
FPC-9002-P6

**Machine Vision Controller with Intel®
Xeon® E3/6th & 7th Generation Core™ i7/i5/i3
Processor with 6 GbE PoE**

User's Manual

Version 1.0



This page is intentionally left blank.

Revision History

Version	Release Time	Description
1.0	2018.03	Initial release

Revision History	i
Contents	ii
Preface.....	v
Copyright Notice.....	v
Declaration of Conformity.....	v
CE	v
FCC Class A.....	v
RoHS.....	vi
SVHC / REACH.....	vi
Important Safety Instructions	vii
Warning.....	viii
Replacing Lithium Battery	viii
Technical Support.....	viii
Warranty.....	ix
Chapter 1 - Introduction.....	1
1.1. The Computer	2
1.2. About this Manual.....	2
1.3. Specifications	3
1.4. Inside the Package.....	5
1.5. Ordering Information	5
1.5.1. Optional Accessories.....	5
1.5.2. Configure-to-Order Service	5
Chapter 2 - System Overview	7
2.1. Dimensions	8
2.2. Take A Tour.....	8
2.2.1. Front View	8
2.2.1. Rear View.....	9
2.3. Driver Installation Notes	10
Chapter 3 - System Configuration	11
3.1. Board Layout.....	12
3.2. Jumpers and Connectors	17
3.2.1. Jumpers	17
3.2.2. Connectors.....	18
Chapter 4 - Installation and Maintenance.....	29
4.1. Install Hardware	30
4.1.1. Open the Computer.....	30
4.1.2. Install CPU	32
4.1.3. Install/Uninstall Memory Modules	36
4.1.4. Install Wi-Fi Module.....	38
4.1.5. Install SATA Storage Devices.....	41

4.1.6. Install PCI and PCI Express Cards	45
4.1.7. Install/uninstall CFast Card	45
4.1.8. Install/uninstall SIM Card	47
4.2. Ground the Computer	48
4.3. Wire DC-in Power Source	49
4.3.1. Automation Mode	49
4.3.2. Vehicle Application Mode	50
4.4. Replace RTC Battery	50
Chapter 5 - BIOS	53
5.1. Main	56
5.2. Advanced	57
5.2.1. CPU Configuration	58
5.2.2. SATA and RST Configuration	60
5.2.3. AMT Configuration	61
5.2.4. Trusted Computing	62
5.2.5. ACPI Settings	63
5.2.6. Super IO Configuration	64
5.2.7. Hardware Monitor	66
5.2.8. S5 RTC Wake Settings	67
5.2.9. PCI Sybssystem Settings	68
5.2.10. CSM Configuration	69
5.2.11. USB Configuration	70
5.3. Chipset	72
5.4 Security	78
5.5. Boot	79
5.6. Save & Exit	81
Appendices	83
A: Digital I/O Setting	84
B: Watchdog Timer (WDT) Setting	87

This page is intentionally left blank.

Copyright Notice

All Rights Reserved.

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.

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

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.

Preface

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:
<http://www.arbor-technology.com>

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

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.

This page is intentionally left blank.

Chapter 1

Introduction

1.1. The Computer

- Wide Range DC power input (19~36V)
- DP x1+HDMI x 1 +VGA x1+DVI x1 (supporting 3 independent display)
- Power on/off delay control/ Configurable ignition power control
- TPM2.0 support (optional)
- RTC battery service windows support
- Two mPCIe for Optional WiFi/3G/4G/GPS or I/O expansion supported
- 2 x SATA SSDs (1 x removable, 1 x fixed), supporting RAID 0,1
- Front-accessible I/O support
- SMART FAN control support
- 6 x 802.3af Gigabit PoE ports



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	
CPU	Intel®Xeon® E3/6 th & 7 th generation Core™ i7/i5/i3 processor in LGA1151 socket
Memory	2 x 260-pin DDR4 SO-DIMM sockets, supporting 2133 MHz SDRAM up to 32GB
Chipset	Intel® C236
Graphics	Integrated Intel® HD Graphics
ATA	2 x Serial ATA ports with 600MB/s HDD transfer rate
LAN Chipset	2 x Intel® WGI211AT PCIe controllers 1 x Intel® WGI219LM PCIe controllers w/ iAMT 6 x Intel® WGI211AT PCIe controllers for PoE
Watchdog Timer	1~255 levels reset
I/O	
Serial Port	2 x RS-232/422/485 configurable
USB Port	6 x USB 3.0/ 2.0 ports Internal USB dongle (Optional)
LAN	3 x RJ-45 ports for GbE 6 x RJ-45 ports for PoE
Video Port	1 x DP 1 x HDMI 1 x DB-15 female connector for Analog RGB 1 x DVI-D female connector for digital video output
Selectable Port	1 x DB25 connector for 1 x DIO (8 in/8 out) port or 1 x LPT port (either one) (default DIO)
Audio	Mic-in/Line-out
Expansion Bus	2 x Mini-card interconnected for optional WiFi/3G/4G/GPS or I/O Expansion 1 x SIM socket 1 x PCIe x16 slot +1 x PCIe x 8 slot (via x 4 lanes) for add-on card
Environmental	
Operating Temp.	-20 ~ 55°C (-4 ~ 131°F), ambient w/ air flow
Storage Temp.	-40 ~ 85°C (-40 ~ 185°F)
Operating Humidity	10 ~ 95% @ 55°C (non-condensing)

Introduction

Vibration	3 Grms/5~500Hz/random operation w/ SSD
Shock	Operating 40G (11ms), Non-operating 60G with SSD Crash 100G, 11ms
Qualification	
Certification	CE, FCC Class A
Power Requirement	
Power Input	DC 19~36V input (w/ 4-pin DC input terminal block, combining remote power on/off switch
Ignition Switch	2-pin terminal block: IGN, GND
Power Consumption	180W (typical)
Storage	
Type	2 x 2.5" drive bays (1 x removable, 1 x fixed) 1 x CFAST socket, can be outside accessible
Mechanical	
Construction	Aluminum alloy
Mounting	Wall-mount
Weight	7.2kg (15.87 lb)
Dimensions (W x D x H)	225 x 292 x 120mm
OS Support	
Windows 10 IOT (For 7 th Gen Intel CPU) Windows 7 / Windows 8.1 / Windows 10 IOT (For 6 th Gen Intel CPU) Linux (Kernel 4.4.x)	

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 FPC-9002-P6



1 x Driver DVD
1 x User's Manual

1.5. Ordering Information

FPC-9002-P6

Machine Vision Controller with Intel® Xeon E3/ 6th & 7th
Generation Core™ i7/i5/i3 Processor with 6 x GbE PoE

1.5.1. Optional Accessories

The following items are normally optional, but some vendors may include them as a standard package, or some vendors may not carry all the items.

WMK-7000 Wall-mount kit for FPC-7XXX Series



PAC-180W6C-FSP 180W AC/DC 24V adapter kit



1.5.2. Configure-to-Order Service

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

Introduction

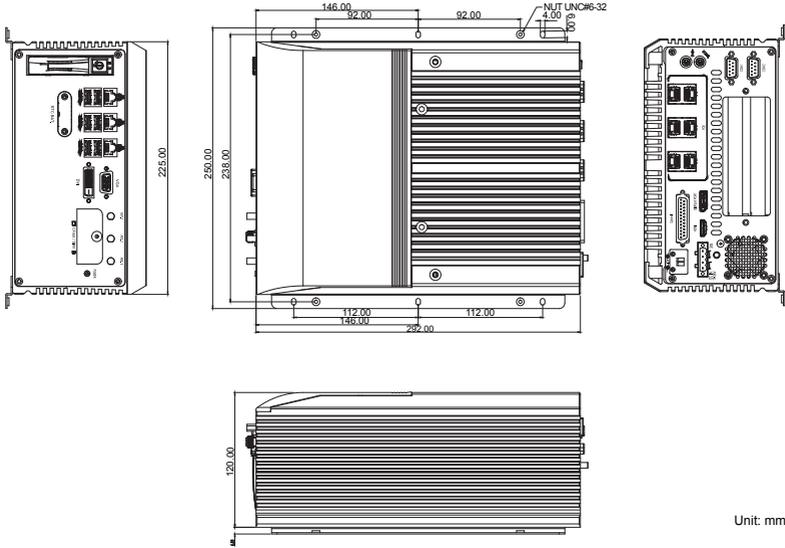
150GB SSD	Intel® 2.5" 150GB SATAIII SSD kit	
WIFI-AT2350	Atheros AR9462 Wi-Fi module w/ 20&30cm internal wires	
ANT-H11	1 x 2dBi HSUPA antenna	
ANT-D11	1 x WiFi dual-band 2.4G/5G antenna	
Core™ i7-7700T	Intel® 7th Gen. Core™ i7-7700T processor, L2/8M, 2.9G	
Core™ i5-7500T	Intel® 7th Gen. Core™ i5-7500T processor, L2/6M, 2.7G	
Core™ i3-7101TE	Intel® 7th Gen. Core™ i3-7101TE processor, L2/3M, 3.4G	
Xeon™ E3-1268L-V5	Intel® 6th Gen Xeon™ E3-1268L processor, L2/8M, 2.4G	
MK-4C-4G	DDR4-2133 4GB SDRAM DIMM kit	
MK-4C-8G	DDR4-2133 8GB SDRAM DIMM kit	
MK-4C-16G	DDR4-2133 16GB SDRAM DIMM kit	

Chapter 2

System Overview

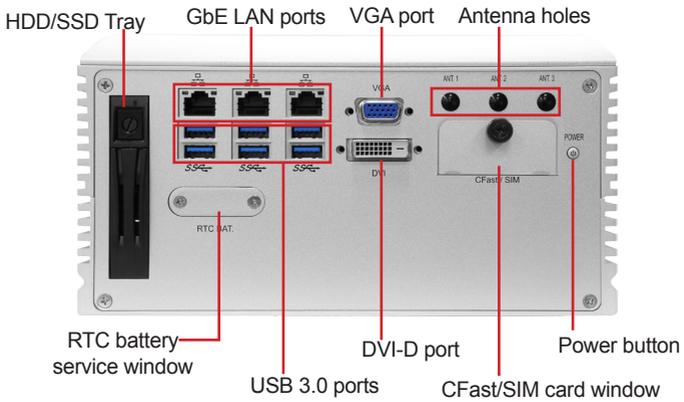
System Overview

2.1. Dimensions



2.2. Take A Tour

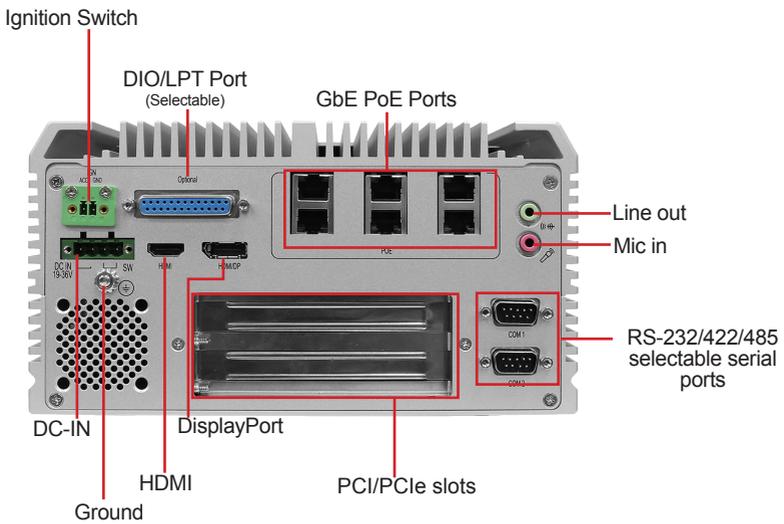
2.2.1. Front View



- Power LED Status

LED Lamp	Color	State	Description
PWR	Green	on	Power is on.
	Red	on	Stand by
	N/A	off	No power input.

2.2.1. Rear View



2.3. Driver Installation Notes

The FPC-9002-P6 supports the operating systems of Windows 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.

