IEI Integration Corp.

MODEL:

IRS-100-ULT3

Railway Surveillance System with Intel® Core™ i5-6300U CPU, 4 GB DDR4L Memory Preinstalled, Dual M12 GbE LAN Port, CFast, Dual SIM Card Slot, One DVI-D, One VGA, Dual 2.5” SATA HDD/SSD Bay, EN 50155 Compliant

User Manual

Rev. 1.00 – April 19, 2017

RoHS Lead Free

Revision

Date	Version	Changes
April 19, 2017	1.00	Initial release

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Federal Communication Commission Interference Statement

This equipment has been tested and found to comply with 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 in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

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

FCC Caution: Any change or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment. This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Radiation Exposure Statement

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

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.

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Introduction

1.1 Overview

Figure 1-1: IRS-100-ULT3 Railway Surveillance System

The IRS-100-ULT3 is an embedded system designed for railway surveillance applications. At the heart of the system is the Intel® Core™ i5-6300U processor, offering low power in a powerful package.

The IRS-100-ULT3 can work under extreme temperature (-40ºC ~ 70ºC) and accepts a wide range of DC power input (24 V ~ 110 V). With the optional Wi-Fi and 3G modules, the IRS-100-ULT3 can ensure smooth network connectivity. Besides, the IRS-100-ULT3 supports dual display via the DVI-D and VGA interfaces.

Other peripherals include two USB 3.0 ports, two M12 GbE LAN ports, two DB-9 RS-232/422/485 serial ports, one digital I/O terminal block, two SIM card slots, two 2.5” SATA HDD/SSD drive bays and one CFast card slot.

1.2 Features

All of the IRS-100-ULT3 models feature the following:

- Intel® Core™ i5-6300U CPU
- 4 GB DDR4L memory preinstalled (system max. 32 GB)
- Supports 24 V ~ 110 V DC power input
- Supports dual display via VGA and DVI-D ports
- Supports wide range of operating temperature from -40ºC to 70ºC
- Two 2.5” SATA HDD/SSD drive bays

- One CFast card slot
- Two M12 GbE LAN ports
- Two external SIM card slots
- Two DB-9 RS-232/422/485 serial ports
- One 8-bit digital I/O terminal block
- One M12 USB 2.0 port
- One M12 audio port, supporting line-in and line-out
- Two USB 3.0 ports (Type A)
- Optional Wi-Fi, Bluetooth and 3G network
- EN 50155 compliant
- RoHS compliant

1.3 Front Panel

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

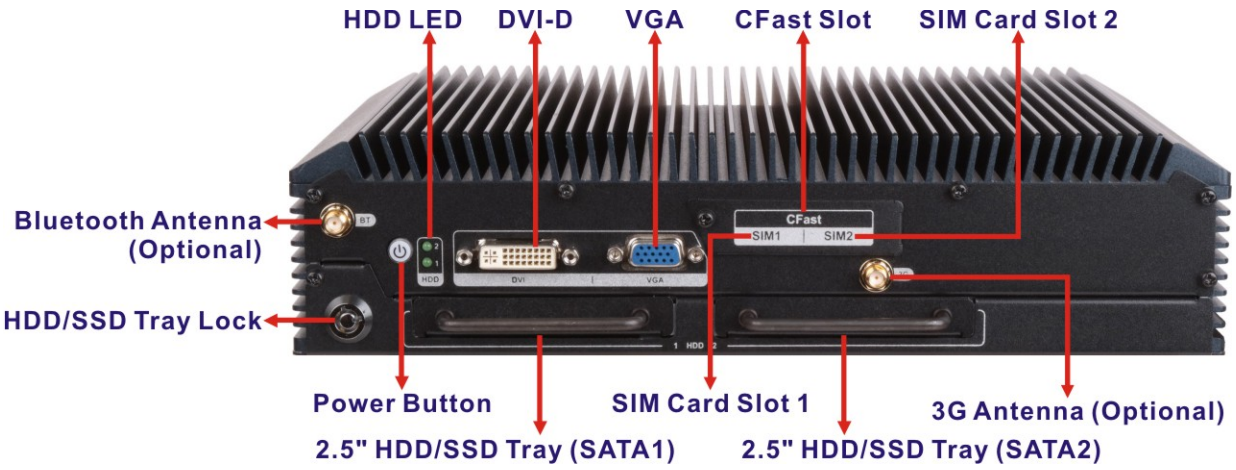


Figure 1-2: Front Panel

1.4 Rear Panel

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

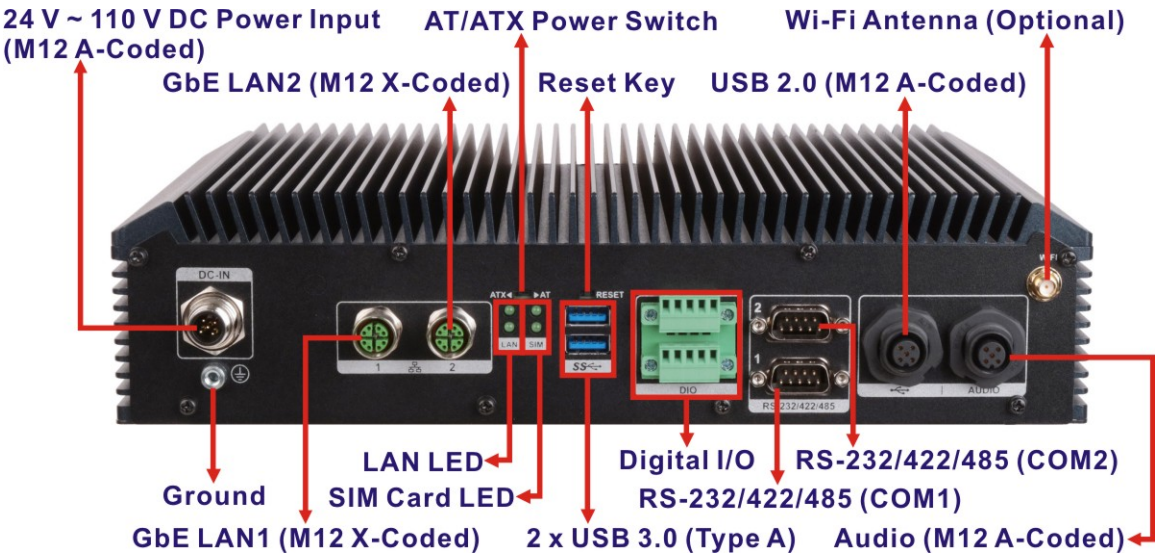


Figure 1-3: Rear Panel

1.5 Bottom Panel

The bottom panel has the mounting screw holes for the mounting brackets.

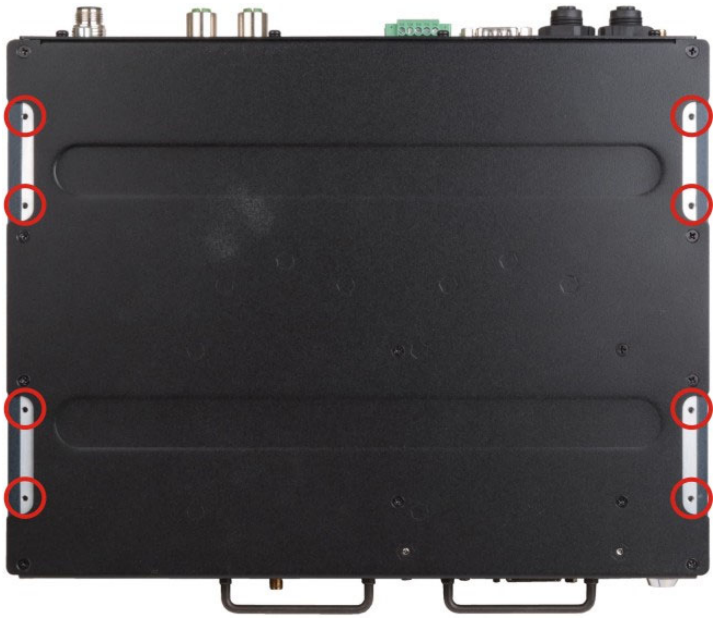


Figure 1-4: Bottom View

1.6 System Specifications

The IRS-100-ULT3 technical specifications are listed in **Table 1-1**.

System	
CPU (SoC)	Intel® Core™ i5-6300U (TDP: 15 W)
Memory	2 x 260-pin DDR4L SO-DIMM slots (system max. 32 GB) Preinstalled with one 4 GB DDR4L SO-DIMM
Storage	2 x 2.5” SATA 6Gb/s HDD/SSD drive bay 1 x CFast card slot
OS Image (Optional)	Windows® Embedded Standard 7 E
Communication	
Ethernet	2 x 10/100/1000 Mbps LAN M12 X-coded connectors (1.5 kV isolation protection)
WLAN	PCIe Mini, 802.11a/b/g/n/ac with Bluetooth v4.0/3.0+HS, 1T1R Wi-Fi module (optional) **or** PCIe Mini, 802.11b/g/n, 1T1R Wi-Fi module (optional)
Bluetooth	Bluetooth v4.0/3.0+HS (integrated with optional Wi-Fi module) **or** Bluetooth v2.1 (integrated with optional 3G module)
WWAN	PCIe Mini, 3G module (optional) 2 x SIM card slots
Indicators and I/O Interfaces	
Antenna Connectors	1 x Wi-Fi antenna connector (optional) 1 x Bluetooth antenna connector (optional) 1 x WWAN antenna connector (optional)
Buttons and Keys	1 x AT/ATX power switch 1 x Power button 1 x Reset key
Expansions	2 x PCIe Mini card slots
I/O Ports	1 x 24 V ~ 110 V DC power input connector (M12 A-coded) 1 x Audio connector (supports line-in and line-out, M12 A-coded) 1 x DVI-D connector 1 x Power button 2 x DB-9 RS-232/422/485 serial ports (1.5 kV isolation protection, 4 kV ESD protection for all signals)

	1 x 8-bit digital I/O (1.5 kV isolation protection, 10-pin terminal block) 1 x VGA connector 1 x USB 2.0 (M12 A-coded) 2 x USB 3.0 (Type A)
LED Indicators	2 x HDD/SSD LED 2 x SIM LED 2 x LAN LED
Power	
Power Input	24 V ~ 110 V DC input (compliant with EN 50155 at 24 V DC)
Environmental and Physical Specifications	
Chassis Construction	Extruded aluminum alloy
Mounting	Wall mount
Dimensions (WxHxD)	290 mm x 70 mm x 224 mm
Weight (Net/Gross)	4.8 kg/5.2 kg
Operating Temperature	-40ºC ~ 70ºC (with air flow)
Storage Temperature	-40ºC ~ 85ºC
Humidity	10% ~ 90% (non-condensing)
Operating Shock	EN 50155 compliant
Operating Vibration	EN 50155 compliant
EMC	EN 55022/24
EMI	IEC 61000-4-2 ESD: Contact 6 kV; Air 8 kV IEC 61000-4-3 RS: 20 V/m (80 MHz to 1 GHz) IEC 61000-4-4 EFT: Power 2 kV; Signal 2 kV IEC 61000-4-5 Surge: Power 2 kV; Signal 2 kV IEC 61000-4-6 CS: 10 V IEC 61000-4-8
Safety	CE, FCC Class A, EN 50155

Table 1-1: Technical Specifications

1.7 Dimensions

The dimensions are shown below.

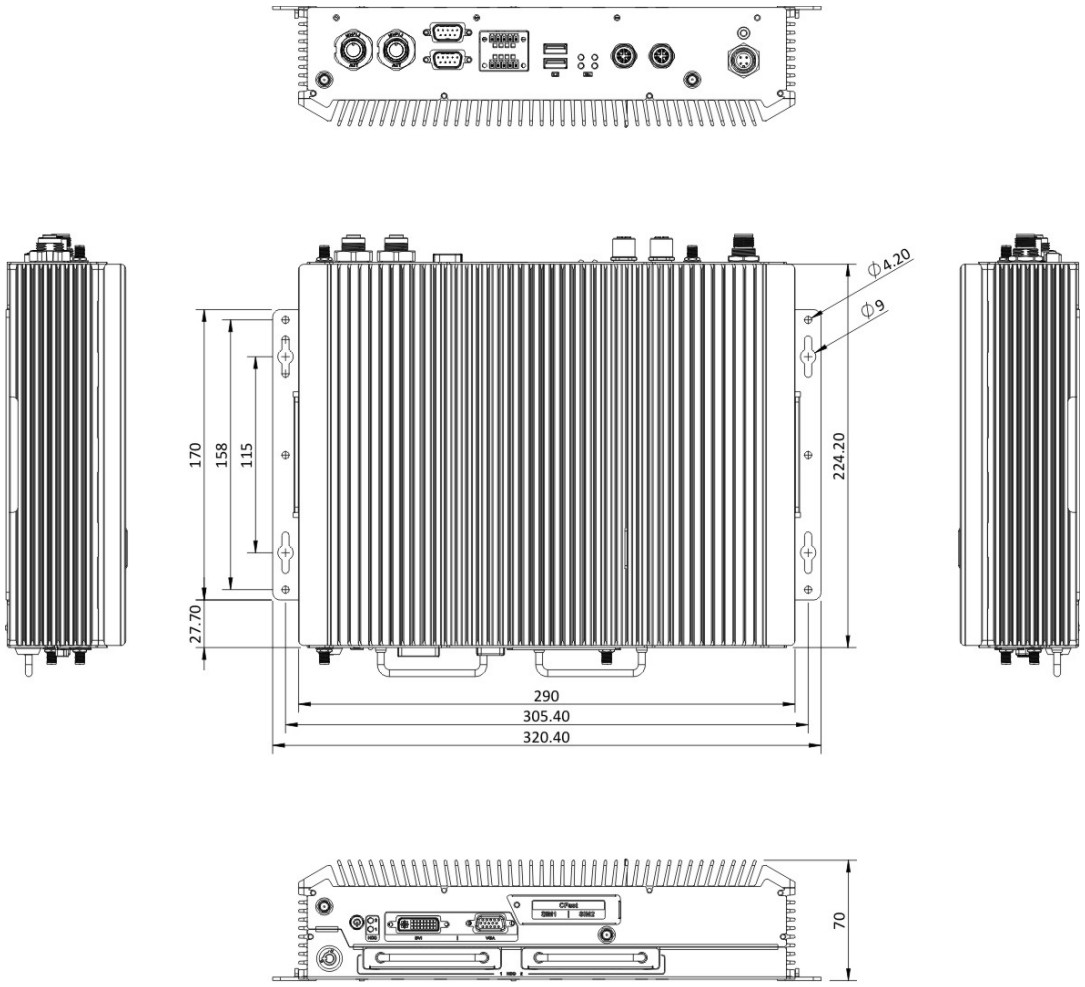


Figure 1-5: Dimensions (unit: mm)

Chapter

2

Unpacking

2.1 Anti-static Precautions

WARNING!

Static electricity can destroy certain electronics. Make sure to follow the ESD precautions to prevent damage to the product, and injury to the user.

Make sure to adhere to the following guidelines:

- ***Wear an anti-static wristband***: Wearing an anti-static wristband can prevent electrostatic discharge.
- ***Self-grounding***: Touch a grounded conductor every few minutes to discharge any excess static buildup.
- ***Use an anti-static pad***: When configuring any circuit board, place it on an anti-static mat.
- ***Only handle the edges of the PCB***: Don't touch the surface of the motherboard. Hold the motherboard by the edges when handling.

2.2 Unpacking Precautions

When the IRS-100-ULT3 is unpacked, please do the following:

- Follow the anti-static guidelines above.
- Make sure the packing box is facing upwards when opening.
- Make sure all the packing list items are present.

2.3 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 IRS-100-ULT3 was purchased from or contact an IEI sales representative directly by sending an email to sales@ieiworld.com.

The IRS-100-ULT3 is shipped with the following components:

Quantity	Item	Image
1	IRS-100-ULT3 railway surveillance system	
2	Mounting brackets	
2	Keys for HDD/SSD tray lock	
1	User manual CD and driver CD	

Table 2-1: Packing List

2.4 Optional Items

The following table lists the optional items that can be purchased separately.

Item	Image
M12 A-coded power cable (**P/N**: 32002-009000-100-RS)	
M12 A-coded cable for USB 2.0 (**P/N**: 32001-022700-200-RS)	
M12 X-coded cable for Ethernet (**P/N**: 32013-003400-100-RS)	
M12 A-coded cable for line-in and line-out (**P/N**: 32007-005400-100-RS)	
OS image with Windows® Embedded Standard 7 E 64-bit for IRS-100-ULT3, DVD-ROM, RoHS (**P/N**: IRS-100-ULT3-WES7E64-R10)	
1T1R Wi-Fi module kit, Wi-Fi 802.11a/b/g/n/ac with Bluetooth v4.0/3.0+HS (assemble-to-order) (**P/N**: IRS-100-WIFI-KIT02-R10)	
3G module kit (assemble-to-order) (**P/N**: IRS-100-3G-KIT02-R10)	

Table 2-2: Optional Items

Chapter

3

Installation

3.1 Anti-static Precautions

WARNING:

Failure to take ESD precautions during the maintenance of the IRS-100-ULT3 may result in permanent damage to the IRS-100-ULT3 and severe injury to the user.

