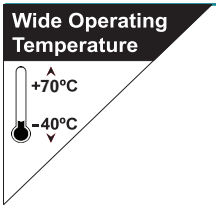

Rigid-772

Extreme Rugged Box Computer with Intel® Core™ i3-3120ME

User's Manual

Version 1.0

P/N: 4016077200100P 2013.02

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Revision History

Version	Date	Description
1.0	2013 February	Initial release

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Copyright Notice

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

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

Declaration of Conformity

CE

The CE symbol on the computer indicates that it is in compliance with the directives of the Union European (EU). A Certificate of Compliance is available by contacting Technical Support.

This product has passed the CE test for environmental specifications when shielded cables are used for external wiring. We recommend the use of shielded cables. This kind of cable is available from ARBOR. Please contact your local supplier for ordering information.

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

FCC Class A

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.

NOTE:

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.

RoHS

ARBOR Technology Corp. certifies that all components in its products are in compliance and conform to the European Union's Restriction of Use of Hazardous Substances in Electrical and Electronic Equipment (RoHS) Directive 2002/95/EC.

The above mentioned directive was published on 2/13/2003. The main purpose of the directive is to prohibit the use of lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls (PBB), and polybrominated diphenyl ethers (PBDE) in electrical and electronic products. Member states of the EU are to enforce by 7/1/2006.

ARBOR Technology Corp. hereby states that the listed products do not contain unintentional additions of lead, mercury, hex chrome, PBB or PBDB that exceed a maximum concentration value of 0.1% by weight or for cadmium exceed 0.01% by weight, per homogenous material. Homogenous material is defined as a substance or mixture of substances with uniform composition (such as solders, resins, plating, etc.). Lead-free solder is used for all terminations (Sn(96-96.5%), Ag(3.0-3.5%) and Cu(0.5%)).

SVHC / REACH

To minimize the environmental impact and take more responsibility to the earth we live, Arbor hereby confirms all products comply with the restriction of SVHC (Substances of Very High Concern) in (EC) 1907/2006 (REACH --Registration, Evaluation, Authorization, and Restriction of Chemicals) regulated by the European Union.

All substances listed in SVHC < 0.1 % by weight (1000 ppm)

Important Safety Instructions

Read these safety instructions carefully

1. Read all cautions and warnings on the equipment.
2. Place this equipment on a reliable surface when installing. Dropping it or letting it fall may cause damage
3. Make sure the correct voltage is connected to the equipment.
4. For pluggable equipment, the socket outlet should be near the equipment and should be easily accessible.
5. Keep this equipment away from humidity.
6. The openings on the enclosure are for air convection and protect the equipment from overheating. DO NOT COVER THE OPENINGS.
7. Position the power cord so that people cannot step on it. Do not place anything over the power cord.
8. Never pour any liquid into opening. This may cause fire or electrical shock.
9. Never open the equipment. For safety reasons, the equipment should be opened only by qualified service personnel.
10. If one of the following situations arises, get the equipment checked by service personnel:
    a. The power cord or plug is damaged.
    b. Liquid has penetrated into the equipment.
    c. The equipment has been exposed to moisture.
    d. The equipment does not work well, or you cannot get it to work according to the user's manual.
    e. The equipment has been dropped or damaged.
    f. The equipment has obvious signs of breakage.
11. Keep this User's Manual for later reference.

Warning

The Box PC and its components contain very delicately Integrated Circuits (IC). To protect the Box PC and its components against damage caused by static electricity, you should always follow the precautions below when handling it:

1. Disconnect your Box PC from the power source when you want to work on the inside.
2. Use a grounded wrist strap when handling computer components.
3. Place components on a grounded antistatic pad or on the bag that came with the Box PC, whenever components are separated from the system.

Replacing Lithium Battery

Incorrect replacement of the lithium battery may lead to a risk of explosion.

The lithium battery must be replaced with an identical battery or a battery type recommended by the manufacturer.

Do not throw lithium batteries into the trash can. It must be disposed of in accordance with local regulations concerning special waste.

Technical Support

If you have any technical difficulties, please consult the user's manual first at: ftp://ftp.arbor.com.tw/pub/manual

Please do not hesitate to call or e-mail our customer service when you still cannot find out the answer.

http://www.arbor.com.tw

E-mail:info@arbor.com.tw

Warranty

This product is warranted to be in good working order for a period of one year from the date of purchase. Should this product fail to be in good working order at any time during this period, we will, at our option, replace or repair it at no additional charge except as set forth in the following terms. This warranty does not apply to products damaged by misuse, modifications, accident or disaster.

Vendor assumes no liability for any damages, lost profits, lost savings or any other incidental or consequential damage resulting from the use, misuse of, or inability to use this product. Vendor will not be liable for any claim made by any other related party.

Vendors disclaim all other warranties, either expressed or implied, including but not limited to implied warranties of merchantability and fitness for a particular purpose, with respect to the hardware, the accompanying product's manual(s) and written materials, and any accompanying hardware. This limited warranty gives you specific legal rights.

Return authorization must be obtained from the vendor before returned merchandise will be accepted. Authorization can be obtained by calling or faxing the vendor and requesting a Return Merchandise Authorization (RMA) number. Returned goods should always be accompanied by a clear problem description.

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Chapter 1

Introduction

1.1. The Product

The Rigid-772 is ARBOR's new generation of extreme rugged box system based on Intel® Core™ i3-3120ME with chipset Intel® QM77 to deliver low power consumption, high performance and wide temperature tolerance

Integrated with Intel® HD 4000 graphics, the computer supports DirectX 11 to deliver superb video and audio. The RAID-capable computer with dual display ports (DVI-I and DVI-D) suffices for the sophisticated applications such as security surveillance.

The computer features the rich I/O ports including six USB 2.0 and four USB 3.0 ports, two PCIe buses, four COM ports for RS232/422/485 protocols, three LAN ports, one SIM card socket and one MiniCard socket for powerful networking and data connections.

The modularized mechanical design makes the computer easy-to-install and easy-to-maintain, and the simple, sturdy and rugged design makes the computer ideal for almost every industrial application. This computer is a powerful and reliable system for your infrastructure to deliver uncompromised control over your work network in harsh environment.

1.2. About this Manual

This manual is meant for the experienced users and integrators with hardware knowledge of personal computers. If you are not sure about the description herein, consult your vendor before further handling.

We recommend that you keep one copy of this manual for the quick reference for any necessary maintenance in the future. Thank you for choosing ARBOR products.

1.3. Specifications

System Kernel	
Processor	Intel® Core™ i3-3120ME (Dual-core) (rPGA988B)
BIOS	AMI Flash BIOS
Chipset	Intel® QM77
Graphics	Integrated Intel® HD 4000
System Memory	2 x 204-pin DDR3 SO-DIMM sockets supporting up to 16GB at 1333/1600 MHz
	4GB wide-temperature DDR3 memory module installed
Serial ATA	2 x Serial ATA ports for RAID
	2 x eSATA
Ethernet Controller	2 x Intel® WG82583V Gigabit Ethernet controllers
	1 x Intel® WG82579LM Gigabit Ethernet controller, supporting iAMT
Watchdog Timer	1 ~ 255 levels reset
I/O Ports	
Serial Port	1 x DB-44 female connector
	COM1/2 are RS-232 w/ 5v power output
	COM3/4 are RS-232/422/485 selectable, w/ 2.5 kv isolation protection.
***Selectable Port**	1 x DB25 connector for 1 x DIO (8 x IN, 8 x OUT) port or 1 x LPT port (Either one, DIO is the default, but changeable to LPT)
USB Port	6 x USB 2.0 ports, 4 x USB 3.0/2.0 ports
	2 x internal USB dongle for software license key (configure-to-order only)
LAN Port	3 x RJ-45 ports for Gigabit Ethernet
Video Port	1 x DVI-I female connector for digital/analog video output
	1 x DVI-D female connector for digital video output
Audio	Mic-in/Line-out
Expansion Bus	1 x MiniCard socket for optional Wi-Fi or HSUPA module
	1 x SIM slot / 1 x CFast slot (both outside accessible)
	1 x PCIe x16 slot and 1x PCIe x8 slot (via x4 lanes)

Storage	
Type	2 x 2.5” drive bays
	1 x CFast slot
Qualification	
Certification	CE, FCC Class A
Environment	
Operating Temp.	-40 ~ 70°C (-40 ~ 158°F), ambience w/ air flow
Storage Temp.	-40 ~ 85°C (-40 ~ 185°F)
Relative Humidity	10 ~ 95% @ 40°C (non-condensing)
Vibration	3 Grms/5 ~ 500Hz/random operation w/ SSD
Shock	Operating 20G (11ms); Non-operating 40G with HDD Operating 50G (11ms); Non-operating 80G with SSD
Mechanical	
Construction	Aluminum alloy
Mounting	Wall mounting
Weight	7 kg (15.43 lb)
Dimensions (W x D x H)	225 x 267 x 120 mm
Power Requirement	
Power Input	DC 9~36V input w/ 4-pin terminal block
Power Consumption	1.86A/19V, 36W (i3-3120ME)

1.4. Inside the Package

Upon opening the package, carefully inspect the contents. If any of the items is missing or appears damaged, contact your local dealer or distributor. The package should contain the following items:

1 x Rigid-772
Extreme Rugged Box System

1 x Driver CD
1 x User's Manual

1 x 120W AC/DC adapter kit
PAC-B120W-FSP

1 x Wall-Mount Kit
WMK-7000

1 x COM converter cable
CBL-7100-COM

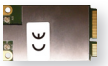
1.5. Ordering Information

Rigid-772	Fanless embedded controller

1.5.1. Configure-to-Order Service

Make your Rigid-772 more tailored to your needs by selecting one or more components from the list below to be fabricated to the computer.

SSD-25040
Intel® 2.5” 40GB SATAII SSD kit



HSPA-SI1400
HSUPA 3.75G module kit & internal wiring

WIFI-IN1300
Intel® Centrino® Advanced-N 6205 WiFi module w/ 20cm internal wiring

ANT-H11
2dBi HSUPA antenna kit

ANT-D11
1 x WiFi Dual-band 2.4G/5G antenna

MK-3I-4G-2
Industrial DDR3 4GB SDRAM kit

UDK-7702
Internal USB dongle kit

Chapter 2

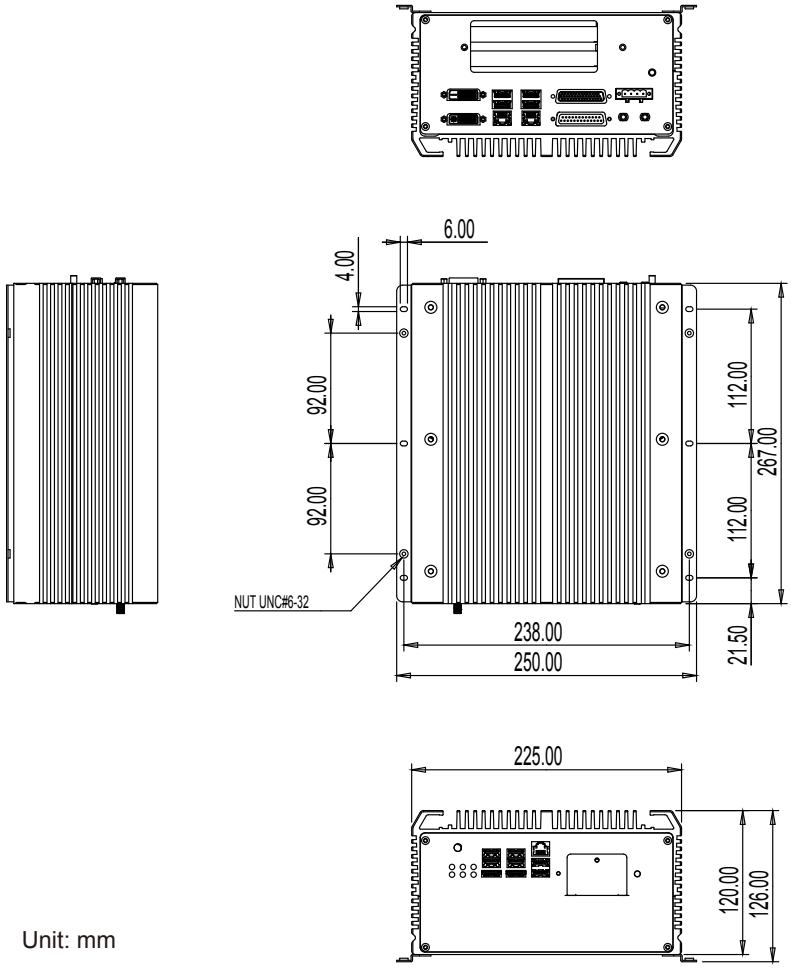
Getting Started

2.1. System Overview

This section will give an overview of the computer.

2.1.1. Dimensions

The following illustration shows the dimensions of Rigid-772, with the measurements in width, depth, and height called out.

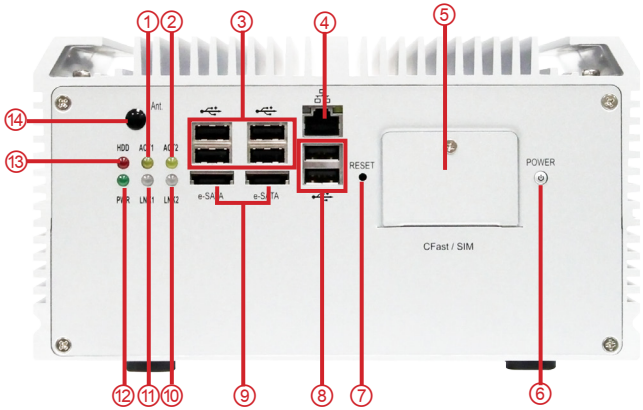


Unit: mm

2.1.2. Take A Tour

The computer has some I/O ports, status LED lights and controls on the front and rear panels. The following illustrations show all the components called out.

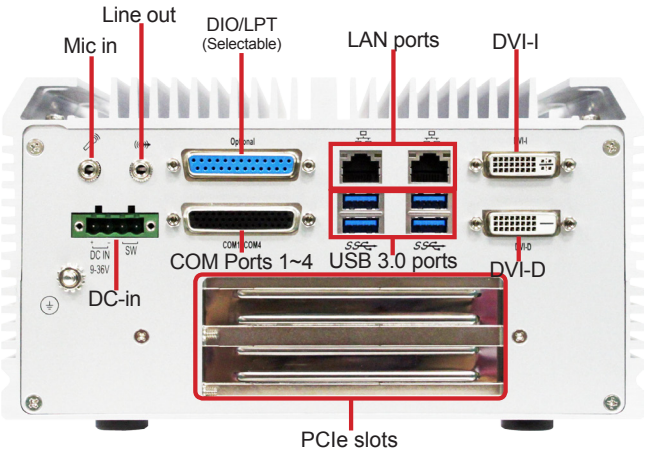
2.1.2.1. Front View



No.	Description	No.	Description
①	LAN1 Active LED	⑧	USB 2.0 ports
②	LAN2 Active LED	⑨	eSATA ports
③	USB 2.0 ports	⑩	LAN2 Link LED
④	LAN port	⑪	LAN1 Link LED
⑤	CFast/SIM slots	⑫	Power LED
⑥	Power button	⑬	HDD status LED
⑦	Reset trigger	⑭	Antenna hole

2.1.2.2. Rear View

Take a look a the rear side of Rigid-772.



2.1.2.3. Side Views

- **Front-right**

- **Rear-left**

2.2. Driver Installation Notes

The computer supports the operating systems of Windows XP, Windows 7 and Linux. For Windows O.S., find the necessary device drivers on the CD that comes with your purchase. For different O.S., the installation of drivers/utilities may vary slightly, but generally they are similar. **Always** follow the sequence below to install the drivers to prevent errors:

Chipset→.NET Framework→VGA→Audio→LAN→ME→USB 3.0

To install AHCI driver, the system's SATA configuration needs to change to AHCI first. See 5.2.4. SATA Configuration on page 81 to know how to change the setting.

This computer supports Intel® Management Engine, a microcontroller embedded in the PCH chipset, which joins the associated firmware to form the architecture of Intel® AMT (Active Management Technology) for a remote management console to connect to a client through the network. Intel® Management Engine is able to work even in the absence of the O.S. (the "out-of-band" capability) To make Intel® ME work correctly on the computer, install the driver included on the CD.