Paths to find various drivers on the CD:

Windows 10

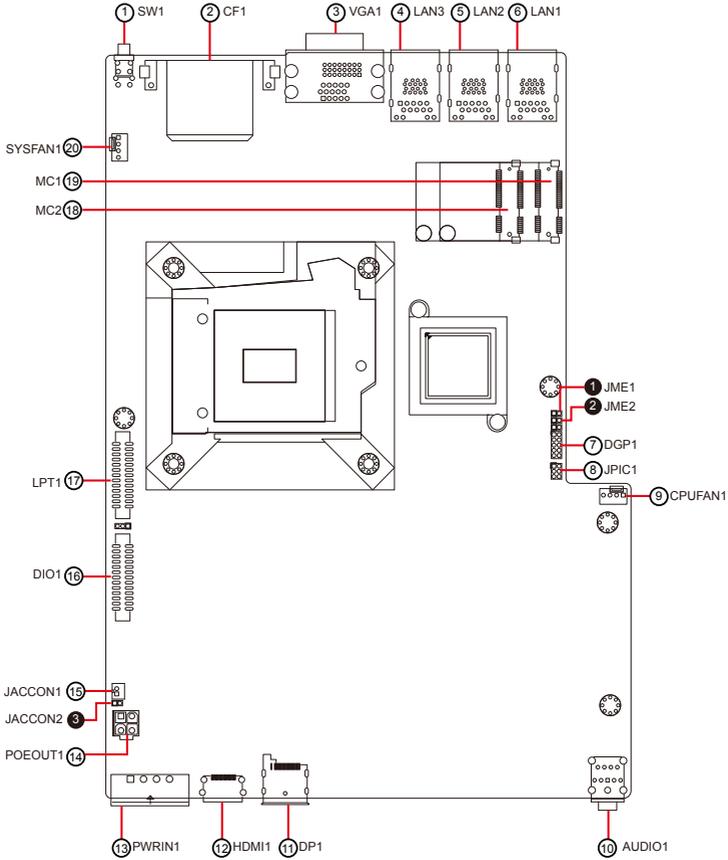
Driver	Path
Chipset	\\WIN10\Chipset\10.1.1.42\SetupChipset.exe
LAN	\\WIN10\Ethernet\PROWinx64.exe
VGA	\\WIN10\Graphics\Setup.exe
Audio	\\WIN10\AUDIO\0006-64bit_Win7_Win8_Win81_Win10_R279.exe
ME	\\WIN10\ME_11.6\SetupME.exe

Chapter 3

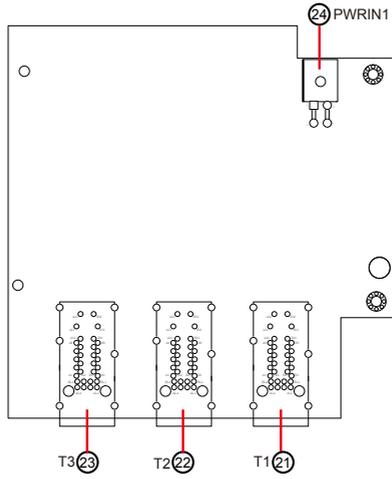
System Configuration

3.1. Board Layout

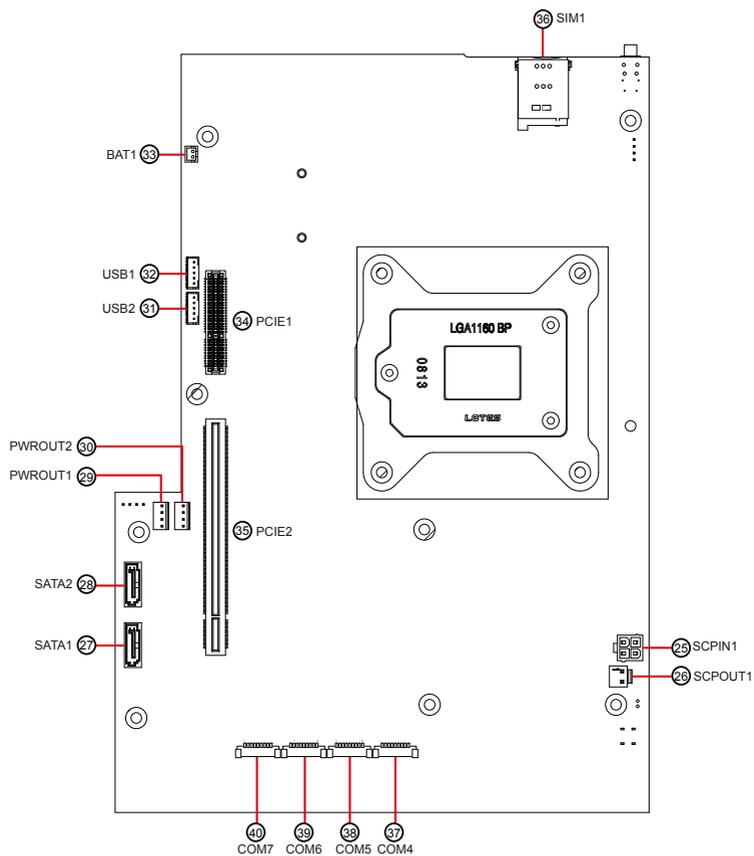
Main Board Top



Daughter Board Top



Main Board Bottom



Jumpers

Label	Description
① JME1	ME FLASH Selection
② JME2	CMOS Settings
③ JACCON2	Ignition power mode

Connectors

Label	Description
① SW1	Power button
② CF1	CFast Card Type I/II slot
③ VGA1	Analog RGB & DVI-D connector
④ ⑤ ⑥ LAN3, 2, 1	GbE RJ-45 Ethernet connector & dual USB3.0 connectors
⑦ DPG1	External 80 port
⑧ JPIC1	PIC programming pin header
⑨ CPUFAN1	Fan power connector
⑩ AUDIO1	Audio connector
⑪ DP1	DisplayPort connector
⑫ HDMI1	HDMI connector
⑬ PWRIN1	DC adapter power input
⑭ POEOUT1	PoE power output connector
⑮ JACCON1	Vehicle Acc mode selection
⑯ DIO1	Digital IO connector
⑰ LPT1	On-board parallel port connector
⑱ ⑲ MC2, 1	PCI Express Mini-card full/half size socket
⑳ SYSFAN1	Fan power connector
㉑ ㉒ ㉓ T1, T2, T3	RJ-45 ports for GbE PoE
㉔ PWRIN1	PoE power input connector
㉕ SCPIN1	Supercapacitor power in
㉖ SCPOUT1	Supercapacitor power out
㉗ ㉘ SATA1, 2	Serial ATA connector

Engine of the Computer

②⑨ ③⑩	PWROUT1, 2	SATA HDD power connector
③① ③②	USB2, 1	USB 2.0 connectors
③③	BAT1	RTC battery
③④	PCIE1	PCIe x4 slot
③⑤	PCIE2	PCIe x16 slot
③④	SIM1	SIM card socket
③⑤ ③⑥	COM4, 5	RS-232/422/485 selectable serial port (panel label: COM1, COM2)
③⑦ ③⑧	COM6, 7	RS-232 serial port (reserved)

3.2. Jumpers and Connectors

3.2.1. Jumpers

① JME1

Function: ME Flash Selection
Jumper Type: 2.54mm pitch, 1x2-pin header
Setting:

Pin	Description	
Short	ME Flash enable	1  2
Open	ME Flash disable (default)	1  2

② JME2

Function: Clear CMOS Selection
Jumper Type: 2.54mm pitch, 1x2-pin header
Setting:

Pin	Description	
Short	Clear CMOS	1  2
Open	Keep CMOS (default)	1  2

③ JACCON2

Function: Vehicle Acc mode selection
Jumper Type: Onboard 2.00mm-pitch 2-pin header
Setting:

Pin	Description	
Short	For automation mode (default)	1  2
Open	For vehicle mode	1  2

3.2.2. Connectors

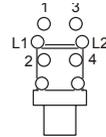
① SW1

Function Power Button

Connector Type: LED tact switch with green and red colors

Pin Assignment:

Pin	Description	Pin	Description
1	GND	2	N/A
3	BTN	4	N/A
L1	SW1_LED_N	L2	SW1_LED_P



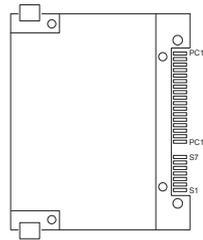
② CF1

Function: CFast Card Type I/II slot

Connector Type: 7+17-pin CFast Card connector consisting of a SATA compatible 7-pin signal connector and a 17-pin power and control connector.

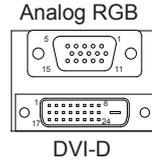
Pin Assignment:

Pin	Desc.	Pin	Desc
S1	SGND1	PC6	TBD
S2	TXP	PC7	GND
S3	TXN	PC8	LED1
S4	SGND2	PC9	LED2
S5	RXN	PC10	IO1
S6	RXP	PC11	IO2
S7	SGND	PC12	IO3
PC1	CDI	PC13	3.3V
PC2	GND	PC14	3.3V
PC3	TBD	PC15	GND
PC4	TBD	PC16	GND
PC5	TBD	PC17	CD0



③ **VGA1**

Function: Analog RGB & DVI-D Connector
Connector Type: Analog RGB (D-Sub 15-pin female type)
 + DVI-D (DVI-D female connector)



Pin Assignment:

Analog RGB Connector

Pin	Desc.	Pin	Desc.	Pin	Desc.
1	RED	6	GND	11	N/C
2	GREEN	7	GND	12	VDDAT
3	BLUE	8	GND	13	HSYNC
4	N/C	9	+5V	14	VSYNC
5	GND	10	GND	15	VDCLK

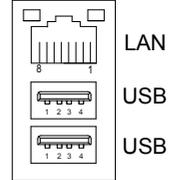
DVI-D Connector

Pin	Desc.	Pin	Desc.	Pin	Desc.
1	TMDS Data 2-	9	TMDS Data 1-	17	TMDS Data 0-
2	TMDS Data 2+	10	TMDS Data 1+	18	TMDS Data 0+
3	GND	11	GND	19	GND
4	NC	12	NC	20	NC
5	NC	13	NC	21	NC
6	DDC clock	14	+5V	22	GND
7	DDC data	15	GND	23	TMDS clock+
8	NC	16	Hot plug detect	24	TMDS clock-

Engine of the Computer

④⑤⑥ LAN3, 2, 1

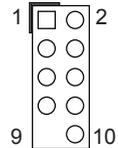
- Function:** GbE RJ-45 Ethernet connector & dual USB3.0 connectors
- Connector Type:** RJ-45 connector that supports 10/100/1000Mbps fast Ethernet USB3.0 connector Type-A connectors
- Pin Assignment:** The pin assignments conform to the industry standard.



⑦ DGP1

- Function:** External 80 port
- Connector Type:** 2.00mm-pitch 2x5-pin header
- Pin Assignment:**

Pin	Description	Pin	Description
1	CLK	2	GND
3	FRAME#	4	LAD0
5	PLTRST#	6	N.C
7	LAD3	8	LAD2
9	VCC3	10	LAD1



⑧ JPIC1

- Function:** PIC programming pin header
- Connector Type:** Onboard 2.00mm-pitch 2x3-pin header
- Pin Assignment:**

Pin	Description	Pin	Description
1	PIC_TX	2	ICSP-CLK
3	ICSP-DAT	4	LAD0
5	VCC5	6	MCU_RST



⑨⑩ CPUFAN1, SYSFAN1

Function: Fan Power Connector

Connector Type: Onboard 2.54mm pitch 1x4-pin one-wall wafer connector

Pin Assignment:

Pin	Description
1	GND
2	+12V
3	RPM
4	Control



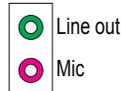
⑩ AUDIO1

Function: Audio connector

Connector Type: Double-stacked ø3.5mm stereo audio jacks

Pin Assignment:

Description
Line-out
Mic-in

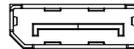


⑪ DP1

Function: DisplayPort connector

Connector Type: 19-pin DisplayPort connector

Pin Assignment: The pin assignments conform to the industry standard.

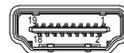


⑫ HDMI1

Function: HDMI connector

Connector Type: 19-pin HDMI connector

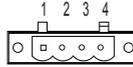
Pin Assignment: The pin assignments conform to the industry standard.



