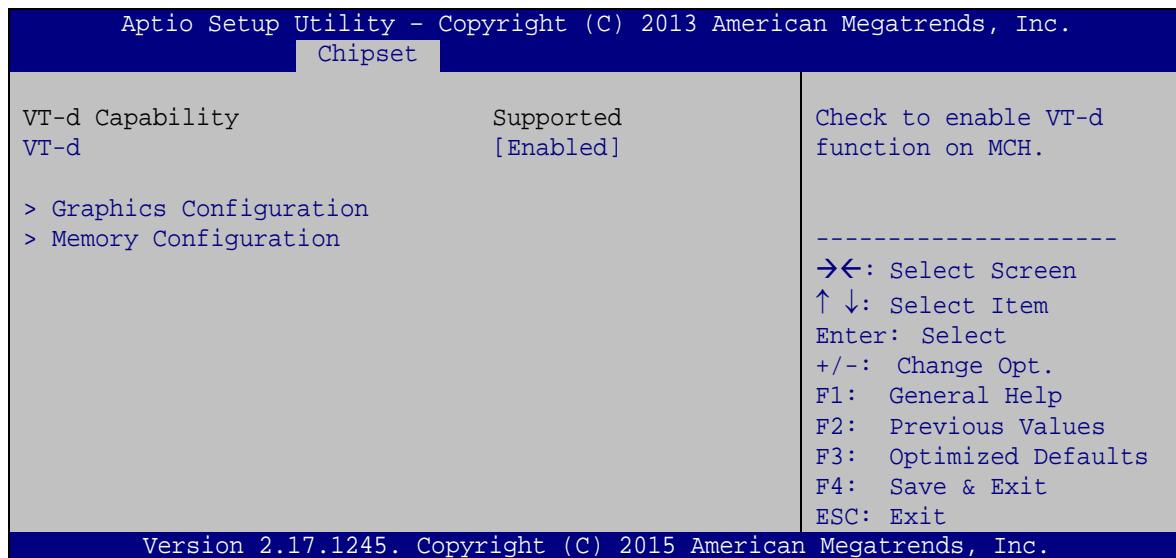
→←: Select Screen  
↑↓: Select Item  
Enter: Select  
+/-: Change Opt.  
F1: General Help  
F2: Previous Values  
F3: Optimized Defaults  
F4: Save & Exit  
ESC: Exit

Version 2.17.1245. Copyright (C) 2015 American Megatrends, Inc.

**BIOS Menu 15: Chipset**

#### 4.4.1 System Agent (SA) Configuration

Use the **System Agent (SA) Configuration** menu (**BIOS Menu 16**) to configure the System Agent (SA) parameters.



##### BIOS Menu 16: System Agent (SA) Configuration

###### → VT-d [Enabled]

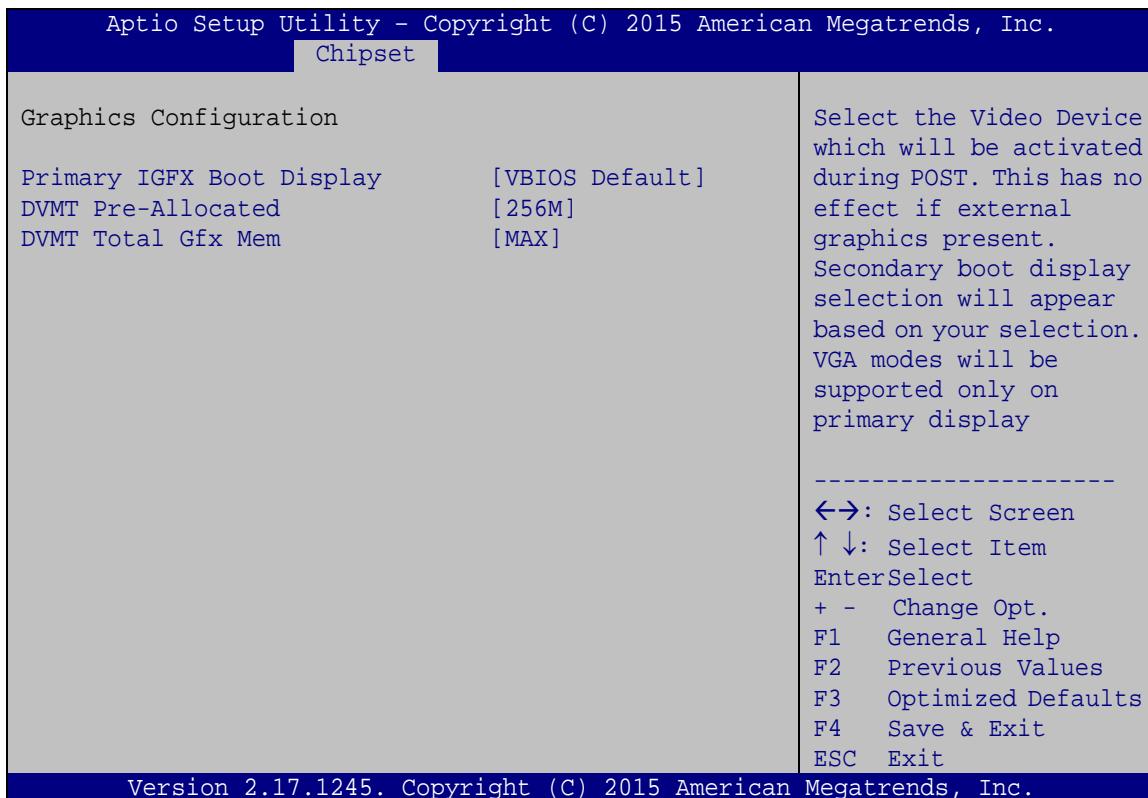
Use the **VT-d** option to enable or disable VT-d support.

→ **Disabled** Disables VT-d support.

→ **Enabled** **DEFAULT** Enables VT-d support.

#### 4.4.1.1 Graphics Configuration

Use the **Graphics Configuration** submenu (**BIOS Menu 17**) to configure the graphics settings.



##### BIOS Menu 17: Graphics Configuration

###### → Primary IGFX Boot Display [VBIOS Default]

Use the **Primary IGFX Boot Display** option to select the display device used by the system when it boots. Configuration options are listed below.

- VBIOS Default **DEFAULT**
- VGA1
- HDMI1

###### → DVMT Pre-Allocated [256M]

Use the **DVMT Pre-Allocated** option to specify the amount of system memory that can be used by the internal graphics device.

- ➔ **32M** 32 MB of memory used by internal graphics device
- ➔ **64M** 64 MB of memory used by internal graphics device
- ➔ **128M** 128 MB of memory used by internal graphics device
- ➔ **256M** **DEFAULT** 256 MB of memory used by internal graphics device
- ➔ **512M** 512 MB of memory used by internal graphics device

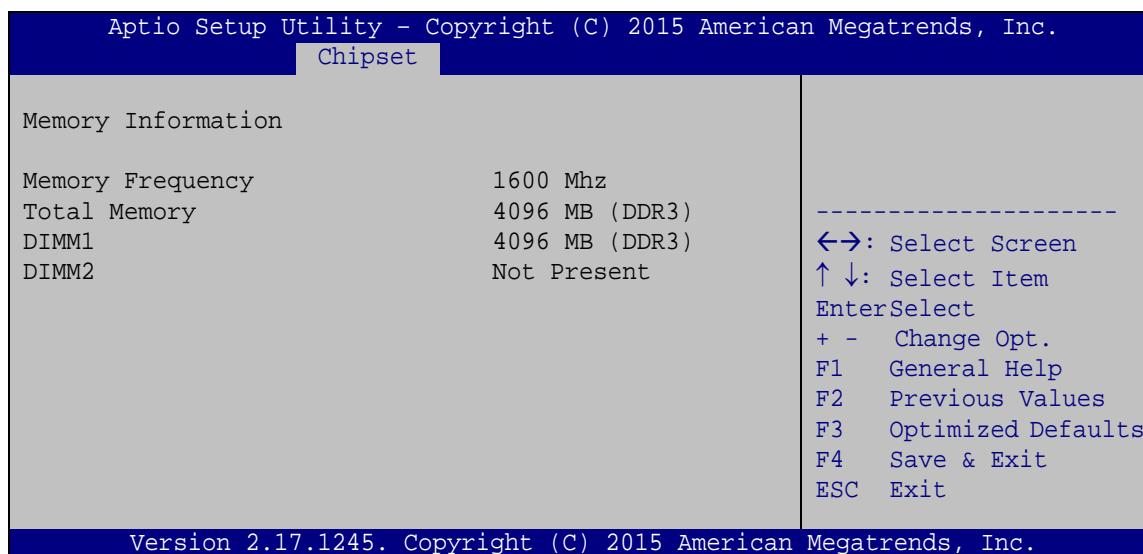
#### ➔ DVMT Total Gfx Mem [MAX]

Use the **DVMT Total Gfx Mem** option to specify the maximum amount of memory that can be allocated as graphics memory. Configuration options are listed below.