Paths to find various drivers on the CD:

Windows XP

Driver	Path
Chipset	INF\Intel Chipset Software Installation Utility
VGA	Graphic driver\XP\winxp Graphic driver\XP\winxp64
LAN	LAN\XP_WIN7_SERIES\32 LAN\XP_WIN7_SERIES\64
Audio	AUDIO\XP
Intel® Management Engine	ME\ME
.NET Framework	Framework 3.5
AHCI	AHCI\Intel_RST_F6_floppy_Installer_WinXP_ v11.1.0.1006

Windows 7

Driver	Path
Chipset	INF\Intel Chipset Software Installation Utility
VGA	Graphic driver\WIN7\Graphic_win7_64_V8.15.10.2795 Graphic driver\WIN7\Intel HD Graphics Driver - 32 Bit\
LAN	LAN\XP_WIN7_SERIES\32 LAN\XP_WIN7_SERIES\64
Audio	AUDIO\WIN7
USB 3.0	USB 3.0\Intel_USB_3.0_xHC_Driver_ENG_1.0.4.225\Intel(R) USB 3.0 eXtensible Host Controller Driver ENG 1.0.4.225\ Driver_Installer
Intel® Management Engine	ME\ME
.NET Framework	Framework 3.5

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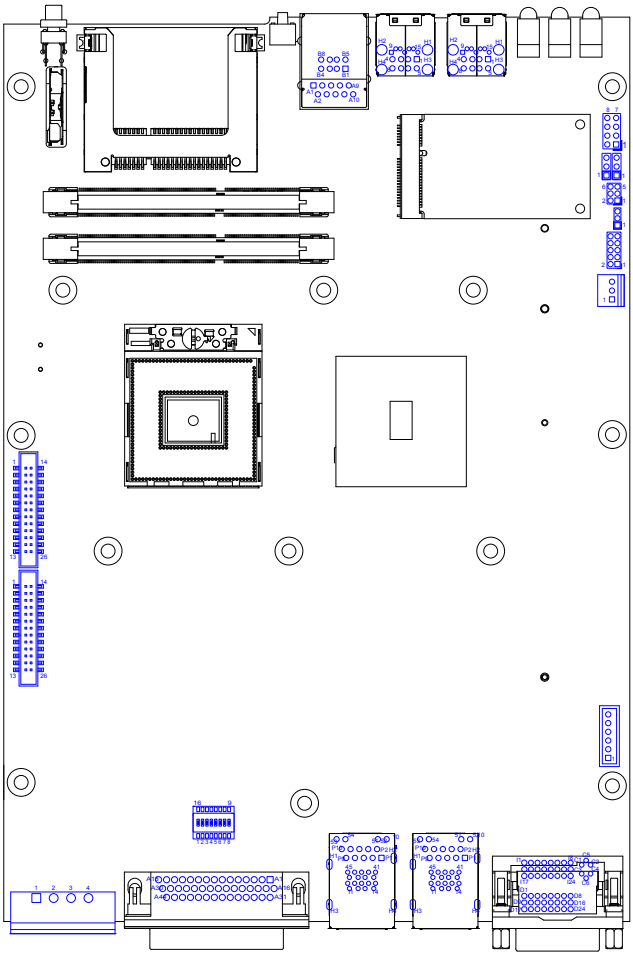
Chapter 3

System Configuration

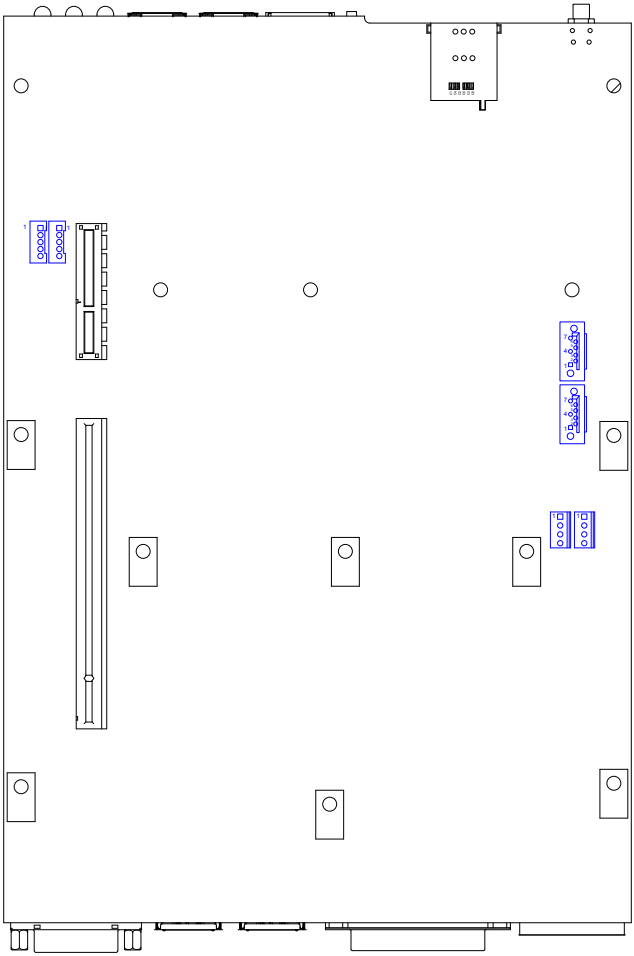
3.1. Board Layout

The main board FMB-i77M1 forms the engine of the computer. This section will give an thorough view of this board.

FMB-i77M1: Board Top



FMB-i77M1: Board Bottom



3.2. Jumpers, Connectors and DIP Switches

The main board FMB-i77M1 comes with some connectors to join cables to other devices and some jumpers and DIP switches to alter hardware configuration. The following in this chapter will explicate each of the components one-by-one.

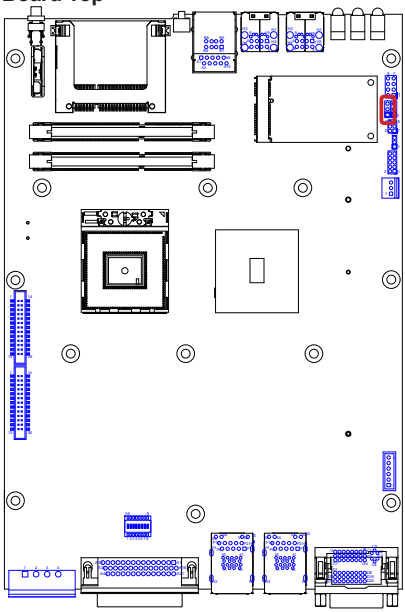
3.2.1. Jumpers

JBAT1

Function: CMOS Setting
Jumper Type: Onboard 2.54mm pitch 1x3-pin header
Setting:

Pin	Function	Setting
1-2	Keeps CMOS (Default)	
2-3	Clears CMOS	

Board Top



JME1

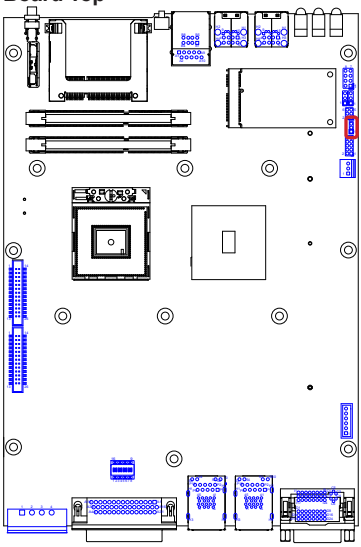
Function: Enables/disables Intel® Management Engine

Jumper Type: Onboard 2.00mm pitch 1x3-pin header

Setting:

Pin	Description	Setting
1-2	Enables ME (default)	
2-3	Disables ME	

Board Top



J1

Function: Controls power supply mode

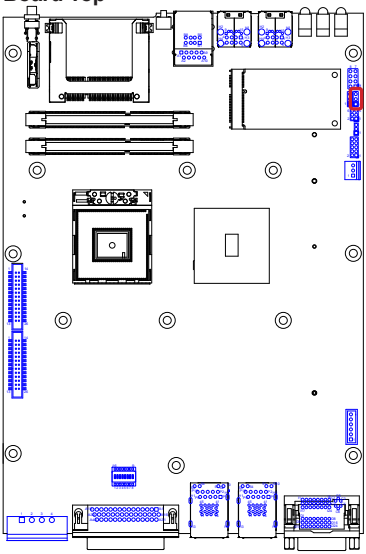
Jumper Type: Onboard 2.54mm pitch 1x3-pin header

Setting:

Pin	Description	Setting
1-2	Sets power supply to AT mode	
2-3	Sets power supply to ATX mode (default)	

- Note this setting should be consistent with **BIOS** | **Advanced** | **ACPI Settings** | **Power-Supply Type** to prevent conflict. See 5.2.1. ACPI Settings on page 78.

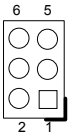
Board Top

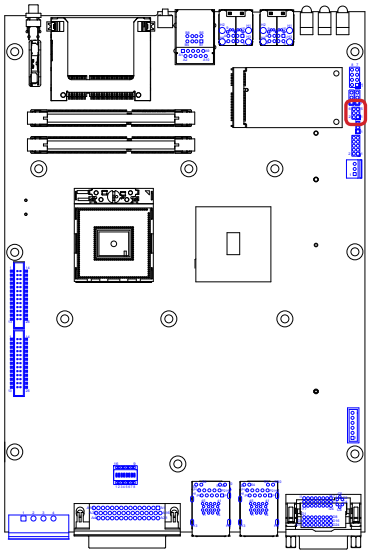


JPIC1

Description: External PIC programming pin header
Jumper Type: Onboard 2.00mm pitch 3x2-pin header

Pin	Description
1	
2	ICSP-CLK
3	ICSP-DAT
4	GND
5	VCC5_PIC
6	MCU_RST

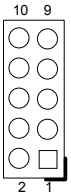


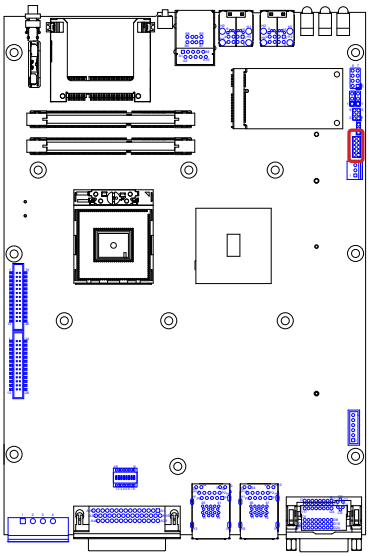


LPCI1

Function: Board debugging
Jumper Type: Onboard 2.00mm pitch 2x5-pin header

Pin	Description
1	PCLK_FWH
2	GND
3	LFRAME#
4	LAD0
5	BUF_ PLTRST_N
6	NC
7	LAD3
8	LAD2
9	3V3S
10	LAD1

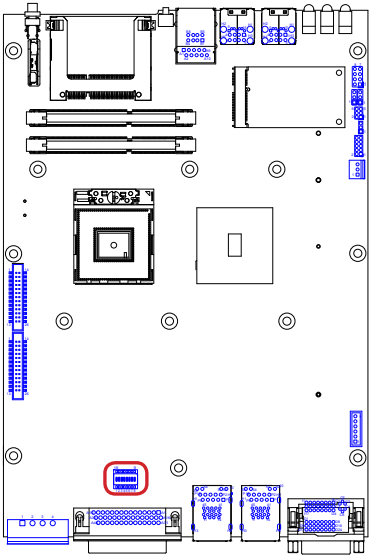




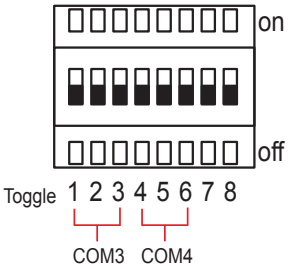
3.2.2. DIP Switch SW9

The computer comes with a DB44 female connector for COM ports 1~4. COM1 and COM2 are fixed to RS232 while COM3 and COM4 can be switched between loopback, RS232, RS485 half-duplex and RS485/RS422 full-duplex. The main board is provided with a 8-toggle (16-pin) DIP switch on the top side to switch COM3 and COM4 among the available protocols

Board Top



Among the toggles: Toggles 1, 2 and 3 control COM3. Toggles 4, 5 and 6 control COM4.



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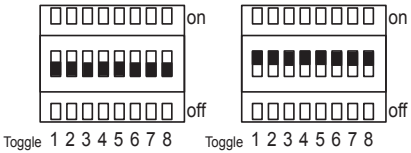
Signal Control

	Low	High
Toggle	**Position**	**Position**
1	off	on
2	off	on
3	off	on
4	off	on
5	off	on
6	off	on
7	off	on
8	off	on



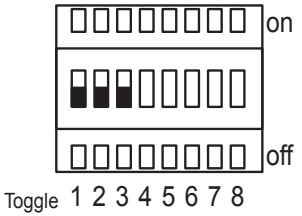
Follow the guide below to switch COM3 and COM4 between loop-back, RS232, RS485 Half-Duplex and RS485/422 Full Duplex.

Note the DIP switch setting here needs to be consistent with **BIOS** | **Advanced** Menu | **F81866 Second Super IO Configuration** | **Serial Port 3 Configuration** and **Serial Port 4 Configuration** to prevent possible conflict. See 5.2.7. F81866 Super IO Configuration on page 84.

- **COM3 Settings**

COM3

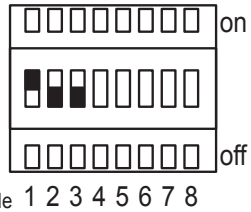
Loop-back

Toggle	Position	Setting
1	off	
2	off	
3	off	
4	not applicable	
5	not applicable	
6	not applicable	
7	not applicable	
8	not applicable	

COM3

RS232

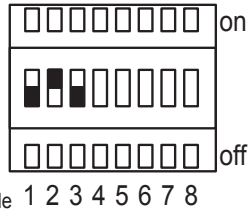
Toggle	Position
1	on
2	off
3	off
4	not applicable
5	not applicable
6	not applicable
7	not applicable
8	not applicable



COM3

RS485 Half-Duplex

Toggle	Position
1	off
2	on
3	off
4	not applicable
5	not applicable
6	not applicable
7	not applicable
8	not applicable

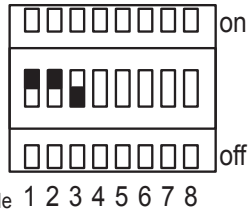


- Note this setting should be consistent with **BIOS** | **Advanced** menu | **F81866 Second Super IO Configuration** | **Serial Port 3 Configuration** to prevent conflict. See Serial Port 3 Configuration on page 85.

COM3

RS485/RS422 Full-Duplex

Toggle	Position
1	on
2	on
3	off
4	not applicable
5	not applicable
6	not applicable
7	not applicable
8	not applicable

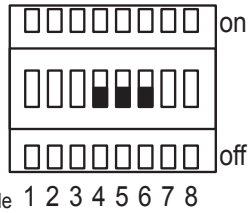


- Note this setting should be consistent with **BIOS** | **Advanced** menu | **F81866 Second Super IO Configuration** | **Serial Port 3 Configuration** to prevent conflict. See Serial Port 3 Configuration on page 85.

- **COM4 Settings**

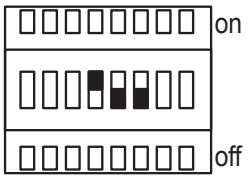
COM4

Loop-back

Toggle	Position	Setting
1	not applicable	
2	not applicable	
3	not applicable	
4	off	
5	off	
6	off	
7	not applicable	
8	not applicable	

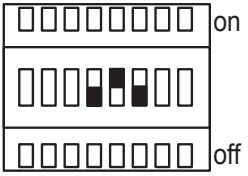
COM4

RS232

Toggle	Position	Setting
1	not applicable	
2	not applicable	
3	not applicable	
4	on	
5	off	
6	off	
7	not applicable	
8	not applicable	

COM4

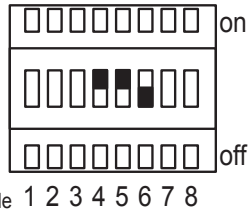
RS485 Half-Duplex

Toggle	Position	Setting
1	not applicable	
2	not applicable	
3	not applicable	
4	off	
5	on	
6	off	
7	not applicable	
8	not applicable	

- Note this setting should be consistent with **BIOS** | **Advanced** menu | **F81866 Second Super IO Configuration** | **Serial Port 4 Configuration** to prevent conflict. See Serial Port 4 Configuration on page 85.

COM4

RS485/RS422 Full-Duplex

Toggle	Position	Setting
1	not applicable	
2	not applicable	
3	not applicable	
4	on	
5	on	
6	off	
7	not applicable	
8	not applicable	

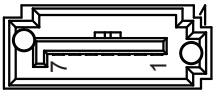
- Note this setting should be consistent with **BIOS** | **Advanced** menu | **F81866 Second Super IO Configuration** | **Serial Port 4 Configuration** to prevent conflict. See Serial Port 4 Configuration on page 85.