⑬ PWRIN1

Function: DC Adapter Power Input
Connector Type: 4-pin Terminal block
Pin Assignment:

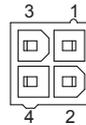
Pin	Desc.
1	VIN+
2	VIN-
3	Switch -
4	Switch +



⑭ POEOUT1

Function: PoE Power Output Connector
Connector Type: 2.54mm-pitch 4-pin header
Pin Assignment:

Pin	Desc.
1	GND
2	GND
3	DCIN
4	DCIN



⑮ JACCON1

Function: Ignition Power Connector
Connector Type: Onboard 2x1-pin box connector
Pin Assignment:

Pin	Desc.
1	Acc_ON
2	GND



⑯ DIO1

Function: Digital IO Connector
Connector Type: 2.0mm pitch 2x13 pin box header

Pin Assignment:

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



⑳ **LPT1**

Function:

On-board Parallel Port Connector

Connector Type:

2.00mm pitch 2 x13-pin box header

Pin Assignment:

Pin	Desc.	Pin	Desc.
1	STB#	14	AFD#
2	PD0	15	ERR#
3	PD1	16	INIT#
4	PD2	17	SLIN#
5	PD3	18	GND
6	PD4	19	GND
7	PD5	20	GND
8	PD6	21	GND
9	PD7	22	GND
10	ACK#	23	GND
11	BUSY	24	GND
12	PE	25	GND
13	SLCT	26	N.C



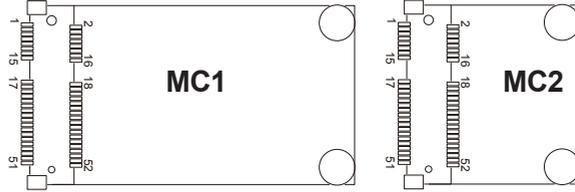
Engine of the Computer

⑱ ⑲ MC2, 1

Function: MC1: PCI Express Mini-card Full Size socket, supporting both PCI Express and USB signals.
MC2: PCI Express Mini-card Half Size socket, supporting both PCI Express and USB signals.

Connector Type: Onboard 0.8mm pitch 52-pin edge card connector

Pin Assignment: The pin assignments conform to the industry standard.

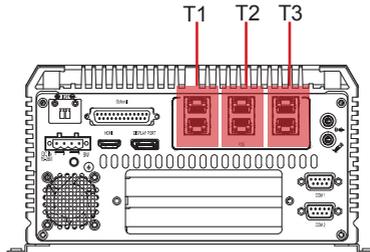
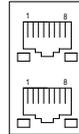


⑳ ㉑ ㉒ T1, T2, T3

Function: RJ-45 ports for GbE PoE

Connector Type: RJ-45 connector that supports 10/100/1000Mbps fast Ethernet and PoE

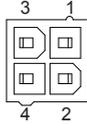
Pin Assignment: The pin assignments conform to the industry standard.



②④ PWRIN1

Function: PoE Power Input Connector
Connector Type: 2.54mm-pitch 4-pin header
Pin Assignment:

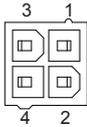
Pin	Desc.
1	GND
2	GND
3	DCIN
4	DCIN



②⑤ SCPIN1

Function: Supercapacitor power in
Connector Type: 2.54mm-pitch 4-pin header
Pin Assignment:

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



②⑥ SCPIN2

Function: Supercapacitor power out
Connector Type: 2.00mm-pitch 2-pin header
Pin Assignment:

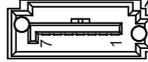
Pin	Desc.
1	+12V
2	GND



②⑦ ②⑧ SATA1, 2

Function: Serial ATA Connector
Connector Type: On-board Serial ATA Connector
Pin Assignment:

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



②⑨ ③① PWROUT1, 2

Function: SATA HDD Power Connector
Connector Type: 2.54mm pitch 1x4-pin one-wall connector
Pin Assignment:

Pin Desc.
1 +5V
2 GND
3 GND
4 +12V



③① ③② USB2, 1

Function: USB 2.0 Connectors
Connector Type: On-board 1.25mm pitch 1x5 pin wafer connector
Pin Assignment:

Pin	Description.
1	+5V
2	D-
3	D+
4	GND
5	GND



③③ BAT1

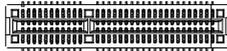
Function: RTC Battery
Connector Type: Onboard 2x1-pin box connector
Pin Assignment:

Pin	Desc.
1	BAT+
2	BAT-



③④ PCIE1

Function: PCIe x4 slot
Pin Assignment: The pin assignments conform to the industry standard.



③⑤ PCIE2

Function: PCIe x16 slot
Pin Assignment: The pin assignments conform to the industry standard.



③⑥ SIM1

Function: SIM Card Socket
Connector Type: 6-pin SIM card socket
Pin Assignment:

Pin	Desc.	Pin	Desc
C5	GND	C1	POWER VOLTAGE
C6	NC	C2	RESET SIGNAL
C7	I/O	C3	CLOCK SIGNAL



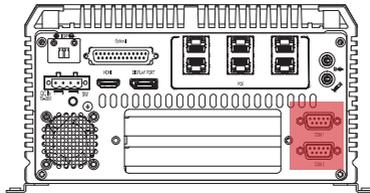
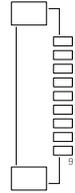
③⑦③⑧ COM4, COM5 (Panel label: COM1, COM2)

Function: RS-232/422/485 Selectable Serial Port

Connector Type: 1x9 pin ACES 1.25mm 4-wall connector

Pin Assignment:

Pin	RS-232	RS-422	RS-485
	Desc.	Desc.	Desc.
1	DCD#	TX-	D-
2	DSR#		
3	RX	TX+	D+
4	RTS#		
5	TX	RX+	
6	CTS#		
7	DTR#	RX-	
8	RI#		
9	GND		



③⑨④⑩ COM6, COM7 (Reserved)

Chapter 4

Installation and Maintenance

4.1. Install Hardware

The FPC-9002-P6 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.

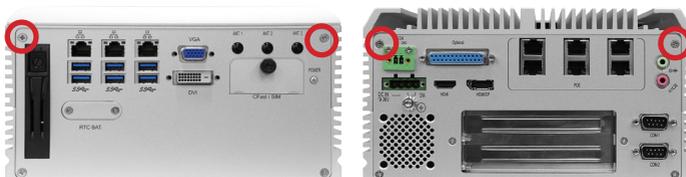
4.1.1.1. Remove Top Cover

All jumpers, CPU socket, MiniCard socket and SDRAM SO-DIMM slots are built on the top side of the main board. To access these components, the computer's top cover has to be removed. Follow through the steps below to remove the top cover.

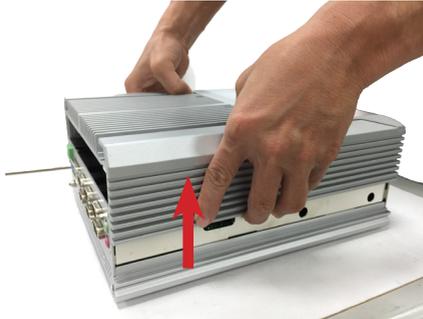
1. Place the computer on a flat surface. Loosen and remove the 4 screws as shown below.



2. Loosen and remove the 2 screws on the front and rear panels respectively as shown below.



3. Carefully lift the top cover and then completely remove the top cover from the computer.



The inside of the computer is revealed.

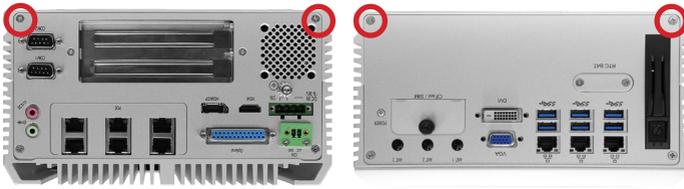


4.1.1.2. Remove the Bottom Cover

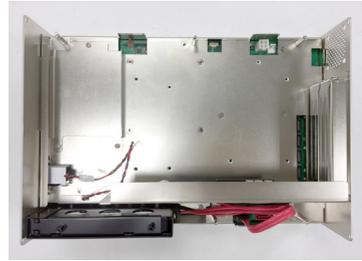
The Serial ATA connectors, the power connectors for SATA storage devices, and the internal USB ports, PCI/PCIe slots are all built on the bottom side of the main board. To access these connectors, the computer's bottom cover has to be removed. Follow through the steps below to remove the bottom cover from the computer.

1. Place the computer upside down on a flat surface. Loosen and remove the 2 screws on the bottom side of front and rear panels respectively as shown below.

Installation & Maintenance



2. After removing the screws, carefully lift and remove the bottom cover from the computer. This should reveal the inside of the computer.

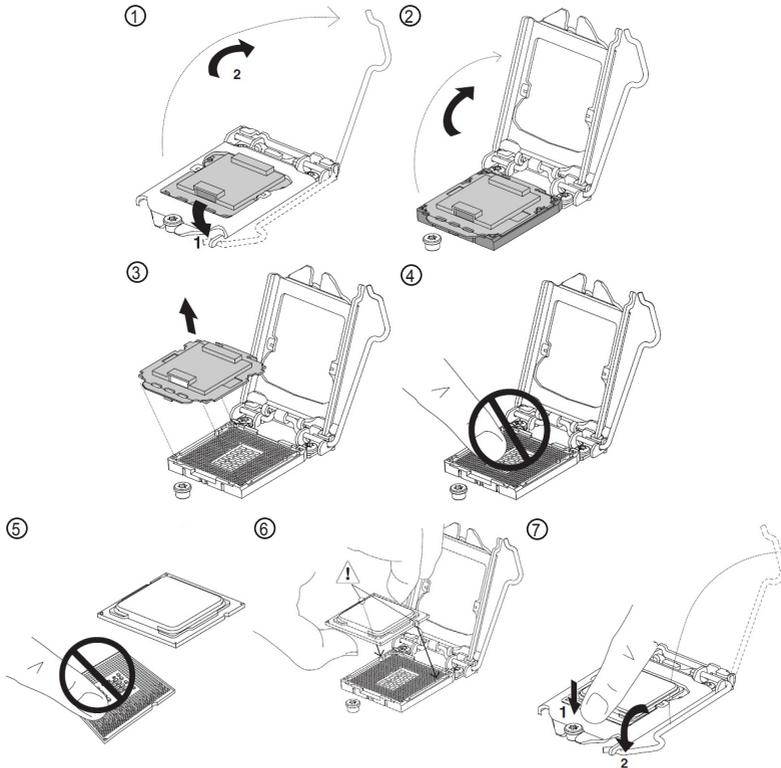


4.1.2. Install CPU

1. Remove the top cover from the computer as described in [4.1.1.1. Remove Top Cover](#) on page [30](#).
2. Locate the CPU socket on the main board

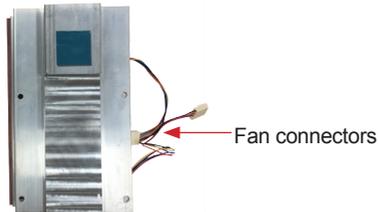


The processor socket comes with a lever to secure the processor. Please refer to the pictures step by step as below and note that the cover of the socket must always be installed during transportation to avoid damage to the socket.

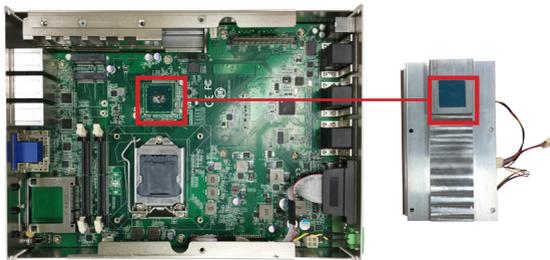


Installation & Maintenance

3. Find the heat sink in the accessory box. Attach the thermal pad to the heat sink, and remove the blue release liner.



4. Apply the thermal paste to the CPU.
5. Place the heat sink on the CPU and PCH. Make sure that the thermal pad is in complete contact with the PCH chipset and the heat sink is in complete contact with the CPU to avoid overheating problem. If not, it would cause your system or CPU hanged, unstable or damaged.



6. For heat sink w/ SMART FAN, connect the fan cable of each fan to the connectors on the system board.



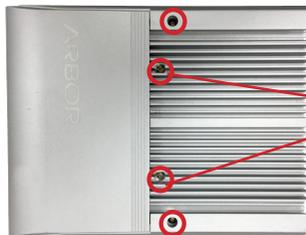
Caution: Make sure the fan cables are properly routed. DO NOT route the cables over the heat sink.

7. Secure the heat sink with 4 screws.



8. Restore the top cover to the computer by fastening the 4 screws as shown below. Note that the 2 screws in the middle are used to secure the top cover to the heat sink. Make sure they are tightened to ensure the heat dissipation.