Electrostatic discharge (ESD) can cause serious damage to electronic components, including the IRS-100-ULT3. Dry climates are especially susceptible to ESD. It is therefore critical that whenever the IRS-100-ULT3 is accessed internally, or any other electrical component is handled, the following anti-static precautions are strictly adhered to.

- ***Wear an anti-static wristband***: - Wearing a simple anti-static wristband can help to prevent ESD from damaging the board.
- ***Self-grounding***: - Before handling the board touch any grounded conducting material. During the time the board is handled, frequently touch any conducting materials that are connected to the ground.
- ***Use an anti-static pad***: - When configuring the IRS-100-ULT3, place it on an anti-static pad. This reduces the possibility of ESD damaging the IRS-100-ULT3.

3.2 Installation Precautions

When installing the IRS-100-ULT3, please follow the precautions listed below:

- **Read the user manual**: The user manual provides a complete description of the IRS-100-ULT3, installation instructions and configuration options.
- **DANGER! Disconnect Power**: Power to the IRS-100-ULT3 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 IRS-100-ULT3 must be installed and operated only by trained and qualified personnel. Maintenance, upgrades, or repairs may 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 IRS-100-ULT3. The IRS-100-ULT3's cooling vents must not be obstructed by any objects. Blocking the vents can cause overheating of the IRS-100-ULT3. Leave at least 5 cm of clearance around the IRS-100-ULT3 to prevent overheating.
- **Grounding**: The IRS-100-ULT3 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 IRS-100-ULT3.

3.3 Installation and Configuration Steps

The following installation steps must be followed.

Step 1: Unpack the system

Step 2: Configure the system settings

Step 3: Install the HDD/SSD, SIM card and CFast card (optional)

Step 4: Mount the system

Step 5: Connect peripheral devices

Step 6: Power up the system

3.4 Opening the Bottom Cover

To access the main board, the bottom cover must be opened. Please follow the steps below to open the bottom cover.

Step 1: Turn the IRS-100-ULT3 over.

Step 2: Remove the bottom cover retention screws (**Figure 3-1**). The bottom cover is secured to the chassis with twelve retention screws (four on the rear panel).

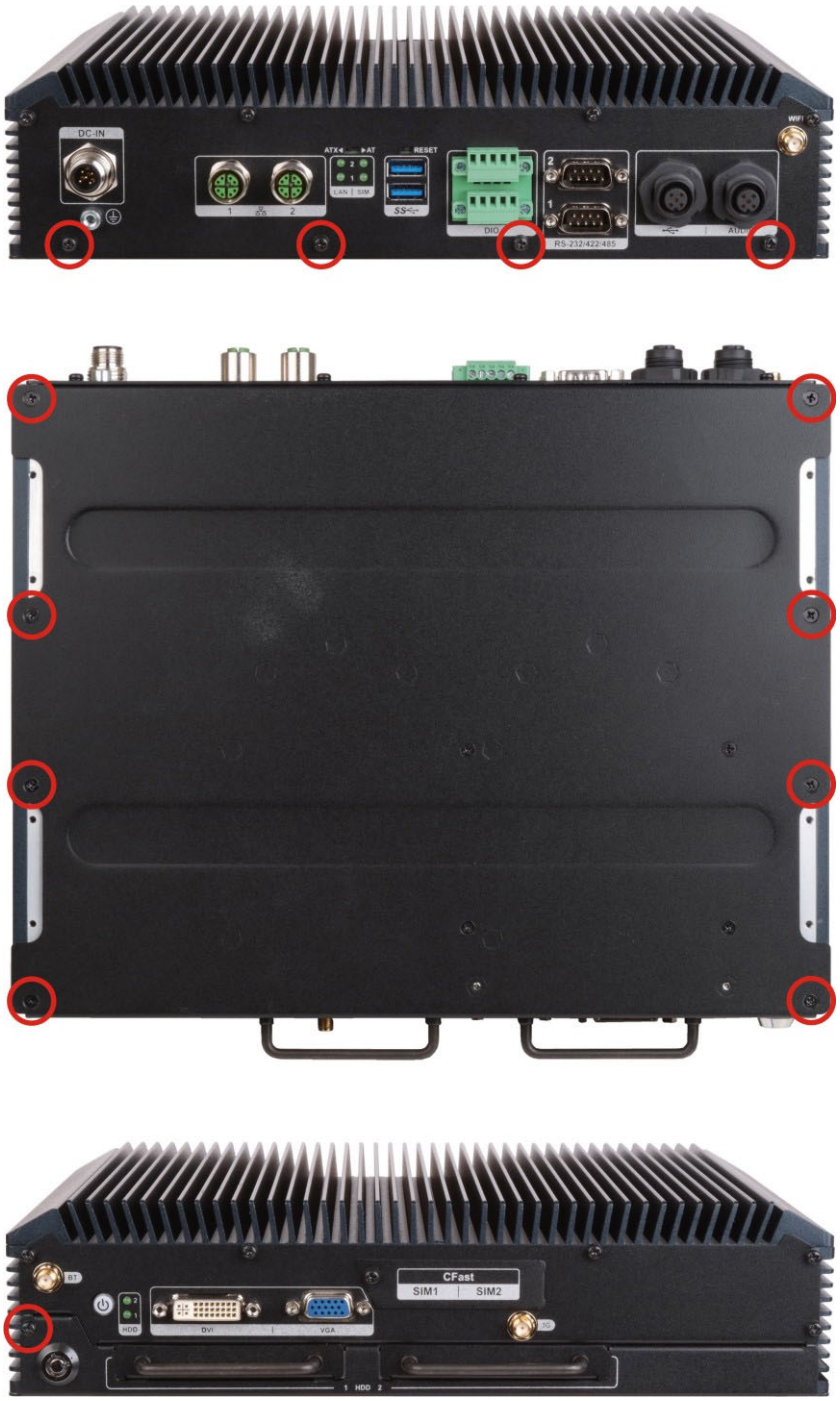


Figure 3-1: Bottom Cover Retention Screws

Step 3: Gently open the bottom cover.

3.5 Configuring the System Settings

The system configuration is controlled by buttons/jumpers/switches, and should be performed before installation. To configure some of the jumper settings, the user has to open the bottom cover. Please refer to **Section 3.4** for details.

3.5.1 AT/ATX Power Mode Selection

AT or ATX power mode can be configured on the IRS-100-ULT3. The selection is made through an AT/ATX switch located on the rear panel (**Figure 3-2**).

Figure 3-2: AT/ATX Mode Selection Switch Location

3.5.2 Clearing CMOS

If the IRS-100-ULT3 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**.

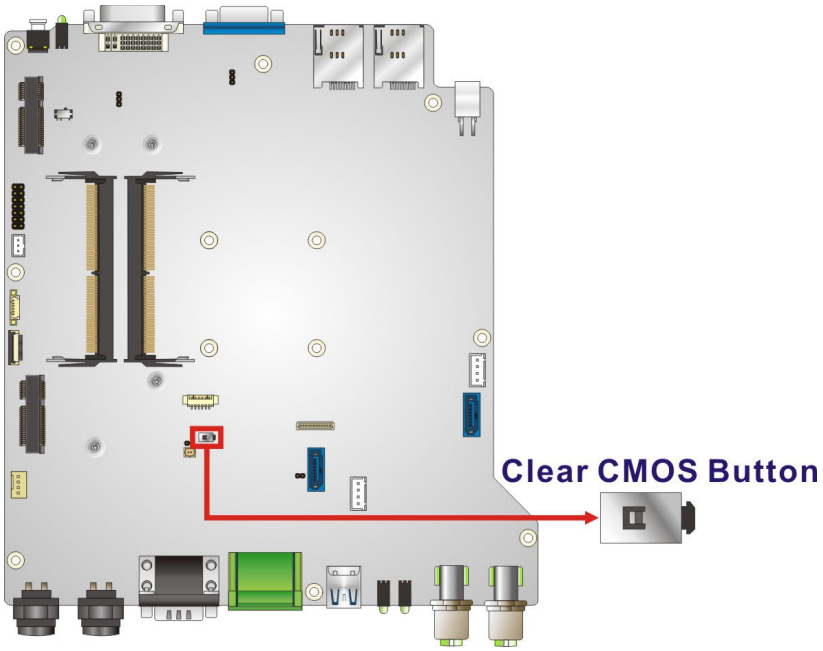


Figure 3-3: Clear CMOS Button

3.5.3 DVI/CRT Selection Switch

To connect a CRT monitor to the DVI-D connector, the user has to set the DVI/CRT selection switch to CRT position. Refer to **Figure 3-4** and **Table 3-1** for the switch location and settings.

Setting	Description
1-2	DVI monitor (Default)
2-3	CRT monitor

Table 3-1: DVI/CRT Selection Switch Settings

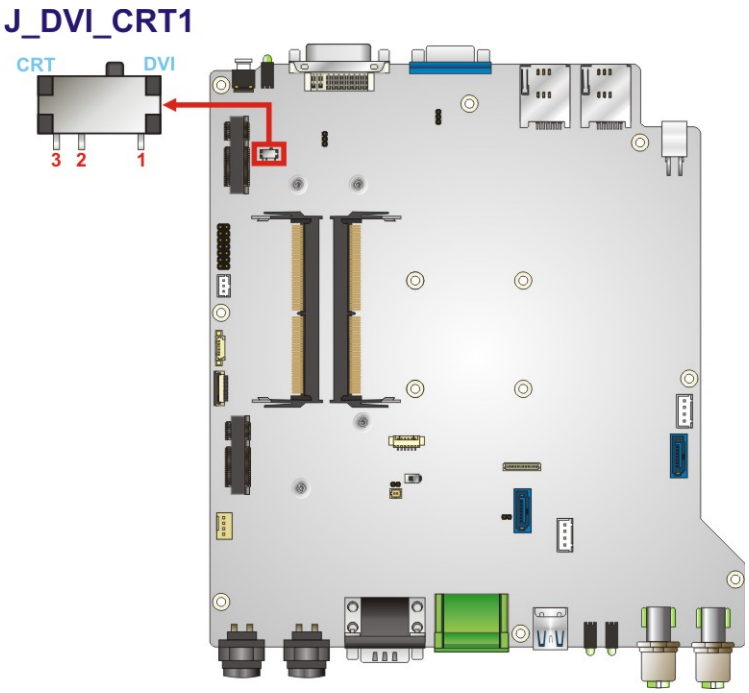


Figure 3-4: DVI/CRT Selection Switch Location

3.5.4 Flash Descriptor Security Override

The Flash Descriptor Security Override jumper (J_FLASH1) allows to enable or disable the ME firmware update. Refer to **Figure 3-5** and **Table 3-2** for the jumper location and settings.

Setting	Description
Open	Disabled (default)
Short	Enabled

Table 3-2: Flash Descriptor Security Override Jumper Settings

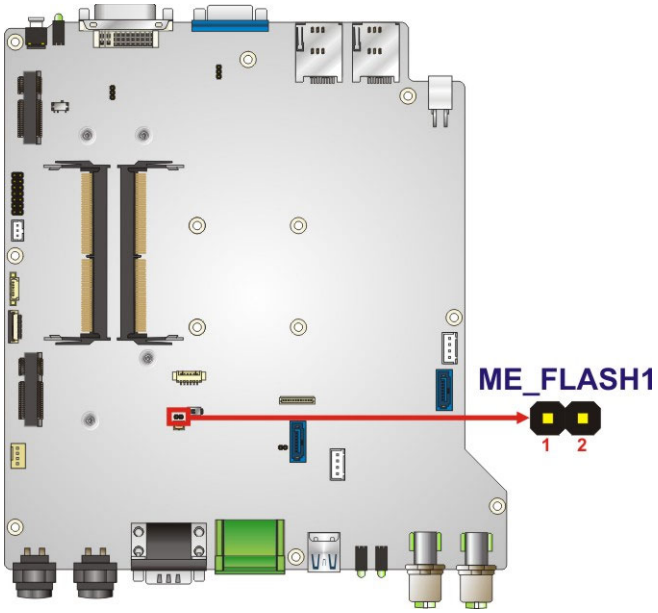


Figure 3-5: Flash Descriptor Security Override Jumper Location

To update the ME firmware, please follow the steps below.

Step 1: Before turning on the system power, short the Flash Descriptor Security Override jumper.

Step 2: Update the BIOS and ME firmware, and then turn off the system power.

Step 3: Remove the metal clip on the Flash Descriptor Security Override jumper.

Step 4: Restart the system. The system will reboot 2 ~ 3 times to complete the ME firmware update.

3.6 HDD/SSD Installation

The IRS-100-ULT3 comes with two 2.5” SATA HDD/SSD bays. To install an HDD/SSD, please follow the steps below.

Step 1: Use the key that came with the IRS-100-ULT3 package to unlock the HDD/SSD trays (**Figure 3-6**).

Figure 3-6: Unlocking the HDD/SSD Trays

Step 2: Pull the drive tray out to remove it from the IRS-100-ULT3 (**Figure 3-7**).

Figure 3-7: Removing the HDD/SSD Tray

Step 3: Place an HDD/SSD onto the drive tray and secure the HDD/SSD with the drive tray by inserting four retention screws into the bottom of the HDD/SSD (**Figure 3-8**).

Figure 3-8: HDD/SSD Retention Screws

Step 4: Carefully insert the HDD/SSD tray into the slot on the front panel (**Figure 3-9**). Make sure the SATA connector on the HDD/SSD is securely connected to the SATA connector inside the chassis.

Figure 3-9: Installing the HDD/SSD Tray

Step 5: Lock the HDD/SSD trays (**Figure 3-10**).

Figure 3-10: Locking the HDD/SSD Trays

3.7 CFast Card Installation

To install a CFast card, follow the instructions below.

Step 1: The CFast card slot is protected by a metal cover. Remove the retention screw that secured the metal cover to the chassis to expose the CFast card slot (**Figure 3-11**).

Figure 3-11: Removing the Metal Cover

Step 2: Insert a CFast card into the slot (**Figure 3-12**).

Figure 3-12: CFast Card Installation

3.8 SIM Card Installation

WARNING:

Please install a mini-SIM (2FF or Standard SIM) card for proper network connection.

The IRS-100-ULT3 has two SIM card slots on the front panel. To install a SIM card, follow the instructions below.

NOTE:

The IRS-100-ULT3 provides an application for setting which SIM card to use. Refer to **Section 3.13.2** for details.

Step 1: The SIM card slots are protected by a metal cover. Remove the retention screw that secured the metal cover to the chassis to expose the SIM card slots (**Figure 3-11**).

Step 2: The SIM card slot locations are shown in **Figure 3-13**. There are two SIM card slots in the IRS-100-ULT3 (**Figure 3-13**).

Figure 3-13: SIM Card Slot Locations

Step 3: The SIM LED indicators on the rear panel show the users which SIM card is being used.

3.9 Mounting the System

To mount the IRS-100-ULT3 onto a wall or some other surface using the two mounting brackets, please follow the steps below.

Step 1: Turn the IRS-100-ULT3 over.

Step 2: Align the four retention screw holes in each bracket with the retention screw holes on the sides of the bottom surface.

Step 3: Secure the brackets to the system by inserting four retention screws into each bracket (**Figure 3-14**).

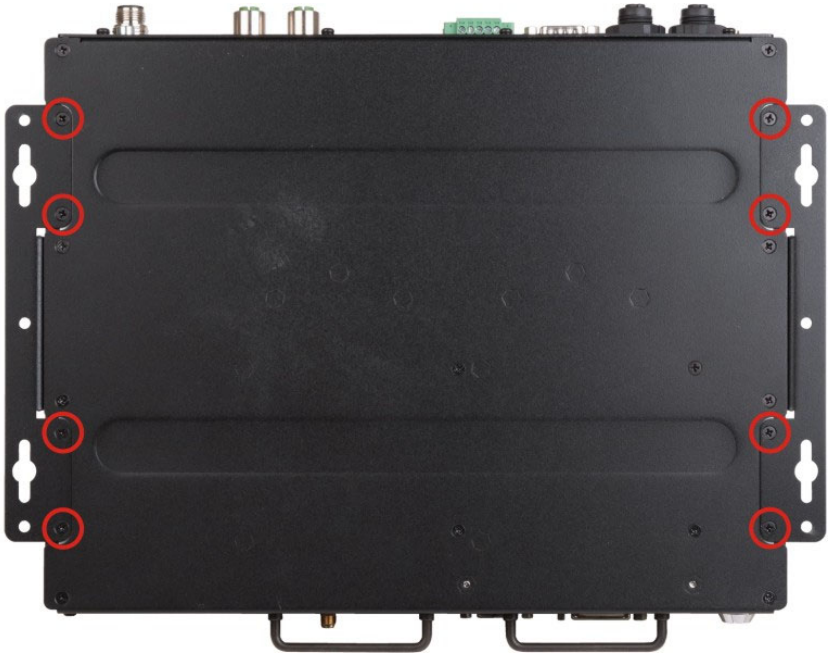


Figure 3-14: Mounting Bracket Retention Screws

Step 4: Drill holes in the intended installation surface.