3.2.3. Connectors

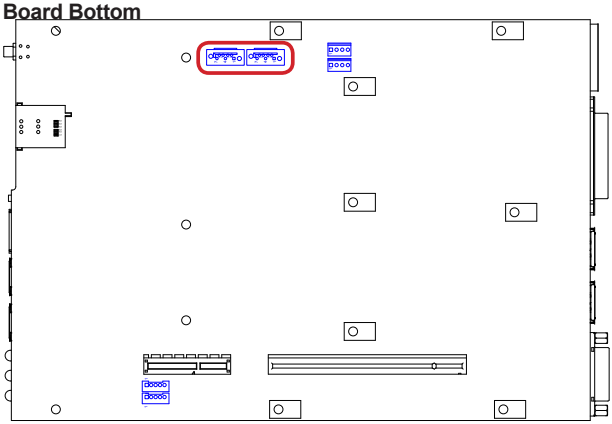
SATA1 & SATA2

Description: Serial ATA connectors for storage devices
Connector Type: 7-pin Serial ATA connector

Pin	Description
1	GND
2	TX+
3	TX-
4	GND
5	RX-
6	RX+
7	GND



Board Bottom



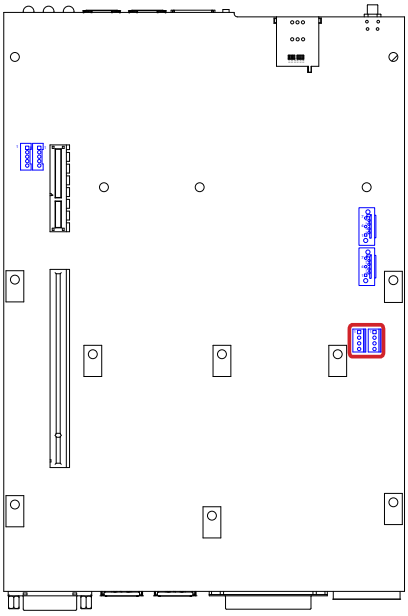
PWROUT1 and **PWROUT2**

Description: Power connectors for SATA storage devices

Connector Type: 2.54mm-pitch 1x4-pin DIP-type connector

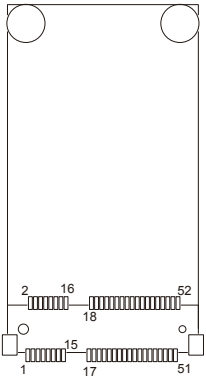
Pin	Desc.
1	VCC5
2	GND
3	GND
4	+12V

Board Bottom



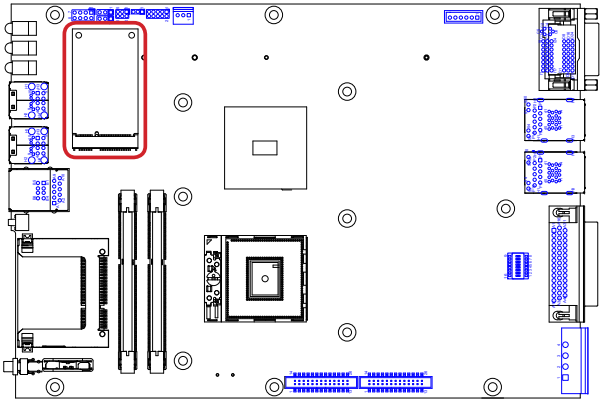
MC1

Description: PCI Express MiniCard socket
Connector Type: Onboard 0.8mm pitch 52-pin edge card connector



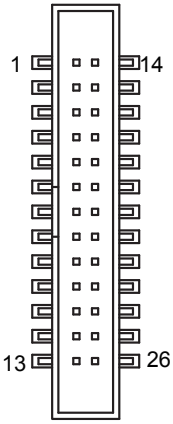
Pin	Desc.	Pin	Desc.	Pin	Desc.
1	Wake	20	W_Disable#	36	USB_D-
2	+3.3V	21	GND	37	GND
3	COEX1	22	PERST#	38	USB_D+
4	GND	23	PERn0	39	+3.3V
5	COEX2	24	+3.3V	40	GND
6	+1.5V	25	PERp0	41	+3.3V
7	CLKREQ#	26	GND	42	LED_WWAN#
8	UIM_PWR	27	GND	43	GND
9	GND	28	+1.5V	44	LED_WLAN#
10	UIM_DATA	29	GND	45	Reserved
11	REFCLK-	30	SMB_CLK	46	LED_WPAN#
12	UIM_CLK	31	PETn0	47	Reserved
13	REFCLK+	32	SMB_DATA	48	+1.5V
14	UIM_RESET	33	PETp0	49	Reserved
15	GND	34	GND	50	GND
16	UIM_VPP	35	GND	51	Reserved
17	UIM_C8/Reserved			52	+3.3V
18	GND				
19	UIM_C4/Reserved				

Board Top



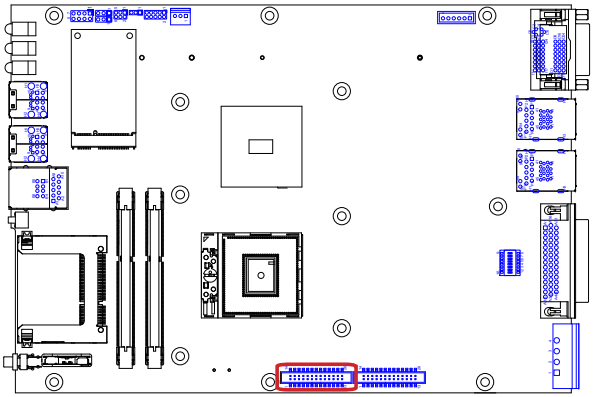
DIO1

Description: Digital I/O connector
Connector Type: Onboard 2.00mm pitch 2x13-pin box header

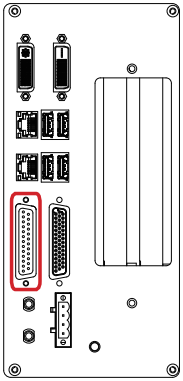


Pin	Desc.	Pin	Desc.
1	DIO0	14	DIO1
2	DIO2	15	DIO3
3	DIO4	16	DIO5
4	DIO6	17	DIO7
5	DIO8	18	DIO9
6	DIO10	19	DIO11
7	DIO12	20	DIO13
8	DIO14	21	DIO15
9	VCC5	22	GND
10	VCC5	23	GND
11	N/C	24	N/C
12	N/C	25	N/C
13	N/C	26	N/C

Board Top

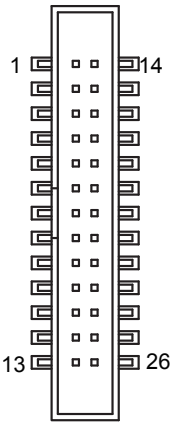


Rear Panel



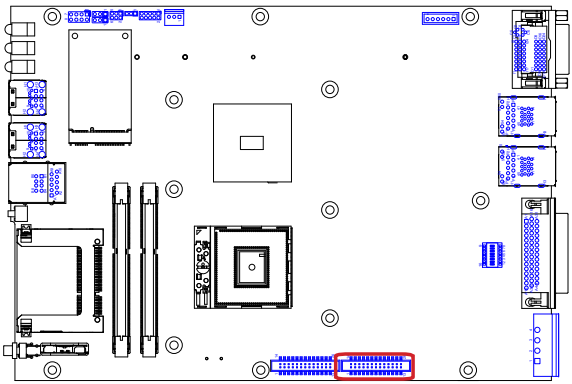
LPT1

Description: Printer/parallel port connector
Connector Type: Onboard 2.00mm pitch 2x13-pin box header

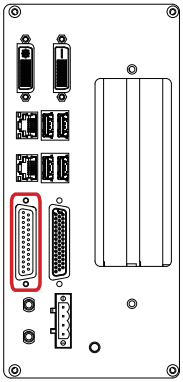


Pin	Desc.	Pin	Desc.
1	XP_STB#	14	P_AFD#
2	XP_D0	15	P_ERR#
3	XP_D1	16	P_INIT#
4	XP_D2	17	P_SLIN#
5	XP_D3	18	GND
6	XP_D4	19	GND
7	XP_D5	20	GND
8	XP_D6	21	GND
9	XP_D7	22	GND
10	P_ACK#	23	GND
11	P_BUSY	24	GND
12	P_PE	25	GND
13	P_SLCT	26	N/C

Board Top



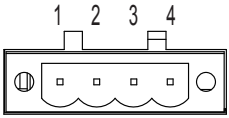
Rear Panel



PWRIN1

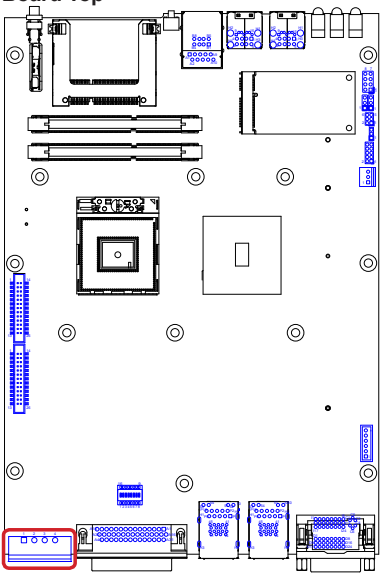
Description: DC-in power receptacle

Connector Type: 5.00mm-pitch 4-pole Euro-Type terminal block

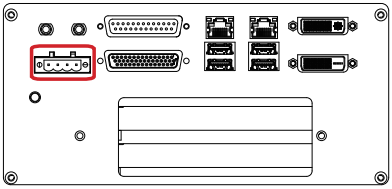


Pin	Desc.
1	PWRINV+
2	PWRINV-
3	G-GND
4	PWR_IN_SW#

Board Top



Rear Panel



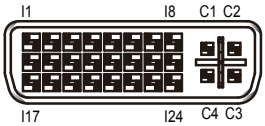
DVI Connectors

The computer features two DVI (digital visual interface) ports, supporting both DVI-I (digital and analog) and DVI-D (analog only).

- **DVI-I**

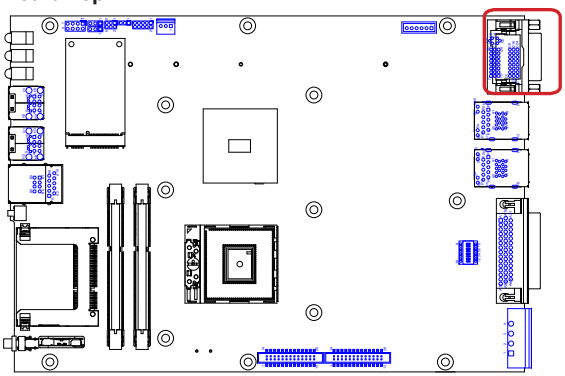
Description: DVI-I port (digital and analog)

Connector Type: 29-pin DIP-type female connector

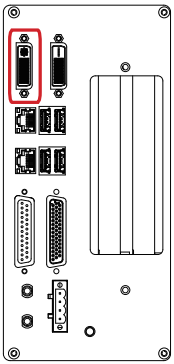


Pin	Desc.	Pin	Desc.	Pin	Desc.
1	T.M.D.S DATA 2-	11	T.M.D.S DATA 1/3 SHIELD	21	T.M.D.S DATA 5+
2	T.M.D.S DATA 2+	12	T.M.D.S DATA 3-	22	T.M.D.S CLOCK SHIELD
3	T.M.D.S DATA 2/4 SHIELD	13	T.M.D.S DATA 3+	23	T.M.D.S CLOCK+
4	T.M.D.S DATA 4-	14	+5V Power	24	T.M.D.S CLOCK-
5	T.M.D.S DATA 4+	15	GND	C1	ANALOG RED
6	DDC CLOCK	16	HOT PLUG DETECT	C2	ANALOG GREEN
7	DDC DATA	17	T.M.D.S DATA 0-	C3	ANALOG BLUE
8	ANALOG VERT. SYNC	18	T.M.D.S DATA 0+	C4	ANALOG HORZ SYNC
9	T.M.D.S DATA 1-	19	T.M.D.S DATA 0/5 SHIELD	C5	ANALOG GROUND
10	T.M.D.S DATA 1+	20	T.M.D.S DATA 5-		

Board Top



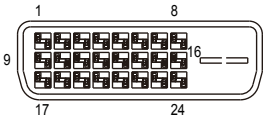
Rear Panel



- **DVI-D**

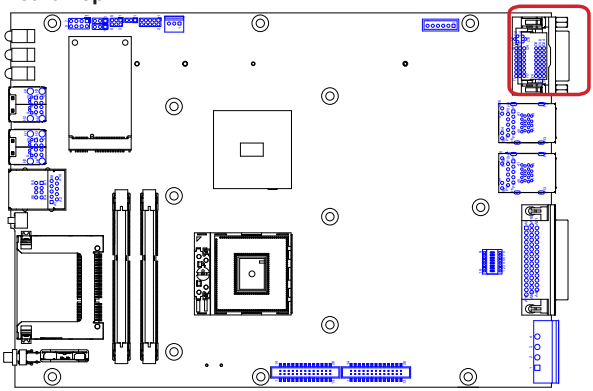
Description: DVI-D port (analog only)

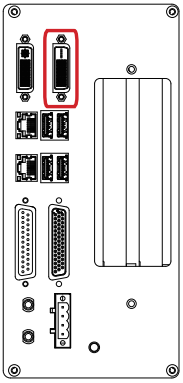
Connector Type: 24-pin DIP-type female connector



Pin	Desc.	Pin	Desc.	Pin	Desc.
1	T.M.D.S DATA 2-	11	T.M.D.S DATA 1/3 SHIELD	21	T.M.D.S DATA 5+
2	T.M.D.S DATA 2+	12	T.M.D.S DATA 3-	22	T.M.D.S CLOCK SHIELD
3	T.M.D.S DATA 2/4 SHIELD	13	T.M.D.S DATA 3+	23	T.M.D.S CLOCK+
4	T.M.D.S DATA 4-	14	+5V Power	24	T.M.D.S CLOCK-
5	T.M.D.S DATA 4+	15	GND	C1	NC
6	DDC CLOCK	16	HOT PLUG DETECT	C2	NC
7	DDC DATA	17	T.M.D.S DATA 0-	C3	NC
8	ANALOG VERT. SYNC	18	T.M.D.S DATA 0+	C4	NC
9	T.M.D.S DATA 1-	19	T.M.D.S DATA 0/5 SHIELD	C5	NC
10	T.M.D.S DATA 1+	20	T.M.D.S DATA 5-		

Board Top **Rear Panel**

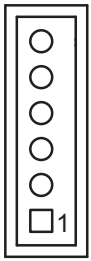




Audio1

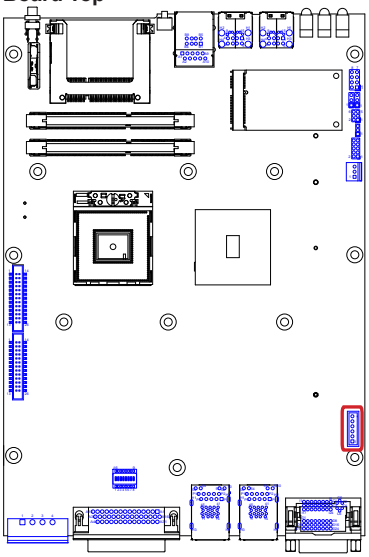
Description: Audio connector

Connector Type: 2.54mm-pitch 4-wall 1x6-pin wafer connector

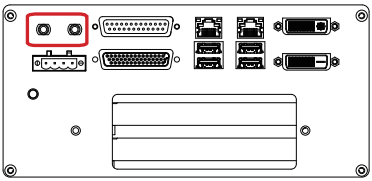


Pin	Desc.
1	MICL
2	MICR
3	MIC GND
4	Speaker(Lout)-L
5	Speaker(Lout)-R
6	Speaker GND