Caution: For models using heat sink with SMART FAN, if the top cover cannot be tightened, make sure the CPU and system fan cables are not placed over the heat sink.



Make sure to tighten the screws to ensure the heat dissipation.

4.1.3. Install/Uninstall Memory Modules

The main board has two memory module (DIMM) sockets. Increase memory capacity to make programs run faster on the system. The memory module for the FPC-9002-P6' SO-DIMM sockets should be a 260-pin DDR4 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.

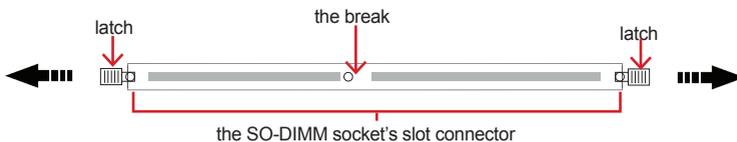
To install a DDR4 memory module:

1. Remove the top cover from the computer as described in [4.1.1.1. Remove Top Cover](#) on page [30](#).
2. Locate the SO-DIMM sockets on the main board.



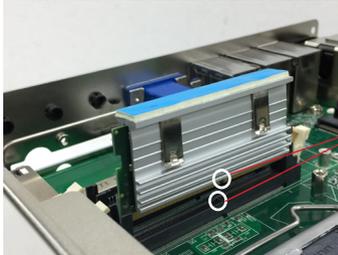
The SO-DIMM sockets are vertical type, and each socket has two latches for fixing the memory modules. The memory module can only be installed by one direction due to the notch.

3. Pull the two release latches on the sides of the memory socket.



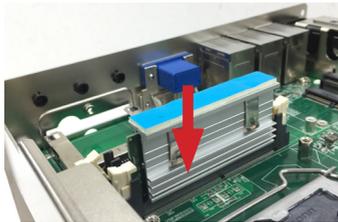
Vertical-type SO-DIMM socket (overview)

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.



Align the notch on the memory module with the notch in the memory socket.

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

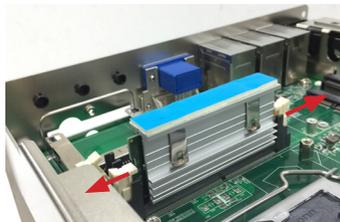


6. Restore the top cover to the computer.

To uninstall a DDR4 memory module:

1. Pull the two release latches on the sides of the memory socket.

The DDR4 memory module will be auto-released from the socket.



Installation & Maintenance

2. Remove the memory module.
3. Restore the top cover to the computer.

4.1.4. Install Wi-Fi Module

1. Remove the top cover from the computer as described in [4.1.1.1. Remove Top Cover](#) on page [30](#).
2. Locate the **Mini PCIe** socket for wireless module. Note that the socket has a break among the connector.

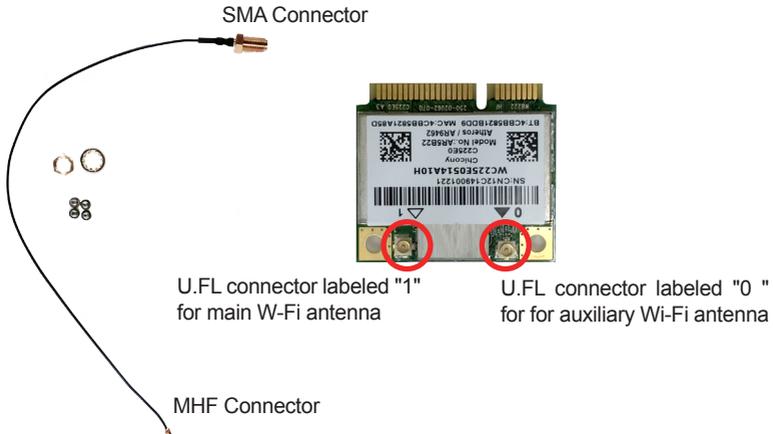
Mini PCIe socket
for Wi-Fi module



The module's key notch should meet the connector's break.

3. Connect the antenna to your wireless module. The wireless module comes with two U.FL connectors - one is "1" and the other is "0". Always follow the connections below for best signal reception.

If you are using only one antenna, connect the antenna's MHF end to the connector labeled "1".



4. Then plug the Wi-Fi module to the socket's connector by a slanted angle. Fully insert the module, and note that the notch on the wireless module should meet the break of the connector.



The module's key notch should meet the connector's break.

5. Press the module down and fix the module in place using the screw.



Installation & Maintenance

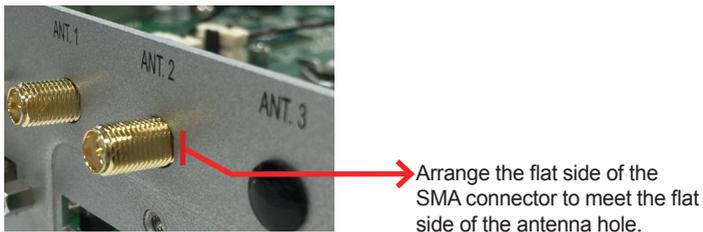
6. Locate the SMA antenna holes on front panel. Remove the plastic plug to make an antenna hole. Keep the plastic plug for any possible restoration in the future.



7. From the SMA end of the RF antenna, remove the washer and the nut. Save the washer and nut for later use. Note that the SMA connector is in the form of a threaded bolt, with one flat side.



8. Pull the SMA connector through the above mentioned antenna hole. Note to meet the aforesaid flattened side with the antenna hole's flat side.



9. Mount the washer first and then the nut to the SMA connector. Make sure the nut is tightened.



10. Have the external antenna(s). Screw and tightly fasten the antenna(s) to the SMA connector.



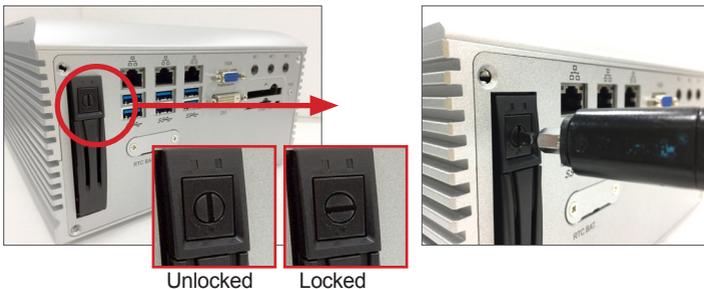
4.1.5. Install SATA Storage Devices

4.1.5.1. Install Outside Accessible SATA Storage Device

The computer comes with an outside accessible HDD/SSD tray for SATA storage installation. Follow the steps below to install the storage device.



1. The outside accessible HDD/SSD tray comes with a lock. To eject the tray, use a flat head screwdriver to unlock the tray.



Installation & Maintenance

2. Press the drive eject button as shown below to eject the HDD/SSD tray.
3. Slide the HDD/SSD storage device into the bracket with the connector side facing toward the internal side.



4. Fix the storage device in place by fastening the 2 screws on both sides of the tray .



5. Slide the tray back into the slot.

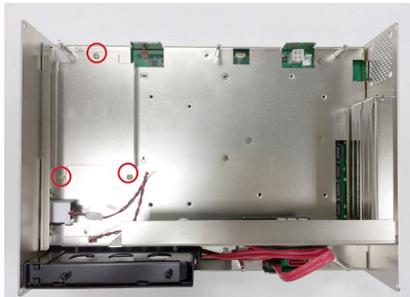


6. Press the eject button first to further slide in the tray. (Do not press the lever directly.) When the lever returns a little bit, press the lever to completely slide the tray back into the drive bay.



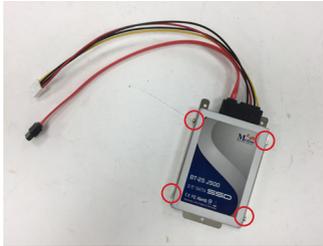
4.1.5.2. Install Internal SATA Storage Device

1. Remove the bottom cover from the computer as described in [4.1.1.2. Remove the Bottom Cover](#) on page 31..
2. Find the HDD/SSD brackets inside the computer. Loosen and remove the screws as marked in the illustration below. Then dismount the brackets from the computer.



3. Attached the SATA cable to the HDD/SSD storage device. Slide the HDD/SSD storage device into the bracket and fix the storage device in place by fastening the 2 screws on both sides of the bracket .

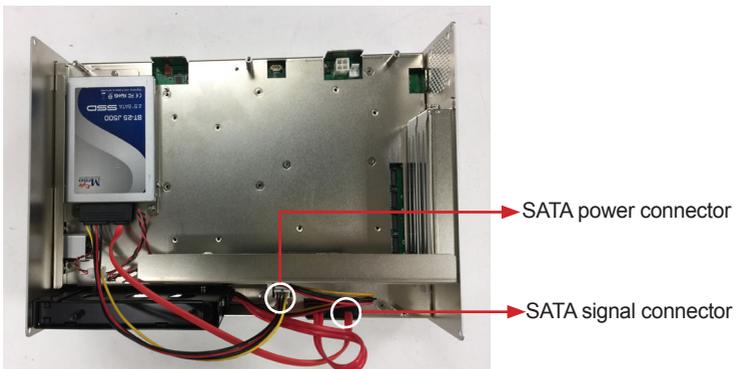
Installation & Maintenance



4. Install the bracket with the storage device back into the computer by refastening the 3 screws.



5. Connect the SATA signal cable and power cable.



6. Restore the bottom cover to the computer.

4.1.6. Install PCI and PCI Express Cards

To install a PCI or PCI Express card:

1. Remove the bottom cover from the computer as described in [4.1.1.2. Remove the Bottom Cover](#) on page [31](#).
2. Use a cross head screwdriver to loose the screw that secure the expansion slot bracket. And then you can install a PCIe card to this expansion slot.



3. Restore the bottom cover to the computer.

4.1.7. Install/uninstall CFAST Card

The computer supports a CFAST card for storage and comes with an outside-accessible CFAST slot. Follow the steps 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.

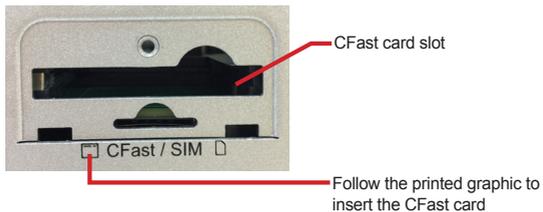
Installation & Maintenance

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.



3. Position the CFast card as directed by the graphic printed on the front panel. Insert the CFast card all the way into the slot.



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: Make sure to refasten the screw to close the card door each time the CFast card is installed or uninstalled.

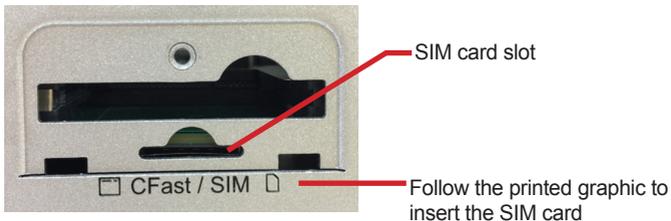
4.1.8. Install/uninstall SIM Card

Follow through the guide below 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.



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: Make sure to refasten the screw to close the card door each time the SIM card is installed or uninstalled.

4.2. 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.



4.3. Wire DC-in Power Source

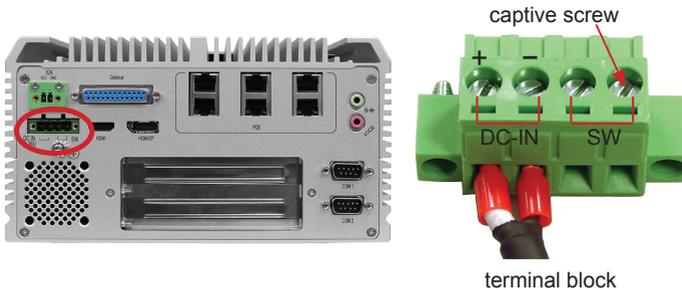
4.3.1. Automation Mode

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



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

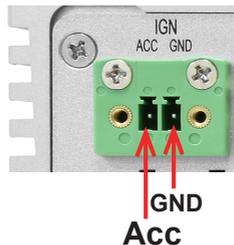
1. Before wiring, make sure the power source is disconnected.
2. Find the terminal block in the accessory box.
3. Use the wire-stripping tool to strip a short insulation segment from the output wires of the DC power source.
4. Identify the positive and negative feed positions for the terminal block connection. 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.