- 128MB
- 256MB
- MAX **DEFAULT**

#### 4.4.1.2 Memory Configuration

Use the **Memory Configuration** menu (**BIOS Menu 18**) to view the memory information.

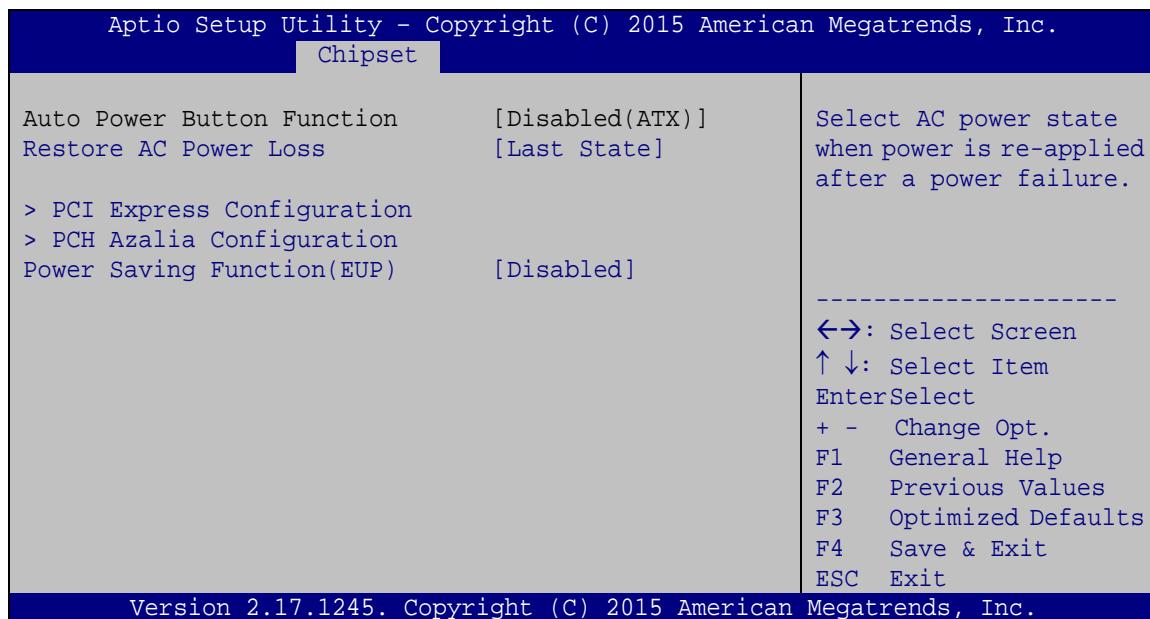


**BIOS Menu 18: Memory Configuration**

## IVS-200-ULT2 Embedded System

### 4.4.2 PCH-IO Configuration

Use the **PCH-IO Configuration** menu (**BIOS Menu 19**) to configure the PCH parameters.



#### BIOS Menu 19: PCH-IO Configuration

##### → **Restore AC Power Loss [Last State]**

Use the **Restore AC Power** BIOS option to specify what state the system returns to if there is a sudden loss of power to the system.

- **Power Off**      The system remains turned off
- **Power On**      The system turns on
- **Last State DEFAULT**      The system returns to its previous state. If it was on, it turns itself on. If it was off, it remains off.

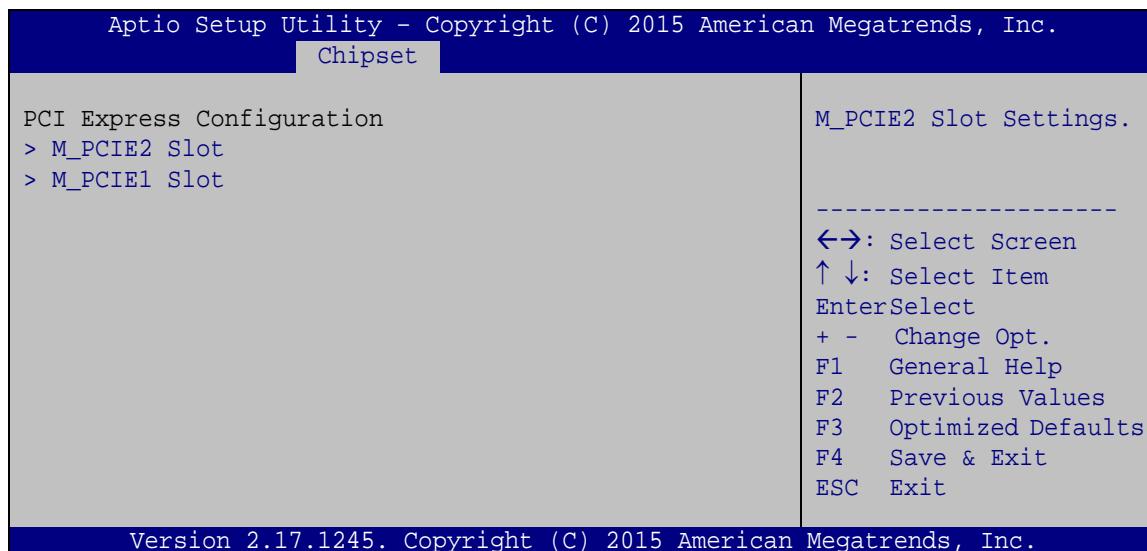
##### → **Power Saving Function(EUP) [Disabled]**

Use the **Power Saving Function(EUP)** BIOS option to enable or disable the power saving function.

- **Disabled**      **DEFAULT**      Power saving function is disabled.
- **Enabled**      Power saving function is enabled. It will reduce power consumption when the system is off.

#### 4.4.2.1 PCI Express Configuration

Use the **PCI Express Configuration** submenu (**BIOS Menu 20**) to configure the PCI Express slots.



##### BIOS Menu 20: PCI Express Configuration

The **M\_PCIE2 Slot** and **M\_PCIE1 Slot** submenus both contain the following options:

→ **PCIe Speed [Auto]**

Use the **PCIe Speed** option to configure the PCIe interface speed.