Board Top



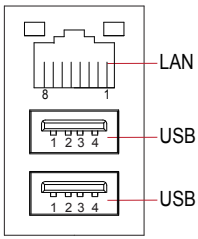
Rear Panel



LAN1

Description: One Ethernet port over double-stacked USB 2.0 ports

Connector Type: One 8P8C RJ45 connector w/ two type-A USB connectors



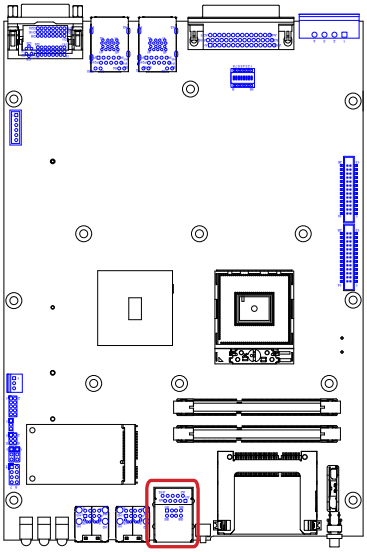
LAN (RJ-45)

Pin	Desc.	Pin	Desc.
1	MDI0+	5	MDI2+
2	MDI0-	6	MDI2-
3	MDI1+	7	MDI3+
4	MDI1-	8	MDI3-

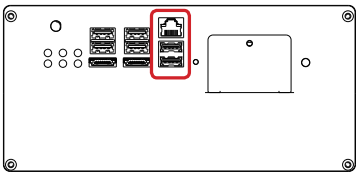
USB (Type-A)

Pin	Desc.
1	+5V
2	USB-
3	USB+
4	GND

Board Top



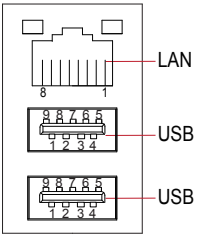
Front Panel



LAN2 and **LAN3**

Description: One Ethernet port over double-stacked USB 3.0/2.0 ports

Connector Type: One 8P8C RJ45 connector w/ two SuperSpeed type-A USB 3.0/2.0 connectors



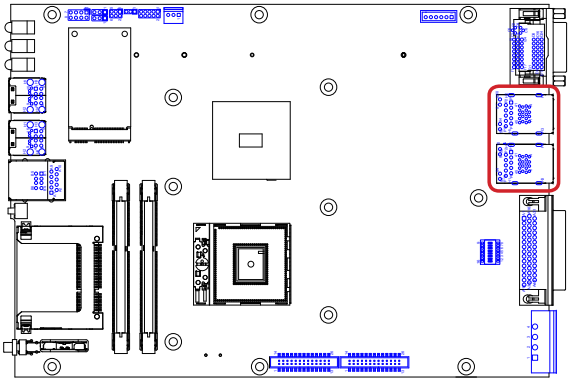
LAN (RJ-45)

Pin	Desc.	Pin	Desc.
1	MDI0+	5	MDI2+
2	MDI0-	6	MDI2-
3	MDI1+	7	MDI3+
4	MDI1-	8	MDI3-

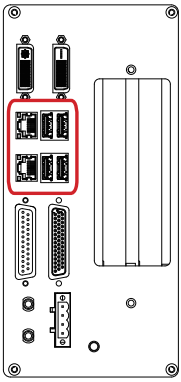
USB (Type-A)

Pin	Desc.
1	VBUS
2	D-
3	D+
4	GND
5	StdA_SSRX-
6	StdA_SSRX+
7	GND
8	StdA_SSTX-
9	StdA_SSTX+

Board Top

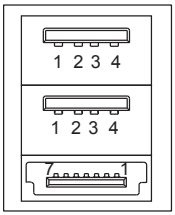


Rear Panel



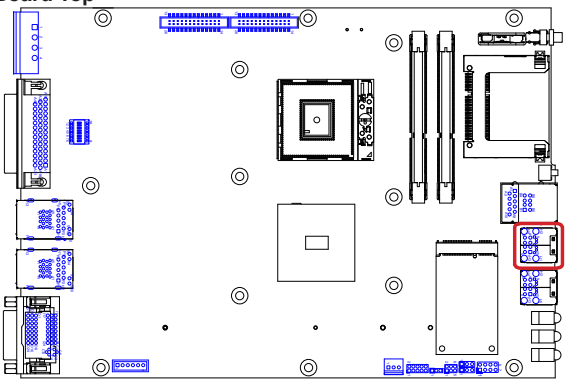
USB2

Description: Double-stacked USB 2.0 ports over one eSATA port

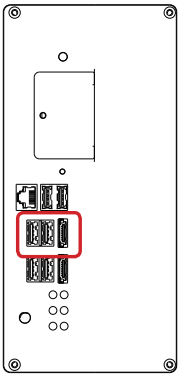


Pin	Desc.	Pin	Desc.
1	USB01_VCC	5	USB01_VCC
2	USBP_10N_CON	6	USBP_11N_CON
3	USBP_10P_CON	7	USBP_11P_CON
4	USB_GND	8	USB_GND
H1	USB_GND	H3	USB_GND
H2	USB_GND	H4	USB_GND
9	USB_GND	10	SATA_TXP4
11	SATA_TXN4	12	USB_GND
13	SATA_RXN4	14	SATA_RXP4
15	USB_GND		

Board Top

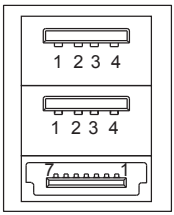


Front Panel



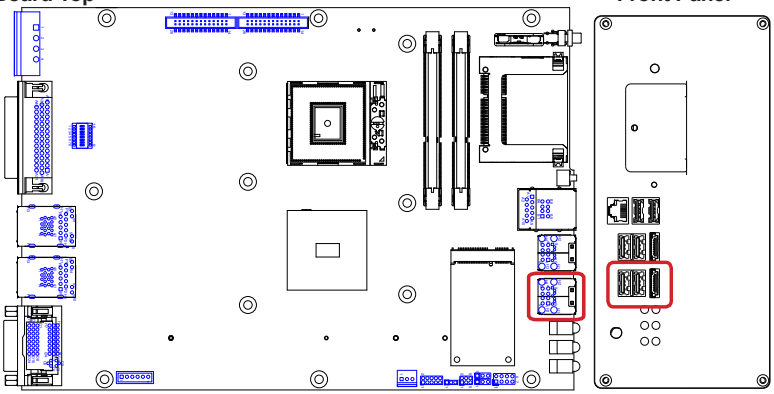
USB3

Description: Double-stacked USB 2.0 ports over one eSATA port



Pin	Desc.	Pin	Desc.
1	USB23_VCC	5	USB23_VCC
2	USBP_12N_CON	6	USBP_13N_CON
3	USBP_12P_CON	7	USBP_13P_CON
4	USB_GND	8	USB_GND
H1	USB_GND	H3	USB_GND
H2	USB_GND	H4	USB_GND
9	USB_GND	10	SATA_TXP5
11	SATA_TXN5	12	USB_GND
13	SATA_RXN5	14	SATA_RXP5
15	USB_GND		

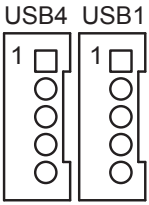
Board Top **Front Panel**



USB1 and USB4

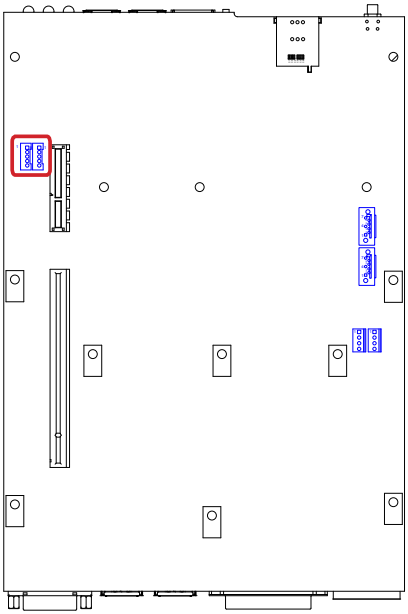
Description: Connectors for the internal USB ports (Configure-to-Order)

Connector Type: Type A female USB 2.0 ports compatible



USB1		USB4	
Pin	**Desc.**	**Pin**	**Desc.**
1	5V	1	5V
2	USBP_4N_CON	2	USBP_5N_CON
3	USBP_4P_CON	3	USBP_5P_CON
4	GND	4	GND
5	GND	5	GND

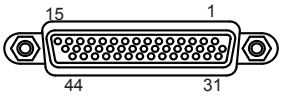
Board Bottom



CN1:

Description: COM1~4
(COM1/2 are RS232; COM3/4 are RS232/422/485 selectable)

Connector type: DB44 female connector

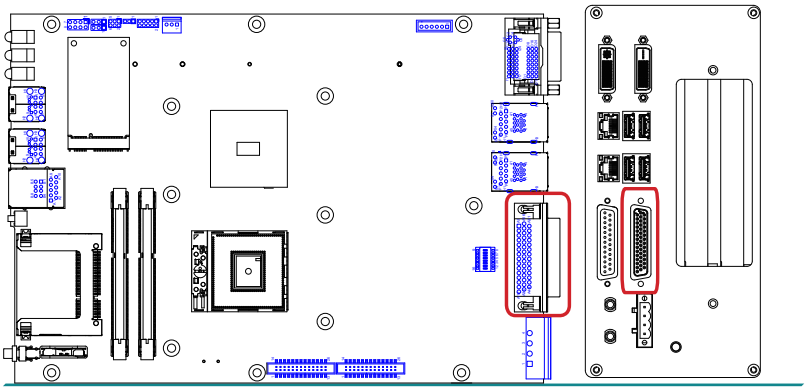


	Pin	Desc.	Pin	Desc.		Pin	Desc.	Pin	Desc.
COM1 (RS-232)	A1	DCD	A2	RXD	COM2 (RS-232)	A11	DCD	A12	RXD
	A3	TXD	A4	DTR		A13	TXD	A14	DTR
	A5	GND2	A6	DSR		A15	GND2	A16	DSR
	A7	RTS	A8	CST		A17	RTS	A18	CTS
	A9	RI	A10	GND1		A19	RI	A20	GND1

	Pin	RS232 Desc.	RS422 Desc.	RS485 Desc.		Pin	RS232 Desc.	RS422 Desc.	RS485 Desc.
COM3 (RS-232 RS-422/ RS-485 selectable)	A21	DCD	RX-	L-	COM4 (RS-232 RS-422/ RS-485 selectable)	A31	DCD	RX-	L-
	A22	RXD	RX+	L+		A32	RXD	RX+	L+
	A23	TXD	TX+			A33	TXD	TX+	
	A24	DTR	TX-			A34	DTR	TX-	
	A25	GND2				A35	GND2		
	A26	DSR				A36	DSR		
	A27	RTS				A37	RTS		
	A28	CTS				A38	CTS		
	A29	RI				A39	RI		
	A30	GND1				A40	GND1		

	Pin	Desc.	Pin	Desc.
N/C	A41	N/C	A42	N/C
	A43	N/C	A44	N/C

Board Top **Rear Panel**



Chapter 4

Installation and Maintenance

4.1. Install Hardware

The computer is constructed based on modular design to make it easy for users to add hardware or to maintain the computer. The following sections will guide you to the simple hardware installations for the computer.

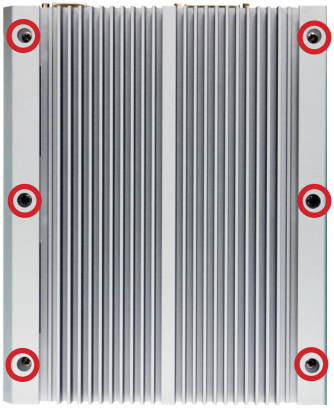
4.1.1. Open the Computer

For the computer, removing the top and bottom covers is essential to open the computer and access the inside. Follow through the steps below to remove the top cover and bottom cover from the computer.

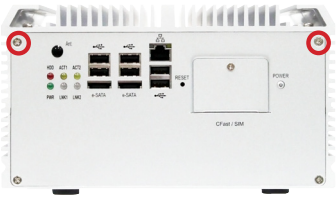
4.1.1.1. Remove Top Cover

All jumpers, MiniCard socket, SDRAM SO-DIMM slots, DIO port and PIO port (printer port) are built on the top side of the main board. To access these components, the computer's top cover has to go. Follow through the steps below to remove the top cover.

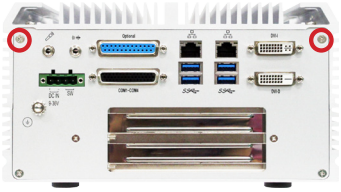
1. Place the computer on a flat surface. Loosen and remove the 6 screws as marked in the illustration below.



2. From the front panel, loosen and remove the 2 screws as marked in the illustrations below. (And make sure the CF Card door is closed.)



3. From the rear panel, loosen and remove the 2 screws as marked in the illustrations below.



4. After the said screws are removed, proceed to dismount the top cover. Carefully pry at the joint of the top cover and bottom cover, which locates at about one third of the computer's height. Then completely part the top cover from the computer.

The inside of the computer comes to view.

- To adjust jumpers or connect/disconnect cables to/from the main board, see 3.2. Jumpers, Connectors and DIP Switches on page 18.
- To install memory modules, see 4.1.2. Install/uninstall Memory Modules on page 49 or 4.1.3. Install Memory Module with Heat Spreaders on page 51.
- To install MiniCard-based wireless modules, see 4.1.4. Install MiniCards on page 57.

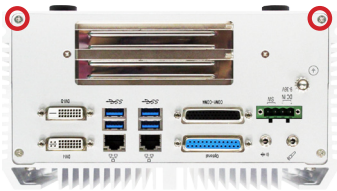
4.1.1.2. Remove Bottom Cover

The Serial ATA connectors, the power connectors for SATA storage devices, and the internal USB ports (configure-to-order), PCI and PCIe connectors are all built on the bottom side of the maind board. To access these connectors, the computer's bottom cover has to go. Follow through the steps below to remove the bottom cover from the computer.

1. Place the computer on a flat surface, with the bottom side facing up. Loosen and remove the 2 screws as marked in the illustration below.

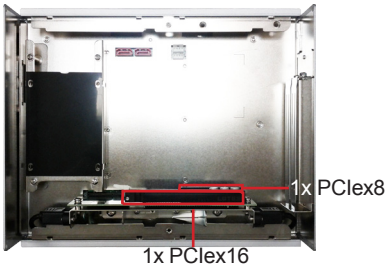
2. From the front panel, loosen and remove the 2 screws as marked in the illustrations below.

3. From the rear panel, loosen and remove the 2 screws as marked in the illustrations below.



4. After the said screws are removed, proceed to dismount the bottom cover. Carefully pry at the joint of the bottom cover and top cover, which locates at about two third of the computer's height. Then completely part the bottom cover from the computer.

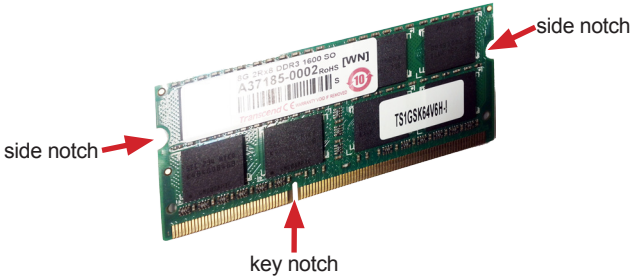
The inside of the computer comes to view.



- To install internal USB drives, see 4.1.5. Install Internal USB Drives on page 60.
- To install SATA storage devices, see 4.1.6. Install SATA Storage Devices on page 61.
- To install PCI/PCIe cards, see 4.1.7. Install PCI Express Cards on page 64.

4.1.2. Install/uninstall Memory Modules

The main board has two dual inline memory module (DIMM) sockets. Increase memory capacity to make programs run faster on the system. The memory module for the computer's SO-DIMM sockets should be a 204-pin DDR3 with a “key notch” off the centre among the pins, which enables the memory module for particular applications. There are another two notches at each left and right side of the memory module to help fix the module in the socket.



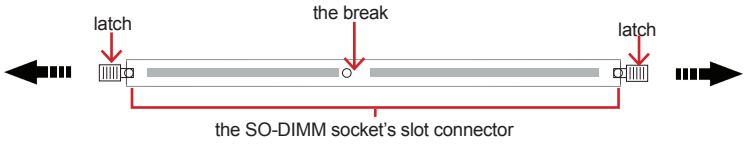
To install a DDR3 memory module:

1. Remove the top cover from the computer as described in 4.1.1.1. Remove Top Cover on page 44.

2. Find the SO-DIMM sockets on the board as marked in the illustration below.

The SO-DIMM sockets are vertical type, and each socket has two latches for fixing the memory modules. The memory module can only be installed by one direction due to the key notch.