Step 5: Align the mounting holes in the sides of the mounting brackets with the predrilled holes in the mounting surface.

Step 6: Insert four retention screws, two in each bracket, to secure the system to the wall.

3.10 I/O Interface Connectors

This section provides an overview of the I/O interface connectors of the IRS-100-ULT3.

3.10.1 Audio Connector

The IRS-100-ULT3 comes with an M12 A-coded audio connector which supports line-in and line-out function. The pinouts for the audio connector are listed in **Table 3-3**.

Pin	Description
1	LINE_OUTR
2	LINE_OUTL
3	LMIC1-L
4	LMIC1-R
5	GND

Table 3-3: Audio Connector Pinouts

Figure 3-15: Audio Connector Pinout Location

3.10.2 DC Power Input Connector

The IRS-100-ULT3 has an M12 A-coded, 24 V ~ 110 V DC power input connector. The pinouts for the power input connector are listed in **Table 3-4**.

Pin	Description
1	Input+
2	GND
3	Input-
4	GND
5	GND

Table 3-4: DC Power Input Connector Pinouts

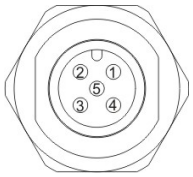


Figure 3-16: DC Power Input Connector Pinout Location

3.10.3 Digital I/O Terminal Block

The digital I/O terminal block provides programmable input and output for external devices. The pinouts for the digital I/O terminal block are listed in the table below.

Pin	Description	Pin	Description
1	GND	6	DOUT2
2	VCC	7	DIN3
3	DIN1	8	DOUT3
4	DOUT1	9	DIN4
5	DIN2	10	DOUT4

Table 3-5: Digital I/O Terminal Block Pinouts

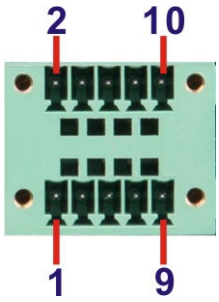


Figure 3-17: Digital I/O Terminal Block Pinout Location

3.10.4 DVI-D Connector

The Digital Visual Interface (DVI) connector connects to a high-speed, high-resolution digital display.

NOTE:

To connect a CRT monitor to the DVI-D connector, the user has to set the DVI/CRT selection switch to CRT position. Please refer to **Section** 3.5.3 for detailed information.

Pin	Description	Pin	Description
1	DVI_DATA2#	2	DVI_DATA2
3	GND	4	NC
5	NC	6	DDC CLK
7	DDC DATA	8	VSYNC
9	DVI_DATA1#	10	DVI_DATA1
11	GND	12	NC
13	NC	14	VCC5V
15	GND	16	HPDET
17	DVI_DATA0#	18	DVI_DATA0
19	GND	20	NC
21	NC	22	GND
23	DVI_CLK	24	DVI_CLK#
C1	RED	C2	GREEN
C3	BLUE	C4	HSYNC
C5	GND		

Table 3-6: DVI-D Connector Pinouts

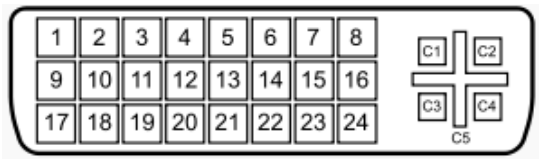


Figure 3-18: DVI-D Connector

3.10.5 LAN Connectors

The IRS-100-ULT3 has two external M12 X-coded GbE LAN connectors. The pinouts for the LAN connector are listed in **Table 3-7**.

Pin	Description	Pin	Description
1	XTRDP0	5	XTRDP3
2	XTRDN0	6	XTRDN3
3	XTRDP1	7	XTRDN2
4	XTRDN1	8	XTRDP2

Table 3-7: LAN Connector Pinouts

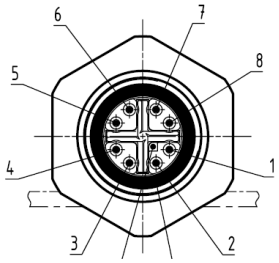


Figure 3-19: LAN Connector Pinout Location

3.10.6 RS-232/422/485 Serial Ports

The IRS-100-ULT3 has two DB-9 RS-232/422/485 serial ports on the rear panel for serial devices. The pinouts for the serial port connector are shown in **Table 3-8**.

Pin	Description	Pin	Description
1	DCD	6	DSR
2	RXD	7	RTS
3	TXD	8	CTS
4	DTR	9	RI
5	GND		

Table 3-8: RS-232/422/485 Serial Port Pinouts

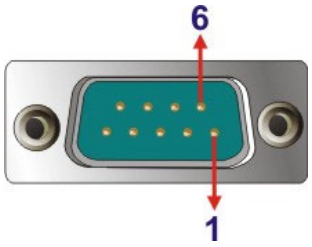


Figure 3-20: RS-232/422/485 Serial Port Pinout Locations

3.10.7 USB 2.0 Connector

The IRS-100-ULT3 comes with an M12 A-coded USB 2.0 connector. The pinouts for the USB 2.0 connector are listed in **Table 3-3**.

Pin	Description
1	USBP
2	USBN
3	VCC
4	GND
5	NC

Table 3-9: USB 2.0 Connector Pinouts

Figure 3-21: USB 2.0 Connector Pinout Location

3.10.8 USB 3.0 Ports

The IRS-100-ULT3 has two USB 3.0 ports. The pinouts for the USB 3.0 port are listed in **Table 3-10**.

Pin	Description	Pin	Description
1	VCC	10	VCC
2	D-	11	D-
3	D+	12	D+
4	GND	13	GND
5	RX-	14	RX-

Pin	Description	Pin	Description
6	RX+	15	RX+
7	GND	16	GND
8	TX-	17	TX-
9	TX+	18	TX+

Table 3-10: USB 3.0 Port Pinouts

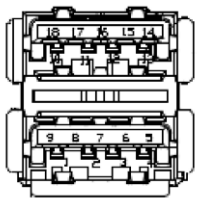


Figure 3-22: USB 3.0 Port Pinout Locations

3.10.9 VGA

The IRS-100-ULT3 has a female DB-15 VGA connector on the front panel. The VGA connector is connected to a CRT or VGA monitor. The pinouts for the VGA connector are listed in **Table 3-11**.

Pin	Description	Pin	Description
1	RED	2	GREEN
3	BLUE	4	NC
5	GND	6	GND
7	GND	8	GND
9	CRT_VCC	10	CRT_PLUG
11	NC	12	DDC DAT
13	HSYNC	14	VSYNC
15	DDCCLK		

Table 3-11: VGA Connector Pinouts

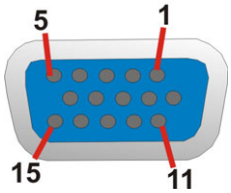


Figure 3-23: VGA Connector Pinout Locations

3.11 Power-On Procedure

3.11.1 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 IRS-100-ULT3, please make sure of the following:

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

3.11.2 Power-on Procedure

To power-on the IRS-100-ULT3 please follow the steps below:

Step 1: Connect the power source to the power input connector of the IRS-100-ULT3 (**Figure 3-24**). The IRS-100-ULT3 accepts 24 V ~ 110 V DC power input.

Figure 3-24: Power Connector

Step 2: To turn on the system, push the power button until the power LED lights on (**Figure 3-25**).

Figure 3-25: Power Button with LED Indication

3.12 Driver Installation

NOTE:

The content of the CD may vary throughout the life cycle of the product and is subject to change without prior notice. Visit the IEI website or contact technical support for the latest updates.

All the drivers for the IRS-100-ULT3 are on the utility CD that came with the system. The following drivers can be installed on the system:

- Chipset
- Graphics
- Audio
- LAN
- WLAN (including Bluetooth driver, WWAN module driver, WLAN module driver and IEI Mobile AP application tool)
- Others:
  - TXE
  - USB 3.0

- I/O driver

Insert the utility CD into a CD drive connected to the system and install all of the necessary drivers for the IRS-100-ULT3.

3.13 Mobile AP

IEI provides an application tool, Mobile AP, for the users of the IRS-100-ULT3 with WWAN module installed to manage mobile network.

3.13.1 Installation

To install this application tool, please locate the **WLAN** folder in the utility CD. This folder contains two files for different operating systems.

- **IEI_Mobile_AP_Setup_x86.exe** for 32-bit Windows OS
- **IEI_Mobile_AP_Setup_x64.exe** for 64-bit Windows OS

Double click the .exe file that is corresponding to the OS version, then the system starts to extract the file. After extracting, it starts to install Bluetooth driver followed by the installation of the WWAN module driver, and IEI Mobile AP application tool.
It is recommended to follow the step-by-step procedure to install all of these three drivers/applications.

NOTE:

After installing the drivers and applications, the IRS-100-ULT3 must be restarted in order to complete the installation.

3.13.2 Usage

To launch the application tool, double click the **MobileAP** icon on the Windows desktop. The user interface appears as shown in **Figure 3-26**. The functions are described below.

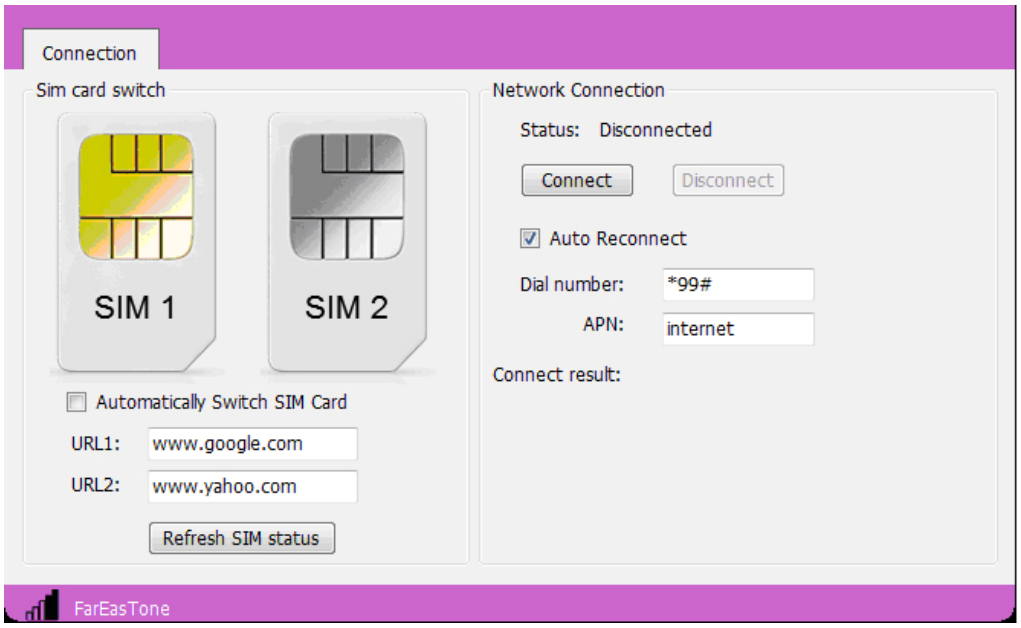


Figure 3-26: Mobile AP – Connection

- **Sim card switch**:
  Select a SIM card to designate a SIM card to use or click the **Refresh SIM status** button to let the system detect automatically.
  - **Automatically Switch SIM Card**: check to allow the system to ping URL1 and URL2 every 30 seconds. If the system is unable to ping both URLs in three minutes, the system will automatically switch to the other SIM card.
- **Network Connection**:
  - **Status**: shows the connection status. Click the **Connect** button to connect the selected SIM card to network.
  - **Auto Reconnect**: allows the system to reconnect automatically.
  - **Dial number**: provided by the ISP for mobile network. The default value is ***99#**.
  - **APN** (Access Point Name): provided by the ISP for mobile network. The default value is **internet**.
  - **Connect result**: displays the connection result.

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 **DEL** or **F2** key as soon as the system is turned on or
2. Press the **DEL** or **F2** key when the "**Press DEL or F2 to enter SETUP**" message appears on the screen.

If the message disappears before the **DEL** or **F2** 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 previous item
Down arrow	Move to next item
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

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

4.1.4 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) 2016 American Megatrends, Inc.
  Main   Advanced   Chipset   Security    Boot    Save & Exit

BIOS Information                                  Set the Date. Use Tab to
BIOS Vendor                    American Megatrends switch between Date
Core Version                   5.11                elements.
Compliancy                     UEFI 2.4; PI 1.3
Project Version                B369AR05.ROM
Build Date and Time            12/08/2016 16:19:26

iWDD Vender                    iEi
iWDD Version                   B396ER06.bin
Access Level                   Administrator      ----------------------
                                                  →←: Select Screen
Processor Information                             ↑ ↓: Select Item
Name                           SkyLake            Enter: Select
Brand String                   Intel(R) Core(TM)  +/-:  Change Opt.
                               i5-6300U CPU @ 2.40GHz F1:  General Help
Frequency                      2300 MHz           F2:  Previous Values
Processor ID                   406E3              F3:  Optimized Defaults
Stepping                       D0/K0              F4:  Save & Exit
Number of Processors           2Core(s) / 4Thread(s) ESC: Exit
Microcode Revision             7C
GT Info                        GT2

IGFX VBIOS Version             1039
Memory RC Version              1.9.0.0
Total Memory                   4096 MB
Memoery Frequency              2133 MHz

PCH Information
Name                           SKL PCH-LP
PCH SKU                        PCH-LP Mobile (U)
                               Premium SKU
Stepping                       21/C1

ME FW Version                  11.0.0.1205
ME Firmware SKU                Consumer SKU

SPI Clock Frequency
D0FR Support                   Unsupported
Read Status Clock Frequency    48 MHz
Write Status Clock Frequency   48 MHz
Fast Read Status Clock Frequency 48 MHz

System Date                    [Wed 02/08/2017]
System Time                    [00:18:35]