- Auto      **DEFAULT**
- Gen 2
- Gen 1

→ **Detect Non-Compliance Device [Disabled]**

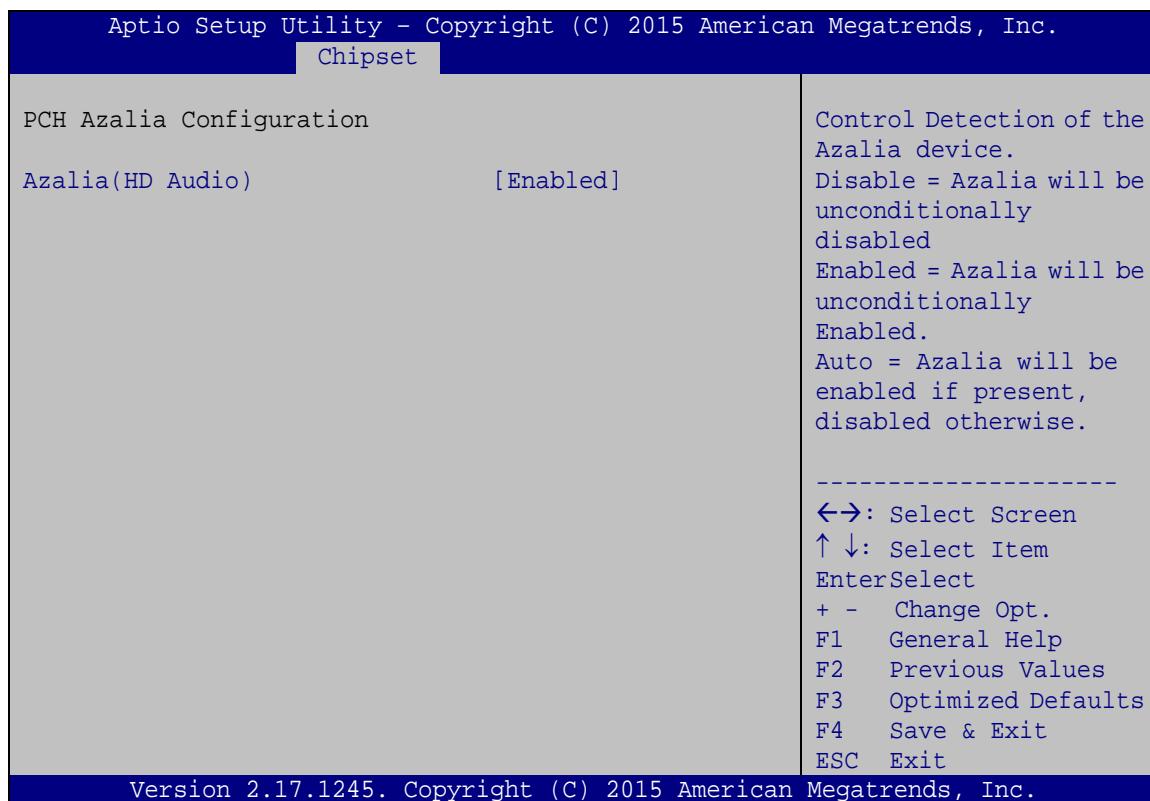
Use the **Detect Non-Compliance Device** option to enable or disable detecting if a non-compliance PCI Express device is connected to the PCI Express slot.

**IVS-200-ULT2 Embedded System**

→ <b>Disabled</b>	<b>DEFAULT</b>	Disables to detect if a non-compliance PCI Express device is connected to the PCI Express slot.
→ <b>Enabled</b>		Enables to detect if a non-compliance PCI Express device is connected to the PCI Express slot.

**4.4.2.2 PCH Azalia Configuration**

Use the **PCH Azalia Configuration** submenu (**BIOS Menu 21**) to configure the High Definition Audio codec.

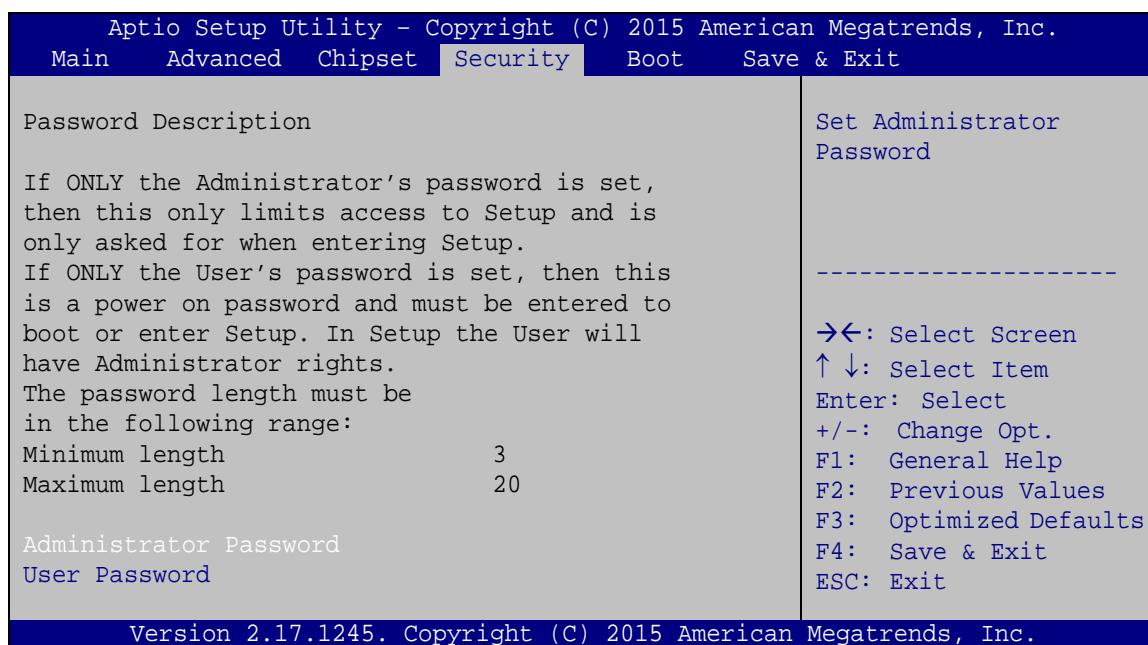
**BIOS Menu 21: PCH Azalia Configuration**→ **Azalia(HD Audio) [Enabled]**

Use the **Azalia(HD Audio)** BIOS option to enable or disable the High Definition Audio controller.

- ➔ **Disabled** The High Definition Audio controller is disabled.
- ➔ **Enabled** **DEFAULT** The High Definition Audio controller is enabled.
- ➔ **Auto** The High Definition Audio controller is automatically detected and enabled.

## 4.5 Security

Use the **Security** menu (**BIOS Menu 22**) to set system and user passwords.



### BIOS Menu 22: Security

#### ➔ Administrator Password

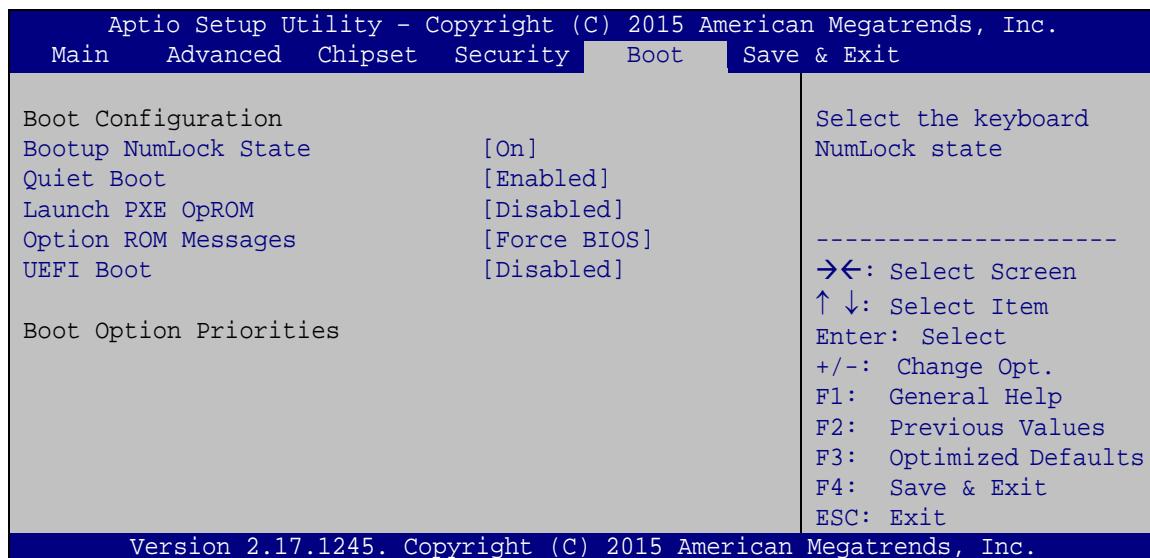
Use the **Administrator Password** to set or change an administrator password.

