Rigid-751 & 753

Wide Temperature Box PC with Intel® Socket G Core™ i5-520M 2.4GHz Processor

User's Manual

Version 1.1

C E

RoHS VERIFIED

P/N: 4016075000110P   2013.05

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Revision History

Version	Time	Description
1.0	2012 August	The initial release for Rigid-753.
1.1	2013 May	The Rigid-751 is newly included in this user's manual. The involved changes are: • 1.1. Introduction • 1.2. Packing List • 1.3. Ordering Information • 1.5. Specifications • 1.6. Dimensions • 1.7. Locating Controls and Connectors

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Copyright Notice

Declaration of Conformity
CE

The CE symbol on your product 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.

About This User's Manual

This User's Manual is intended for experienced users and integrators with hardware knowledge of personal computers. If you are not sure about any description in this User's Manual, please consult your vendor before further handling.

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 the 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

General Information

1.1. Introduction

The computer is designed for various applications. It can be adopted to the markets such as Thin Client, KIOSK, information booth, GSM Server, environment-critical and space-critical applications. The computer features the following advantages:

- **All-In-One Platform**
  The CPU, DRAM and even software are integrated to provide a plug-and-play machine.

- **Compact-sized**
  The kernel of the computer is FMB-i57M2, which is a non-standard form factor embedded board. The whole system consumes only a few space.

- **Fanless Thermal Conduction**
  By using a low power processor, the system needs not to be loaded with fans, which are often unreliable and cause dust to circulate inside the equipment.

- **Socket Mounted CPU**
  Using a socket mounted CPU allows CPU upgrade to a newer and faster one in the future.

- **Powerful Communication Capability**
  The computer provides COM, LPT, Ethernet, USB, Mini Card slot, DVI and Digital I/O expansion slot.

- **Numerous Display/Video Output**
  Integrated with Intel® HD Graphics controller, the computer improves graphics and 3D rendering performance and supports numerous display/video output options including DVI-I and DVI-D.

- **Advanced Storage Solution**
  The computer comes with one Compact Flash slot, which offers a better, faster and more cost-effective expansibilities for various applications.

- **Trustworthy**
  The onboard Watchdog Timer can invoke an NMI or system RESET when your application loses control over the system.

1.2. Packing List

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

	1 x **Rigid-751** or **Rigid-753** Box PC
	1 x Accessory Box (Driver CD/User's Manual/Screws/Cable/Terminal Block)
	PAC-B120W-FSP 120W AC/DC adapter kit
	WMK-7000 Wall-mount kit for FPC-7XXX Series
	CBL-7100-COM COM Converter Cable (1 x 44-pin male to 4 x DB9 male + 1 x DB9 female) L=200mm

1.3. Ordering Information

Rigid-751	Fanless embedded controller w/ 1 x PCI expansion
Rigid-753	Fanless embedded controller w/ 2 x PCIe x8 expansion

Optional Configuration (CTOS* Kit)

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

	MK-3I-2G-2 Industrial DDR3 2GB SDRAM DIMM2 kit
	MK-3I-4G-2 Industrial DDR3 4GB SDRAM DIMM2 kit
	MK-3I-8G-2 Industrial DDR3 8GB SDRAM DIMM2 kit
	HSPA-SI1400 HSUPA 3.75G module kit & internal wiring
	WIFI-IN1500 802.11 a/b/g/n WiFi module kit & internal wiring
	ANT-H11 1 x 2dBi HSUPA antenna
	ANT-D11 1 x WiFi Dual-band 2.4G/5G antenna

1.4. Paths to the Drivers on CD

Windows XP

Driver	Path
CHIPSET	\CHIPSET\INTEL\XP_32_64_WIN7_32_64_SERIES
VGA	\GRAPHICS\INTEL\XP_32
LAN	\ETHERNET\INTEL\XP_32
AUDIO	\AUDIO\REALTEK\XP_32_64
ME	\ME\MEI_AMT_ALLOS_6.1.0.1042_PV
Net Framework	\Net Framework

Windows 7 32-bit

Driver	Path
CHIPSET	\CHIPSET\INTEL\XP_32_64_WIN7_32_64_SERIES
VGA	\GRAPHICS\INTEL\WIN7_VISTA_32
LAN	\ETHERNET\INTEL\WIN7_32
AUDIO	\AUDIO\REALTEK\WIN7_32_64
ME	\ME\MEI_AMT_ALLOS_6.1.0.1042_PV

Windows 7 64-bit

Driver	Path
CHIPSET	\CHIPSET\INTEL\XP_32_64_WIN7_32_64_SERIES
VGA	\GRAPHICS\INTEL\WIN7_VISTA_64
LAN	\ETHERNET\INTEL\WIN7_64
AUDIO	\AUDIO\REALTEK\WIN7_32_64
ME	\ME\MEI_AMT_ALLOS_6.1.0.1042_PV

1.5. Specifications

System Kernel	
Processor	Intel® Socket G i5-520M 2.4GHz processors
BIOS	AMI Flash BIOS
Chipset	Intel® QM57
Graphics	Intel® HD Graphics controller
System Memory	• 2 x 204-pin Dual-channels DDR3 SO-DIMM Sockets up to 8GB at 800/1066MHz • 2GB WT DDR3 memory module installed
Serial ATA	2 x Serial ATA ports with 300MB/s HDD transfer rate
Ethernet Controller	1 x Intel® WG82583V Gigabit Ethernet controller
	1 x Intel® WG82578DM Gigabit Ethernet PHY w/ iAMT
Watchdog Timer	1 ~ 255 levels reset
I/O Ports	
Serial Port	• 1 x DB-44 female connector • Support 4 x RS-232 ports (COM4 is isolated RS-232/422/485 selectable)
*Selectable Port	• SPP/EPP/ECP mode selectable for LPT • 1 x 16-bit Digital I/O (8-in/8-out)
USB Port	8 x USB 2.0 ports
LAN Port	2 x RJ-45
Video Port	• 1 x DVI-I female connector for Digital Video output • 1 x DVI-D female connector for Digital Video output
KB/MS	1 x 6-pin Mini-DIN for keyboard & mouse
Audio	Mic-in/Line-out (6W pre-amplified)
Expansion Bus	• 2 x PCIe x8 slots (Rigid-753) • 1 x PCI slot (Rigid-751) • 1 x Mini-card slot interconnected with SIM card socket for optional WiFi or HSUPA module • 1 x SIM socket (outside accessible)

Storage	
HDD/SSD	1 or 2 x 2.5" drive bay for HDD or SSD w/ 9.5mm height limit
CF	1 x CFast socket (outside accessible)
Safety	
FCC	Class A certified
CE	Certified
Environment	
Operating Temp.	-40 ~ 70°C (-40 ~ 158°F), ambience w/ air flow
Storage Temp.	-40 ~ 85°C (-40 ~ 185°F)
Operating Humidity	10 ~ 95% @ 70°C (non-condensing)
Vibration	3 Grms/5 ~ 500 Hz/random operation
Shock	• Operating 20G, 11ms; Non-operating 40G with HDD • Operating 40G, 11ms; Non-operating 60G with CFast/SSD
Mechanical	
Construction	Aluminum alloy
Mounting	Wall mounting
Weight	Rigid-751: 4.2 kg (9.24 lb) Rigid-753: 4.5 kg (9.9 lb)
Dimensions (W x D x H)	Rigid-751: 195 x 268 x 90 mm (7.68" x 10.55" x 3.54") Rigid-753: 195 x 268 x 110 mm (7.68" x 10.55" x 4.33")
Power Requirement	
Power Input	DC 10~28V input (w/ 4-pin DC input terminal block combine remote power on/off switch)
Power Consumption	Max. 50W (w/o I/O card)

Note: For **Selectable Ports**, it is either LPT or Digital I/O to be opted for.

1.6. Dimensions

Rigid-751

Unit: mm

Rigid-753

116.00
110.00
6.00
4.00
195.00
207.00
184.00
224.00
268.00

Unit: mm
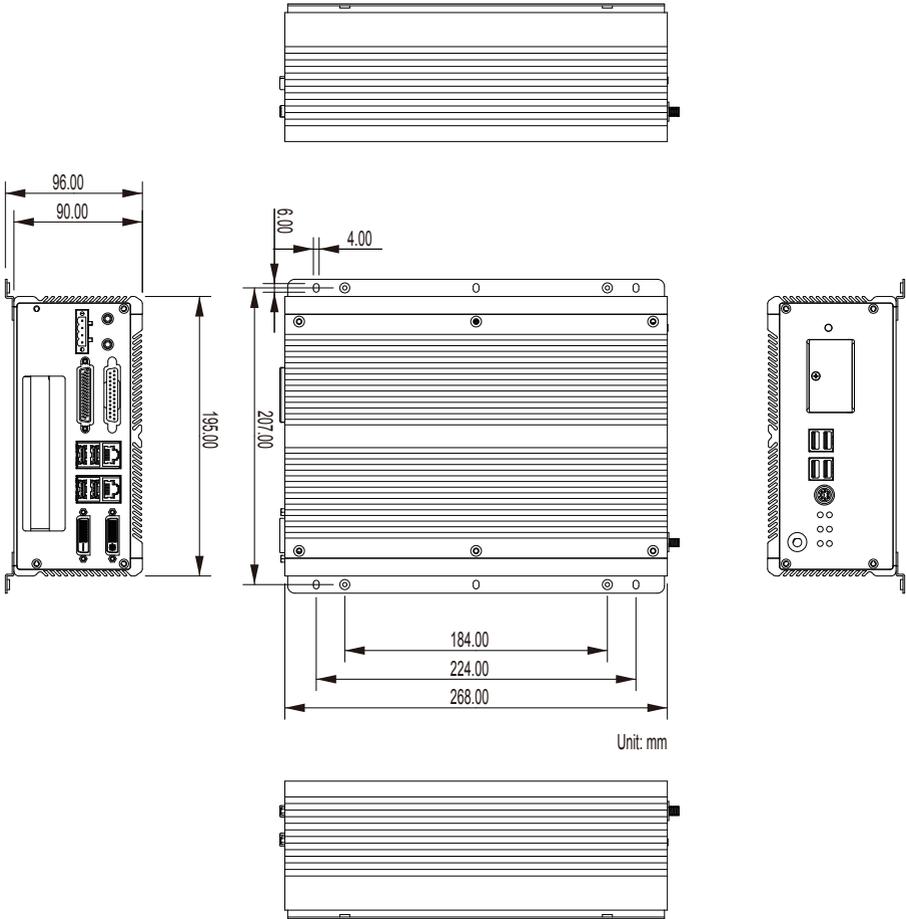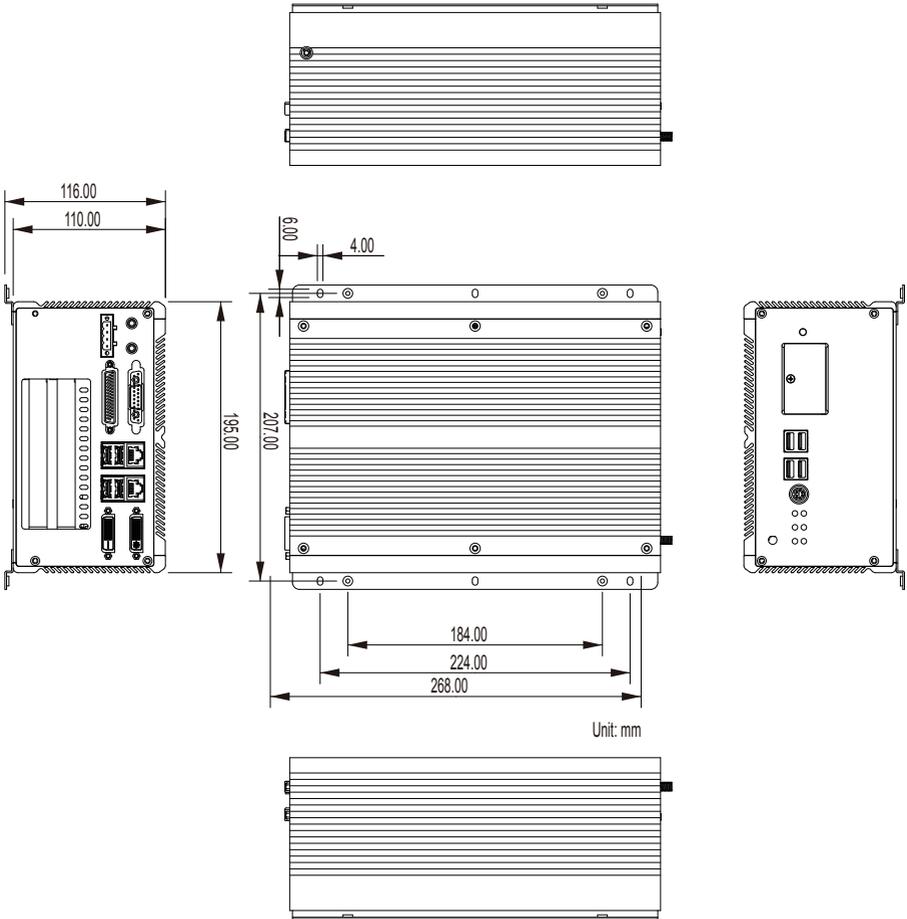
1.7. Locating Controls and Connectors

Take a look around the computer and find the major I/O ports on the enclosure.

Rigid-751

Front Panel

Antenna Port

CFast/SIM Socket

LAN1 Active LED
LAN2 Active LED

KB/MS

USBs

Power On/Off Switch

LAN2 Link LED
LAN1 Link LED
HDD status LED
Power Status LED

Rear Panel

Line-out   DIO/LPT (Selectable)   LANs   DVI-I

Mic-in

DC-in

DVI-D

COM1~4 Ports   1 x PCI slot

Rigid-753

Front Panel

Antenna Port

LAN1 Active LED
LAN2 Active LED

CFast/SIM Socket

HDD

ACT1 ACT2

PWR LNK1 LNK2

S/W

CFast / SIM

KB/MS

USBs

LAN2 Link LED

LAN1 Link LED

HDD status LED

Power Status LED

Power On/Off Switch

Rear Panel

Line-out   DIO/LPT (Selectable)   LANs   DVI-I

Mic-in

Optional

DVI-I

DC-in

DC IN 10V~28V   SW

COM1~COM4

DVI-D

DVI-D

COM1~4 Ports   PCIe Slots

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Chapter 2

Engine of the Computer

2.1. Board Layout

Take a closer look at the computer's main board.