4.3.2. Vehicle Application Mode

Follow the instructions below for connecting the computer to a vehicle power source.

1. Make sure JACCON2 jumper is open for vehicle power mode. (Refer to [Section 3.2.1. Jumpers on page 17.](#))
2. For vehicle application, DC power Input wiring pin configuration is as below. Please connect the Acc pin with your car Acc, and the device will be activated when you turn your ignition key to Acc.



4.4. Replace RTC Battery

The computer comes with a built-in supercapacitor CMOS so that users can replace RTC battery without losing settings. To replace the RTC battery:

1. Remove the 2 screws that secure the RTC service battery window.



2. Pull out the RTC battery and disconnect the battery cable from its connector on the system board.



3. Using a non-metallic tool, pry up the RTC battery from the adhesive that secures it to bracket.
4. Replace the RTC battery and reconnect the battery cable to the connector on the system board.
5. Restore the service window and fasten the 2 screws to secure the RTC service battery window.

This page is intentionally left blank.

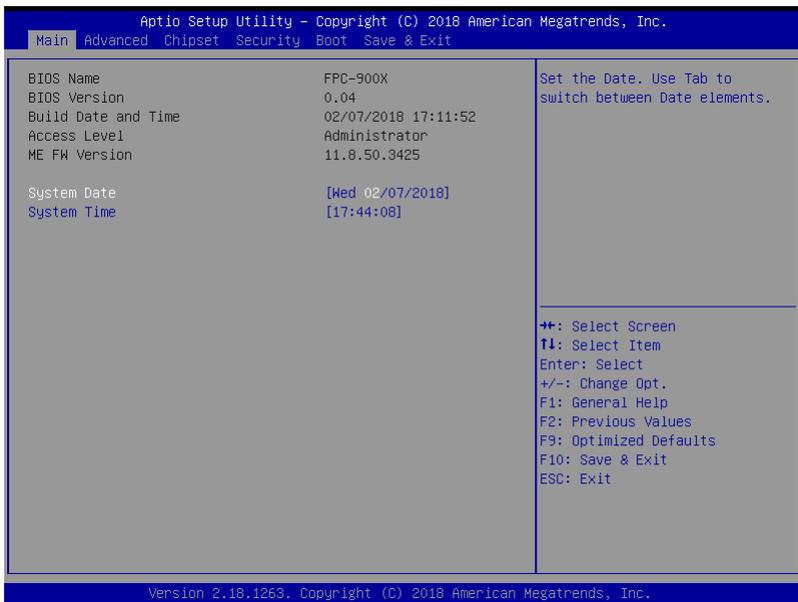
Chapter 5

BIOS

BIOS

The BIOS Setup utility for the FPC-9002-P6 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 56
Advanced	See 5.2. Advanced on page 57
Chipset	See 5.3. Chipset on page 72
Security	See 5.4 Security on page 78
Boot	See 5.5. Boot on page 79
Save & Exit	See 5.6. Save & Exit on page 81

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	<ul style="list-style-type: none"> ▶ 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.
F2	Previous values
F9	Optimized defaults
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.)

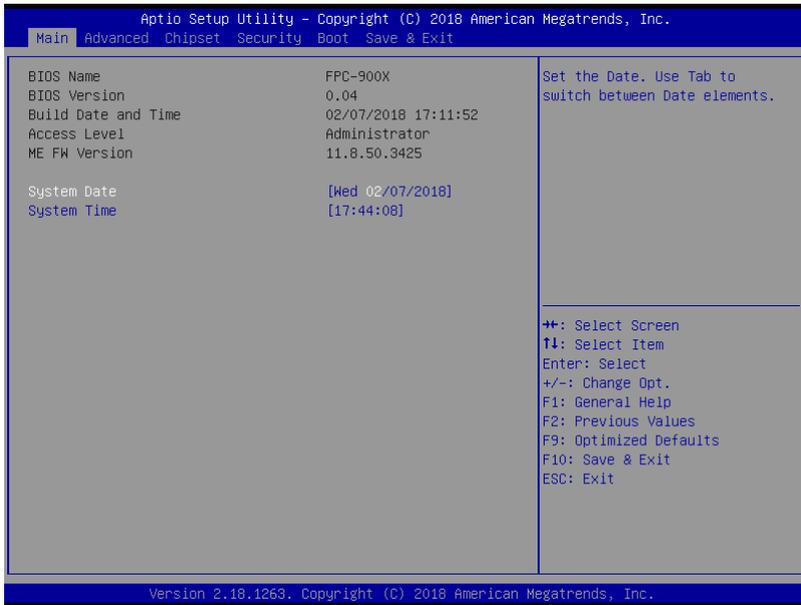
Note: Pay attention to the "WARNING" that shows at the left pane onscreen when making any change to the BIOS settings.

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.

BIOS

5.1. Main

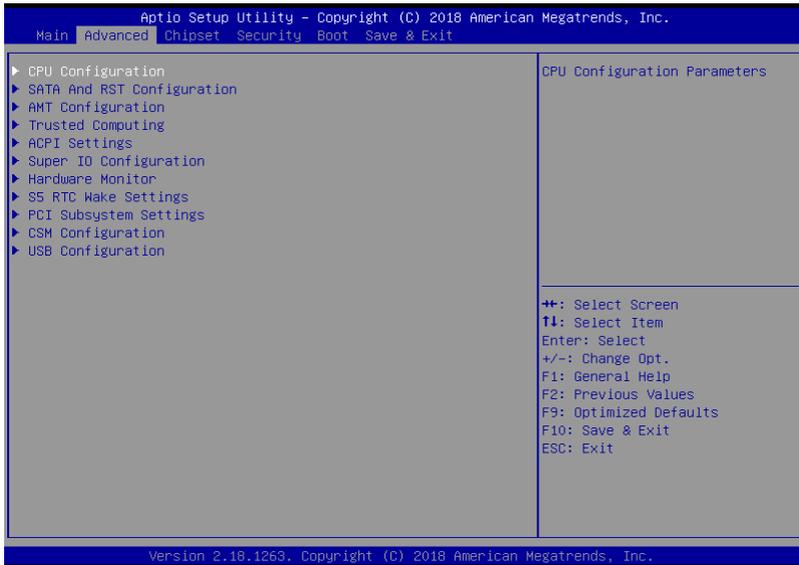
The **Main** menu features the settings of **System Date** and **System Time** and displays some BIOS info.



The featured settings are:

Setting	Description
System Date	Set the system date. Use Tab to switch between Data elements. Note that the 'Day' automatically changes when you set the date. ▶ The date format is: Day: Sun to Sat Month: 1 to 12 Date: 1 to 31 Year: 1998 to 2099
System Time	Set the system time. Use Tab to switch between Time elements. ▶ The time format is: Hour: 00 to 23 Minute: 00 to 59 Second: 00 to 59

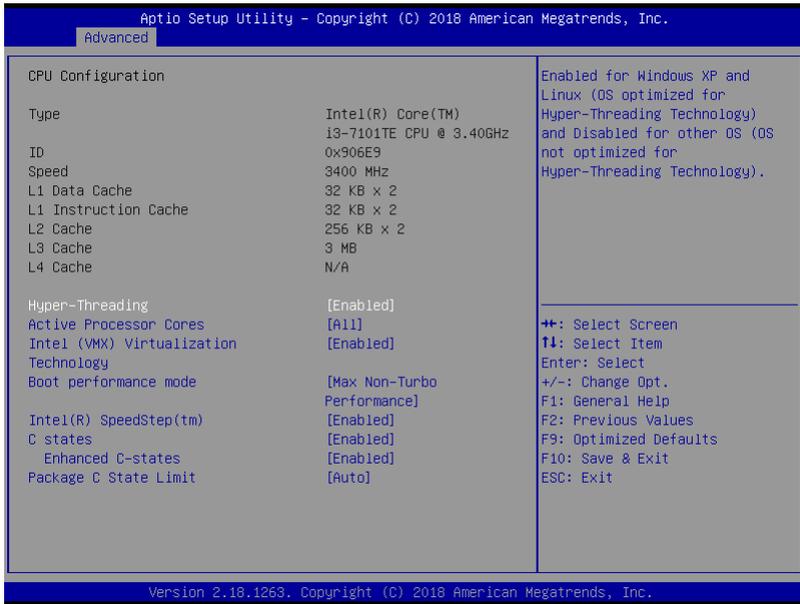
5.2. Advanced



The featured settings and submenus are:

Setting	Description
CPU Configuration	See 5.2.1. CPU Configuration on page 58 .
SATA And RST Configuration	See 5.2.2. SATA and RST Configuration on page 60 .
AMT Configuration	See 5.2.3. AMT Configuration on page 61
Trusted Computing	See 5.2.4. Trusted Computing on page 62
ACPI Settings	See 5.2.5. ACPI Settings on page 63
Super IO Configuration	See 5.2.6. Super IO Configuration on page 64
Hardware Monitor	See 5.2.7. Hardware Monitor on page 66 .
SS RTC Wake Settings	See 5.2.8. S5 RTC Wake Settings on page 67 .
PCI Subsystem Settings	See 5.2.9. PCI Sybssystem Settings on page 68
CSM Configuration	See 5.2.10. CSM Configuration on page 69
USB Configuration	See 5.2.11. USB Configuration on page 70 .

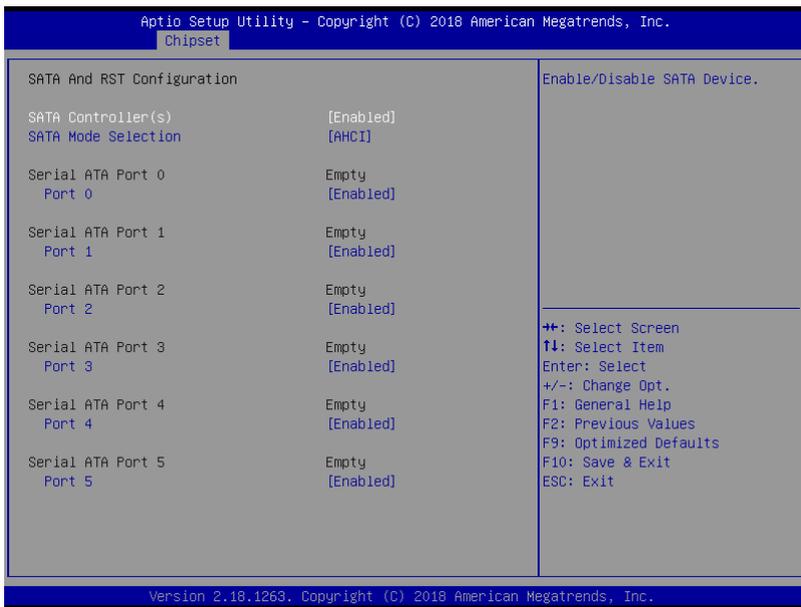
5.2.1. CPU Configuration



Setting	Description
Hyper-Threading	Enabled (default) for Windows XP and Linux (OS optimized for Hyper-Threading Technology) and Disabled for other OS (OS not optimized or Hyper-Threading Technology). When disabled only one thread per enabled core is enabled.
Active Processor Cores	Number of cores to enable in each processor package. ▶ Options: All (default) and 1
Intel (VMX) Virtualization Technology	When enabled, a VMM can utilize the additional hardware capabilities provided by Vanderpool Technology ▶ Options: Enabled (default) or Disabled
Boot performance Mode	Set the performance state that the BIOS will set before the OS handoff. ▶ Options: Max Battery , Max Non-Turbo Performance (default) and Turbo Performance .
Intel (R) Speed Step (tm)	Enable (default)/ Disable Intel SpeedStep. Allows more than two frequency ranges to be supported.

Turbo Mode	Only available when Intel Speed Step is Enabled . Enable /Disable (default) Turbo Mode (requires EMTTM enabled, unless max turbo ratio is bigger than 16 - SKL AO W/A.
C States	Enable (default) / Disable CPU power management. Allows CPU to go to C state when it's not 100% utilized.
Enhanced C-states	Only available when CPU C States is Enabled . Enable (default) / Disable C1E. When enabled, CPU will switch to minimum speed when all cores enter C-State.
Package C State Limit	Only available when CPU C States is Enabled . Maximum Package C State Limit setting. Set package C State limit. ▶ Options: Auto (default, initializes to deepest available package C state limit), CPU Default (leaves to factory default value), C10, C9, C8, C7S, C7, C6, C3, C2, C0/C1

5.2.2. SATA and RST Configuration



Setting	Description
SATA Controller(s)	Enables (default) / disables SATA device(s).
SATA Mode Selection	Configures how SATA controller(s) operate. ▶ Options: AHCI (default) and Intel RST premium With Intel Optane System Acceleration .
Serial ATA Port 0~5	SATA device information. *Available SATA ports depend on your model.
Port 0~5	Enables (default) / disables the SATA port.