#### ➔ User Password

Use the **User Password** to set or change a user password.

## 4.6 Boot

Use the **Boot** menu (**BIOS Menu 23**) to configure system boot options.



### BIOS Menu 23: Boot

#### → Bootup NumLock State [On]

Use the **Bootup NumLock State** BIOS option to specify if the number lock setting must be modified during boot up.

→ **On**      **DEFAULT**      Allows the Number Lock on the keyboard to be enabled automatically when the computer system boots up. This allows the immediate use of the 10-key numeric keypad located on the right side of the keyboard. To confirm this, the Number Lock LED light on the keyboard is lit.

→ **Off**      Does not enable the keyboard Number Lock automatically. To use the 10-keys on the keyboard, press the Number Lock key located on the upper left-hand corner of the 10-key pad. The Number Lock LED on the keyboard lights up when the Number Lock is engaged.

## → Quiet Boot [Enabled]

Use the **Quiet Boot** BIOS option to select the screen display when the system boots.

- ➔ **Disabled** Normal POST messages displayed
  - ➔ **Enabled**    **DEFAULT** OEM Logo displayed instead of POST messages

#### → Launch PXE OpROM [Disabled]

Use the **Launch PXE OpROM** option to enable or disable boot option for legacy network devices.

- |   |                 |                |                            |
|---|-----------------|----------------|----------------------------|
| → | <b>Disabled</b> | <b>DEFAULT</b> | Ignore all PXE Option ROMs |
| → | <b>Enabled</b>  |                | Load PXE Option ROMs       |

## → Option ROM Messages [Force BIOS]

Use the **Option ROM Messages** option to set the Option ROM display mode.

- **Force BIOS**      **DEFAULT**      Sets display mode to force BIOS.
  - **Keep Current**      Sets display mode to current.

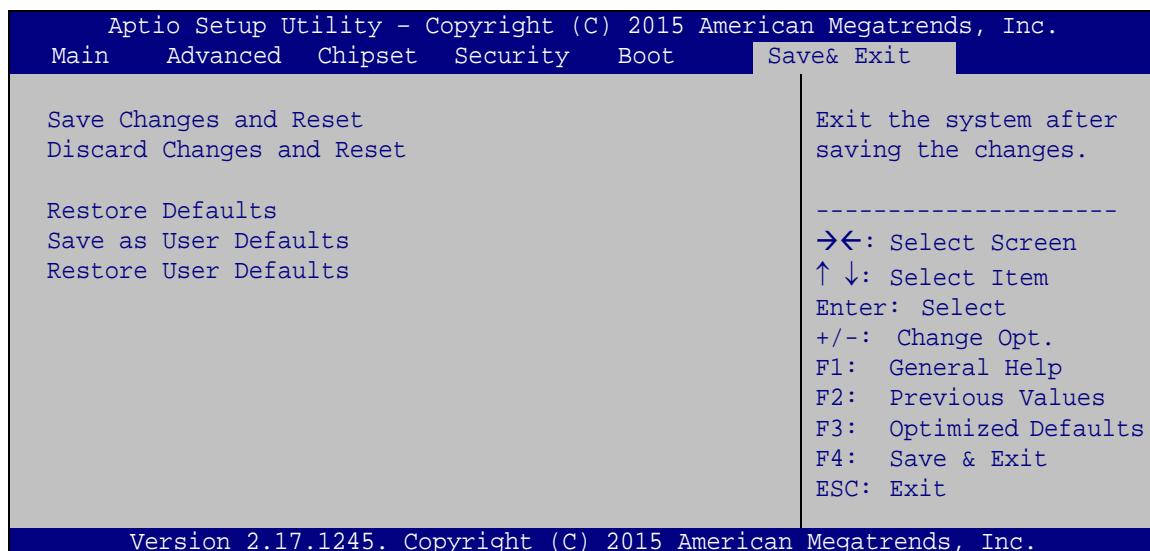
## → UEFI Boot [Disabled]

Use the **UEFI Boot** option to enable or disable to boot from the UEFI devices.

- **Disabled**    **DEFAULT**    Boot from UEFI devices is disabled.
  - **Enabled**                      Boot from UEFI devices is enabled.

## 4.7 Save & Exit

Use the **Save & Exit** menu (**BIOS Menu 24**) to load default BIOS values, optimal failsafe values and to save configuration changes.



### BIOS Menu 24: Save & Exit

#### → Save Changes and Reset

Use the **Save Changes and Reset** option to save the changes made to the BIOS options and reset the system.

#### → Discard Changes and Reset

Use the **Discard Changes and Reset** option to exit the system without saving the changes made to the BIOS configuration setup program.

#### → Restore Defaults

Use the **Restore Defaults** option to load the optimal default values for each of the parameters on the Setup menus. **F3 key can be used for this operation.**

#### → Save as User Defaults

Use the **Save as User Defaults** option to save the changes done so far as user defaults.

#### → Restore User Defaults

Use the **Restore User Defaults** option to restore the user defaults to all the setup options.

Chapter

5

# Troubleshooting and Maintenance

---

**WARNING:**

Take Anti-Static precautions whenever maintenance is being carried out on the system components. Failure to take anti-static precautions can cause permanent system damage. For more details on anti-static precautions, please refer to **Section 3.1**.

## 5.1 IVS-200-ULT2 System Maintenance Overview

**NOTE:**

When doing maintenance operations on the system, please follow the instructions in this chapter. Failure to follow these instructions may lead to personal injury and system damage.

To preserve the working integrity of the IVS-200-ULT2 embedded system, the system must be properly maintained. If embedded system components need replacement, the proper maintenance procedures must be followed to ensure the system can continue to operate normally.

## 5.2 System Troubleshooting

This section provides some simple troubleshooting suggestions.

### 5.2.1 The System Doesn't Turn On

If after turning the system on, there is no power (indicated by the power LED on the front panel not turning on) please do the following:

**Step 1:** Check that the power cable connector is properly connected to the terminal block on the system rear panel.

**Step 2:** Check that the power cable connector is properly plugged into the power source.

**Step 3:** Make sure the power button is turned on.

**Step 4:** Plug the system into a monitor and check to see if anything appears on the screen. If the boot-up screen appears it means the power LED has failed. To fix this problem, contact an IEI sales representative directly.

### 5.2.2 The System Doesn't Boot Up

If the system doesn't boot up please do the following:

**Step 1:** Check the power is turned on. See Section 5.2.1 above.

**Step 2:** Make sure the SO-DIMM module is properly installed.

**Step 3:** Reset the system using the reset CMOS jumper. See **Section 3.5.1**.

### 5.2.3 More Troubleshooting

***Nothing appears on the monitor after booting up the system:*** Make sure the monitor is properly connected to the system and the monitor is connected to a power supply and turned on.



#### WARNING!

If all troubleshooting measures have been taken and the system still fails to start, contact the IEI reseller or vendor you purchased the IVS-200-ULT2 from or contact an IEI sales representative directly. To contact an IEI sales representative, please send an email to [sales@ieiworld.com](mailto:sales@ieiworld.com).

---

## 5.3 Component Replacement Procedure



### WARNING!

Users are not advised to attempt to repair or replace any internal or external components of the IVS-200-ULT2 embedded system other than those listed below. If any other components fail or need replacement, contact the IEI reseller or vendor you purchased the IVS-200-ULT2 from or contact an IEI sales representative directly. To contact an IEI sales representative, please send an email to [sales@ieiworld.com](mailto:sales@ieiworld.com).

The embedded system components listed below can all be replaced if they fail:

- SO-DIMM module
- Internal hard disk drive (see **Section 3.6**)
- mSATA or PCIe Mini card (see **Section 3.7**)
- WLAN or WWAN module (see **Section 3.8**)

### 5.3.1 SO-DIMM Replacement



### WARNING:

Using incorrectly specified SO-DIMM may cause permanently damage the IVS-200-ULT2. Please make sure the purchased SO-DIMM complies with the memory specifications of the IVS-200-ULT2.