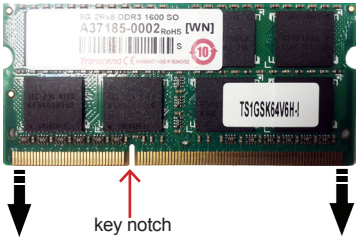
3. Pull back both latches from the socket.



vertical-type SO-DIMM socket (overview)

4. Confront the memory module's edge connector side at the SO-DIMM socket. Position the memory module at the SO-DIMM socket, with the memory module's key notch aligned at the break of the SO-DIMM's slot connector.

5. Vertically plug the memory module to the DIMM socket. "Fully" plug the memory module until both latches auto-lock the memeory module in place.



6. Restore the top cover to the computer.

To uninstall a DDR3 memory module:

1. Pull back both latches from the SO-DIMM socket.

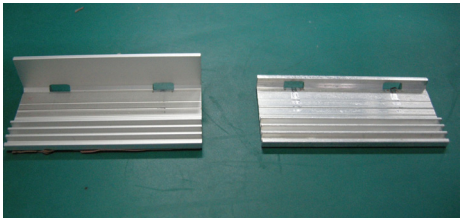
   The DDR3 memory module will be auto-released from the socket.

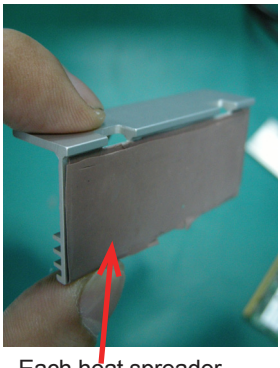
2. Remove the memory module.

3. Restore the top cover to the computer.

4.1.3. Install Memory Module with Heat Spreaders

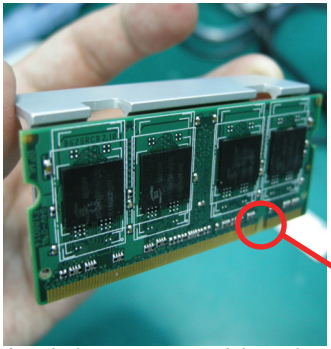
1. Have the heat spreaders. One has the bigger fin and the other has the smaller fin.





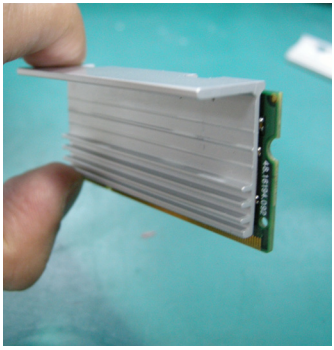
Each heat spreader comes with a thermal pad.

2. Attach the memory module to the thermal pad side of the heat spreader with bigger fin. See the picture below.



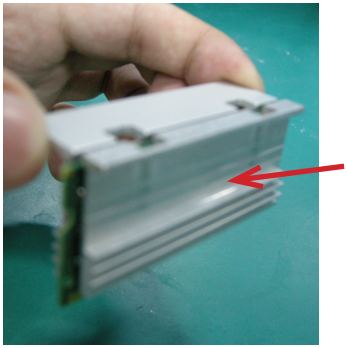
The connector break on the 204-pin memory module

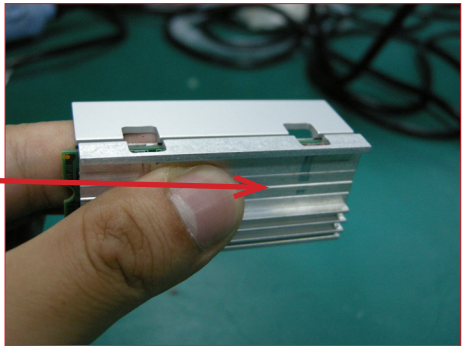
Attach the memory module to the thermal pad

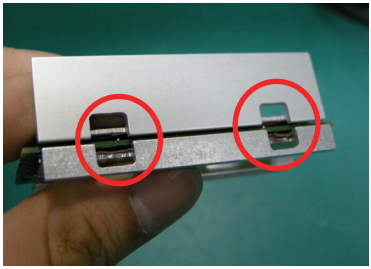


View from the other side..

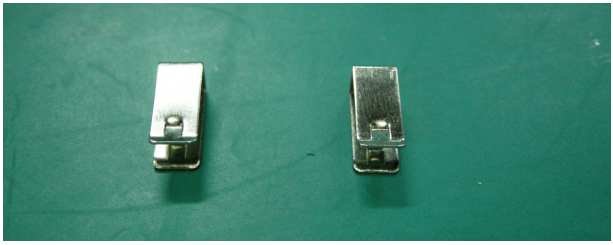
3. Attach the other heat spreader to the other side of the memory module so the two heat spreaders sandwich the memory module. Be sure to align the two heat spreaders properly so as to form the two clip holes.

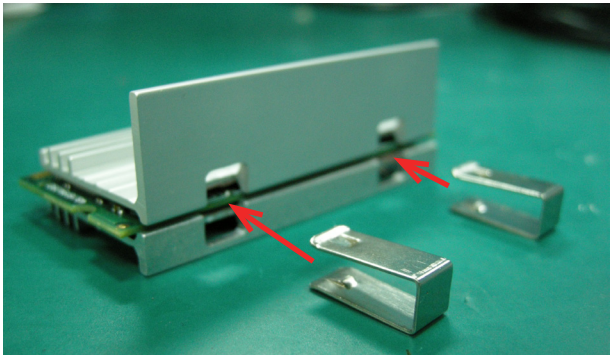


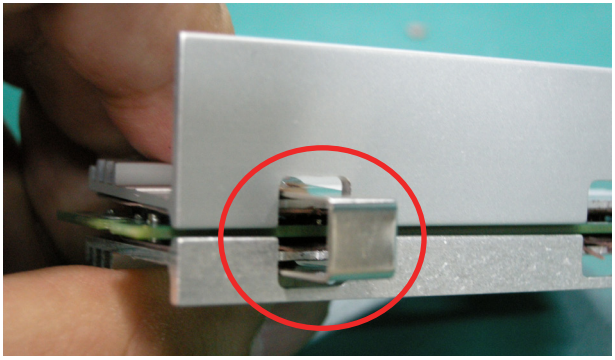




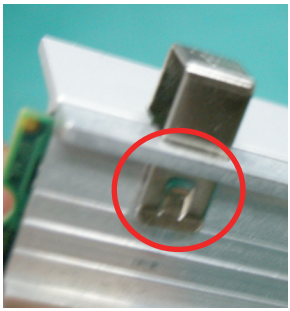
4. Have the two metal clips. Use them to hold the heat spreaders and the memory module together.

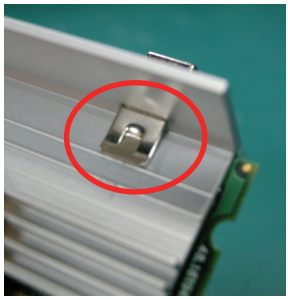




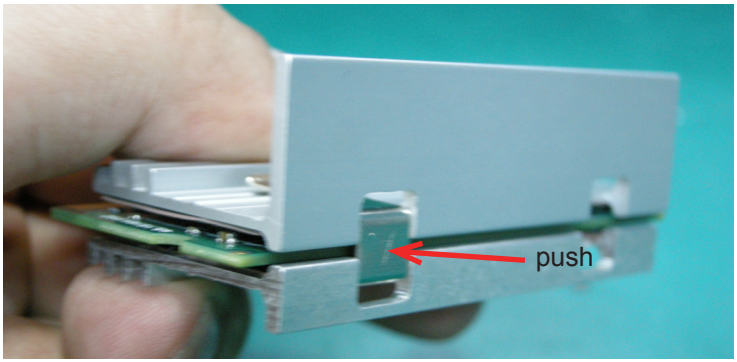


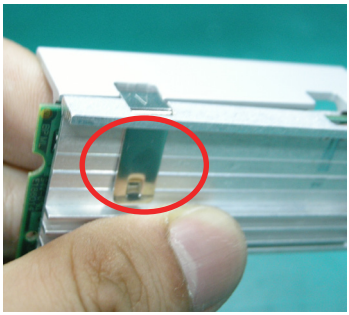
Make sure the heat spreaders are clipped exactly as shown in the pictures below.

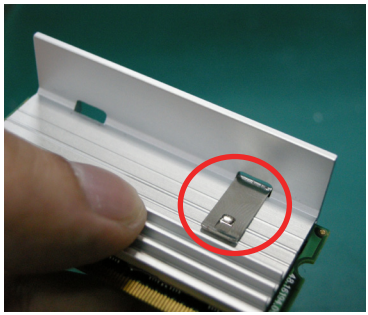




5. Fully push the clips until they cannot be pushed any more. See the pictures below.







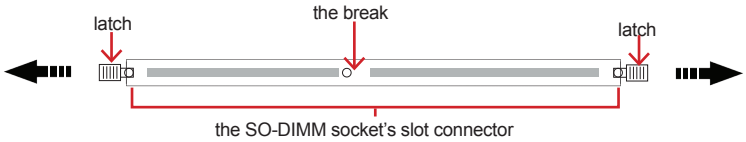
Note: The above mentioned demonstrated one clip only. When you install the memory module with heat spreaders, be sure to use both clips.

6. Remove the top cover from the computer as described in 4.1.1.1. Remove Top Cover on page 44.

7. Find the SO-DIMM sockets on the board as marked in the illustration below.

The SO-DIMM sockets are vertical type, and each socket has two latches to fix the memory modules. The memory module can only be installed by one direction due to the key notch.

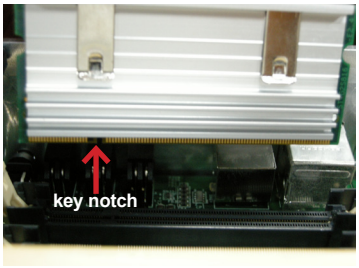
8. Pull back both latches from the socket.



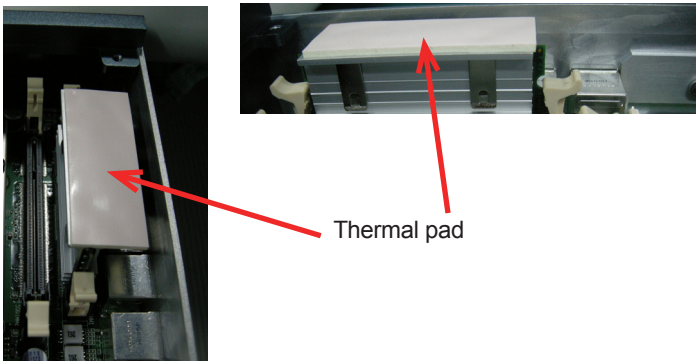
vertical-type SO-DIMM socket (overview)

9. Confront the memory module's edge connector side at the SO-DIMM socket. Position the memory module at the SO-DIMM socket, with the memory module's key notch aligned at the break of the SO-DIMM's slot connector.

10. Vertically plug the memory module to the DIMM socket. “Fully” plug the memory module until both latches auto-lock the memory module in place.



11. Attach another thermal pad onto the top of the heat spreaders.



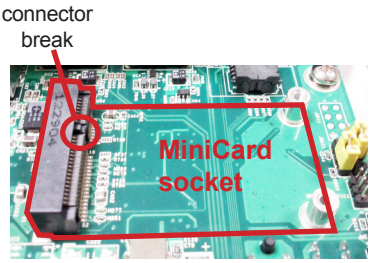
12. Restore the top cover to the computer.

4.1.4. Install MiniCards

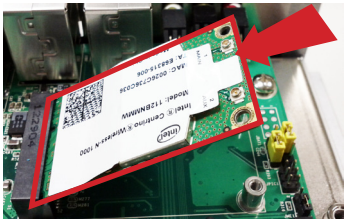
1. Remove the top cover from the computer as described in 4.1.1.1. Remove Top Cover on page 44

2. Find the MiniCard socket on the board as marked in the illustration below.

The MiniCard socket's connector has a break.

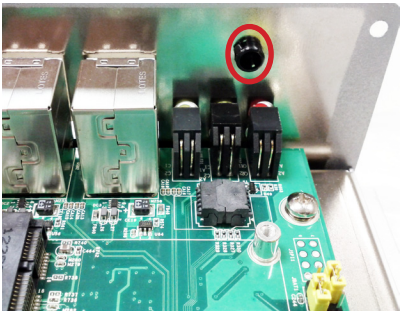


3. Plug a wireless module to the socket's connector by a slanted angle. Note the notch on the wireless module should meet the break of the connector.



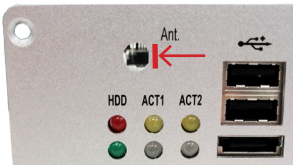
4. Press down the module and fix it in place using two screws.

5. Remove the plastic plug from the enclosure's front panel to make an antenna hole. Keep the plastic plug for any possible restoration in the future.



6. Have an RF cable. Connect the RF cable to the mini-card socket's "MAIN" connector.

7. Pull the other end of the RF cable, a SMA connector jack, through the antenna hole. Be sure to meet the flat side of the antenna hole so the connector jack won't get stuck.



the flat side of the antenna hole

8. Mount a round washer on the SMA connector jack from outside the chassis, and secure an nut to it.

9. Assemble an antenna to the SMA connector jack. Adjust the antenna to an angle for the best signal.

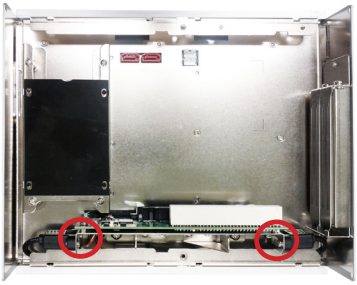
4.1.5. Install Internal USB Drives

Since some critical application programs rely on a USB key to run, an USB drive is necessary to store related encrypted keys and digital certificates. The computer allows building two USB ports inside the chassis to support two USB drives to work therein for reinforced protection against theft or tamper. (Configure-to-Order only)

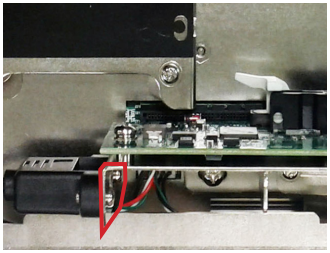
To install the internal USB drive(s):

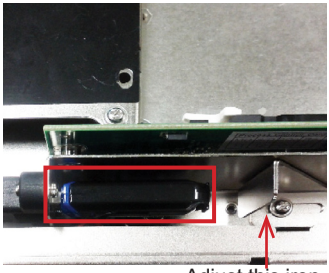
1. Remove the bottom cover from the computer as described in 4.1.1.2. Remove Bottom Cover on page 47.

2. Find the two USB ports inside the computer as marked in the picture below.



3. Install an USB drive to one of the internal USB ports.





Adjust this iron to make space for the USB drive installed.

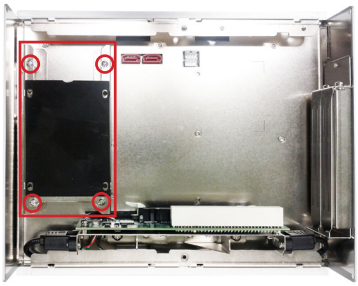
4. Restore the bottom cover to the computer.

4.1.6. Install SATA Storage Devices

The computer allows two 2.5” SATA drives for RAID. The following will gudie you to install two SATA HDD or SSD.

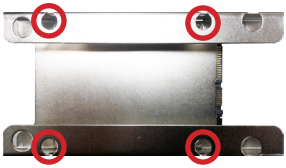
1. Remove the bottom cover from the computer as described in 4.1.1.2. Remove Bottom Cover on page 47.

2. Find the HDD/SSD bracket inside the computer. Loosen and remove the four screws as marked in the picture below. Then dismount the bracket from the computer.

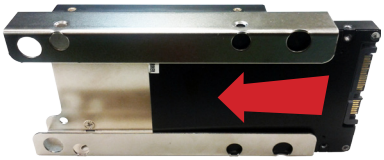


3. Place a SATA storage device on the bracket.

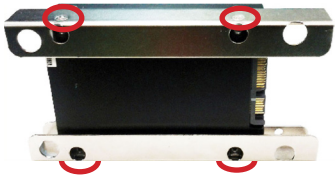
4. Flip them over. Use four screws to fix them together.