5.2.3. AMT Configuration

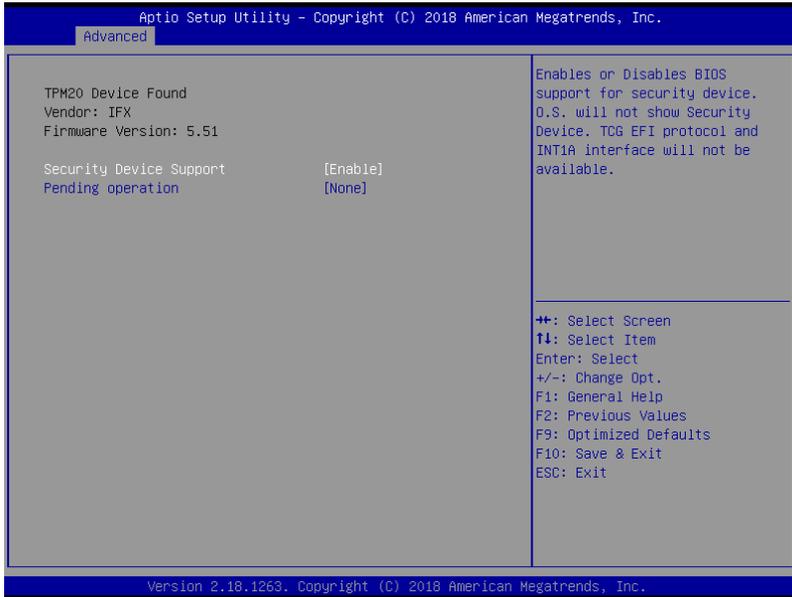
Intel® Active Management Technology (Intel® AMT) is a hardware-based solution that uses out-of-band communication for system administrators to monitor and manage the computers and other network equipment by remote control even if the hard drive is crashed, the system is turned off or the operating system is locked. This submenu features the settings of iAMT's BIOS extension, which are required to make use of iAMT.



Setting	Description
AMT BIOS Features	Enables (default) / disables AMT BIOS features. When disabled, AMT BIOS features are no longer supported and user is no longer able to access MEBx Setup. Note: This option doesn't disable Manageability Features in FW.

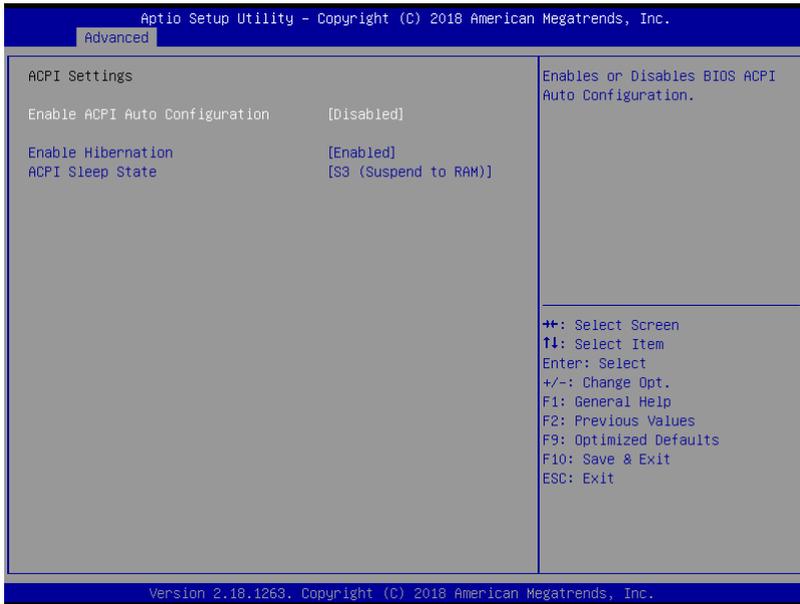
BIOS

5.2.4. Trusted Computing



Setting	Description
Security Device Support	Enable (default) or Disable BIOS support for security device.
Pending operation	Schedule an Operation for the security Device. Your computer will reboot during restart in order to change State of Security Device. ▶ Options: None (default) and TPM Clear

5.2.5. ACPI Settings



Setting	Description
Enable ACPI Auto Configuration	Enables or Disables (default) BIOS ACPI Auto Configuration
Enable Hibernation	Enables (default) or Disables System ability to Hibernate (OS/S4 Sleep State). This option may be not effective with some OS.
ACPI Sleep State	Select ACPI sleep state the system will enter when the SUSPEND button is pressed. ► Options: Suspend Disabled and S3 (Suspend to RAM) (default)

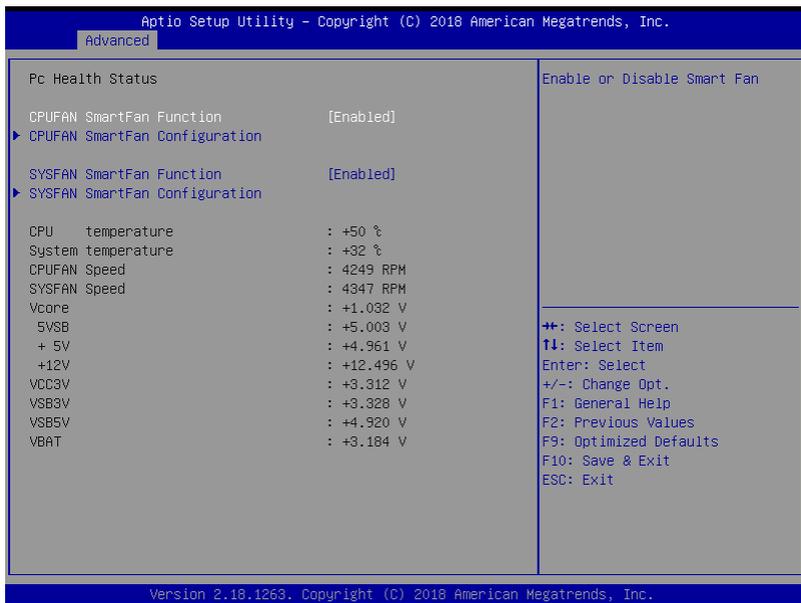
5.2.6. Super IO Configuration



Setting	Description
Serial Port 1/2 Configuration	
Serial Port	Enable (default) or Disable Serial Port (COM).
Change Settings	<p>Select an optimal setting for Super IO device.</p> <ul style="list-style-type: none"> ▶ Options for Serial Port 1: <ul style="list-style-type: none"> IO=3F8h; IRQ=4 (default) ; IO=3F8h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12; IO=2F8h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12; IO=3E8h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12; IO=2E8h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12; ▶ Options for Serial Port 2: <ul style="list-style-type: none"> IO=2F8h; IRQ=3 (default) IO=3F8h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12; IO=2F8h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12; IO=3E8h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12; IO=2E8h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12

Mode Select	Select RS-232 (default), RS-422 , RS-485 , RS-422 Termination Resistor or RS-485 Termination Resistor
Parallel Port Configuration	
Parallel Port	Enable (default) or Disable Parallel Port (LPT/LPTE).
Change Settings	Select an optimal setting for Super IO device. ▶ Options: Auto (default) ; IO=378h; IRQ=5; IO=378h; IRQ=5, 6, 7, 9, 10, 11, 12; IO=278h; IRQ=5, 6, 7, 9, 10, 11, 12; IO=3BCh; IRQ=5, 6, 7, 9, 10, 11, 12;
Device Mode	Change the printer port mode: ▶ Options: 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

5.2.7. Hardware Monitor



Setting	Description
CPUFAN SmartFan Function	Enables (default) or Disables Smart Fan
CPUFAN SmartFan Configuration`	Temperature 1~4 & RPM Percentage 1~4 Auto fan speed control. Fan speed will follow different temperature by different PRM 1-100.
SYSFAN SmartFan Function	Enables (default) or Disables Smart Fan
SYSFAN SmartFan Configuration`	Temperature 1~4 & RPM Percentage 1~4 Auto fan speed control. Fan speed will follow different temperature by different PRM 1-100.

Note: CPUFAN & SYSFAN functions only apply to SKUs with smart fan. If your SKU doesn't come with smart fan, ignore these settings.

5.2.8. S5 RTC Wake Settings



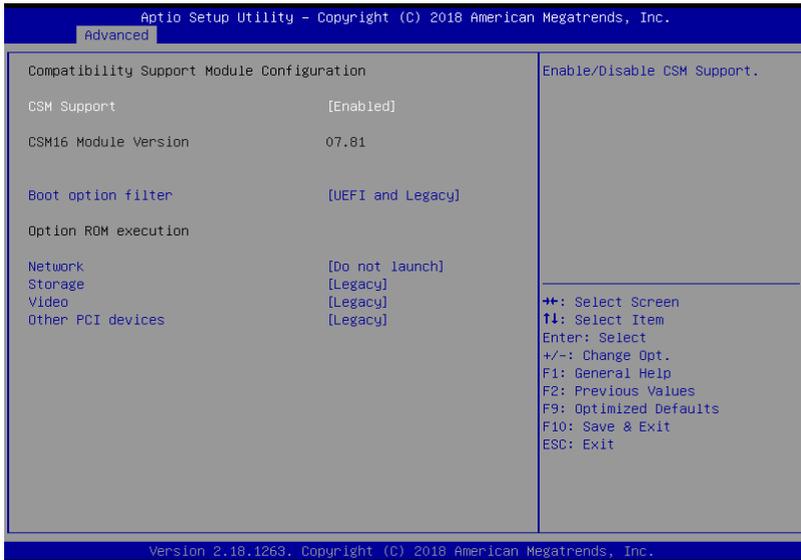
Setting	Description
Wake System from S5	<p>Enable or Disable (default) system wake on alarm event.</p> <ul style="list-style-type: none"> Options available are: <ul style="list-style-type: none"> Disabled (default): Fixed Time: System will wake on the hr::min::sec specified. DynamicTime: If selected, you need to set Wake up minute increase from 1 - 5. System will wake on the current time + increase minute(s).

5.2.9. PCI Sybssystem Settings



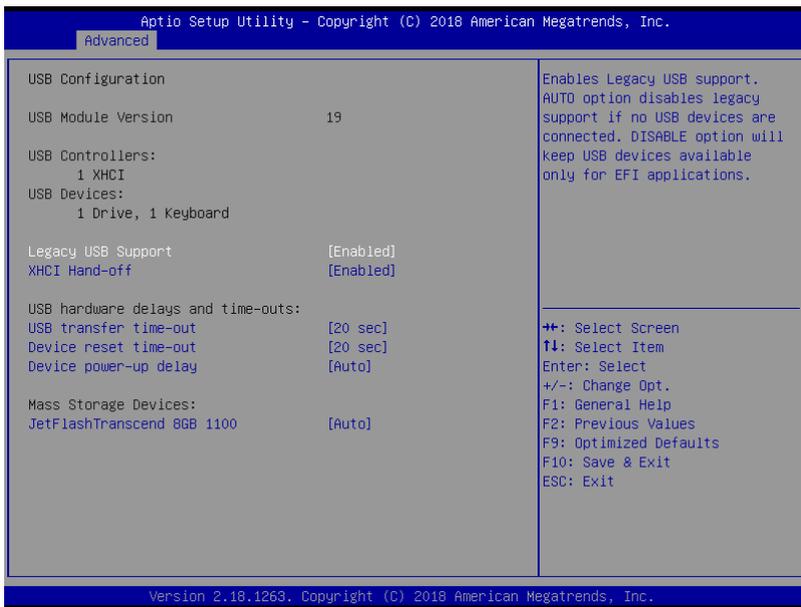
Setting	Description
PCI Latency Timer	Value to be programmed into PCI Latency Timer Register. ▶ Options: 32 (default), 64, 96, 128, 160, 192, 224 and 248 PCI Bus Clocks.
PCI-X Latency Timer	Value to be programmed into PCI-X Latency Timer Register. ▶ Options: 32, 64 (default), 96, 128, 160, 192, 224 and 248 PCI Bus Clocks.
Above 4G Decoding	Enable/Disable (default) 64bit capable Devices to be Decoded in Above 4G Address Space (Only if System Supports 64 bit PCI Decoding).