      Version 2.17.1255. Copyright (C) 2016 American Megatrends, Inc.
```

BIOS Menu 1: Main

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]**

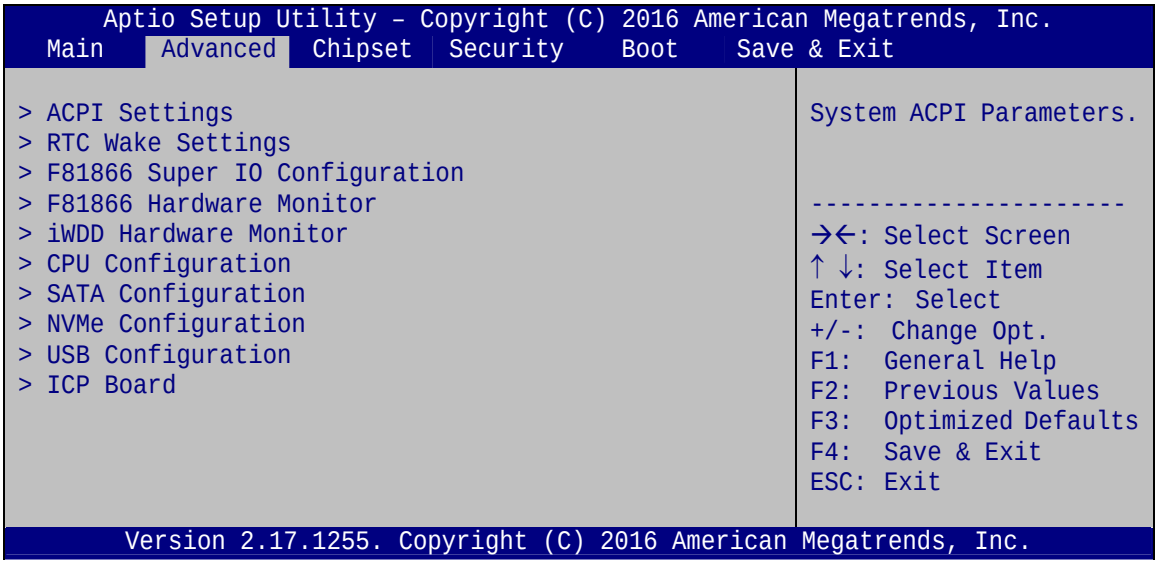
Use the **System Time** option to set the system time. Manually enter the hours, minutes and seconds.

4.3 Advanced

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

WARNING:

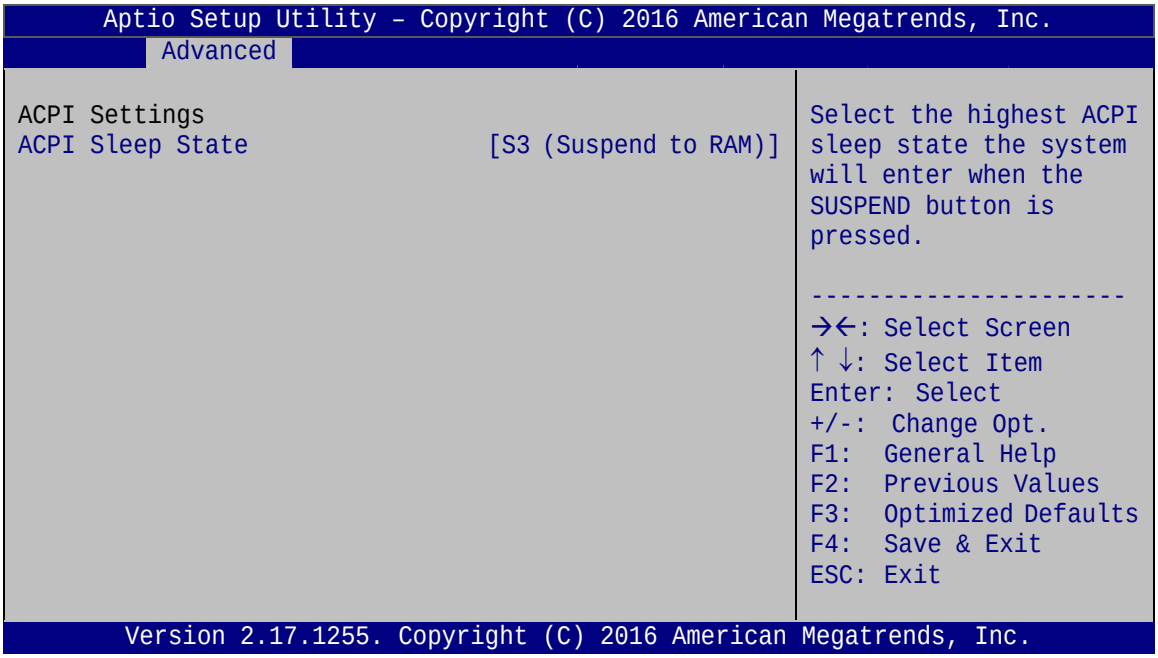
Setting the wrong values in the sections below may cause the system to malfunction. Make sure that the settings made are compatible with the hardware.



BIOS Menu 2: Advanced

4.3.1 ACPI Settings

The **ACPI Settings** menu (**BIOS Menu 3**) configures the Advanced Configuration and Power Interface (ACPI) options.



BIOS Menu 3: ACPI Configuration

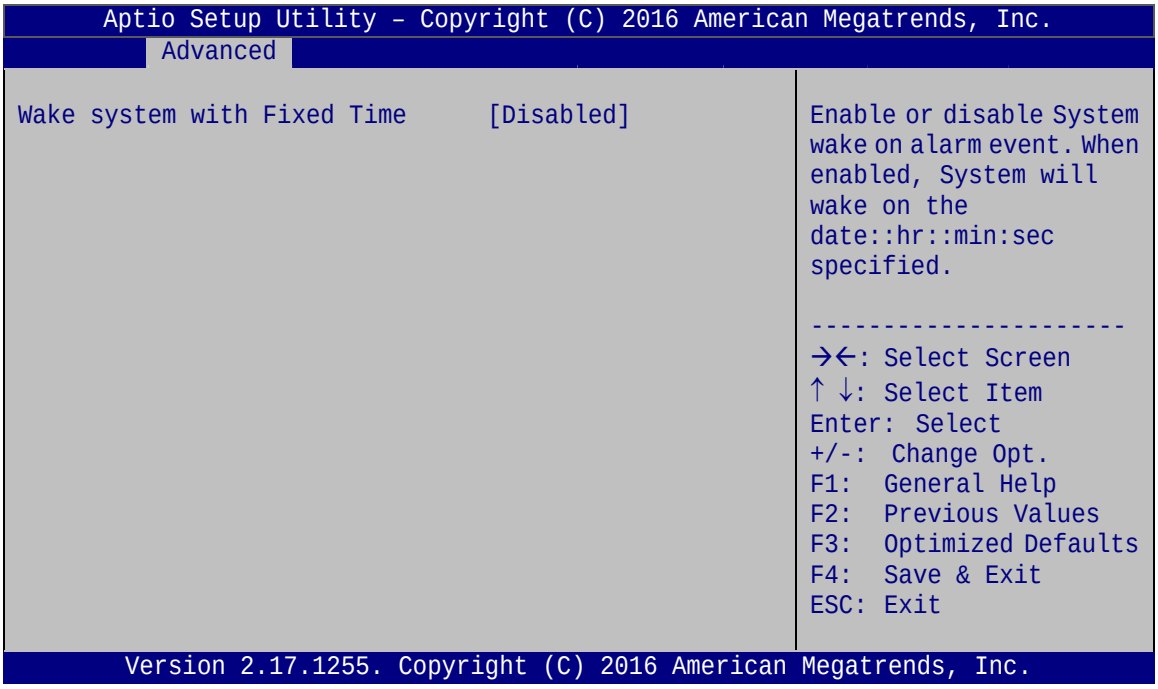
➔ **ACPI Sleep State [S3 (Suspend to RAM)]**

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

➔ **S3 (Suspend to RAM)** **DEFAULT** 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.

4.3.2 RTC Wake Settings

The **RTC Wake Settings** menu (**BIOS Menu 4**) enables the system to wake at the specified time.



BIOS Menu 4: 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 every day

Wake up date

Wake up hour

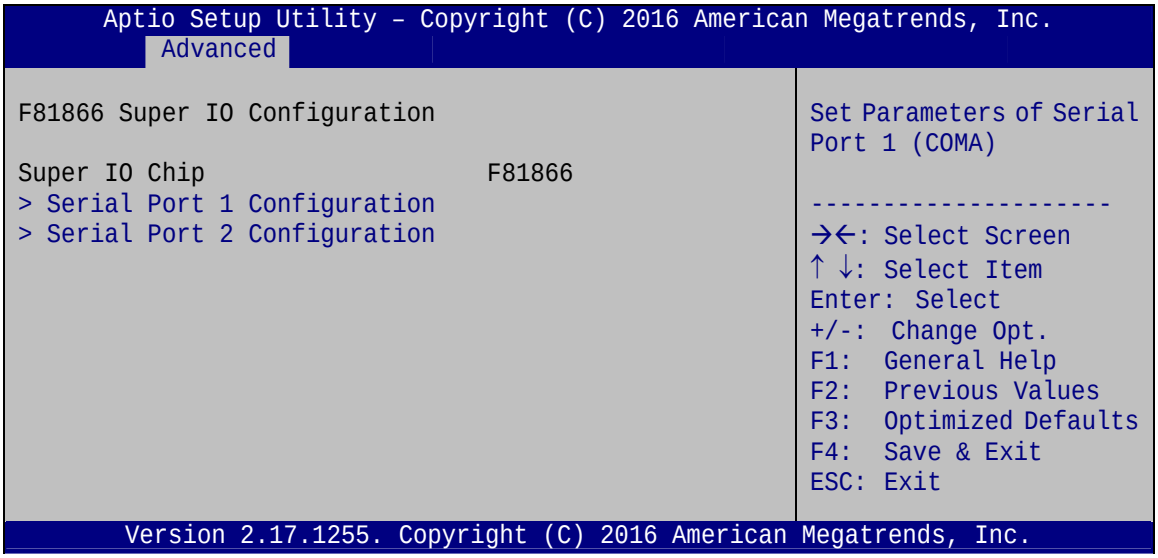
Wake up minute

Wake up second

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

4.3.3 F81866 Super IO Configuration

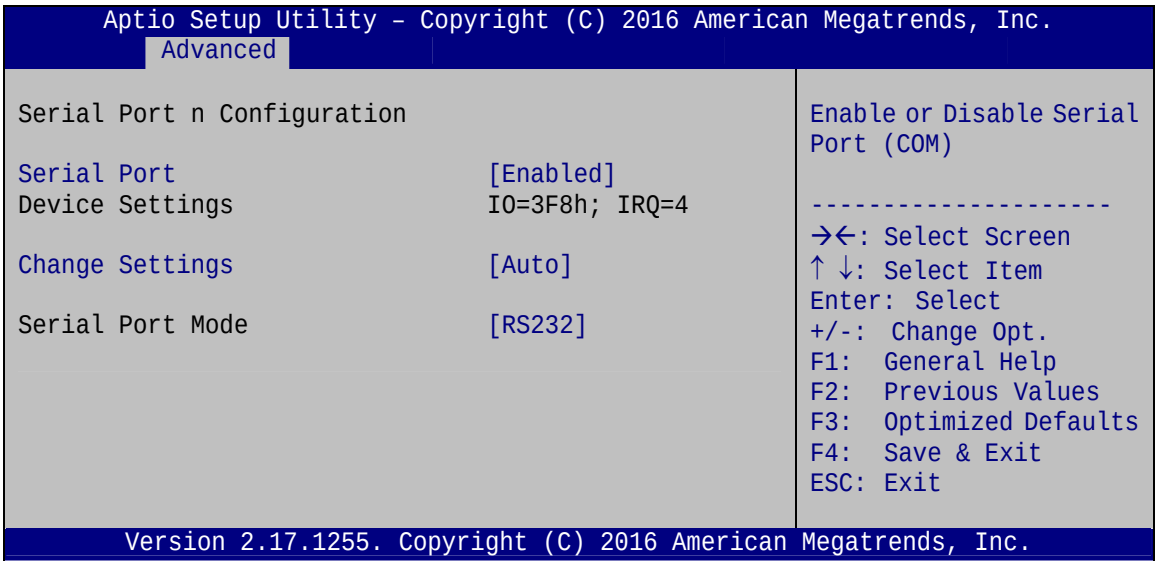
Use the **F81866 Super IO Configuration** menu (**BIOS Menu 5**) to set or change the configurations for the serial ports.



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, 5, 6, 7, 9, 10, 11, 12**	Serial Port I/O port address is 3F8h and the interrupt address is IRQ3, 4, 5, 6, 7, 9, 10, 11, 12
➔ **IO=2F8h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12**	Serial Port I/O port address is 2F8h and the interrupt address is IRQ3, 4, 5, 6, 7, 9, 10, 11, 12
➔ **IO=3E8h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12**	Serial Port I/O port address is 3E8h and the interrupt address is IRQ3, 4, 5, 6, 7, 9, 10, 11, 12
➔ **IO=2E8h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12**	Serial Port I/O port address is 2E8h and the interrupt address is IRQ3, 4, 5, 6, 7, 9, 10, 11, 12

➔ **Serial Port Mode [RS232]**

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

➔ **RS232**	**DEFAULT**	Serial Port 1 signaling mode is RS-422
➔ **RS422**		Serial Port 1 signaling mode is RS-232
➔ **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, 5, 6, 7, 9, 10, 11, 12**		Serial Port I/O port address is 3F8h and the interrupt address is IRQ3, 4, 5, 6, 7, 9, 10, 11, 12
➔ **IO=2F8h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12**		Serial Port I/O port address is 2F8h and the interrupt address is IRQ3, 4, 5, 6, 7, 9, 10, 11, 12
➔ **IO=3E8h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12**		Serial Port I/O port address is 3E8h and the interrupt address is IRQ3, 4, 5, 6, 7, 9, 10, 11, 12
➔ **IO=2E8h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12**		Serial Port I/O port address is 2E8h and the interrupt address is IRQ3, 4, 5, 6, 7, 9, 10, 11, 12

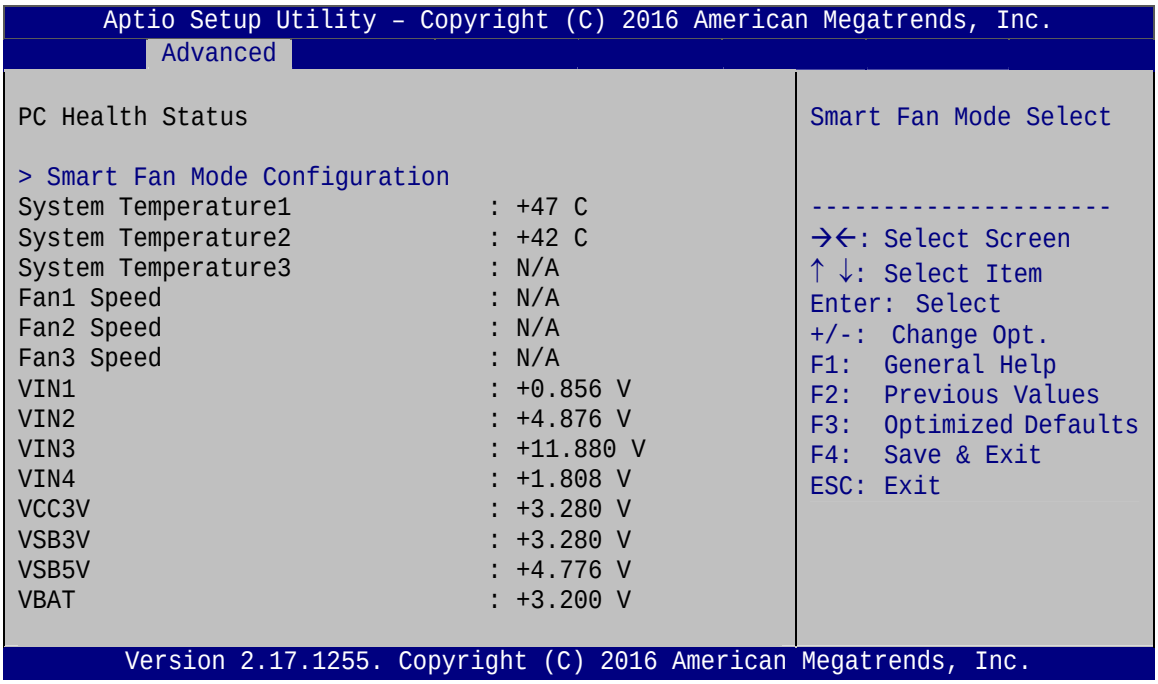
➔ **Serial Port Mode [RS232]**

Use the **Device 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 F81866 Hardware Monitor

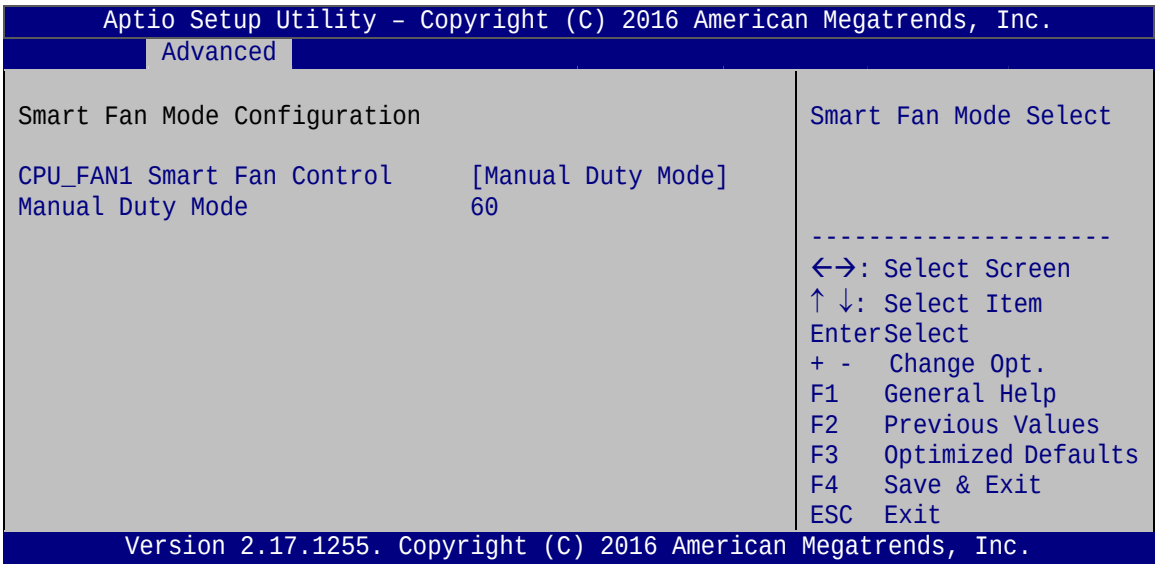
The **F81866 Hardware Monitor** menu (**BIOS Menu 7**) contains the fan configuration submenus and displays system temperature, fan speeds and system voltages.



BIOS Menu 7: F81866 Hardware Monitor

4.3.4.1 Smart Fan Mode Configuration

Use the **Smart Fan Mode Configuration** submenu (**BIOS Menu 8**) to configure fan temperature and speed settings.



BIOS Menu 8: Smart Fan Mode Configuration

➔ **CPU_FAN1 Smart Fan Control [Manual Duty Mode]**

Use the **CPU_FAN1 Smart Fan Control** BIOS option to configure the CPU Smart Fan.

➔ **Manual Duty Mode** **DEFAULT** The fan spins at the speed set in the Manual Duty Mode option.

➔ **Auto Duty-Cycle Mode** The fan adjusts its speed using these settings:

- CPU Temperature 1
- CPU Temperature 2
- CPU Temperature 3
- CPU Temperature 4

4.3.5 iWDD H/W Monitor

The **iWDD H/W Monitor** menu (**BIOS Menu 9**) contains the fan configuration submenus and displays operating temperature, fan speed and system voltages.