Top View

Bottom View

SIM1

SATA1

27 PWR1

26 SATA2

PCIE1

PCIE2
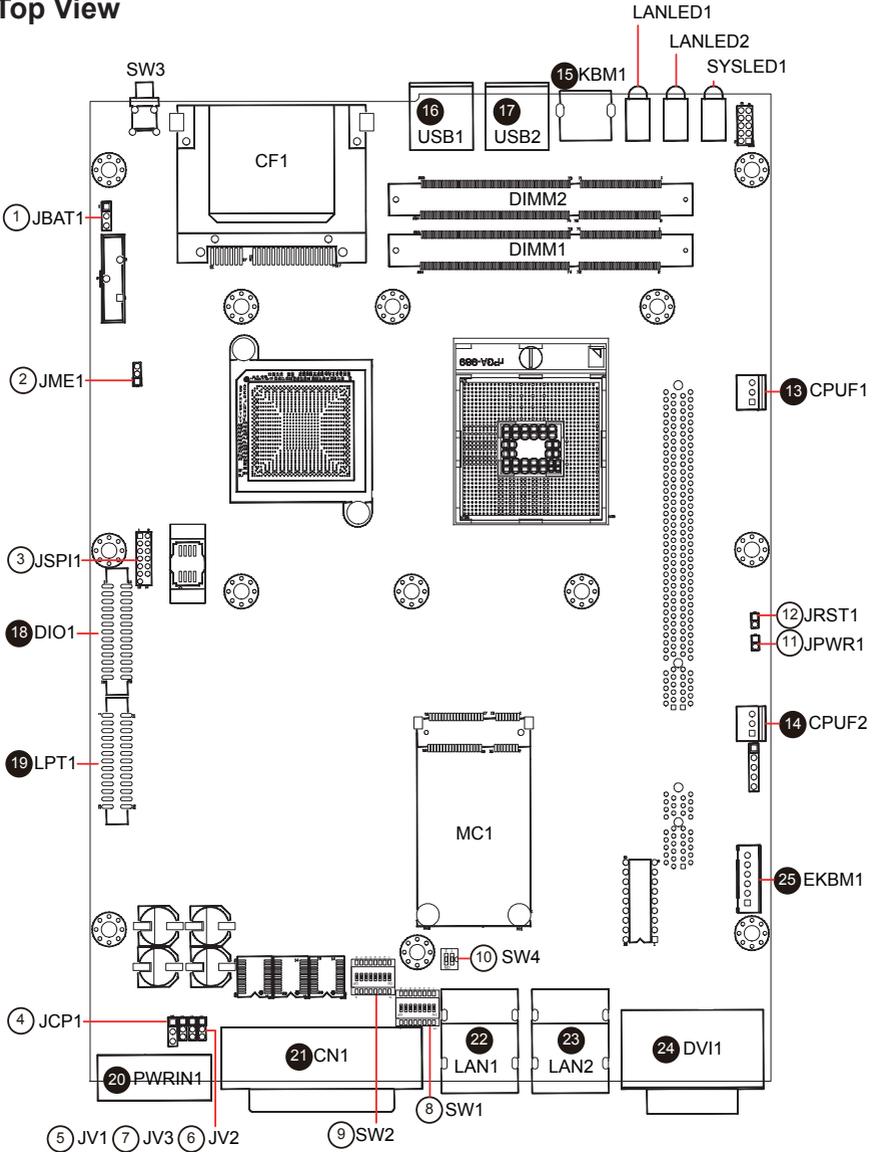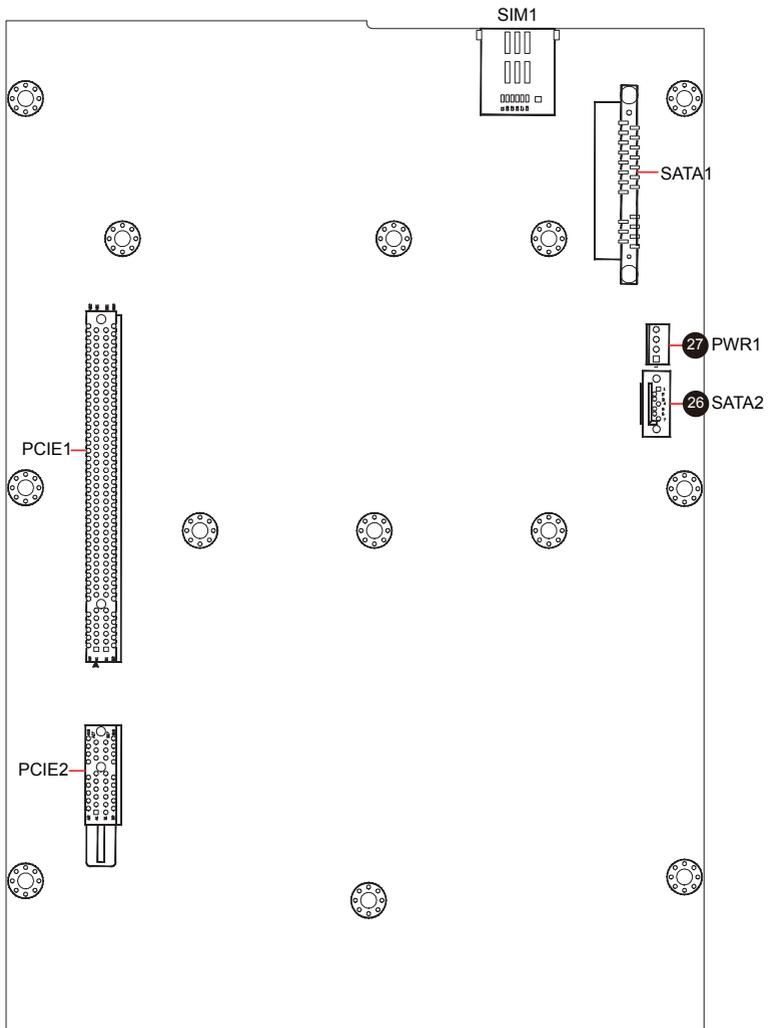
2.2. Jumpers and Connectors

2.2.1. Jumpers & Connectors List

Jumpers

Label	Function
JBAT1	Clear CMOS Setup
JME1	ME Enable
JSPI1	System BIOS Enable/Disable Pin Head
JCP1	COM Port Power Selection
JV1	RI/5V/12V (Pin 9) Selection for COM1
JV2	RI/5V/12V (Pin 9) Selection for COM2
JV3	RI/5V/12V (Pin 9) Selection for COM3
SW1~2	RS-232/RS-422/RS-485 Selection (for COM4)
SW4	Termination Setting (for COM4)
JPWR1	AT/ATX Power Selection
JRST1	Reset Pin Head

Connectors

Label	Function
CPUF1	CPU fan connector
CPUF2	System fan connector
SYSLED1	Power status & HDD status LED
LANLED1	LAN1 link & active LED
LANLED2	LAN2 link & active LED
KBM1	PS/2 keyboard & mouse
USB1~2	Double stacked USB type A connectors
DIMM1~2	DDR3 SO-DIMM sockets
CF1	CFAST socket
SW3	Power on/off switch
DIO1	Digital I/O box head
LPT1	Parallel port box head
PWRIN1	DC adapter power input
CN1	COM1~4 (COM1~3 are RS-232; COM4 is RS-232/422/485)
LAN1~2	Ethernet connectors (including USB port connectors)
DVI1	DVI-I & DVI-D
EKBM1	External microphone and speaker
MC1	Mini card slot
PCIE1	PCIe x16 interface slot
PCIE2	PCIe x1 interface slot
SATA1	Serial ATA & power connector
SATA2	Serial ATA connector
PWR1	HDD/SSD power connector
SIM1	SIM card socket

2.2.2. Jumper Setting

Label & Function	Jumper Settings	
JBAT1: Clear CMOS Setup (1)	1-2: Keep CMOS (default)	**3 2 1**
	2-3: Clear CMOS	**3 2 1**
JME1: ME Enable (2)	1-2: Enable ME (default)	**3 2 1**
	2-3: Disable ME	**3 2 1**
JCP1: COM Port Power Selection (4)	1-2: +5V (default)	**3 2 1**
	2-3: +12V	**3 2 1**
JV1~3: RI/5V/12V (Pin 9) Selection for COM1~3 (5~7)	1-2: RI (default)	**3 2 1**
	2-3: 5V or 12V (depends on JCP1)	**3 2 1**
JPWR1: AT/ATX Power Selection (11)	ATX Mode (default)	**1** ☐○ **2**
	AT Mode	**1** ☐ **2**
JRST1: Reset Pin Head (12)	Keep (default)	**1** ☐○ **2**
	Reset	**1** ☐ **2**

JSPI1: System BIOS Enable/ Disable Pin Header (3)

Pin	Enable BIOS	Disable BIOS
1-2	ON	OFF
3-4	ON	OFF
5-6	ON	OFF
7-8	ON	OFF
9-10	ON	OFF
11-12	N/C	SPI_CS1
13-14	GND	N/C (Key)
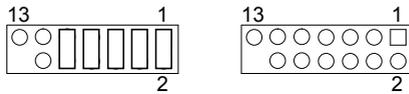
SW1~2: RS-232/RS-422/RS-485 Selection (for COM4) (8~9)

SW1	RS-232 (default)	RS-422	RS-485
1-16	ON	OFF	OFF
2-15	OFF	ON	OFF
3-14	OFF	OFF	ON
4-13	N/C	N/C	N/C
5-12	OFF	ON	ON
6-11	OFF	ON	ON
7-10	OFF	ON	OFF
8-9	OFF	ON	OFF
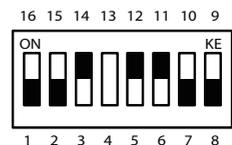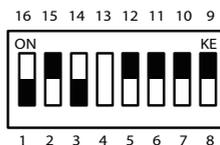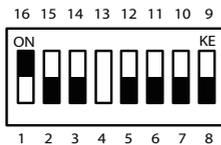
SW2	RS-232 (default)	RS-422	RS-485
1-16	ON	OFF	OFF
2-15	ON	OFF	OFF
3-14	ON	OFF	OFF
4-13	ON	OFF	OFF
5-12	ON	OFF	OFF
6-11	ON	OFF	OFF
7-10	ON	OFF	OFF
8-9	ON	OFF	OFF
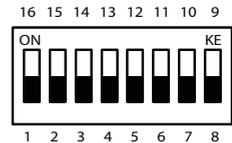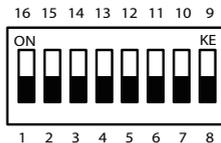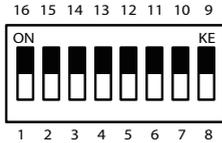
SW4: Termination Setting (for COM4) (10)

SW4	RS-422		RS-485	
1-4	Termination ON	Termination OFF	Not Used	Not Used
2-3	Termination ON	Termination OFF	Termination ON	Termination OFF

2.2.3. Pin Assignments for Connectors

CPUF1/2: CPU/System Fan Connector (13/14)

Pin	Description
1	GND
2	+12V
3	FAN_CTL

KBM1: PS/2 Keyboard & Mouse (15)

Pin	Description
1	KB_DAT
2	MS_DAT
3	GND
4	VCC5
5	KBCLK
6	MSCLK
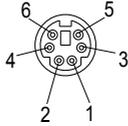
USB1~2: Double Stacked USB type A Connectors (16~17)
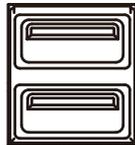
PWRIN1: DC Adapter Power Input (20)

Pin	Description
1	VCC
2	GND
3	GND-
4	PWR_BTN-
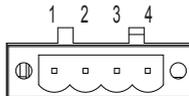
DVI1: DVI-I & DVI-D (24)

DVI-I

DVI-D
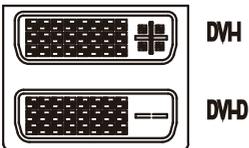
DIO1: Digital I/O Box Head (18)

Pin	Description	Pin	Description
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

LPT1: Parallel Port Box Head (19)

Pin	Description	Pin	Description
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

EKBM1: External microphone & speaker (25)

Pin	Description
1	MICL
2	MICR
3	MIC GND
4	Speaker(Lout)-L
5	Speaker(Lout)-R
6	Speaker GND
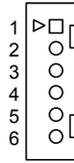
CN1: COM1~4 (COM1~3 are RS-232; COM4 is RS-232/422/485) (21)
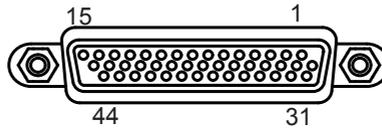
	Pin	Desc.	Pin	Desc.		Pin	Desc.	Pin	Desc.
COM1 (RS-232)	1	DCD	2	RXD	COM2 (RS-232)	11	DCD	12	RXD
	3	TXD	4	DTR		13	TXD	14	DTR
	5	GND	6	DSR		15	GND	16	DSR
	7	RTS	8	CST		17	RTS	18	CST
	9	RI	10	GND		19	RI	20	GND
COM3 (RS-232)	21	DCD	22	RXD	COM4 (RS-232)	31	DCD	32	RXD
	23	TXD	24	DTR		33	TXD	34	DTR
	25	GND	26	DSR		35	GND	36	DSR
	27	RTS	28	CST		37	RTS	38	CST
	29	RI	30	GND		39	RI	40	GND
N/C	41	N/C	42	N/C					
	43	N/C	44	N/C					

CBL-7100-COM (COM Converter Cable) (optional)

1 to 5 COM converter cable: 4 x DB9 male and 1 x DB9 female connectors
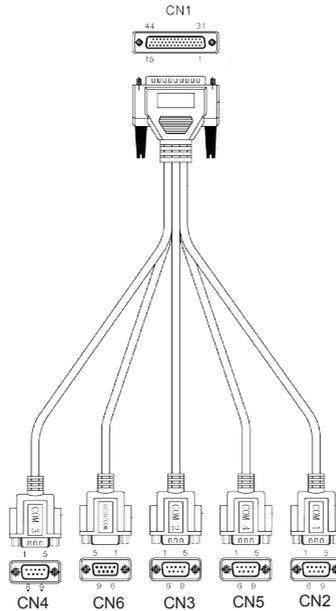
Note: CN6 on DB9 Cable Controller is unused.

COM1 (RS-232) labelled CN2 on DB9 Cable Controller

DB44 Pin	DB9 Pin	Desc.	DB44 Pin	DB9 Pin	Desc.
1	1	DCD	2	2	RXD
3	3	TXD	4	4	DTR
5	5	GND	6	6	DSR
7	7	RTS	8	8	CTS
9	9	RI	10		GND

COM2 (RS-232) labelled CN3 on DB9 Cable Controller

DB44 Pin	DB9 Pin	Desc.	DB44 Pin	DB9 Pin	Desc.
11	1	DCD	12	2	RXD
13	3	TXD	14	4	DTR
15	5	GND	16	6	DSR
17	7	RTS	18	8	CTS
19	9	RI	20		GND

COM3 (RS-232) labelled CN4 on DB9 Cable Controller

DB44 Pin	DB9 Pin	Desc.	DB44 Pin	DB9 Pin	Desc.
21	1	DCD	22	2	RXD
23	3	TXD	24	4	DTR
25	5	GND	26	6	DSR
27	7	RTS	28	8	CTS
29	9	RI	30		GND

COM4 (RS-232) labelled CN5 on DB9 Cable Controller

DB44 Pin	DB9 Pin	Desc.	DB44 Pin	DB9 Pin	Desc.
31	1	DCD	32	2	RXD
33	3	TXD	34	4	DTR
35	5	GND	36	6	DSR
37	7	RTS	38	8	CTS
39	9	RI	40		GND

COM4 (RS-422) labelled CN5 on DB9 Cable Controller

DB9 Pin	Signal	Desc.	DB9 Pin	Signal	Desc.
1	Tx-		2	Tx+	
3	Rx+		4	Rx-	
5	GND	Ground	6	N/C	
7	N/C		8	N/C	
9	N/C				

COM4 (RS-485) labelled CN5 on DB9 Cable Controller

DB9 Pin	Signal	Desc.	DB9 Pin	Signal	Desc.
1	DATA-	TX/RXDATA-	2	DATA+	TX/RXDATA+
3	N/C		4	N/C	
5	GND	Ground	6	N/C	
7	N/C		8	N/C	
9	N/C				

LAN1~2: Ethernet Connectors (Include USB Port Connectors) (22~23)

Pin	Description	Pin	Description
1	MDI0+	5	MDI2+
2	MDI0-	6	MDI2-
3	MDI1+	7	MDI3+
4	MDI10-	8	MDI3-

LAN
USB
USB
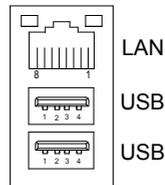
SATA2: Serial ATA Connector (26)

Pin	Description
1	GND
2	TX+
3	TX-
4	GND
5	RX-
6	RX+
7	GND
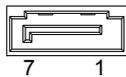
PWR1: HDD/SSD Power Connector (27)

Pin	Description
1	VCC5
2	GND
3	GND
4	+12V
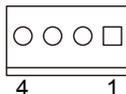
Chapter 3

Installation and Maintenance

3.1. CPU, Memory and HSUPA Module Installation

The computer is designed to be modular, slim and lightweight for easier maintenance. The following sections describe simple hardware installations.