5. Slide another HDD/SSD storage device into the bracket.

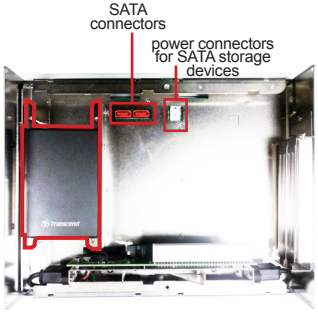


6. Fix another storage device in place by using screws at the four screw holes on both sides of the bracket.

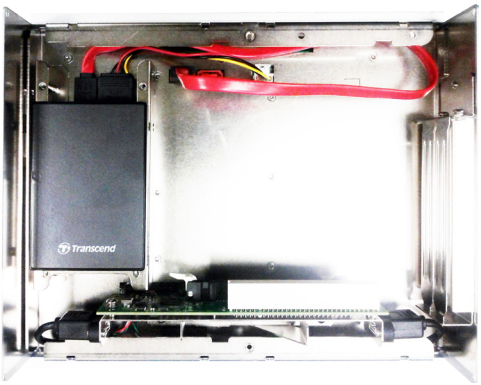


the bracket and two 2.5" SATA storage devices piggybacking.

7. Reinstall the bracket (with the storage devices) to the computer.



8. Connect the SATA signal cable(s) and power cable(s).



9. Restore the bottom cover to the computer.

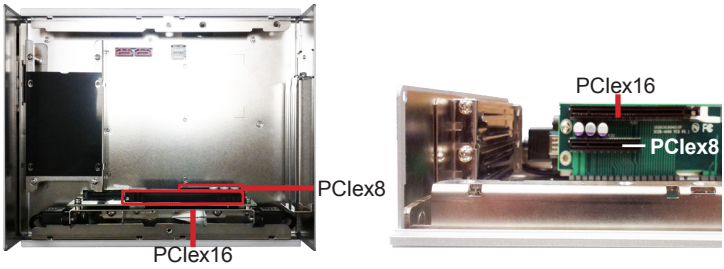
4.1.7. Install PCI Express Cards

For computer buses, the computer features each PCIe x16 slot and PCIe x8 slot. Follow the guide below to install an PCI Express card to the computer.

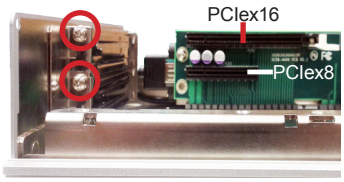
To install a PCI Express card:

1. Remove the bottom cover from the computer as described in 4.1.1.2. Remove Bottom Cover on page 47.

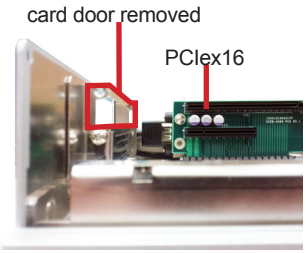
2. Find the PCI Express slots inside the computer.



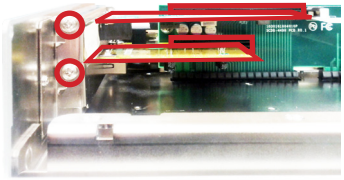
3. Loosen and remove either of the screws as marked in the illustration below depending on which PCI Express slot to use, the PCIex8 or PCIex16.



4. After the screw is removed, dismount the card door from the I/O bracket.



5. Plug the PCI Express card to the due slot. Re-fasten the screw to fix the card in place.



6. Restore the bottom cover to the computer.

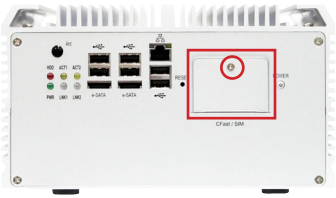
4.1.8. Install/uninstall CFast Card

The computer supports a CFast card for storage and comes with an outside-accessible CFast slot. Follow through the guide below to install a CFast card to the computer.

Note: Be sure to turn off the computer before installing or uninstalling the CF card if the OS is installed on the card.

To install the CFast card:

1. From the front panel of the computer, find the door to the CFast slot. Loosen and remove the screw that locks the door.



2. Once the screw is removed, open the door. The CFast slot then comes to view.

The door is a hinged door. On the inner side of the door, there is a printed graphic to guide users of the direction to insert the CFast card.

3. Position the CFast card at the slot as directed by the graphic printed on the inner side of the door. Push-insert the CFast card.

To uninstall the CFast card:

1. Loosen and remove the card door screw and open the card door.
2. Push-eject the CFast card.
3. Remove the CFast card.
4. Refasten the screw to close the card door.

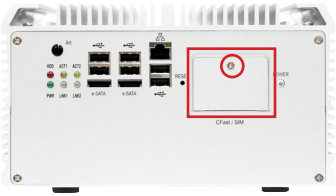
Note to refasten the screw to close the card door each time the CFast card is installed or uninstalled.

4.1.9. Install/uninstall SIM Card

The computer supports a SIM card for mobile networking and comes with an outside-accessible SIM card slot. Follow through the guide below to install a SIM card to the computer.

To install the SIM card:

1. From the front panel of the computer, find the door to the SIM card slot. Loosen and remove the screw that locks the door.



2. Once the screw is removed, open the door. The SIM card slot then comes to view.

The door is a hinged door. On the inner side of the door, there is a printed graphic to guide users of the direction to insert the card.

3. Position the SIM card at the slot as directed by the graphic printed on the inner side of the door. Push-insert the SIM card.

To uninstall the SIM card:

1. Loosen and remove the card door screw and open the card door.
2. Push-eject the SIM card.
3. Remove the SIM card.
4. Refasten the screw to close the card door.

Note to refasten the screw to close the card door each time the SIM card is installed or uninstalled.

4.2. Mount the Computer

Integrate the computer to where it works by mounting it to a wall in the surroundings. Such integration relies on a wall-mount kit, which comes with the computer. Follow through the guide below to assemble the kit to the computer:

1. Place the computer on a flat surface, with the bottom facing up. Find the eight screw holes at its bottom as marked in the red circles in the illustration below:

2. Have the two wall-mount brackets. Use the screws included in the wall-mount kit to assemble the brackets to the computer's bottom by the screw holes on them (as marked in the blue circles in the illustration above).

3. Use the other screw holes and cutouts on both wall-mount brackets to mount the computer to a wall. (See the green circles in the illustration below).

4.3. Ground the Computer

Follow the instructions below to ground the computer to land. Be sure to follow every grounding requirement in your place.

> **Warning** Whenever the unit is installed, the ground connection must always be made first of all and disconnected lastly.

1. See the illustration below. Remove the ground screw from the rear panel.

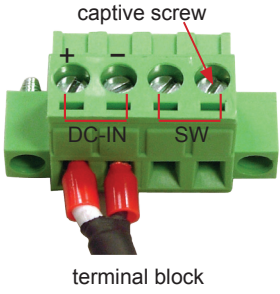
2. Attach a ground wire to the rear panel with the screw.

4.4. Wire DC-in Power Source

> **Warning** Only trained and qualified personnel are allowed to install or replace this equipment.

Follow the instructions below for connecting the computer to a DC-input power source.

1. Before wiring, make sure the power source is disconnected.
2. Find the terminal block in the accessory box.
3. Use the wire-stripping tool to strip a short insulation segment from the output wires of the DC power source.
4. Identify the positive and negative feed positions for the terminal block connection. See the symbols printed on the rear panel indicating the polarities and DC-input power range in voltage.
5. Insert the exposed wires into the terminal block plugs. Only wires with insulation should extend from the terminal block plugs. Note that the polarities between the wires and the terminal block plugs must be positive to positive and negative to negative.
6. Use a slotted screwdriver to tighten the captive screws. Plug the terminal block firmly, which wired, into the receptacle on the rear panel.



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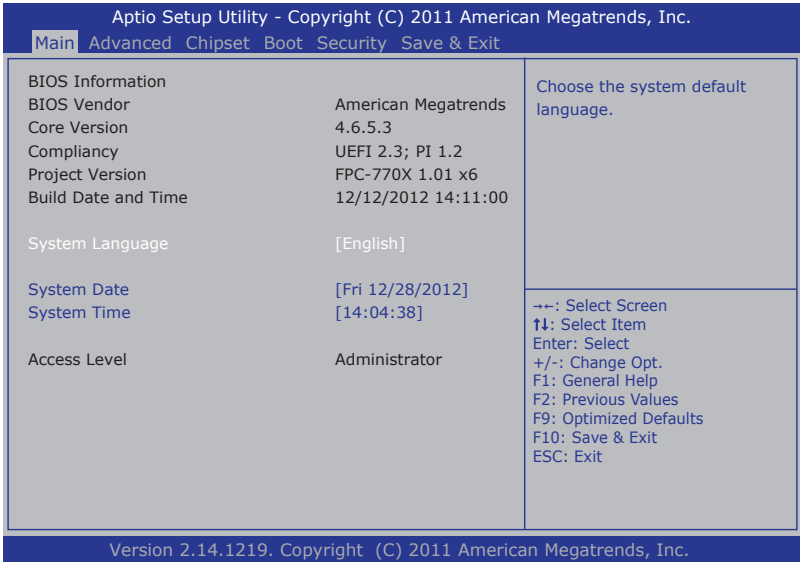
Chapter 5

BIOS

The BIOS Setup utility for the Rigid-772 is featured by American Megatrends Inc to configure the system settings stored in the system's BIOS ROM. The BIOS is activated once the computer powers on. When the computer is off, the battery on the main board supplies power to BIOS RAM.

To enter the BIOS Setup utility, keep hitting the "Delete" key upon powering on the computer.



The featured settings are:

Menu	Description
Main	See 5.1. Main on page 76.
Advanced	See 5.2. Advanced on page 77.
Chipset	See 5.3. Chipset on page 88.
Boot	See 5.4. Boot on page 92.
Security	See 5.5. Security on page 95.
Save & Exit	See 5.6. Save & Exit on page 96.

Key Commands

The BIOS Setup utility relies on a keyboard to receive user's instructions. Hit the following keys to navigate within the utility and use the utility.

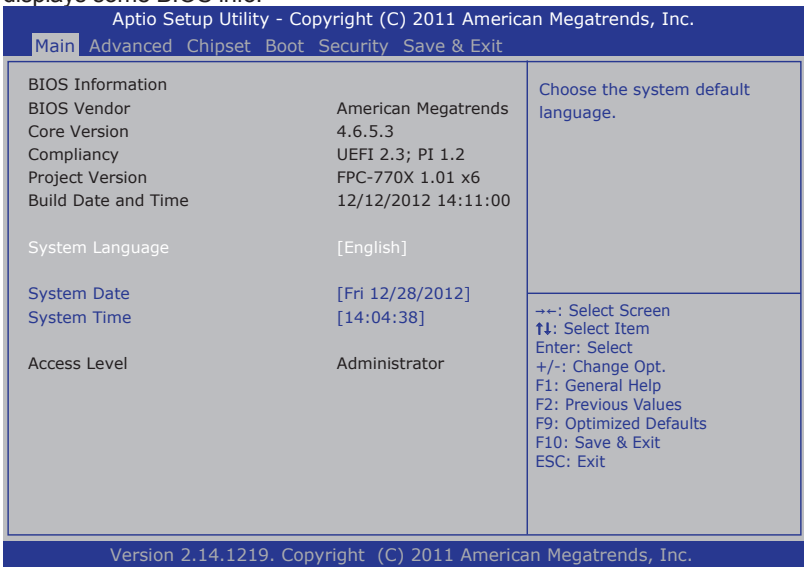
Keystroke	Function
← →	Moves left/right between the top menus.
↓ ↑	Moves up/down between highlight items.
Enter	Selects an highlighted item/field.
Esc	▸ On the top menus: Use **Esc** to quit the utility without saving changes to CMOS. (The screen will prompt a message asking you to select **OK** or **Cancel** to exit discarding changes. ▸ On the submenus: Use **Esc** to quit current screen and return to the top menu.
Page Up / +	Increases current value to the next higher value or switches between available options.
Page Down / -	Decreases current value to the next lower value or switches between available options.
F1	Opens the **Help** of the BIOS Setup utility.
F10	Exits the utility saving the changes that have been made. (The screen then prompts a message asking you to select **OK** or **Cancel** to exit saving changes.)

Note: Pay attention to the "WARNING" that shows at the left pane onscreen when making any change to the BIOS settings.

This BIOS Setup utility is updated from time to time to improve system performance and hence the screenshots hereinafter may not fully comply with what you actually have onscreen.

5.1. Main

The **Main** menu features the settings of **System Date** and **System Time** and displays some BIOS info.



The BIOS info displayed are:

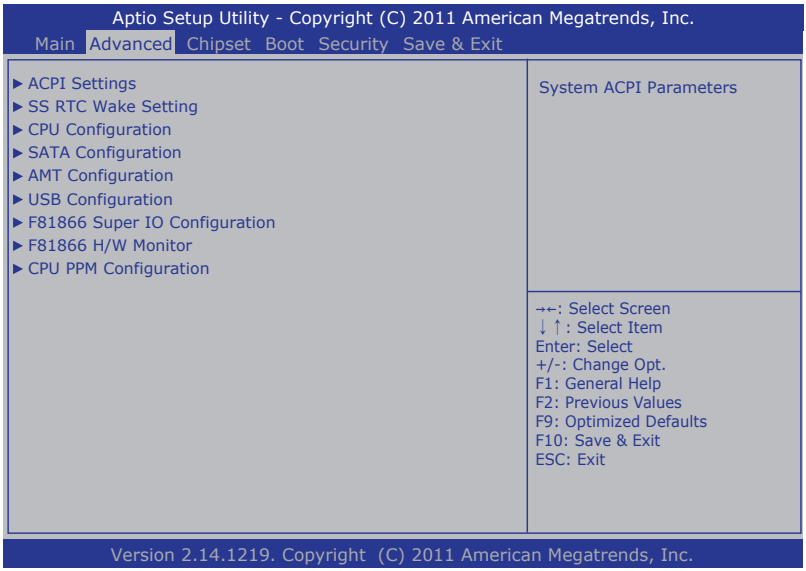
Info	Description
BIOS Vendor	Delivers the provider of the BIOS Setup utility.
Core Version	Delivers the version info of the core.
Compliency	Delivers the UEFI support.
Project Version	Delivers the computer's BIOS version.
Build Date and Time	Delivers the date and time when the BIOS Setup utility was made/updated.
Access Level	Delivers the level that the BIOS is being accessed at the moment.

The featured settings are:

Setting	Description
Language	The system language is set to **English** and cannot be changed.
System Time	Sets system time.
System Date	Sets system date.

5.2. Advanced

Access the **Advanced** menu to manage the computer's system configuration including the Super IO chip, Fintek 81866.



The featured settings and submenus are:

Setting	Description
ACPI Settings	See 5.2.1. ACPI Settings on page 78.
SS RTC Wake Settings	See 5.2.2. SS RTC Wake Settings on page 79.
CPU Configuration	See 5.2.3. CPU Configuration on page 80.
SATA Configuration	See 5.2.4. SATA Configuration on page 81.
AMT Configuration	See 5.2.5. AMT Configuration on page 82.
USB Configuration	See 5.2.6. USB Configuration on page 83.
F81866 Second Super IO Configuration	See 5.2.7. F81866 Super IO Configuration on page 84.
F81866 H/W Monitor	See 5.2.8. F81866 H/W Monitor on page 87.
CPU PPM Configuration	See 5.2.9. CPU PPM Configuration on page 87.

5.2.1. ACPI Settings

The submenu **ACPI Settings** enable users to change the system's ACPI (Advanced Configuration and Power Interface) configuration by the following settings:

Setting	Description
Enable Hibernation	Enables/disables the system to/from hibernation (OS/S4 Sleep State). ▸ This option may not be effective with some OS. ▸ Options available are **Enabled** (default) and **Disabled**.
ACPI Sleep State	Sets the ACPI sleep state for the system to enter when the suspend button is hit. ▸ Options available are **Suspend Disabled**, **S1 only (CPU Stop Clock)** and **S3 only (Suspend to RAM)**. ▸ **S1 only (CPU Stop Clock)** is the default.
Power-Supply Type	Sets the power-supply type. ▸ Options available are **AT** and **ATX** (default). ▸ Note this setting should be consistent with jumper J1 to prevent possible conflict. See 3.2.1. Jumpers on page 18 for J1 jumper setting.