```
Aptio Setup Utility – Copyright (C) 2016 American Megatrends, Inc.
        Advanced
PC Health Status                                Smart Fan Mode Select

CPU temperature                 :+24°C
System temperature              :+26°C

CPU_FAN1 Speed                  :N/A            ---------------------
                                                ←→: Select Screen
CPU_CORE                        :+0.38 V        ↑ ↓: Select Item
+5V                             :+5.000 V       EnterSelect
+12V                            :+12.144 V      + -   Change Opt.
+DDR                            :+1.208 V       F1    General Help
+5VSB                           :+4.944 V       F2    Previous Values
+3.3V                           :+3.259 V       F3    Optimized Defaults
+3.3VSB                         :+3.244 V       F4    Save & Exit
                                                ESC   Exit
> Smart Fan Mode Configuration
Version 2.17.1255. Copyright (C) 2016 American Megatrends, Inc.
```

BIOS Menu 9: iWDD H/W Monitor

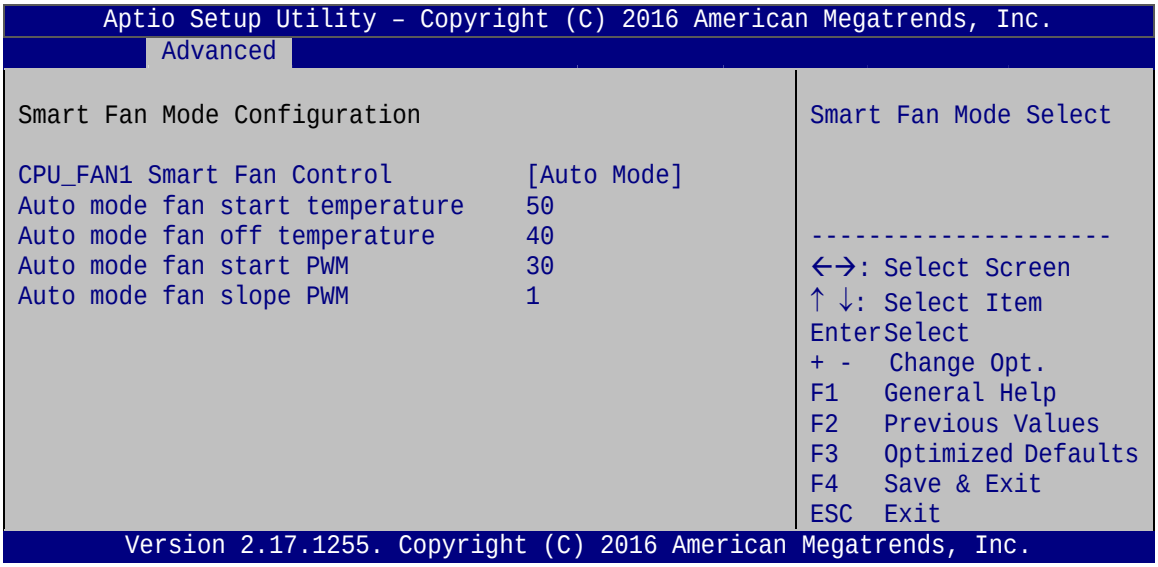
➔ **PC Health Status**

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

- System Temperatures:
  - CPU Temperature
  - System temperature
- Fan Speed:
  - CPU Fan Speed
- Voltages
  - CPU_CORE
  - +5V
  - +12V
  - +DDR
  - +5VSB
  - +3.3V
  - +3.3VSB

4.3.5.1 Smart Fan Mode Configuration

Use the **Smart Fan Mode Configuration** submenu (**BIOS Menu 8**) to configure fan temperature and speed settings.



BIOS Menu 10: Smart Fan Mode Configuration

➔ **CPU_FAN1 Smart Fan Control [Auto Mode]**

Use the **CPU_FAN1 Smart Fan Control** BIOS option to configure the CPU Smart Fan.

➔ **Manual Mode** The fan spins at the speed set in the Manual Mode option

➔ **Auto Mode** **DEFAULT** The fan adjusts its speed using these settings:

- Auto mode fan start temperature
- Auto mode fan off temperature
- Auto mode fan start PWM
- Auto mode fan slope PWM

➔ **Auto mode fan start/off temperature**

Use the + or – key to change the **Auto mode fan start/off temperature** value. Enter a decimal number between 1 and 100.

➔ **Auto mode fan start PWM**

Use the + or – key to change the **Auto mode fan start PWM** value. Enter a decimal number between 1 and 100.

➔ **Auto mode fan slope PWM**

Use the + or – key to change the **Auto mode fan slope PWM** value. Enter a decimal number between 1 and 8.

4.3.6 CPU Configuration

Use the **CPU Configuration** menu (**BIOS Menu 11**) to view detailed CPU specifications or enable the Intel Virtualization Technology.

```
      Aptio Setup Utility – Copyright (C) 2016 American Megatrends, Inc.
         Advanced
 CPU Configuration                                  | Enabled for Windows XP
                                                    | and Linux (OS optimized
 Intel(R) Core(TM) i5-6300U CPU @ 2.40GHz           | for Hyper-Threading
 CPU Signature                    406E3             | Technology) and Disabled
 Microcode Patch                  7C                | for other OS (OS not
 Max CPU Speed                    2400 MHz          | optimized for
 Min CPU Speed                    400 MHz           | Hyper-Threading
 CPU Speed                        2300 MHz          | Technology). When
 Processor Cores                  2                 | Disabled, only one
 Hyper Threading Technology       Supported         | thread per enabled core
 Intel VT-x Technology            Supported         | is enabled.
 Intel SMX Technology             Supported         |
 64-bit                           Supported         | ----------------------
 EIST Technology                  Supported         | →←: Select Screen
                                                    | ↑ ↓: Select Item
 L1 Data Cache                    32 KB x 2         | Enter: Select
 L1 Code Cache                    32 KB x 2         | +/-: Change Opt.
 L2 Cache                         256 KB x 2        | F1: General Help
 L3 Cache                         3 MB              | F2: Previous Values
 L4 Cache                         Not Present       | F3: Optimized Defaults
                                                    | F4: Save & Exit
 Hyper-threading                  [Enabled]         | ESC: Exit
 Active Processor Cores           [All]             |
 Intel Virtualization Technology  [Enabled]         |
 Intel(R) SpeedStep(tm)           [Enabled]         |
      Version 2.17.1255. Copyright (C) 2016 American Megatrends, Inc.
```

BIOS Menu 11: CPU Configuration

➔ **Hyper-threading [Enabled]**

Use the **Hyper-threading** option to enable or disable the CPU hyper threading function.

➔ **Disabled**		Disables the use of hyper threading technology
➔ **Enabled**	**DEFAULT**	Enables the use of hyper threading technology

➔ **Active Processor Cores [All]**

Use the **Active Processor Cores** 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**		Disables Intel® Virtualization Technology.
➔ **Enabled**	**DEFAULT**	Enables Intel® Virtualization Technology.

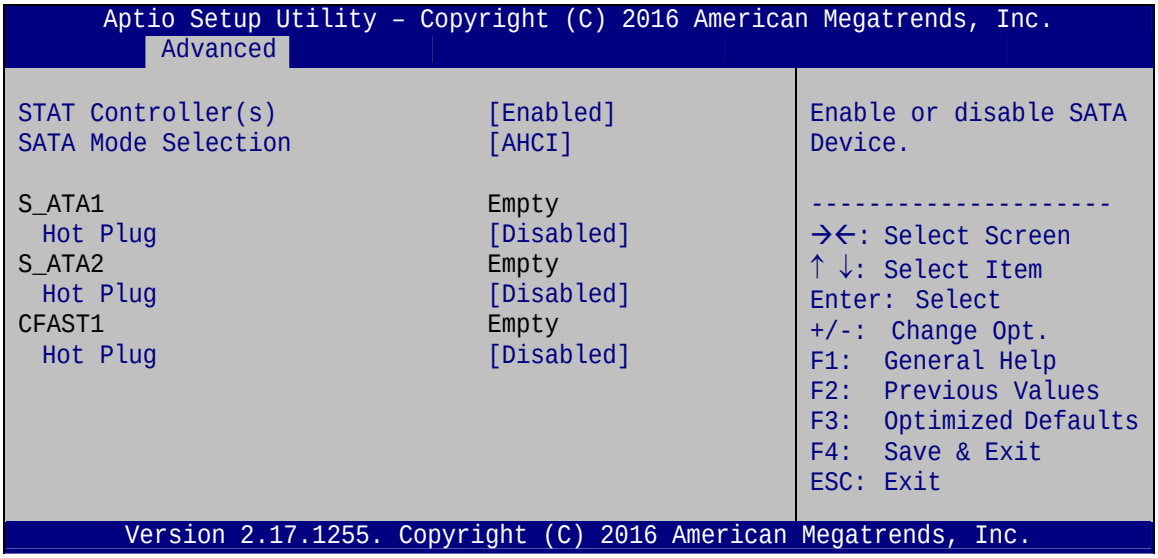
➔ **Intel® SpeedStep™ [Enabled]**

Use the **Intel® SpeedStep™** option to enable or disable the Intel® SpeedStep Technology.

➔ **Disabled**		Disables the Intel® SpeedStep Technology.
➔ **Enabled**	**DEFAULT**	Enables the Intel® SpeedStep Technology.

4.3.7 SATA Configuration

Use the **SATA Configuration** menu (**BIOS Menu 12**) to change and/or set the configuration of the SATA devices installed in the system.



BIOS Menu 12: SATA Configuration

➔ **STAT Controller(s) [Enabled]**

Use the **STAT Controller(s)** option to enable or disable the SATA device.

➔ **Enabled** **DEFAULT** Enables the SATA device.

➔ **Disabled** Disables the SATA device.

➔ **SATA Mode Selection [AHCI]**

Use the **SATA Mode Selection** option to configure SATA devices as AHCI devices.

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

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

NOTE:

Before accessing the RAID configuration utility, ensure to set the **Option ROM Messages** BIOS option in the **Boot** menu to **Force BIOS**. This is to allow the "Press <CTRL+I> to enter Configuration Utility……" message to appear during POST. Press Ctrl+I when prompted to enter the RAID configuration utility.

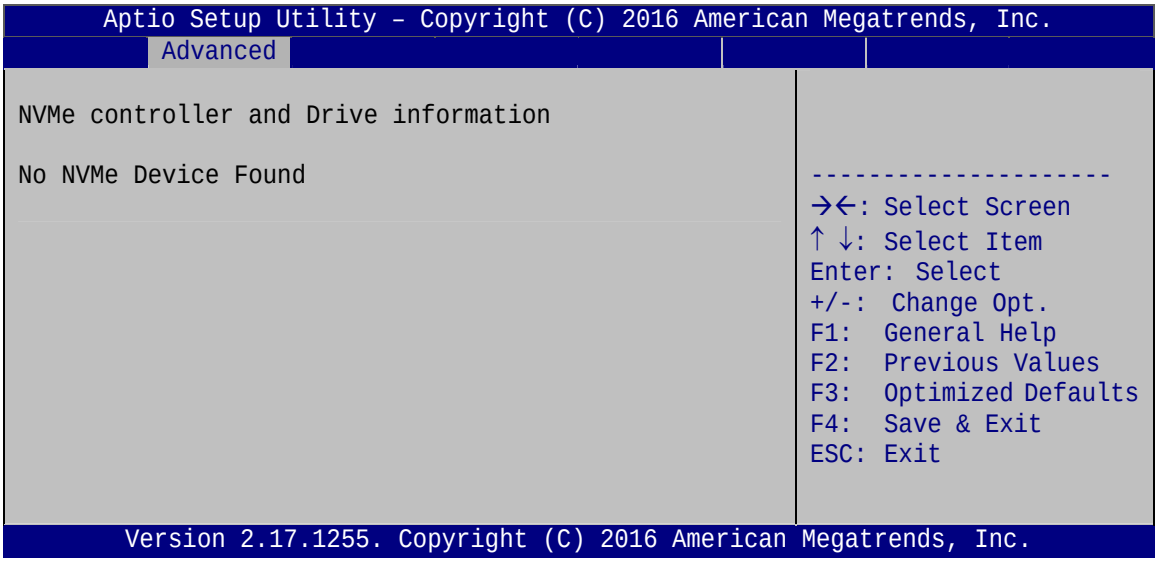
➔ **Hot Plug [Disabled]**

Use the **Hot Plug** option to enable or disable the SATA device hot plug.

➔	**Disabled**	**DEFAULT**	Disables the SATA device hot plug.
➔	**Enabled**		Enables the SATA device hot plug

4.3.8 NVMe Configuration

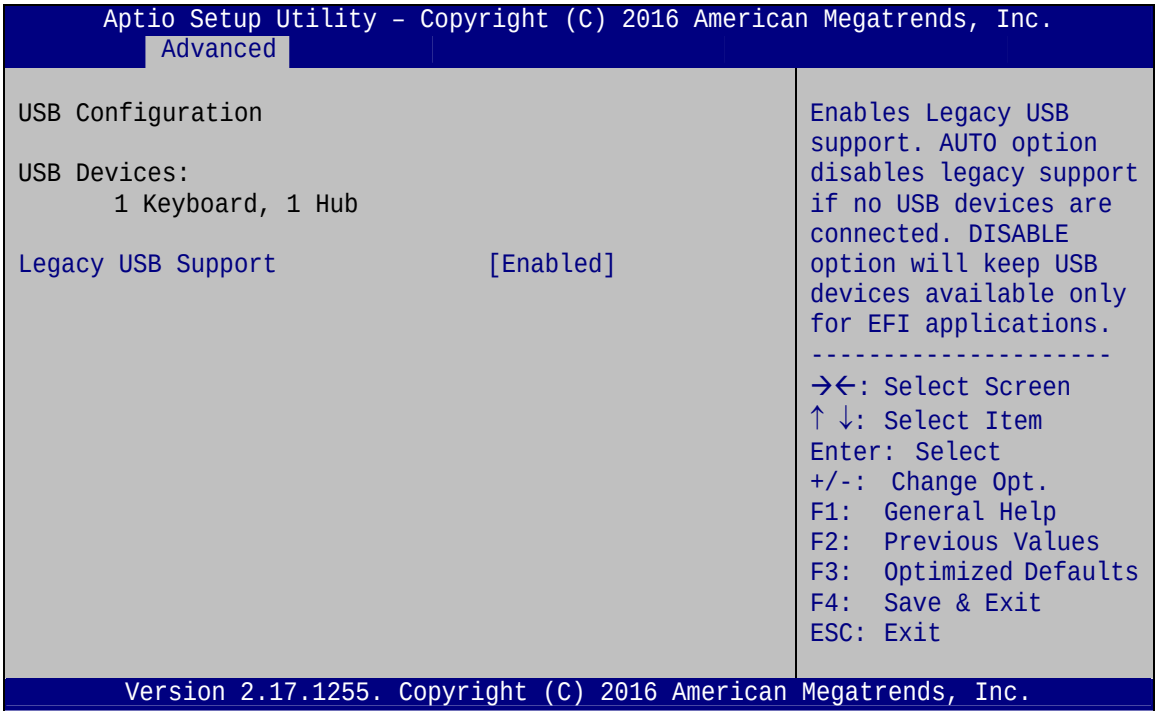
Use the **NVMe Configuration** (**BIOS Menu 13**) menu to display the NVMe controller and device information.



BIOS Menu 13: NVMe Configuration

4.3.9 USB Configuration

Use the **USB Configuration** menu (**BIOS Menu 14**) to read USB configuration information and configure the USB settings.



BIOS Menu 14: USB Configuration

➔ **Legacy USB Support [Enabled]**

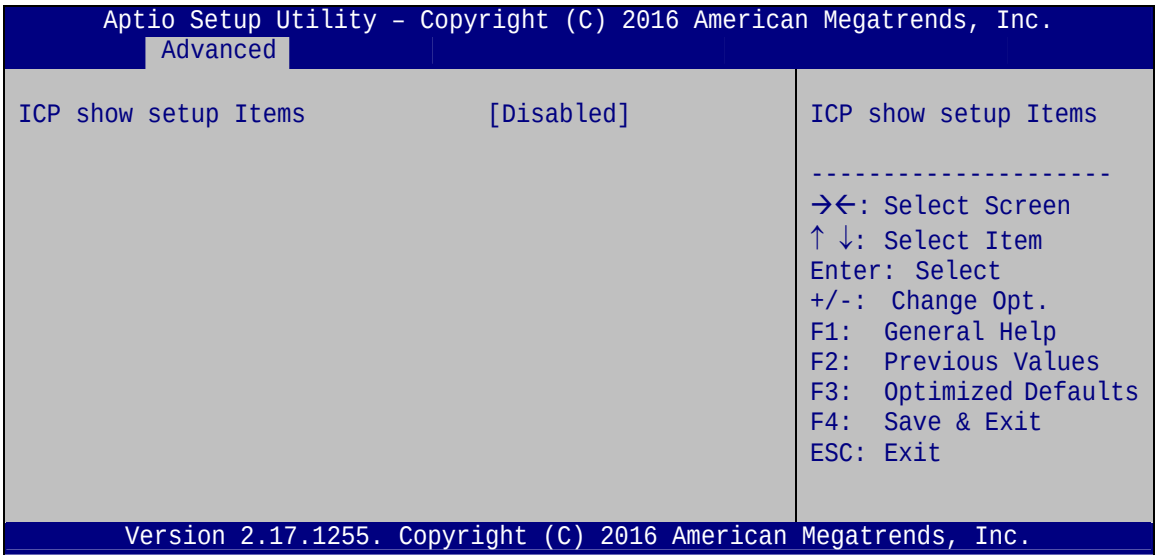
Use the **Legacy USB Support** BIOS option to enable USB mouse and USB keyboard support.

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 ICP Board

Use the **ICP Board** menu (**BIOS Menu 15**) to show detailed setup items.



BIOS Menu 15: ICP Board

➔ **ICP show setup Items [Enabled]**

Use the **ICP show setup Items** BIOS option to enable or disable configuring the ICP board parameters.

➔ **Disabled**	**DEFAULT**	Disables to show detailed setup items.
➔ **Enabled**		If selected, several BIOS setup items would appear, allowing the users to configure.

4.4 Chipset

Use the **Chipset** menu (**BIOS Menu 16**) to access the PCH-IO and System Agent (SA) Subsystem configuration menus.

WARNING!

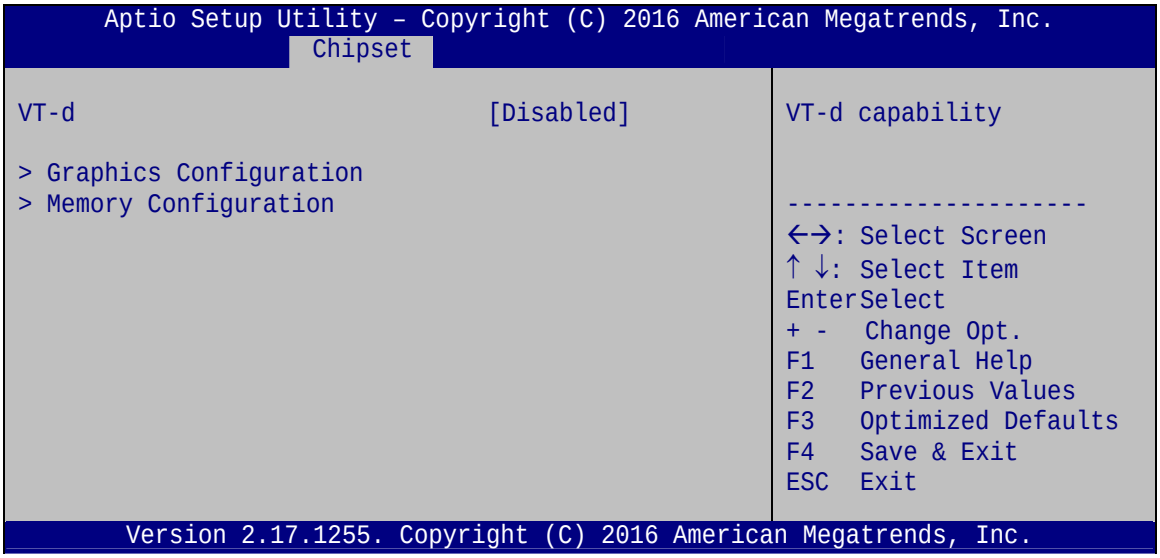
Setting the wrong values for the Chipset BIOS selections in the Chipset BIOS menu may cause the system to malfunction.