3.1.1. Removing Top Cover

1. Locate the six screws which secure the top cover.
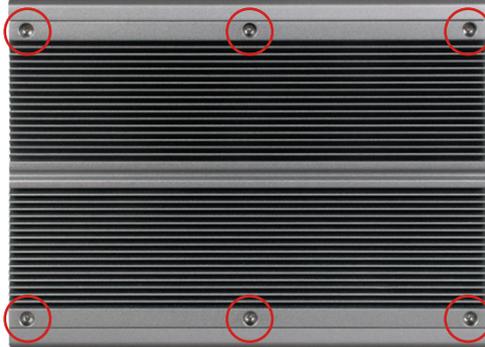
2. Use a screwdriver to remove the top cover screws. First unscrew the four screws in each corner, and then the two screws in the middle of the two sides. Keep these screws safely for later use. (Remember to first secure the two screws in the middle and then the two sides when you are to install the top cover.)
3. Slightly lift the top cover.

CFast Slot

Thermal Lump of PCH & CPU

Mini-card Socket

Memory

Antenna Hole
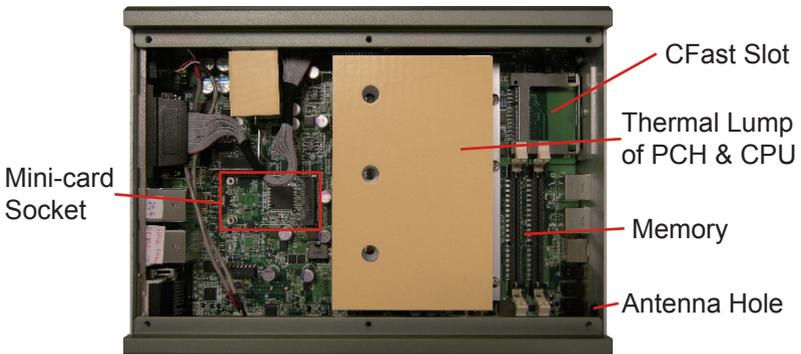
3.1.2. Installing CPU

1. Locate the six screws which secure the thermal lump.
2. Use a screwdriver to remove the six screws and thermal lump. Keep them safely for later use.
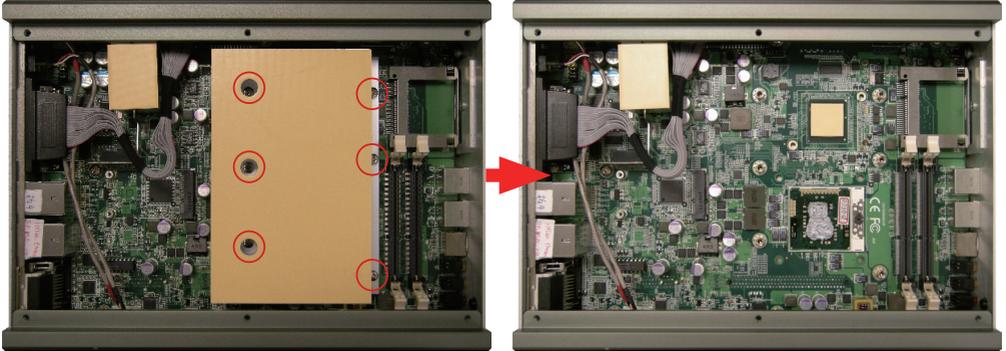
3. The processor socket comes with a screw to secure the CPU. See the picture below. Before the CPU can be mounted, the screw needs to be unfasten.
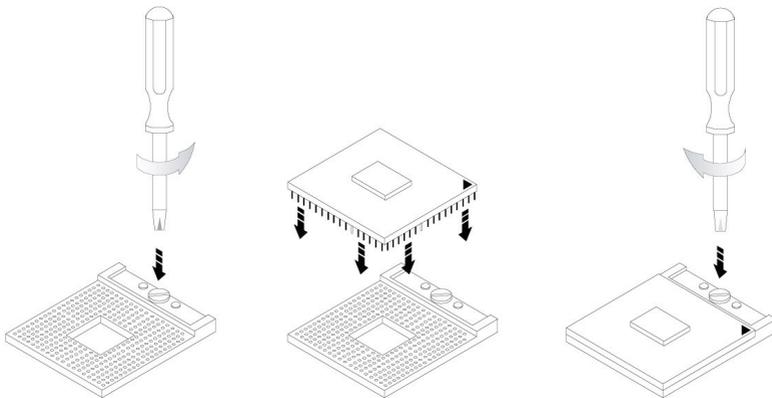
4. Place the CPU onto the socket while meeting the notch on one corner of the CPU with the notch on the inside of the socket. Once the CPU is slid in place, fasten the screw.
5. The contact area and gap between the CPU and the heat spreader require a thermal pad or thermal paste. Make sure CPU top surface is in full contact with the heat spreader so as to protect CPU from overheating, getting unstable, damage or any possible system hanging or CPU hanging.

3.1.3. Installing Memory Module

1. Locate the DDR3 SO-DIMM slots and push the clips aside.
2. Position the SO-DIMM at the slot so the notch on the SO-DIMM and the break on the slot will meet.
3. Hold the SO-DIMM with both hands, and gently insert the SO-DIMM into the slot until the clips of the SO-DIMM slot close and lock the memory module in place.
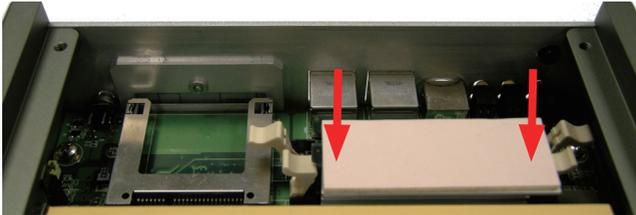
4. To remove the memory module, simultaneously release both clips at the SO-DIMM slot. The memory module are unlocked and ready for removal.
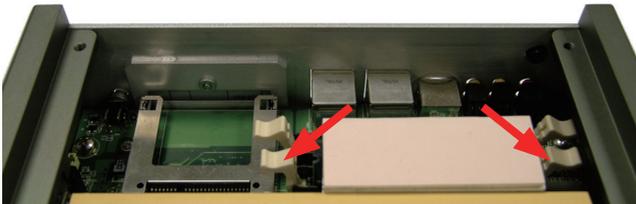
3.1.4. Installing Memory Module with Heat Spreader & Thermal Pad (Optional)

1. Prepare the optional metal heat spreader.
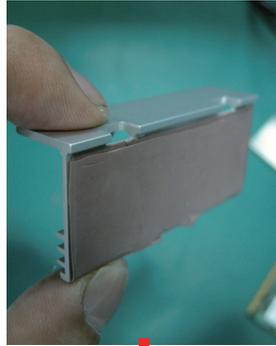
2. Attach the SO-DIMM to it as below.
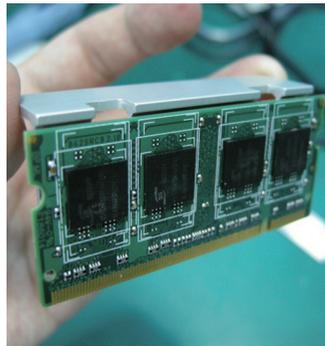
3. Attach another piece of heat spreader to the SO-DIMM and stick them tightly together. Make sure their notches meet.
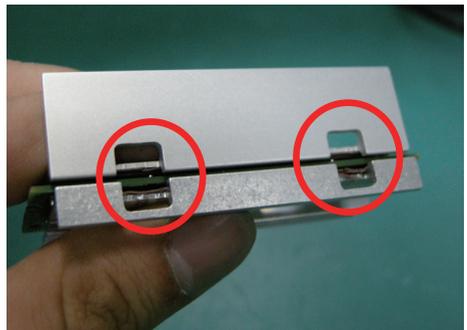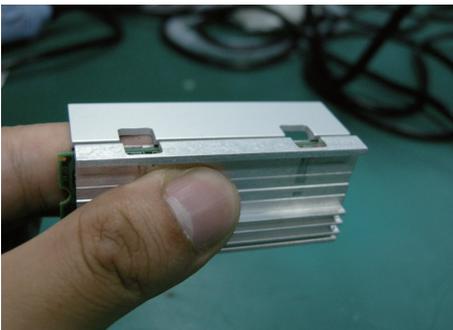
4. Use clips to clamp the heat spreaders together.
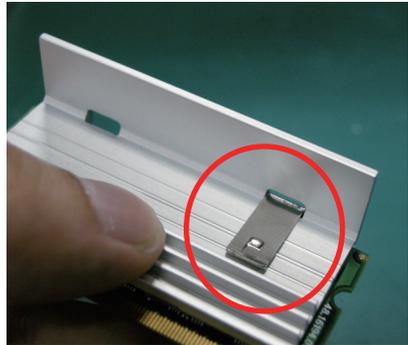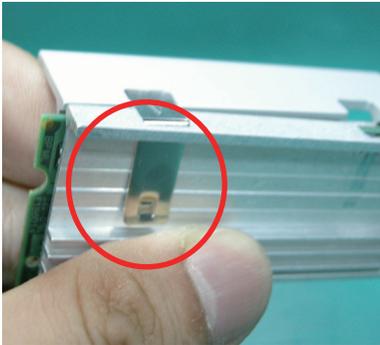
5. Stick the thermal pad on the top of the heat spreader.   .
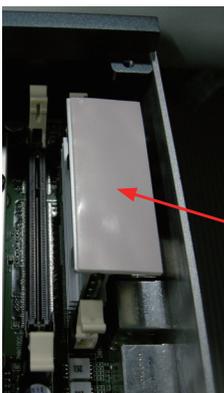
Thermal pad

3.1.5. Installing Mini-card (Optional)

1. Locate Mini-card socket.
2. Insert WiFi or HSUPA module to the socket at a slanted angle. Remember to meet the notch on the module with the break on the socket.
3. Fasten two screws to fix the module in place.
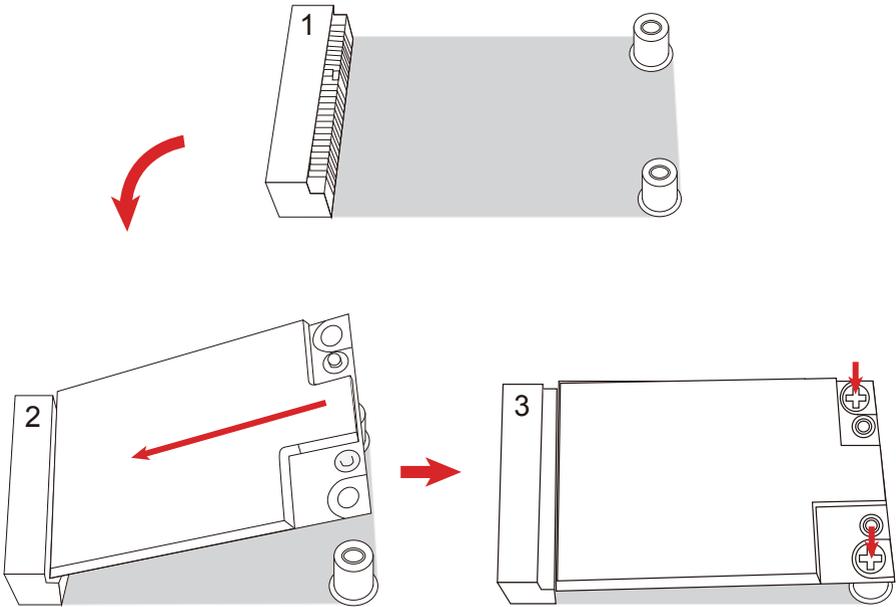
4. Press one end of the RF cable into one of the studs named MAIN.

5. Push the plastic plug outwards to remove it, so that the other end of RF cable, which is a SMA connector jack, can go through the antenna hole on the front pane. Keep the plastic plug for later use. See the picture below. The SMA connector jack comes with a flat side, and so does the antenna hole. When trying to get the SMA connector jack through the antenna hole, be sure to meet them by the flat sides so the SMA connector jack won't get stuck.

Align the flat fitting side with the red flat edge of antenna hole.
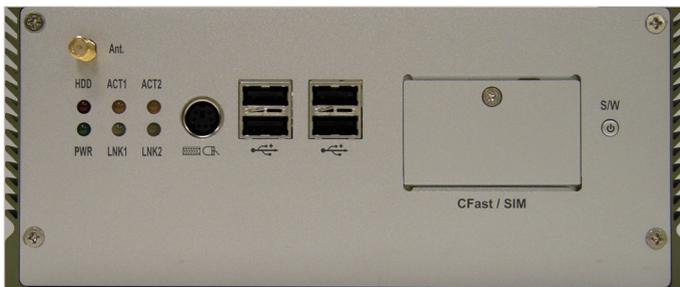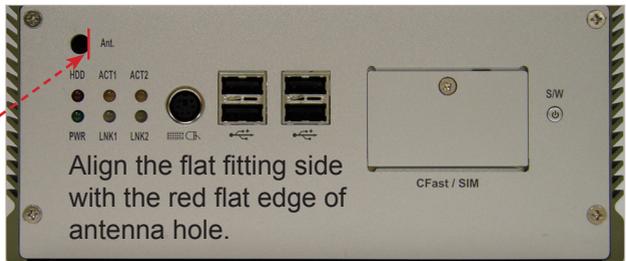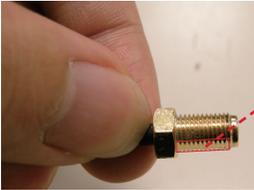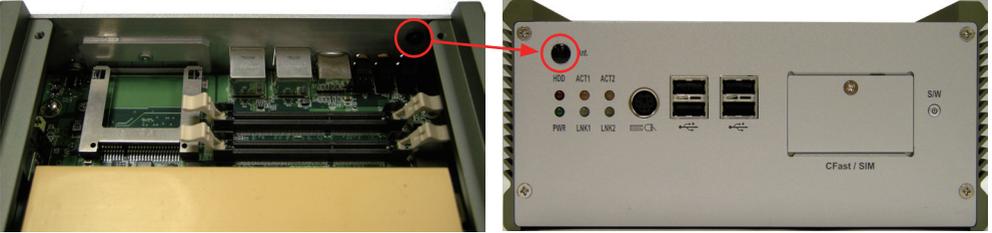
6. Mount a round washer into the SMA connector jack from outside before securing another nut into it.

7. At the end, screw antenna into the SMA connector jack and adjust antenna angle for better signal.

3.2. How to Access CFast/SIM Card

1. Make sure you have turned off the power before inserting or ejecting the CFast card (if OS is installed on CFast card).
2. Locate the CFast card door on the front panel.
3. Use a crosshead screwdriver (#1 tip) to remove the screw that secures the CFast/SIM card door. Open the door.

4. Insert your CFast/SIM card into the slot according to the illustration that you find close to the card door.

Insert CFast card

Insert SIM card

5. After inserting the CFast/SIM card, close the card door and screw it on clockwise.

6. To remove the CFast card or SIM card, follow step 1, 2 and 3 above. And then push-release it from the slot.

remove CFast card

remove SIM card

3.3. Hard Disk Drive and PCIe Card Installation

3.3.1. Removing Bottom Cover

1. Place the Box PC upside down. Unscrew the six screws which secure the bottom cover.
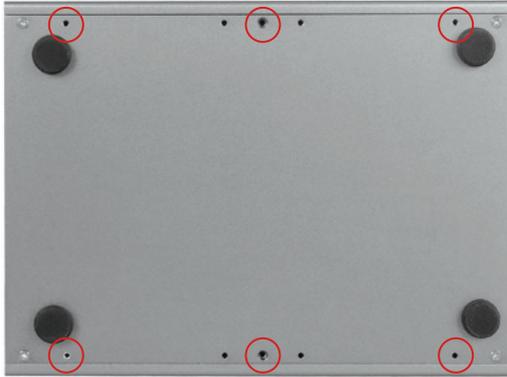
2. Use screwdriver to remove the bottom cover screws and keep them safely for later use.

3.3.2. Installing 1st Hard Disk Drive

1. Remove the bottom cover as described in .
2. Loosen and remove the four screws that fix the HDD Holder Bracket to the main unit. Keep the screws for later use.