To replace a SO-DIMM memory module into a SO-DIMM socket, please follow the steps below.

**Step 1:** **Open the bottom cover.** Place the IVS-200-ULT2 on an anti-static pad with the bottom panel facing up and the bottom cover opened (see **Section 3.4**).

**Step 2:** **Locate the SO-DIMM** on the motherboard.



Figure 5-1: SO-DIMM Location

**Step 3:** Remove the SO-DIMM by releasing the arms on the SO-DIMM socket.

**Step 4:** Align the new SO-DIMM with the socket. The SO-DIMM must be oriented in such a way that the notch in the middle of the SO-DIMM must be aligned with the plastic bridge in the socket (**Figure 5-2**).

**Step 5:** Insert the SO-DIMM. Push the SO-DIMM chip into the socket at an angle (Figure 5-2).

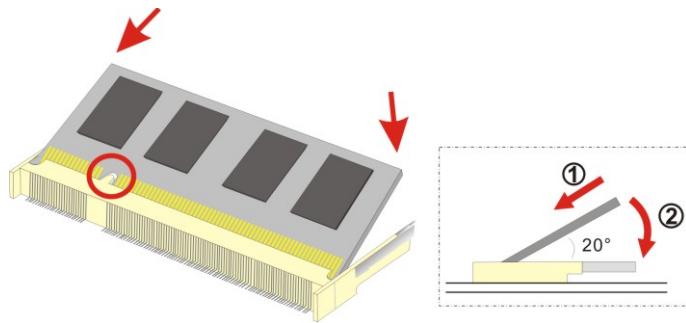


Figure 5-2: SO-DIMM Installation

**Step 6:** Open the SO-DIMM socket arms. Gently pull the arms of the SO-DIMM socket out and push the rear of the SO-DIMM down (See **Figure 5-2**).

**Step 7:** Secure the SO-DIMM. Release the arms on the SO-DIMM socket. They clip into place and secure the SO-DIMM in the socket.

Chapter

6

# Interface Connectors

---

## 6.1 Peripheral Interface Connectors

The IVS-200-ULT2 embedded system motherboard comes with a number of peripheral interface connectors and configuration jumpers. The connector locations are shown in **Figure 6-1**. The Pin 1 locations of the on-board connectors are also indicated in the diagram below. The connector pinouts for these connectors are listed in the following sections.

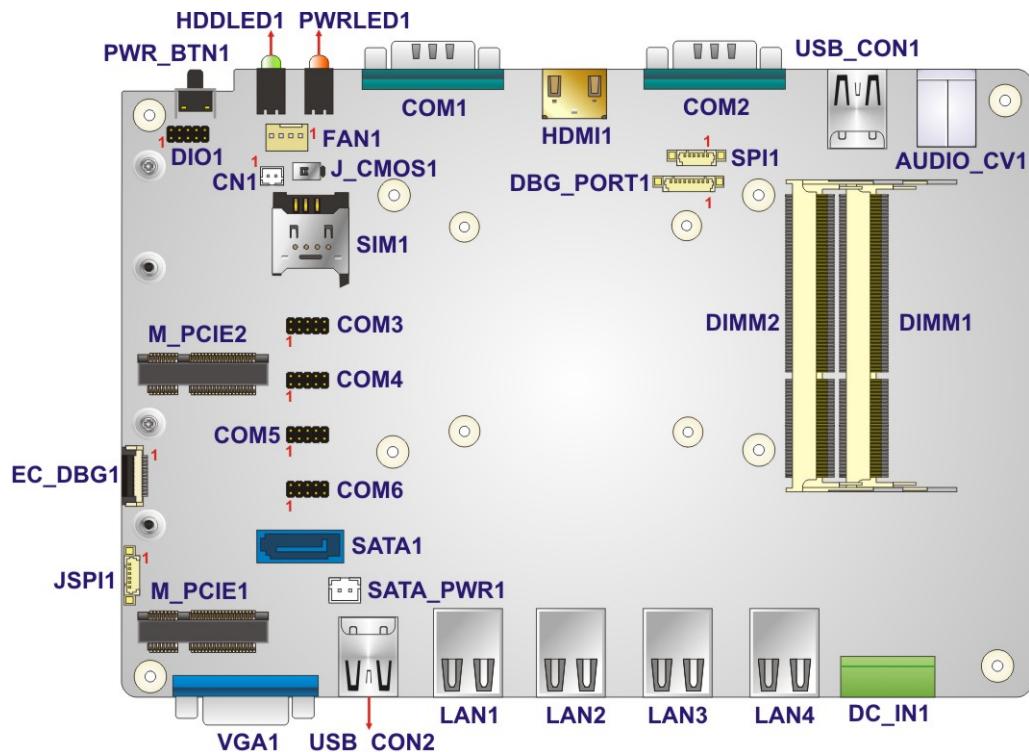


Figure 6-1: Jumper and Connector Locations

## 6.2 Internal Peripheral Connectors

Internal peripheral connectors are found on the motherboard and are only accessible when the motherboard is outside of the chassis. The table below shows a list of the peripheral interface connectors on the IVS-200-ULT2's motherboard. Pinouts of these connectors can be found in the following sections.

Connector	Type	Label
Battery connector	2-pin wafer	CN1

## IVS-200-ULT2 Embedded System

DDR3 SO-DIMM slots	DDR3 SO-DIMM slot	DIMM1, DIMM2
Digital I/O connector	10-pin header	DIO1
Fan connector	4-pin wafer	FAN1
PCIe Mini card/mSATA slot	PCIe Mini card slot	M_PCIE1
PCIe Mini card slot	PCIe Mini card slot	M_PCIE2
RS-232 serial port connectors	10-pin header	COM3, COM4, COM5, COM6
SATA 6Gb/s drive connector	7-pin SATA connector	SATA1
SATA power connector	2-pin wafer	SATA_PWR1
SPI flash connector (BIOS)	6-pin wafer	SPI1
SPI flash connector (EC)	6-pin wafer	JSP1

Table 6-1: Peripheral Interface Connectors

### 6.2.1 Battery Connector (CN1)

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	VBATT	2	GND

Table 6-2: Battery Connector (CN1) Pinouts

### 6.2.2 Digital I/O Connector (DIO1)

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION	
1	GND	2	+5V	
3	DOUT3	4	DOUT2	
5	DOUT1	6	DOUT0	
7	DIN3	8	DIN2	
9	DIN1	10	DINO	



Table 6-3: Digital I/O Connector (DIO1) Pinouts

### 6.2.3 Fan Connector (FAN1)

PIN NO.	DESCRIPTION
1	GND
2	+12V
3	FANIO1
4	FANOUT1

Table 6-4: Fan Connector (FAN1) Pinouts

### 6.2.4 RS-232 Serial Port Connectors (COM3 ~ COM6)

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION	
1	DCD	2	DSR	
3	RXD	4	RTS	
5	TXD	6	CTS	
7	DTR	8	RI	
9	GND	10	GND	

Table 6-5: RS-232 Serial Port Connector (COM3 ~ COM6) Pinouts

### 6.2.5 SATA Power Connector (SATA\_PWR1)

PIN NO.	DESCRIPTION
1	+5V
2	GND

Table 6-6: SATA Power Connector (SATA\_PWR1) Pinouts

### 6.2.6 SPI Flash Connector, BIOS (SPI1)

PIN NO.	DESCRIPTION
1	+SPI_VCC
2	SPI_CS0#_CN
3	SPI_SO0_CN
4	SPI_CLK0_CN
5	SPI_SIO_CN
6	GND

Table 6-7: SPI Flash Connector (SPI1) Pinouts

### 6.2.7 SPI Flash Connector, EC (JSPI1)

PIN NO.	DESCRIPTION
1	+SPI_VCC_EC
2	SPI_CS0#_CN_EC
3	SPI_SO0_CN_EC
4	SPI_CLK0_CN_EC
5	SPI_SIO_CN_EC
6	GND

Table 6-8: SPI Flash Connector (JSPI1) Pinouts

## 6.3 External Interface Panel Connectors

The table below lists the rear panel connectors on the motherboard. Pinouts of these connectors can be found in the following sections.