```
        Aptio Setup Utility – Copyright (C) 2016 American Megatrends, Inc.
  Main    Advanced  Chipset  Security    Boot    Save & Exit

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

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

        Version 2.17.1255. Copyright (C) 2016 American Megatrends, Inc.
```

BIOS Menu 16: Chipset

4.4.1 System Agent (SA) Configuration

Use the **System Agent (SA) Configuration** menu (**BIOS Menu 17**) to configure the System Agent (SA) parameters.



BIOS Menu 17: System Agent (SA) Configuration

➔ **VT-d [Disabled]**

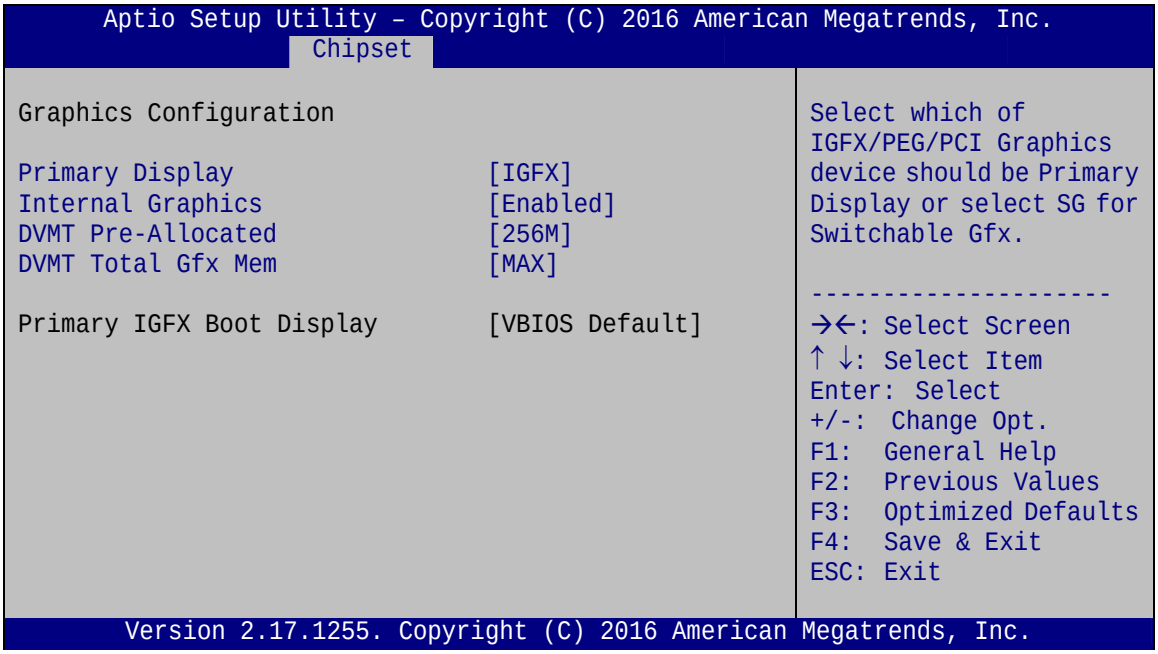
Use the **VT-d** option to enable or disable VT-d support.

➔ **Disabled** **DEFAULT** Disable VT-d support.

➔ **Enabled** Enable VT-d support.

4.4.1.1 Graphics Configuration

Use the **Graphics Configuration** submenu (**BIOS Menu 18**) to configure the graphics settings.



BIOS Menu 18: Graphics Configuration

➔ **Primary Display [Auto]**

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

- Auto **DEFAULT**
- IGFX
- PCIE

➔ **Internal Graphics [Enabled]**

Use the **Internal Graphics** option to enable or disable the internal graphics device.

➔ **Auto** The internal graphics device is automatically detected and enabled.

➔ **Disabled** Disable the internal graphics device.

➔ **Enabled** **DEFAULT** Enable the internal graphics device. The following options/submenu appear with values that can be selected:

DVMT Pre-Allocated

DVMT Total Gfx Mem

➔ **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.

- 128M
- 256M
- MAX **Default**

➔ **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.

- VBIOS Default **DEFAULT**
- DVI-D

- DVI-A
- VGA1

4.4.1.2 Memory Configuration

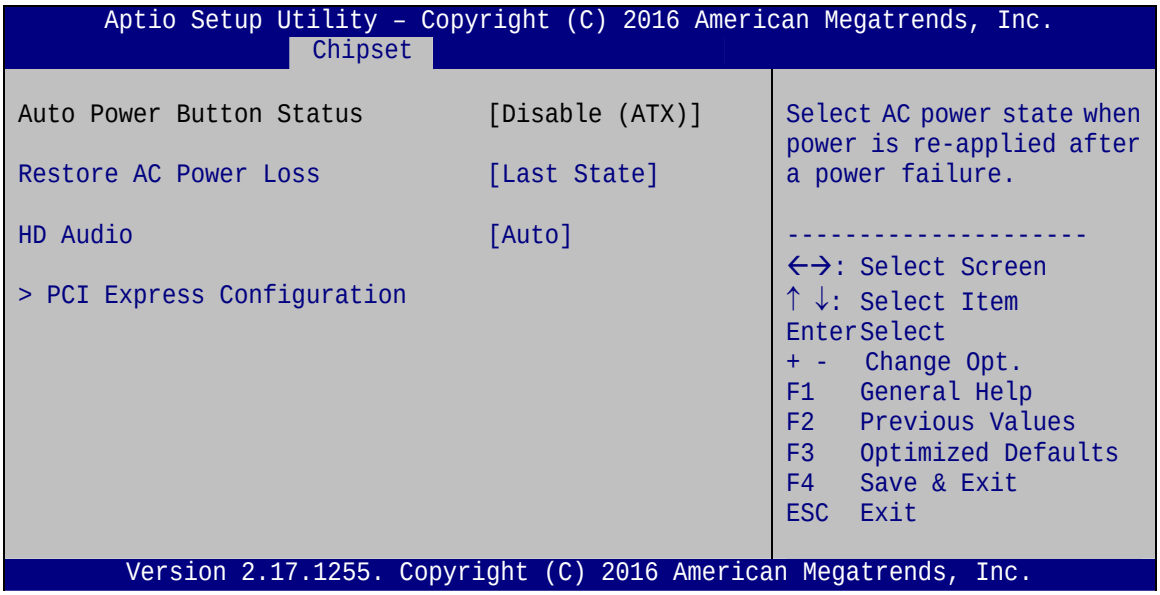
Use the **Memory Configuration** submenu (**BIOS Menu 19**) to view the memory information.

```
Aptio Setup Utility – Copyright (C) 2016 American Megatrends, Inc.
        Advanced
Memory Configuration

Total Memory                    4096 MB
DIMM1                           4096 MB
DIMM2                           Not Present