PCIe Socket
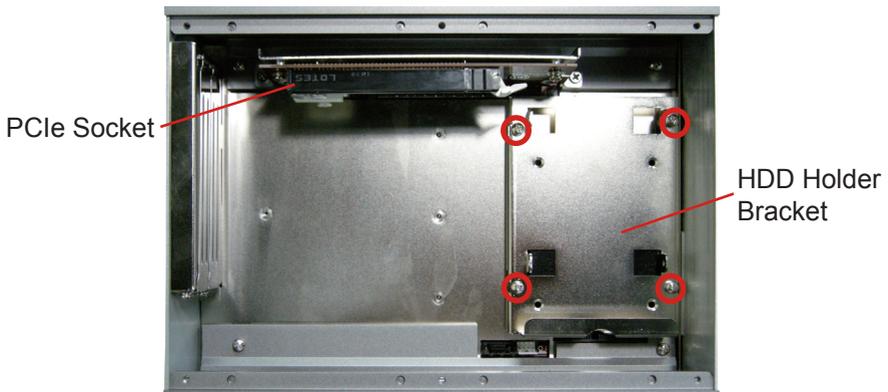
HDD Holder Bracket

3. Slide the hard disk drive into the HDD Holder Bracket and assemble them together.
4. Insert HDD adapter to the HDD connector.
5. Plug the HDD and the Holder Bracket to the HDD connector on the main board. Fully plug them.
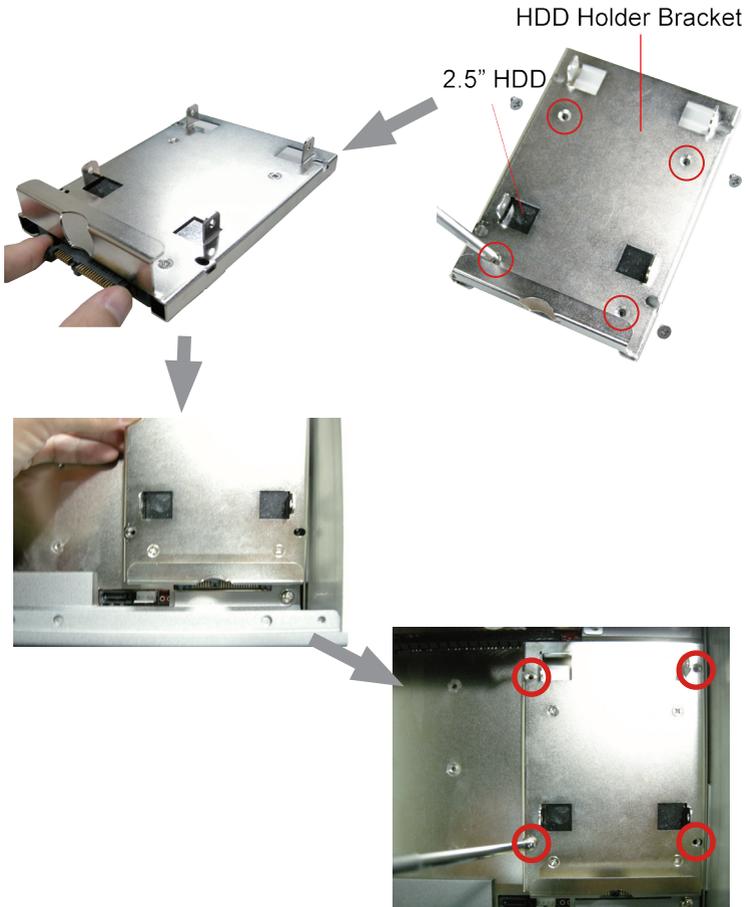
6. Find the four screws that fixes the HDD Holder Bracket to the main unit.
7. Restore the HDD Holder Bracket to the main unit.

3.3.3. Installing 2nd Hard Disk Drive

1. You may also install a second HDD. Please unscrew the HDD Holder Bracket firstly.
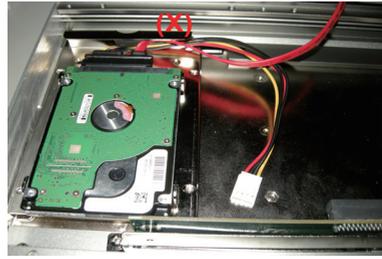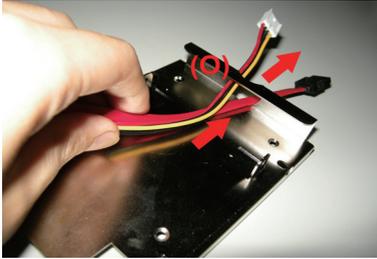
2. Thread the cable used to connect main unit and HDD through the hole at one end of HDD Holder Bracket so the cable won't be jammed later on.
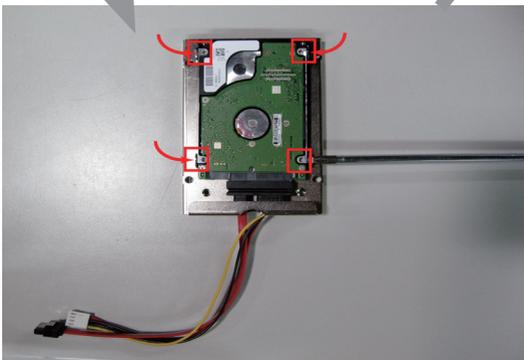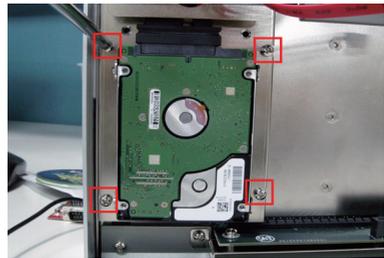
3. Plug the cable into HDD's jack, and then lock HDD onto the HDD Holder Bracket by screwing its four side corners.
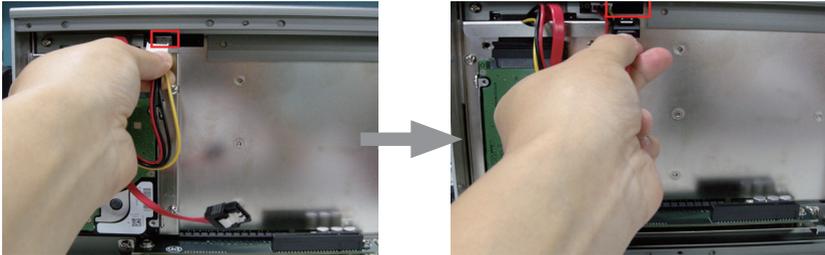
Note: Unlike Rigid-753, Rigid-751 has its HDD holder bracket separated in two parts. Assemble an hard disk drive to the flat plate as shown above and assemble the two parts together later on. Reason to separate the HDD holder bracket to two parts is because Rigid-751 is not as high as Rigid-753; the height limitation makes it possbile to cause the conflict between the longer PCIe x16 card and the 2nd HDD if they are both installed. So you can only choose either one of them. That is to say, take off the flat plate when a PCIe card is installed.
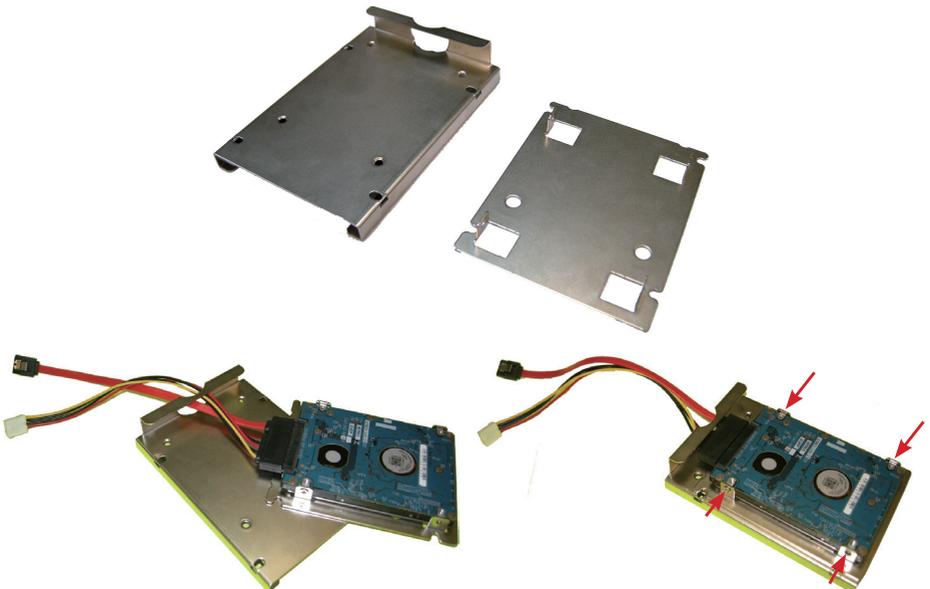
4. Repeat the steps 6-7 as described in <u>3.3.2. Installing 1st Hard Disk Drive</u> to load and screw HDD Holder Bracket.
5. Plug power line and SATA line in corresponding PWR2 and SATA2 connectors separately.
6. Be sure that SATA cable for second HDD is devised with a lockable function. Therefore, you have to use a tool to press against the little metal clip while you try to unplug SATA cable.
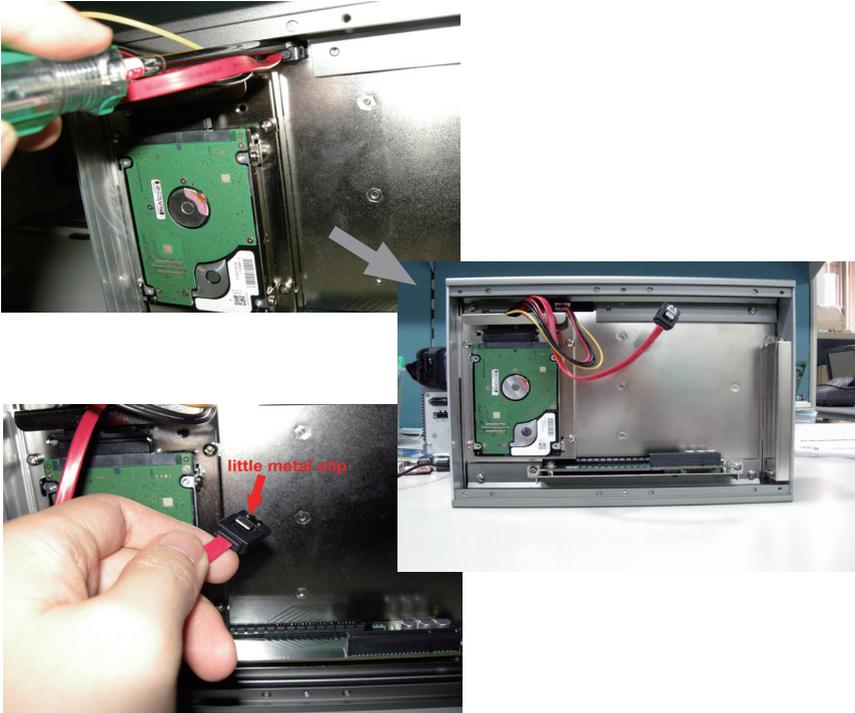
3.3.4. Installing PCIe Cards

1. Use a crosshead screwdriver to loosen the screw that secure the upper expansion slot bracket. Then install a PCIe card to this expansion slot.

2. And penetrate through the hole on case side with screwdriver to remove lower bracket and install PCIe card.

3.4. Wall Mounting (Optional)

1. Place the main unit upside down on a flat surface and locate the 8 screw holes on the bottom cover.
2. Place the wall-mount brackets along the up side and the bottom side of the bottom cover. Meet the screw holes on the wall-mount brackets and those on the bottom covers
3. Fix the brackets to the main unit with the accompanying screws.
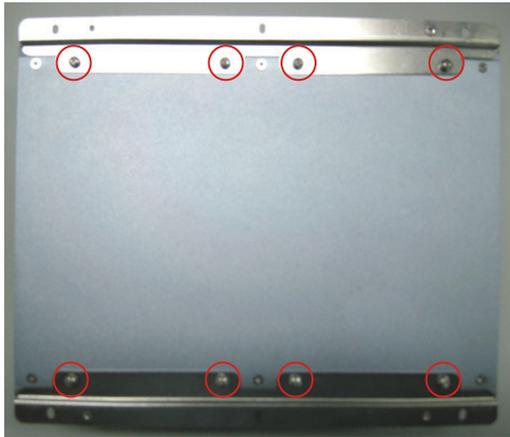
3.5. Grounding the Box PC

Follow the instructions below to ground the box PC onto land. Be sure of following any grounding requirements in your place.

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

1. See the figure above. Remove the ground screw located on the rear panel.
2. Attach the ground wire to the rear panel with the screw.

3.6. Wiring the DC-Input Power Source

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

Follow the instructions below to connect 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.
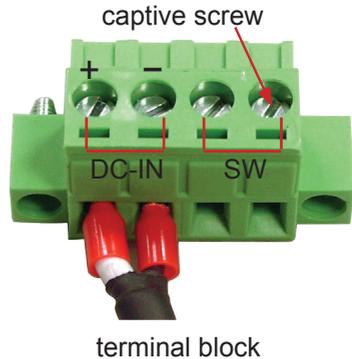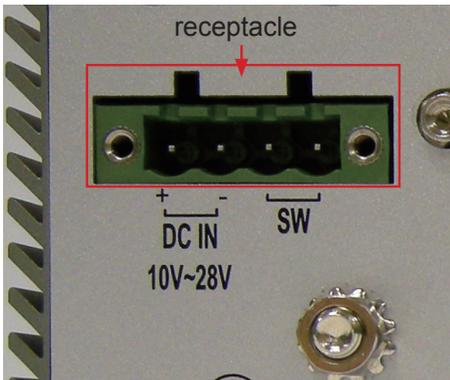
Chapter 4

Drivers & AP

4.1. Preliminary Work

After the setup mentioned in previous chapters are done, proceed to install the necessary drivers and the application so that the box PC's can function for your application. The following instructions take Windows 7 as the exemplary OS. Different OS may vary slightly, but generally they are nearly the same. Note the appropriate installation procedure is as below:

CHIPSET→Net Framework→VGA→ME→AUDIO→LAN

Please **Follow This Procedure** to install all necessary units in most cases, or you may encounter errors.

Also, the correct driver & AP paths for Windows 7 & Windows XP are listed below. Follow the suggested paths to proceed with the installation.

Windows XP

Driver	Path
CHIPSET	\CHIPSET\INTEL\XP_32_64_WIN7_32_64_SERIES
VGA	\GRAPHICS\INTEL\XP_32
LAN	\ETHERNET\INTEL\XP_32
AUDIO	\AUDIO\REALTEK\XP_32_64
ME	\ME\MEI_AMT_ALLOS_6.1.0.1042_PV
Net Framework	\Net Framework

Windows 7

Driver	Path
CHIPSET	\CHIPSET\INTEL\XP_32_64_WIN7_32_64_SERIES
VGA	\GRAPHICS\INTEL\WIN7_VISTA_32
	\GRAPHICS\INTEL\WIN7_VISTA_64
LAN	\ETHERNET\INTEL\WIN7_32
	\ETHERNET\INTEL\WIN7_64
AUDIO	\AUDIO\REALTEK\WIN7_32_64
ME	\ME\MEI_AMT_ALLOS_6.1.0.1042_PV

4.2. Drivers

4.2.1. CHIPSET

1. Run the executable file "infinst911autol.exe" in the suggested path (\
CHIPSET\INTEL\   XP_32_64_WIN7_32_64_SERIES).   Always   click
Yes when Windows 7 prompts "Do you want to allow the following programs
to make changes to this computer?"
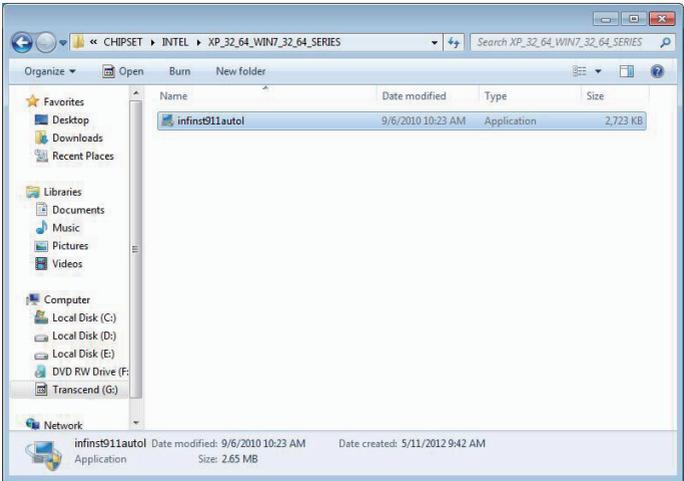
2. Setup wizard opens. Click "Next >" to proceed.