### 6.3.1 Ethernet Connector (LAN1)

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION	ACT/LINK LED	SPEED LED
1	MDIO+	5	MDI2-		
2	MDIO-	6	MDI1-		
3	MDI1+	7	MDI3+		
4	MDI2+	8	MDI3-		

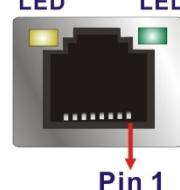


Table 6-9: Ethernet Connector (LAN1) Pinouts

### 6.3.2 Ethernet Connectors (LAN2 ~ LAN4)

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION	ACT/LINK LED	SPEED LED
1	TRD0+	5	TRD2-		
2	TRD0-	6	TRD1-		
3	TRD1+	7	TRD3+		
4	TRD2+	8	TRD3-		

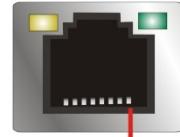


Table 6-10: Ethernet Connectors (LAN2 ~ LAN4) Pinouts

### 6.3.3 RS-232/422/485 DB-9 Serial Ports (COM1, COM2)

PIN NO.	RS-232	RS-422	RS-485
1	DCD	TXD422-	TXD485-
2	RX	TXD422+	TXD485+
3	TX	RXD422+	
4	DTR	RXD422-	
5	GND		
6	DSR		
7	RTS		
8	CTS		
9	RI		

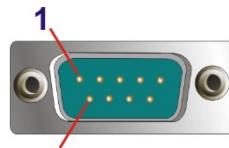


Table 6-11: RS-232/422/485 DB-9 Serial Port (COM1, COM2) Pinouts

### 6.3.4 USB 2.0 Connectors (USB\_CON2)

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION	Pin 5
1	+5V	5	+5V	
2	USB2P0_DM2_L	6	USB2P0_DM3_L	
3	USB2P0_DP2_L	7	USB2P0_DP3_L	
4	GND	8	GND	Pin 1



Table 6-12: USB 2.0 Connectors (USB\_CON2) Pinouts

### 6.3.5 USB 3.2 Gen 1 Connectors (USB\_CON1)

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	+5V	10	+5V
2	USB2PO_DM0	11	USB2PO_DM1
3	USB2PO_DP0	12	USB2PO_DP1
4	GND	13	GND
5	USB3PO_RXDNO	14	USB3PO_RXDN1
6	USB3PO_RXDPO	15	USB3PO_RXDP1
7	GND	16	GND
8	USB3PO_TXDNO	17	USB3PO_TXDN1
9	USB3PO_TXDPO	18	USB3PO_TXDP1

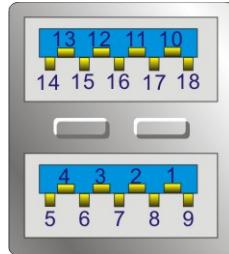


Table 6-13: USB 3.2 Gen 1 Connectors (USB\_CON1) Pinouts

### 6.3.6 Power Input Terminal Block (DC\_IN1)



Table 6-14: Power Input Terminal Block (DC\_IN1) Pinouts

### 6.3.7 VGA Connector (VGA1)

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	Red	2	Green
3	Blue	4	NC
5	GND	6	GND
7	GND	8	GND
9	VGAVCC	10	HOTPLUG
11	NC	12	DDCDAT
13	HSYNC	14	VSYNC
15	DDCCLK		

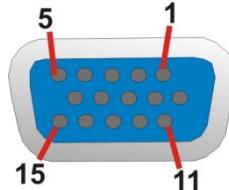


Table 6-15: VGA Connector (VGA1) Pinouts

Appendix

A

# Regulatory Compliance

---

## DECLARATION OF CONFORMITY



This equipment is in conformity with the following EU directives:

- EMC Directive 2014/30/EU
- Low-Voltage Directive 2014/35/EU
- RoHS II Directive 2011/65/EU, 2015/863/EU

If the user modifies and/or install other devices in the equipment, the CE conformity declaration may no longer apply.

If this equipment has telecommunications functionality, it also complies with the requirements of the R&TTE Directive 1999/5/EC.

---

English

IEI Integration Corp declares that this equipment is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC.

---

Български [Bulgarian]

IEI Integration Corp. декларира, че този оборудване е в съответствие със съществените изисквания и другите приложими правила на Директива 1999/5/EC.

---

Česky [Czech]

IEI Integration Corp tímto prohlašuje, že tento zařízení je ve shodě se základními požadavky a dalšími příslušnými ustanoveními směrnice 1999/5/ES.

---

Dansk [Danish]

IEI Integration Corp erklærer herved, at følgende udstyr overholder de væsentlige krav og øvrige relevante krav i direktiv 1999/5/EF.

---

Deutsch [German]

IEI Integration Corp, erklärt dieses Gerät entspricht den grundlegenden Anforderungen und den weiteren entsprechenden Vorgaben der Richtlinie 1999/5/EU.

---

Eesti [Estonian]

IEI Integration Corp deklareerib seadme seadme vastavust direktiivi 1999/5/EÜ põhinõuetele ja nimetatud direktiivist tulenevatele teistele asjakohastele sätetele.

---

---

**Español [Spanish]**

IEI Integration Corp declara que el equipo cumple con los requisitos esenciales y cualesquiera otras disposiciones aplicables o exigibles de la Directiva 1999/5/CE.

---

**Ελληνική [Greek]**

ΙΕΙ Integration Corp ΔΗΛΩΝΕΙ ΟΤΙ ΕΞΟΠΛΙΣΜΟΣ ΣΥΜΜΟΡΦΩΝΕΤΑΙ ΠΡΟΣ ΤΙΣ ΟΥΣΙΩΔΕΙΣ ΑΠΑΙΤΗΣΕΙΣ ΚΑΙ ΤΙΣ ΛΟΙΠΕΣ ΣΧΕΤΙΚΕΣ ΔΙΑΤΑΞΕΙΣ ΤΗΣ ΟΔΗΓΙΑΣ 1999/5/EK.

---

**Français [French]**

IEI Integration Corp déclare que l'appareil est conforme aux exigences essentielles et aux autres dispositions pertinentes de la directive 1999/5/CE.

---

**Italiano [Italian]**

IEI Integration Corp dichiara che questo apparecchio è conforme ai requisiti essenziali ed alle altre disposizioni pertinenti stabilite dalla direttiva 1999/5/CE.

---

**Latviski [Latvian]**

IEI Integration Corp deklarē, ka iekārta atbilst būtiskajām prasībām un citiem ar to saistītajiem noteikumiem Direktīvas 1999/5/EK.

---

**Lietuvių [Lithuanian]**

IEI Integration Corp deklaruoją, kad šis įranga atitinka esminius reikalavimus ir kitas 1999/5/EB Direktyvos nuostatas.

---

**Nederlands [Dutch]**

IEI Integration Corp dat het toestel toestel in overeenstemming is met de essentiële eisen en de andere relevante bepalingen van richtlijn 1999/5/EG.

---

**Malti [Maltese]**

IEI Integration Corp jiddikjara li dan prodott jikkonforma mal-ħtiġijiet essenziali u ma provvedimenti oħrajn relevanti li hemm fid-Dirrettiva 1999/5/EC.

---

**Magyar [Hungarian]**

IEI Integration Corp nyilatkozom, hogy a berendezés megfelel a vonatkozó alapvető követelményeknek és az 1999/5/EC irányelv egyéb előírásainak.

---

**Polski [Polish]**

IEI Integration Corp oświadcza, że wyrobu jest zgodny z zasadniczymi wymogami oraz pozostałymi stosownymi postanowieniami Dyrektywy 1999/5/EC.

---

**Português [Portuguese]**

IEI Integration Corp declara que este equipamento está conforme com os requisitos essenciais e outras disposições da Directiva 1999/5/CE.