5.2.10. CSM Configuration



Setting	Description
CSM Support	Enable (default) or Disable CSM Support.
Boot option filter	Control the Legacy/UEFI ROMs priority. ▶ Options: UEFI and Legacy (default), Legacy only and UEFI only
Network	Control the execution of UEFI and Legacy PXE OpROM ▶ Options: Do not launch (default), UEFI and Legacy
Storage	Control the execution of UEFI and Legacy Storage OpROM ▶ Options: Do not launch and Legacy (default)
Video	Control the execution of UEFI and Legacy Video OpROM ▶ Options: UEFI and Legacy (default)
Other PCI devices	Determines OpROM execution policy for devices other than network, storage or video ▶ Options: Do not launch and Legacy (default)

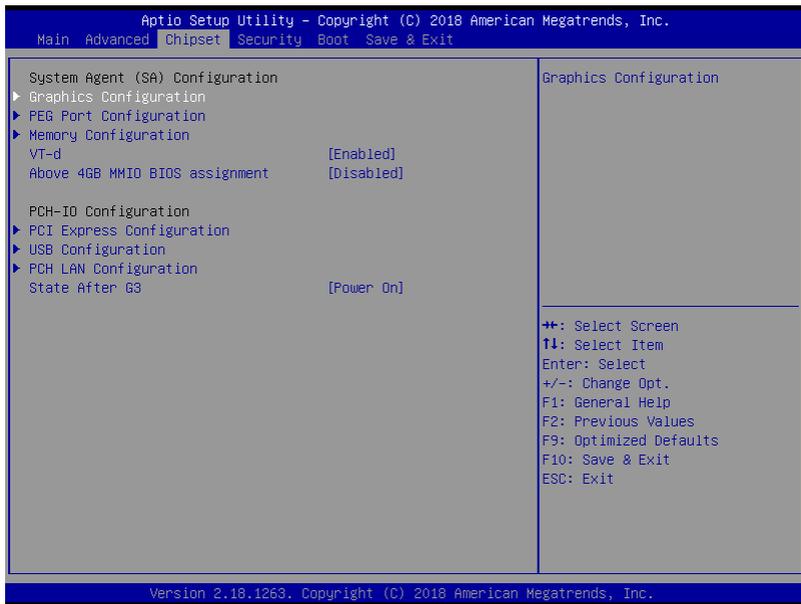
5.2.11. USB Configuration



Setting	Description
Legacy USB Support	<p>Enables/disables legacy USB support.</p> <ul style="list-style-type: none"> ▶ 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.
XHCI Hand-off	<p>This is a workaround for OSEs without XHCI hand-off support. The XHCI ownership change should be claimed by XHCI driver.</p> <ul style="list-style-type: none"> ▶ The optional settings are: Enabled (default) / Disabled.
USB Transfer time-out	<p>Use this item to set the time-out value for control, bulk, and interrupt transfers.</p> <ul style="list-style-type: none"> ▶ Options: 1 sec, 5 sec, 10 sec, 20 sec (default).

Device reset time-out	Use this item to set USB mass storage device start unit command time-out. ▶ Options available are: 10 sec, 20 sec (default), 30 sec, 40 sec
Device power-up delay	Use this item to set maximum time the device will take before it properly reports itself to the host controller. 'Auto' uses default value: for a root port it is 100 ms, for a hub port the delay is taken from hub descriptor. ▶ Options available are: Auto: Default Manual: Select Manual you can set value for the following sub-item: 'Device Power-up delay in seconds', the delay range in from 1 to 40 seconds, in one second increments.

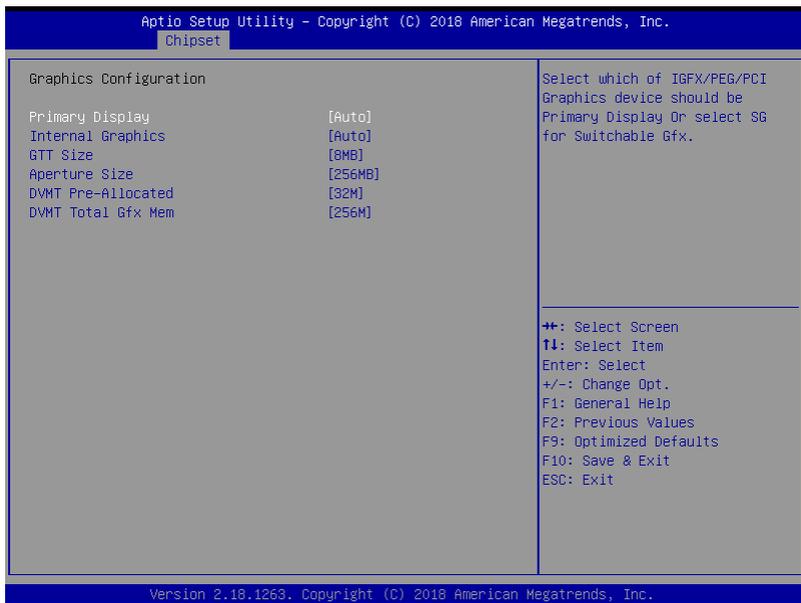
5.3. Chipset



Setting	Description
System Agent (SA) Configuration	
Graphics Configuration	See 5.3.1.1. Graphics Configuration on page 74
PEG Port Configuration	PEG port options Enable Root Port: Enable or Disable the root port. ▶ Options: Auto (default), Enabled and Disabled . Max Link Speed: Configure PEG 0:1:0 Max Speed. ▶ Options: Auto (default), Gen1 , Gen 2 and Gen3 .
Memory Configuration	Access this submenu to view the memory configuration.
VT-d	Enable (default) or Disable VT-d function
Above 4GB MMIO BIOS assignment	Enable or Disable (default) Above 4GB MMIO BIOS assignment. This is enabled automatically when aperture size is set to 2048MB.
PCH-IO Configuration	

PCI Express Configuration	See 5.3.1.2. PCI Express Configuration on page 75
USB Configuration	See 5.3.1.3. USB Configuration on page 76
PCH LAN Controller	See 5.3.1.4. PCH LAN Configuration on page 77
State After G3	Specify what state to go to when power is re-applied after a power failure (G3 state). ▶ Options available are Power On (default), Power Off and Last State .

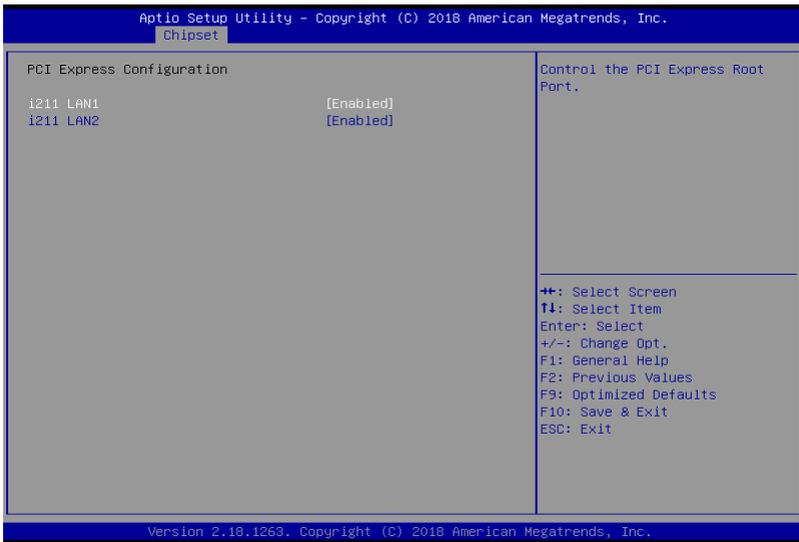
5.3.1.1. Graphics Configuration



Setting	Description
Primary Display	Select the Graphics device which will be activated as Primary Display. ▶ Options available are Auto (default), IGFX , PEG and PCI
Internal Graphics	Enables/disables the IGD. ▶ Options available are Auto (default), Disabled , and Enabled .
GTT Size	Select the GTT Size. ▶ Options: 4MB , 2MB and 8MB (default).
Aperture Size	Select the Aperture Size. Note that above 4GB MMIO BIOS assignment is automatically enabled when selecting 2048MB aperture. To use this feature, please disable CSM support. ▶ Options: 128MB , 256MB (default), 512MB , 1024MB and 2048MB

DVMT Pre-Allocated	Select the DVMT 5.0 Pre-allocated (Fixed) Graphic Memory size used by the Internal Graphic Device. ▶ 32M is the default.
DVMT Total Gfx Mem	Select the DVMT 5.0 Total Graphic Memory size used by the Internal Graphic Device. ▶ Options: 128M , 256M (default) and Max .

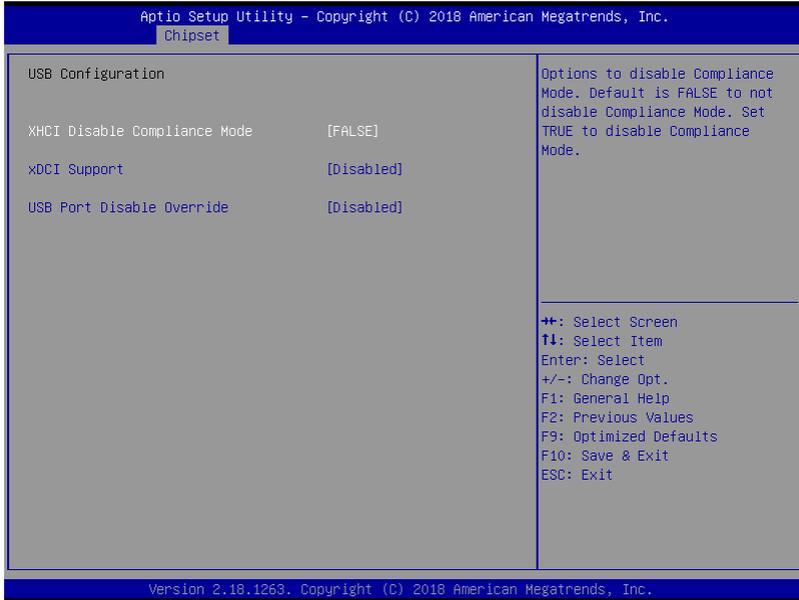
5.3.1.2. PCI Express Configuration



Setting	Description
i211 LAN1	Enable (default) or disable the PCI Express Root Port.
i211 LAN2	Enable (default) or disable the PCI Express Root Port.

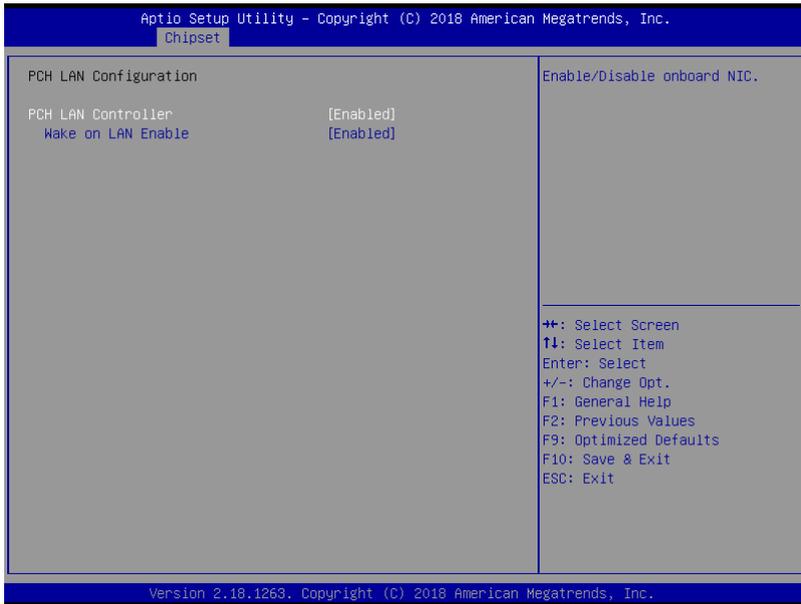
BIOS

5.3.1.3. USB Configuration



Setting	Description
XHCI Disable Compliance Mode	Options to disable Compliance Mode. Default is FALSE (default) to not disable Compliance Mode. Set TRUE to disable Compliance Mode.
xDCI Support	Enable/disable (default) xDCI (USB OTG Device).
USB Port Disable Override	Selectively enable/disable (default) the corresponding USB port from reporting a device connection to the controller.