3. The setup wizard starts to extract the files needed for driver installation.
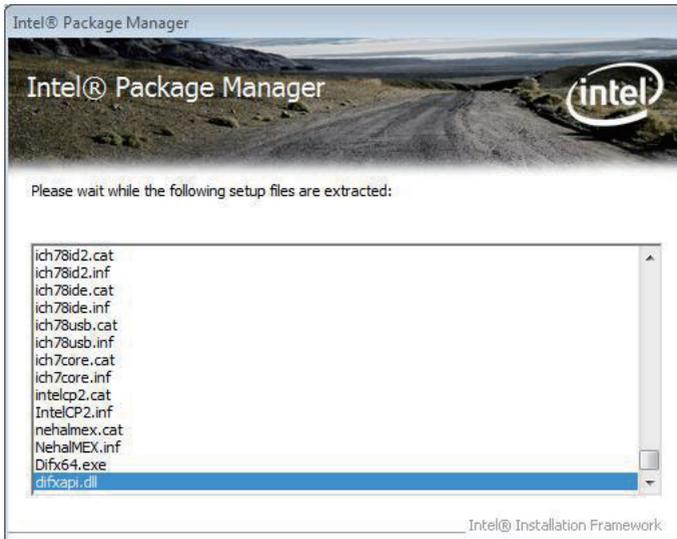
4. Once the extraction is through, the setup wizard prompts you to accept the license agreement. Click "Yes >" to proceed.

5. Click "Next >".
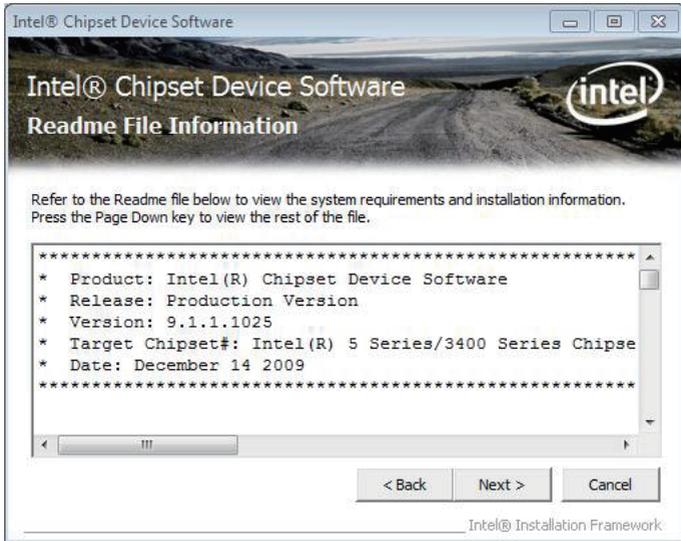
Setup progresses.

6. Click "Next >".
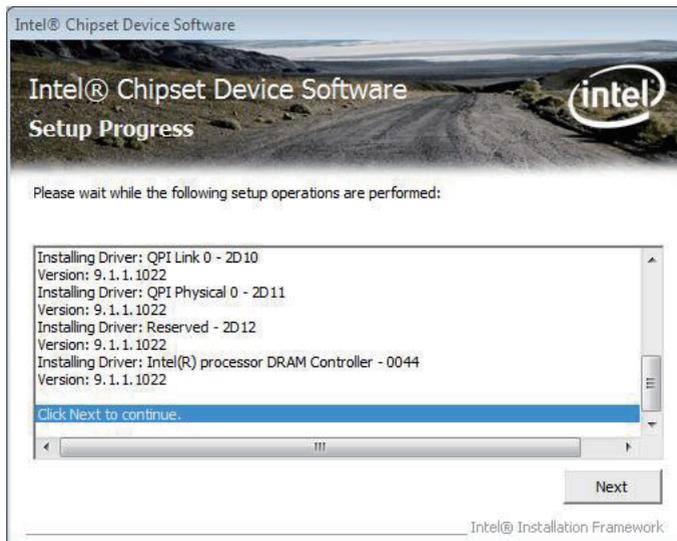
7. Select "Yes, I want to restart this computer now." and click "Finish >".

4.2.2. Net Framework

1. For Win XP, you need to install Net Framework or VGA may not function normally. Run the executable file "NET Framework 3.5.exe" in the suggested path (\NET Framework) to start extracting files..

2. Select "I have read and ACCEPT the terms of the License Agreement" and click "Install >". to proceed.
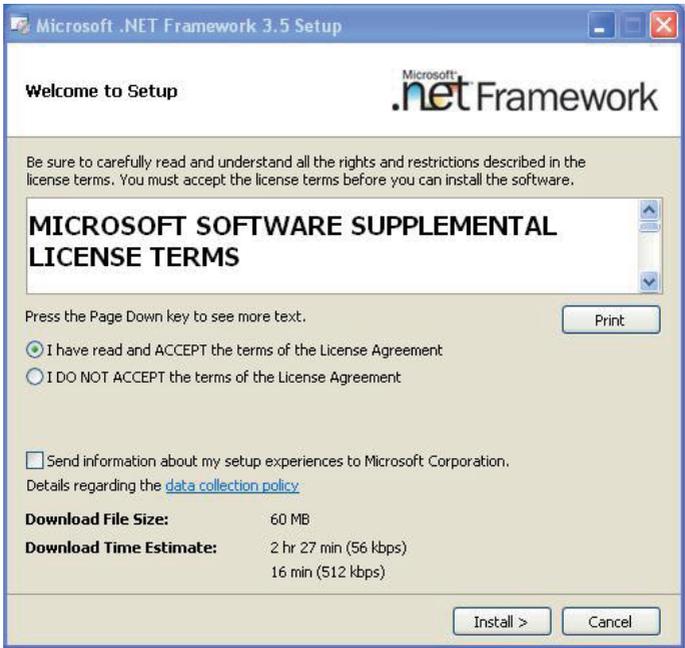
3. The installation starts and progresses. It is through in a few seconds.
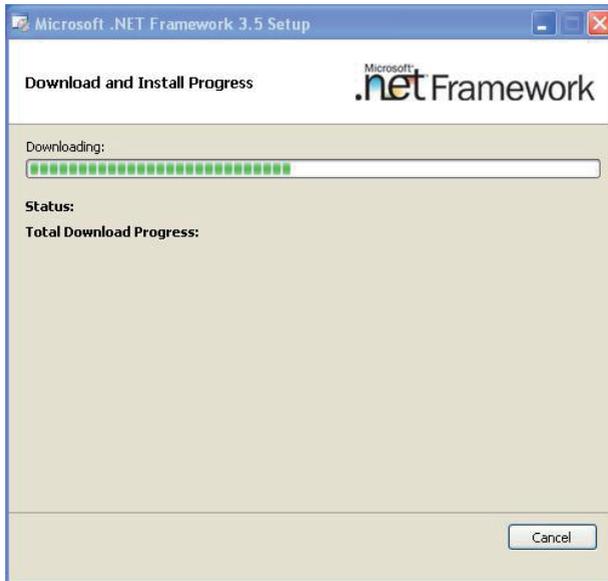
4. Click "Exit >".
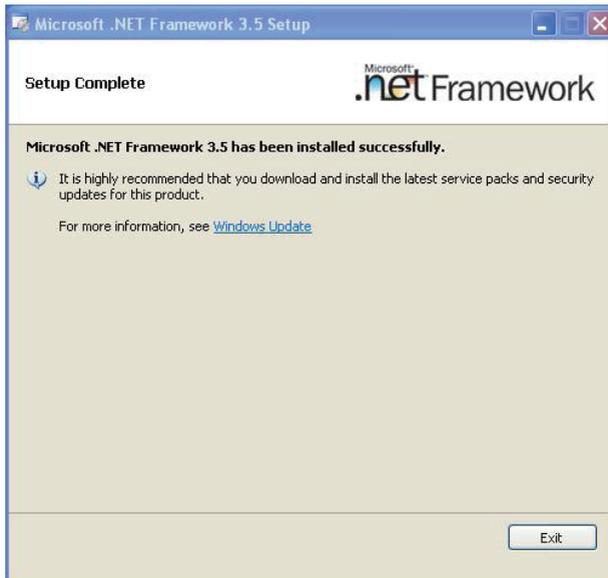
4.2.3. VGA

1. Run the executable file "Setup.exe" in the suggested path (\GRAPHICS\ INTEL_WIN7_VISTA_32\Win7Vista_15179).
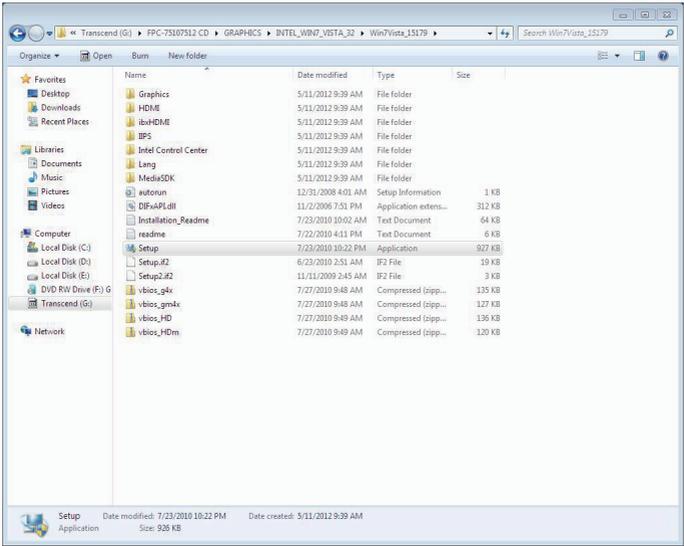
2. The setup wizard opens. Select **Automatically run WinSAT and enable the Windows Aero desktop theme (if support)**. Click "Next >" to proceed.

3. Click "Yes >" to proceed.

4. Click "Next >".
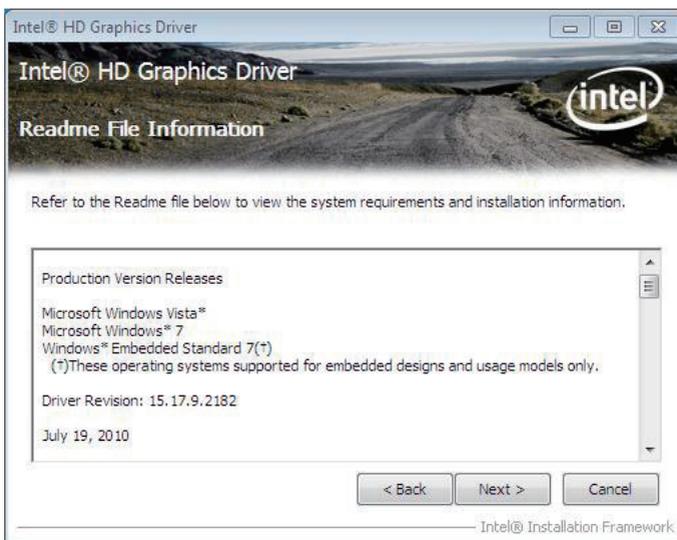
Setup starts and progresses. When it is through, click "Next >" to proceed.
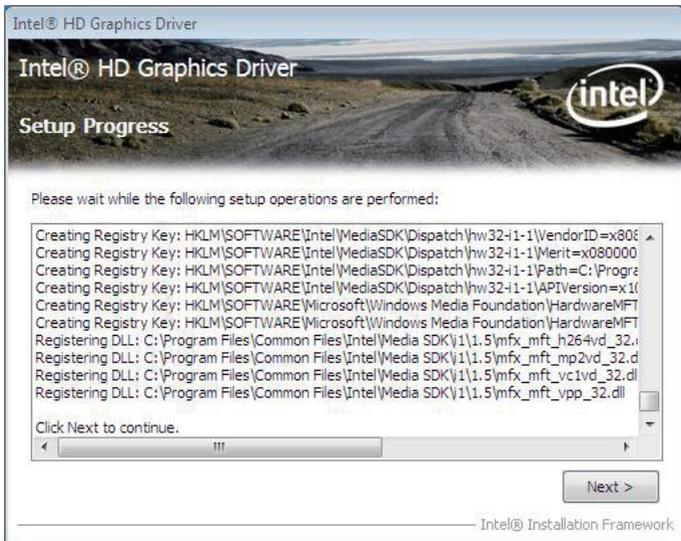
6. Select "Yes, I want to restart this computer now." Click "Finish >" to finish and quit the setup.

4.2.4. ME

1. Run the executable file "Setup.exe" in the suggested path at \
   ME\6.1.0.1042_PV.
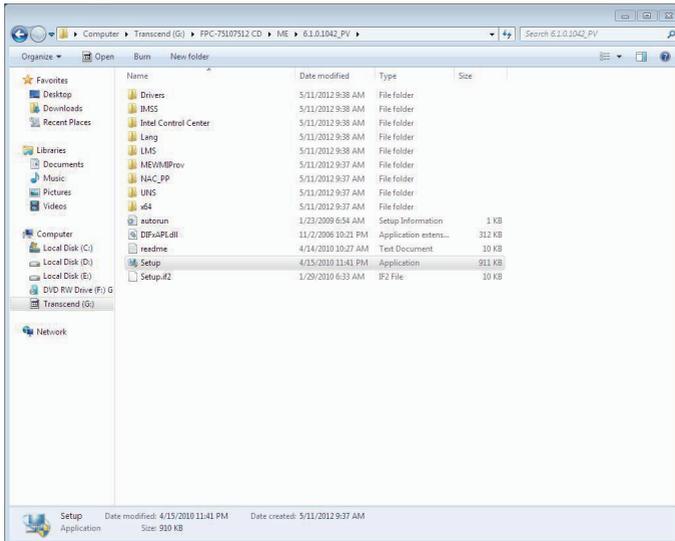
2. Setup wizard opens. Select **Install Intel® Control Center** and click "Next >".

3. Setup wizard prompts you to accept the license agreement. Click "Yes >".
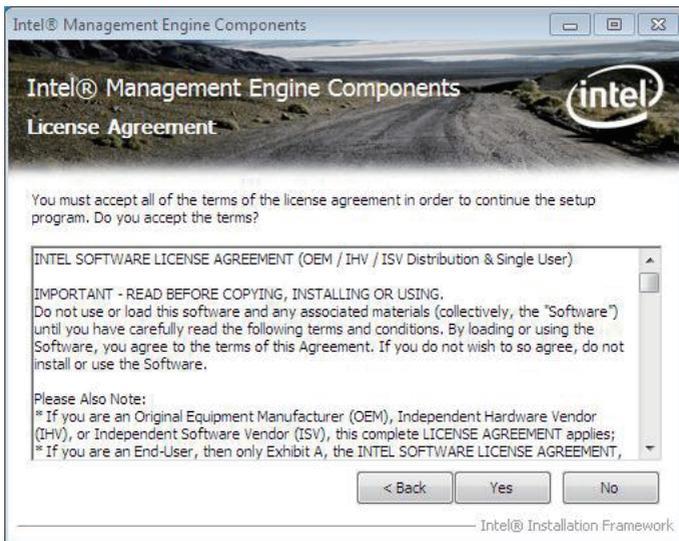
4. Click "Next >".