---

## IVS-200-ULT2 Embedded System

---

Româna [Romanian]

IEI Integration Corp declară că acest echipament este în conformitate cu cerințele esențiale și cu celelalte prevederi relevante ale Directivei 1999/5/CE.

---

Slovensko [Slovenian]

IEI Integration Corp izjavlja, da je ta opreme v skladu z bistvenimi zahtevami in ostalimi relevantnimi določili direktive 1999/5/ES.

---

Slovensky [Slovak]

IEI Integration Corp týmto vyhlasuje, že zariadenia spĺňa základné požiadavky a všetky príslušné ustanovenia Smernice 1999/5/ES.

---

Suomi [Finnish]

IEI Integration Corp vakuuttaa täten että laitteet on direktiivin 1999/5/EY oleellisten vaatimusten ja sitä koskevien direktiivin muiden ehtojen mukainen.

---

Svenska [Swedish]

IEI Integration Corp förklarar att denna utrustningstyp står i överensstämmelse med de väsentliga egenskapskrav och övriga relevanta bestämmelser som framgår av direktiv 1999/5/EG.

---

**FCC WARNING**

This equipment complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

- This device may not cause harmful interference, and
- This device must accept any interference received, including interference that may cause undesired operation.

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 own expense.

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

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

## Appendix

## B

# Safety Precautions

---

**WARNING:**

The precautions outlined in this chapter should be strictly followed.

Failure to follow these precautions may result in permanent damage to the IVS-200-ULT2.

## B.1 Safety Precautions

Please follow the safety precautions outlined in the sections that follow:

### B.1.1 General Safety Precautions

Please ensure the following safety precautions are adhered to at all times.

- **Follow the electrostatic precautions** outlined below whenever the device is opened.
- **Make sure the power is turned off and the power cord is disconnected** whenever the IVS-200-ULT2 is being installed, moved or modified.
- **To prevent the risk of electric shock, make sure power cord is unplugged from wall socket.** To fully disengage the power to the unit, please disconnect the power cord from the AC outlet. Refer servicing to qualified service personnel. The AC outlet shall be readily available and accessible.
- **Do not apply voltage levels that exceed the specified voltage range.** Doing so may cause fire and/or an electrical shock. Use a power cord that matches the voltage of the power outlet, which has been approved and complies with the safety standard of your particular country.
- **Electric shocks can occur** if the IVS-200-ULT2 chassis is opened when it is running. To avoid risk of electric shock, this device must only be connected to a supply mains with protective earth.
- **Do not drop or insert any objects** into the ventilation openings of the IVS-200-ULT2.

## IVS-200-ULT2 Embedded System

- **If considerable amounts of dust, water, or fluids enter the device**, turn off the power supply immediately, unplug the power cord, and contact the IVS-200-ULT2 vendor.
- **DO NOT:**
  - Drop the device against a hard surface.
  - In a site where the ambient temperature exceeds the rated temperature

### B.1.2 Anti-static Precautions



#### WARNING:

Failure to take ESD precautions during the installation of the IVS-200-ULT2 may result in permanent damage to the IVS-200-ULT2 and severe injury to the user.

Electrostatic discharge (ESD) can cause serious damage to electronic components, including the IVS-200-ULT2. Dry climates are especially susceptible to ESD. It is therefore critical that whenever the IVS-200-ULT2 is opened and any of the electrical components are 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 any electrical component.
- **Self-grounding:** Before handling any electrical component, touch any grounded conducting material. During the time the electrical component is handled, frequently touch any conducting materials that are connected to the ground.
- **Use an anti-static pad:** When configuring or working with an electrical component, place it on an anti-static pad. This reduces the possibility of ESD damage.
- **Only handle the edges of the electrical component:** When handling the electrical component, hold the electrical component by its edges.

### B.1.3 Product Disposal

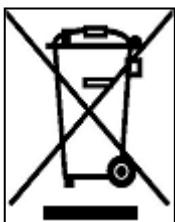


#### CAUTION:

Risk of explosion if battery is replaced by an incorrect type. Only certified engineers should replace the on-board battery.

Dispose of used batteries according to instructions and local regulations.

- Outside the European Union – If you wish to dispose of used electrical and electronic products outside the European Union, please contact your local authority so as to comply with the correct disposal method.
- Within the European Union – The device that produces less waste and is easier to recycle is classified as electronic device in terms of the European Directive 2012/19/EU (WEEE), and must not be disposed of as domestic garbage.



EU-wide legislation, as implemented in each Member State, requires that waste electrical and electronic products carrying the mark (left) must be disposed of separately from normal household waste. This includes monitors and electrical accessories, such as signal cables or power cords. When you need to dispose of your products, please follow the guidance of your local authority, or ask the shop where you purchased the product. The mark on electrical and electronic products only applies to the current European Union Member States.

Please follow the national guidelines for electrical and electronic product disposal.

## B.2 Maintenance and Cleaning Precautions

When maintaining or cleaning the IVS-200-ULT2, please follow the guidelines below.



### WARNING:

- For safety reasons, turn-off the power and unplug the embedded system before cleaning.
- If you dropped any material or liquid such as water onto the embedded system when cleaning, unplug the power cable immediately. Always make sure your hands are dry when unplugging the power cable.

### B.2.1 Maintenance and Cleaning

Prior to cleaning any part or component of the IVS-200-ULT2, please read the details below.

- Never spray or squirt liquids directly onto any other components.
- The interior of the device does not require cleaning. Keep fluids away from the device interior.
- Be cautious of all small removable components when vacuuming the device.
- Never drop any objects or liquids through the openings of the device.
- Be cautious of any possible allergic reactions to solvents or chemicals used when cleaning the device.
- Avoid eating, drinking and smoking within vicinity of the device.

### B.2.2 Cleaning Tools

Some components in the IVS-200-ULT2 may only be cleaned using a product specifically designed for the purpose. In such case, the product will be explicitly mentioned in the cleaning tips. Below is a list of items to use when cleaning the IVS-200-ULT2.

- **Cloth** – Although paper towels or tissues can be used, a soft, clean piece of cloth is recommended when cleaning the device.
- **Water or rubbing alcohol** – A cloth moistened with water or rubbing alcohol can be used to clean the device.

- **Using solvents** – The use of solvents is not recommended when cleaning the device as they may damage the plastic parts.
- **Vacuum cleaner** – Using a vacuum specifically designed for computers is one of the best methods of cleaning the device. Dust and dirt can restrict the airflow in the device and cause its circuitry to corrode.
- **Cotton swabs** – Cotton swaps moistened with rubbing alcohol or water are excellent tools for wiping hard to reach areas.
- **Foam swabs** – Whenever possible, it is best to use lint free swabs such as foam swabs for cleaning.

Appendix

C

# BIOS Menu Options

---

## C.1 BIOS Configuration Options

Below is a list of BIOS configuration options described in **Chapter 4**.