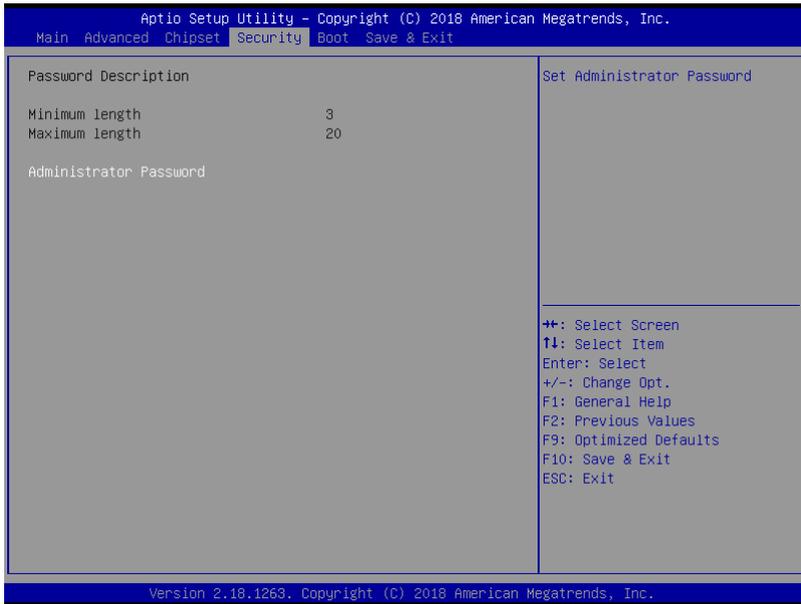
5.3.1.4. PCH LAN Configuration



Setting	Description
PCH LAN Controller	Enabled (default) / disabled onboard NIC. If enabled, "Wake on LAN" option will be available to enable (default) / disable integrated LAN to wake the system. (The Wake On LAN cannot be disabled if ME is on at Sx state.)
Wake on LAN Enable	Enable (default) or disable integrated LAN to wake the system.

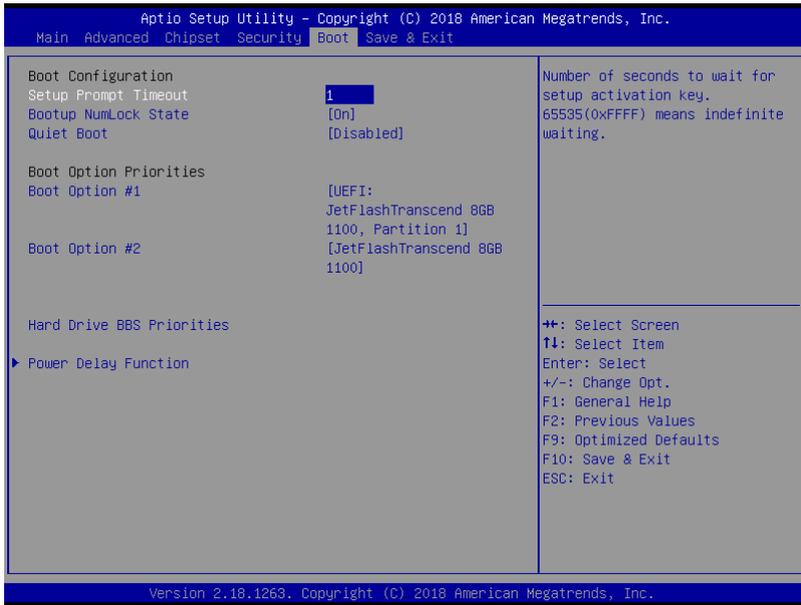
BIOS

5.4 Security



Setting	Description
Administrator Password	To set up an administrator password: <ol style="list-style-type: none">1. Select Administrator Password.2. An Create New Password dialog then pops up onscreen.3. Enter your desired password that is no less than 3 characters and no more than 20 characters.4. Hit [Enter] key to submit.

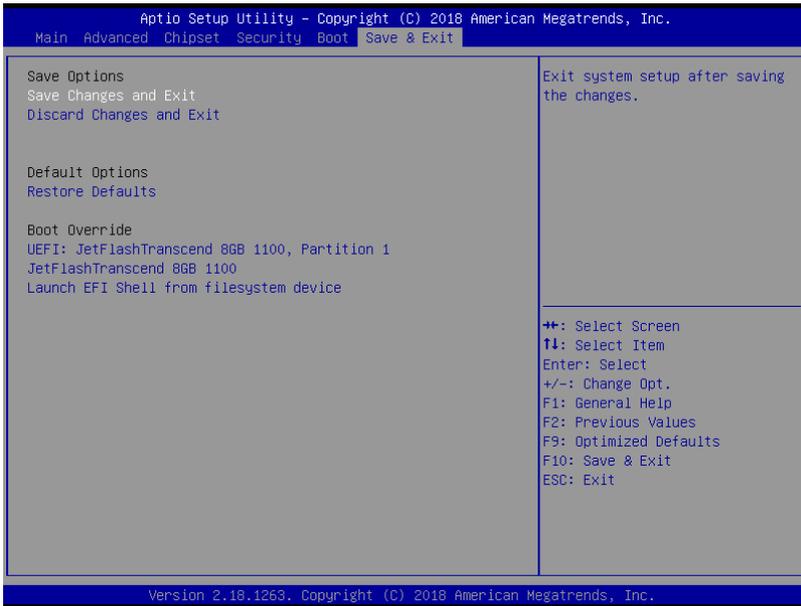
5.5. Boot



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.
Boot Option Priorities	Set the system boot order.

Hard Drive BBS Priorities	Sets the order of the legacy devices in this group. BBS means "BIOS Boot Specification".
Power Delay Function	<p>Power Delay Function Set the system support power delay function.</p> <ul style="list-style-type: none">▶ Options: Enable (default): Support power delay function. Disable: Power on/off manually operated. <p>Power on delay Select the time which the system will power on.</p> <ul style="list-style-type: none">▶ Options: Manually Operator (default), 04 Seconds, 08 Seconds and 16 Seconds. <p>Power off delay Select the time which the system will shutdown.</p> <ul style="list-style-type: none">▶ Options: Manually Operator (default), 30 Seconds, 60 Seconds and 90 Seconds.

5.6. Save & Exit



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. ▶ P0: mSATA-I50: Select the device to boot up the system regardless of the currently configured boot priority. ▶ Launch EFI Shell from filesystem device: Attempts to launch EFI Shell Application (Shell.efi) from one of the available filesystem devices.

This page is intentionally left blank.



Appendices

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 <math.h>
#include <stdio.h>
#include <dos.h>

int sioIndex = 0x2E;
int sioData = 0x2F;

int main(void)
{
    int iData;

    SioGPIOMode(0xFF00);
    delay(2000);

    SioGPIOData(0x5500);
    delay(2000);

    iData = SioGPIOStatus();
    printf(" Input : %2x \n",iData);
    delay(2000);

    SioGPIOData(0xAA00);
    delay(2000);

    iData = SioGPIOStatus();
    printf(" Input : %2x \n",iData);
    delay(2000);

    return 0;
}

void SioGPIOMode(int iMode)
{
    int iTemp;

    outportb(sioIndex,0x87); /* Enable
Super I/O */
    outportb(sioIndex,0x87);

    outportb(sioIndex,0x07); /* Select
```

```

logic device - GPIO */
    outportb(sioData, 0x06);

    outportb(sioIndex,0x30);                                /* Enable
GPIO */
    outportb(sioData, 0x01);

        iTemp = iMode & 0x00FF;
    outportb(sioIndex,0xA0);                                /* GPIO
50~57 - Output Enable */
    outportb(sioData,iTemp);

        iTemp = (iMode & 0xFF00) >> 8;
    outportb(sioIndex,0xF0);                                /* GPIO
00~07 - Output Enable */
    outportb(sioData,iTemp);

        outportb(sioIndex,0xAA);                            /* Disable
Super I/O */
}

void SioGPIOData(int iData)
{
    int iTemp;

    outportb(sioIndex,0x87);                                /* Enable
Super I/O */
    outportb(sioIndex,0x87);

    outportb(sioIndex,0x07);                                /* Select
logic device - GPIO */
    outportb(sioData, 0x06);

        iTemp = iData & 0x00FF;
    outportb(sioIndex,0xA1);                                /* GPIO
50~57 - Output Data */
    outportb(sioData,iTemp);

        iTemp = (iData & 0xFF00) >> 8;
    outportb(sioIndex,0xF1);                                /* GPIO
00~07 - Output Data */
    outportb(sioData,iTemp);

        outportb(sioIndex,0xAA);                            /* Disable
Super I/O */
}

int SioGPIOStatus()
{
    int iStatus;
    int iTemp;

```

Appendices

```
        outportb(sioIndex,0x87);                /* Enable
Super I/O */
        outportb(sioIndex,0x87);

        outportb(sioIndex,0x07);                /* Select
logic device - GPIO */
        outportb(sioData, 0x06);

        outportb(sioIndex,0xA2);                /* GPIO
50~57 - Status */
        iTemp = inportb(sioData);

        outportb(sioIndex,0xF2);                /* GPIO
00~07 - Status */
        iStatus = inportb(sioData);

        outportb(sioIndex,0xAA);                /* Disable
Super I/O */

        iStatus = (iStatus<<8) + iTemp;

        return iStatus;
}
```

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 <math.h>
#include <stdio.h>
#include <dos.h>

int sioIndex = 0x4E;          /* or 0x2E */
int sioData = 0x4F;         /* or 0x2F */

int main(void)
{
    int    iCount;
    printf("WDT Times ( 1 ~ 255 ) : \0");
    scanf("%d",&iCount);
    printf("\n");

    SioWDTStart(iCount);

    while(1)
    {
        iCount = SioWDTCount();
        printf("\r Counts : %d ",iCount);
        sleep(1);
    }

    return 0;
}

void SioWDTStart(int iCount)
{
    outportb(sioIndex, 0x87);          /* Enable
Super I/O */

```

Appendices

```
        outportb(sioIndex, 0x87);

        outportb(sioIndex, 0x07); /* Select
logic device - WDT */
        outportb(sioData, 0x07);

        outportb(sioIndex, 0x30); /* Enable
WDT */
        outportb(sioData, 0x01);

        outportb(sioIndex, 0xFA); /* Enable
WDRST# Output */
        outportb(sioData, 0x01);

        outportb(sioIndex, 0xF6); /* Set WDT
Timeout value */
        outportb(sioData, iCount);

        outportb(sioIndex, 0xF5); /* Set
Configure and Enable WDT timer, Start countdown */
        outportb(sioData, 0x32);

        outportb(sioIndex, 0xAA); /* Disable
Super I/O */
    }

void SioWDTStop(void)
{
    outportb(sioIndex, 0x87); /* Enable
Super I/O */
    outportb(sioIndex, 0x87);

    outportb(sioIndex, 0x07); /* Select
logic device - WDT */
    outportb(sioData, 0x07);

    outportb(sioIndex, 0xF5); /* Disable
WDT timer, stop countdown */
    outportb(sioData, 0x12);

    outportb(sioIndex, 0xAA); /* Disable
Super I/O */
}

void SioWDTClear(int iCount)
{
    outportb(sioIndex, 0x87); /* Enable
Super I/O */
    outportb(sioIndex, 0x87);

    outportb(sioIndex, 0x07); /* Select
```

```
logic device - WDT */
    outportb(sioData, 0x07);

        outportb(sioIndex, 0xF6);                /* Reset WDT
Timeout Value */
        outportb(sioData, iCount);

        outportb(sioIndex, 0xAA);                /* Disable
Super I/O */
    }

int SioWDTCount(void)
{
    int iData;

        outportb(sioIndex, 0x87);                /* Enable
Super I/O */
        outportb(sioIndex, 0x87);

        outportb(sioIndex, 0x07);                /* Select
logic device - WDT */
        outportb(sioData, 0x07);

        outportb(sioIndex, 0xF6);                /* Get count
of timer */
        iData = inportb(sioData);

        outportb(sioIndex, 0xAA);                /* Disable
Super I/O */

    return iData;
}
```