5. Setup starts and progresses. When it is through, click "Next >".
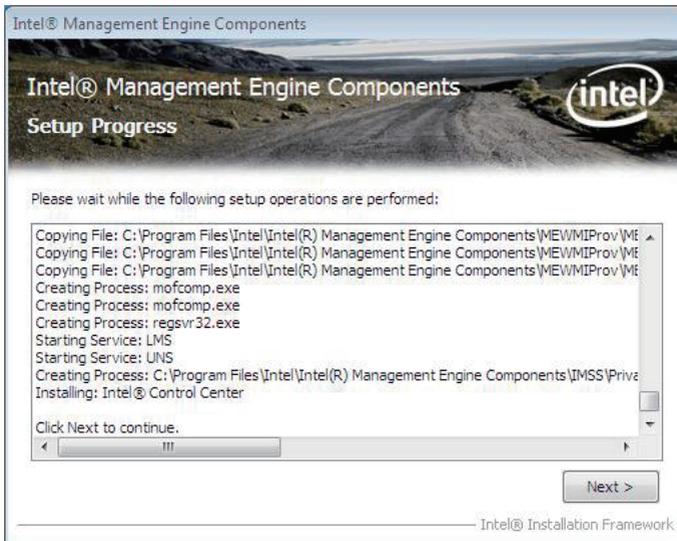
6. When the setup is through, click "Finish >" to finish and quit the setup.

4.2.5. Audio

1. Run the executable file "Vista_Win7_R251.exe" in the suggested path (\
AUDIO\REALTEK_HD\Vista_WINDOWS7_R251).
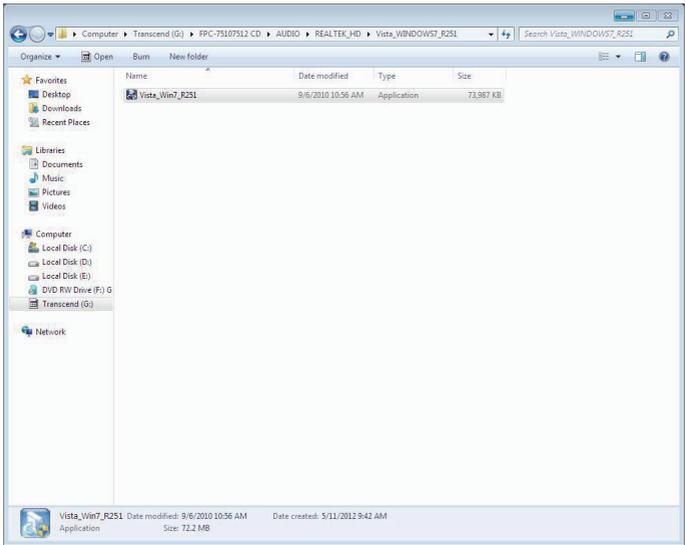
2. Installation wizard opens and starts to extract the files needed for the installation.
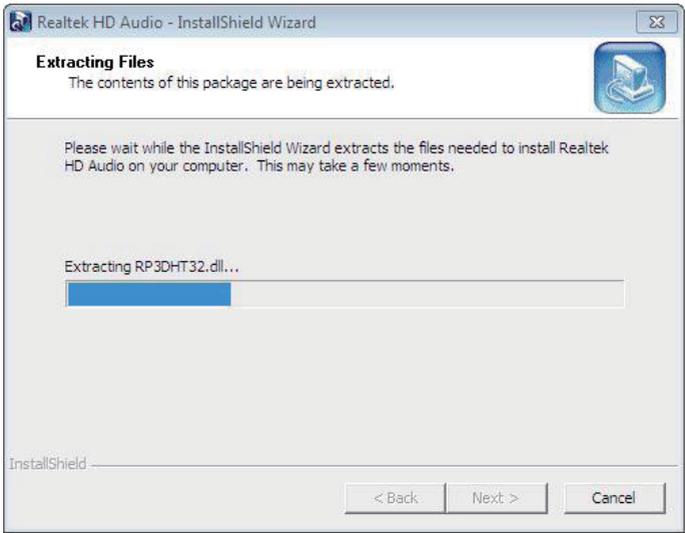
3. Click "Next >".
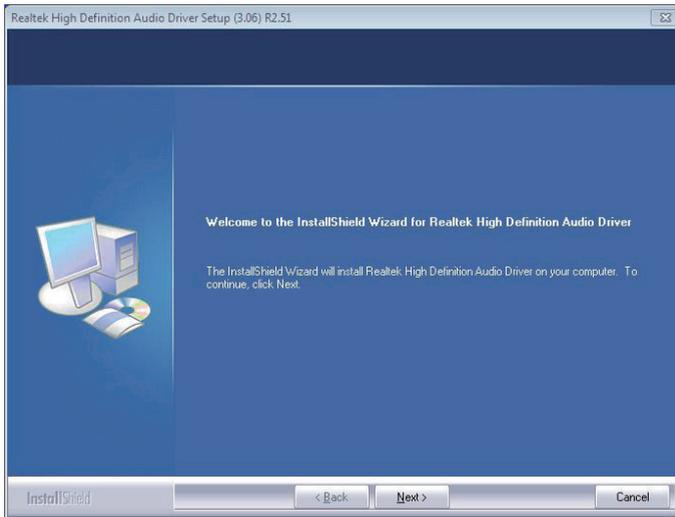
4. Installation starts and progresses.
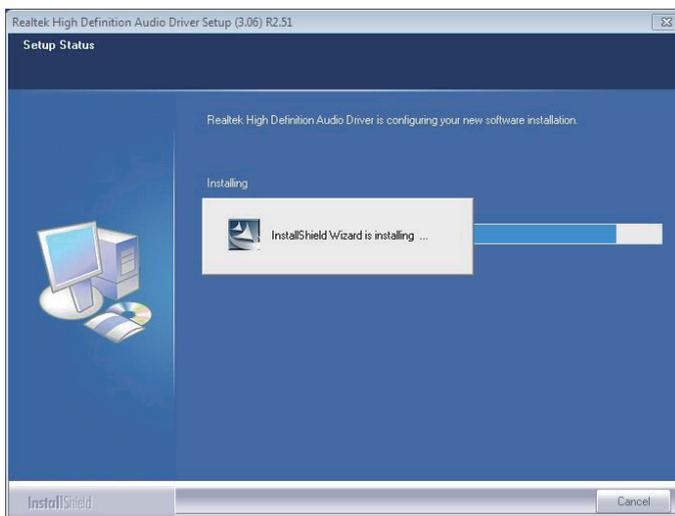
5. Once the installation is through, you are prompted to restart the system. Select "Yes, I want to restart my computer now." and click "Finish >".
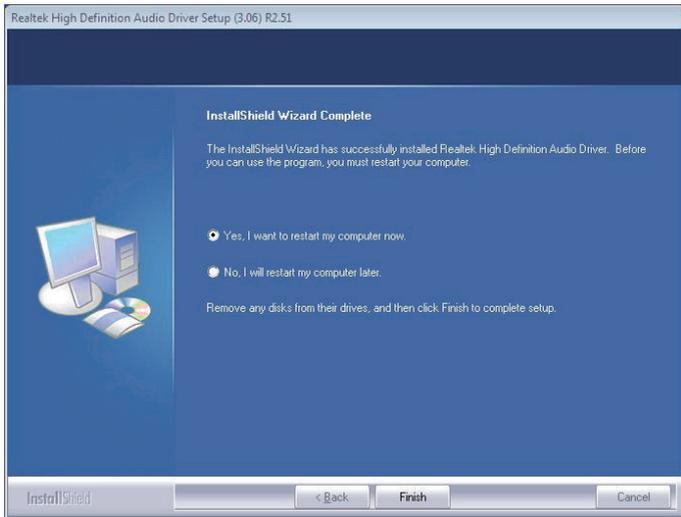
4.2.6. LAN

1. Run the executable file "PROWin32.exe" at the suggested path (\ ETHERNET\INTEL\XP_WIN7_SERIES\32).
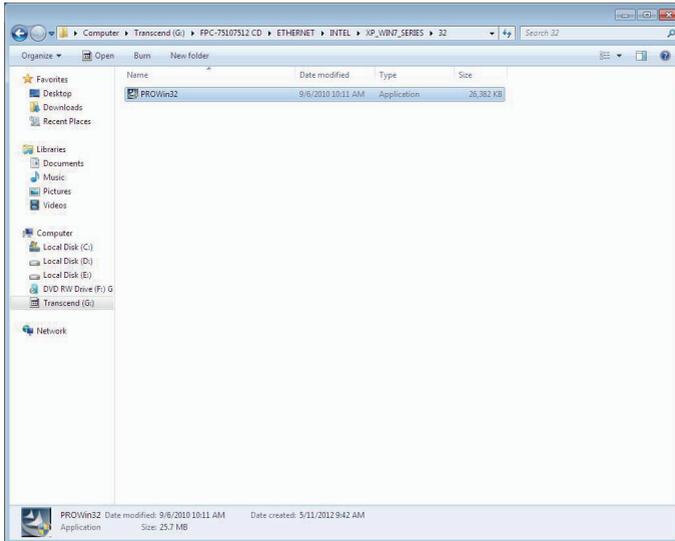
2. Installation wizard opens and starts to extract the files needed for the installation.
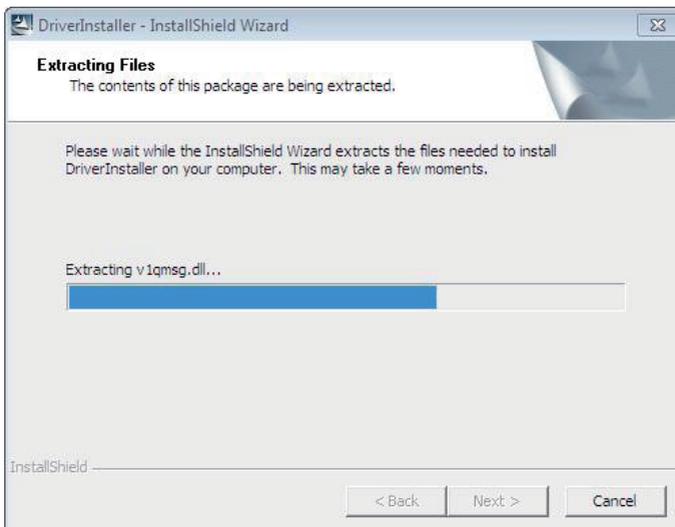
3. Click "Next >".

4. Select "I accept the terms in the license agreement." and click "Next >".

5. Click "Next >".
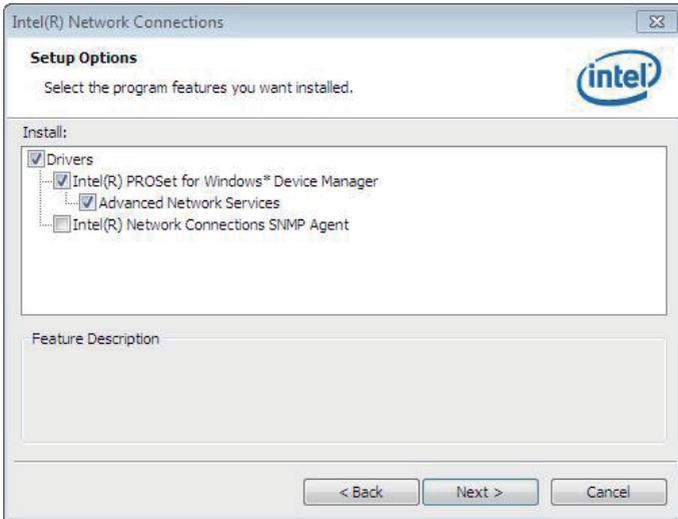
6. Click "Install >".
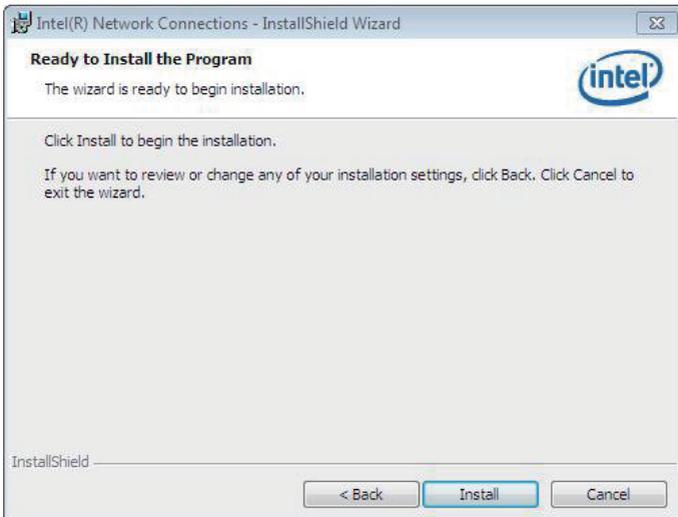
7. Wait for the process.
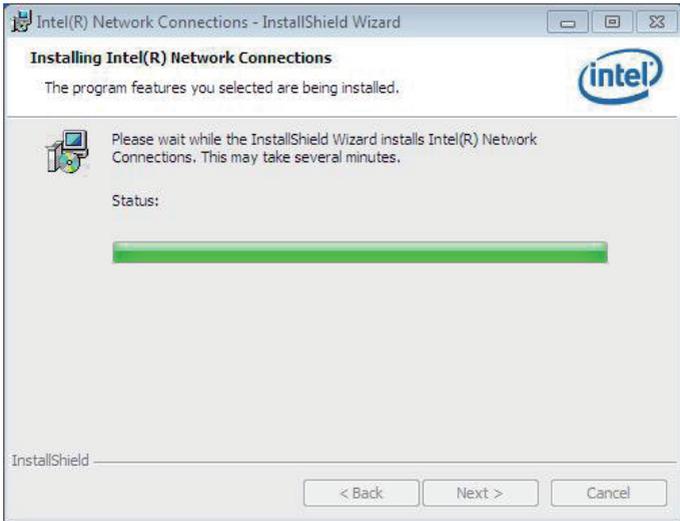
8. Click "Finish >".
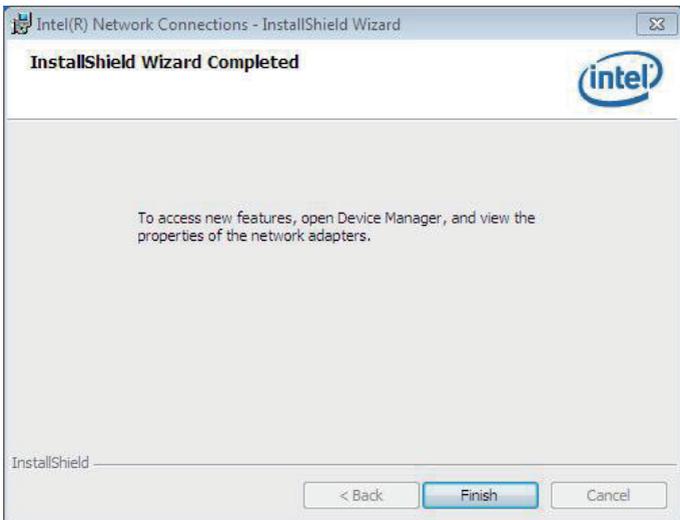
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Chapter 5

BIOS

5.1. BIOS Main Setup

The AMI BIOS provides a setup utility program for specifying the system configurations and settings which are stored in the BIOS ROM of the system. When you turn on the computer, the AMI BIOS is immediately activated. After you have entered the setup utility, use the left/right arrow keys to highlight a particular configuration screen from the top menu bar or use the down arrow key to access and configure the information below.