                                ---------------------
                                →←: Select Screen
                                ↑ ↓: Select Item
                                Enter:  Select
                                +/-:  Change Opt.
                                F1:   General Help
                                F2:   Previous Values
                                F3:   Optimized Defaults
                                F4:   Save & Exit
                                ESC:  Exit
Version 2.17.1255. Copyright (C) 2016 American Megatrends, Inc.
```

BIOS Menu 19: Memory Configuration

4.4.2 PCH-IO Configuration

Use the **PCH-IO Configuration** menu (**BIOS Menu 20**) to configure the PCH-IO controller.



BIOS Menu 20: 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.

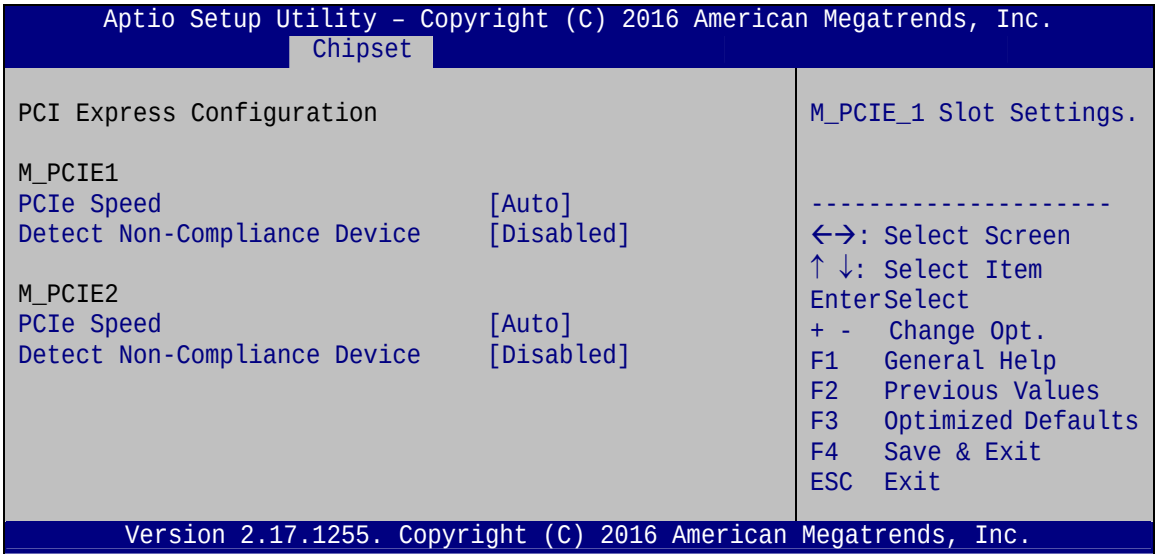
➔ **HD Audio [Auto]**

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

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

4.4.2.1 PCI Express Configuration

Use the **PCI Express Configuration** submenu (**BIOS Menu 21**) to configure the PCIe Mini slots.



BIOS Menu 21: PCI Express Configuration

➔ **PCIe Speed [Auto]**

Use the **PCIe Speed** option to configure the interface speed of the PCIe Mini slot.

- Auto **DEFAULT**
- Gen 1
- Gen 2
- Gen 3

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

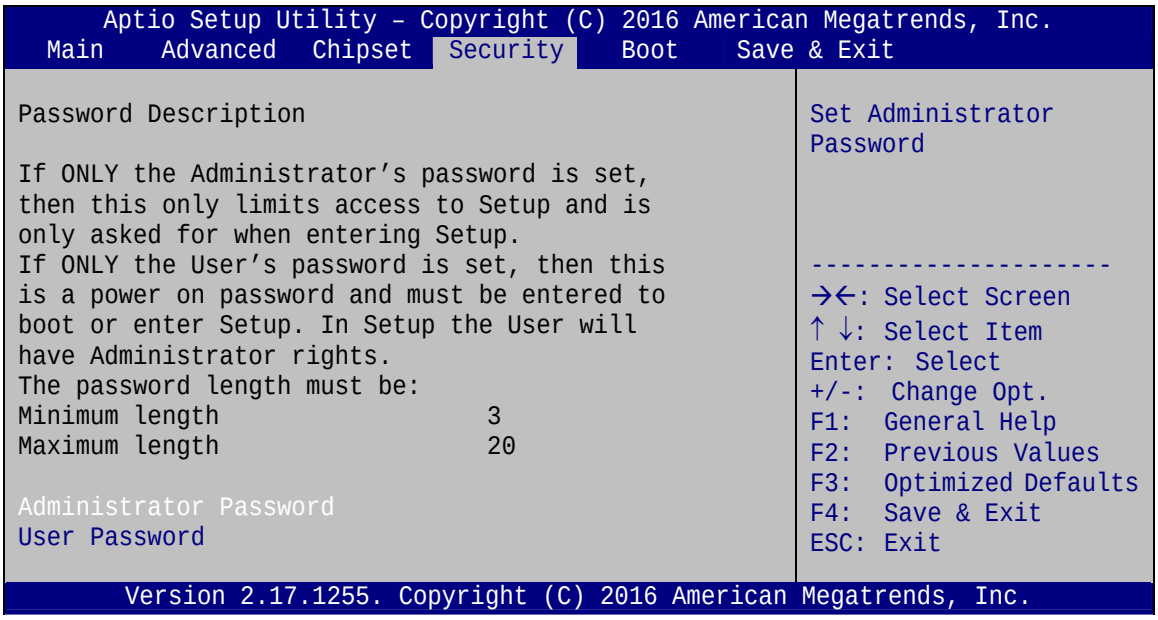
Use the **Detect Non-Compliance Device** option to enable or disable detecting if a non-compliance device is connected to the PCIe Mini slot.

➔ **Disabled** **DEFAULT** Disables to detect if a non-compliance device is connected to the PCIe Mini slot.

➔ **Enabled** Enables to detect if a non-compliance device is connected to the PCIe Mini slot.

4.5 Security

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



BIOS Menu 22: Security

➔ **Administrator Password**

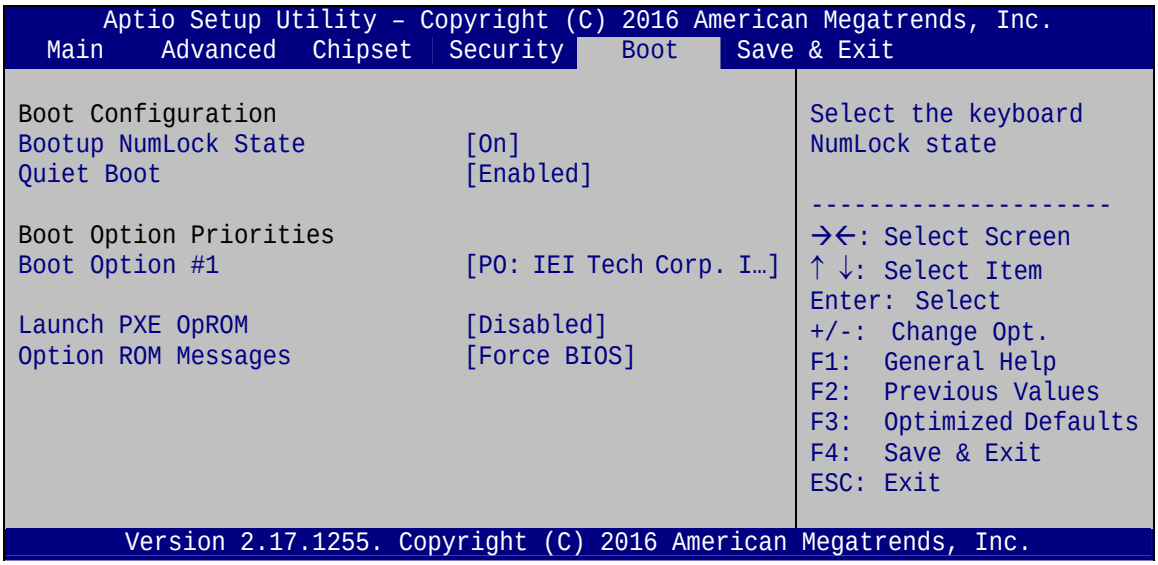
Use the **Administrator Password** to set or change a administrator password.

➔ **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

➔ **Boot Option Priorities**

Use the **Boot Option Priorities** function to set the system boot sequence from the available devices. The drive sequence also depends on the boot sequence in the individual device section.

➔ **Launch PXE OpROM [Disabled]**

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

➔	**Disabled**	**DEFAULT**	Ignore all PXE Option ROMs
➔	**Enabled**		Load PXE Option ROMs.

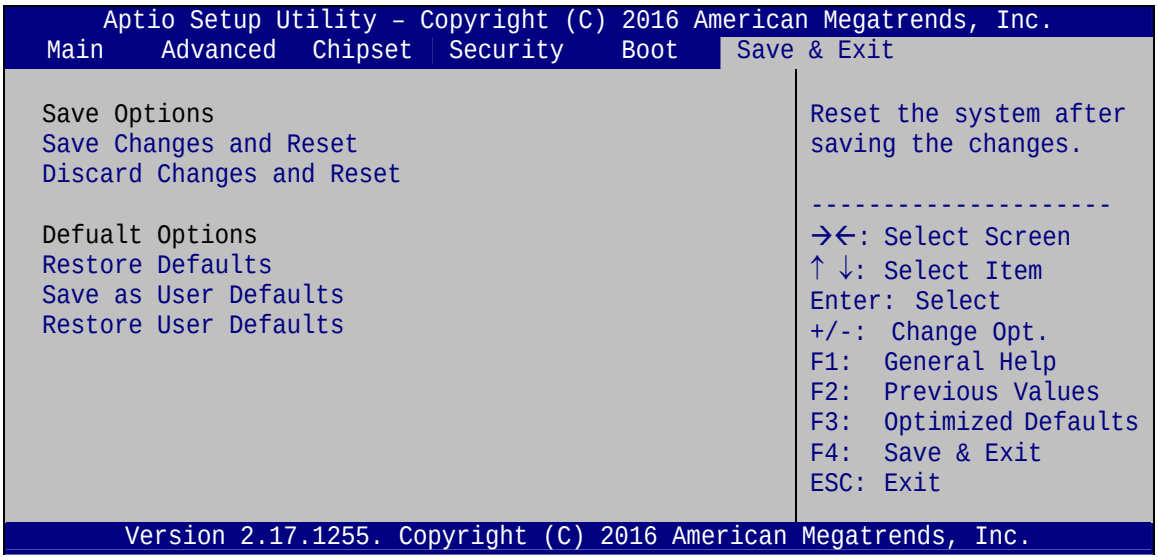
➔ **Option ROM Messages [Force BIOS]**

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.

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: 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

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 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 IRS-100-ULT3, the system must be properly maintained. If internal components need replacement, the proper maintenance procedures must be followed to ensure the system can continue to operate normally.

5.2 Component Replacement Procedure

WARNING!

Users are not advised to attempt to repair or replace any internal or external components of the IRS-100-ULT3 embedded system other than those listed below. If any other components fail or need replacement, contact the IEI reseller or vendor you purchased the IRS-100-ULT3 from or contact an IEI sales representative directly. To contact an IEI sales representative, please send an email to sales@ieiworld.com.

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

- SO-DIMM module

5.2.1 SO-DIMM Replacement

WARNING:

Using incorrectly specified SO-DIMM may cause permanently damage the IRS-100-ULT3. Please make sure the purchased SO-DIMM complies with the memory specifications of the IRS-100-ULT3.

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

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

Step 2: Disconnect the SATA connector and the SATA power connector from the motherboard to entirely remove the bottom cover.

Step 3: Locate the SO-DIMM installed on the motherboard. The SO-DIMM slot locations are shown in **Figure 5-1**.

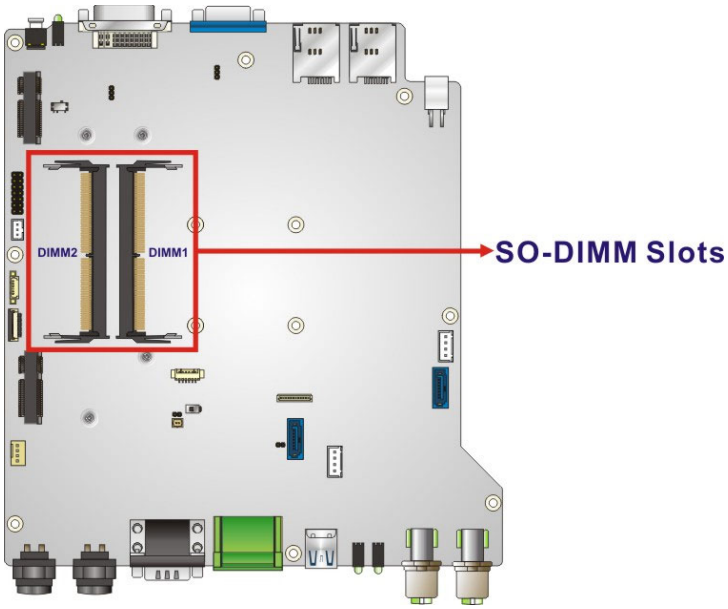


Figure 5-1: SO-DIMM Slot Locations

Step 4: Remove the SO-DIMM by releasing the arms on the SO-DIMM socket.

Step 5: Align a new SO-DIMM so the notch on the memory lines up with the notch on the memory slot (**Figure 5-2**).

Step 6: Once aligned, press down until the SO-DIMM is properly seated. (**Figure 5-2**).

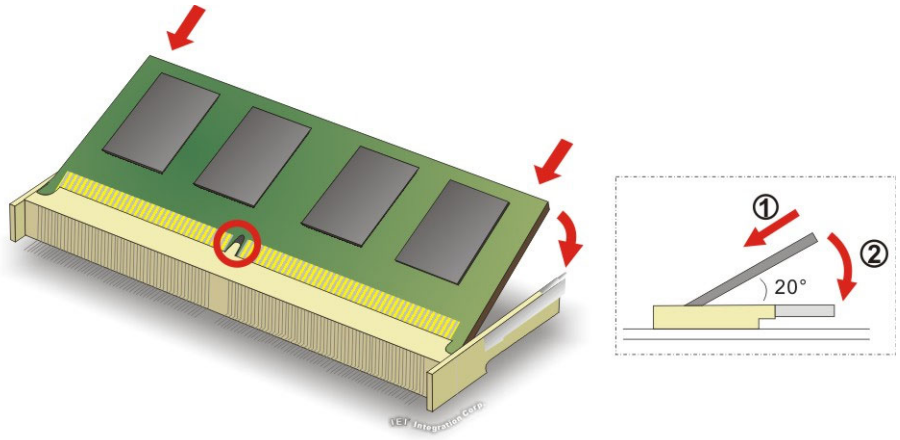


Figure 5-2: SO-DIMM Installation

Chapter

6

Interface Connectors

6.1 Peripheral Interface Connectors

The IRS-100-ULT3 motherboard comes with a number of peripheral interface connectors. The connector locations are shown in **Figure 6-1** and **Figure 6-2**. The Pin 1 locations of the on-board connectors are also indicated in the diagrams. The connector pinouts for these connectors are listed in the following sections.

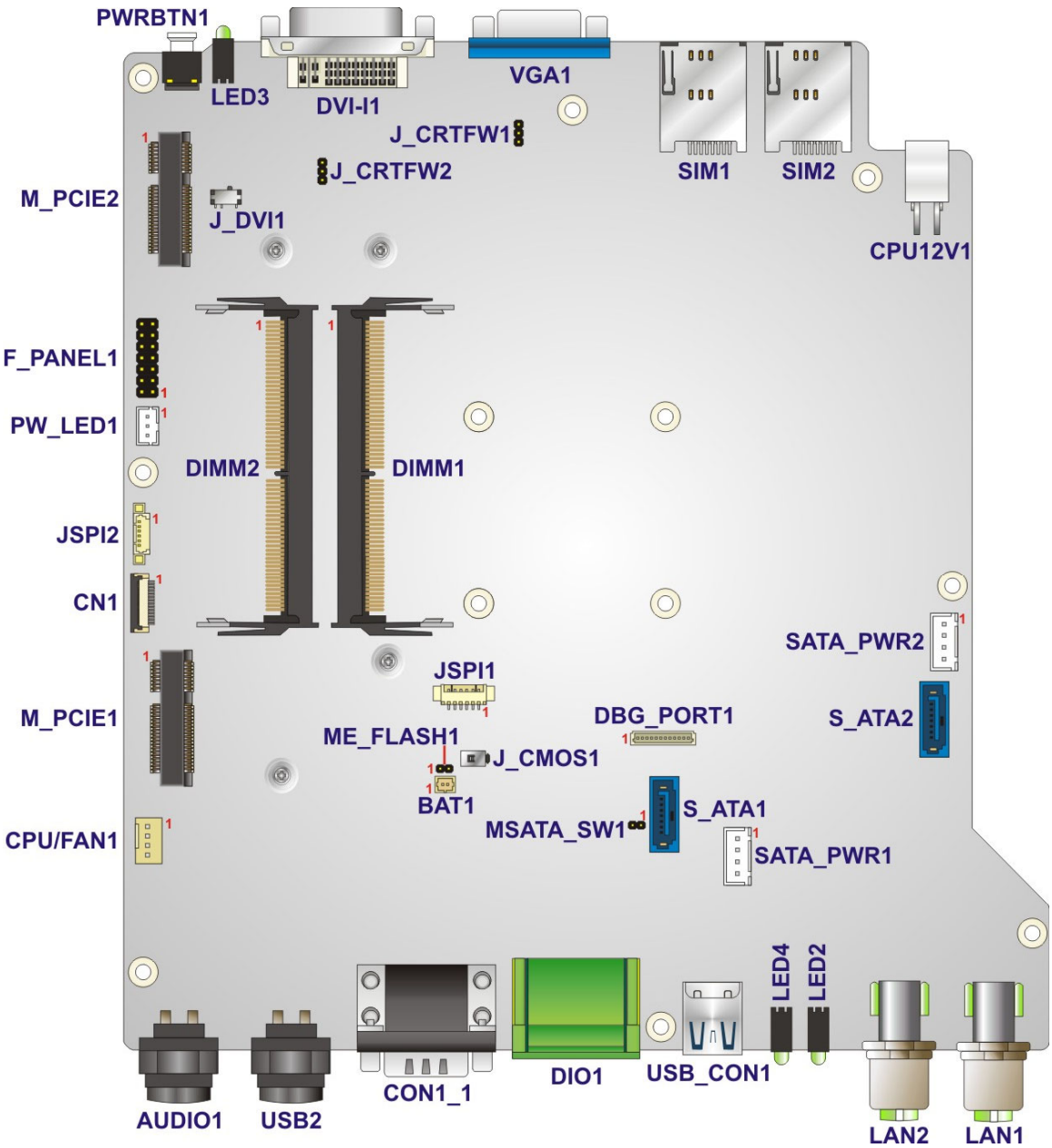


Figure 6-1: Main Board Layout Diagram (Front Side)

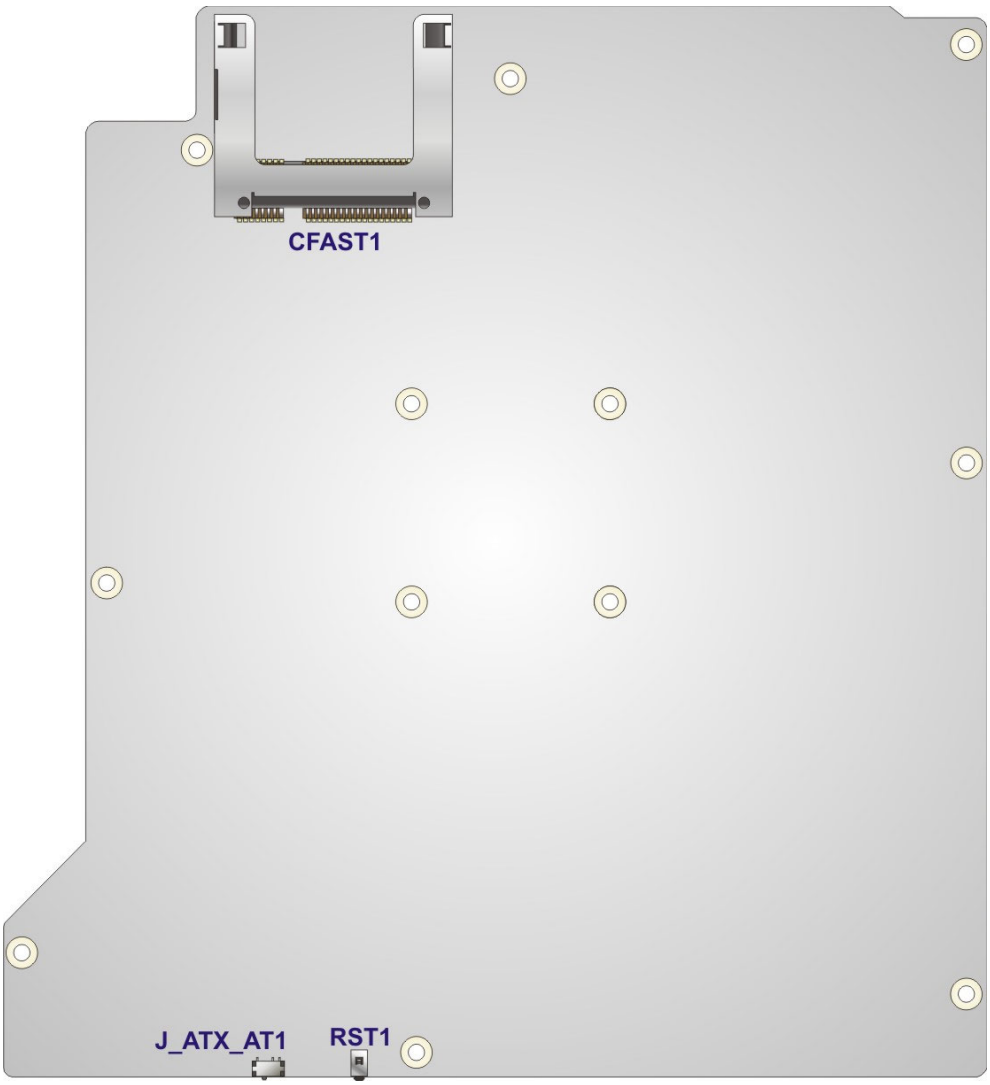


Figure 6-2: Main Board Layout Diagram (Solder Side)

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 IRS-100-ULT3 motherboard. Pinouts of these connectors can be found in the following sections.

Connector	Type	Label
Battery connector	2-pin wafer	BAT1
CFast card slot	CFast card slot	CFAST1
CPU fan connector	4-pin wafer	CPU/FAN1
EC debug connector	20-pin FPC	CN1
Front panel connector	14-pin header	F_PANEL1
LPC debug card connector	12-pin wafer	DBG_PORT1
Memory slots	260-pin DDR4L SO-DIMM	DIMM1, DIMM2
PCIe Mini card slot (supports mSATA)	52-pin PCIe Mini slot	M_PCIE1
PCIe Mini card slot	52-pin PCIe Mini slot	M_PCIE2
Power LED indicator connector	3-pin wafer	PW_LED1
Reset button	Push button	RST1
SATA 6Gb/s drive connector	7-pin SATA	S_ATA1, S_ATA2
SATA power connector	4-pin wafer	SATA_PWR1, SATA_PWR2
SIM card slots	SIM card slot	SIM1, SIM2
SPI flash connector	6-pin wafer	JSPI1
SPI flash connector (EC)	6-pin wafer	JSPI2

Table 6-1: Peripheral Interface Connectors

6.2.1 Battery Connector (BAT1)

PIN NO.	DESCRIPTION
1	+V3.3A
2	GND

Table 6-2: Battery Connector (BT1) Pinouts

6.2.2 CPU Fan Connector (CPU/FAN1)

PIN NO.	DESCRIPTION
1	GND
2	+12V
3	FANIO
4	PWM

Table 6-3: CPU Fan Connector (CPU/FAN1) Pinouts

6.2.3 EC Debug Connector (CN1)

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	KSI0	11	KSO9
2	KSO0	12	KSO10
3	KSO1	13	KSO12
4	KSO2	14	KSI1
5	KSO3	15	KSO11
6	KSO4	16	KSI2
7	KSO5	17	KSI3
8	KSO6	18	GND
9	KSO7	19	GND
10	KSO8	20	GND

Table 6-4: EC Debug Connector (CN1) Pinouts

6.2.4 EC SPI Flash Connector (JSPI2)

PIN NO.	DESCRIPTION
1	+3.3V_SPI_CON_EC
2	SPI_CS#0_CN_EC
3	SPI_SO_SW_EC
4	SPI_CLK_SW_EC
5	SPI_SI_SW_ED
6	GND

Table 6-5: SPI Flash Connector (JSPI2) Pinouts

6.2.5 Front Panel Connector (F_PANEL1)

FUNCTION	PIN NO.	DESCRIPTION	FUNCTION	PIN NO.	DESCRIPTION
Power LED	1	+5V	Speaker	2	BEEP_PWR
	3	NC		4	NC
	5	GND		6	NC
Power Button	7	PWRBTN_SW#		8	PC_BEEP
	9	GND		10	NC
HDD LED	11	+5V	Reset	12	EXTRST-
	13	SATA_LED#		14	GND

Table 6-6: Front Panel Connector (F_PANEL1) Pinouts

6.2.6 LPC Debug Card Connector (DBG_PORT1)

PIN NO.	DESCRIPTION
1	+V5S
2	+V3.3S
3	GND
4	INT_SERIRQ
5	LPC_AD3
6	LPC_AD2
7	LPC_AD1
8	LPC_AD0
9	LPC_FRAME#
10	BUF_PLT_RST#
11	LPC_CLKM
12	GND

Table 6-7: LPC Debug Card Connector (DBG_PORT1) Pinouts

6.2.7 PCIe Mini Card Slot (M_PCIE1)

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	PCIE_WAKE#	2	VCC3
3	N/C	4	GND
5	N/C	6	1.5V
7	N/C	8	N/C
9	GND	10	N/C
11	CLK-	12	N/C
13	CLK+	14	N/C
15	GND	16	N/C
17	PCIRST#	18	GND
19	N/C	20	VCC3
21	GND	22	PCIRST#
23	PERN (SATA_RX1+)	24	3V Dual
25	PERP (SATA_RX1-)	26	GND

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
27	GND	28	1.5V
29	GND	30	SMBCLK
31	PETN (SATA_TX1-)	32	SMSDATA
33	PETP (SATA_TX1+)	34	GND
35	GND	36	USBD7-
37	N/C	38	USBD7+
39	N/C	40	GND
41	N/C	42	N/C
43	SATA_DET4_R_N	44	N/C
45	N/C	46	N/C
47	N/C	48	1.5V
49	N/C	50	GND
51	MSATA_SEL#	52	VCC3

Table 6-8: PCIe Mini Card Slot (M_PCIE1) Pinouts

6.2.8 PCIe Mini Card Slot (M_PCIE2)

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	PCIE_WAKE#	2	VCC3
3	N/C	4	GND
5	N/C	6	1.5V
7	N/C	8	SIM_VCC
9	GND	10	SIM_CIO
11	CLK-	12	SIM_CLK
13	CLK+	14	SIM_RST
15	GND	16	N/C
17	PCIRST#	18	GND
19	N/C	20	VCC3
21	GND	22	PCIRST#
23	PERN12	24	3V Dual
25	PERP12	26	GND
27	GND	28	1.5V

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
29	GND	30	SMBCLK
31	PETN12	32	SMSDATA
33	PETP12	34	GND
35	GND	36	USBD6-
37	N/C	38	USBD6+
39	N/C	40	GND
41	N/C	42	N/C
43	N/C	44	N/C
45	N/C	46	N/C
47	N/C	48	1.5V
49	N/C	50	GND
51	MSATA_SEL#	52	VCC3

Table 6-9: PCIe Mini Card Slot (M_PCIE2) Pinouts

6.2.9 Power LED Indicator Connector (PW_LED1)

PIN NO.	DESCRIPTION
1	SYSTEM ON
2	GND
3	SYSTEM STBY

Table 6-10: Power LED Indicator Connector (PW_LED1) Pinouts

6.2.10 SATA Drive Connectors (S_ATA1, S_ATA2)

PIN NO.	DESCRIPTION
1	GND
2	SATA_TXP
3	SATA_TXN
4	GND
5	SATA_RXN
6	SATA_RXP
7	GND

Table 6-11: SATA Drive Connector Pinouts

6.2.11 SATA Power Connector (SATA_PWR1, SATA_PWR2)

PIN NO.	DESCRIPTION
1	12V
2	GND
3	GND
4	5V

Table 6-12: SATA Power Connector Pinouts

6.2.12 SPI Flash Connector (JSPI1)

PIN NO.	DESCRIPTION
1	+3.3V_SPI_CON
2	SPI_CS#0_N
3	SPI_SO_N
4	SPI_CLK_N
5	SPI_SI_N
6	GND