5.2.2. SS RTC Wake Settings

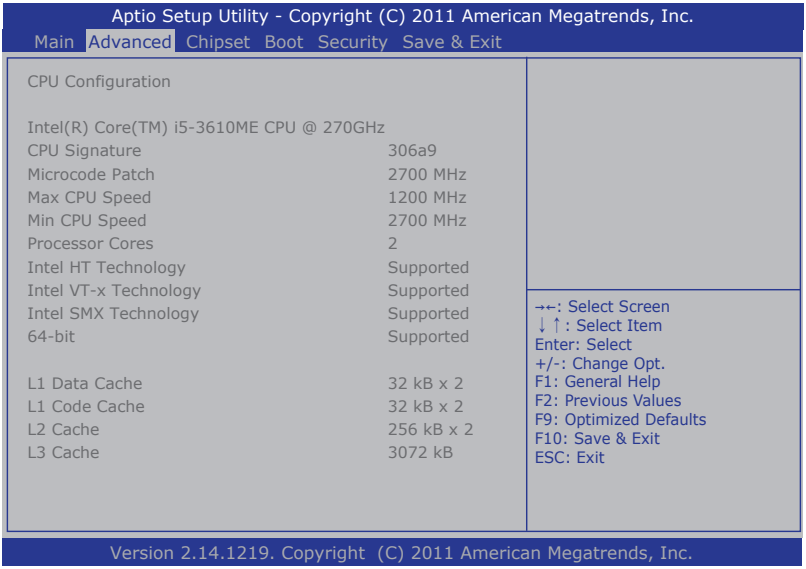
Access this submenu to configure whether and when to awake the system.

The featured settings are:

<table>
<tr><th>Setting</th><th>Description</th></tr>
<tr><td>Wake System with Fixed Time</td><td>Sets if to awake the system at a defined moment.
▸ Options available are Enabled and Disabled (default).
▸ Enable this feature to awake the system at a defined moment in time. When enabled, the following settings become available:
<table>
<tr><th>Setting</th><th>Description</th></tr>
<tr><td>Wake up hour</td><td>Defines the (hour) time to awake the system.
▸ 0 to 23 configurable.</td></tr>
<tr><td>Wake up minute</td><td>Defines the (minute) time to awake the system.
▸ 0 to 59 configurable.</td></tr>
<tr><td>Wake up second</td><td>Defines the (second) time to awake the system.
▸ 0 to 59 configurable.</td></tr>
</table></td></tr>
<tr><td>Wake System with Dynamic TIme</td><td>Sets if to awake the system some time in the future.
▸ Options available are Enabled and Disabled (default).
▸ Enable this feature to awake the system some time from now. When enabled, the following setting becomes available:
<table>
<tr><th>Setting</th><th>Description</th></tr>
<tr><td>Wake up minute increase</td><td>Defines how long from now to awake the system.
▸ 1 to 5 minutes configurable.</td></tr>
</table></td></tr>
</table>

5.2.3. CPU Configuration

Select **CPU Configuration** to run a report of the CPU's details including: model name, processor speed, microcode revision, max./min. processor speeds, the amount of processor core(s), Intel® Hyper-Threading Technology support, Intel® virtualization technology (VT-x) support, Intel® Safer Mode Extensions (SMX) support and CPU caches. See the depiction below:



5.2.4. SATA Configuration

SATA Configuration manages the system's SATA configuration and also delivers its status.

The featured settings are:

Setting	Description
SATA Controller(s)	Enables/disables SATA device(s). ▸ **Enabled** is the default.
SATA Mode Selection	Configures how to operate the SATA controller(s). ▸ Options available are **IDE**, **AHCI** (default) and **RAID**.
SATA Controller Speed	Defines the maximum speed the SATA controller can support. ▸ Options available are **Gen1**, **Gen2** and **Gen3** (default).
Alternate ID	Enables/disables the SATA controller reporting its alternate device ID. ▸ **Disabled** is the default. ▸ This setting is only available when **SATA Mode Selection** is set to **RAID**.

5.2.5. AMT Configuration

Intel® Active Management Technology (Intel® AMT) is a hardware-based solution that uses out-of-band communication for system administrators to monitor and manage the computers and other network equipment by remote control even if the hard drive is crashed, the system is turned off or the operating system is locked.

This submenu features the settings of iAMT's BIOS extension, which are required to make use of iAMT.

Setting	Description
Intel AMT	Enables/disables Intel® Active Management Technology BIOS extensions. ▸ Note iAMT hardware is always enabled. ▸ This setting only controls the execution of BIOS extension execution. ▸ **Enabled** is the default. ▸ When enabled, additional firmware is required in the SPI device.
Activate Remote Assistance Process	Enables/disables CIRA (Client-Initiated Remote Access) boot. ▸ **Disabled** is the default.
AMT CIRA Timeout	Customizes the timeout for the establishment of MPS connection. ▸ This setting is only available when **Activate Remote Assistance Process** is enabled. ▸ Set it to 0 to use the default timeout value of 60 seconds. ▸ Set it to 255 to have MEBx (Management Engine BIOS extension) wait until the connection succeeds. ▸ CIRA means "Client Initiated Remote Access".

5.2.6. USB Configuration

Select this submenu to view the status of the USB devices and configure USB features. The featured settings are:

Setting	Description
Legacy USB Support	Enables/disables legacy USB support. ▸ Options available are **Enabled** (default), **Disabled** and **Auto**. ▸ Select **Auto** to disable legacy support if no USB device are connected. ▸ Select **Disabled** to keep USB devices available only for EFI applications.
USB 3.0 Support	Enables/disables USB 3.0 (xHCI) controller support. ▸ **Enabled** is the default. ▸ "xHCI" means "Extensible Host Controller Interface", the specification that describes the register-level host controller interface for Universal Serial Bus 2.0 and above.

5.2.7. F81866 Super IO Configuration

This submenu configures the Super IO chip (Fintek F81866) for the computer's serial ports 1~4 and the parallel port. The featured submenus are:

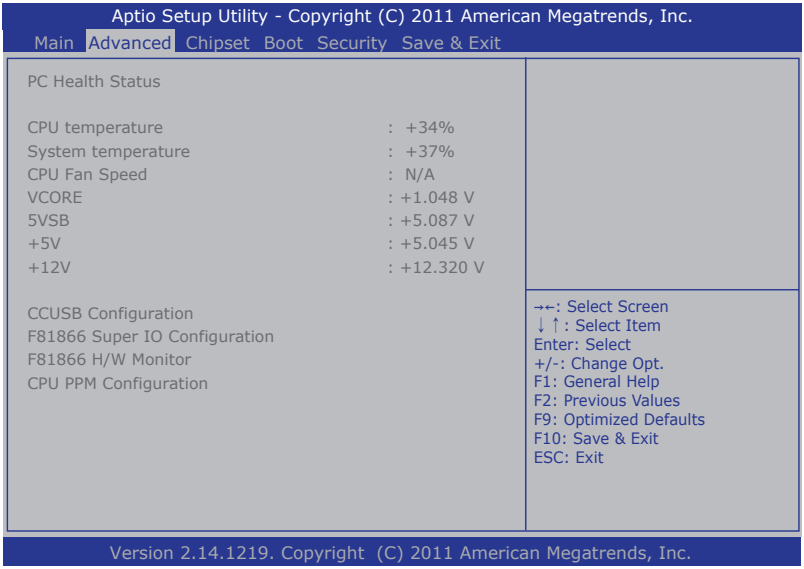
<table>
<tr><th>Submenu</th><th>Description</th></tr>
<tr><td>Serial Port 1 Configuration</td><td>Configures the computer's COM1, which is fixed to RS232 and cannot be changed. The featured settings are:
<table>
<tr><th>Setting</th><th>Description</th></tr>
<tr><td>Serial Port</td><td>Enables/disables the serial port.
‣ Enabled is the default.</td></tr>
<tr><td>Change Settings</td><td>Sets the optimal IO address and IRQ info for the serial port.
‣ Options available are:
IO=3F8h; IRQ=4; (default)
IO=3F8h; IRQ=3,4,5,6,7,10,11,12;
IO=2F8h; IRQ=3,4,5,6,7,10,11,12;
IO=3E8h; IRQ=3,4,5,6,7,10,11,12;
IO=2E8h; IRQ=3,4,5,6,7,10,11,12;
‣ This setting is only available when the serial port is enabled.</td></tr>
</table></td></tr>
<tr><td>Serial Port 2 Configuration</td><td>Configures the computer's COM2, which is fixed to RS232 and cannot be changed. The featured settings are:
<table>
<tr><th>Setting</th><th>Description</th></tr>
<tr><td>Serial Port</td><td>Enables/disables the serial port.
‣ Enabled is the default.</td></tr>
<tr><td>Change Settings</td><td>Sets the optimal IO address and IRQ info for the serial port.
‣ Options available are:
IO=2F8h; IRQ=3; (default)
IO=3F8h; IRQ=3,4,5,6,7,10,11,12;
IO=2F8h; IRQ=3,4,5,6,7,10,11,12;
IO=3E8h; IRQ=3,4,5,6,7,10,11,12;
IO=2E8h; IRQ=3,4,5,6,7,10,11,12;
‣ This setting is only available when the serial port is enabled.</td></tr>
</table></td></tr>
</table>

<table>
<tr><td>Serial Port 3 Configuration</td><td>Configures the computer's COM3, which is configurable between RS232, RS422 and RS485. The featured settings are:
<table>
<tr><th>Setting</th><th>Description</th></tr>
<tr><td>Serial Port</td><td>Enables/disables the serial port.
▸ Enabled is the default.</td></tr>
<tr><td>Change Settings</td><td>Sets the optimal IO address and IRQ info for the serial port.
▸ Options available are:
IO=3E8h; IRQ=10; (default)
IO=3E8h; IRQ=3,4,5,6,7,10,11,12;
IO=2E8h; IRQ=3,4,5,6,7,10,11,12;
IO=2F0h; IRQ=3,4,5,6,7,10,11,12;
IO=2E0h; IRQ=3,4,5,6,7,10,11,12;
▸ This setting is only available when the serial port is enabled.</td></tr>
<tr><td>RS485 Mode</td><td>Enables/disables RS485 mode.
▸ Disabled is the default.
▸ Note this setting needs to be consistent with the DIP switch SW9 to prevent possible conflict. See also 3.2.2. DIP Switch SW9 on page 22</td></tr>
</table></td></tr>
<tr><td>Serial Port 4 Configuration</td><td>Configures the computer's COM4, which is RS232/RS422/RS485 selectable. The featured settings are:
<table>
<tr><th>Setting</th><th>Description</th></tr>
<tr><td>Serial Port</td><td>Enables/disables the serial port.
▸ Enabled is the default.</td></tr>
<tr><td>Change Settings</td><td>Sets the optimal IO address and IRQ info for the serial port.
▸ Options available are:
IO=2E8h; IRQ=11; (default)
IO=3E8h; IRQ=3,4,5,6,7,10,11,12;
IO=2E8h; IRQ=3,4,5,6,7,10,11,12;
IO=2F0h; IRQ=3,4,5,6,7,10,11,12;
IO=2E0h; IRQ=3,4,5,6,7,10,11,12;
▸ This setting is only available when the serial port is enabled.</td></tr>
<tr><td>RS485 Mode</td><td>Enables/disables RS485 mode.
▸ Disabled is the default.
▸ Note this setting needs to be consistent with the DIP switch SW9 to prevent possible conflict. See also 3.2.2. DIP Switch SW9 on page 22</td></tr>
</table></td></tr>
</table>

<table>
<tr><td>Parallel Port Configuration</td><td>Configures the computer's parallel port (printer port). The featured settings are:<table>
<tr><th>Setting</th><th>Description</th></tr>
<tr><td>Parallel Port</td><td>Enables/disables the parallel port.
▸ Enabled is the default.</td></tr>
<tr><td>Change Settings</td><td>Sets the optimal IO address and IRQ info for the parallel port
▸ Options available are:
IO=378h; IRQ=7; (default)
IO=378h; IRQ=5,7;
IO=278h; IRQ=5,7;
OR
When the Device Mode (see the next setting) is set to ECP Mode, ECP & EPP 1.9 Mode or ECP and EPP 1.7 Mode, the options available become the following:
IO=378h; IRQ=7; DMA=3; (default)
IO=378h; IRQ=5,6,7,10,11,12; DMA=1,3;
IO=278h; IRQ=5,6,7,10,11,12; DMA=1,3;
▸ This setting is only available when the parallel port is enabled.</td></tr>
<tr><td>Device Mode</td><td>Sets the parallel port mode.
▸ Options available are:
STD Printer Mode (default)
SPP Mode
EPP-1.9 and SPP Mode
EPP-1.7 and SPP Mode
ECP Mode
ECP and EPP 1.9 Mode
ECP and EPP 1.7 Mode
▸ This setting is only available when the parallel port is enabled.</td></tr>
</table></td></tr>
<tr><td>Power On After Power Fail</td><td>Sets whether the system should power on or power off when the power supply resumes after an power failure.
▸ Options are Power off (default) and Power on.</td></tr>
</table>

5.2.8. F81866 H/W Monitor

Select this submenu to view the main board's hardware status. Select it to run a report of various info as depicted below:



5.2.9. CPU PPM Configuration

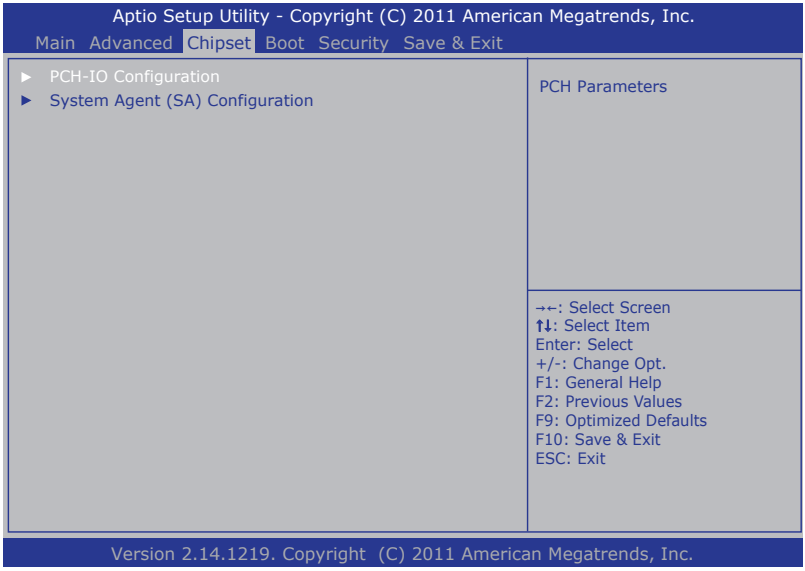
Select this submenu to configure the PPM (processor power module) for the CPU.

The featured setting is:

Setting	Description
Turbo Mode	Enables/disables the turbo mode, which can boost CPU performance without generating extra heat. ▸ **Disabled** is the default.

5.3. Chipset

The **Chipset** menu controls the system's chipset.



The featured submenus are **PCH-IO Configuration** and **System Agent (SA) Configuration**, which are explicated in the following of this section.

Submenu overview:

Submenu	Description
PCH-IO Configuration	Configures the PCH (Platform Controller Hub). See 5.3.1. PCH-IO Configuration on page 89 for the settings.
System Agent (SA) Configuration	Configures the System Agent (SA), i.e. the north bridge. See 5.3.2. System Agent (SA) Configuration on page 90 for the settings.