NOTE: In order to increase system stability and performance, our engineering staff are constantly improving the BIOS menu. The BIOS setup screens and descriptions illustrated in this manual are for your reference only, and may not completely match what you see on your screen.

```
              Aptio Setup Utility – Copyright (C) 2009 American Megatrends, Inc.
      Main  Advanced  Chipset  Boot  Security  Save & Exit

  BIOS Information                                        Set the Date. Use Tab to
  BIOS Vendor                 American Megatrends         switch between Data elements.
  Core Version                4.6.3.7
  BIOS Version                Rigid-75x  0.08
  Build Date                  06/18/2012 09:58:05

  Memory Information
  Total Memory                2048 MB (DDR3 1066)

  System Date                 [Thu 06/17/2010]
  System Time                 [03:12:33]

  Access Level                Administrator
                                                        →←: Select Screen
                                                        ↑↓: Select Item
                                                        Enter: Select
                                                        +/-: Change Opt.
                                                        F1: General Help
                                                        F2: Previous Values
                                                        F9: Optimized Defaults
                                                        F10: Save & Exit Setup
                                                        ESC: Exit



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```

BIOS Information

Display the BIOS information.

System Date

Set the system date. 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 : 2010 to 2099

System Time

Set the system time.

The time format is: **Hour :** 00 to 23
Minute : 00 to 59
Second : 00 to 59

5.2. Advanced Settings

```
              Aptio Setup Utility - Copyright (C) 2009 American Megatrends, Inc.
    Main  Advanced  Chipset  Boot  Security  Save & Exit

                                                           Enable or Disable Boot Option
    Legacy OpROM Support                                   for Legacy Network Devices.
    Launch PXE OpROM                     [Disabled]

  ▶ ACPI Settings
  ▶ S5 RTC Wake Settings
  ▶ CPU Configuration
  ▶ SATA Configuration
  ▶ Intel IGD SWSCI OpRegion
  ▶ USB Configuration
  ▶ Super IO Configuration
  ▶ H/W Monitor
  ▶ Second Super IO Configuration
                                                           →←: Select Screen
                                                           ↑↓: Select Item
                                                           Enter: Select
                                                           +/-: Change Opt.
                                                           F1: General Help
                                                           F2: Previous Values
                                                           F9: Optimized Defaults
                                                           F10: Save & Exit Setup
                                                           ESC: Exit

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```

Launch PXE OpROM

Enable or disable the boot option for legacy network devices.

ACPI Settings

Enable/disable the Advanced Configuration and Power Interface (ACPI).

S5 RTC Wake Settings

Enable system to wake from S5 using RTC alarm.

CPU Configuration

This section is used to configure the CPU. It will also display detected CPU information.

SATA Configuration

This section is used to configure the SATA drives.

Intel® IGD SWSCI OpRegion

Configure the Inte®l graphics display.

USB Configuration

Configure the USB devices.

Super IO Configuration

This section is used to configure the I/O functions supported by the onboard Super I/O chip.

H/W Monitor

This section is used to configure the hardware monitoring events, such as temperature, fan speed and voltages.

Second Super IO Configuration

This section is used to configure the 2nd I/O functions supported by the onboard Super I/O chip.

5.2.1. ACPI Settings

```
          Aptio Setup Utility - Copyright (C) 2009 American Megatrends, Inc.
  Advanced

ACPI Sleep State                    [S1 (CPU Stop Clo...]      Select the highest ACPI sleep
                                                               state the system will enter,
                                                               when the SUSPEND button is
                                                               pressed.




                                                               →←: Select Screen
                                                               ↑↓: Select Item
                                                               Enter: Select
                                                               +/-: Change Opt.
                                                               F1: General Help
                                                               F2: Previous Values
                                                               F9: Optimized Defaults
                                                               F10: Save & Exit Setup
                                                               ESC: Exit



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```

ACPI Sleep State

This item allows you to select ACPI Sleep State.
ACPI sleep state enables you to send the system in a low-power consuming sleep mode.

5.2.2. S5 RTC Wake Settings

```
                 Aptio Setup Utility - Copyright (C) 2009 American Megatrends, Inc.
       Advanced

  Wake system with Fixed Time          [Disabled]              Enable or disable System wake
                                                               on alarm event. When enabled,
  Wake system with Dynamic Time        [Disabled]              System will wake on the
                                                               hr::min::sec specified




                                                               →←: Select Screen
                                                               ↑↓: Select Item
                                                               Enter: Select
                                                               +/-: Change Opt.
                                                               F1: General Help
                                                               F2: Previous Values
                                                               F9: Optimized Defaults
                                                               F10: Save & Exit Setup
                                                               ESC: Exit




                 Version 2.00.1201. Copyright (C) 2009 American Megatrends, Inc.
```

Wake system with Fixed Time

Enable/Disable System wake on alarm event. When enabled, System will wake on the hr::min::sec specified.

Wake system with Dynamic Time

Enable/Disable System wake on alarm event. When enabled, System will wake on the current time + Increase minute(s).

5.2.3. CPU Configuration

The CPU Configuration setup screen varies depending on the installed processor.

```
             Aptio Setup Utility - Copyright (C) 2009 American Megatrends, Inc.
      Advanced

 CPU Configuration                                        Number of cores to enable in
                                                          each processor package.
 Intel(R) Celeron(R) CPU P4500 @ 1.87GHz
 EMT64                             Supported
 Processor Speed                   1862 MHz
 Processor Stepping                20652
 Microcode Revision                d
 Processor Cores                   2
 Intel HT Technology               Not Supported

 Active Processor Cores            [All]
 Limit CPUID Maximum               [Disabled]
 Intel Virtualization Technology   [Disabled]
 Power Technology                  [Default]          →←: Select Screen
                                                      ↑↓: Select Item
                                                      Enter: Select
                                                      +/-: Change Opt.
                                                      F1: General Help
                                                      F2: Previous Values
                                                      F9: Optimized Defaults
                                                      F10: Save & Exit Setup
                                                      ESC: Exit



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```

Active Processor Cores

Enter the number of cores to enable in each processor package.

Limit CPUID Maximum

Enable or disable the Limit CPUID Maxium.

Intel Virtualization Technology

When enabled, a VMM can utilize the additional hardware capabilities provided by Vanderpool Technology.

Power Technology

Configure the power management features.

5.2.4. SATA Configuration

It allows you to select the operation mode for SATA controller.

```
          Aptio Setup Utility - Copyright (C) 2009 American Megatrends, Inc.
   Advanced

 SATA Configuration                                        (1) IDE Mode. (2) AHCI Mode.
                                                           (3) RAID Mode.
 SATA Port0                      Not Present
 SATA Port1                      Not Present
 SATA Port4                      Not Present

 SATA Mode                       [IDE Mode]
 Serial-ATA Controller 0         [Compatible]
 Serial-ATA Controller 1         [Enhanced]



                                                          ←→: Select Screen
                                                          ↑↓: Select Item
                                                          Enter: Select
                                                          +/-: Change Opt.
                                                          F1: General Help
                                                          F2: Previous Values
                                                          F9: Optimized Defaults
                                                          F10: Save & Exit Setup
                                                          ESC: Exit


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```

SATA Port 0/1/4

Delivers the type of device attached to the serial ATA connectors.

SATA Mode

Settings: Disable; IDE Mode (Default), AHCI Mode, RAID Mode
IDE Mode: Set the Serial ATA drives as Parallel ATA storage devices.
AHCI Mode: Allow the Serial ATA devices to use AHCI (Advanced Host Controller Interface).
RAID Mode: Create RAID or Intel Matrix Storage configuration on Serial ATA devices.

Serial-ATA Controller 0/1

Enable/ Disable Serial ATA Controller 0/1.
The choice: Disable, Enhanced, Compatible

5.2.5. Intel® IGD SWSCI OpRegion Configuration

Select DVMT/FIXED mode memory size used by Internal Graphics Device.

```
              Aptio Setup Utility - Copyright (C) 2009 American Megatrends, Inc.
   Advanced

                                                          Select DVMT/FIXED Mode Memory
   Intel IGD SWSCI OpRegion Configuration                 size used by Internal Graphics
                                                          Device
   DVMT/FIXED Memory                  [256MB]
   IGD - Boot Type                    [DVI-I]




                                                          →←: Select Screen
                                                          ↑↓: Select Item
                                                          Enter: Select
                                                          +/-: Change Opt.
                                                          F1: General Help
                                                          F2: Previous Values
                                                          F9: Optimized Defaults
                                                          F10: Save & Exit Setup
                                                          ESC: Exit


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```

DVMT/FIXED Memory [256 MB]

IGD - Boot Type [DVI-I]

This option allows you to select the display device when you boot up the system.

5.2.6. USB Configuration

```
                Aptio Setup Utility - Copyright (C) 2009 American Megatrends, Inc.
       Advanced

    USB Configuration                                        Enables Legacy USB support.
                                                             AUTO option disables legacy
    USB Devices:                                             support if no USB devices are
          1 Drive, 1 Keyboard, 1 Mouse, 3 Hubs               connected. DISABLE option will
                                                             keep USB devices available
    Legacy USB Support                   [Enabled]           only for EFI applications.
    EHCI Hand-off                        [Disabled]

    Mass Storage Devices:
    SanDisk Cruzer Crossfire0.1          [Auto]

                                                             →←: Select Screen
                                                             ↑↓: Select Item
                                                             Enter: Select
                                                             +/-: Change Opt.
                                                             F1: General Help
                                                             F2: Previous Values
                                                             F9: Optimized Defaults
                                                             F10: Save & Exit Setup
                                                             ESC: Exit

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```

Legacy USB Support

Enable/Disable support for legacy USB. AUTO option disables legacy support if no USB devices are connected.

EHCI Hand-Off

Allows you to enable/disable support for operating systems without an EHCI hand-off feature. Do not disable the BIOS EHCI Hand-Off option if you are running a Windows® operating system with USB device.

SanDisk Cruzer Crossfire0.1

The choice: Disable, Disable, Auto

5.2.7. Super IO Configuration

```
           Aptio Setup Utility - Copyright (C) 2009 American Megatrends, Inc.
  Advanced

  Super IO Configuration                                Set Parameters of Parallel
                                                        Port (LPT/LPTE)
  Super IO Chip                     F71869E
▶ Parallel Port Configuration

  Power On After Power Fail         [Power Off]




                                                        ⇆: Select Screen
                                                        ↑↓: Select Item
                                                        Enter: Select
                                                        +/-: Change Opt.
                                                        F1: General Help
                                                        F2: Previous Values
                                                        F9: Optimized Defaults
                                                        F10: Save & Exit Setup
                                                        ESC: Exit



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```

Parallel Port Configuration

This allows you to set parameters of Parallel Port (LPT/LPTE).

Power On After Power Fail

After Power Failure is a power management option that will set the mode of operation if a power loss occurs.
Settings:
Power Off: Keep the power off until the power button is pressed.
Power On: Restore power to the computer.

5.2.8. PC Health Status

```
         Aptio Setup Utility - Copyright (C) 2009 American Megatrends, Inc.
   Advanced

  Pc Health Status

  CPU Temperature              : +66 ℃
  System Temperature           : +28 ℃
  CPU FAN Speed                : N/A
  SYS FAN Speed                : 5791 RPM
  VCore                        : +1.160 V
  +5V                          : +5.003 V
  +1.5V                        : +1.520 V
  +12V                         : +11.968 V
  +3.3V                        : +3.328 V
  VBAT                         : +3.264 V

                                                   →←: Select Screen
                                                   ↑↓: Select Item
                                                   Enter: Select
                                                   +/-: Change Opt.
                                                   F1: General Help
                                                   F2: Previous Values
                                                   F9: Optimized Defaults
                                                   F10: Save & Exit Setup
                                                   ESC: Exit

         Version 2.00.1201. Copyright (C) 2009 American Megatrends, Inc.
```

PC Health Status

The hardware monitor menu shows the operating temperature, fan speeds and system voltages.

5.2.9. Second Super IO Configuration

```
                Aptio Setup Utility - Copyright (C) 2009 American Megatrends, Inc.
      Advanced

   Second Super IO Configuration                                    Set Parameters of Serial Port
                                                                    1 (COMA)
   Super IO Chip                         Fintek F81216
 ▶ Serial Port 1 Configuration
 ▶ Serial Port 2 Configuration
 ▶ Serial Port 3 Configuration
 ▶ Serial Port 4 Configuration



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



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```

Serial Port 0~4 Configuration

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

5.3. Chipset Settings

This submenu allows you to configure the specific features of the chipset installed on your system. The chipset manage bus speeds and access to system memory resources, such as DRAM. It also coordinates communications with the PCI bus.

Note: Beware of that setting inappropriate values in items of this menu may cause system to malfunction.

```
            Aptio Setup Utility – Copyright (C) 2009 American Megatrends, Inc.
      Main   Advanced   Chipset   Boot   Security   Save & Exit

                                                      North Bridge Parameters
 ▶ North Bridge
 ▶ South Bridge




                                                      ↔: Select Screen
                                                      ↑↓: Select Item
                                                      Enter: Select
                                                      +/-: Change Opt.
                                                      F1: General Help
                                                      F2: Previous Values
                                                      F9: Optimized Defaults
                                                      F10: Save & Exit Setup
                                                      ESC: Exit



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```

5.3.1. North Bridge

```
              Aptio Setup Utility - Copyright (C) 2009 American Megatrends, Inc.
                  Chipset

   Memory Information                                         Select which Graphics
                                                             Controller to use as the
   CPU Type                         Arrandale                primary boot device.

   Total Memory                     2048 MB (DDR3 1066)

   Memory Slot0                       0 MB (DDR3 1066)
   Memory Slot1                     Not Present
   Memory Slot2                     2048 MB (DDR3 1066)
   Memory Slot3                     Not Present

   CAS# Latency(tCL)                  7
   RAS# Active Time(tRAS)             20
   Row Precharge Time(tRP)            7                      →←: Select Screen
   RAS# to CAS# Delay(tRCD)           7                      ↑↓: Select Item
   Write Recovery Time(tWR)           8                      Enter: Select
   Row Refresh Cycle Timea(tRFC)      86                     +/-: Change Opt.
   Write to Read Delay(tWTR)          4                      F1: General Help
   Active to Active Delay(tRRD)       4                      F2: Previous Values
   Read CAS# Precharge(tRTP)          5                      F9: Optimized Defaults
                                                             F10: Save & Exit Setup
                                                             ESC: Exit
   Initiate Graphic Adapter         [PEG/IGD]                ↑↓: Select Item
   Graphics Turbo IMON Current      31                       Enter: Select
                                                             +/-: Change Opt.
   VT-d                             [Disabled]               F1: General Help
                                                             F2: Previous Values
   PCI Express Compliance Mode      [Disabled]               F9: Optimized Defaults
                                                             F10: Save & Exit Setup
   PCI Express Port                 [Auto]                   ESC: Exit
   IGD Memory                       [32M]
   PAVP Mode                        [Disabled]
   PEG Force Gen1                   [Disabled]

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```

Initiate Graphic Adapter

This item allows you to select which graphics controller to use as the primary boot device.

Graphics Turbo IMON Current

Graphics turbo IMON current values supported.

VT-d

Enable VT-d function on MCH.

PCI Express Compliance Mode

Enable/Disable PCI Express Compliance Testing Mode.

PCI Express Port

Enable/Disable PCI Express Port.

IGD Memory

Select IGD Share Memory Size.

PAVP Mode

Select PAVP Mode used by Internal Graphics Device.

PEG Force Gen1

Force PCI Express Port to Gen1.

5.3.2. South Bridge Configuration

```
            Aptio Setup Utility - Copyright (C) 2009 American Megatrends, Inc.
               Chipset

                                                      Power-Supply Type.
       SB Chipset Configuration

       Power-Supply Type               [ATX]

       Audio Configuration
       Azalia HD Audio                 [Enabled]
     ▶ USB Configuration


                                                      →←: Select Screen
                                                      ↑↓: Select Item
                                                      Enter: Select
                                                      +/-: Change Opt.
                                                      F1: General Help
                                                      F2: Previous Values
                                                      F9: Optimized Defaults
                                                      F10: Save & Exit Setup
                                                      ESC: Exit



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```

Power-Supply Type

Select AT or ATX mode.

Azalia HD Audio

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

USB Configuration

```
                Aptio Setup Utility - Copyright (C) 2009 American Megatrends, Inc.
   Main    Advanced    Chipset    Boot    Security    Save & Exit

   USB Configuration                                          Enable / Disable All USB
                                                              Devices
   All USB Devices                    [Enabled]

   EHCI Controller 1                  [Enabled]
   EHCI Controller 2                  [Enabled]



                                                              →←: Select Screen
                                                              ↑↓: Select Item
                                                              Enter: Select
                                                              +/-: Change Opt.
                                                              F1: General Help
                                                              F2: Previous Values
                                                              F9: Optimized Defaults
                                                              F10: Save & Exit Setup
                                                              ESC: Exit


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```

All USB Devices

Enable/Disable all USB devices.

EHCI Controller 1/2

Enable/Disable USB 2.0 (EHCI) Support.

5.4. Boot Configuration

The Boot menu items allow you to change the system boot options.