Table 6-13: SPI Flash Connector (JSPI1) Pinouts

Appendix

A

Regulatory Compliance

DECLARATION OF CONFORMITY

CE

This equipment is in conformity with the following EU directives:

- EMC Directive (2004/108/EC, 2014/30/EU)
- Low-Voltage Directive (2006/95/EC, 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 Radio Equipment Directive 2014/53/EU.

English IEI Integration Corp declares that this equipment is in compliance with the essential requirements and other relevant provisions of Directive 2014/53/EU.
Български [Bulgarian] IEI Integration Corp. декларира, че този оборудване е в съответствие със съществените изисквания и другите приложими правила на Директива 2014/53/EU.
Česky [Czech] IEI Integration Corp tímto prohlašuje, že tento zařízení je ve shodě se základními požadavky a dalšími příslušnými ustanoveními směrnice 2014/53/EU.
Dansk [Danish] IEI Integration Corp erklærer herved, at følgende udstyr overholder de væsentlige krav og øvrige relevante krav i direktiv 2014/53/EU.
Deutsch [German] IEI Integration Corp, erklärt dieses Gerät entspricht den grundlegenden Anforderungen und den weiteren entsprechenden Vorgaben der Richtlinie 2014/53/EU.
Eesti [Estonian] IEI Integration Corp deklareerib seadme seadme vastavust direktiivi 2014/53/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 2014/53/EU.
Ελληνική [Greek] IEI Integration Corp ΔΗΛΩΝΕΙ ΟΤΙ ΕΞΟΠΛΙΣΜΟΣ ΣΥΜΜΟΡΦΩΝΕΤΑΙ ΠΡΟΣ ΤΙΣ ΟΥΣΙΩΔΕΙΣ ΑΠΑΙΤΗΣΕΙΣ ΚΑΙ ΤΙΣ ΛΟΙΠΕΣ ΣΧΕΤΙΚΕΣ ΔΙΑΤΑΞΕΙΣ ΤΗΣ ΟΔΗΓΙΑΣ 2014/53/EU.
Français [French] IEI Integration Corp déclare que l'appareil est conforme aux exigences essentielles et aux autres dispositions pertinentes de la directive 2014/53/EU.
Italiano [Italian] IEI Integration Corp dichiara che questo apparecchio è conforme ai requisiti essenziali ed alle altre disposizioni pertinenti stabilite dalla direttiva 2014/53/EU.
Latviski [Latvian] IEI Integration Corp deklarē, ka iekārta atbilst būtiskajām prasībām un citiem ar to saistītajiem noteikumiem Direktīvas 2014/53/EU.
Lietuvių [Lithuanian] IEI Integration Corp deklaruoja, kad šis įranga atitinka esminius reikalavimus ir kitas 2014/53/EU 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 2014/53/EU.
Malti [Maltese] IEI Integration Corp jiddikjara li dan prodott jikkonforma mal-ħtiġijiet essenzjali u ma provvedimenti oħrajn relevanti li hemm fid-Dirrettiva 2014/53/EU.
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Polski [Polish] IEI Integration Corp oświadcza, że wyrobu jest zgodny z zasadniczymi wymogami oraz pozostałymi stosownymi postanowieniami Dyrektywy 2014/53/EU.
Português [Portuguese] IEI Integration Corp declara que este equipamento está conforme com os requisitos essenciais e outras disposições da Directiva 2014/53/EU.

Româna [Romanian] IEI Integration Corp declară că acest echipament este in conformitate cu cerințele esențiale şi cu celelalte prevederi relevante ale Directivei 2014/53/EU.
Slovensko [Slovenian] IEI Integration Corp izjavlja, da je ta opreme v skladu z bistvenimi zahtevami in ostalimi relevantnimi določili direktive 2014/53/EU.
Slovensky [Slovak] IEI Integration Corp týmto vyhlasuje, že zariadenia spĺňa základné požiadavky a všetky príslušné ustanovenia Smernice 2014/53/EU.
Suomi [Finnish] IEI Integration Corp vakuuttaa täten että laitteet on direktiivin 2014/53/EU 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 2014/53/EU.

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 IRS-100-ULT3.

WARNING:

This is Class A Product. In domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

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 IRS-100-ULT3 is opened.
- ***Make sure the power is turned off and the power cord is disconnected*** whenever the IRS-100-ULT3 is being installed, moved or modified.
- ***Do not apply voltage levels that exceed the specified voltage range***. Doing so may cause fire and/or an electrical shock.
- ***Electric shocks can occur*** if the IRS-100-ULT3 chassis is opened when the IRS-100-ULT3 is running.
- ***Do not drop or insert any objects*** into the ventilation openings of the IRS-100-ULT3.
- ***If considerable amounts of dust, water, or fluids enter the IRS-100-ULT3***, turn off the power supply immediately, unplug the power cord, and contact the IRS-100-ULT3 vendor.

- **DO NOT**:
  - Drop the IRS-100-ULT3 against a hard surface.
  - Strike or exert excessive force onto the LCD panel.
  - Touch any of the LCD panels with a sharp object
  - 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 IRS-100-ULT3 may result in permanent damage to the IRS-100-ULT3 and severe injury to the user.

Electrostatic discharge (ESD) can cause serious damage to electronic components, including the IRS-100-ULT3. Dry climates are especially susceptible to ESD. It is therefore critical that whenever the IRS-100-ULT3 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.

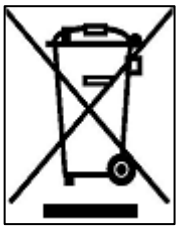
B.1.3 Product Disposal

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:



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 display 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 IRS-100-ULT3, please follow the guidelines below.

B.2.1 Maintenance and Cleaning

Prior to cleaning any part or component of the IRS-100-ULT3, please read the details below.

- Except for the LCD panel, never spray or squirt liquids directly onto any other components. To clean the LCD panel, gently wipe it with a piece of soft dry cloth or a slightly moistened cloth.
- The interior of the IRS-100-ULT3 does not require cleaning. Keep fluids away from the IRS-100-ULT3 interior.
- Be cautious of all small removable components when vacuuming the IRS-100-ULT3.
- Turn the IRS-100-ULT3 off before cleaning the IRS-100-ULT3.
- Never drop any objects or liquids through the openings of the IRS-100-ULT3.
- Be cautious of any possible allergic reactions to solvents or chemicals used when cleaning the IRS-100-ULT3.
- Avoid eating, drinking and smoking within vicinity of the IRS-100-ULT3.

B.2.2 Cleaning Tools

Some components in the IRS-100-ULT3 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 IRS-100-ULT3.

- ***Cloth*** – Although paper towels or tissues can be used, a soft, clean piece of cloth is recommended when cleaning the IRS-100-ULT3.
- ***Water or rubbing alcohol*** – A cloth moistened with water or rubbing alcohol can be used to clean the IRS-100-ULT3.
- ***Using solvents*** – The use of solvents is not recommended when cleaning the IRS-100-ULT3 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 IRS-100-ULT3. Dust and dirt can restrict the airflow in the IRS-100-ULT3 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

Watchdog Timer

NOTE:

The following discussion applies to DOS. Contact IEI support or visit the IEI website for drivers for other operating systems.

The Watchdog Timer is a hardware-based timer that attempts to restart the system when it stops working. The system may stop working because of external EMI or software bugs. The Watchdog Timer ensures that standalone systems like ATMs will automatically attempt to restart in the case of system problems.

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

INT 15H:

AH – 6FH Sub-function:	
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 C-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. When 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:

The Watchdog Timer is activated through software. The software application that activates the Watchdog Timer must also deactivate it when closed. If the Watchdog Timer is not deactivated, the system will automatically restart after the Timer has finished its countdown.

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

D

Hazardous Materials Disclosure

The details provided in this appendix are to ensure that the product is compliant with the Peoples Republic of China (China) RoHS standards. The table below acknowledges the presences of small quantities of certain materials in the product, and is applicable to China RoHS only.

A label will be placed on each product to indicate the estimated "Environmentally Friendly Use Period" (EFUP). This is an estimate of the number of years that these substances would "not leak out or undergo abrupt change." This product may contain replaceable sub-assemblies/components which have a shorter EFUP such as batteries and lamps. These components will be separately marked.

Please refer to below 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)
Housing	O	O	O	O	O	O
Display	O	O	O	O	O	O
Printed Circuit Board	O	O	O	O	O	O
Metal Fasteners	O	O	O	O	O	O
Cable Assembly	O	O	O	O	O	O
Fan Assembly	O	O	O	O	O	O
Power Supply Assemblies	O	O	O	O	O	O
Battery	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 SJ/T11363-2006 (now replaced by GB/T 26572-2011).

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 SJ/T11363-2006 (now replaced by GB/T 26572-2011).

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	O	O	O	O	O	O
显示	O	O	O	O	O	O
印刷电路板	O	O	O	O	O	O
金属螺帽	O	O	O	O	O	O
电缆组装	O	O	O	O	O	O
风扇组装	O	O	O	O	O	O
电力供应组装	O	O	O	O	O	O
电池	O	O	O	O	O	O

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/T 11363-2006 (现由 GB/T 26572-2011 取代) 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/T 11363-2006 (现由 GB/T 26572-2011 取代) 标准规定的限量要求。