5.3.1. PCH-IO Configuration

Select this submenu to view the RC version, SKU name and revision ID of the Intel® PCH. Select this submenu also to configure the PCH:

The featured settings/submenus are:

<table>
<tr><th>Setting / Submenu</th><th>Description</th></tr>
<tr><td>USB Configuration</td><td>Configures the computer's USB (2.0) features by the following settings:
<table>
<tr><th>Setting</th><th>Description</th></tr>
<tr><td>EHCI1
EHCI2</td><td>Control the USB EHCI (USB2.0) function.
▸ Both EHCI are enabled by default.
▸ One EHCI must always be enabled.</td></tr>
</table></td></tr>
<tr><td>PCH LAN Controller</td><td>Enables/disables the onboard NIC (network interface controller).
▸ Enabled is the default.</td></tr>
<tr><td>High Precision Timer</td><td>Enables/disables the "High Precision Timer", which delivers more accurate controls for multimedia events.
▸ Enabled is the default.</td></tr>
<tr><td>SLP_S4 Assertion Width</td><td>Sets the minimum assertion width of the SLP_S4# signal to ensure the DRAMs have been safely power-cycled, or disables it.
▸ Options available are:
Disabled
1 to 2 seconds
2 to 3 seconds
3 to 4 seconds
4 to 5 seconds (default)</td></tr>
</table>

5.3.2. System Agent (SA) Configuration

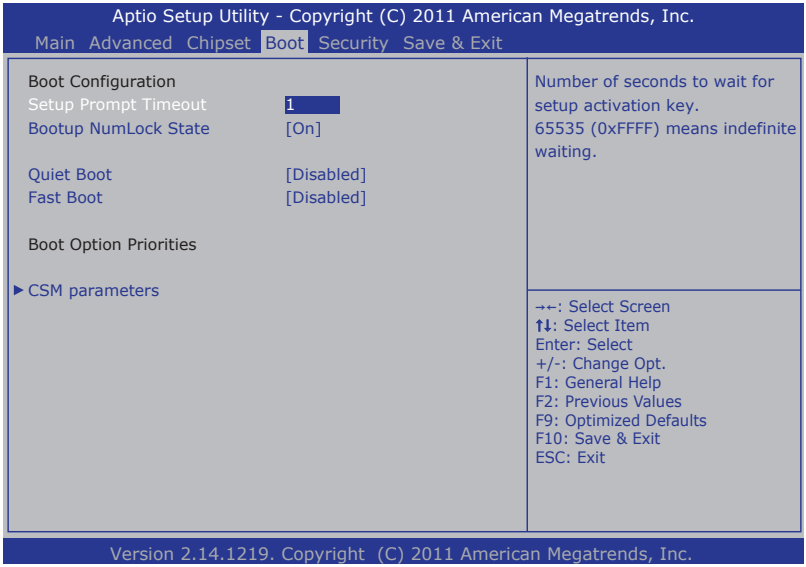
Select this submenu to view the name and RC version of the **System Agent (SA)**, i.e. the north bridge. Select this submenu also to configure the **System Agent (SA)** by the following setting and submenus:

<table>
<tr><th>Setting / Submenu</th><th>Description</th></tr>
<tr><td>VT-d</td><td>Enables/disables Intel® virtualization technology for directed I/O on the MCH (memory controller hub).
▸ Enabled is the default.</td></tr>
<tr><td>LCD Control</td><td>Configures LCD feature by the following setting:
<table>
<tr><th>Setting</th><th>Description</th></tr>
<tr><td>Boot Display</td><td>Sets which video device to activate during POST (Power-on Self Test).
▸ DVI-I is the default.
▸ This setting has no effect if an external graphicse is present.</td></tr>
</table></td></tr>
<tr><td>Graphics Configuration</td><td>Displays the graphics information including IGFX VBIOS (internal graphics video BIOS) version and frequency. It also configures the graphics devices by the following settings:
<table>
<tr><th>Setting</th><th>Description</th></tr>
<tr><td>Graphics Turbo IMON Current</td><td>Sets the supported values for graphics turbo IMON (CPU load current monitor) current.
▸ Options available are 14 to 31.
▸ 31 is the default.</td></tr>
<tr><td>Primary Display</td><td>Sets the primary display, the IGFX (internal graphics) or the PEG (PCI Express Graphics), or leaves it on BIOS auto-configuration.
▸ Options available are Auto (default), IGFX and PEG.</td></tr>
<tr><td>Internal Graphics</td><td>Enables/disables the internal graphics, or leaves it on BIOS auto-configuration.
▸ Options available are Auto (default), Enabled and Disabled.</td></tr>
</table></td></tr>
</table>

<table>
<tr><td>NB PCIe Configuration</td><td>Delivers the status and configures the north bridge PEG (PCI Express Graphics) by the following settings:
<table>
<tr><th>Setting</th><th>Description</th></tr>
<tr><td>PEG - Gen X</td><td>Configures PEG0 B0:D1:F0 Gen1-Gen3, or leaves it on BIOS auto-configuration.
▸ Options available are Auto, Gen1, Gen2 and Gen3 (default).</td></tr>
<tr><td>PEG0 ASPM</td><td>Configures the ASPM (Active State Power Management) support for the PEG device, or leaves it on BIOS auto-configuration.
▸ This setting has no effect if the PEG isn't the active device at the moment.
▸ Options available are: Disabled, Auto (default), ASPM L0s, ASPM L1 and ASPM L0sL1.
▸ When set to ASPM L0s or ASPM L0sL1, the setting ASPM L0s becomes available.</td></tr>
<tr><td>ASPM L0s</td><td>Enables/disables PCI Express ASPM L0s.
▸ Options available are Disabled, Root Port Only, Endpoint Port Only and Both Root and Endpoint Ports (default).
▸ This setting is only available when PEG0 ASPM is set to ASPM L0s or ASPM L0sL1.</td></tr>
</table></td></tr>
<tr><td>Memory Configuration</td><td>Delivers the information/configuration of the computer's system memory such as RC version, frequency, total memory, the presence/absence of memory module(s) at SO-DIMM sockets and so on.</td></tr>
</table>

5.4. Boot

The **Boot** menu configures how to boot up the system such as the configuration of boot device priority.



The featured settings and submenu are:

Setting	Description
Setup Prompt Timeout	Set how long to wait for the prompt to show for entering BIOS Setup. ▸ The default setting is **1** (sec). ▸ Set it to **65535** to wait indefinitely.
Bootup NumLock State	Sets whether to enable or disable the keyboard's NumLock state when the system starts up. ▸ Options available are **On** (default) and **Off**.
Quiet Boot	Sets whether to display the POST (Power-on Self Tests) messages or the system manufacturer's full screen logo during booting. ▸ Select **Disabled** to display the normal POST message, which is the default.

<table>
<tr><td colspan="2">Fast Boot</td><td>Enables/disables initializing only a minimal set of devices required to launch the active boot options when booting up the system.
▸ Disabled is the default.
▸ This setting has no effect for BBS (BIOS Boot Specification) options.
▸ When enabled, the following settings become available:
<table><tr><th>Setting</th><th>Description</th></tr><tr><td>Skip VGA</td><td>Enables/disables skipping EFI VGA driver when booting up the system.
▸ Disabled is the default.</td></tr><tr><td>Skip USB</td><td>Enables/disables skipping USB devices when booting up the system.
▸ When enabled, the USB devices won't be available until OS startup.
▸ When disabled, the USB devices are available before OS startup. This is the default.</td></tr><tr><td>Skip PS2</td><td>Enables/disables skipping PS2 (keyboard and mouse) devices when booting up the system.
▸ Disabled is the default.</td></tr></table></td></tr>
<tr><td>Boot Option Priority</td><td>CSM parameters</td><td>Configures whether to launch the UEFI/legacy OpROM, boot options, filters, etc. See the full settings at 5.4.1. CSM Paramenters on page 94.</td></tr>
</table>

5.4.1. CSM Paramenters

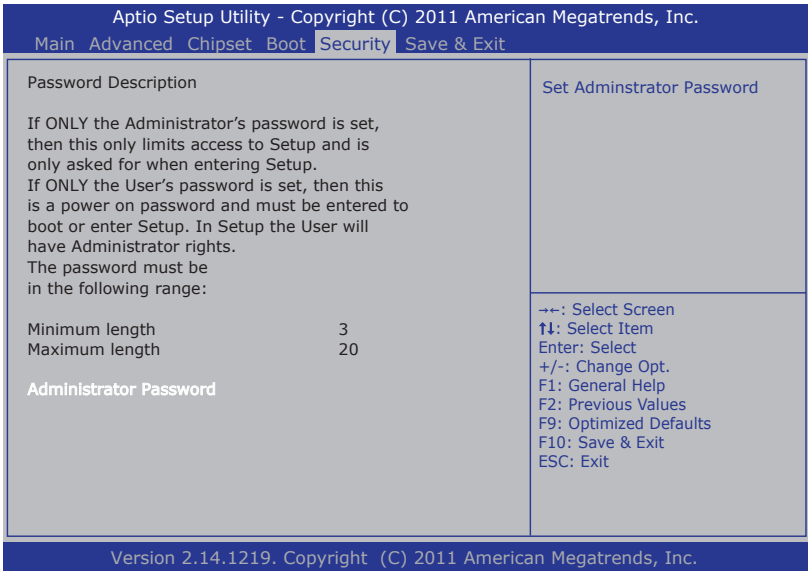
Access this submenu to configure the execution of OpROM, boot options filter and so on.

The featured settings are:

Setting	Description
Launch CSM	Enables/disables launching CSM (capability support module), which provides UEFI with the additional functionality to allow loading a traditional OS or using a traditional OpROM. ▸ Options available are: **Always** (default) and **Never**.
Boot Option Filter	Defines the devices to boot the system to. ▸ Options available are **UEFI and Legacy** (default), **Legacy only** and **UEFI only**. ▸ This setting is only available when **Launch CSM** is enabled (set to **Always**).
Launch PXE OpROM policy	Configures whether to launch the UEFI or legacy OpROM of PXE (Preboot eXecution Environment). ▸ Options available are **Do not launch** (default), **UEFI only** and **Legacy only**. ▸ This setting is only available when **Launch CSM** is enabled (set to **Always**).
Launch Storage OpROM policy	Configures whether to launch the UEFI or legacy OpROM of storage. ▸ Options available are **Do not launch**, **UEFI only** and **Legacy only** (default). ▸ This setting is only available when **Launch CSM** is enabled (set to **Always**).
Launch Video OpROM policy	Configures whether to launch the UEFI or legacy OpROM of video. ▸ Options available are **Do not launch**, **UEFI only** and **Legacy only** (default). ▸ This setting is only available when **Launch CSM** is enabled (set to **Always**).
Other PCI device ROM priority	Configures which OpROM to run for the PCI devices other than network, mass storage, or video. ▸ Options available are **UEFI OpROM** and **Legacy OpROM** (default).

5.5. Security

The **Security** menu sets up the password for the system's administrator account. Once the administrator password is set up, this BIOS Setup utility is limited to access and will ask for the password each time any access is attempted.

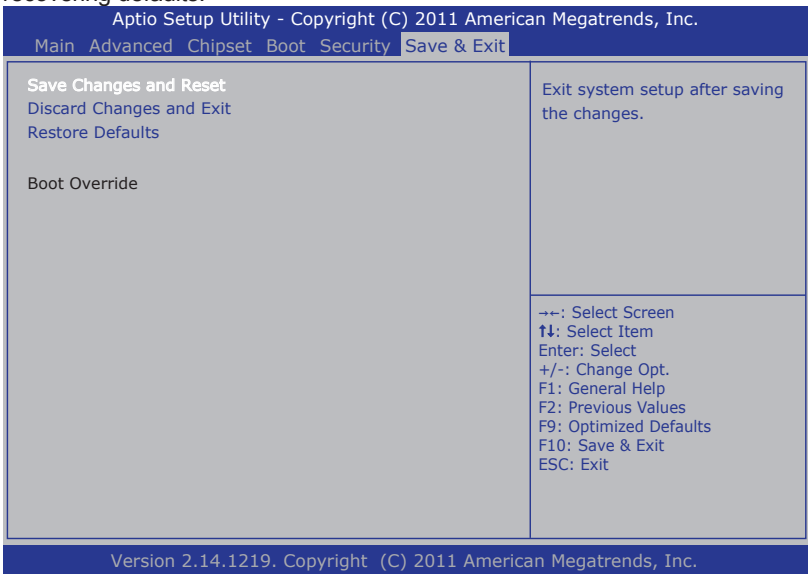


The featured setting is:

Setting	Description
Administrator Password	To set up an administrator password: 1. Select **Administrator Password**. An **Create New Password** dialog then pops up onscreen. 2. Enter your desired password that is no less than 3 characters and no more than 20 characters. 3. Hit [Enter] key to submit.

5.6. Save & Exit

The **Save & Exit** menu features a handful of commands to launch actions from the BIOS Setup utility regarding saving changes, quitting the utility and recovering defaults.



The features settings are:

Setting	Description
Save Changes and Reset	Saves the changes and quits the BIOS Setup utility.
Discard Changes and Exit	Quits the BIOS Setup utility without saving the change(s).
Restore Defaults	Restores all settings to defaults. ▸ This is a command to launch an action from the BIOS Setup utility.
Boot Override	**Boot Override** presents a list in context with the boot devices in the system. Select the device to boot up the system regardless of the currently configured boot priority. ▸ This is a command to launch an action from the BIOS Setup utility.

Appendix

A: Digital I/O Setting

Digital I/O can read from or write to a line or an entire digital port, which is a collection of lines. This mechanism helps users achieve various applications such as industrial automation, customized circuit, and laboratory testing. Take the source code below that is written in C for the digital I/O application example.

Sample Codes:

```
/*-----  Include Header Area -----*/
#include "math.h"
#include "stdio.h"
#include "dos.h"

int SMB_PORT_AD    = 0xF040;
int SMB_DEVICE_ADD = 0x6e;                                    /*  75111R's
Add=6eh */

/*-----  routing, sub-routing -----*/
void main()
{
         DIO_Set(0xFFFF,0xFFFF);
         delay(2000);

         DIO_Set(0xFFFF,0x0000);
         delay(2000);

         DIO_Set(0xFFFF,0x5555);
         delay(2000);

         DIO_Set(0xFFFF,0xAAAA);
         delay(2000);
}

unsigned int DIO_Set(unsigned int oMode, unsigned int oData)
{
    unsigned int iData;
    unsigned int iTemp;

         /* GPIO10~17 control */
         SMB_Byte_WRITE(SMB_PORT_AD,SMB_DEVICE_ADD,0x10,oMode & 0x00FF);
         delay(10);

         /* GPIO20~27 control */
         SMB_Byte_WRITE(SMB_PORT_AD,SMB_DEVICE_ADD,0x20,(oMode  &  0xFF00)
>> 8 );
         delay(10);

         /* GPIO10~17 Data */
         SMB_Byte_WRITE(SMB_PORT_AD,SMB_DEVICE_ADD,0x11,oData & 0x00FF);
```

```
        delay(10);

        /* GPIO20~27 Data */
        SMB_Byte_WRITE(SMB_PORT_AD,SMB_DEVICE_ADD,0x21,(oData  &  0xFF00)
>> 8 );
        delay(10);

        /* GPIO10~17 Status */
        iTemp = SMB_Byte_READ(SMB_PORT_AD,SMB_DEVICE_ADD,0x12);
        iData = iTemp;
        delay(10);

        /* GPIO20~27 Status */
        iTemp = SMB_Byte_READ(SMB_PORT_AD,SMB_DEVICE_ADD,0x22);
        iData = ( iTemp << 8 ) + iData;
        delay(10);

        return iData;
}

unsigned char SMB_Byte_READ(int SMPORT, int DeviceID, int iREG_INDEX)
{
        unsigned char iData;

        outportb(SMPORT+02, 0x00);
        outportb(SMPORT+00, 0xff);
        delay(10);
        outportb(SMPORT+04, DeviceID+1);
        outportb(SMPORT+03, iREG_INDEX);
        outportb(SMPORT+02, 0x48);
        delay(10);

        iData = inportb(SMPORT+05);

        return iData;
}

void SMB_Byte_WRITE(int SMPORT, int DeviceID, int oREG_INDEX, int oREG_
DATA)
{
        outportb(SMPORT+02, 0x00);
        outportb(SMPORT+00, 0xff);
        delay(10);
        outportb(SMPORT+04, DeviceID);
        outportb(SMPORT+03, oREG_INDEX);
        outportb(SMPORT+05, oREG_DATA);
        outportb(SMPORT+02, 0x48);
        delay(10);
}
```

B: Watchdog Timer (WDT) Setting

WDT is widely used for industry application to monitor the activity of CPU. Application software depends on its requirement to trigger WDT with adequate timer setting. Before WDT time out, the functional normal system will reload the WDT. The WDT never time out for a normal system. The WDT will not be reloaded by an abnormal system, then WDT will time out and auto-reset the system to avoid abnormal operation.

This computer supports 255 levels watchdog timer by software programming I/O ports.

Below is an assembly program example to disable and load WDT.

Sample Codes:

```
/*-----  Include Header Area -----*/
#include "math.h"
#include "stdio.h"
#include "dos.h"

#define SIO_INDEX       0x4E                /* or index = 0x2E */
#define SIO_DATA        0x4F                /* or data  = 0x2F */

/*-----  routing, sub-routing -----*/
void main()
{
        outportb(SIO_INDEX, 0x87);              /* SIO - Enable */
        outportb(SIO_INDEX, 0x87);

        outportb(SIO_INDEX, 0x07);              /* LDN - WDT */
        outportb(SIO_DATA,  0x07);

        outportb(SIO_INDEX, 0x30);              /* WDT - Enable */
        outportb(SIO_DATA,  0x01);

        outportb(SIO_INDEX, 0xF6);               /* WDT - Timeout Value :
5sec */
        outportb(SIO_DATA,  0x05);

        outportb(SIO_INDEX, 0xFA);              /* WDOUT - Enable */
        outportb(SIO_DATA,  0x01);

        outportb(SIO_INDEX, 0xF5);              /* WDT - Configuration */
        outportb(SIO_DATA,  0x31);

        outportb(SIO_INDEX, 0xAA);              /* SIO - Disable */
}
```

This page is intentionally left blank.