<input type="checkbox"/> System Date [xx/xx/xx] .....	39
<input type="checkbox"/> System Time [xx:xx:xx] .....	39
<input type="checkbox"/> Hyper-threading [Enabled].....	41
<input type="checkbox"/> Active Processor Cores [All] .....	41
<input type="checkbox"/> Intel Virtualization Technology [Enabled] .....	42
<input type="checkbox"/> EIST [Enabled].....	42
<input type="checkbox"/> Intel TXT(LT) Support [Disabled].....	42
<input type="checkbox"/> ACPI Sleep State [S1 (CPU Stop Clock)] .....	43
<input type="checkbox"/> Serial Port [Enabled].....	45
<input type="checkbox"/> Change Settings [Auto] .....	45
<input type="checkbox"/> Serial Port Mode [RS232] .....	46
<input type="checkbox"/> Serial Port [Enabled].....	46
<input type="checkbox"/> Change Settings [Auto] .....	46
<input type="checkbox"/> Serial Port Mode [RS232] .....	47
<input type="checkbox"/> Wake system with Fixed Time [Disabled].....	48
<input type="checkbox"/> Console Redirection [Disabled] .....	49
<input type="checkbox"/> Terminal Type [ANSI].....	50
<input type="checkbox"/> Bits per second [115200].....	50
<input type="checkbox"/> Data Bits [8] .....	51
<input type="checkbox"/> Parity [None].....	51
<input type="checkbox"/> Stop Bits [1].....	51
<input type="checkbox"/> Auto Recovery Function [Disabled].....	52
<input type="checkbox"/> SATA Controller(s) [Enabled] .....	53
<input type="checkbox"/> SATA Mode Selection [AHCI].....	53
<input type="checkbox"/> Hot Plug [Disabled].....	54
<input type="checkbox"/> Intel(R) Rapid Start Technology [Disabled].....	54
<input type="checkbox"/> USB Devices.....	55
<input type="checkbox"/> Legacy USB Support [Enabled].....	55
<input type="checkbox"/> PC Health Status .....	56
<input type="checkbox"/> VT-d [Enabled].....	58
<input type="checkbox"/> Primary IGFX Boot Display [VBIOS Default] .....	59

## IVS-200-ULT2 Embedded System

<input type="checkbox"/> DVMT Pre-Allocated [256M] .....	59
<input type="checkbox"/> DVMT Total Gfx Mem [MAX].....	60
<input type="checkbox"/> Restore AC Power Loss [Last State] .....	61
<input type="checkbox"/> Power Saving Function(EUP) [Disabled].....	61
<input type="checkbox"/> PCIe Speed [Auto].....	62
<input type="checkbox"/> Detect Non-Compliance Device [Disabled] .....	62
<input type="checkbox"/> Azalia(HD Audio) [Enabled] .....	63
<input type="checkbox"/> Administrator Password .....	64
<input type="checkbox"/> User Password .....	64
<input type="checkbox"/> Bootup NumLock State [On].....	65
<input type="checkbox"/> Quiet Boot [Enabled] .....	66
<input type="checkbox"/> Launch PXE OpROM [Disabled] .....	66
<input type="checkbox"/> Option ROM Messages [Force BIOS].....	66
<input type="checkbox"/> UEFI Boot [Disabled] .....	66
<input type="checkbox"/> Save Changes and Reset .....	67
<input type="checkbox"/> Discard Changes and Reset .....	67
<input type="checkbox"/> Restore Defaults .....	67
<input type="checkbox"/> Save as User Defaults .....	67
<input type="checkbox"/> Restore User Defaults .....	67

Appendix

D

# Watchdog Timer

---

**NOTE:**

The following discussion applies to DOS environment. IEI support is contacted or the IEI website visited for specific drivers for more sophisticated operating systems, e.g., Windows and Linux.

The Watchdog Timer is provided to ensure that standalone systems can always recover from catastrophic conditions that cause the CPU to crash. This condition may have occurred by external EMI or a software bug. When the CPU stops working correctly, Watchdog Timer either performs a hardware reset (cold boot) or a Non-Maskable Interrupt (NMI) to bring the system back to a known state.

A BIOS function call (INT 15H) is used to control the Watchdog Timer:

**INT 15H:**

<b>AH – 6FH Sub-function:</b>	
AL – 2:	Sets the Watchdog Timer's period.
BL:	Time-out value (Its unit-second is dependent on the item "Watchdog Timer unit select" in CMOS setup).

**Table D-1: AH-6FH Sub-function**

Call sub-function 2 to set the time-out period of Watchdog Timer first. If the time-out value is not zero, the Watchdog Timer starts counting down. While the timer value reaches zero, the system resets. To ensure that this reset condition does not occur, calling sub-function 2 must periodically refresh the Watchdog Timer. However, the Watchdog timer is disabled if the time-out value is set to zero.

A tolerance of at least 10% must be maintained to avoid unknown routines within the operating system (DOS), such as disk I/O that can be very time-consuming.

**NOTE:**

When exiting a program it is necessary to disable the Watchdog Timer, otherwise the system resets.

**Example program:**

```
; INITIAL TIMER PERIOD COUNTER
;
W_LOOP:
    MOV     AX, 6F02H      ;setting the time-out value
    MOV     BL, 30          ;time-out value is 48 seconds
    INT     15H
;
; ADD THE APPLICATION PROGRAM HERE
;
    CMP     EXIT_AP, 1      ;is the application over?
    JNE     W_LOOP          ;No, restart the application

    MOV     AX, 6F02H      ;disable Watchdog Timer
    MOV     BL, 0            ;
    INT     15H
;
; EXIT :
```

Appendix

E

# Error Beep Code

---

## E.1 PEI Beep Codes

Number of Beeps	Description
1	Memory not Installed
1	Memory was installed twice (InstallPeiMemory routine in PEI Core called twice)
2	Recovery started
3	DXE IPL was not found
3	DXE Core Firmware Volume was not found
4	Recovery failed
4	S3 Resume failed
7	Reset PPI is not available

## E.2 DXE Beep Codes

Number of Beeps	Description
1	Invalid password
4	Some of the Architectural Protocols are not available
5	No Console Output Devices are found
5	No Console Input Devices are found
6	Flash update is failed
7	Reset protocol is not available
8	Platform PCI resource requirements cannot be met



### NOTE:

If you have any question, please contact IEI for further assistance.

Appendix

F

# Hazardous Materials Disclosure

---

## F.1 RoHS II Directive (2015/863/EU)

The details provided in this appendix are to ensure that the product is compliant with the RoHS II Directive (2015/863/EU). The table below acknowledges the presences of small quantities of certain substances in the product, and is applicable to RoHS II Directive (2015/863/EU).

Please refer to the following table.

Part Name	Toxic or Hazardous Substances and Elements									
	Lead (Pb)	Mercury (Hg)	Cadmium (Cd)	Hexavalent Chromium (Cr(VI))	Polybrominated Biphenyls (PBB)	Polybrominated Diphenyl Ethers (PBDE)	Bis(2-ethylhexyl) phthalate (DEHP)	Butyl benzyl phthalate (BBP)	Dibutyl phthalate (DBP)	Diisobutyl phthalate (DIBP)
Housing	O	O	O	O	O	O	O	O	O	O
Display	O	O	O	O	O	O	O	O	O	O
Printed Circuit Board	O	O	O	O	O	O	O	O	O	O
Metal Fasteners	O	O	O	O	O	O	O	O	O	O
Cable Assembly	O	O	O	O	O	O	O	O	O	O
Fan Assembly	O	O	O	O	O	O	O	O	O	O
Power Supply Assemblies	O	O	O	O	O	O	O	O	O	O
Battery	O	O	O	O	O	O	O	O	O	O
O: This toxic or hazardous substance is contained in all of the homogeneous materials for the part is below the limit requirement in Directive (EU) 2015/863. X: This toxic or hazardous substance is contained in at least one of the homogeneous materials for this part is above the limit requirement in Directive (EU) 2015/863.										

## F.2 China RoHS

此附件旨在确保本产品符合中国 RoHS 标准。以下表格标示此产品中某有毒物质的含量符合中国 RoHS 标准规定的限量要求。

本产品上会附有“环境友好使用期限”的标签，此期限是估算这些物质“不会有泄漏或突变”的年限。本产品可能包含有较短的环境友好使用期限的可替换元件，像是电池或灯管，这些元件将会单独标示出来。

部件名称	有毒有害物质或元素					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr(VI))	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
壳体	○	○	○	○	○	○
显示	○	○	○	○	○	○
印刷电路板	○	○	○	○	○	○
金属螺帽	○	○	○	○	○	○
电缆组装	○	○	○	○	○	○
风扇组装	○	○	○	○	○	○
电力供应组装	○	○	○	○	○	○
电池	○	○	○	○	○	○

O: 表示该有毒有害物质在该部件所有物质材料中的含量均在 SJ/T11364-2014 與 GB/T26572-2011 标准规定的限量要求以下。

X: 表示该有毒有害物质至少在该部件的某一均质材料中的含量超出 SJ/T11364-2014 與 GB/T26572-2011 标准规定的限量要求。