```
              Aptio Setup Utility - Copyright (C) 2009 American Megatrends, Inc.
   Main  Advanced  Chipset  Boot  Security  Save & Exit

   Boot Configuration                                          Select the keyboard NumLock
                                                               state
   Bootup NumLock State               [On]

   Boot Option Priorities
   Boot Option #1                     [SanDisk Cruzer C...]
   Boot Option #2                     [Built-in EFI Shell]
   Boot Option #3                     [UEFI: SanDisk Cr...]

   Hard Drive BBS Priorities

                                                              →←: Select Screen
                                                              ↑↓: Select Item
                                                              Enter: Select
                                                              +/-: Change Opt.
                                                              F1: General Help
                                                              F2: Previous Values
                                                              F9: Optimized Defaults
                                                              F10: Save & Exit Setup
                                                              ESC: Exit

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```

Bootup NumLock State

This setting determines whether the Num Lock key should be activated at boot up.

Boot Option Priorities

Select the boot sequence of the hard drives.

Hard Drive BBS Priorities

This allows you to set the hard drive boot priority. The BIOS will attempt to arrange the hard disk boot sequence automatically. You can also change the booting sequence. The number of device items that appears on the screen depends on the number of devices installed in the system.

5.5. Security

```
              Aptio Setup Utility - Copyright (C) 2009 American Megatrends, Inc.
   Main  Advanced  Chipset  Boot  Security  Save & Exit

   Password Description                              Set Setup Administrator
                                                    Password
   If ONLY the Administrator's password is set,
   then this only limits access to Setup and is
   only asked for when entering Setup
   If ONLY the User's password is set, then this
   is a power on password and must be entered to
   boot or enter Setup. In Setup the User will
   have Administrator rights


   Administrator Password
                                                    →←: Select Screen
                                                    ↑↓: Select Item
                                                    Enter: Select
                                                    +/-: Change Opt.
                                                    F1: General Help
                                                    F2: Previous Values
                                                    F9: Optimized Defaults
                                                    F10: Save & Exit Setup
                                                    ESC: Exit



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```

Administrator Password

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

ENTER PASSWORD
Type the password, up to eight characters in length, and press <Enter>. The password typed now will clear any previously entered password from CMOS memory. You will be asked to confirm the password. Type the password again and press <Enter>. You may also press <ESC> to abort the selection and not enter a password.

To disable a password, just press <Enter> when you are prompted to enter the password. A message will confirm the password will be disabled. Once the password is disabled, the system will boot and you can enter Setup freely.

PASSWORD DISABLED
When a password has been enabled, you will be prompted to enter it every

time you try to enter Setup. This prevents an unauthorized person from changing any part of your system configuration.

Additionally, when a password is enabled, you can also require the BIOS to request a password every time your system is rebooted. This would prevent unauthorized use of your computer.

You can determine when the password is required within the BIOS Features Setup Menu and its Security option. If the Security option is set to "System", the password will be required both at boot and at entry to Setup. If it's set to "Setup", prompting only occurs when trying to enter Setup.

5.6. Save & Exit

```
          Aptio Setup Utility - Copyright (C) 2009 American Megatrends, Inc.
   Main  Advanced  Chipset  Boot  Security  Save & Exit

   Save Changes and Reset                         Reset the system after saving
   Discard Changes and Reset                      the changes.

   Save Options
   Restore Defaults

   Boot Override
   SanDisk Cruzer Crossfire0.1
   Built-in EFI Shell
   UEFI: SanDisk Cruzer Crossfire0.1

                                                  →←: Select Screen
                                                  ↑↓: Select Item
                                                  Enter: Select
                                                  +/-: Change Opt.
                                                  F1: General Help
                                                  F2: Previous Values
                                                  F9: Optimized Defaults
                                                  F10: Save & Exit Setup
                                                  ESC: Exit

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```

Save Changes and Reset

Pressing <Enter> on this item and it asks for confirmation:

Save configuration changes and exit setup?

Pressing <OK> stores the selection made in the menus in CMOS - a special section of memory that stays on after you turn your system off. The next time you boot your computer, the BIOS configures your system according to the Setup selections stored in CMOS. After saving the values the system is restarted again.

Discard Changes and Reset

Exit system setup without saving any changes.
<ESC> key can be used for this operation.

Save Options

Restore Defaults

Restore system to factory default.
Pressing <Enter> on this item and it asks for confirmation prior to executing this command.

Boot Override

This group of functions includes a list of tokens, each of them corresponding to one device within the boot order. Select a drive to immediately boot that device regardless of the current boot order.

This page is intentionally left blank.

Appendices

Appendix A: I/O Port Address Map

Each peripheral device in the system is assigned a set of I/O port addresses which also becomes the identity of the device.
The following table lists the I/O port addresses used.

Address	Device Description
0x000002F8-0x000002FF	Communications Port (COM2)
0x000003E8-0x000003EF	Communications Port (COM3)
0x000002E8-0x000002EF	Communications Port (COM4)
0x00000061-0x00000061	System speaker
0x00000000-0x00000CF7	PCI bus
0x00000000-0x00000CF7	Direct memory access controller
0x00000D00-0x0000FFFF	PCI bus
0x0000E000-0x0000EFFF	Intel(R) 5 Series/3400 Series Chipset Family PCI Express Root Port 2 - 3B44
0x00000070-0x00000071	System CMOS/real time clock
0x00000400-0x0000047F	System board
0x00001180-0x0000119F	System board
0x00000500-0x0000057F	System board
0x0000F0A0-0x0000F0A7	Intel(R) HD Graphics
0x000003B0-0x000003BB	Intel(R) HD Graphics
0x000003C0-0x000003DF	Intel(R) HD Graphics
0x00000010-0x0000001F	Motherboard resources
0x00000022-0x0000003F	Motherboard resources
0x00000044-0x0000005F	Motherboard resources
0x00000062-0x00000063	Motherboard resources
0x00000065-0x0000006F	Motherboard resources
0x00000072-0x0000007F	Motherboard resources
0x00000080-0x00000080	Motherboard resources
0x00000084-0x00000086	Motherboard resources
0x00000088-0x00000088	Motherboard resources
0x0000008C-0x0000008E	Motherboard resources

0x00000090-0x0000009F	Motherboard resources
0x000000A2-0x000000BF	Motherboard resources
0x000000E0-0x000000EF	Motherboard resources
0x000004D0-0x000004D1	Motherboard resources
0x00000290-0x0000029F	Motherboard resources
0x000000F0-0x000000FF	Numeric data processor
0x0000F090-0x0000F097	Intel(R) 5 Series/3400 Series Chipset Family 6 Port SATA AHCI Controller - 3B2F
0x0000F080-0x0000F083	Intel(R) 5 Series/3400 Series Chipset Family 6 Port SATA AHCI Controller - 3B2F
0x0000F070-0x0000F077	Intel(R) 5 Series/3400 Series Chipset Family 6 Port SATA AHCI Controller - 3B2F
0x0000F060-0x0000F063	Intel(R) 5 Series/3400 Series Chipset Family 6 Port SATA AHCI Controller - 3B2F
0x0000F020-0x0000F03F	Intel(R) 5 Series/3400 Series Chipset Family 6 Port SATA AHCI Controller - 3B2F
0x00000020-0x00000021	Programmable interrupt controller
0x000000A0-0x000000A1	Programmable interrupt controller
0x0000F000-0x0000F01F	Intel(R) 5 Series/3400 Series Chipset Family SMBus Controller - 3B30
0x00000040-0x00000043	System timer
0x00000081-0x00000083	Direct memory access controller
0x00000087-0x00000087	Direct memory access controller
0x00000089-0x0000008B	Direct memory access controller
0x0000008F-0x0000008F	Direct memory access controller
0x000000C0-0x000000DF	Direct memory access controller
0x00000060-0x00000060	Standard PS/2 Keyboard
0x00000064-0x00000064	Standard PS/2 Keyboard
0x00000378-0x0000037F	Printer Port (LPT1)
0x000003F8-0x000003FF	Communications Port (COM1)

Appendix B: Interrupt Request Lines (IRQ)

Peripheral devices use interrupt request lines to notify CPU for the service required. The following table shows the IRQ used by the devices on board.

Level	Function
IRQ 0	System timer
IRQ 1	Standard PS/2 Keyboard
IRQ 3	Communications Port (COM2)
IRQ 4	Communications Port (COM1)
IRQ 8	System CMOS/real time clock
IRQ 10	Communications Port (COM3)
IRQ 11	Communications Port (COM4)
IRQ 11	Intel(R) 5 Series/3400 Series Chipset Family SMBus Controller - 3B30
IRQ 12	Microsoft PS/2 Mouse
IRQ 13	Numeric data processor
IRQ 16	Intel(R) Management Engine Interface
IRQ 16	Intel(R) 5 Series/3400 Series Chipset Family USB Enhanced Host Controller - 3B3C
IRQ 19	Intel(R) 5 Series/3400 Series Chipset Family 6 Port SATA AHCI Controller - 3B2F
IRQ 22	High Definition Audio Controller
IRQ 23	Intel(R) 5 Series/3400 Series Chipset Family USB Enhanced Host Controller - 3B34

Appendix C: Memory Mapping

Address	Device Description
0xA0000-0xBFFFF	PCI bus
0xA0000-0xBFFFF	Intel(R) HD Graphics
0xD0000000-0xFFFFFFFF	PCI bus
0xD0000000-0xFFFFFFFF	Intel(R) HD Graphics
0xD0000-0xD3FFF	PCI bus
0xD4000-0xD7FFF	PCI bus
0xD8000-0xDBFFF	PCI bus
0xDC000-0xDFFFF	PCI bus
0xE0000-0xE3FFF	PCI bus
0xE4000-0xE7FFF	PCI bus
0xFE400000-0xFE5FFFFF	Intel(R) 5 Series/3400 Series Chipset Family PCI Express Root Port 2 - 3B44
0xFE400000-0xFE5FFFFF	Intel(R) 82574L Gigabit Network Connection
0xFED1C000-0xFED1FFFF	System board
0xFEC00000-0xFECFFFFF	System board
0xFED08000-0xFED08FFF	System board
0xFF000000-0xFFFFFFFF	System board
0xFE620000-0xFE623FFF	High Definition Audio Controller
0xFED14000-0xFED19FFF	System board
0xE0000000-0xEFFFFFFF	System board
0xFED90000-0xFED93FFF	System board
0xFED20000-0xFED3FFFF	System board
0xFEE00000-0xFEE0FFFF	System board
0xFE000000-0xFE3FFFFF	Intel(R) HD Graphics
0xFE62A000-0xFE62A00F	Intel(R) Management Engine Interface
0xFE500000-0xFE51FFFF	Intel(R) 82574L Gigabit Network Connection
0xFE520000-0xFE523FFF	Intel(R) 82574L Gigabit Network Connection

0xFE626000-0xFE6267FF	Intel(R) 5 Series/3400 Series Chipset Family 6 Port SATA AHCI Controller - 3B2F
0xFE600000-0xFE61FFFF	Intel(R) 82578DM Gigabit Network Connection
0xFE629000-0xFE629FFF	Intel(R) 82578DM Gigabit Network Connection
0xFE625000-0xFE6250FF	Intel(R) 5 Series/3400 Series Chipset Family SMBus Controller - 3B30
0xFE627000-0xFE6273FF	Intel(R) 5 Series/3400 Series Chipset Family USB Enhanced Host Controller - 3B34
0xFE628000-0xFE6283FF	Intel(R) 5 Series/3400 Series Chipset Family USB Enhanced Host Controller - 3B3C

Appendix D: 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 can be used to meet user's various applications such as industrial automation, customized circuit, and laboratory testing. The source code below written in C is the applicable sample for programming.

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

void main(void){


  int SMB_PORT_AD  = 0xF000;
  int SMB_DEVICE_ADD = 0x6E;          /*75111R's Add=6eh */

  //programming DIO as output
  //0:input 1:Output

/*        Index 10, GPIO1x Output pin control       */
  SMB_Byte_WRITE(SMB_PORT_AD,SMB_DEVICE_ADD,0x10,0xff);
  delay(10);
/*        Index 20, GPIO2x Output pin control       */
  SMB_Byte_WRITE(SMB_PORT_AD,SMB_DEVICE_ADD,0x20,0xff);
  delay(10);

/*        Index 40, GPIO3x Output pin control       */
  SMB_Byte_WRITE(SMB_PORT_AD,SMB_DEVICE_ADD,0x40,0xff);
  delay(10);

  //programming DIO default LOW

/*        Index 11, GPIO1x Output Data value       */
  SMB_Byte_WRITE(SMB_PORT_AD,SMB_DEVICE_ADD,0x11,0x00);
  delay(10);
/*        Index 21, GPIO2x Output Data value       */
  SMB_Byte_WRITE(SMB_PORT_AD,SMB_DEVICE_ADD,0x21,0x00);
  delay(10);
```

```
/*        Index 41, GPIO3x Output Data value      */
  SMB_Byte_WRITE(SMB_PORT_AD,SMB_DEVICE_ADD,0x41,0x00);
  delay(10);
}
//-----------------------------------------------------------------------------
unsigned char SMB_Byte_READ (int SMPORT, int DeviceID, int REG_IN-
DEX)
{
  unsigned char SMB_R;
  outportb(SMPORT+02, 0x00);          /* clear */
  outportb(SMPORT+00, 0xff);          /* clear */
  delay(10);
  outportb(SMPORT+04, DeviceID+1);    /* clear */
  outportb(SMPORT+03, REG_INDEX);     /* clear */
  outportb(SMPORT+02, 0x48);          /* read_byte */
  delay(10);
  SMB_R= inportb(SMPORT+05);
  return SMB_R;
}

void SMB_Byte_WRITE(int SMPORT, int DeviceID, int REG_INDEX, int
REG_DATA)

{
  outportb(SMPORT+02, 0x00);          /* clear */
  outportb(SMPORT+00, 0xff);          /* clear */
  delay(10);
  outportb(SMPORT+04, DeviceID);      /* clear */
  outportb(SMPORT+03, REG_INDEX);     /* clear */
  outportb(SMPORT+05, REG_DATA);      /* read_byte */
  outportb(SMPORT+02, 0x48);          /* read_byte */
  delay(10);
}
```

Appendix E: Watchdog Timer (WDT) Setting

WDT is widely applied to industry computers to monitor activities of CPU. The programmed application triggers WDT with adequate timer setting depending on its requirement. Before WDT counts down to zero, the functional system will reset the counter. In case the WDT counter is not reset by an abnormal system, it will counts down to zero and then reset the system automatically.

This computer supports the watchdog timer up to 255 levels for users for software programming. Below please take the source code written in C for a WDT application example.

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

/**-------- index port 0x2e ---------*/
void main()
{
        outportb(0x2e, 0x87);          /* initial IO port */
        outportb(0x2e, 0x87);          /* twice,  */

        outportb(0x2e, 0x07);          /* point to logical device */
        outportb(0x2e+1, 0x07);        /* select logical device 7 */
        outportb(0x2e, 0xf5);          /* select offset f5h */
        outportb(0x2e+1, 0x40);        /* set bit5 = 1 to clear bit5 */
        outportb(0x2e, 0xf0);          /* select offset f0h */
        outportb(0x2e+1, 0x81);        /* set bit7 =1 to enable WDTRST# */
        outportb(0x2e, 0xf6);          /* select offset f6h */
        outportb(0x2e+1, 0x05);        /* update offset f6h to 0ah :10sec */
        outportb(0x2e, 0xF5);          /* select offset f5h */
        outportb(0x2e+1, 0x20);        /* set bit5 = 1 enable watch dog time
*/

        outportb(0x2e, 0xAA);           /* stop program F71869E, Exit */
}
```